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STATE
OF
NEW JERSEY

IN RE: HEARING ON AUTOMOBILE INSURANCE CLASSIFICATIONS
AND RELATED METHODOLOGIES

FINAL DETERMINATION– ANALYSIS AND REPORT

APR 1981

DEPARTMENT
OF
INSURANCE

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COMMISSIONER

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Section 1

INTRODUCTION

The availability and affordability of automobile insurance is a subject of major controversy in New Jersey. Over the past seven years the combined forces of inflation and a generous benefit structure have forced regulatory approval of cumulative rate level increases amounting to 120 per cent. Most companies protest that even these increases are "inadequate" and have in varying degrees limited their participation in the New Jersey market. As a result, more than a million New Jersey insureds have been forced to obtain essential insurance coverages through the Assigned Risk Plan. More than two-thirds of these insureds have clean driving records.[1]

The problems of cost and availability have been compounded by industry rating practices which charge different premiums for the same coverages based on the insured's age, sex, place of residence and other demographic characteristics. These rating practices generate premium differentials of more than 10-to-1 between groups. The highest-rated group must now pay more than $2,000 for full coverage, and up to $1,200 for the basic package of coverages required to be carried by law.[2]

The high cost of insurance overall, the difficulties of obtaining it at any price, and the differences in premium among insureds are not subject to conventional market forces. The State's compulsory insurance law makes motorists a captive market. If premiums for mandated coverages are not affordable, the only options are to stop

driving entirely or to violate the law by driving uninsured. Conservation or diminished usage is not now a means for reducing insurance costs.

The threat of jail sentences notwithstanding, a large fraction of New Jersey motorists have chosen to drive uninsured. A reasonable estimate places the number of uninsured motorists at about 300,000.[3] At current premium levels even massive public expenditures for enforcement are unlikely to force most of them to buy insurance or to stay off the road.

Solving the problems of New Jersey's automobile insurance market requires comprehensive treatment of diverse contributing elements. Pending legislation would address many of them. Proposed bills would reduce nuisance lawsuits by strengthening the No-Fault threshold, guaranty the availability of full coverages at conventional prices by replacing the Assigned Risk Plan, shift a greater burden of insurance costs to proven bad drivers through so-called merit rating, and create sophisticated anti-fraud and rate-analysis capabilities in the Department of Insurance.[4] The only needed law reform now missing from the legislative agenda is the elimination of compulsory liability insurance and the fashioning of new insurance concepts for the protection of accident victims and financially responsible drivers. This step awaits enactment of the more immediate reform measures.

A determination of the accuracy and fairness of classification-based pricing systems under existing rating statutes represents another major step toward a comprehensive solution to automobile insurance problems. In order to make this determination the Commissioner personally conducted an extensive public hearing spanning 89

days of testimony and argument in calendar year 1979. Participants in the hearing included numerous industry representatives, the Public Advocate, public officials, consumer representatives and Department staff. This report culminates a 15-month effort to digest and synthesize the voluminous information developed.

The accuracy and fairness of automobile insurance classifications have been the subject of nationwide debate. Over the past seven years at least eight other states have challenged the status quo, through regulation, legislation, court action or some combination. The most systematic and well researched of these efforts was a 1977 ruling by the Massachusetts Insurance Commissioner eliminating age, sex and marital status as rating variables and modifying several aspects of traditional pricing methodology.[5]

In 1978 a Task Force of the National Association of Insurance Commissioners recommended the elimination of sex and marital status classifications and other reforms. The recommendations were opposed by the industry and later tabled until 1981.[6] Consensus is unlikely. Regulators are divided on the subject, while industry opposition to involuntary change has remained both firm and unified.

The New Jersey Commissioner of Insurance has taken several steps to address classification inequities during his tenure. In 1977 the Commissioner directed companies to eliminate most classification distinctions applicable to the No-Fault medical and wage-replacement coverage; and he required a minimum 50 per cent discount for senior citizens under this coverage, to account for medical expenses paid by Medicare. In 1978 the Commissioner directed companies to allocate operating expenses more equitably across territory categories; and

one year later, he enlarged this directive to include the flattening of certain expenses across classifications as well.

Issues concerning the accuracy and fairness of classification systems have also surfaced in debate before the New Jersey Legislature. In the Spring of 1978 the Byrne Administration introduced a package of reform bills which included proposals for accident and conviction rating and the equitable determination of premiums for motorists unable to obtain insurance in the open market. In response to controversy touched off by these proposals the Legislature created an ad hoc study committee consisting of legislators and industry representatives.[7] A concept later emerging from the committee, although without its endorsement, urged the capping of class and territory premium differentials. This concept, proposed by Assemblyman Michael Adubato, the committee chairman, was packaged with other reform proposals in a bill which passed both houses of the Legislature in January, 1980. The bill was not signed by the Governor, on various grounds, and a somewhat revised version of the bill--retaining the capping provisions--was reintroduced in the current legislative session.[8]

The proceedings which produced this Report were officially convened under the Commissioner's orders of December 22, 1978, severing classification issues from pending rate applications and ordering affected rate filers to produce data bearing upon these issues. The proceedings are further grounded on an industry-wide notice of hearing and call for data inviting all companies and all interested parties in the State to present evidence and participate. These procedural steps followed a series of informal conferences on classification issues in which all companies and interested parties had been invited

to meet with Department staff. The purpose of these conferences was to refine issues, explore areas of possible consensus, and discuss the scope of data and other information to be submitted at the contemplated hearing.[9]

The Commissioner's Order to Present Evidence and Notice of Hearing defined as the purpose of the proceedings examination of all issues and information relevant to the accuracy and equity of current rating factors. The following subjects were specifically delineated: (1) the accuracy and equity of current rating factors based on age, sex, marital status, place of residence, driver training, driving record, car usage and car value; (2) the interactive effects of such rating factors; and (3) the distribution of company expenses and producer commissions among policyholders. The Order and Notice further specified that the Commissioner would explore these issues with a view toward ruling on the rate-distribution aspects of pending filings in a manner which would provide standards and guidelines applicable to all rating systems in effect in the State.

The major industry participants in the subsequent hearing were the Insurance Services Office (ISO), Allstate Insurance Company, State Farm Mutual Automobile Insurance Company, The Travelers Indemnity Company, and The Hartford Accident and Indemnity Company. Nationwide Mutual Insurance Company and Colonial Penn Insurance Company were represented by counsel throughout the proceedings but chose only a limited role. The rating systems used by these filers, collectively, affect about 80 per cent of the State's private passenger premium volume. Table 1 below provides a breakdown of company market shares.

The Public Advocate also presented evidence and participated actively throughout the proceedings. Participants on select issues

TABLE 1

MARKET SHARES BY COMPANY AND COVERAGE

State of New Jersey
Private Passenger Automobile Direct Written Premiums
For the Year Ending December 31st, 1977 (Premiums in Thousands of $)

Company	Direct Premiums Written					
	Liability		No-Fault		Combined	
Name	Amount	%	Amount	%	Amount	%
* Allstate Insurance Company	122,668	22.3	34,410	24.5	157,078	22.7
* State Farm Auto. Ins. Co.	49,185	8.9	11,269	8.0	60,454	8.7
New Jersey Manuf. Ins. Co.	43,269	7.9	10,072	7.2	53,341	7.7
Liberty Mut. Fire Ins. Co.	21,467	3.9	5,147	3.7	26,614	3.9
Selected Risks Ins. Co.	18,756	3.4	5,784	4.1	24,540	3.8
Motor Club of Amer. Ins. Co.	19,275	3.5	5,014	3.6	24,289	3.5
Aetna Cas. & Surety Co.	19,685	3.6	2,911	2.1	22,596	3.3
* Travelers Indemnity Co.	16,553	3.0	3,888	2.8	20,441	3.0
Ins. Co. of North America	16,808	3.0	2,309	1.7	19,117	2.8
Prud. Prop. & Cas. Ins. Co.	12,813	2.3	4,373	3.1	17,186	2.5
* Nationwide Mut. Ins. Co.	11,570	2.1	3,250	2.3	14,820	2.1
Hartford Acc. & Ind. Co.	10,097	1.8	3,063	2.2	13,160	1.9
Camden Fire Ins. Assoc.	10,226	1.9	2,863	2.0	13,089	1.9
Newark Insurance Company	9,886	1.8	2,582	1.8	12,468	1.8
* Safeco Insurance Company	9,345	1.7	2,535	1.8	11,880	1.7
United Services Auto Assoc.	6,900	1.3	1,782	1.3	8,682	1.3
* Keystone Insurance Company	6,613	1.2	1,834	1.3	8,447	1.2
Ohio Casualty Ins. Company	6,550	1.2	1,857	1.3	8,407	1.2
Liberty Mutual Ins. Co.	6,233	1.1	1,636	1.2	7,869	1.1
Associated Indemnity Corp.	5,454	1.0	1,427	1.0	6,881	1.0
Federal Insurance Company	5,320	1.0	1,281	.9	6,611	1.0
* Colonial Penn Ins. Company	5,606	1.0	989	.7	6,595	1.0
Continental Insurance Co.	5,045	.9	1,285	.9	6,330	.9
U. S. Fid. & Guar. Company	4,953	.9	1,392	.9	6,245	.9
Harleysville Mut. Ins. Co.	4,713	.9	1,394	1.0	6,107	.9
Maryland Casualty Company	4,377	.8	1,234	.9	5,611	.8
West American Ins. Company	3,999	.7	1,135	.8	5,134	.7
Fidelity & Cas. Co. of N.Y.	4,065	.7	1,034	.7	5,099	.7
Commercial Union Ins. Co.	3,983	.7	1,094	.8	5,077	.7
Lumbermen's Mut. Cas. Co.	3,677	.7	1,003	.7	4,680	.7
Amica Mutual Ins. Co.	3,623	.7	916	.7	4,539	.7
National Surety Corp.	3,519	.6	949	.7	4,468	.6
Total	476,233	86.5	121,622	86.7	597,855	86.5
# All Other Companies	74,404	13.5	18,691	13.3	93,095	13.5
Grand Total	550,637	100.0	140,313	100.0	690,950	100.0

Note:
*Indicates the company is affiliated with the National Association of Independent Insurer

#Indicates the volume of business written by approximately 151 companies who are affiliat with Insurance Services Office or National Association of Independent Insurers.

Above listed companies without * or # are affiliated with the Insurance Services Office.
Source of Data: Page 14 of Company Annual Statements. (Exhibit D-7)

TABLE 1 (cont.)

Company Name	Direct Premiums Written Physical Damage Amount	%
* Allstate Insurance Company	70,204	22.8
* State Farm Automobile Insurance Company	28,692	9.3
New Jersey Manufacturers Insurance Company	22,576	7.3
Aetna Casualty & Surety Company	12,320	4.0
Liberty Mutual Fire Insurance Company	11,098	3.6
* Travelers Indemnity Company	11,069	3.6
Selected Risks Insurance Company	9,904	3.2
Motor Club of America Insurance Comapny	9,379	3.0
Prudential Property & Casualty Ins. Co.	8,162	2.7
Hartford Accident & Indemnity Company	7,224	2.4
* Nationwide Mutual Insurance Company	5,972	1.9
Insurance Company of North America	5,855	1.9
Camden Fire Insurance Association	4,946	1.6
Newark Insurance Company	4,902	1.6
* Safeco Insurance Company	4,674	1.5
United Services Automobile Association	4,396	1.4
* Keystone Insurance Company	3,505	1.1
Motors Insurance Corporation	3,387	1.1
Federal Insurance Company	3,250	1.1
Ohio Casualty Insurance Company	3,242	1.1
Liberty Mutual Insurance Company	2,907	.9
Associated Indemnity Corporation	2,879	.9
Continental Insurance Company	2,862	.9
* Colonial Penn Insurance Company	2,798	.9
U. S. Fidelity & Guaranty Insurance Company	2,568	.8
Maryland Casualty Company	2,349	.8
Commercial Union Insurance Company	2,306	.8
Lumbermen's Mutual Casualty Company	2,291	.7
West American Insurance Company	2,206	.7
Harleysville Mutual Insurance Company	2,204	.7
Amica Mutual Insurance Company	2,014	.7
Fidelity Casualty Company of New York	1,914	.6
National Surety Corporation	1,503	.5
Total	265,558	86.1
# All Other Companies	42,858	13.9
Grand Total	308,416	100.0

Note:
*Indicates the company is affiliated with the National Association of Independent Insurers.

#Indicates the volume of business written by approximately 158 companies who are affiliated with Insurance Services Office or National Association of Independent Insurers.

Companies without * or # are affiliated with the Insurance Services Office.

Source of Data: Page 14 of Company Annual Statements. (Exhibit D-7)

included the Professional Insurance Agents and the Independent Insurance Agents of New Jersey, the American Insurance Association, and the National Consumer Law Center for New Jersey Legal Services. Mayors Kenneth Gibson of Newark and Thomas F. X. Smith of Jersey City were among a number of public officials and interested parties who offered statements. The hearing commenced on January 24, 1979 and was completed on December 20th of the same year.

The task of sorting through thousands of transcript pages and documentary exhibits produced by 60 different witnesses is obviously immense in its own right. The task is complicated by the nature of the proceedings, which not only challenged the validity of existing practices but also sought to develop standards for needed improvements. Although the format resembled an adversary proceeding in some respects, the purpose was not to determine a winner and a loser as much as to identify problems and to fashion solutions on a marketwide basis.

This Report is the product of a comprehensive review of the entire hearing record, supported by reference to additional data available to the Department. The discussion does not attempt to give explicit treatment to the testimony of every witness. The major effort is devoted to distilling important points and marshaling the related factual materials.

For purposes of further simplification the discussion will focus primarily on the ISO rating system, secondarily on the State Farm system, and selectively on the systems of other filers when relevant to particular issues. Allstate's recent decision to adopt the ISO rating system means that ISO classification practices now have a direct impact on most companies and at least 65 per cent of the

market by premium volume.[10] In the class-average cost comparisons emphasis on ISO is also essential because its submission of statewide class-average data, while missing important mix-of-business factors for the most part, come closest to providing the detail requested in the Commissioner's Order to Present Evidence and call for data.

State Farm's class-average data for New Jersey, relating to about 9 per cent of the market, lack the volume required to be fully credible in numerous instances; and exposure detail needed to interpret credibility and interactive effects is also limited. Discussion is further hampered in this respect by State Farm's contention that these exposure distributions--the numbers of insureds State Farm writes in each class and territory, and class-within-territory--are "trade secrets."[11] The hearing deferred resolution of this contention to avoid the prospect of disruptive litigation.

Most quantitative issues can nonetheless be resolved on the basis of data submitted by filers and other companies at the Commissioner's request. Statistical exhibits offered by filers on their own initiative, while voluminous, are limited by a number of factors. First, they frequently rely on "loss-ratio" measures of differential class-average costs and not specific assessments of average losses per car. For reasons described in the Report, ratios of losses to premiums are a measure of aggregate financial return ill-suited for determining the accuracy with which individual variables are priced.[12] Secondly, to the extent company exhibits use "pure premiums," or average loss costs per car, they typically lack the exposure and mix-of-business detail needed to interpret them. Finally, many filers rely on countrywide data to avoid credibility problems raised by the

sparseness of their class and territory data for New Jersey. Yet for reasons also discussed in the Report, these countrywide data are not representative of New Jersey experience in many important respects.[13]

The discussion which follows does not reflect the uncertain legal status of the Allstate class plan. The company is now using the ISO plan, but the extent to which it can do so depends on the outcome of current litigation.[14] For this reason, and the fact that Allstate's decision to join ISO was not made known until after the close of the hearing, the text refers to the Allstate system in the present tense. References to this classification system are in any event useful for rounding out the nature of definitional and methodological differences across the market.

Section 2

THE ROLE OF CLASSIFICATION PLANS IN THE INSURANCE MARKET

I. AN OVERVIEW OF THE CUSTOMER-SELECTION PROCESS

A primary purpose of competition among insurers is to obtain the best possible book of business: success depends on who rather than how many buy the product. The methods employed by insurance companies to determine for whom they write insurance and how that insurance is priced involve the interaction of marketing, underwriting and classification strategies. The design and pricing of classification plans are alone the subject of this proceeding; but a brief overview of how classifications fit into the overall process of customer selection will provide better understanding of their function and relative importance.[1]

A. Marketing

In the context of risk assessment, marketing is the company's effort to influence directly the type of customer who comes to it for insurance. Marketing decisions concern advertising, promotion and, most importantly, the nature and location of marketing outlets. All companies essentially use one or a combination of three types of customer contact.

The most traditional marketing approach is through "independent agents". These agents contract with companies to solicit and underwrite business on their behalf. Compensation takes the form of commissions and bonuses. A typical independent agent represents more than one company--sometimes a dozen or more companies--and also serves as a broker for the Automobile Insurance Plan (or "assigned-risk" plan) for placing insureds whom the companies are not willing to write voluntarily.

Another common marketing approach involves the use of "captive agents". These agents frequently operate out of store fronts or other visible outlets, much as independent agents do, but are essentially employees of the company. Forms of compensation include commissions--usually at a somewhat lower rate than independent agents--subsidization of overhead and incentive plans. The so-called captive agents work for only one company; but, like the independent agents, they also serve as assigned-risk brokers.

The third marketing approach involves "direct writing". The companies using this approach have no agency force; they make direct contact with consumers by telephone and through the mails using salaried employees; and they perform no broker services for the assigned-risk plan. The success of direct writing depends on the company's ability to target the desired market. GEICO's mailings to government employees is an example of successful targeting.[2]

Marketing has an impact on the cost of insurance in at least two ways. First, the relative costliness of a company's acquisition system has a direct impact on the expense component of premium. The accepted belief is that the most costly approach is the independent agency system because the commission rate is the highest, and that the least costly method is direct writing because it avoids payment of commissions entirely. Secondly, marketing impacts on the cost of insurance indirectly through the quality of the risks it attracts to the company. Because each company is theoretically a pool of risks, the better the overall quality of the risks in the pool the lower the costs to everyone in it.

B. Underwriting

Underwriting is the process by which a company, or an agent on its behalf, decides whether to accept an applicant for insurance.

The law places few restrictions on underwriting; and a company may refuse to write an applicant for almost any reason, even if entirely unrelated to driving record. Reasons for refusal may involve such considerations as a company's lack of capacity to insure, business decisions to curtail underwriting in certain geographical areas, or subjective judgments by agents or underwriters based on the applicant's age, sex, marital status, occupation, demeanor, family connections or various other personal characteristics required to be scrutinized by company underwriting guidelines. Once several companies have refused to write an applicant, or in the opinion of the agent are likely to do so, the prospective insured is placed in the assigned-risk plan.[3]

A direct limitation on company underwriting prerogatives is the statutory requirement that, once written, no private passenger automobile policy may be refused renewal without the consent of the Commissioner of Insurance. Conditions for obtaining this consent are defined by regulation. Currently permissible grounds for non-renewal are limited essentially to involvement in designated numbers of accidents or motor vehicle violations. Cancellations are also limited to specific grounds.[4]

A second less direct constraint on underwriting is the company's legal obligation to participate in the assigned-risk plan by accepting for coverage a share of unwanted insureds in proportion to market share. The assigned-risk policy issues in the name of the assigned company but is otherwise standardized as to terms and pricing method with assigned business marketwide. Each company underwrites the entire risk assigned to it, regardless of the extent of actual losses, and services the insured through the broker originating the business.

Selectivity of underwriting affects the cost of insurance in the voluntary market by restricting the risks admitted to the company pool; but it has a more direct and immediate impact on the car owners who are refused insurance. Assigned risks pay higher rates than insureds in the voluntary market, are eligible for less coverage, and typically suffer poorer service. Through regulatory intervention the prices for coverages which are mandatory under New Jersey law are kept at voluntary market levels for assigned risks with clean driving records. However, even these drivers pay higher prices for collision and comprehensive coverages and are subject to more extensive driving-record surcharges than if they had obtained insurance in the regular market.

Philosophically, underwriting is another form of classification. The "assigned-risk" designation carries a special stigma; but with respect to pricing, it differs from a formal price classification only to the extent it is not constrained by definition. The single characteristic which all members of the "assigned-risk" class have in common is that for some reason they were not able to obtain insurance in the voluntary market.

C. Classification

A classification plan determines how an insured--or technically, the insured's car--is priced once a favorable underwriting decision has been made. The most important determinants of classification are the observable personal characteristics of certain users of the insured car and the geographical territory in which the car is garaged. Classification plans are an integral part of company marketing and underwriting strategies.

From a marketing standpoint the classification plan can determine the relative price-attractiveness of the company's policy to the different categories of consumers separately priced under the plan. Similarly, the average costs attributable to particular classes, blended with additional business considerations, help determine their desirability to the company. Some of the additional considerations include the marginal cost of adding new business and the opportunities lost or gained in attracting particular types of customers.

Classification plans interact with underwriting practices in numerous respects. The price attributed to a particular class presents a target to the underwriter. To the extent the underwriter can subjectively weed out risks who are believed to be worse than the targeted price for the class, or, conversely, can select risks which are "overpriced" in their class, profitability is enhanced. In addition, the availability of a broad range of possible price categories defined by personal characteristics makes it easier to elicit personal information at the time of application; and the prior definition of formal categories of insureds facilitates the use of highly specific underwriting instructions.

Finally, the classification plan can itself serve as an underwriting device to the extent it discourages classes of insureds from obtaining insurance. A 1974 report of the Federal Insurance Administrator explains:

> "Despite the claims of some insurers that their classifications and rating plans have been structured so as to accommodate all risks no matter what their driving records may have been, it would seem that many of the class rates . . . result in the 'rating-out' of unwanted risks in lieu of the 'writing-out' of such risks through underwriting selection.

> "The statutory and regulatory limitations upon the cancellation or nonrenewal of automobile insurance which have become increasingly prevalent in recent years may well increase the importance of the 'rate-out' process through classification plan refinement . . . Unfortunately, where a classification scheme produces rates for certain unwanted classes which are so exorbitant that applicants will be deterred from insuring with the company offering the rates, that insurer will have accomplished its goal of selectivity without violating the law."[5]

High prices and poor service are a convenient means of forcing undesired business to another company or out of the market. With respect to new business, self-selection by consumers may even serve as a more consistent screening device than the judgments of agents and underwriters.

At first blush the link between classification plans and subjective underwriting objectives may not seem logical. Theoretically, statistical analyses should be able to determine whether the high prices for certain classes are warranted by past experience. In practice, however, the complexity of classification plans makes the statistical estimation of cost for each subcategory of insured significantly judgmental; and the evidence suggests systematic biases in the estimates of cost for certain groups of insureds.[6]

Although a competitive market should be expected to ferret out systematic pricing errors and penalize erring companies through loss of business and profit, pricing errors do not appear to be self-correcting in the automobile insurance market. One explanation is that the nature of the accident process itself makes the identification of true costs difficult. Accidents are statistically rare events; and chronic accident repeaters are few.[7] The accident likelihood of a typical high risk may be no greater than one in 5 to 7 years, while

that of a low risk may be one in 15 to 20 years. The driving population contains not merely "good drivers" and "bad drivers" but a broad spectrum of drivers innumerably different in degree. Efforts to distinguish among degrees of risk based on superficial classification characteristics face rapidly diminishing returns[8] and leave substantial uncertainties as to how best to treat limited information. The pressures of customer-selection competition combine with these uncertainties to produce an inertia favoring the status quo. Because the classification process generally affects only the distribution of costs among insureds--the underpricing of some results in an overpricing of others--companies are shielded from their mistakes as long as they share similar pricing strategies.

II. EXISTING CLASS AND TERRITORY PLANS

Automobile insurance focuses on the insured car as the unit of analysis. Coverage generally follows the car; and evaluation of risk under a policy must take into account the totality of circumstances affecting the car's operation. Toward this end, three types of criteria are of universal application for determining the price category to which a car is assigned: (1) the personal characteristics of certain drivers of the car; (2) circumstances surrounding use of the car; and (3) the type of car. Each of these broad categories includes a range of specific classification variables which, with surprisingly limited exceptions, are used by virtually all companies. The most common variables are summarized in Table 2. Refinements of these variables and differences among the major filers will be discussed in subsequent chapters.

The range of available variables and related refinements suggest an enormous number of possible combinations. The ISO system, for example, uses refinements of the driver-characteristic and use-of-car variables, excepting only mileage, to generate 234,360 separate rates for identical coverages. Further refinement by type-of-car classification generates more than a million rating possibilities.[9] The extent to which each of these separate rates can be supported by precise estimates of expected costs is questionable. The small numbers of insureds in most of the rating slots limit the reliability with which past loss experience can provide the basis for future projections. The fact that past loss experience itself is not conclusive as to future costs further complicates the accurate pricing of individual classification cells.

A. Driver Characteristics

The classification variable given the most important role in pricing is the age of the customary users of the automobile. All other driver-related variables subdivide and refine the rating category first defined by age. If any operator of the car falls into one of the youthful-driver categories, the car will be rated in that category regardless of the number or age of other operators or any other rating consideration. Generally, the youngest operator classes, are charged the highest premiums.

The line of demarcation between youthful and non-youthful classes for all companies is driver age 30, although the age at which particular classes of youths begin to be treated as adults depends on other factors to be discussed. The youthful category, consisting of drivers aged 17 through 29, is subdivided into at least three major

TABLE 2

Common Classification Variables

1. Driver Characteristics

   age
   sex
   marital status
   resident student status (student away from home)
   good student status [b]
   occasional/principal operator
   driver training [b]
   experience (years licensed) [c]
   accident record
   conviction record [b, c]

2. Use of Car

   type of use (pleasure, commute, etc.)
   mileage [a]
   number of cars (single-car or multicar)
   territory

3. Type of Car

   retail price (new)
   age
   select physical characteristics
   performance rating [b]

---

a - Not Used by ISO

b - Not Used by Allstate

c - Not Used by State Farm

subgroups aged 17-through-20, 21-through-24 and 25-through-29. ISO further differentiates by individual year of age, and State Farm makes a refinement for married males in the 21-through-24 age group. The subgroups are further subdivided by the sex and marital status of the youthful driver in question. Generally, males pay more than females, and for youths of the same gender, singles pay more than marrieds.

With only two exceptions marketwide--ISO's classification for the female 30-through-64 who is the sole operator in the household, and Allstate's single male 30-through-49 who uses the car more than half the time--sex and marital status variables apply exclusively to under-30 drivers. As many as four additional driver-related variables also apply exclusively to the youthful classes: resident student, good student, occasional operator and driver training. Each of these refinements produces a significant reduction in the otherwise applicable youthful rate. Availability of the refinements to particular insureds, however, varies according to the age, sex and marital status of the youth in question.

Sex and marital status considerations, combined with certain of these other refinements, further determine the point at which a youth's age ceases to be a liability. Married females are rated as adults regardless of age or other factors. Single females and married males are treated as adults beginning at age 25. Single males become adults at age 25 if they are considered occasional operators of the car. Single females and single-male occasional operators who reside at school a required distance from home are generally rated as if "married".[10]

If there is no youthful operator of the vehicle, driver-related classifications are relatively limited under current plans.

ISO and State Farm have a senior citizen classification turning on whether the principal operator of the car has reached age 65. ISO and Allstate recognize the limited sex and marital status distinctions for over-30 drivers noted earlier. All other cars are rated in the "all other" or "adult" class.

The ISO companies and Allstate also impose "inexperience" surcharges on certain cars having principal operators licensed for less than 3 years. Allstate confines the surcharges to cars involving unmarried drivers under age 25. The ISO companies theoretically apply the surcharge to principal operators of all ages, although the Division of Motor Vehicles cannot verify the number of years a driver has been licensed and application of the surcharge can be assured only in the youngest classes where age and years licensed are largely equivalent.

Pricing practices related to driving records vary significantly by filer. Allstate surcharges only for accidents but with this filing has requested permission to surcharge for certain traffic violations. State Farm surcharges only for accidents. The Travelers has an extensive driving record scheme which in addition to accidents covers the whole spectrum of traffic violations, although some categories of offenses are not separately priced.[11] The ISO companies generally surcharge for accidents and major violations. The most notable exception is the ISO's New Jersey Manufacturers Insurance Company which eschews driver-record surcharges of any kind and increases premiums on all policies to make up the difference.[12]

B. Use of Car

1. Use-related Classifications

The degree of classification refinement for vehicle usage or, loosely, type of driving, varies by driver-age classification and

by company. Classes of drivers over 30 are subdivided by at least four usage categories: pleasure, drive-to-work, business and farm. The farm category is the lowest priced, followed by pleasure use, then the drive-to-work classes (variously subdivided according to distance driven); and business use is the highest priced category. Drivers under age 30 have fewer than four usage categories available to them. ISO and State Farm aggregate two or more of the usage categories for the youthful classes; and Allstate has denied any application of these usage categories to youths.

Allstate, State Farm and Travelers also subdivide the adult classes based on "short" and "long" estimated annual mileage. The higher mileage categories pay higher rates. However, ISO makes no distinctions based on annual mileage; and no filer applies these distinctions to the youthful classes.

Finally, all filers grant lower per car rates--the so-called "multicar discount"--to policyholders insuring more than one car in the same company. The theory is that multiple cars having one owner are driven less on average than single cars and therefore present reduced exposure to loss. Attention is largely confined to ownership. No consideration is given to the number of actual operators.

2. Territories

A car is further categorized for rating purposes according to the geographical territory in which the insured resides or the car is garaged.[13] There are 27 such territories in New Jersey. The boundaries for these territories were established by the industry as part of the rate classification process; and approval by the Department many years ago provides the sole legal basis for their existence.

All companies use the same territory definitions although related rates vary by filer. The map in Figure 1 reflects the specific boundaries currently recognized.

Territories are described here as a use-related variable because they are grounded on the theory that the place in which the insured resides or the car is garaged says something about typical driving environment. Properly defined and priced, therefore, territories should differentiate such environments and not the people who live in them. The objective served in practice is not always clear, as will be discussed.

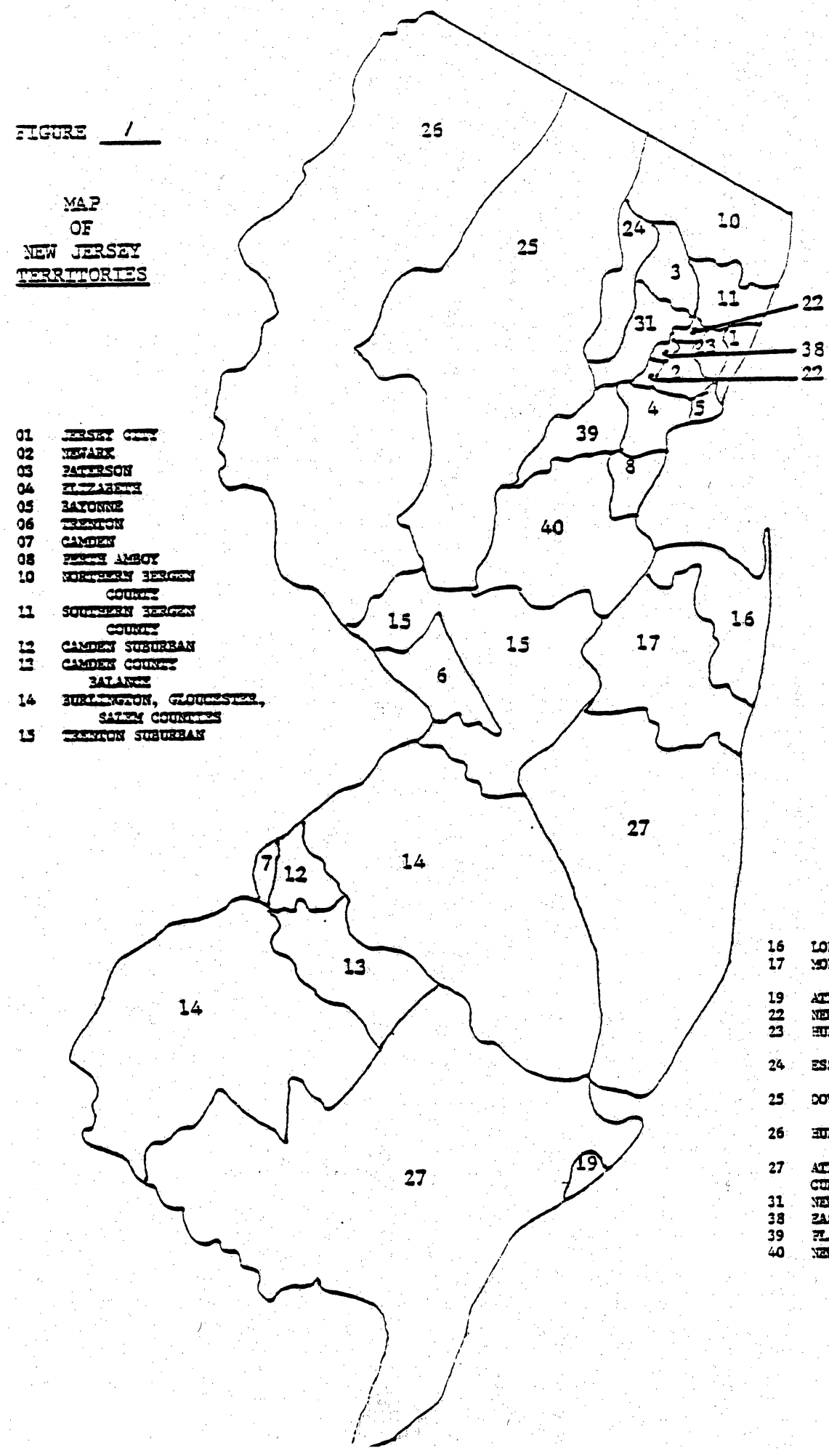
Territories are distinguishable from other classification variables with respect to methods used to price them. Territory differentials reflect differences in territory base rates which are a function of the average loss costs of the territory, variously adjusted, and a formula-based allocation for expenses and profit. The base rate is the rate charged the base class, or the largest adult driver class, in each territory. Every other class in the territory pays some multiple of the base rate depending on the "relativity" of the class to the base class. The class relativity is a function of average cost comparisons relating to the particular variables which define the class.

Class relativities and territory base rates are derived independently. The former are largely based on countrywide data, consistent with the fact that carriers use the same classification definitions in most states.[14] The latter are based on state and local data. Territories are by definition unique to each state.

The separate treatment of classes and territories means that individual premiums are not directly traceable to the observed loss

FIGURE 1

MAP
OF
NEW JERSEY
TERRITORIES



01 JERSEY CITY
02 NEWARK
03 PATERSON
04 ELIZABETH
05 BAYONNE
06 TRENTON
07 CAMDEN
08 PERTH AMBOY
10 NORTHERN BERGEN COUNTY
11 SOUTHERN BERGEN COUNTY
12 CAMDEN SUBURBAN
13 CAMDEN COUNTY BALANCE
14 BURLINGTON, GLOUCESTER, SALEM COUNTIES
15 TRENTON SUBURBAN

16 LONG BRANCH
17 MONMOUTH COUNTY BALANCE
19 ATLANTIC CITY
22 NEWARK SEMI-SUBURBAN
23 HUDSON COUNTY BALANCE
24 ESSEX COUNTY BALANCE
25 DOVER, MORRISTOWN, SOMERVILLE
26 HUNTERDON, WARREN, SUSSEX
27 ATLANTIC, CAPE MAY, CUMBERLAND, OCEAN
31 NEWARK SUBURBAN
38 EAST ORANGE, ORANGE
39 PLAINFIELD
40 NEW BRUNSWICK

experience of particular classes within particular territories. For example, when determining the rate to be charged a 17-year old single male in Trenton the companies do not look at the loss experience of 17-year old single males living in the Trenton territory. Instead, they combine a rating factor for 17-year old single males, adjusted by surcharges, discounts and secondary classification factors, and a base rate for the Trenton territory.

The wisdom or fairness of the industry's approach to combining class and territory information in the computation of rates will be addressed at various points in this opinion. Analogous issues arise with respect to the combination of independently derived classification variables. The independence of class and territory plans is raised here only to explain the separate treatment of them in much of the discussion which follows.

C. Type of Car

The filers employ a diverse assortment of classification variables relating to the physical characteristics of the insured car. The more esoteric include the classifications for antique and classic automobiles offered marketwide and the fiberglass-body classification employed by State Farm. In addition, Allstate has used compact car and airbag discounts; and the ISO companies offer discounts for anti-theft and various passive-restraint devices. The ISO and State Farm plans further classify cars on the basis of horsepower or performance rating,[15] ISO makes still further distinctions for sports cars, and all three of the major filers accord special treatment to farm automobiles.

The type-of-car classifications having the greatest significance across the market are the age and price (or "symbol") classi-

fications used to rate cars for physical damage coverages. These classifications work together to price collision and comprehensive insurance according to the market value of the car during the period of coverage. Market value is a determinant of the size of any claim for damage or theft and may even have a bearing on claim frequencies.[16]

Issues surrounding existing type-of-car classifications have been addressed only fleetingly, if at all, in these proceedings. The major thrust of the testimony has concerned the driver- and use-related variables. The type-of-car classifications are in need of further attention; but to address them in depth here would make an already gargantuan agenda entirely unmanageable.

The only aspect of this subject area discussed in detail concerned the proposals by ISO and Allstate to further refine the physical damage classifications for different makes and models of automobiles. The proposed refinements would vary premiums according to the comparative loss experience of each make and model, thus attempting to reflect differences among types of cars respecting susceptibility to damage and ease of repair. Properly conceived, these kinds of distinctions could influence consumer behavior in selection of automobile and have important cost-containment implications in the long run. The ISO and Allstate proposals are discussed in connection with the larger economic issues further below.

D. Illustrative Rating Hypotheticals

Consideration of a number of simplified rating hypotheticals can provide the best illustration of the mechanics of class plans. These hypotheticals can also suggest the importance of judgment in the application of classification rules and the inevitability of in-

consistent results on a case-by-case and company-by-company basis. The hypotheticals should also indicate some of the practical impediments to shopping for insurance.

In order to simplify the hypotheticals as much as possible only driver-characteristic and use-of-car variables are considered. The analysis is further limited to the class-rated coverages. ISO and Allstate, for example, do not differentiate no-fault ("personal injury protection") rates by class but only by territory. State Farm class-rates all coverages.

Hypothetical # 1

> Husband and wife are between forty and fifty years old and have an 18-year old son and a 16-year old daughter. Both children are unmarried. The family owns one car which is driven about 12,000 miles per year. Every morning the wife drives her husband to a nearby train station several miles away--although no one has ever clocked the precise mileage--before taking the car for shopping and other daily chores. The son lives at a college several hours driving distance away (about 150 miles). He maintains a "B" average and drives the car on vacations, occasional weekends, and in the summer, totaling about 3,000 miles per year. When the son was in high school he successfully completed a driver training course.

Rating Analysis[17]

Under all of the current plans the son would be the controlling factor in classification of the automobile because he is the driver in the highest-rated class. Under the ISO class plan, assuming all facts are known, the car probably would be rated in the class for 18 year-old married males, pleasure use, eligible for good student credit, with driver training. The son is considered "married"--though in fact single--because he is a "resident student" more than 100 "road miles" from home. The car is considered in the "pleasure use" category

because the drive to the train station is arguably less than 3 miles one way. If the insured were conscientiously to measure the distance and find it to be 3 or more miles, the car theoretically would shift to the "drive to work" class under ISO rules. The son's full-time student status and grade average qualify the car for a good-student discount; and his successful completion of a high school driver training course probably qualifies the car for that additional discount, assuming the course meets prescribed standards.

The ISO rate for the class-rated compulsory coverages on this car, before considering the driving records of any of the users of the car, would be 30 per cent above the applicable adult base rate if the pleasure-use class applies, or 45 per cent above the adult base rate if the car is placed in the drive-to-work class. Annual mileage would not be considered under the ISO system. An "inexperience" surcharge would not apply, although the son has been licensed for less than three years, because he is not the "principal" operator of the vehicle. (Some guesswork is involved here because the ISO rate manual does not define "principal operator".)

Under the State Farm class plan the car probably would be priced in the class for married males under 21, pleasure use, with driver training but without good student discount. The son is again considered married because he lives at school about the required distance away from home--in this case "over 150 miles"--but he is not given the "good student" designation because State Farm denies the credit to males who are "married". For the same reason State Farm would not seek to determine whether the son is a "principal" or "occasional" operator of the car, that distinction applying only to single youths who are classified as such.

The State Farm rate for compulsory coverages on this car before consideration of driving records, would be 80 per cent above the applicable adult base rate if the pleasure-use class is applied and 100 per cent above the adult base rate if the drive-to-work class is applied. The appropriate usage class is again a close call, this time turning on whether the car is driven "more than 30 miles" per week to and from work (or commuting point). Under the State Farm plan, as well as the plans of the other filers, the use of the car by the parents would control the usage classification here even though the son controls the classification of the car in every other respect. However, in constrast, State Farm would not consider the parents' annual mileage in pricing this policy because the car is rated in a youthful class. State Farm recognizes mileage only for cars rated in the adult classes.

The Allstate class plan probably would rate this car in the class for single "restricted" males under age 21 with resident-student discount. The critical judgment would concern whether the son drives 25 per cent or less of the estimated annual mileage on the vehicle. If he is assumed to drive more than that amount, he could not be considered a "restricted" operator. The car would be placed in the under-21 male "basic" class, an "inexperience" surcharge would apply and the resident-student discount would not.

If the "restricted" classification is applied, the Allstate rate for class-rated compulsory coverages on this car, before consideration of driving records, would be about 110 per cent above the applicable adult base rate. If the "basic" classification is used, the rate would increase to about 255 per cent above the adult base

rate. In neither case would good student or driver training classifications apply because the Allstate plan does not recognize them. Annual mileage and usage classifications would not apply because Allstate makes no such distinctions for cars in the youthful classes.

Under the classification plans of all three filers the premium charged would further vary depending on the driving records of the users of the car. If any member of the family has had a "chargeable accident" in the past year, the following results would obtain: the ISO rate would increase by another 40 per cent of the applicable base rate; the State Farm rate would increase by 10 per cent of the applicable base rate; and the premium charged by Allstate would increase by about 35 per cent of the base rate for the "restricted" class and about 25 per cent of base rate for the "basic" class. (The diminished marginal impact of the accident surcharge on Allstate's "basic" class assumes that the inexperience surcharge is already in effect. Allstate rules effectively require that the amount of the first accident surcharge be net of any preexisting inexperience surcharge.)

The applicable adult base rate would vary according to the rating territory in which the family resides. For example, if the hypothetical family were to live in Lawrenceville (Trenton territory), its premium for the major compulsory coverages would be derived from the following aggregated base rates:[18]

ISO	State Farm	Allstate
$199	$193	$196

If the family were to live in Princeton (Trenton Suburban territory), the following aggregated base rates would apply for the compulsory coverages:

ISO	State Farm	Allstate
$172	$131	$157

To compute the premium for a policy priced at, say, 80 per cent above the adult base rate, the applicable base rate is multiplied by a factor of 1.80. For a policy priced at 110 per cent above the adult base rate, the applicable base rate is multiplied by a factor of 2.10.

Hypothetical #2

> Assume the same facts as the first hypothetical except one year later. The son is still away at school and still maintaining a "B" average. The daughter is now 17 and licensed to drive. She has not taken driver training because the high school was forced to eliminate it in order to stay within State-mandated budget caps. The daughter spends little time at her studies although she maintains a "B" average. She frequently uses the car to go out with her friends on Friday and Saturday nights and whenever else an opportunity presents itself. Annual mileage on the car has increased about 3,000 miles.

Rating Analysis

Under the ISO class plan the daughter would now control classification of the car because the son is a year older and the daughter, at 17 and without driver training, is now the driver with the highest rating factor. ISO companies probably would price the car in the class for 17-year old single females, with good student status but without driver training. No "inexperience" surcharge would be imposed unless the daughter can be considered a "principal" operator of the car, and the principal-occasional distinction explicitly applies only to young males under the ISO rules. In other respects the car would be classified in the same manner as in the first hypothetical. The new rate would be 50 per cent above the adult base class. If the drive-to-work class were applied, the rate would increase to 65 per cent above base rate.

State Farm would rate the car precisely as it was rated in the first hypothetical, even with the introduction of an additional operator and additional mileage. The son would continue to be the controlling factor in the classification of the car because State Farm has one age classification for all drivers 17 through 20 and both children are therefore considered the same age for rating purposes. Nothwithstanding the absence of driver training for the sister, the sex variable would give the brother a higher rating factor as long as the age difference is not recognized.

Allstate would rate the car in the class for male "restricted" operators under age 21, eligible for resident-student status. This classification would yield a substantial decrease in premium if in the first hypothetical the "basic" class had been applied. The son continues to be the controlling factor but because total annual mileage has increased--from 12,000 to 15,000 miles--his 3,000 miles per year now represents less than 25 per cent of total mileage. The increase in total annual mileage is of no additional significance because Allstate limits the application of mileage distinctions to the adult classes. The rate declines to 110 per cent of base rate as in the "restricted" variant of the first hypothetical.

Hypothetical #3

> Assume the same facts as the first hypothetical except two years later. The son is still away at school and still maintaining a "B" average. (He is now 20.) The family has bought a new car and the son has taken the older car back to school with him, although title and insurance have remained in the father's name. The daughter is going to college full-time and also has a "B" average; but she lives at home, works at various part-time jobs and uses her parents' new car. (She is now 18.) The son puts about 6,000 miles per year on the older car split between the 30 weeks he is at

school and the balance of the year he spends at home. The daughter puts about 5,000 miles per year on the new car, frequently driving to school (about 10 miles away) and taking weekend excursions with friends. Total annual mileage on the new family car is about 14,000 miles.

Rating Analysis

An important additional fact under all of the class plans is the availability of the multicar discount for both vehicles. Under all plans the daughter would control the classification of the new car and the son would control the classification of the old car. Both cars would be eligible for a discount by reason of the fact that the father insured them in the same company.

The New Car

The ISO class plan probably would rate the new car in the class for 18 year old single females, pleasure use, with good student status, without driver training, and with multicar discount. Since the distance to school is greater than 3 miles one-way and the daughter "frequently" drives there, the determination of a usage class requires a judgment as to whether the commute is "customary." (Driving to school is considered the equivalent of driving to work.) If pleasure-use is deemed appropriate, the car would be priced at 10 per cent above the adult base rate; and if the commuting class is applied, the car would be priced at 25 per cent above base rate. Both rates reflect a multi-car discount of 15 per cent of the base rate.

The applicability of an inexperience surcharge is also uncertain, depending on whether the daughter can be considered a "principal" operator of the car. (Although females are not subject to principal-occasional price classifications under ISO rules, an agent has the option of making such a distinction for purposes of applying

inexperience surcharges.) The daughter is not responsible for more than half of total annual mileage but she may well be the most frequent user of the car overall. If the mother and father drive about equal amounts of mileage the daughter could be the greatest single user of the car in mileage terms; and if most of her trips are local, she could also be the greatest user in terms of time behind the wheel. ISO has not defined "principal operator," but in light of the fine distinctions involved--all of which must be made prospectively--it is not clear that a definition would help.

State Farm would probably rate the new car in the class for single female occasional operators under age 21, pleasure use, without good student or driver training and with multicar discount. The good student discount would not apply to the new car, in spite of the daughter's grades, because State Farm denies the good student classification to females. As noted earlier, State Farm does not use inexperience surcharges.

Judgments again would be required with respect to the applicability of "occasional" operator and usage classifications. State Farm defines a principal operator as one who will use the car "50 per cent or more of its time or mileage". The daughter may qualify as a principal on grounds of total time behind the wheel. If the daughter's "frequent" trips to school average more than 30 miles per week, the drive-to-work class may also apply under State Farm rules. However, even though combined mileage devoted to the father's trips to the train station and the daughter's trips to school should put the car clearly in the drive-to-work class, similar uses of this sort are not required to be aggregated to determine the applicable class. Under the plans

of all the companies the usage classification is determined by the highest-rated single use.

The State Farm rate possibilities for the new car range from 45 per cent above the base rate, if both the "occasional" and pleasure-use classes are applied, to 95 per cent above the base rate, if "principal" and drive-to-work designations are used. These differentials reflect multicar discounts ranging from 15 to 20 per cent of base rate depending on classification.

Allstate would rate the new car in the class for female "basic" operators under age 21 with inexperience surcharge and multi-car discount. No other variables would apply. The resulting class rate would be 90 per cent above the adult base rate. The multicar discount would amount to about 19 per cent of the base rate.

The Older Car

ISO would now rate the older car--assuming full facts were disclosed--in the class for 20-year old single male "principal" operators, pleasure use, with good student, driver training and multicar discounts. The son would lose his "married" status because the resident-student rule does not apply to principal operators. The resulting class factor would be 90 per cent above the adult base rate.

State Farm would rate the older car in the class for single male principal operators under age 21, pleasure use, with good student, driver training and multicar credits. Here too the son loses his "married" status--assuming the full facts are disclosed--because he has become the principal operator of the car. On these facts, the State Farm rate for the class-rated compulsory coverages would be 140 per cent above the applicable adult base rate.

Allstate would classify the older car as single male "basic" under age 21 with multicar discount. The resident-student discount does not apply because the son is no longer a "restricted" operator. However, the inexperience surcharge also has been removed because at this point the son presumably has been licensed for more than three years. No other variables would apply. The resulting class rate would be about 206 per cent above the adult base rate.

The garaging of the older car at school for about 30 weeks in the year complicates application of an appropriate territory base rate under the plans of all three filers. Although ISO would apply the rate of the territory in which the insured car is "principally garaged," the latter term is not defined in the ISO manual. If the "principal garage" is the place in which the car spends the most time, the territory in which the son's school is located (even if out of state) would determine the territory base rate for the son's car. Here the difference of about four weeks could make the proper territory very difficult to determine. If the "principal garage" is the residence of the owner of the car or the named insured, the base rates for the family's home territory would apply, even if the car were not to be found there most of the time.

State Farm uses the latter approach. It determines territory according to the insured's place of "residence". (The named insured in this case is the father.) However, the Allstate class plan appears to seek a middle ground. It would require the agent and the insured to estimate the proportion of the year the car is at home and the proportion of the year the car is at school and derive a composite base rate.

Hypothetical #4

An 18-year old single male lives with his parents next-door to the family in the first three hypotheticals. He owns a car in his own name, works full-time during the day and attends college part-time at night. He is an "A" student. He carpools to work with four other people in the area and drives his own car three nights per week to school. The distance to work is approximately 10 miles and the distance to school is about 10 miles. He puts about 6,000 miles per year on the car. He did not take driver training in high school because his parents had taught him to drive and no one had told him that taking a course in driver training would reduce his insurance rates.

Rating Analysis

The ISO companies would rate this car in the class for 18-year old single male owners and principal operators, drive to work, without good student or driver training and with an inexperience surcharge. Good student status would not apply in spite of the "A" grades because school enrollment is not "full-time". An inexperience surcharge would apply because the youth is the principal operator and has been licensed for less than 3 years. The resulting class rating factor is 285 per cent--a 3.85 multiple--of the adult base.

State Farm would rate this car in the class for single male principal operators under age 21, without good student or driver training. The absence of full-time student status would again prevent application of the good-student discount. The State Farm premium for the class-rated compulsory coverages on this car would be about 315 per cent--a 4.15 multiple--of the applicable adult base rate. Allstate would rate the car in the same fashion as the male "basic" variant in the first hypothetical. The Allstate rate would be about 255 per cent higher than the adult base rate.

TABLE 3

SUMMARY OF RATING HYPOTHETICALS -
RANGE OF FINAL RATES FOR THE MAJOR COMPULSORY COVERAGES*
Assuming Lawrenceville Residence (Trenton Territory)

Range of Likely Rates	ISO	State Farm**	Allstate**
Hypo #1	$240 - 314	$347 - 405	$362 - 570
Hypo #2	$267 - 341	$347 - 405	$362 - 436
Hypo #3			
new car***	$226 - 253	$280 - 396	$309 - 340
older car	$577 - 591	$463 - 483	$739 - 818
Hypo #4	$584 - 638	$762 - 820****	$539 - 570

*The compulsory Uninsured Motorist coverage is not considered. It is priced at a flat dollar rate per policy.

**ISO and Allstate premiums reflect application of class factors to the base rates for bodily injury and property damage coverages--their class-rated coverages--and the inclusion of an unmodified base rate for personal injury protection. The State Farm premiums reflect application of class factors to the base rates of all three compulsory coverages.

***Assumes out-of-state territory in which school is located is an urban territory with a rating factor two times as high as Trenton territory.

****The possible 40-per-cent-of-base-rate multicar discount is <u>not</u> reflected in these computations.

There is a chance that the car would qualify for a multicar discount under the State Farm plan even though title is in the youth's name. If it is determined that there is another car in the household and both the 18-year old's car and this other car are insured by State Farm and "readily available" to members of the household, a multicar discount amounting to 40 per cent of base rate would apply. State Farm is unique in this respect. The other filers look only to whether multiple cars are under common ownership. Accordingly, under ISO and Allstate rules, multicar discounts would not apply in this hypothetical even if the two cars in the family were insured in the same company.

Table 3 summarizes the range of final premiums under each hypothetical. Computations apply the range of likely class factors against the adult base rates in the Trenton Territory (assuming that the insureds live in Lawrenceville).

III. THE ORIGINS OF CURRENT CLASSIFICATION SYSTEMS

Automobile insurance classification systems based on the age, sex, marital status and other personal characteristics of drivers are unique to the private passenger lines. In commercial automobile insurance, classifications are limited to the weight of the vehicle, its usage, radius of operation and territory of principal garaging, together with number of vehicles under the insured's control. For long-haul vehicles, the zone of operation, encompassing typical origins and destinations, is also considered. Private passenger-type vehicles rated as commercial vehicles are classified only with respect to territory of garaging and whether or not the principal users are employees of the insured.

The use of highly refined demographic variables in the rating of private passenger automobile policies is a phenomenon of the last thirty years. Prior to 1950 there were few distinctions among private passenger insureds. The National Bureau of Casualty Underwriters, an ISO predecessor, used four and then five classification groupings defined by driving record, usage, and the presence of operators under age 25. Classifications based on annual mileage and the numbers and occupations of operators were the subjects of brief experimentation.[19] Territories in the form currently familiar to us were first introduced in 1946.[20]

As late as 1955, State Farm separately priced farm and non-farm vehicles but used no other classification or territory variables in the rating of its liability coverages. For physical damage coverages it considered only age and value of car. Michael Miller, State Farm's actuary and principal witness in these proceedings, had the following explanation, underscoring the importance of market strategies and competitive considerations in the shaping of classification plans:

> "Our marketing emphasis was primarily in the rural areas. And so even though we had no, for instance, territory differences in effect, the experience that was being generated at the time reflected the rural exposure, and it was only when the company grew to the point where it was selling substantial amount[s] of business in suburban and city areas that it became necessary to introduce territorial ratings. With respect to age, sex, and marital status, those classification factors, no other company utilized them. I don't know what the underwriting practices were with respect to those classes at the time, it was long before my time. But no other companies utilized them, so there wasn't any competitive pressure for us to do so."[21]

Through World War II and the years immediately following it the market was dominated by companies which set rates in concert through

industry rating bureaus and marketed their policies through independent agents. In the early 1950's, however, companies emerged specializing in the personal insurance lines and marketing their policies through direct contact with consumers. New marketing approaches of the sort used by State Farm and Allstate reduced acquisition expenses while targeting specific segments of the market. State Farm concentrated its outlets in rural areas. Allstate sold through booths in Sears stores and initiated a refined classification plan consisting of some 16 classes.[22] Market selection combined with reduced acquisition costs permitted the non-traditional companies to offer lower prices to the segments of the market they pursued; and as insurance premiums increased across the market, these companies became increasingly attractive to eligible consumers.

Classification refinement was a logical competitive response by bureau-affiliated companies. It permitted them to provide lower rates to risks targeted by the non-traditional companies, thought to be the "cream" of the market, at the cost of only higher rates to the segments of the market not then sought after. By thus "skimming the cream" the bureau companies could stem the loss of market share and avoid a type of adverse selection. If price inducements were to permit the non-traditional companies to siphon off the most desirable risks--those likely to have below-average loss costs and above-average buying power--the bureau companies would be left on average with a more costly and less profitable book of business. This in turn would force them to raise prices or limit market growth through extreme underwriting selectivity, ever more diminishing their competitive position.

The process of classification refinement, once begun, perpetuates itself in a vicious circle. It is a commonly held view that

everyone must participate in the process in order to preserve market position. The 1974 report of the Federal Insurance Administrator aptly observes:

> "Even those carriers who appreciate the defects in the existing classification system are trapped into participating by competitive realities. No individual company can establish and maintain an alternative system of broad classification of risks and open underwriting unless other insurers operate under the same rules. The adverse selection against a single company trying to introduce an open market system would economically isolate the company. Its insurance policies would have to become more and more expensive as the better risks were drawn to the more selective companies that could then afford to insure at lower cost."[23]

An example of competitive frustrations in this context was explained by Richard Reeves, principal witness for Travelers, when describing the evolution of his company's efforts to give traffic convictions a more important role in the pricing of automobile policies. Although data collected by the company indicated statistically significant differences among groups of insureds having common violations, the effort to make corresponding distinctions in price met little success. Travelers retreated from the system "[n]ot because from an underwriting standpoint we felt it was proper, but again for competitive reasons since Travelers was one of few companies using minor traffic violations in the rating plan."[24]

As explained by Mr. Reeves, whatever the empirical support for recognizing the higher loss expectancies of all traffic offenders, agents would not place business with the company if an otherwise desirable applicant with a minor conviction could get a better rate elsewhere.[25] Travelers now makes no rate adjustment for a minor conviction and confines surcharges to "major traffic violations" and

"in-between types of convictions."[26] Mr. Reeves readily admits that even these surcharges are based on judgment and not empirical study. Travelers has not looked at the loss data for different types of traffic offenders since 1963.[27]

The variables which make up current classification systems appear to have been more the product of competitive pressures than of any scientific effort to identify the full range of differences in risk among insureds. Philipp Stern, formerly the Chief Actuary of this Department, was an actuary for the Mutual Rating Bureau in the 1950's and participated in the formulation of the first classification refinements. Mr. Stern testified that in most cases the choice of classification variable was based on "preconceived ideas," more the result of trial and error experimentation than systematic research.[28] The industry witnesses disagreed with Mr. Stern's choice of words, but most of them acknowledged the pivotal role of judgment in the creation of classes and the "need to react in a competitive marketplace."[29] Mr. Miller of State Farm indicated that, indeed, competition was the most important consideration in the creation of classes and that data influenced particular choices of variables only "when available."[30]

This testimony and the overwhelming weight of the evidence in these proceedings belie industry pretenses about the scientific origins of classification plans. George Bernstein, a former Federal Insurance Administrator who now represents the industry as a lawyer specializing in "insurance regulation and legislation,"[31] was among the relatively few witnesses who would perpetuate the myth:

> "The factors of age, sex, marital status and territory are not hypothetical social stereotypes.

> These distinctions were not even included in the original rating plans. They were only developed and added after years of experience and statistics were compiled that demonstrated certain measurable patterns and identified characteristics of higher or lower loss potential in the affected groups."[32]

However, Mr. Bernstein's stance as Federal Insurance Administrator reflected a more realistic view, as quoted from his 1974 report:

> "In place of the judgmental bases and subjective criteria for classification schemes which have intensified in recent years, it is proposed that the regulator be empowered to require, in advance, credible statistical proof of the validity of the predicates for the classification plan. As one regulatory official recently complained regarding the current system: 'Since we first began to discuss this subject, the rating plans filed with our office have become more complex. We now have before us a number of filings by which the companies are proposing to convert underwriting considerations to rating factors . . . In these plans, as in all others, they come to us with the plans that are very heavy on judgment--with the promise and assurance that complete statistics will be maintained and available. We think it is fair and reasonable that we ask--'Why don't you code out these factors and when the figures justify the factors you want, we will look at them at that time?' Why must it always be the other way around?'"[33]

If current classification systems were the product of scientific studies, the studies have vanished without a trace. No company representative could produce a single report, survey, internal memorandum or anything in writing whatsoever which set forth reasons of any sort for the initial selection of age, sex and marital status as class variables. With one exception, even subsequent refinements of the major classification variables were entirely unsupported by documentation. The exception was a 1964 report by the National Bureau of Casualty Underwriters and the National Automobile Underwriters Association (hereafter the "NBCU Report") which preceeded introduction

of the so-called "260 class plan." The report analyzed the results of a countrywide survey, involving some 300,000 risks in states other than New Jersey.[34] The document was compiled by ISO's predecessor organizations years after introduction of age, sex and marital status as rating factors[35] and addressed only the modification and further refinement of existing classification concepts. Efforts to explore with industry witnesses the specific thinking behind choices of variables--and decisions to overlook or dismiss other variables--were repeatedly met with disclaimers of any direct or detailed information.[36]

Similarly, industry witnesses suggested that the delineation of territory boundaries was based on analysis of traffic flows, population studies, field observations, and other systematic study.[37] After repeated requests, however, no industry representative could produce a single piece of paper containing this material. Implicit in the explanations of the industry witnesses was that the documents in question, much like the documents supporting classification choices, were not of sufficient importance to have been retained in company files.[38]

Of central interest is the apparent imbalance in the current system, reflected in a preoccupation with the youthful driver. In more than one instance the industry appears to have ignored evidence suggesting measurable distinctions among adult drivers. For example, research by the California Department of Motor Vehicles, cited by industry witnesses in support of existing classifications, indicates that differences in accident experience and traffic convictions correlated to sex and marital status are not confined to youths. The largest differences in accident rates between males and females show

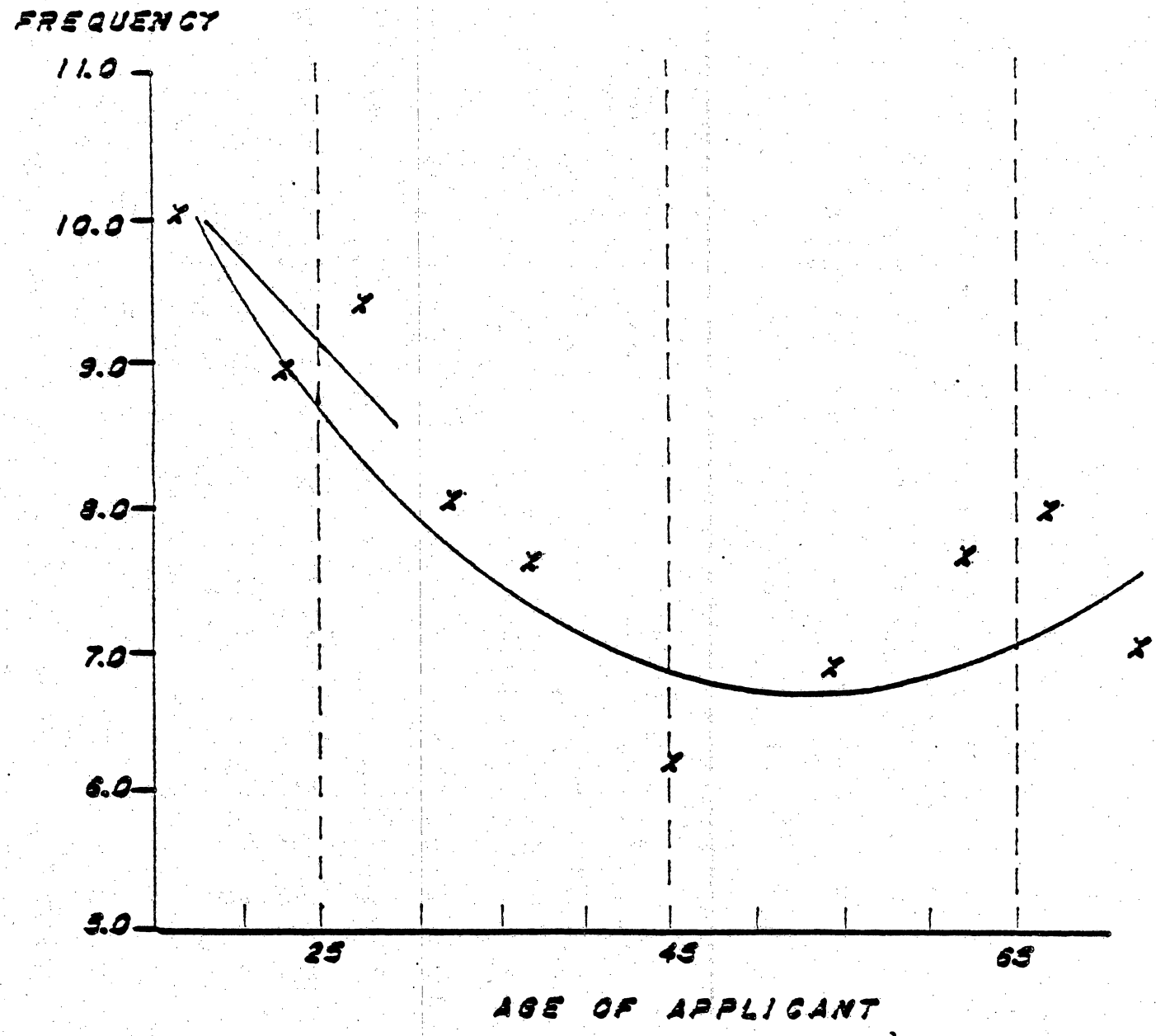
up in the after-30 age group.[39] Yet, while ISO has a class for females 30-64 who are sole operators, no further sex-based refinements have been explored for the broad adult group. Allstate uses a class for single males 30-through-49 but is unable to offer a reason for isolating only these adults on the basis of sex. The experience of single females and married males in the same age group has not been monitored.[40]

The data assembled in the NBCU Report suggested a variety of refinements for the 30-through-64 age group. As reflected in the graph extracted from the report and reproduced in Figure 2, average loss experience for single males in the survey declined after age 30, bottomed out in the 50's, and rose again through the late 60's. Michael Walters, ISO's actuary, explained the apparent oversight on the theory that there were too few single males older than 30 to justify the expense of classifying them. Yet no effort seems to have been made to determine the number of single males in the 30-64 age group.[41] Under the ISO rule which defines divorced men to be single, the numbers should be substantial. Furthermore, diminutive numbers of affected insureds have not deterred creation of other classes.

The record is replete with examples of companies alternately embracing and ignoring classification possibilities. Mr. Young of Allstate explained his company's denial of vehicle-usage distinctions to the youthful classes in terms of the familiar credibility problem and an "Allstate management decision."[42] Mr. Reeves of Travelers offered a not dissimilar explanation for his company's denial of annual mileage distinctions to youths. He explained that although mileage information is collected on youthful risks, the data are "not

FIGURE 2

SINGLE MALE OPERATORS LIABILITY ACCIDENT FREQUENCIES BY AGE OF APPLICANT



Note:
The points plotted on this chart represent the actual liability accident frequencies in the Survey for five and ten year age groups. A straight line has been "fitted" to the data by individual years from 18-29 and an exponential curve has been "fitted" to the five and ten year data, using the method of least squares in both cases.

SOURCE: 1964 NBCU SURVEY AND REPORT (ISO-31)

given any credibility" because information elicited from an insured having no impact on the rate charged cannot be trusted to be accurate. Curiously, however, Travelers established its driver-record program without any data and has been pricing it without reference to the data for the last fifteen years.[43]

Michael Miller of State Farm offered one of the more explicit accounts of the nature of the process which shapes classification plans. At issue in the testimony was the reasoning of his company in defining separate age brackets for 21-and-22 year old and 23-and-24 year old married males. He explained:

> "The reason for setting up the class definitions was based upon our observation that several of our competitors were rating not by grouping the youthful drivers as we had been, but actually with different rates for each age. At every age there was a change in the rate, 21, change to 22, change to 23, change to 24, change to 25.
>
> "So there certainly is no basis for us to assume that if we were to gather statistics in a more refined fashion, such as this, that we would reasonably expect to see that the 23- and 24-year-olds should be rated lower than the 21- to 22-year-olds.
>
> "There is also real competitive considerations, business judgment considerations, in establishing this class, because with our competitors rating as they do, as compared to our grouping of these four years, we found ourselves in some areas very competitive at age 21 and very non-competitive at age 24 . . ."[44]

Curiously, State Farm did not introduce a similar refinement for single males in the 21-through-24 age group. Mr. Miller again explained:

> "Well, the competitive pressure, for whatever reason, is certainly not as intense on the youthful unmarried male classes as it was the married male class, and the considerations go beyond New Jersey. This was a decision that was based upon what was

> happening throughout the country, not just New Jersey . . . We just haven't experienced the same competitive pressures in that class . . ." (Emphasis added)[45]

In most instances we are left to speculate as to the real reasons behind company classification decisions, either as to choice of variable or specific approaches to aggregating the data. Especially troublesome is the absence of research concerning even the possibility of better approaches. That the process was shaped by the pressures of customer-selection competition is of no consolation. The complexity of classification plans and underlying risk-assessment issues, combined with competitive resistance to non-conformity and marketing efforts addressed to less than the entire market, substantially reduce any likelihood that the marketplace can assure optimally fair and accurate classification systems.

Section 3

STANDARDS OF EVALUATION

I. CONCEPTUAL BACKGROUND

The appropriate purpose of classification plans is to stratify insureds according to relative accident likelihoods.[1] Some of the differences among insureds in their probabilities of having accidents are predictable: any car is liable to be involved in an accident, it is said, but some cars (as driven by certain drivers) are more liable to have accidents than others. In metaphorical terms, an insured's accidents from year to year may be no more predictable than the roll of dice, but experience teaches that the dice are loaded in various degrees for different insureds. The purpose of differentiating among risks is to identify how and to what extent the dice for particular insureds are loaded and to price accordingly. The degree of loading on the dice for each insured--taking into account the totality of circumstances surrounding operation of the insured car--is that insured's "inherent" or "systematic" risk.

The task of differentiating between degrees of inherent risk is complicated by the fact that actual accident experience is dominated by random events.[2] Even if the inherent risk of a particular insured were identifiable, randomness is so pervasive that the actual experience of the insured could not be predicted with certainty.[3] For the individual insured the greatest likelihood is that no accident will occur during the year covered by the policy or in most years insurance is purchased. Predictable fractions of drivers with high-accident likelihoods will have no accidents over long periods and drivers with low-accident likelihoods will have multiple accidents over comparatively short periods.[4] The picture is clouded further by substantial changes in the inherent risk characteristics of individuals over time, espe-

cially among individuals who at any given point in their lives are thought to be high risks. Because ratemaking is prospective and requires forecasting risk at some future time, these changes limit the usefulness of hindsight based on insureds' past experience.

In fact, the inherent risk of any particular individual is virtually imperceptible by direct observation. Direct measurement based on individual accident experience would require the monitoring of individual experience for an extended period of perhaps several decades or more, assuming unrealistically that the individual's risk-related qualities and circumstances would not change in the interim. This is of course impossible. An alternative would require a personal evaluation based on in-depth psychological tests, driving tests and the like, which even if we knew what to look for and had the know-how to find it would present serious privacy and cost-benefit problems. Regardless, the relevance of individual test results would be limited to only one of potentially numerous operators of the insured car.

In practical terms an individual's inherent risk can be measured only indirectly, and approximately, by inference from actual loss data aggregated across groups of individuals. Traditionally two or more groups are defined in terms of some driver characteristic thought to have a relationship to accident experience, loss data is collected for a time and it is determined whether there is a significant difference between groups. If a group is large enough, the average actual experience for the group can be equated to the accident propensity or inherent risk of the group as a group.[5]

The fairness of differentiating among insureds on a group basis is best understood when the differentiating factor bears an

easily recognizable relationship to accident likelihood. Few would resist the notion that someone who drives an above-average amount of mileage should pay more for insurance, or that the owner of an expensive car should pay more for collision insurance that the owner of a jalopy. Nonetheless, even here variability on a driver by driver basis can raise questions.

The significance of the mileage criterion depends in no small part on the ability of the driver in question--practice may even make some drivers better--and the circumstances in which the miles are driven--long-distance trips on uncrowded roads may be substantially less hazardous than short trips to the local shopping center. The value-of-car criterion may neglect the fact that at least some of the drivers of expensive cars substantially improve their driving behavior to protect their investment.[6] The range of imaginable scenarios affecting the use of any particular car suggest the elusiveness of individual risk assessment and the complexities of devising rules to govern accuracy and fairness in all cases.

II. THE STATUTORY TESTS

The Commissioner of Insurance is obliged by law to disapprove any classification system which produces rates in whole or in part unreasonable, excessive or unfairly discriminatory between risks in this State involving "essentially the same hazards and expense elements."[7] The questions to be resolved in reviewing current industry rating systems pursuant to this statutory standard are twofold: (1) whether current classification systems are reasonably defined and priced to assure that similar risks are treated similarly; and (2)

whether any aspect of classification, however similar the risks affected, is per se unfairly discriminatory or otherwise unlawful. The first cluster of questions goes to what has been referred to throughout these proceedings as the predictive accuracy of existing classifications. The second set of questions pertains to the various legal and public policy considerations affecting the selection and pricing of certain classification variables.

A. Predictive Accuracy Questions

The predictive accuracy questions concern the ability of classifications to identify similarities and differences in risk. Ideally, each defined class of policyholders should consist of risks very similar to each other and very different from everyone else: a classification system should be held unfairly discriminatory if it treats different risks the same and similar risks differently. This formulation of the predictive accuracy criterion, however, begs the fundamental question as to which risks are "essentially the same" and which risks are "essentially different." In the real world this determination is not easily made.

The industry concedes that all similarities and differences between risks have not been identified under existing class plans. For example, Michael Walters, Vice President and Actuary for the ISO, acknowledges that current classifications are not perfect but contends that "within the constraints of cost of obtaining information, and the value of the information once you obtain it" the imperfections are not "unreasonable."[8] A 1976 industry-sponsored study by the Stanford Research Institute (SRI) observed that "the accuracy of risk assessment is difficult to measure" and the "cost of the risk assessment process are also difficult to identify."[9] The report noted:

> "We conclude that from the insurer's viewpoint, there is no easily defined best level of refinement in the risk assessment process. General observation leads us to believe that the present degree of refinement evolved out of industry practice and common underwriting wisdom."[10]

The degree to which current class plans have identified similarities and differences in risk among insured cars is determinable and will be discussed at length. Evaluating the failings of the system once identified is more difficult. For example, although the 1976 SRI study found that classifications and underwriting together explain only about 30 per cent of the total variation in expected losses among insureds,[11] the final report was not disapproving of current plans. A controlling consideration appears to have been that "while room for improvement exists, the precision of current risk assessment processes may in fact be relatively near the practical limit imposed by current scientific knowledge and economic factors."[12]

The regulator must hold classification plans to a more exacting standard, however. The "practical limits" affecting classifications may not condone results which are unfairly discriminatory. A final judgment under the statute requires an evaluation of degrees of classification error and the consequences which flow from them. If the system must tolerate imperfection, it is the regulator's task to assure that the adverse consequences of imperfection are shared evenly by all policyholders. The pressures of customer-selection competition leave no hope that the market itself can bring this outcome about.

Application of the statutory proscription against "unfair discrimination," from a predictive accuracy standpoint, therefore begins with an analysis of the <u>extent</u> to which risk and expense elements

of separate classes are essentially different and the extent to which these elements within classes are essentially the same. Resolution of these questions requires inquiries in the following areas: (1) the rationale for current classification variables; (2) the objectivity and reliability of classification definitions; (3) the nature and extent of between-class differences in average expected costs and their relation to price; and (4) degrees of within-class variation in risk. These subject areas have differing degrees of importance.

The ultimate test of predictive accuracy goes to the last area of inquiry, within-class homogeneity or the relative success of classifications in correctly identifying and pricing differences in risk between individual insureds. The other subject areas relate to accuracy in the design and pricing of variables which distinguish between groups of individuals. The likely accuracy of group distinctions provide only circumstantial indication of the probable success of the variables in meeting the ultimate accuracy test.

1. Reasonable Relation to Hazard of Loss

The most elusive subject area relates to the evaluation of the rationale for current classification variables. The inquiry is important because differences between groups can be identified only if there is a decision made to isolate them, and the magnitude of differences in the average losses of groups is a function of how the groups are defined. Correlations to persistent differences in average losses are relatively easy to find. Even driver weight can be correlated to variations in average accident experience.[13]

Although choice of correlations best suited for classification is necessarily judgmental, the range of permissible choices is

properly the subject of regulation under the statute. The earlier finding that the industry's selection of class definitions does not reflect a balanced effort to identify cost differences in all segments of the market underscores the need to examine the reasonableness of definitional choices. Classifications based on stereotypes and half-truths which yield differences in loss experience and serve business purposes may not represent reasonable categorization of risks under the statute.

Few would deny that a qualitative assessment is necessary.[14] Michael Walters of the ISO, for example, suggests that the "common characteristics used to identify insureds as similar should reasonably relate to the potential for or hazard of loss."[15] Walters offered no standard for determining reasonableness, but he acknowledged that at least such variables as "color of hair" would fail the test;[16] and "height and weight", even if correlated to driver maneuverability or ability to reach the pedals, would be questionable.[17]

As a general proposition the probability of accidents--the "potential for or hazard of loss"--depends on how well, how much and where on average the insured car is driven. Each of these operations-related factors is only partially measurable. How well a car is driven depends not only on the skills of its operators but on their diverse psychological make-ups and the environments in which they drive. How much a car is driven is reflected not only in total mileage but also in frequency of trips or total time on the road. Where a car is driven, even if known, does not address the range of circumstances affecting the nature of driving hazards in particular areas. Any determination of reasonableness must deal with questions of degree.

a. Direct Relation to Vehicle Operations

The reasonableness of a classification variable should depend in part on the directness of its relationship to the operations-related factors--how well, how much and where the insured car is driven. The closest possible nexus should be sought. The more distant or indirect the relationship between the criterion for segregating insureds and the operations-related factors, the more numerous are the potential intervening circumstances affecting individual accident likelihoods. For example, if estimated mileage only partially measures how much a car is driven, a variable which serves as a proxy for the measurement of mileage, but is used instead of mileage for other reasons, can be expected to be even less accurate overall. Conceivably the use of a number of indirect or circumstantial measures in tandem can begin to substitute for a direct link to vehicle operations, but the proponent's burden of proof that the same result obtains should increase accordingly.

The proposed "directness" criterion is not unrelated to the familiar argument that rating variables should be related to factors which cause accidents; but the standard is recast to clarify the issues and to avoid the analytical uncertainties surrounding questions of strict causation. To the extent that accidents cannot be predicted on an individual basis and actual accident experience is dominated by random events, so too the "causes" of accidents are extremely difficult to identify. As ISO's Michael Walters correctly pointed out, quoting a study by the U.S. Department of Transportation: "'Driver responsibility for crashes is rarely unilateral and is often impossible to isolate from the multiplicity of causes involved in almost every

crash.'"[18] The "directness" test therefore assumes that classifications cannot delineate the causes of accidents and that the proper focus is less causation per se than the relative potential for loss among insureds.[19] The premise of the proposed test is merely that some variables are more likely related to loss-causing behavior than others.

Most would agree that the quality of drivers' eyesight, if knowable consistent with their privacy rights, would be a reasonable basis for classification if it produced correlations to differences in accident experience. Poor eyesight does not necessarily cause accidents. A driver with impaired vision may curtail driving, drive more carefully or otherwise adjust driving behavior to compensate. Nonetheless, a driver's physical impairment of this sort is directly related to whether operation of the insured vehicle is likely to be hazardous. Whatever the ultimate merits of using a quality-of-eyesight variable, it is preferable under a "reasonable relation" test, all else being equal, to some variable which seeks to measure the same driver trait but indirectly, say through an age criterion.

The directness of the relationship between the variable and the operations-related factors also affects public comprehension of the variable and its relation to the larger classification system. An informed consumer is critical to the effective workings of a competitive market. Moreover, if variables are perceived to be arbitrary, efforts to beat the system--to manipulate or falsify classification information or to recoup premiums through claims--logically intensify at the expense of all policyholders and the predictive accuracy of the system. The more direct and visible the relationship between

classification variables and vehicle operations, the more readily members of the public will acquire and retain the knowledge they need to be effective consumers; and the less frequently they will see themselves the victims.

b. Broad Inclusion of Insureds Likely to Share the Same Risk Characteristics

A classification variable reasonably related to the hazard of loss should also maximize inclusion in the same class of cars having the same risk characteristics. For example, even if hypothetically a nearly homogeneous class can be split away from a larger group, the failure to include in that subclass most cars having the same risk characteristics--because insureds having the same risk characteristics fail to share some trait described by the classification variable--necessarily means that the undifferentiated group which remains is more heterogeneous than it need be. A standard requiring broadest possible inclusion would immediately bring into question, say, a variable addressed directly to how well or how much a car is driven but applied to limited segments of the risk population.

Efforts to maximize inclusion of similar risks in the same class inevitably give rise to questions concerning the availability of alternative classification variables. A narrowly inclusive variable is less tolerable when alternative variables capable of broader inclusion of similar risks are available. However, more difficult to resolve are situations in which the risk characteristic sought to be identified can be reached, if at all, only by narrowly inclusive proxy variables, either because available technology does not permit more direct or precise measurement, individual privacy rights are jeopardized, or economic feasibility concerns are a bar.

Hypothetically, if it were impractical to expect companies to test the reflexes of every applicant for insurance, it might be suggested that age be used as a proxy--that all drivers over 65 be separately classified on the grounds that a high percentage of this group may have poor reflexes. Used in this manner the age variable is narrowly inclusive because it seeks to isolate drivers with poor reflexes but can only affect slow-reflex drivers who are over age 65. Drivers who are over 65 but do not have poor reflexes are swept up; and slow-reflex drivers under 65 are left out. Ironically senior citizens are now classified separately and qualify for lower rates on other grounds; but the hypothetical is useful to identify the kinds of tradeoffs to be considered in assessing reasonableness.

The defenders of using age as a proxy for reflexes would argue, hypothetically, that the over-65 group can be presumed to have a higher proportion of poor reflex drivers than the balance of the larger group, that failure to split off the over-65 class would leave the larger group even more heterogeneous, and that there is no feasible alternative for reaching a broader group of poor-reflex drivers. It would be difficult to resolve these arguments without additional information provided by the other accuracy tests, a conclusion which suggests the limited nature of the "reasonable relation" test. Nonetheless, the variable here showed only an indirect connection to an operations-related risk characteristic--poor reflexes--and limited inclusion of drivers likely to share that characteristic. The fact that feasibility is the major consideration supporting use of the variable would make it especially vulnerable in the event of poor performance under any of the other tests.

c. Feasibility

Mr. Walters of the ISO would suggest that economic feasibility should be an equal partner of other criteria governing the suitability of classification variables. He contends that the "cost of administering a rating variable should be reasonable in relation to the benefits received."[20] No doubt this thinking should be included in the mix of considerations under any reasonableness test; but it does not deserve the priority suggested for it. Economic feasibility concerns have greater importance to business decisions concerning which variables to choose than regulatory decisions concerning which variables to rule out. If a variable fails to meet standards of accuracy or fairness, the fact that it is convenient should not save it from application of the statute.

Furthermore, because the costs of risk assessment uniquely attributable to individual variables are so difficult to assess,[21] the proposed cost-benefit standard is largely theoretical. The costs and benefits of particular variables do not seem to have been analyzed in a systematic way. The only cost tradeoffs able to be quantified are those affecting premiums: each classification refinement increases costs for some insureds and diminishes costs for others. These tradeoffs should be included in any cost-benefit assessment.

2. Adequacy of Definition

The inconsistent application of classification variables contributes to the misclassification of insureds and increases heterogeneity of risks within classes. Classifications should therefore be defined (1) "so that there exists no ambiguity as to what class an individual insured belongs,"[22] and (2) so that the applicability of

variables cannot be easily manipulated by either applicants or producers.[23] The ability of particular variables to meet these tests appears to depend more on the nature of the variable than the language used to define it.

The tests are obviously subject to reasonable limitations. Intentional fraud is difficult to prevent because the insuring company rarely sees the applicant. At the same time a knowledgeable and conscientious agent should not be misled by the typical consumer. The intricacy of class plans make their susceptibility to fraud or manipulation inscrutable to the uninformed. Pointed and thorough questioning of the applicant should be enough to elicit accurate information in most cases. The availability of convenient sources of verification is not indispensable.

The most pervasive threat to the consistent application of classification criteria is the use of variables which depend for interpretation on subjective judgments. Variables of this sort give agents a substantial amount of discretion in the pricing of their customers. The agent who wants to favor selected customers for any reason can bend the truth or merely resolve uncertainties in their favor.

Variables requiring discretionary applications are not necessarily troublesome to agents and their companies. The use of discretion in classifying insureds is not unlike the application of subjective underwriting standards. The agent's performance depends on the average accuracy of selection overall and the ultimate profitability of the agency's business. Profitability in turn depends on the buying power of customers and their desirability as insureds across

all lines of insurance sold by the agency. This bottom line is logically more important for both agent and company than meticulous application of rules in individual cases.

Critical to the evaluation of particular class definitions are the price differentials they generate. Efforts by insureds and agents to bend the rules or apply them subjectively should vary in proportion to benefits and costs. Rating variables which of themselves cause large swings in price, no matter how well defined semantically, are certain to produce uneven applications.

3. Between-Class Differences in Expected Losses

This area of inquiry relates to statistical estimation of differences in average losses between groups of insureds. The purpose of the analysis is to test the ability of variables to identify differences in expected costs which are significant and unique. The analysis is limited to differences between groups and does not reach the question whether the average for the group can be imputed to individuals in it.

The consistency and stability of between-class differences in average costs are the best indicators of whether observed experience is reflective of true differences between groups or merely the peculiarities of particular data. Observed differences between classes should be "statistically significant" or, in actuarial terms, "credible." Statistical significance concerns the probability that different data will produce the same amount of class separation. The higher the probability the more likely it is that the effects of randomness have been removed from the data and systematic differences between groups identified. A lack of stability in the size of differences

between classes can indicate any one of four things: (1) a spurious relation between risk and the factor used to separate the groups; (2) too small a sample size in one or both of the groups to enable a credible estimation of class-average costs; (3) variation in the mix of true high and low individual risks in each class; or (4) variation over time in the risks of individuals or the nature of driving conditions.

Assessments of statistical significance are closely related to judgments concerning the significance of the size of estimated differences between groups. This issue has been described in testimony and in other forums as the "separation" issue. The magnitude of the separation in average costs between classes is circumstantial indication of the extent to which the accident propensities of class-members are likely to overlap.[24] The smaller the separation the more likely as well that the difference indicated is not of sufficient magnitude to withstand likely variation in underlying risk over time--the third and fourth reasons for fluctuations in experience cited earlier. Qualitative assessments of the magnitude of separation are judgmental; but these kinds of judgments are a necessary part of the companies' own decisions concerning the categorization and pricing of insureds.[25] The regulator should make comparable judgments, especially as the estimated differences between classified groups becomes increasingly small.

Finally, a variable has identified a unique difference between groups only to the extent the difference is not already identified by some other variable in the system. Logically the more numerous the variables used the more likely they are to be redundant. For

example, consider the two hypothetical classification variables discussed earlier, one relating to the quality of driver vision and the other to the quality of driver reflexes. There is a substantial likelihood that drivers with poor vision will also be significantly represented among drivers with poor reflexes. If the two variables are evaluated independently, the experience of persons with both impairments will be counted twice. A variable must fail the accuracy test if its specific contribution to risk assessment cannot be identified beyond that which is already accounted for by other variables.

4. Within-Class Variation in Expected Losses

Under current practices the risk of the classified group, as estimated based on class-average loss experience, is imputed to each individual within the group; and actuarial analysis stops there. The approach is convenient and consistent with competitive objectives. Yet the statutory standard concerns fairness to individuals and not to groups. Ultimate resolution of the issues here depend upon more than the traditional analysis concerning differences between groups. Critical to a determination of predictive accuracy is the validity of the central assumption of the traditional approach: whether or to what extent the average accident propensity of the group may be properly imputed to the individuals within the group.

All agree that classes must be homogeneous to meet the statutory standard.[26] Disagreement is addressed to the choice of standard for measuring homogeneity, to the treatment of degrees of imperfection, and to the appropriateness of sensitivity to the consequences of imperfection for individuals. Industry-proposed standards would hold a class to be homogeneous if it (1) contains "no clearly identi-

fiable subsets with significantly different loss potential" in the same class, as determined through competition,[27] and (2) consistently identifies differences in class-average costs.[28] However, these standards provide limited insight. An appropriate test involves direct assessment of within-class variation in risk.

a. Absence of Clearly Identifiable Subsets

The identifiability of subgroups within existing classifications says something about the homogeneity of classes but raises as many questions as it answers. The industry does not propose that all identifiable subgroups be separately rated. Obviously current plans would fail on these grounds. For example, companies group youths by sex and not mileage, and adults by mileage and not sex; companies underwrite on the basis of occupational category but make no effort to price these categories separately. The value judgments implicit in identifying some "subsets" and not others again becomes an issue.

The important wrinkle in the proposed homogeneity test, which effectively immunizes existing class plans, is that the "clearly identifiable" subsets must also have competitive appeal. As explained by ISO's Michael Walters, "[I]t is in every insurer's best interest to try to find better measures of expected costs to put like individuals together."[29] In Mr. Walter's view there is at work a "continuous competitive process to refine and to find within broad classes whether there are identifiable subsets with a purpose, competitive purpose of making higher profits . . . to write the better risks within that class and identify them clearly over the years."[30] Under this thinking, the competitive pressures to identify subsets within classes is so strong that if a subset has not been identified there must be good reason.

The argument assumes unrealistically that the industry competes equally for all subclasses of insureds, even when optimally priced. By their own admission, they do not.[31] The argument also ignores the industry's historical resistance to change, however clearly indicated by conventional cost analysis. For example, traditional methods for computing the expense portion of premiums, now discredited, took the prodding of regulators to modify.[32]

The principal reason for failing to identify subsets, in the Walters view, is "practicality" or, as earlier discussed, feasibility.[33] The proposed homogeneity standard therefore serves not to test homogeneity but to justify lack of it: practicality and homogeneity are "sometimes opposing forces," Walters admits.[34] Whatever the validity of a practicality (or feasibility) defense to an allegation of unfair discrimination--reminiscent perhaps of the very limited "business necessity" defense in employment discrimination cases--the proposed standard adds little to the discussion of homogeneity per se. In fact, by limiting its attention to potential "subsets" of existing classifications the proposed test limits the possibilities for challenging the status quo. Cost-effectiveness concerns will severely limit innovation since the refinement of existing classes, and not the substitution of new variables, quickly becomes the only economic option.

b. Consistent Identification of Class-Average Differences

Industry witnesses also suggest that the consistency with which class variables identify differences in class average costs is a measure of their homogeneity. If the classes were not homogeneous, it is said, "switches and crossovers" would occur.[35] This argument

confuses two separate matters: the stability of class averages and the similarity of risks within classes. In fact, the consistency with which one class shows higher average loss experience than another merely reflects the consistency in composition of the classes and not the distribution of high and low risks within each class.

Analyses of class-average losses consider only the expected loss for each class, distinguishable from the expected loss of each individual within the class. Overcharges result when the expected loss of the individual is less than the expected loss for the class, and undercharges result when the individual's expected loss is greater than that for the class. These overcharges and undercharges amount to pricing errors. State Farm's Michael Miller concedes that a "condition of a homogeneous class is that the expected loss of each of the individuals in that class should be relatively close to the mean expected loss of the class."[36] Disagreement lies in whether and how the expected losses of individuals may be inferred from experience.

c. Direct Assessment of Within-Class Variation in Risk: Explanatory Power and Homogeneity Analyses

The traditional industry approach ignores the availability of analytical tools which can look behind class averages to assess directly the extent of similarities and dissimilarities in risk within classes and the kinds of pricing errors taking place. Nonetheless, at least one industry actuary, The Hartford's Richard Woll, is prepared to break with tradition:

> "I believe that the time has passed when actuaries can be content with focusing their attention on mean class rates without explicit concern for the kind of classes that exist. I think we are being told that if we wish to charge people different

> prices for equivalent amounts of insurance, we are going to have to do a better job of explaining why we group people the way we do."[37]

At the Department's lead, and with the participation of Mr. Woll and other industry actuaries, together with witnesses offered by the Public Advocate, the analytical techniques required to look behind class averages were the single greatest subject of testimony in these proceedings. Significant new ground was broken.

The direct examination of the distribution of claim frequencies across individuals within the insured population permits estimation of total variation in inherent or systematic risk among individuals. From this assessment, in turn, can be derived an estimation of the explanatory power of classification plans and a very specific notion of the homogeneity of the classes defined by these plans. The most technical aspects of the subject are addressed in depth in the Appendix.

Explanatory Power

Explanatory power estimates give a broad view of the overall effectiveness of a risk classification system. The procedure compares the range of variation in average expected losses or average claim frequencies across defined classes with the range of variation in systematic risk across individuals in the population at large. The ratio of group variation to individual variation indicates the percentage of overall variation in risk explained by the classification system and hence the effectiveness of class variables in identifying all the various differences among individuals known to exist in the population. If each individual in the population has an expected loss corresponding to the expected loss of his or her assigned class, the

variation in group expected losses and individual expected losses will be identical; and the "explanatory power" or "efficiency" of the class plan will be estimated at 100 per cent, meaning that 100 per cent of the variation in systematic risk among individuals is "explained by" the class variables. The extent to which the fraction explained is less than 100 per cent indicates the extent to which variations in individual risk are buried in class-average experience.[38]

Substantial attention has been given to deriving explanatory power estimates for each of three major classification plans used in New Jersey. Separate assessments have been made as well with respect to the relative explanatory power of individual classification variables. The results provide a very specific indication of the extent to which class plans and their component variables are accomplishing the predictive functions intended for them.

The ultimate significance of percentage measures of explanatory power or efficiency varies according to the absolute variation of systematic risk among individuals. In a population where the total dollar-variation in risk is relatively narrow, the importance of less than 100 per cent efficiency is correspondingly small. Conversely, if the dollar variations in risk have a broad spread, as they appear to have in New Jersey, any failing can have an important bearing on the question of unfair discrimination. The most important considerations in an analysis of explanatory power go to the magnitude of risk variations left unexplained by class-average experience.

Homogeneity

Measuring variability among individual risks has its greatest relevance to the issue of unfair discrimination when it reveals the

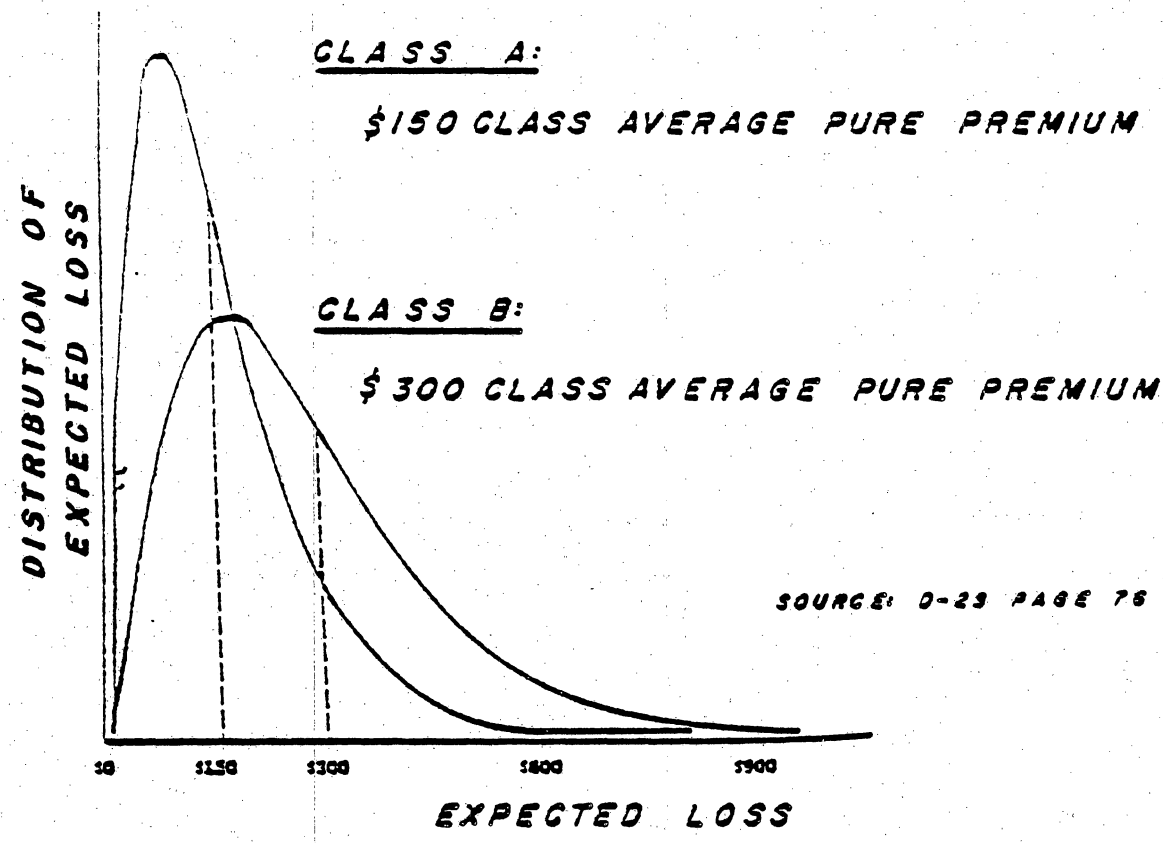
impact of class refinement on particular groups of individuals and related distributions of pricing errors. Explanatory-power analyses are of limited usefulness in this respect. Two factors with equal explanatory power can generate substantially different dollar impacts on individuals whose inherent risks are not fairly represented by applicable class averages.[39] The homogeneity analysis therefore goes behind class averages to determine the extent to which estimates of class average risk are representative of the range of risks within the class. The results amount to an assessment of the extent to which insureds placed in the same classes are in fact "essentially the same" as required by law.

A standard picture of heterogeneous classes is depicted in Figure 3. The graph illustrates that in a class with an average risk of $300 and the degree of heterogeneity indicated, about one-third of the members of the class represent risks at least 70 per cent or $210 above or below the mean. In a class with an average risk of $150 and the same degree of heterogeneity, about one-third of the members have risks at least $105 above or below the mean.[40] The graph also shows that although the <u>average</u> loss experience for the $300 class is twice as large as for the $150 class, the curves for the two classes overlap substantially. On the basis of these curves it can be estimated that approximately 26 per cent of the insureds in the $300 class have expected losses <u>less</u> than the average expected loss for the $150 class; and about 9 per cent of those in the $150 class have <u>higher</u> expected losses than the average for the $300 class.[41]

In contrast to this picture of heterogeneity, Figure 4 posits the hypothetical ideal of two relatively homogeneous classes. Here

FIGURE 3

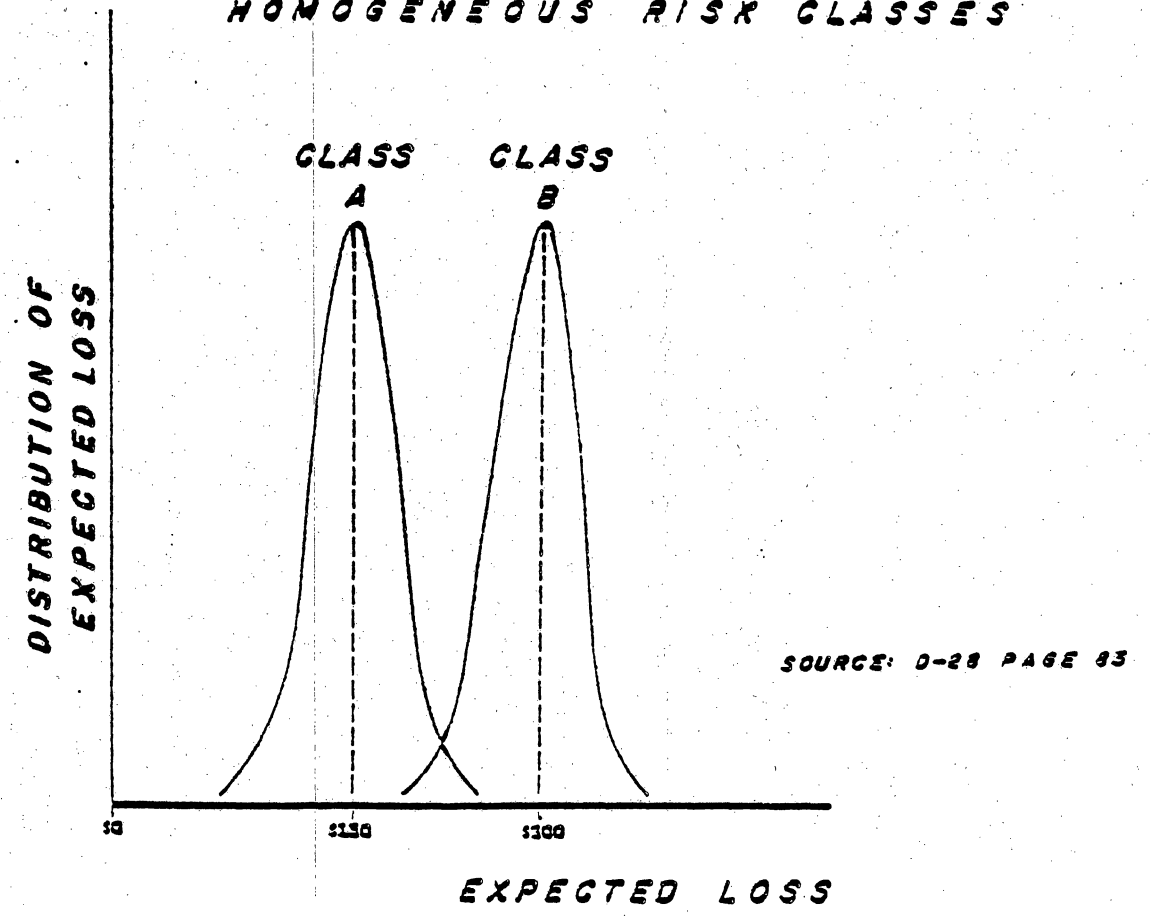
HETEROGENEOUS RISK CLASSES



SOURCE: D-23 PAGE 76

FIGURE 4

HOMOGENEOUS RISK CLASSES



SOURCE: D-28 PAGE 93

two-thirds of each class are estimated to be within $34 of the mean. Although some significant differences in risk remain unexplained, the two classes are homogeneous in practical terms. There is little overlap.

The picture of homogeneity depicted in Figure 4 reflects a state of perfection which would elude any classification scheme reasonably conceivable. However, it represents at least one standard for determining whether risks within the same class are "essentially the same." The extent to which risk classes can deviate from this ideal standard and still meet the test of homogeneity depends in large part on the relationship between the size of within-class variation and the magnitude of class average costs. The larger the class-average cost, the less within-class variation is tolerable. A major thrust of these proceedings has been an effort to determine whether New Jersey classes look like Figure 3 or Figure 4.

5. Evaluation of Classification Inaccuracies

The four-part predictive accuracy analysis addresses the extent to which classifications accurately identify differences in risk among individuals by placing in the same classes risks which are "essentially the same" and in different classes risks which are essentially different. However, this threshold determination is not dispositive of the predictive accuracy question. Even if it is found that a classification contains significant numbers of risks which are substantially different and different classifications contain significant numbers of risks which are substantially the same, the outcome is not self-evident. It remains to be determined whether the indicated degrees of difference among risks within classes are unreasonable.

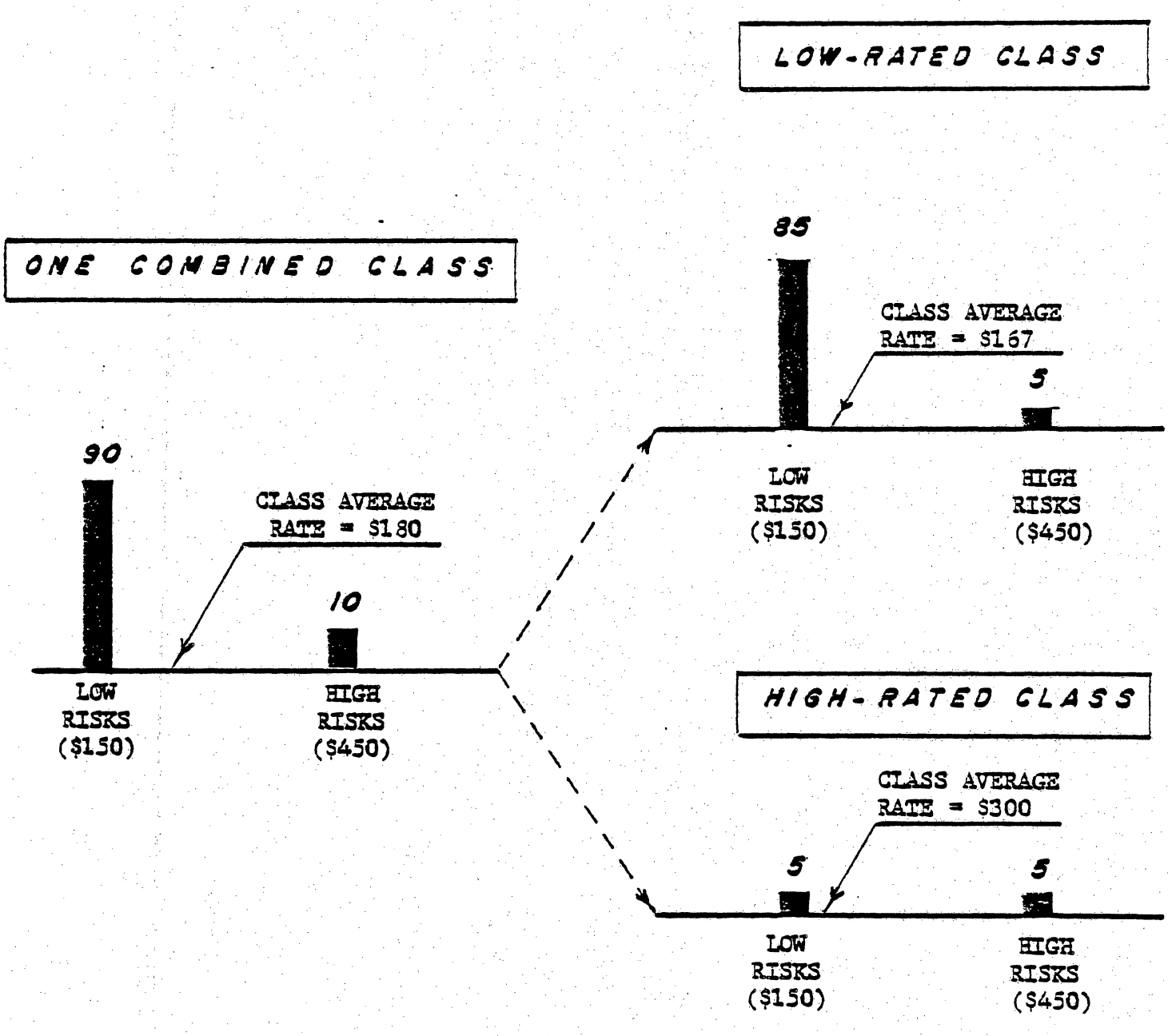
Resolution of this issue depends on the standards adopted for evaluating the significance of overcharges and undercharges which flow from the inaccuracies in question.

The hypothetical risk distributions in Figure 5 depict the typical tradeoff between classification refinement and individual overcharges and undercharges, as discussed in testimony by Dr. Joseph Ferreira.[42] The hypothetical assumes a population of 100 drivers with an average claim cost of $180 per person per year. This average claim cost represents 90 people with an average risk of $150 and 10 people with an average risk of $450, although they cannot be individually identified. If the risks are not broken up into separate classes everyone pays $180 (properly loaded for expenses and profit). It is further assumed, however, that an effort is made to break this population up into high risks and low risks based on some classification variable. Two classes are created but because risk assessment is imperfect one class consists of only a preponderance of low risks, say 85 people at $150 risk and 5 people at $450 risk; and the other class consists of a mix of high and low risks, say 5 people at $150 and 5 people at $450 risk.[43]

If one knew nothing about the distribution of risks within the hypothetical classes and looked only to class average experience, the low-risk class would be priced at $167 and the high-risk class would be priced at $300, representing the average of the risks in the respective classes. If no classification had been attempted, the 90 low risks would have been overcharged $30 and the 10 high risks would have been undercharged $270. Classification results in a new mix of overcharges and undercharges: 90 low risks are overcharged--5 by $150

FIGURE 5

THE IMPACT OF CLASSIFICATION REFINEMENT ON THE DISTRIBUTION OF PRICING ERRORS: TWO-CLASS HYPOTHETICAL



SOURCE: D-33

and 85 at $17--and 10 high risks are undercharged--5 by $283 and 5 by $150. Overcharges to low risks in the high-rated class have been increased $120 to permit a $13 reduction in overcharges to low risks in low-rated classes.

If predictive accuracy is viewed in the abstract or absolute sense, one might argue that dividing the hypothetical population into two classes results in more "accurate" premiums overall. The pricing errors under each scenario add up as follows:

NO CLASSIFICATION			TWO CLASSES			
90 overcharges	@ $ 30*	= $2700	5 overcharges	@ $150*	=	$ 750
10 undercharges	@ $270	= 2700	85 overcharges	@ 17	=	1445
		$5400	5 undercharges	@ 283	=	1415
			5 undercharges	@ 150	=	750
						$4360

*largest overcharge

The systemwide total of overcharges and undercharges has been reduced about 20 per cent as the result of classification. However, in order to achieve this overall reduction in total pricing errors the overcharges imposed on low risks in the high-rated class have been increased five-fold. The percentage increase in overcharges to this group is 20 times as large as the percentage decline in overall errors.

If standards for evaluating classification imperfections focus on the size and distribution of overcharges, the tradeoffs depicted in this hypothetical require a conclusion that the imperfection of the classifications here have resulted in excessive overcharges for a fraction of insureds and that the degrees of difference among the risks within these classes are therefore unreasonable. The fact that the overcharged individuals cannot be identified is not important as long as the identity of the affected class and the extent of related

overcharges are known. Specific intent is not a required element of unfair discrimination under the rating statute.

Under a compulsory insurance regime, at least, the avoidance of large overcharges--what has been referred to in testimony as an asymmetrical attitude toward overcharges and undercharges[44]--is an appropriate subject of regulatory concern:

> "One $100 overcharge should be of more concern than ten $10 overcharges. Undercharges are a concern primarily because others must be overcharged in order to make up the shortfall."[45]

This standard comports with commonly accepted principles of fairness and suggests the indivisibility of accuracy and fairness issues in this respect.

The adoption of an asymmetrical attitude toward overcharges and undercharges is in fact a compromise. A stricter view would be less tolerant of any degree of inaccuracy. This view would hold that if classifications are shown to be differentially inaccurate in the absolute sense, they should be prohibited. In such a case the burden would be on the proponent to either replace the inaccurate variables or do without them.[46] The proposed compromise standard, in contrast, can permit the use of imperfect classifications as long as unreasonably large overcharges are avoided.

B. Fairness Issues

The predictive accuracy analysis does not necessarily resolve the ultimate issue regarding fairness of classification distinctions. At least two additional inquiries are required with respect to: (1) issues of law concerning the acceptability of status classifications as a basis for differentiating premiums; and (2) questions in particular cases concerning the fairness of individual accountability for the full extent of inherent risk, however accurately identified.

1. Issues of Law

All classification variables must meet a legal standard of acceptability. The extent of the predictive imperfection of given variables will have varying degrees of relevance to interpretation of this legal standard. In some cases the importance of empirical demonstrations drops out and the legal standard is itself dispositive. For example, few would disagree that classification based on race or religion, however correlated to differences in average accident experience, would be an impermissible basis for rate determination.

The issues of law and equity are especially poignant under laws of this State which have eliminated freedom of choice in the purchase of insurance. Compulsory insurance is appropriately likened to a tax on the use of the public highways. The tax is both onerous and regressive.[47] Those as groups least able to afford the compulsory coverages--the young, the residents of cities--and least in need of much of the property-protection they provide, are required to pay the highest premiums.

Under all the classification plans currently in use the price paid for insurance is largely determined by what one <u>is</u> and not what one <u>does</u>.[48] Large differences in premium are predicated on the immutable characteristics of age and sex and the variety of social and economic factors relating to marriage, family, educational background and place of residence. The individual has no more control over these factors than the decision to pay the premiums they determine.

The central role of age-, sex- and status-based variables under current class plans appears inconsistent with the fundamental notion that the imposition of legal burdens should bear a meaningful

relationship to individual responsibility. Although completely individualized treatment of insureds is not feasible, the public rightfully expects that factors related to behavior and not biological or social stereotypes should be prime determinants of mandatory insurance rates. This rudimentary sense of fairness must influence the regulator in the application of statutory proscriptions.

Specific legal issues are also raised. The most encompassing formulation of these issues is whether rating systems which differentiate between insureds based on immutable personal characteristics or characteristics relating to social and economic status violate fundamental guarantees provided by Article I, paragraphs 1 and 5 of the New Jersey Constitution and are therefore "unfairly discriminatory" under the New Jersey statutes governing the regulation of insurance rates, N.J.S.A. 17:29A-1 et seq. In addition, because the prohibition against unfair discrimination in the insurance statutes is at least coextensive with New Jersey laws which prohibit discrimination of various sorts, questions arise whether the differentiation of automobile insurance rates based on age, sex or marital status is included among the prohibited discriminations, to wit:

a. whether the use of age, sex or marital status as a basis for rate classifications amounts to unlawful discrimination under the New Jersey Law Against Discrimination which declares to be "unlawful discrimination" the refusal of any person to "sell to . . . contract with, or trade with, provide goods, service or information to, or otherwise do business with any other person on the basis of . . .

race, creed, color, national origin, ancestry, age, sex, marital status, liability for service in the Armed Forces of the United States, or nationality." (Emphasis added), N.J.S.A. 10:5-12(l);

b. whether the use of sex and marital status as a basis for rate classification further violates the Law Against Discrimination which prohibits as "unlawful discrimination" the act of "any owner . . . agent, or employee of any place of public accommodation directly or indirectly to refuse, withhold from or deny to any person any of the accommodations, advantages, facilities or privileges thereof, or to discriminate against any person in the furnishing thereof . . . on account of the race, creed, color, national origin, ancestry, marital status, sex or nationality of such person." (Emphasis added), N.J.S.A. 10:5-12(f); and

c. whether the use of age as a basis for rate classification violates the New Jersey Trade Practices Act which prohibits "making or permitting any unfair discrimination solely because of age in the issuance, withholding, extension or renewal of any policy or contract of automobile liability insurance or in the fixing of the rates, terms or conditions therefor, or in the issuance or acceptance of any application therefor" (Emphasis added), N.J.S.A. 17:29B-4(7)(e).

2. Shared Responsibility for Risk

The so-called "responsibility issues" concern whether individuals should be accountable for the entire risk attributable to them in cases where other drivers or society at large share responsibility for conditions which affect the risk in question. This type of issue has been raised in testimony with respect to territorial traffic congestion and the allocation of responsibility for the driving risks associated with congested driving environments: whether the entire risk should be borne and paid for by the people who live in these environments or by all segments of the driving public which contribute to the congestion in question. The problem is analogous in many respects to that of "municipal overburden" which has been discussed in contexts unrelated to insurance.[49]

Another responsibility issue has been raised in connection with the uneven distribution of benefits and burdens under the liability coverages.[50] Because these coverages insure drivers for the payment of damages caused to third parties, the amount of exposure in a given accident is a material function of the wealth of the third party. In the case of property damage liability coverage, the extent of the insured's liability (i.e., the amount of the third party's claim for damages resulting from the insured's conduct) will be determined by the value of the claimant's car or other property damaged by the insured. In the case of bodily injury liability, the extent of the insured's liability will be determined significantly by the earning capacity of the person injured by the insured. Thus, a low-income insured who drives a jalopy, all else being equal, presents less liability risk to others than a higher income insured driving a more

valuable car. If the jalopy hits the luxury car the resulting liability claim will tend to be greater than if the luxury car hits the jalopy.

On still another philosophical plane it has been suggested that differentiation of rates based on place of residence involves the allocation of responsibility for crime problems.[51] The risk of motor vehicle thefts and vandalism has a direct impact on the cost of comprehensive insurance. Although this coverage is not compulsory as a matter of law it may amount to an essential coverage as the sine qua non for the financing of automobile purchases. The issue is whether only the residents of high-crime areas should bear the cost of crime or whether the burden should be shared by society at large.

The responsibility issues underscore the regressive nature of insurance premiums. Traffic congestion and high crime rates are most readily associated with low-income areas. The liability anomaly imposes its most consistent burdens on classes of insureds with the lowest incomes. Yet while current pricing practices have been quick to anticipate the probable impact of these factors on the expected loss experience of affected insureds, the proper allocation of responsibility for these costs has not been considered.

The anomalies of liability insurance and the issue of societal responsibility for the consequences of crime are beyond the explicit scope of these proceedings. Only questions relating to traffic congestion will be addressed here, because evaluation of cross-territory traffic flows requires close attention to empirical detail and is uniquely suited to resolution through reevaluation of territory boundaries and related rate differentials. Nonetheless,

responsibility considerations bear important implications for the pricing of imperfect classification systems. These considerations should be weighed in the balance when exercising judgments with respect to allocating the costs of imperfections and uncertainties among policyholders.

Section 4

DEMOGRAPHIC FACTORS: AGE, SEX, MARITAL STATUS AND RELATED CLASSIFICATIONS

I. THE PREDICTIVE ACCURACY OF YOUTH-RELATED CLASSIFICATIONS

A. Relation to Hazard of Loss

The rationale for the use of age as a rating variable focuses on arguments supporting separate treatment of youths and adults. These in turn depend largely on a stereotype of the adolescent driver. The argument in favor of youthful classifications contends that limited driving experience, coupled with a lack of maturity and the constraints of "real-world" responsibilities, cause youthful drivers to have significantly greater accident likelihoods than their parents or other adults.[1] The adolescent is on two learning curves, it is said: one for learning to drive, the other for learning to be an adult.[2] Before developing the skills needed to cope with a full range of driving situations, the youth must learn to cope with alcohol, sex and a variety of peer pressures which will affect the consistency and conservativeness of driving behavior. All variables uniquely applicable to young drivers would appear to be based on this reasoning or some variant of it.

1. The Hazards Sought to be Measured

a. Age

In addition to a lack of driving experience, youths who fit the stereotype are supposed to share a common psychological profile. They tend to use the automobile as an outlet, it is said, for enjoying "symbolically" a number of adult satisfactions, such as "risk-taking, status enhancement, demonstration of knowledge and virtuosity," which they cannot enjoy in "real life." As pointed out by more than one industry witness, citing studies by the U. S. Department of Transportation:

> " . . . [T]he automobile offers [the adolescent] a degree of autonomy and social equality which he cannot enjoy otherwise because of his sub-adult status. The more severely he is restricted in these respects, the more likely he is to use the automobile as a compensatory mechanism and an emotional outlet.
>
> " . . . A youth who is oversensitive to the actions of others may react with 'getting even' behavior, finding an excuse for racing or speeding or employing obstructionist tactics toward other drivers.
>
> "Or to prove his maturity and his mastery of the situation, the uncertain and insecure youth may race around, stop with a screech, and overcompensate with show-off kinds of driving."[3]

It is implied that these youths also share a common lifestyle, involving greater use of the car for "recreational" than "occupational" purposes. Implicit is the notion of a typical adolescent social life which has younger drivers using "more hazardous portions of the road than older drivers at more hazardous times--at night, for example, when visibility is poor."[4] Lifestyle considerations reach full flower with the refinement of age classes by sex, marital status and academic standing.

b. Sex

The rationale for sex-based distinctions has not been developed in detail. The major thrust of industry testimony was merely that over time there appeared to be a difference in the average loss experience of males and females. A more pointed account was offered by Philipp Stern, formerly Chief Actuary for this Department, who participated as an industry actuary in the formulation of the first class plans.

Mr. Stern recalls that the classification for young males under 25 grew out of publicity surrounding revelations by motor vehicle

authorities that young male drivers had a higher accident rate than other drivers. The bureaus created the class to respond to public pressure for increasing the insurance rates of this group so that other drivers could enjoy lower rates.[5] However, when several years later the possibility of a separate classification for females was raised, the feeling was that females spent little time behind the wheel:

> "If they go out, their boyfriend drives. Maybe they drive their mother on Saturday to the store. They don't drive much."[6]

Attitudes about the "traditional roles" of males and females are necessarily part of the thinking which seeks to distinguish among drivers on this basis.[7] One study hypothesizes that with respect to teenagers at least a difference between males and females may be attributable to the relative aggressiveness and macho behavior of young males. Even here the focus is on the importance of traditional sex roles:

> "Family dysfunction and social stress seem to be important in the causation of accidents in males, but not females. The important predictor for females seems to be exposure to risk or actual mileage driven. These preliminary studies give credence to the hypothesis that for males, auto accidents, like social deviancy, are symptomatic of family disorder. That females do not choose this avenue of expression of conflict is probably due to sex-role limitations on macho behavior in girls."[8]

c. Marital Status

The contours of what insurers would consider the preferred and non-preferred lifestyles are further refined in the marital status criterion. Implicit is the notion that marriage for the youth offsets an otherwise likely lack of maturity and responsibility. Of special importance, necessarily, are beliefs as to differences in married and single lifestyles. In order to qualify for the married class under

the ISO and Allstate rules, the married couple must live together. Divorce, legal separation, or the death of the spouse generally reverts the youth to single status. However, if there are children involved, the spouse retaining custody continues to be married for rating purposes under the ISO and Allstate plans. The State Farm rules have no reference to child custody, nor would they disqualify an insured if the spouse dies. The only requirement that State Farm imposes is that a couple not be "estranged" and that they maintain a single household.[9]

No industry witness sought to explain the marital status variable in explicit conceptual terms, relying primarily on class-average cost indications, to be addressed further below. The one industry source to provide insight was the personal lines underwriting manual of The Continental Insurance Companies, offered in evidence by the witness for New Jersey Legal Services. With a degree of candor reserved for such manuals, the instructions to Continental's underwriters explain the importance of an applicant's marital status as follows:

> " . . . The married man usually spends his evenings at home with his family. A considerable percentage of the accidents when unmarried men are driving occur in the late evening or after midnight. More often than not they have been drinking. Persons who drive in the late evening or early morning are over-exposed to drunken drivers even if they are above average drivers themselves.
>
> Any variation from the normal conventional mode of living usually has an adverse influence on a risk. Marriage is the normal state for mature adults . . .
>
> The divorced or separated male is, in our opinion, more undesirable than the man who has never married. The same is true in comparing the divorcee and the unmarried female. Some divorced persons are the innocent victims of circumstances. Others

> are divorced because they are emotionally unstable. That is almost surely to be the situation with the person who has been divorced twice. We should leave him or her alone." (Emphasis added)[10]

The excerpt sketches vividly the kinds of lifestyle stereotypes which provide the underpinning for marital-status classifications. It also reflects a preoccupation with males. Single females are not at all identified with the out-at-night, drinking-and-driving lifestyle of the single males. Married females are not discussed at all.

d. Good Student Classifications

The importance of perceptions concerning degrees of maturity and responsibility among youths is also reflected in the so-called "good student" classifications. The stereotype is fairly specific. The student must be enrolled full-time and maintain at least a "B" average or rank scholastically in the upper 20 per cent of the class. After high school the youth may qualify only by being enrolled in a college or university and, under the State Farm rule, in an "academic" curriculum.

The apparent rationale for the good student classification is that youths who maintain good grades in school are more mature and responsible--more stable--than other youths. However, State Farm's continuation of the discount for college dropouts[11] is at least partially inconsistent with this reasoning. Exclusion of full-time vocational students and part-time (self-supporting) students of all sorts by both ISO and State Farm further clouds the rationale for the classification.

Under current pricing practices the significance of good academic performance is relative to other factors. ISO offers the possibility of good-student status to single females 17-24 and to all

males 17-24. The percentage amount of the ISO discount varies in direct proportion to the steepness of the rate otherwise applicable, the highest discounts going to single males under 21. Married females are ineligible for the discount at any age, apparently because they are already treated as adults for rating purposes and are presumed mature regardless of educational status. State Farm limits the good student discount to unmarried males under 25 and continues the credit after graduation until the youth marries or reaches age 25. The percentage amount of the State Farm discount is essentially uniform across the affected age groups.

e. Resident Student Rules

The "resident student" discount is the one other instance in which the companies look to a youth's status as a student to reduce the otherwise applicable youthful rate. The application of the rules vary according to the sex of the youthful driver in question. The reason resident-student status is expected to compensate for the disabilities usually attributed to youths is not clear and was not explained in the testimony. Perhaps the companies perceive this group to be more responsible than other youths. Another explanation could be the extent to which the away-from-home student is likely to use the insured car. This explanation is more logical, but degree of usage is already accounted for under the occasional- and principal-operator distinctions.

f. Occasional and Principal Operators

The logic of the distinction between occasional and principal youthful operators is also blurred. Logically, the more the youthful driver uses the insured car, the greater the youth-related risk to be associated with the car. However, the amount of usage attributable

to the youthful operator is not what the distinction measures--only the degree of such use. Under the current plans, if one youth drives fewer total miles than another but drives a greater fraction of the total mileage on a particular car than the other, a higher rate may apply to the lower-mileage youth. Under the Allstate plan, for example, where 25 per cent is the fraction of total usage which distinguishes between "basic" youthful operators and the lower-rated "restricted" operators, a car driven 7,500 miles per year with a youth driving 2,000 miles pays a higher rate than a car driven 25,000 miles per year with a youth driving 5,000 miles.

The most logical explanation for the degree-of-usage distinctions is that they seek to distinguish between cars driven by youths based on who "controls" the car. If the youth is an "occasional" or "restricted" operator (or is away at college without a car) it may be argued that parents control when and how the car is used. If the youth is a "principal" or "basic" operator, by the same logic, parental influence may be limited. An excerpt from The Hartford's personal lines underwriting manual indicates the kind of company thinking along these lines:

> "For operators under 21 years old, evidence of parental control is an important consideration. For this reason young drivers with cars away at college are not generally desirable risks because they are outside the controlling influence of the home environment."[12]

g. Inexperienced Operators

The risk purported to be measured by "inexperience" classifications, affecting drivers who have been licensed less than three years, is lack of driver skill. Yet the rationale for imposing inexperience surcharges on the youngest drivers is difficult to fathom.

Driver inexperience is precisely one of the hazards claimed to be measured by the age variable as applicable to youths. Under the laws of this State most 17, 18 and 19 year olds have by definition been licensed less than three years.

In addition, there appears little logic to confining the surcharge to principal operators, especially in the case of youthful drivers. A possible explanation for this practice is that "occasional" and "restricted" youthful operators use the car so little or are sufficiently under the control of their parents as to negate the significance of their lack of driving experience to the risk presented. If this were the case, however, the significance of their age should be negated as well.

h. Driver Training

Under the ISO and State Farm class plans, the youthful driver under 21 who successfully completes an approved driver training course, as certified by a school official, is given a lower rate than youths without such training. The prerequisites for an approved course consist of a designated number of hours in classroom training and behind-the-wheel practice sessions. ISO requires 30 clock-hours of classroom training and 3 hours of actual driving. State Farm requires 10 hours in the classroom and 3 behind the wheel.

The apparent rationale for driver-training discounts is an assumption that new drivers who take the proper course of instruction improve their driving skills. However, limiting application of the discounts to youths under 21 draws into doubt whether this in fact is the industry's reasoning. Newly licensed adults or older youths get no recognition for commercial training programs even though, if they are ISO insureds, they are subject to inexperience surcharges.

Driver training discounts and inexperience surcharges are subject to still another inconsistency. Occasional youthful operators are for some reason not surcharged for inexperience. Yet discounts related to the driver training designed to overcome inexperience are extended to this group as well as the surcharged principal operators. In fact, under the ISO rating plan at least, the "occasional" youthful operator receives a larger percentage discount for driver training than the "principal" youthful operator.

2. Directness and Inclusiveness

a. Attitudes and Lifestyles

Emotional stability suggests a whole range of highly variable factors both innate to the individual and dependent on changing day to day circumstances. Among the numerous psychological traits hypothesized as important to an individual's driving behavior are response to stress, frustration threshold, relative insecurity and sensitivity to the real or imagined slights of others. These traits interact within a changing personal environment involving such factors as parental control, status of marriage, family dysfunction, social stress and a host of different peer pressures. It is unlikely that individuals could be accurately categorized on the basis of such variables even through individualized testing and observation, or that such testing could identify direct psychological links to driving behavior. The likelihood that proxies such as age, sex, marital status and educational standing could do as good a job is out of the question.

Furthermore, the broad demographic variables used in rating youthful drivers err by including those who do not fit the corresponding stereotypes and by excluding those who do. Immature, insecure

and overly aggressive drivers are not confined to the youthful categories, nor are single males the only ones who go out at night. Conversely, those who have married or gone on to college full-time are not the only youths who demonstrate maturity and a sense of responsibility. One can readily envision the stereotypes to which the youthful classes apply and agree that at least some fraction of teenage drivers are accurately described. However, the most that can be assumed is that the adolescent classes generally contain a higher proportion of irresponsible drivers than the older classes and that the mix in the lower-rated youthful classes is somewhat less pronounced.

The small size of the youthful driver population cause the irresponsible youths to impose especially heavy burdens on the others in their age group. The distribution of motor vehicle points in the New Jersey driver population reflect the disproportions here. If an irresponsible driver may be defined hypothetically as any driver with four or more points, irresponsible youths outnumber irresponsible adults by less than 2 to 1; but they represent a fraction of the youth population more than 3 times as great as the fraction of the adult population represented by irresponsible adults.[13] If hypothetical lines be drawn to define an "irresponsible" driver differently, say as anyone with any points, or, at the other extreme, as anyone with 6 or more points, the disproportions change only in degree. When the respective numbers of insured cars in the two groups are also considered, the disproportions are much larger. Licensed adults outnumber licensed youths about 2 to 1, but adults have about 4 times as many insured cars.

Whether drivers with as few as a single point or with as many as 6 points or with something in between should be defined as

"irresponsible" is of course debatable. Whether all drivers below a certain chronological age should be similarly classified is no less debatable. Under a crude system which depends only on averages, a more important question is whether a given definition is more likely to capture a higher proportion of irresponsible drivers than some other definition. An equally important question is whether definitions which identify ever larger proportions of irresponsible drivers do not at the same time make excessive the price for responsible drivers who do not fit the same psychological mold but share in common the characteristic stressed by the class definition.

The individuals most heavily burdened by the narrow base of the youthful classes are the responsible single males. Yet all youths bear a disproportionately heavy burden caused by the irresponsible few among them. The higher number of irresponsible drivers in their age group combined with the comparatively small number of youths overall result in higher losses and a narrower base across which to spread them. This fact creates a fundamental anomaly in the current system: it is substantially more expensive to be a responsible youth than an irresponsible adult.

b. Driving Skill

Relative degrees of driver skill are directly linked to driving behavior and are more susceptible to classification than emotional and psychological factors. Presumably the behind-the-wheel driving tests and written examinations required for licensure do not demand the full range of skills required to be a safe driver. These skills are most likely to be obtained through experience; and for at least the very youngest drivers, age would permit inferences about this lack of driving experience.

Under current industry practices driver-skill variables play a very limited role in risk assessment. A thirty- or forty-year old licensed for the first time pays a lower rate than the most experienced youths. State Farm makes no distinctions for inexperience. Allstate confines its inexperience surcharge to unmarried youths under 25. ISO makes no provision for inexperienced adults who are not "principal" operators.

Even among youths the companies' concern for actual driving experience is secondary. An observation in the Continental underwriting manual reinforces this conclusion:

> "Skill pertains to the know-how or the physical and mental ability to drive in a safe manner. The most skillful drivers might be the young male operators, but they also have the worst accident records by far of any age group."

The manual continues:

> "Persons who are learning to drive are not normal exposures. We cannot avoid the increased hazard of the teenager learning to drive the family car. There is some feeling [however] that on the average he is a better risk than after he has acquired the know-how but has lost the supervision that went with learning."[14]

The subordination of driver-skill considerations is reflected in the apparent illogic of compounding age and inexperience factors for the youngest drivers and limiting inexperience surcharges to youths who are "principal" operators. The obvious overlap between these variables would be difficult to price if an effort were made. In fact, the pricing of inexperience surcharges is entirely judgment-based and is immune to statistical analysis under current data collection procedures.[15]

The specific rationale for driver training discounts is similarly shaky, especially as they are currently used and priced.

While approved training need include only three hours of practice behind the wheel, discounts extend for up to three years. Independent research by the California Division of Motor Vehicles suggests that any effect driver training may have rapidly diminishes or disappears after the first year following the training. This research also concludes that any difference in accident and traffic conviction records between drivers with and without driver training is largely attributable to socioeconomic factors inherent in the two populations of drivers which have nothing to do with driver training per se.[16] Findings of this sort prompt further examination of the socioeconomic implications of this and the other youthful variables.

3. A Socioeconomic Perspective

The choices of rating variables for youthful drivers reflect the overriding importance of company perceptions concerning relationships between attitudes and preferred lifestyles. The Continental underwriting manual describes "attitude" as "by far the most important underwriting consideration."[17] The instructions to underwriters provide insight into both the elusive qualities of desired attitudes and the industry's preoccupation with them:

> "Whatever the assigned reason, the root cause of a very large percentage of automobile accidents is emotional immaturity or instability. This quality produces the attitudes and reactions which produce the accident. It is found in all walks of life. We know, however, that its distribution is not uniform. The questionable occupations which we have listed have more than an average amount of it. So do those who live in unfavorable surroundings. The environmental influences found there are not conducive to acquiring and cultivating attitudes that are characteristic of the good driver."[18]

The manual further advises:

> "We are seeking the means of identifying those categories of drivers who are less likely to possess the attitudes that are required to avoid accidents. From experience we have learned that certain facts and characteristics provide an insight into the type of driving attitude a person is likely to possess. They include:
>
> Character
> Occupation
> Stability and Credit Rating
> Marital Status
> Temperament
> Environment."[19]

(Emphasis added)

The underwriting guidelines reflect a very specific notion of perceived normalcy--the "model insured:"

> "We do not expect perfection, but our picture of the model insured is an emotionally stable, well adjusted person, conservative in his tastes and actions, who lives at peace with both his family and neighbors and possesses the following qualities or characteristics.
>
> 1. A high boiling point.
> 2. Dependable.
> 3. Lives within means and pays his debts.
> 4. Married. If previously divorced, not more than once.
> 5. Moderate in drinking and other personal habits.
> 6. Not an excessive entertainer or party goer.
> 7. Acceptable occupation."[20]

The youthful classifications, as a whole, seem to project this view of normalcy. The "model" youthful insureds are the ones who drive the family car, do well at school, care enough or are savy enough to take a driver-training course (if for no other reason than to reduce their parents' insurance premiums), and go on to college and marriage. In other words, the model youth is most likely a youth with "model insureds" for parents. The perceived importance of parents

and family environment is reflected elsewhere in the manual, underwriting instructions on the evaluation of a youthful risk who has a traffic record:

> "There is no sure-fire formula, but environmental and personal reputation are most important considerations in evaluating the youthful driver. If he is a school drop-out his traffic record is less likely to improve as he grows older than it would were he the type to value an education or had parents who do and who also exercise some control."[21]

Classification characteristics are used to make inferences about the attitudes and personal and family lifestyles of the applicant for insurance. These inferences, in turn, reflect value judgments as to the importance of an insured's socioeconomic circumstances. This fact coupled with a close examination of who pays more and who pays less under current classification systems raises serious question whether the youthful classifications as a whole attempt less to identify differences in how well, how much and where one drives than to apply price differences to groups of insureds in proportion to subjective images of desirability which relegate the deserving and conscientious disadvantaged to a permanent second-class status.

The most telling distinction is between youths whose parents on average pay their premiums and youths who, for insurance purposes at least, are probably on their own. One thing most of the youths in the favored youthful classes--good students, resident students, "occasional" operators--would appear to have in common is dependency on their parents. The various rate reductions awarded the favored youthful classifications, taken together, result in substantial reduction of the burdens of youthful rates for parents who pay the premium.

Parents are entitled to a rate reduction of from 20 to 40 per cent of base rate if the youth on their policy is listed as an

"occasional" or "restricted" operator rather than a "principal" one, or a reduction of up to 45 per cent of base rate if the youth is listed as a "resident student." In both cases (depending on company) the parents also avoid the application of "inexperience" surcharges amounting to up to 40 per cent of base rate. The parents would obtain an additional 10 to 25 per cent rate reduction if the youth is a "good student" and another reduction of 10 to 15 per cent if the youth is eligible for the driver training credit. The applicability or amount of these rate reductions will depend on the age, sex and actual or constructive marital status of the youth in question. If the number of youths in the family exceeds the number of vehicles, each such extra youth is added to the policy free of charge.[22]

The most important qualification for these substantial reductions from the youthful rates is the parents' ability or inclination to continue the dependency of their children after the age of majority. They must afford to share the family car. They must afford to send their child to college on a full-time basis, preferably away from home. They must live in a school district which can afford an on-the-road driver training program and counsels all of its students to take it.

In contrast, the hard-working and conscientious youth who owns a car and has not gone on to college full-time or in "academic" courses is automatically disqualified from any opportunity for rate reduction. The student who works full-time and attends college part-time, for example, can pay a premium up to three times as high as a full-time student passing the premium bill to parents. Independent youths, especially males, have little opportunity to overcome presumptions about the attitudes and lifestyle imputed to their age and sex.

The tendency to price independent single males out of the market reflects and reinforces typical industry underwriting policies. As enunciated in the Continental Manual, unmarried owners and principal operators under 21 are "normally" not acceptable for the standard and preferred programs and should be accepted only when, "as a minimum, we insure the parents' automobile."[23] In the argot of the trade the independent youth is aptly described as the youth "without parents."[24]

In an effort to take a closer look at the possible socio-economic implications of the youthful classification variables, Department staff have examined the distribution of ISO exposures by class within a cross-section of insurance territories distinguished by relative wealth. The purpose of the analysis was to determine whether insureds in the different territories are equally represented in the favored youthful classes, or, conversely, whether youthful insureds in the wealthier territories are correspondingly better represented in the favored classes than their counterparts in lower-wealth territories.

The territories selected, in ascending order of relative wealth,[25] were Camden, Newark, Jersey City, the so-called Southern Counties territory (Ocean, Atlantic and Cape May), the Burlington-Gloucester-Salem territory, the New Brunswick territory (including most of Middlesex County), the Morristown-Dover territory, and Northern Bergen County. The latter six territories represent the six largest territories by population. The demographic character of the territories range in degree from urban to rural to suburban, in that order, although these characterizations are subjective. As a whole the territories represent approximately 49 per cent of all cars insured voluntarily by the ISO companies.[26]

The distribution of exposures in the favored youthful classes within each of these territories, using ISO's combined single- and multicar data, is displayed in Table 4. The percentages indicated reflect ratios between (1) total insured youths in each territory accorded the favored classification and (2) total insured youths in each territory (classified as such) who by virtue of age, sex and marital status are eligible to be considered for the favored treatment if they otherwise qualify. The following observations are suggested.

Good Students

(1) The territories with the lowest percentages of eligible youthful operators in the "good student" class are Camden, at 8.7 per cent, and Jersey City, at 9.7 per cent. The territories with the highest percentages of insured youths in the good student class are Morristown-Dover, at 15.9 per cent, and Northern Bergen County, at 15.6 per cent. These territories are also at opposite ends of the relative-wealth scale.

(2) In absolute numbers the spread is more severe. Camden has 51 cars which have been granted the good student classification and Newark, the territory with the second fewest "good students" in number, has 152. In contrast, Morristown-Dover has 3,448 good-student cars and Northern Bergen County has 3,194. Morristown-Dover and Northern Bergen County have about 15 per cent more cars in

TABLE 4

DISTRIBUTION OF EARNED EXPOSURES WITHIN TERRITORY*

Territories Ranked by Wealth**		Good Student Credit		Married Males Age 17-20***		Driver Training Credit		Occasional Male Operators	
Code	Definition	Number	%	Number	%	Number	%	Number	%
07	Camden	51	8.7	10	7.8	87	30.0	96	32.5
02	Newark	152	11.0	26	8.3	239	30.3	272	43.5
01	Jersey City	350	9.7	47	6.1	577	31.1	810	44.4
27	Atlantic, Cumberland, Cape May Counties	1,514	10.9	356	9.9	3,794	47.5	1,937	26.5
14	Burlington, Gloucester, Salem Counties	2,033	14.4	421	10.3	4,445	55.2	2,262	28.5
40	New Brunswick	1,692	13.8	297	8.5	4,101	56.2	1,985	28.7
25	Dover, Morristown, Somerville	3,448	15.9	965	14.5	7,610	57.3	3,465	29.4
10	Northern Bergen County	3,194	15.6	1,075	17.1	7,289	60.6	3,867	34.3
	Combined	12,434	14.1	3,197	12.6	28,142	54.6	14,604	30.6

NOTE:

* Single and Multicar Exposures combined

** Territory wealth based on Gross Income, Number of Homesteads, Market Value of Homesteads.

*** Includes "Resident Students"

Percentages Based on Total Population of Eligible Youthful Operators Within Territory.

the good student class than the other six territories combined.

Married Resident Students

(3) There are similar differences among the territories studied with respect to ratios of married to unmarried youths in the 17-through-20 age group. (Logically, most of the "resident students," classified "married" though single, are found in this age group.) The Jersey City territory, at 6.1 per cent, has the lowest percentage of insured 17-through-20 year olds in the "married class." In numbers, Camden is the lowest. It has 10 cars insured in this class. In both percentage and absolute terms, Northern Bergen County is the highest. Approximately 17.1 per cent or 1,075 of its insured 17-through-20 year old youths are considered "married" for rating purposes.

(4) The total number of "married" 17-through-20 year old exposures in the first six territories is only slightly more than half (57%) of the total exposures so classified in the remaining two wealthiest territories--Morristown-Dover and Northern Bergen County.[27]

Driver Training

(5) Driver-training insureds are also distributed disproportionately. Camden, Newark and Jersey City

have the lowest percentages of cars qualifying for the discount. Each has between 30 and 31 per cent. Northern Bergen County has about 60 per cent. Here the territories clustered at the top with Northern Bergen County include Burlington and New Brunswick (Middlesex) as well as Morristown-Dover. Burlington is the lowest in this group with about 55 per cent. The Southern Counties are about at the middle with 47.5 per cent.

(6) The total number of eligible cars qualifying for the driver training discount in the two wealthiest territories is about 12 per cent more than the total in the other six territories.

Occasional Operators

(7) The percentage allocations of occasional operators do not follow the same pattern across territories as the other three favored youth classifications. In Camden and Newark, respectively, about 32 and 44 per cent of insured male youths aged 17-through-24 are in the "occasional" operator class. In Morristown-Dover and Northern Bergen County, respectively, the comparable distributions are about 29 and 34 per cent. This difference indicates that the "occasional-principal" distinction figures heavily in the underwriting or screening of young urban males. Principal operators of this age and

sex are less likely to get any voluntary coverage at all in these areas. Accordingly, when absolute numbers are considered, the distribution of occasional operators across territories resembles the distribution of other favored youthful classes. The occasional operators in the two wealthiest territories outnumber their counterparts in the two least wealthy territories by almost 20 to 1. The comparable ratio of principal operators is 33 to 1.

Throughout the analysis there persistently appear three echelons of territories. The lowest echelon consists of the low-wealth urban territories: Camden, Newark and Jersey City. They are lowest in terms of numbers and percentages of youthful insureds in the favored classes. The highest echelon consists of wealthy suburbs and suburban-rural areas: Northern Bergen County and the Morristown-Dover territory. These territories consistently show the highest numbers and percentages of favorably classified youths. In between these extremes are the three remaining territories, which are somewhat mixed as to relative wealth indicators and demographic patterns but are fairly closely bunched with respect to their relative shares of the favored youthful classes.

The observed relationships are of course crude because they depend on generalizations about groups. Within each of the territories, substantial diversity in wealth between different areas and municipalities and even between next-door neighbors is likely. In addition, company underwriting practices limit the sample.

Nonetheless, on average, the proportions of youths granted favorable pricing treatment are less in the urban territories than in the wealthy suburban territories. One explanation is that even the "cream" of the youths in the urban territories--from an insurance standpoint--are less advantaged economically and have less access to higher education than youths in the suburbs. Another possible explanation is that even though the urban youths selected for coverage are eligible for the favored classes in proportions equal to the suburban youths selected for coverage, the urban youths (or their parents) are not in fact being extended the price breaks available to them. Certainly the extent of public ignorance in these matters would permit such disparities in treatment to occur unnoticed.

Apparent correlations between rate differentials and relative wealth raise again the possible mixing of marketing and actuarial objectives first discussed in connection with the origins of the current system. It happens that the insureds who are the lowest rated under the system also happen to be the group with the greatest buying power and are most likely to buy insurance products other than mandatory automobile coverages. These considerations are substantially far removed from performance behind the wheel. Moreover, socioeconomic biases in the design of classification variables can only limit the extent to which similar risks are similarly classified.

4. Other Explanations for the Cost Differentials Attributed to Youthful Variables

As one youthful class variable is stacked upon another it becomes increasingly difficult to find a consistent, unifying rationale for them. In the absence of industry documentation on the specific origins of these variables, we can only speculate as to the motives

which prompted their selection. This complicates a factor-by-factor analysis which uses as a yardstick the hazards of loss sought to be identified and evaluates the factors based on their relative success in measuring them.

The actual impact of driver maturity and lifestyle on the average experience of entire classes of insureds is largely conjectural, especially since the personal characteristics of only one of the users of the insured car determine its classification for rating purposes. Although the personality of one user of a car probably has some bearing on the risk attributable to overall usage of that car, considerations of this sort do not necessarily account for all or even most of the differences in average loss experience between groups of cars delineated by age, sex and the related youthful variables.

Equally appealing is the hypothesis that age, sex and certain other youthful variables reflect, indirectly, systematic differences in amounts of vehicle usage. There is also the distinct possibility that the age variable measures as much differences in years of driving experience as differences in emotional makeup. These competing theories suggest the availability of alternative variables which more directly relate to driving behavior and vehicle usage, transcend age, sex and socioeconomic categories, and promise to be at least as inclusive of insureds sharing the same risk characteristics.

a. Amount of Usage

One of the principal industry contentions in support of youthful classifications is that youths, especially teenagers, have a uniquely high accident rate per mile. More than one industry witness cited the results of a California study which concludes that teenage

drivers average twice as many accidents as adult drivers, and because teenage drivers drive only half as many miles as adult drivers (on average), the teenager accident rate per mile is four times as great as that of adult drivers.[28] These contentions would suggest a high degree of sensitivity in expected insurance losses to the amount a youthful driver uses the insured car. Yet amount of usage by youthful drivers, however measured, is given little if any consideration in current classification systems (as suggested in the earlier discussion on principal-occasional distinctions.)[29]

The Significance of the Number of Operators

Except in those instances where the youth is the owner and exclusive operator, a car rated in a youthful classification reflects the addition of a youthful driver to an existing policy. Whatever the maturity, responsibility and driving skills of this youth, the additional usage will itself increase the insured car's total exposure to loss. When any siblings reach driver age and they too are added to the policy, total usage and consequent exposure to loss increase still further. Because the driver characteristics of only one user of the car determine its classification, these variations within the youth classes and between youth and adult classes respecting age of operators vis-a-vis number of operators is entirely ignored.

The 1964 NBCU Report on proposed classification refinements indicates the consistency with which cars with three or more operators include at least one youthful operator. The NBCU analysis was confined to single-car policies which at the time of the survey were rated in the class for adults 30 through 64. Approximately 92 per cent of this adult sample involved cars with only one operator or two operators

described as "male and spouse." Only 3 per cent of the adult sample involved cars with "three operators". Most of the three-operator group represented cars with female operators under age 25, for which a separate class had not yet been broken out.[30] (There was no figure indicated for cars having more than three operators. The balance of 5 per cent were miscellaneous two-operator policies.)

The younger the age category in which a car falls, the greater the number of possible additional operators under present rating plans. If the car is priced in a class for 17-year olds, any number of older youths may also operate the car without affecting premium; but if the car is priced in a class for 24-year olds, there is a good chance that no operator of the car is younger than 24. Furthermore, as the youths on the policy grow older, they are presumably less likely to continue to share a car.

These observations are also important because under current data-reporting systems losses are charged to the car and not to the individual operators for future pricing and classification purposes. Any accident caused by the older sibling (or parent) of the 17-year old will be charged to the 17-year old classification. Failure to recognize differences within the 17-year old class and other youthful classes with respect to the number and individual risk characteristics of other drivers of the car causes a needless compounding of costs for these classes.

Mileage and Gender

Testimony addresses the extent to which classification of youthful drivers based on sex reflect merely the differences in the average mileage driven by males and females as groups. The previously

cited study by the California Department of Motor Vehicles found that male teenagers average twice as many accidents as female teenagers; but because teenage males also drive twice as much on average as teenage females, there is no difference in accident rate between the sexes in the teenage years.[31] Other data cited in the California report indicate that accident rates for males and females per 100,000 miles driven are virtually identical from ages 17 through 29. The rate for females is significantly higher--in the neighborhood of 50 per cent between ages 30 and 50--at later points in life.[32]

These data emphasize the sensitivity of youthful accident experience to amounts of usage and cause serious question of the empirical soundness of sex-based distinctions. Female teenagers who drive as much as the average teenage male enjoy the lower rates attributable to the average low mileage of other females. Males who drive below-average amounts for their group are penalized.

At least two industry witnesses disagreed with this conclusion pointing to another California analysis. The additional California data compares the accident rates of males and females in each of seven annual mileage categories over a six-year period 1969-75. In each category males were shown to have a higher "annual accident rate per one million miles driven."[33]

The critical difference between the two California analyses is that the latter data, relied upon by industry witnesses, pertained to males and females of all ages and were not controlled by age of driver. In fact, licensed teenage males outnumbered licensed teenage females at the time of the study and the teenage males were also indicated to have been licensed earlier in life. Forty-three per cent

more males than females were licensed at age 16, and 21 per cent more males than females were licensed at age 19.[34] The accident experience by mileage category in the second analysis therefore contains a higher mix of older drivers in the female group than the male group. Conversely, there is a greater mix of teenage driving experience--reported to be four times worse than the adults on a per-mile basis--in the male group. The importance of this insight for the findings of the study is accentuated by the fact that there is no assurance that the drivers studied were licensed for the entire six years. If this in fact was the case, more of the youngest males in the sample are likely to have a full six-years of experience built into the results than the females.

The data confirm that the males studied drove an average of twice as many miles per year as the females. The average accident rate for females in the mileage category containing the most males was significantly higher than the rate for females in the category containing the most females. Conversely, the accident rate for the males in the mileage category with the most females was significantly lower than for the males in the category containing the most males. This evidence would indicate that differences in accident experience correlated to differences in sex are in fact substantially if not entirely correlated to differences in miles driven.

b. Number of Years Licensed

The merits of substituting a driver-experience variable for the age variable has been the subject of national debate among the industry and regulators for some time. In 1978 the Massachusetts Insurance Commissioner ordered the abolition of age as a rating variable

and the substitution of a driver-experience variable calibrated in numbers of years licensed. Any driver who had been licensed for less than three years was to be separately classified and priced. The three-year cutoff dovetailed neatly with the experience period under the Massachusetts merit rating system. At the end of the three-year period the driver's conviction and accident record would take over as a prime determinant of the price charged.

Commissioner Stone offered the following explanation for his decision, which I quote at length:

> "A variety of hearing witnesses described the age factor in youthful driver rating as a proxy for characteristics more causally related to accident occurrence. The most obvious reason why young drivers should have more accidents than older drivers is lack of experience . . . On the assumption that most of the young drivers in the sample obtained their licenses soon after they were legally permitted to do so, the filing data shows an extremely rapid improvement in record after only a few years on the road."
>
> "If age is serving in the rating system primarily as a proxy for experience on the road, one should expect that older people who learn to drive would have records which resemble the youthful driver records. The inclusion of older new drivers in the surcharged class should then raise its value as a predictor. This is exactly what the statistics show. An analysis of data in the State Rating Bureau's filing demonstrates that, if all drivers with less than three years of experience are grouped together in a class which releases those young drivers with more than three years on the road, the predictive accuracy of the risk assessment process is enhanced. In the state's sample, the use of an age variable alone explains 10.2% of inherent risk variance. The use of a three year driver experience factor alone explains 11.4% of the variance . . . "[35]

The data referred to by Commissioner Stone was 1972 and 1973 New York data which had been supplied by Allstate--the same data offered by Allstate in this proceeding. However, the efficiency

estimates computed for Massachusetts are not applicable here because the age variable in use in Massachusetts defined only three broad groupings by age--under 25, 25 to 65, and over 65. To the explanatory power of one of these broad groups--the under 25 group--was compared what was essentially a more refined class plan which segregated the under-25 groups into four separate classes, by individual year of licensure up to three years and a fourth class for drivers licensed more than three years. In New Jersey the age variable is considerably more refined.

Nonetheless, the Allstate data provide some useful insights into the possible significance of years-licensed as a rating variable. Allstate proposed the data here to demonstrate that even after controlling for number of years licensed, youths who had been licensed for more than three years generated higher loss relativities than adults who had been licensed for more than three years. The implication suggested was that "there is something there besides inexperience" with respect to the youthful classes, especially the 21-through-24 year old male.[36] This is a fair inference. The average loss costs per car for youths licensed less than three years were also somewhat higher than the corresponding experience of adults licensed less than three years.

The data may also suggest that number-of-years licensed is only a crude measure of different degrees of experience among drivers, especially youths. A sample of youthful drivers licensed for more than three years will contain a much higher degree of variability as to actual experience than a comparable adult sample. Adults classified as having more than three years experience will in the main have much

more than three years of experience, but youths in that category frequently may not in fact have had three full years behind the wheel. This kind of variability among youths is very likely here since the Allstate samples include any insured car driven by a youth as little as one-third of its estimated annual mileage.

The case for using number-of-years licensed as a substitute for age is essentially that such a variable can identify significant differences--as reflected in the Allstate data--and can separate out from the risks purported to be measured by the age variable that component of risk which is most susceptible to objective classification. If used in conjunction with other classification variables, say number of operators and conviction records, the "something else" purported to be explained by age could be filled in as well. A subsequent section of this report will discuss the potential significance of traffic conviction records as a primary basis for rating.[37]

A common objection to use of numbers of years licensed for the age criterion goes to the difficulty involved in verifying date of licensure information. The New Jersey Division of Motor Vehicles does not capture this data and has yet to come up with a reliable method for obtaining it.[38] The reporting problems are especially troublesome with respect to people moving from state to state.[39]

However, company objections on these grounds are inconsistent with application of the years-licensed variable to limited classes of drivers under present rating plans. Ironically, today the only classes to which inexperience surcharges can be applied with certainty are "those instances where the age of the insured would obviously preclude 3 years of driving experience."[40] The classes to which application

of years-licensed criteria, in addition to age, makes the least sense, are therefore the only classes to which the criteria can be applied consistently.[41] Inability to surcharge all drivers licensed for less than three years has not prompted termination of the practice.

B. Adequacy of Definition

The rating classifications applied to youthful drivers are defined with differing degrees of precision. When the interrelationships of the youthful variables are considered, moreover, definitional problems are magnified and the extent to which factors as defined lend themselves to fair and even application overall is questionable. The intricacy of the twists and turns in current systems and the wide range of possible rating slots for particular cars and their drivers far exceed the ability of consumers to understand how the changing circumstances of their personal lives affect the prices they pay for insurance.

Obtaining the most favorable automobile classification requires mastery of a considerable amount of detail or the assistance of a professional able and willing to steer the consumer through the system. If definitional intricacies and ambiguities prevent admission to the favored classes for applicants who do not belong there, they may also facilitate the exclusion of applicants even though they qualify. The complexity of the system effectively deprives it of any check on the uniformity and fairness with which rating variables are applied in individual cases.

Most of the youthful variables are clearly defined and easy to apply, at least at the time of application; but generalizations are difficult. Even age and sex variables are not immune to adminis-

trative problems. These variables cannot be applied accurately unless full information as to all users of the insured car is reported to the company. The ISO rules, for example, require that a car be priced in a youth classification whenever a youth of driving age is "resident" in the same household as the applicant or otherwise "customarily" operates the automobile. Yet once the youth has reached the age of majority any number of different living and car-usage arrangements are likely. The precision with which the complete truth is disclosed may vary significantly by insured. The greater the price consequences of age and sex classifications, the greater the inducement to play with the facts.

The information supplied at the time of application is not uniformly subject to verification. The reliability of most rating information depends on the perceptiveness of the agent and the truthfulness of the applicant. Under existing rules there is no procedure for confirming the identity of residents in the household or actual marital status. Classifications based on degrees of usage, years of licensure, distance to work and driving record, among others, also require no verification under existing rules. Driver-training and good-student rules alone require documentary confirmation.

Most classification variables also share common administrative problems in keeping rating information up to date. For example, although company rules would deny the marital status classification to someone divorced or separated, an insured couple can go through any number of trial separations and erratic changes in their living arrangements--not to mention emotional well-being--without ever

coming to the attention of the insurance company. Even a divorce may not become known to the company unless the insureds elect to advise it.

The status of students is even more difficult to monitor. State Farm's rules governing "children away at school" indicate the difficulties of predicting future applicability of lifestyle classifications and keeping on top of changes as they arise:

> "1. A son or daughter who resides away from home during both the school year and summer vacation but who occasionally operates the automobile while home on short infrequent visits shall be disregarded as an operator for the purpose of classifying the automobile.
>
> "2. A son or daughter who attends school over 150 miles from home but who operates the automobile occasionally while home during school vacation or holiday periods shall be considered as though married for the purpose of classifying the automobile."[42]

Under these rules a student can take a car to school for a semester or periodically commute between home and school after the policy is in effect without realistically jeopardizing the parents' insurance status or making them liars at the time of the initial application.

There is no indication that agents attempt to keep on top of the changing circumstances of their clients' personal lives. Changes in status are effected for the most part only when they are brought to the agent's attention.[43] Companies which bill their insureds on a direct basis may send their insureds classification questionnaires, but the insured's failure to return them is not a grounds for termination under the law.

Class variables which depend for their application on particular features of an insured's lifestyle necessarily face an uphill

fight to keep on top of changes. Without actual surveillance of the insured, and the substantial cost outlays and incursions on privacy such surveillance would entail, the adequacy of a factor's definition at the time the insured first obtains insurance and is first classified may have little bearing on its adequacy over time. Few classifications lend themselves to perfectly uniform application. Although this fact does not invalidate most variables, it makes less than compelling traditional arguments about the administrative conveniences of existing criteria.

The only youthful classification presenting uniquely troublesome definitional problems is the distinction between "principal" and "occasional" operators. For the ISO companies this distinction, applicable only to those youths rated as single males, means a premium difference of between 20 and 90 per cent of base rate--the latter for single-male principal operators over 25--and determines as well the applicability of an additional 40-per-cent-of-base-rate surcharge for inexperience.[44] Yet the ISO rules do not define the distinction, perhaps in recognition of the difficulties involved. Proper application of the principal-occasional distinction is uncertain in the most likely cases. The "frequent" operator falls somewhere in-between the "occasional" operator and the "principal" operator, as these terms are commonly understood. Also unclear is whether the youth must be "a" principal operator or "the" principal operator in order to pay the higher rate.

Under the State Farm system the distinction between "principal" and "occasional" operators means rate differences of from 50 to 70 per cent of base rate for young males and from 20 to 35 per cent

for young females. The criteria on which the distinction turns are the most elaborate of any company, but they highlight the resistance of the distinction to objective definition. A "principal" operator is defined as an individual whose operation of the insured automobile constitutes "50 per cent" or more of its total use, measured in either time or mileage, or whose "aggregate operation" of all cars in the household equals "50 per cent" or more of the "total time or mileage use" of one of the insured cars in the household. The designation also applies to an automobile if two or more single males under age 25 or two or more single females under 25--but apparently not a combination of the two--or two or more single males between 25 and 29 use the car on a combined basis "50 per cent" or more of its total time or mileage use.

Allstate has made a comparable distinction between "basic" (principal) and "restricted" (occasional) operators, turning on whether the youth in question drives more or less than a designated fraction of the total estimated annual mileage on the vehicle. Single males and single females under age 25 who drive "over 25 per cent" of estimated annual mileage pay a rate up to 49 per cent higher than those who drive "25 per cent or less." For Allstate's single males from age 25 through 29, the line is drawn at 50 per cent of estimated annual mileage and the rate differential is as high as 93 per cent of base rate.[45]

The numerous assessments of degree required even by the detailed State Farm and Allstate definitions make the role of subjective judgments impossible to confine within reasonable bounds. Judgments are critical even if all the underlying facts known by the

applicant are disclosed precisely. Changes in degrees of usage over time can be neither monitored nor reasonably anticipated. The subjective assessments required, coupled with the substantial differences in premium which turn on them, make the classification essentially unworkable.

C. Measurement and Pricing of Between-Class Differences

1. Data Problems

a. Rating the Car and Not the Driver

The fact that the classification of the insured car is determined largely by the personal characteristics of only one of the users of the car limits the significance of class-average cost comparisons with respect to analyzing the risk characteristics of particular types of drivers. All accidents in which the car is involved are charged to the predetermined classification for that car, regardless of who was behind the wheel at the time of the accident. If a car is rated in a youthful male class, for example, an accident caused by the youth's mother, father or sister will be charged to youthful males.

It is argued that if operators and not cars were the subjects of classification, extremes in premium would actually increase. This view holds that including in the youthful male class cars other than those driven exclusively by youthful males actually tempers the rate in favor of the independent youthful males. Removing the accidents caused by mothers and fathers from the youthful class would remove from that class all cars driven by families; and that class of cars, it is hypothesized, has better average loss experience as a class than cars whose sole operators are youths.[46]

The merits of this debate are not resolvable under the current class and statistical plans. However, even under more detailed plans,

it is unreasonable to assume that the totality of circumstances which affect the projected use of the insured car can be predicted. Notwithstanding the intricate detail of the current plans and the complexities of pricing highly refined rating cells, we are dealing in the final analysis with a very crude system of measurement.

b. Limitations on Comparability

A comparison of loss experience by type of variable is difficult. Few variables are universally applied. Rating cells are defined by combinations of different variables determined by the age and sometimes the sex and marital status of vehicle operators. Analysis of the unique contribution of each variable in isolation is cumbersome and limited by incomplete information.

The effort to determine the nature and extent of differences in average loss costs between youths and adults, for example, is limited by the following factors:

(1) The experience of married females under age 30 are not included in the available data for youths. None of the companies have a class for married females, of any age. The accident experience of the youthful married female is merged with either the adult/"all other" class or, if her husband is classified as a youth (under 25) and she shares one or more cars with him, her husband's class.

(2) Single females under 25 who reside at a school more than 100 or 150 miles from home (depending on the company) are also omitted from the data

for youths. The experience of female "resident students" is merged with the adult class.

(3) Data tracing the experience of youthful single females (who are not resident students), married males and single male "occasional" operators are not available from any company after these people reach age 25.

(4) Under the ISO coding system, the loss data relating to 25 out of 101 youthful "drive-to-work" classes are merged with the adult class for cars either used for business or driven to work (or school) 10 or more miles.

A comparison of males and females or marrieds and singles is similarly limited. With two exceptions, comparative data on the loss experience of males and females are not collected for females past age 24 and for males past 29. Below these ages various groups of males and females, depending on age and marital status, are merged with the adult classes as indicated above. For example, ISO's twenty-five youthful "drive to work" classes merged with the adults include males and females and singles and marrieds. In addition, data on married males are not collected past age 24; and the data collected for married males below that age also include the experience of single males who are "resident students."

The uneven availability of data by age, sex, marital status and other variables is the result of industry judgments as to which classes should and should not be separately classified. To the extent

the groups excised from the youthful classes have better loss experience (on average) than the balance of the youthful classes, the decision to merge them with adults tends to make arguments about the higher risk of youthful drivers self-fulfilling; and to the extent the excised groups have worse loss experience than the adults, the system is inconsistent. The correct interpretation is not determinable on the basis of available data.

Other peculiarities of available loss data affect discussion of comparative class-average experience. The data used by the industry to assess the effectiveness of its class plans and to price class differentials reflect essentially "countrywide" experience on "voluntary" "single-car" policies.[47] This means (1) that the loss data used to measure differences between classes of drivers in New Jersey are drawn from all states in which the companies do business using the same or similar class plan; (2) that the loss data pertain only to policies voluntarily written and not to those policies underwritten through an assigned-risk plan or other involuntary market mechanism; and (3) that the data pertain only to policies which cover one car. The industry's decision to limit analysis to these data has significant bearing on the magnitude of differences between classes and, consequently, the prices charged affected insureds.

c. The Implications of Reliance on Countrywide Data

Countrywide accident experience fails to reflect the impact of local driving conditions and the unique aspects of State laws affecting driver behavior and relative accident likelihoods. The laws which help make any state unique include laws governing age of licensure, the drinking age, speed limits and amounts of insurance (if any)

required to be carried by motorists. More significantly, countrywide data tend to be drawn from states more rural in character than this one. The percentage differences in loss costs between youths and adults are generally greater in rural than urban areas.[48]

Countrywide data also gloss over variations among states with respect to company underwriting practices. Companies employ underwriting strategies which can be as varied from state to state as the many reasons they have for refusing to write new business, or certain types of new business. These reasons include perceived adequacy of comparative rate levels, preferences for suburban and rural markets, and the comparatively high cost and incidence of fraud in particular states, to name a few. Differences among states in the extent to which companies write particular classes of business can have a significant bearing on overall loss levels and class relativities.

Furthermore, exclusive reliance on countrywide data can frustrate analysis of the relative loss experience of particular classes within the insurance territories unique to each state. Under the refined class plans in use today, most class-within-territory cells contain too few (if any) insureds to generate statistically reliable data; and the expected loss costs of these tiny cells can be inferred only through use of statistical approximation techniques. Any effort to evaluate the accuracy of approximation methods or to otherwise fine tune insurance prices from territory to territory requires specific local data.

The major justification for using countrywide data in lieu of New Jersey data is that the statewide data lack sufficient numbers of insureds in each class to be "credible". However, credibility

problems are produced by classification refinements which are of the industry's own making, and they will persist with or without the use of countrywide data. Credibility problems can be alleviated by broadening the base of available statewide data, say by the combination of voluntary and assigned-risk data, by using countrywide data in tandem to help fill gaps as necessary, and by using modern multivariate analytical techniques.

Greater dependence on New Jersey data will affect the spread of premium costs among insureds here, especially through greater recognition of the State's urban character. The integrity of insurance pricing requires that the unique features of a state be given such recognition. The statistical plan therefore should be modified to require all filers to collect and report loss experience in a form which permits periodic analysis of exposures, claims and pure premiums broken down by class within territory for New Jersey only. At the moment, only ISO data are available in this detail.

Finally, even the countrywide data traditionally provided by filers are not sufficiently detailed to permit in-depth analysis of classification pricing. If these data are to be used constructively--and credibility problems at the state level make some role inevitable, at least for reference purposes--they must itemize exposures, claim counts and pure premiums for the full detail of the class plan which produces them. Only detailed data of this sort permit the informed and independent judgments required to regulate classification pricing.

d. Pricing Distortions Caused by Exclusive Reliance on Voluntary Data

The exclusive use of voluntary data in the estimation of rate relativities "distorts the indications" and overstates the

differences between youths and adults.[49] This distorting effect stems from an underwriting tendency to select adults on an individual basis, giving specific attention to driving record and other factors unique to the individual, while excluding youths as a class, simply by virtue of age or other class characteristics. The practice accentuates differences in the relative loss experience of the two groups by forcing out the worst experience from the adult classes while excluding the good with the bad from the youth classes. To the extent voluntary market data also include disproportionate numbers of insureds in rural areas, the percentage spread between youths and adults is also enlarged.

The evidence confirms the uneven nature of company underwriting practices, especially the common aversion to youthful males and urban residents.[50] Of the majority of drivers in the assigned risk plan with clean driving records, a disproportionate number come from urban areas. Combining voluntary and assigned-risk data for use in estimating class differentials, as well as rate levels, could reduce the high to low spread in premiums across the population; but it would have its greatest impact on urban males with clean driving records, precisely the groups most systematically excluded from the voluntary market.

The bar chart in Figure 6 suggests the likely impact of combining data for the unmarried male principal operator across a variety of geographical settings. The data were developed from experience in the Mid-Atlantic and New England states as part of a 1976 study conducted by Philipp Stern for the National Association of Insurance Commissioners. The bar chart illustrates the extent to which

relative loss costs of unmarried male principal operators with clean driving records are substantially lower in the assigned risk plans than in the voluntary market. Specifically, they are more than 50 per cent lower in "large cities," 41 per cent lower in "small cities," 37 per cent lower in "suburban" areas, 38 per cent lower in "semi-suburban" areas, and 6 per cent lower in "rural" areas.[51]

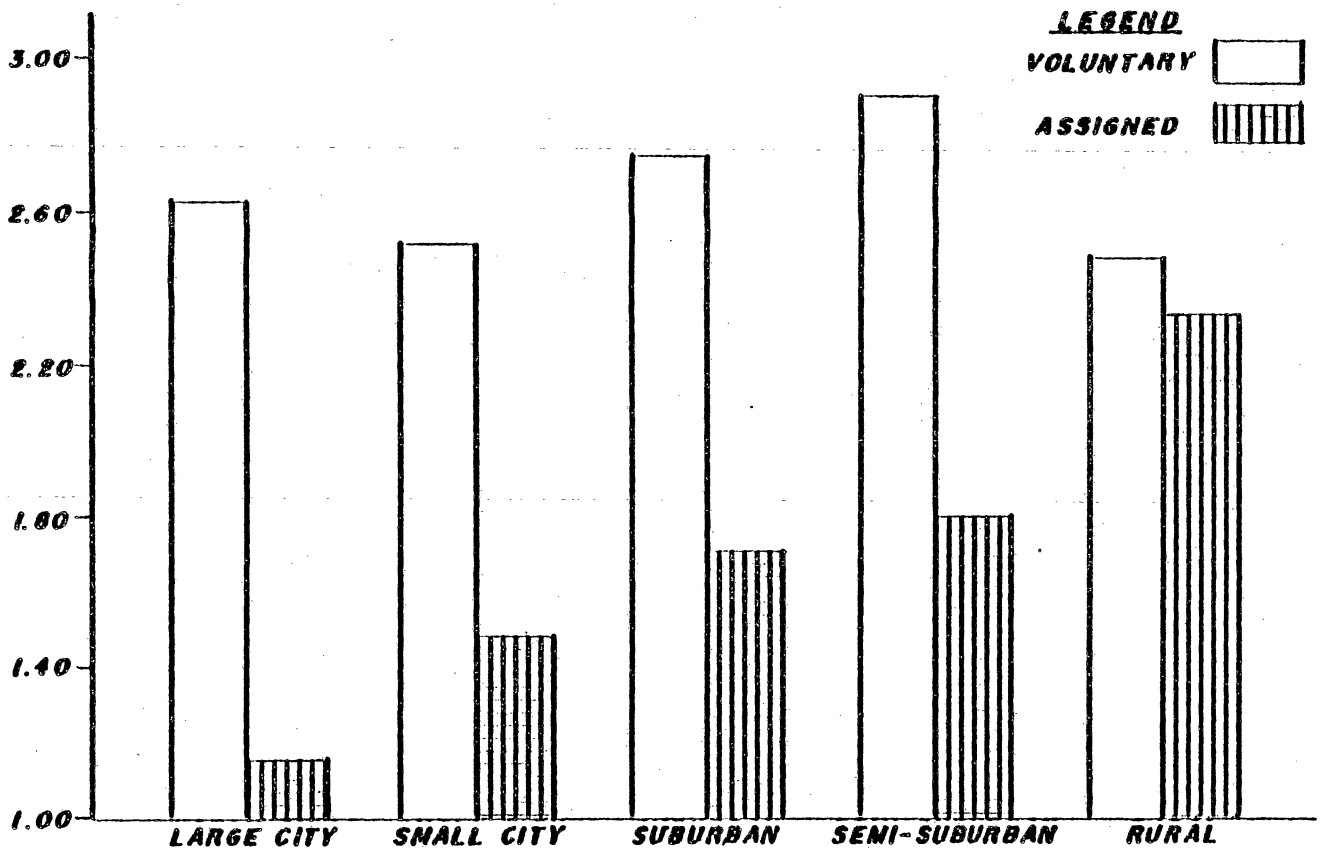
It is not clear that the combination of voluntary and assigned-risk data would work to reduce spreads in rate relativities overall. Specifically, high-rated territories may be adversely affected. To the extent companies are more inclined to exclude youths in high-rated territories than in low-rated territories, the current territory relativities (or base rates) founded solely on voluntary experience reflect higher proportions of youths in the low-rated territories than in the higher-rated urban territories. Combining voluntary market and assigned-risk data in these circumstances may serve to increase the relative losses of the higher-rated territories.

Nevertheless, the merger will increase the credibility of the data overall and promote stability in the pricing structure by insensitizing it to underwriting practices. Furthermore, companies underwrite both assigned-risk and voluntary business and losses are ultimately backed by the same financial reserve. Overall rate levels in the voluntary market are based on the combined experience of the voluntary and secondary markets, at least for liability coverages. As long as this practice continues, it makes simple common sense that the distribution of rate level across insureds should proceed on the same basis.[52]

A practical problem obstructing the use of combined data involves differences in definitional detail between the AIP class plan

FIGURE 6

INDICATED CLASS RELATIVITIES
UNMARRIED MALE PRINCIPAL OPERATORS VERSUS ADULT PLEASURE USE
BY TERRITORY SUBGROUP VOLUNTARY AND ASSIGNED SEPARATELY



SOURCE: D-17 SHEET 3

and the voluntary market plans. This problem can be remedied in two ways. First, data generated by the voluntary plans can be combined with AIP data on a lowest-common-denominator basis. Secondly, steps can and should be taken to modify existing statistical plans to reconcile differences and ultimately put the voluntary and involuntary markets on a common reporting basis. This goal is in keeping with the mandate of pending legislation which would require voluntary and secondary markets to use the same class plan.

e. The Appropriateness of Considering Only Single-Car Data

Single-car data are not fully representative of the typical company's differential accident experience. For most companies single-car insureds represents less than half of the total book of business. An Allstate actuary stressed the importance of examining multicar as well as single-car data when estimating class homogeneity:

> "Since 70 per cent of the automobiles that we insured voluntarily are on a multiple car policies, we feel that it is inappropriate to ignore multiple car policies. Most of our rating plans have been designed to apply to all of our policyholders. Thus, it is all of our policyholders that should be used when measuring efficiency. Using single cars only also ignores the multiple car discount."[53]

The representativeness of single-car data is also questionable on the grounds that multicar insureds are unevenly distributed across territories and classes. The fewest multicar exposures and the lowest multi-to-single-car ratios are in the urban areas. Multicar exposures are also slightly less represented in the youthful classes.[54]

The major drawback to using multicar data in classification pricing is the lower degree of identification between car and driver

on a multicar policy. In a single-car situation the insured car is necessarily used by all the drivers named on the policy. When more than one car is involved there is presumably a sharing of cars among drivers; and there is no guaranty that the car assigned to a driver for rating purposes is in fact used by that driver.[55]

Single-car data have similar problems. The single-car policy takes the class of the highest-rated driver using the car, regardless of amount of use or the number and classification characteristics of other operators. The multicar data are perhaps more troublesome only to the extent a greater number of cars and drivers suggest a greater range of possible combinations.

Failing to use multicar data probably causes the largest part of the business to be improperly priced. Analyses below indicate that for ISO companies at least single-car relativities differ from multicar relativities in a manner which is not accounted for by the multicar discount.[56] This not only raises unfair discrimination problems but also can have a material impact on rate level. Henceforth both single- and multicar data must be supplied in support of class relativities.

f. The Implications of Loss-Ratio Pricing Methods

The industry's pricing of classifications has relied primarily on ratios of losses-to-premiums for each class. These loss-ratios are essentially a financial yardstick keyed not to comparative losses but to comparative rates of return. As such they provide only crude indications of classification accuracy. The only direct measure of losses is the pure premium, or average loss per insured car. This direct measure is the best means for resolving the issues in this proceeding.

Under the traditional methodology, all classification groupings are expected to generate the same loss ratio, a target percentage of losses-to-premiums amounting to a desired rate of return. To the extent any classification grouping falls below the target, i.e., average losses for the group relative to other groups begin to consume too much of premiums and erode amounts needed for expenses and profits, the premium differential is increased to bring the class loss ratio back into line. For example, if the target loss ratio is 65 per cent, each class is expected to generate average losses of no more than 65 per cent of average premium for the class. Should the loss ratio for a particular class increase to say 75 or 80 per cent while loss ratios for the other classes remain at 65, the rating factor for that class will be increased to generate enough additional premium to reduce the loss ratio for the class to the targeted 65 per cent level.

A major defect of the loss-ratio approach is that it assumes that existing price levels for each class are correct and that shifts in loss ratios are attributable to real shifts in differential average losses. However, an increase in class loss ratio can mean not only that average losses for the class have changed but also that the class was not correctly priced in the first place. Because loss ratios are examined for aggregated groups only, numerous pricing discrepancies across individual classes can go undetected for a long time.

One example of long undetected pricing error involves the industry's traditional method of loading premium for company overhead. Until recently total premium was computed on the assumption that administrative expenses allocable to risk classes vary in direct proportion to class-average losses. Although this theory has been dis-

credited in recent years, as will be discussed in a subsequent chapter, today's premiums still contain a percentage loading for expenses to a substantial degree; and during most of the time periods in which data for this hearing were generated expenses were loaded in premiums solely on a percentage basis.[57]

A related defect of the loss-ratio approach is that it blends together and makes invisible the diverse components which contribute to the comparative loss experience of the classes. Company actuaries defend this feature of the loss-ratio approach because it obviates analysis of the mix of business within classes. According to this thinking a comparison of two classes need not account for different proportions of subclasses within each class, because while the losses of one subclass may be lower than another, the premiums too should be lower, and the overall ratio of losses to premiums will not be affected. However, the presupposition that premiums for subclasses bear a correct relation to their losses begs the ultimate question.[58]

A mix-of-business analysis based on pure premiums asks the question whether average-loss differences between classes are entirely or in some part attributable to differences in the mix of other classes within them. If the mixes of classes within class groups are not equivalent, observed differences in class-average losses are not certain to be of unique or independent significance. Loss-ratio analysis asks a similar but more complicated question. When using loss ratios, the mix of classes within classes will affect class differentials not only through differences in the mix of average loss costs but also through differences in the correctness of price for each of the component classes.

Henceforth, all filings in support of classification and territory differentials should be supportable by pure premiums and claim- and exposure-counts. For purposes of this proceeding, between-class cost analyses will rely primarily on the detailed pure premium data supplied by filers at the Commissioner's request. Focusing on these data will clarify the mix-of-business and double-counting issues obscured by traditional pricing techniques.

2. Comparison of Class-Average Loss Costs

Industry response to conceptual criticisms of the youthful classes contends that these classes, as defined, consistently generate differences in average loss experience between classified groups. As a general proposition, and with notable exceptions, this assertion is true; but it does not go far enough. The differences in class-average costs identified are limited to those groups of insureds chosen to be isolated and compared; and they reflect differences in risk which other variables or combinations of them could measure as well.

a. Age

The average loss experience of cars rated in the classes for youths between the ages of 17 through 29 is significantly higher than the average for cars rated in the "all other" or "adult" class.[59] The differences on ISO single-car data range from a low of 14 per cent for comprehensive coverage to a high of 64 per cent for collision. Under the aggregated compulsory coverages, these data produce average experience for the under-30 youth cars about 38 per cent greater than the comparable average for "all others". ISO's combined single- and multi-car data yield indications in the same direction although varying in size. The State Farm statewide data produce similar or larger indications but are too sparse to be fully credible.[60] Results generated by the two sets of more credible ISO data are summarized in Table 5.

TABLE 5

AGE COMPARISON - YOUTHFUL V. ALL OTHER OPERATORS

BETWEEN GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
A	LIAB.	+ 38
	COMP.	+ 14
	COLL.	+ 64
B	LIAB.	+ 61
	COMP.	+ 16
	COLL.	+ 68

Youthful - All 17-29 year old operators excluding those classified as "all other".

All Other - Sometimes referred as the "Adult" class but excluding those operators classified as "Over 65" and "Female 30-64".

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multicar data.

Within the youthful category the experience improves somewhat with age, although the improvement is confined largely to the early years and the pattern is not consistent across coverages. The ISO single-car data for compulsory liability coverages indicate that cars in the classes for 17-through-20 year old youths produce average losses about 34 per cent higher than cars in the classes for youths 21-through-24; and cars in the 21-through-24 year old group produce average losses about 10 per cent higher than the 25-through-29 year old group. The ISO combined single- and multicar data for the compulsory coverages produce a smaller 27 per cent differential between the 17-through-20 and 21-through-24 year old classes, and a 9 per cent difference between the 21-through-24 and 25-through-29 year old classes.

On both data sets the differentials between the two younger groups are smaller for the collision coverages; and the average collision experience for youths 21-through-24 is in fact below comparable experience for cars in the 25-through-29 year old class. Under the comprehensive coverage experience actually deteriorates with age. The average comprehensive experience for each youth subgroup is below the comparable average experience for the next older subgroup. The results of the analysis for ISO's youth subgroups are summarized in Table 6 for compulsory and physical damage coverages.

The State Farm data lack sufficient sample size to be of further assistance here. It should be noted, however, that these data, while of limited credibility, confirm the pattern observed in the ISO data. The largest differences between youths are in the early years and under the compulsory liability coverages.[61]

The magnitude of the indicated differentials are a function in part of the mix of subgroups within each of the age groups examined.

TABLE 6

AGE COMPARISON - YOUTHFUL OPERATORS

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
YOUTHS 17-20 v YOUTHS 21-24	A	LIAB.	+ 34
		COMP.	- 36
		COLL.	+ 14
	B	LIAB.	+ 27
		COMP.	- 31
		COLL.	+ 11
YOUTHS 21-24 v YOUTHS 25-29	A	LIAB.	+ 10
		COMP.	- 27
		COLL.	- 10
	B	LIAB.	+ 9
		COMP.	- 36
		COLL.	- 15
YOUTHS 25-29 v "ALL OTHERS"	A	LIAB.	+ 13
		COMP.	+ 69
		COLL.	+ 72
	B	LIAB.	+ 31
		COMP.	+102
		COLL.	+ 86

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multicar data.

The average-cost differentials between these subgroups are separately accounted for by other classification variables in use, and failure to factor out the redundancy will result in misestimation of average differences between the larger groups. For example, ISO males classified in the 17-through-29 year old group outnumber females in that group by as much as 55 per cent, due largely to the fact that many females are classified as "all other" before reaching age 25 and there are no classifications for females after age 24.[62] If youthful males classified as such produce higher average losses than youthful females so classified (infra), and if (hypothetically) there is no difference between genders within the "all other" class[63]--none is recognized in the class plans--part of the observed differential between the two broad age groups can be attributed to the gender variable.

Differences in mix of business also complicate accurate assessment of average-cost differentials between youthful subgroups. For example, in the ISO's 17-through-20 group under combined single- and multicar data, females slightly outnumber the males, and only 12 per cent of the males are married.[64] In the 21-through-24 age group males outnumber females by as much as 70 per cent; and about 38 per cent of the males are married.[65] The 25-through-29 year old group, by definition, contains single males only. The differences in gender mix tend to reduce the observed differences between the three youthful age groups, that is, the differences among youth subgroups would tend to be larger on these data if the samples were controlled for mix by sex. The marital-status mix has a similar effect on observed differences between the 21-through-24 and 25-through-29 groups; but it exaggerates observed average differences between the two youngest groups,

that is, the difference between 17-through-20 and 21-through-24 year old groups would tend to be smaller if the samples were controlled for mix of marrieds and singles.

The mixes of primary classes are different under single- and multicar data. Nonetheless, for illustrative purposes, Table 6A summarizes the mix of primary classes within youthful age groups for combined single- and multicar policies. The mixes of all such primary factors across groups tend on balance to reduce observed differences in average loss costs.

Mix of territories produces conflicting tendencies. The evidence shows that relatively few youths are written in high-rated areas, as reflected in Table 6B. At first blush this suggests that the observed average differences between youths and adults statewide may be tempered by the lower-average loss experience of low-rated territories. However, because average loss differences between youths and adults are largest in the low-rated territories,[66] the opposite effect is equally plausible.

The most likely redundancies involve surcharges for merit rating and discounts for multiple cars, the so-called secondary rating factors. The higher-average losses of the youngest drivers are reflected in higher average accident surcharges. To fail to adjust for the differential losses separately accounted for by these surcharges counts at least part of the same risk twice. Similarly, on combined single- and multicar data, differential losses also, reflect to some extent the different distributions of multicar insureds across classes. Failing to adjust for the lower average losses of multicar risks, separately accounted for by multicar discounts, effectively grants a double-discount to the groups with disproportionate shares of these risks.

TABLE 6A

DISTRIBUTION OF PRIMARY CLASSES WITHIN AGE GROUPS

	17-20		21-24		25-29	
	#	%	#	%	#	%
Males	133,930	49.4	140,217	63.4	47,267	100.0
Females	137,101	50.6	81,070	36.6	Not Applicable	
Single Males	118,173	88.2	86,498	61.7	47,267	100.0
Married Males	15,757	11.8	53,719	38.3	Not Applicable	
Pleasure	192,353	71.0	132,814	60.0	25,558	54.1
Drive to Work	78,678	29.0	88,473	40.0	21,709	45.9
Principal	57,258	48.5	68,456	79.1	47,267	100.0
Occasional	60,915	51.5	18,042	20.9	Not Applicable	
Without Good Student	226,167	83.4	209,979	94.9	Not Applicable	
With Good Student	44,864	16.6	11,308	5.1		
Without Driver Training	130,233	48.1	Not Applicable		Not Applicable	
With Driver Training	140,798	51.9				
Without Driver Training and Good Student	118,291	43.6	Not Applicable		Not Applicable	
With Driver Training and Good Student	32,922	12.1	Not Applicable		Not Applicable	

Source: D-94c Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 6B-1

DISTRIBUTION OF ADULT AND YOUTHFUL OPERATORS
(TOTAL POPULATION) BY TERRITORY*

Based on 8 Territory Sample

Code	Territories Definition	Total Adult Operators		Total Youthful Operators	
		Number	%	Number	%
02	Newark	9,392	1.8	1,488	1.6
07	Camden	4,729	0.9	659	0.7
01	Jersey City	23,122	4.5	4,058	4.2
14	Burlington, Gloucester, Salem Counties	89,255	17.5	15,404	16.1
27	Southern Counties	105,462	20.6	15,129	15.8
40	New Brunswick	63,645	12.5	13,389	14.0
10	Northern Bergen County	96,812	18.9	22,034	23.0
25	Dover, Morristown, Somerville	119,367	23.3	23,616	24.6
	Combined	511,784	100.0	95,777	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 6B-2

AVERAGE TERRITORY RATING FACTOR*

Total Adult Operators	Total Youthful Operators	Percentage of Difference
1.021	1.006	.985

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

Table 6C summarizes the mix of secondary rating factors--net average surcharges and discounts--for each of the age groups compared in Tables 5 and 6. The most conspicuous instance of double-counting is in the single-car data (Data Set A) for the 17-through-20 age group. These youngest drivers pay a higher average surcharge than the adult "all other" class amounting to about 14 per cent of average base rate. Youths 17-through-29 generally have a higher average secondary rating factor than adults amounting to about 6 per cent of average base rate on both data sets.

These mix of business considerations complicate the estimation of unique average cost differences between groups. The fact that the differentials are uneven across coverages--sometimes moving in opposite directions--make ultimate determinations even more complex. Under the industry practice of establishing one class differential for all coverages, judgments are required to convert the varied indications. ISO explains that a combined rating factor for all coverages is "selected" as a "middle ground", keeping in mind that all insureds do not buy all coverage and that the data base for the non-compulsory coverages includes less than all insureds.[67] Additional judgments are required to differentiate these combined factors by individual year of age.[68]

Company judgments are a major determinant of differential prices for the youthful classes. Yet the relatively modest cost differentials for some groups, combined with conflicting indications across coverages, leave little margin for error. The fact that these judgments are based on nothing more sophisticated than loss-ratio analyses, avoiding explicit recognition of multiple overlapping factors, makes accurate outcomes unlikely.

TABLE 6C

AVERAGE SECONDARY RATING FACTORS FOR
AGE GROUPS (Compulsory Liability Coverages)

Age	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
17-20	+ .193	+ .039
21-24	+ .068	+ .000
25-29	+ .063	+ .028
17-29	+ .113	+ .022
"All Others"	+ .050	- .044

b. Sex

ISO loss experience for young male- and female-rated cars, to the extent comparable, produce overall pure premium differentials for the compulsory coverages of from 29 to 34 per cent on the two sets of data examined. In the 17-through-20 group, the average losses of the male-rated cars are from 42 to 56 per cent higher than average losses of the female-rated cars. In the 21-through-24 category, male-rated cars are from 11 to 18 per cent higher than female-rated cars. The physical damage coverages produce even larger differentials between these groups.

These comparisons are limited to single male and single female groups. The absence of a rating class for married females precludes gender comparisons for married youths. Available comparisons are summarized in Table 7 for both sets of ISO data and for collision and comprehensive as well as the compulsory coverages. The State Farm data are consistent with the ISO indications but are too sparse to be representative.[69]

Mix of business is again a complicating factor. The mix of primary classifications within gender categories is summarized in Table 7A, within-class distribution of territories is reflected in Table 7B, and average secondary rating factors are displayed in Table 7C. With respect to the primary class and territory mix, the differences between males and females are slight but tend if anything to reduce the observed differences between male- and female-rated cars. In other words, if the male and female variables were controlled for a common mix of primary classes and territories, the differences observed would be slightly larger. The mix of secondary rating factors works the

TABLE 7

SEX COMPARISON

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
SINGLE MALES 17-20 v SINGLE FEMALES 17-20	A	LIAB.	+ 56
		COMP.	+ 81
		COLL.	+ 96
	B	LIAB.	+ 42
		COMP.	+ 42
		COLL.	+ 61
SINGLE MALES 21-24 v SINGLE FEMALES 21-24	A	LIAB.	+ 18
		COMP.	+ 71
		COLL.	+ 61
	B	LIAB.	+ 11
		COMP.	+ 67
		COLL.	+ 50
SINGLE MALES 17-24 v SINGLE FEMALES 17-24	A	LIAB.	+ 34
		COMP.	+ 80
		COLL.	+ 74
	B	LIAB.	+ 29
		COMP.	+ 55
		COLL.	+ 56

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multi-Car data.

TABLE 7A

DISTRIBUTION OF OTHER PRIMARY CLASSIFICATIONS
WITHIN MALE AND FEMALE CLASSIFICATIONS

	Males		Females	
Age	Number	%	Number	%
17	30,441	11.1	27,689	12.7
18	33,435	12.2	47,581	21.8
19	37,741	13.8	33,629	15.4
20	32,313	11.8	28,202	12.9
21	38,921	14.2	26,551	12.2
22	32,454	11.8	21,319	9.8
23	36,248	13.2	18,642	8.5
24	32,594	11.9	14,558	6.7
With Driver Training	75,128	56.1	65,670	47.9
Without Driver Training	58,802	43.9	71,431	52.1
With Good Student and Driver Training	17,416	13.0	15,506	11.3
Without Good Student and Driver Training	65,149	47.5	53,142	39.7
Pleasure	179,003	65.3	146,164	67.0
Drive to Work	95,144	34.7	72,007	33.0
17-20				
With Good Student	23,076	17.2	21,788	15.9
Without Good Student	110,854	82.8	115,313	84.1
21-24				
With Good Student	8,137	5.8	3,171	3.9
Without Good Student	132,080	94.2	77,899	96.1

Source: D-94C Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 7B-1

DISTRIBUTION OF MALES AND FEMALES
(AGE 17-20) BY TERRITORY

Based on 8 Territory Sample

		Age 17-20			
		Females		Males	
Code	Territories Definition	Number	%	Number	%
02	Newark	476	1.8	312	1.2
07	Camden	162	0.6	128	0.5
01	Jersey City	1,083	4.1	775	3.1
14	Burlington, Gloucester, Salem Counties	3,985	15.2	4,074	16.1
27	Southern Counties	4,381	16.7	3,600	14.2
40	New Brunswick	3,795	14.5	3,507	13.8
10	Northern Bergen County	5,756	21.9	6,273	24.8
25	Dover, Morristown, Somerville	6,607	25.2	6,666	26.3
	Combined	26,245	100.0	25,335	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 7B-2

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Age Group	Females	Males	Percentage of Difference
17-20	1.007	.994	.987
21-24	1.016	1.011	.995
17-24	1.010	1.002	.992

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 7C

AVERAGE SECONDARY RATING FACTORS FOR GENDER GROUPS
(Compulsory Liability Coverages)

	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
Single Males 17-20	+ .238	+ .045
Single Females 17-20	+ .164	+ .033
Single Males 21-24	+ .073	- .022
Single Females 21-24	+ .063	+ .003
Single Males 17-24	+ .144	+ .021
Single Females	+ .115	+ .022

other way, tending to make the gender differential appear larger than it would on controlled data. The largest disproportion is in the single-car data for the 17-through-20 group where males pay a higher average surcharge than females amounting to 7 per cent of average base rate.

c. Marital Status and the Resident Student

The Limited Available Comparisons

The practice of merging the loss experience of married females with the adult group limits the testing of the marital status variable to a comparison of single and married males under age 25. The significance of this comparison is further diminished by the extremely small number of married males in the very youngest age category and resulting credibility problems. Unmarried males under 21 outnumber married males of the same age by between 7- and 8-to-1 on the ISO data.

Table 8 summarizes comparisons of average loss experience for single and married males on the two ISO data sets. Overall the single males produce higher average loss experience for the liability and collision coverages and similar or lower average experience for comprehensive, before mix of business considerations. In four out of six comparisons the experience for married males 17-through-20 consists of fewer than 1,000 claims. State Farm's statewide data are even more limited.[70]

It is worthy of note that classification differentials proposed by Allstate (based on loss ratios) reflect no distinction between married males and single "restricted" males, under liability and collision coverages.[71] For the last three classification review periods beginning in 1971, Allstate reported the same liability and collision

TABLE 8

MARITAL STATUS COMPARISON

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

SINGLE / MARRIED	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
SINGLE MALE 17-20 v MARRIED MALE 17-20*	A	LIAB.	+ 41*
		COMP.	- 1*
		COLL.	+ 86*
	B	LIAB.	+ 51
		COMP.	+ 3*
		COLL.	+ 51
SINGLE MALE 21-24 v MARRIED MALE 21-24	A	LIAB.	+ 26
		COMP.	- 4
		COLL.	+ 39
	B	LIAB.	+ 19
		COMP.	+ 5
		COLL.	+ 36
SINGLE MALE 17-24 v MARRIED MALE 17-24	A	LIAB.	+ 47
		COMP.	- 11
		COLL.	+ 55
	B	LIAB.	+ 43
		COMP.	- 8
		COLL.	+ 46

*Fewer than 1000 claims for Data Set A

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multi-Car data.

relativities for these two groups, in both the 17-through-20 and 21-through-24 age brackets. For the comprehensive coverage, Allstate retains the distinction between married and restricted male operators, but combines the 17-through-20 and 21-through-24 age groups. Although these indications flow from judgments by Allstate actuaries,[72] they suggest the conceptual similarities between single-male occasional operators and married males who are in fact single-male resident students.

Overlap With Other Variables

The resident-student rule frustrates any effort to evaluate the marital-status variable. As currently defined the variable captures under one rubric two entirely different risks. One type of risk involves largely sporadic use of one or more family cars by a student living away from home.

Because the experience of resident students is not separately coded, the distinction is immune to statistical analysis. The other type of risk involves full-time use of one or more cars by a married couple.

The mix of single resident students in the married male classes is obviously greatest in the youngest 17-through-20 category, where the apparent differences based on marital status are largest. As a result of company reluctance to insure very young drivers who are in fact married, this group may consist exclusively of resident students. The Continental's instructions to its underwriters are again on point:

> "If the husband is under 21 we should proceed with caution. This is especially so if he is less than 20. Marriage by males at these ages is frequently an indication of emotional problems that produce a below average risk."[73]

For this or other reasons, the marital status variable heavily overlaps with other classifications in use. Tables 8A, 8B and 8C reflect the distributions of primary classes, territories and secondary rating factors, respectively, among married and single youths. The largest disproportions are in the 17-through-20 age groups.

Overall, the 17-through-20 "married" males are older--by individual year of age--and more frequently eligible for good-student and driver-training credits. The 17-through-20 year old single males contain a proportion of 17-year olds almost 5 times larger than the proportion of 17-year olds among their married counterparts. The proportion of 17-through-20 marrieds with both good student and driver training discounts is about 40 per cent larger than the proportion of same-age singles with both discounts. The proportion of drivers with neither good-student nor driver-training discounts is about 15 per cent larger among the singles. The territory mix varies by age group; but in the youngest group, where raw average cost differences appear largest, the "marrieds" tend to live in lower-rated territories than the singles.

Similar disproportions are reflected in the mix of secondary rating factors. On the single-car data, 17-through-20 year old singles pay higher average surcharges than their married counterparts amounting to 8 per cent of average base rate. On combined single- and multicar data the difference in average surcharges amounts to 5 per cent of average base rate.

The double-counting phenomenon is a theme which runs throughout the balance of the class-average cost analysis. It is one of the serious shortcomings of a very complex system of classification that

TABLE 8A

DISTRIBUTION OF OTHER PRIMARY CLASSIFICATIONS
WITHIN MARRIED AND SINGLE CLASSIFICATIONS

	Married		Single	
Age	Number	%	Number	%
17	862	5.5	29,579	25.0
18	3,347	21.2	30,088	25.5
19	5,589	35.5	32,152	27.2
20	5,959	37.8	26,354	22.3
TOTAL	15,757	100.0	118,173	100.0
21	12,286	22.9	26,635	30.8
22	10,082	18.8	22,372	25.9
23	15,756	29.3	20,492	23.7
24	15,595	29.0	16,999	19.6
TOTAL	53,719	100.0	86,498	100.0
	Married (17-20)		Single (17-20)	
	Number	%	Number	%
Good Student	3,479	22.1	19,597	16.6
No Good Student	12,278	77.9	98,576	83.4
Driver Training	9,608	61.0	65,520	55.4
No Driver Training	6,149	39.0	52,653	44.6
Pleasure	14,148	70.3	84,598	71.6
Drive to Work	4,609	29.7	33,575	28.4
Good Student and Driver Training	2,763	17.5	14,653	12.4
Without Good Student and Without Driver Training	5,433	34.5	47,709	40.4
	Married (21-24)		Single (21-24)	
	Number	%	Number	%
Good Student	2,489	4.6	5,648	6.5
Without Good Student	51,230	95.4	80,850	93.5
Pleasure	29,927	55.7	53,330	61.7
Drive to Work	23,792	44.3	33,168	38.3

SOURCE: D-94C Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 8B-1

DISTRIBUTION OF MARRIED AND SINGLE MALES
(AGE 17-20) BY TERRITORY*

		Age 17-20			
		Married Males		Single Males	
Code	Territories Definition	Number	%	Number	%
02	Newark	26	0.8	286	1.3
07	Camden	10	0.3	118	0.5
01	Jersey City	47	1.5	728	3.3
14	Burlington, Gloucester, Salem Counties	421	13.2	3,653	16.5
27	Southern Counties	356	11.1	3,244	14.7
40	New Brunswick	297	9.3	3,210	14.5
10	Northern Bergen County	1,075	33.6	5,198	23.5
25	Dover, Morristown, Somerville	965	30.2	5,701	23.5
	Combined	3,197	100.0	22,138	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 8B-2

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Age Group	Married Males	Single Males	Percentage of Difference
17-20	.973	.997	1.025
21-24	1.024	1.004	.980
17-24	1.009	1.000	.991

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 8C

AVERAGE SECONDARY RATING FACTORS
FOR MARITAL-STATUS GROUPS
(Compulsory Liability Coverages)

	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
Single Males 17-20	+ .238	+ .053
Married Males 17-20	+ .153	+ .001
Single Males 21-24	+ .073	+ .008
Married Males 21-24	+ .067	- .018
Single Males 17-24	+ .144	+ .034
Married Males 17-24	+ .080	- .014

traditionally has been priced by simplistic combination of differentials developed from aggregate categories. The sluggishness with which companies have sought to use multivariate statistical techniques to do a better job is an indication of industry reluctance to deviate from established patterns or to test and refine judgmental theories.

d. The Other Youthful Classifications

Only three of the five other variables applicable uniquely to youths identify separate bodies of data susceptible to analysis. These three variables differentiate between principal and occasional operators in the 17-through-29 age groups, "good students" and other youths in the 17-through-24 age group, and youths with and without approved driver training in the 17-through-20 age category. The remaining two variables, "inexperience" surcharges and "resident student" discounts, are without separate data to support them.[74]

The principal-occasional, good-student and driver-training variables account for large rate differences among youth-rated insureds and are responsible in no small measure for some of the most anomalous extremes in the present rating structure. Analyzed independently they identify varying degrees of difference in average loss costs between the classes of cars they define but subject to notable exceptions. The differences identified are further subject to substantial uncertainty related to double-counting.

Occasional Operators

The principal-occasional operator distinction identifies a variety of substantial differences in average loss experience among youth-rated cars, but the patterns and sizes of these differences are highly variable. The ISO single-car data indicate that in the 17-

through-20 year old group the average losses of the principal operators under the compulsory liability coverages are about 12 per cent greater than the average for occasional operators. Under collision and comprehensive coverages the averages for the principals are greater by 59 and 92 per cent, respectively. In the 21-through-24 age category on these data, the principal operators are about 8 per cent less for the compulsory coverages and 45 and 15 per cent greater for collision and comprehensive. On average overall, principal operators produce losses 10 per cent less than occasional operators for the compulsory coverages and 26 and 71 per cent greater than the occasionals for collision and comprehensive.

ISO's combined single and multicar data produce somewhat different indications, except for the compulsory coverages in the 21-through-24 age category where principals are again below the occasionals. For all ages combined these data indicate average compulsory losses for principal operators 7 per cent higher than occasional operators. The results on both sets of ISO data are summarized in Table 9.[75]

Tables 9A, 9B and 9C reflect the mix of factors within principal and occasional categories. Occasionals are heavily weighted with the youngest (17- and 18-year old) drivers--a proportion about 3 times the size of the comparable proportion among principal operators. Occasionals are also more heavily weighted with insureds in high-rated territories. In the other direction, occasional operators include slightly greater proportions of insureds with good student credits and the combination of good student and driver training.

The most striking imbalance involves the distribution of average secondary rating factors. As a result of inexperience sur-

TABLE 9

OCCASIONAL/PRINCIPAL OPERATOR COMPARISON

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
YOUTHFUL PRINCIPAL OPERATOR 17-20 v YOUTHFUL OCCASIONAL OPERATOR 17-20	A	LIAB.	+ 12
		COMP.	+ 92
		COLL.	+ 59
	B	LIAB.	+ 29
		COMP.	+ 79
		COLL.	+ 65
YOUTHFUL PRINCIPAL OPERATOR 21-24 v YOUTHFUL OCCASIONAL OPERATOR 21-24*	A	LIAB.	- 8
		COMP.	+ 15
		COLL.	+ 45
	B	LIAB.	- 3
		COMP.	+ 58*
		COLL.	+ 37
YOUTHFUL PRINCIPAL OPERATOR 17-24 v YOUTHFUL OCCASIONAL OPERATOR 17-24	A	LIAB.	- 10
		COMP.	+ 71
		COLL.	+ 26
	B	LIAB.	+ 7
		COMP.	+ 84
		COLL.	+ 39

*Fewer than 1000 claims

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multi-Car data.

Principal - ISO defines as "Owner or Principal Operator"

Occasional - ISO defines as "Not Owner or Principal Operator"

TABLE 9A

DISTRIBUTION OF OTHER PRIMARY CLASSIFICATIONS
WITHIN OCCASIONAL AND PRINCIPAL OPERATOR CATEGORIES

	Occasional		Principal	
Age	Number	%	Number	%
17	20,100	25.5	9,479	7.5
18	16,937	21.5	13,151	10.5
19	14,647	18.5	17,505	13.9
20	9,231	11.7	17,123	13.6
21	7,026	8.9	19,609	15.6
22	4,857	6.2	17,515	13.9
23	3,567	4.5	16,925	13.5
24	2,592	3.3	14,407	11.5
Males 17-20				
Without Good Student	49,622	81.5	48,954	85.5
With Good Student	11,293	18.5	8,304	14.5
Without Driver Training	27,258	44.7	25,395	44.4
With Driver Training	33,657	55.3	31,863	55.6
With Good Student and Driver Training	8,397	13.8	6,256	10.9
Without Good Student and Driver Training	24,362	40.0	23,347	40.8
Pleasure	43,288	71.1	41,310	72.1
Drive to Work	17,627	28.9	15,948	27.9
Males 21-24				
Without Good Student	16,849	93.4	64,001	93.5
With Good Student	1,193	6.6	4,455	6.5
Pleasure	12,572	69.7	40,758	59.5
Drive to Work	5,470	30.3	27,698	40.5

Source: D-94C Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 9B-1

DISTRIBUTION OF OCCASIONAL MALES AND PRINCIPAL MALES (AGE 17-20) BY TERRITORY*

		Age 17-20			
		Occasional Males		Principal Males	
Code	Territories Definition	Number	%	Number	%
02	Newark	193	1.7	93	0.9
07	Camden	77	0.7	41	0.4
01	Jersey City	499	4.4	229	2.1
14	Burlington, Gloucester, Salem Counties	1,858	16.3	1,795	16.7
27	Southern Counties	1,534	13.4	1,710	15.9
40	New Brunswick	1,520	13.3	1,690	15.8
10	Northern Bergen County	2,939	25.7	2,259	21.1
25	Dover, Morristown, Somerville	2,801	24.5	2,900	27.1
	Combined	11,421	100.0	10,717	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 9B-2

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Age Group	Occasional Males	Principal Males	Percentage of Difference
17-20	1.006	.994	.981
21-24	1.033	.996	.964
17-24	1.012	.992	.980

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 9C

AVERAGE SECONDARY RATING FACTORS
FOR "PRINCIPAL" AND "OCCASIONAL" YOUTHS
(Compulsory Liability Coverages)

	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
Principals 17-20	+ .318	+ .138
Occasionals 17-20	+ .102	- .027
Principals 21-24	+ .071	+ .017
Occasionals 21-24	+ .094	- .027
Principals 17-24	+ .155	+ .072
Occasionals 17-24	+ .100	- .027

charges, the average surcharge for principal operators in the 17-through-20 category is higher by about 21 per cent of base rate on the single-car data and about 15 per cent of base rate on combined single- and multicar data. Adjusting the principal-occasional differential for average differences accounted for by secondary factors would significantly reduce the already modest average differential between principals and occasionals in this age bracket.

The Good Student Classification

The ISO single-car data indicate that, for the compulsory coverages, average experience of cars rated in the good-student classifications is about 14 per cent better than the comparable experience of cars rated without the good-student credit. The good-student experience is about 2 per cent worse for collision, and as much as 55 per cent better for comprehensive coverage. ISO's single- and multicar data indicate somewhat larger differentials for liability and collision overall, and a smaller--though still large--differential for comprehensive. The results on both sets of ISO data are summarized in Table 10.[76] Ballooning differentials for the comprehensive coverage--which relates to such perils as fire, theft and vandalism--are likely to be correlated with socioeconomic factors.

Much of the better loss experience attributed to the good-student classification is accounted for in the driver training, married (resident student), occasional operator and pleasure-use classes; in the lower base rates for suburban and rural communities; and in multicar discounts. Tables 10A, 10B and 10C reflect the distribution of these factors among insureds with and without good-student status. The only factors tending to understate observed differences between the

TABLE 10

GOOD STUDENT COMPARISON

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
YOUTHS 17-20 WITHOUT GSD v YOUTHS 17-20 WITH GSD*	A	LIAB.	+31
		COMP.	+114*
		COLL.	-12*
	B	LIAB.	+ 37
		COMP.	+ 55
		COLL.	+ 23
YOUTHS 21-24 WITHOUT GSD v YOUTHS 21-24 WITH GSD*	A	LIAB.	+16*
		COMP.	+70*
		COLL.	+20*
	B	LIAB.	+ 45
		COMP.	+ 91
		COLL.	+ 23
YOUTHS 17-24 WITHOUT GSD v YOUTHS 17-24 WITH GSD*	A	LIAB.	+ 16
		COMP.	+127*
		COLL.	- 2
	B	LIAB.	+ 29
		COMP.	+ 81
		COLL.	+ 18

*Fewer than 1000 claims

GSD - Good Student Discount

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multi-Car data.

TABLE 10A

DISTRIBUTION OF PRIMARY CLASSIFICATIONS AMONG INSUREDS WITH AND WITHOUT GOOD-STUDENT DISCOUNTS

	Without Good Student		With Good Student	
Age	Number	%	Number	%
17	41,631	9.5	16,499	29.4
18	68,632	15.7	12,384	22.0
19	61,785	14.2	9,585	17.1
20	54,119	12.4	6,396	11.4
21	59,560	13.7	5,912	10.5
22	50,677	11.6	3,096	5.5
23	53,400	12.2	1,490	2.7
24	46,342	10.6	810	1.4
17-20				
Married	12,278	5.4	3,479	7.8
Unmarried	213,889	94.6	41,385	92.2
21-24				
Married	51,230	24.4	2,489	22.0
Unmarried	158,749	75.6	8,819	78.0
17-20 Married				
With Driver Training	6,845	55.8	2,763	79.4
Without Driver Training	5,433	44.2	716	20.6
Male	242,934	55.7	31,213	55.6
Female	193,212	44.3	24,959	44.4
With Driver Training	107,876	47.7	32,922	73.4
Without Driver Training	118,291	52.3	11,942	26.6
Pleasure	283,251	64.9	41,916	74.6
Drive to Work	152,895	35.1	14,256	25.4
Principal	112,955	63.0	12,759	50.5
Occasional	66,471	37.0	12,486	49.5

Source: D-94C Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 10B-1

DISTRIBUTION OF GOOD STUDENTS AND
NON-GOOD STUDENTS (AGE 17-20) BY TERRITORY*

		Age 17-20			
		Good Student		Non-Good Student	
Code	Territories Definition	Number	%	Number	%
02	Newark	111	1.1	677	1.6
07	Camden	34	0.3	256	0.6
01	Jersey City	272	2.7	1,586	3.8
14	Burlington, Gloucester, Salem Counties	1,723	17.0	6,336	15.3
27	Southern Counties	1,272	12.6	6,709	16.2
40	New Brunswick	1,386	13.7	5,916	14.3
10	Northern Bergen County	2,430	24.0	9,599	23.2
25	Dover, Morristown, Somerville	2,894	28.6	10,379	25.0
	Combined	10,122	100.0	41,458	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 10B-2

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Age Group	Good Student	Non-Good Student	Percentage of Difference
17-20	.988	1.004	1.016
21-24	.996	1.014	1.018
17-24	.989	1.008	1.019

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 10C

AVERAGE SECONDARY RATING FACTORS FOR INSUREDS WITH AND WITHOUT GOOD-STUDENT STATUS (Compulsory Liability Coverages)

	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
Without Good Student 17-20	+ .194	+ .047
With Good Student 17-20	+ .196	+ .005
Without Good Student 21-24	+ .068	+ .002
With Good Student 21-24	+ .058	- .035
Without Good Student 17-24	+ .119	+ .025
With Good Student 17-24	+ .159	- .003

two groups is the greater proportion of very young drivers among good students and, on single-car data, a higher average surcharge amounting to 4 per cent of base rate.

Driver Training

The percentage differences in average loss costs between cars rated with and without driver training are summarized in Table 11 for the two sets of ISO New Jersey data.[77] On single-car data the indicated differential is only 4 per cent for the compulsory coverages; and cars without driver training actually have 8 per cent lower losses for the collision coverages. As in the case of good students, comprehensive coverage differentials are likely to reflect socioeconomic factors.

The differentials indicated are explained in large part by other rating variables, as displayed in Tables 11A, 11B and 11C. The most striking imbalances, tending to account for the entire differential observed for driver training, involves the mix of good students and territories. The proportion of driver training insureds who also have good-student status is more than two times as large as the comparable proportion of insureds without driver training. Similarly, the driver training insureds are more heavily weighted with insureds in the lower-rated territories. Based on the 8-territory sample, the average territory rating factor of the insureds without driver training--about 4 per cent higher than that of driver-training insureds--could account for the entire driver training differential under the single-car compulsory coverages.

Partially offsetting effects result from the distribution of gender classifications and average secondary rating factors. Males

TABLE 11

DRIVER TRAINING COMPARISON

BETWEEN-GROUP DIFFERENCES IN AVERAGE LOSSES PER CAR FOR THE COMPULSORY LIABILITY AND OPTIONAL PHYSICAL DAMAGE COVERAGES

	DATA SET	COVERAGE	INDICATED DIFFERENTIAL (%)
YOUTHS 17-20 WITHOUT DRIVER TRAINING	A	LIAB.	+ 4
		COMP.	+ 32
		COLL.	- 8
v			
YOUTHS 17-20 WITH DRIVER TRAINING	B	LIAB.	+ 15
		COMP.	+ 26
		COLL.	+ 10

Data Set A - Insurance Services Office (1975-77) Single Car data.

Data Set B - Insurance Services Office (1975-77) Single & Multi-Car data.

TABLE 11A

DISTRIBUTION OF PRIMARY CLASSIFICATIONS
WITHIN DRIVER TRAINING GROUPS

	Without Driver Training		With Driver Training	
Age	Number	%	Number	%
17	27,221	20.9	30,909	22.0
18	42,628	32.7	38,388	27.3
19	31,772	24.4	39,598	28.1
20	28,612	22.0	31,903	22.7
Married	6,149	4.7	9,608	6.8
Unmarried	124,084	95.3	131,190	93.2
Male	58,802	45.2	75,128	53.4
Female	71,431	54.8	65,670	46.6
With Good Student	11,942	9.2	32,922	23.4
Without Good Student	118,291	90.8	107,876	76.6
Pleasure	92,195	70.8	100,158	71.1
Drive to Work	38,038	29.2	40,640	28.9
Principal	25,395	48.2	31,863	48.6
Occasional	27,258	51.8	33,657	51.4

Source: D-94C Insurance Services Office property damage liability exposures calendar accident years 1975, 1976, 1977.

TABLE 11B-1

DISTRIBUTION OF DRIVER TRAINING AND
NON-DRIVER TRAINING (AGE 17-20) BY TERRITORY*

Based on 8 Territory Sample

		Age 17-20			
		Driver Training		Non-Driver Training	
Code	Territories Definition	Number	%	Number	%
02	Newark	239	0.8	549	2.3
07	Camden	87	0.3	203	0.9
01	Jersey City	577	2.1	1,281	5.5
14	Burlington, Gloucester, Salem Counties	4,445	15.8	3,614	15.4
27	Southern Counties	3,794	13.5	4,187	17.9
40	New Brunswick	4,101	14.6	3,201	13.6
10	Northern Bergen County	7,289	25.9	4,740	20.2
25	Dover, Morristown, Somerville	7,610	27.0	5,663	24.2
	Combined	28,142	100.0	23,438	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 11B-2

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Age Group	Driver Training	Non-Driver Training	Percentage of Difference
17-20	.983	1.022	1.040
21-24	NA	NA	NA
17-24	NA	NA	NA

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 11C

AVERAGE SECONDARY RATING FACTORS FOR
INSUREDS WITH AND WITHOUT DRIVER TRAINING
(Compulsory Liability Coverages)

	Net Average Surcharges (+) and Discounts (-)	
	Single-Car Data (Data Set A)	Combined Single- and Multicar Data (Data Set B)
Without Driver Training	+ .166	+ .019
With Driver Training	+ .227	+ .008

representing a somewhat higher percentage of insureds with driver training than females--probably because female resident students are treated as adults and male resident students remain youths for rating purposes. On single-car data, insureds with driver training also pay a higher average surcharge than insureds without, amounting to about 6 per cent of base rate. This unevenness is more difficult to explain since driver training insureds are supposed to have fewer accidents. It probably has to do with the within-class distributions of insureds subject to inexperience surcharges.

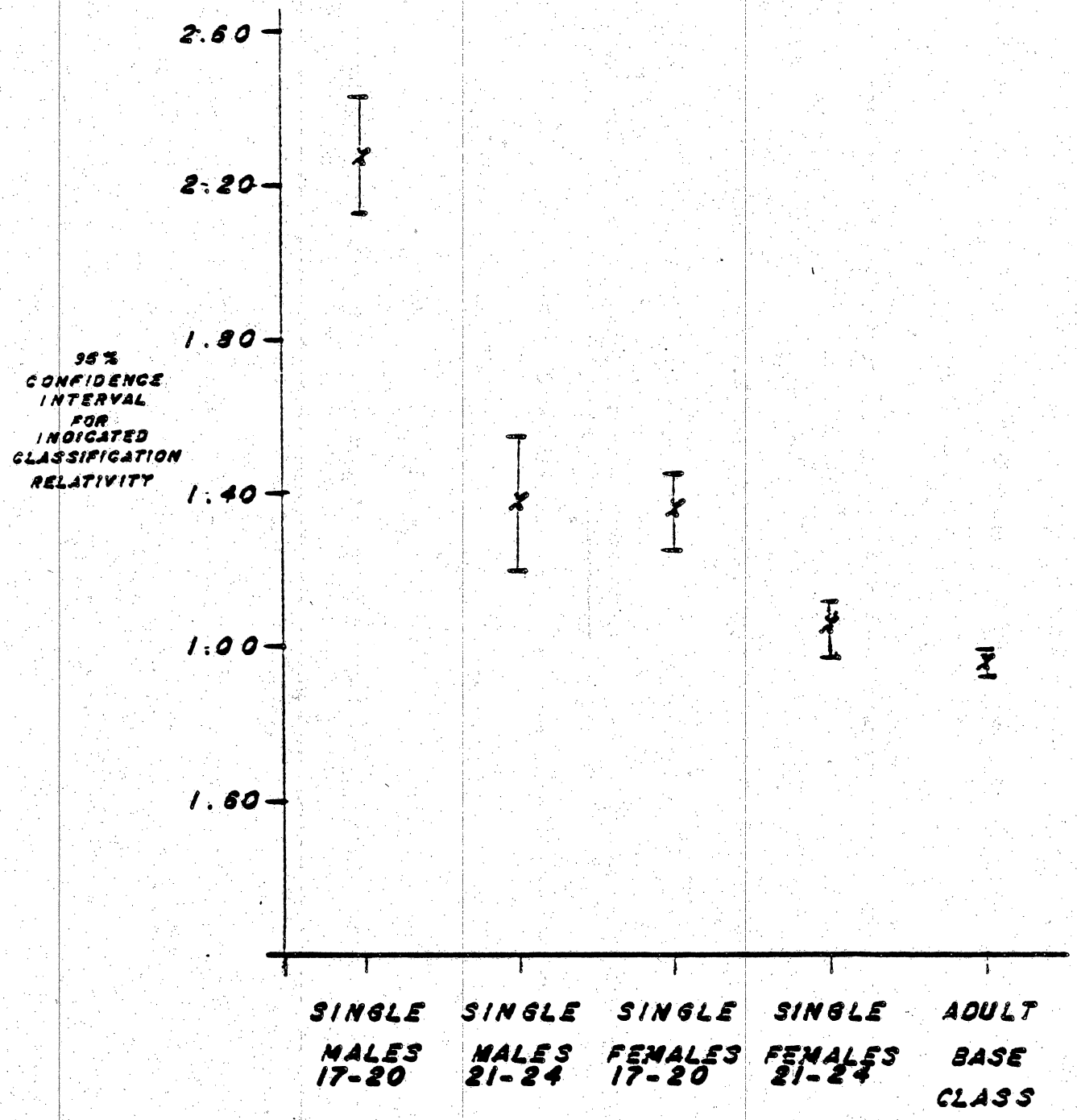
3. Credibility

It has been demonstrated that some classes have different average loss costs than others. Of equal importance, however, is whether these differences in average costs provide a sufficient basis for the derivation of accurate premiums for each class. In the case of classification variables relating exclusively to youths, they do not. Although in particular instances relevant loss experience may meet a claim-count standard or other minimal credibility test, the uniquely small size of the youthful classes overall causes a high degree of variability in average loss costs for each class over time. Variations in class-average costs over multi-year periods frustrates their use as a basis for predicting the magnitude of future differences between classes.

Figure 7 is a graph reflecting the accuracy of estimated relativities for ISO's youthful classes. The "x" for each class represents the average class relativity--relative to the adult base class--on three years of statewide single-car data. The interval or vertical line for each class reflects the 95 per cent confidence in-

FIGURE 7

THE STATISTICAL SIGNIFICANCE OF CLASS DIFFERENTIALS VARIABILITY AND OVERLAP FROM YEAR TO YEAR



SOURCE: D-90 ISO DATA

terval for each class relativity that is estimated from the three years of data.[78]

The standard errors in Figure 7 are a function of the variability of experience for each class from year to year within the three year period notwithstanding that each year formal standards for full credibility are met.[79] Table 12 summarizes the computations. High-to-low fluctuation in relativities for the youthful classes is about 11 per cent for single males 17-through-20, 25 per cent for single males 21-through-24, 13 per cent for single females 17-through-20, and 20 per cent for single females 21-through 24. High-to-low fluctuation in the experience of the adult base class is about 3 per cent.

It is axiomatic that the smaller the data base the higher the degree of its sensitivity to random events. Predictions based on sampling of past accident experience largely depend for their accuracy on the breadth and representativeness of that experience. A small sample, unless tightly controlled for homogeneity, is generally an inadequate basis for prognostication. The pricing of insurance in this respect is somewhat analogous to public-opinion polling which attempts to predict the outcome of elections--a practice which is still imperfect despite enormously improved (multivariate) estimation techniques. Insurance pricing bears an additional responsibility which underscores the importance of the credibility of the data it uses. Insurance pricing must predict not only which candidate will win but also the margin of victory. Specifically, it must predict the margins of difference between each of the candidates in the race. As the numbers of candidates proliferate, therefore, the task becomes more exacting.

The credibility problem was acknowledged by a variety of witnesses as one of the factors which limited the extent of classi-

TABLE 12

STANDARD ERROR OF ESTIMATED
CLASS-AVERAGE COST DIFFERENCES

Class	Exposures 1975-77*	Relativity to Statewide 1975	1976	1977	3-year**	Standard Error of Estimate**
Single males 17-20	35,987	2.202	2.199	2.434	2.278	0.078
Single males 21-24	47,970	1.521	1.401	1.215	1.379	0.089
Single females 17-20	48,888	1.281	1.445	1.337	1.354	0.048
Single females 21-24	46,354	1.051	0.957	1.147	1.052	0.055
Adult Base Class	669,173	0.985	0.959	0.958	0.957	0.009
TOTAL	1,219,096	1.000	1.000	1.000	1.000	--

Source: D-90 ISO data, with development of 1975 to 39 months, 1976 to 27 months and 1977 to 15 months, using ISO compilation of experience submitted June 24, 1980 and January 4, 1979.

fication refinement. There was suggested a tradeoff between homogeneity and credibility:

> "Although insurance rates are addressed to the future, past loss experience, particularly the most recent loss experience, offers the best guide in predicting future loss costs. Furthermore, the broader the base of the loss experience used, the more reliable, or credible, the indications of the past loss experience will be for purposes of making rates for the future. Fragmentation of classifications, however, narrows the base of the loss experience and substantially impairs its credibility."[80]

The industry response to credibility problems raised by the heavy refinement of youthful classifications relies generally on the "credibility of consistency." Industry witnesses argue that as long as the relative indications for the separate classes keep coming up in the same direction, say, the indications for youths keep coming up higher than the indications for adults from review-period to review-period, the maintenance of separate classes as currently defined is vindicated. The argument is of course simplistic. Absence of full credibility in the high-rated youthful classes causes substantial swings in experience from year to year and leaves to guesswork what the true indications should be. The problem is structural, moreover. If the rating variables currently applied to youths cannot be reliably priced, they are inherently defective.

Any recognition of credibility problems with respect to the pricing of classifications does not show up in the rate filings. Although formula-based credibility adjustments to territory base rates is routine, classification data are offered without formal attention to credibility. The regulator is asked to rely largely on the unexplained judgments of company actuaries unconstrained by explicit standards. As Allstate's Elton Stephenson put it:

> ". . . The fact that we do not and did not in the filing reference a credibility table for the classification data would imply that we believe each classification here is fully credible."[81]

State Farm's Michael Miller described very cogently the nature of the qualitative assessments made by company actuaries in using the information generated by the classification plans:

> ". . . Credibility, I think, is very often misunderstood by many actuaries. As a matter of fact, I have heard some actuaries give some testimony that is not precise in terms of credibility theory.
>
> "Credibility is very often thought of as simply a function of the volume of data.
>
> "Credibility is a concept that was devised by the actuary, not by . . . the statistician.
>
> "Credibility is not something that's innate to the data in the same manner that a standard deviation is innate to data . . .
>
> "If you give me a series of numbers, I cannot calculate for you a credibility factor unless I know something about the numbers. I have to know . . . whence those numbers came. I have to know what you want me to use those numbers for.
>
> "Now, this credibility theory is really a theory of establishing certain standards for credibility to kind of give us some kind of organization . . . but it really comes down to the judgment of the actuary." (emphasis added)[82]

Miller offered a variety of standards and considerations which would assist him in determining the degree of confidence to be placed in particular data and how partially credible data can be used to the fullest extent of its true information content. Of particular interest was his explanation of the relevance of "consistency" from year to year:

> "If you are looking at a classification where some year you get an indicated class rating factor of 60, and the next year you get an indicated class rating factor of 120, and you see that kind of

> variation from year to year, and you look at the average for the two years, the average is 90, and based upon the value of the data, you may assign a high credibility to this 90 average factor that was calculated, but in my view you have to look behind that average and realize that that average was generated by two very divergent indications, 60-to-120. This is rather a simplistic answer, but in that kind of situation, I am not sure I would know what the right answer is, what the right indicated factors were. . . If you take the average, I am pretty sure that it's wrong. You have minimized error, but it's not right, it just happens to be somewhere in the middle."[83]

Edward Young of Allstate confirmed the judgmental nature of choosing among class-relativity indications which fluctuate from review period to review period. He pointed out the Allstate practice of "moving in the direction of the indication"--adopting (in varying degrees) some but not all of the change in differential indicated by the most recent multi-year data.[84]

The intricacies of present classification plans concededly defy formalistic approaches. The reasonableness of the methods suggested by Miller and Young is difficult to quarrel with in the circumstances. Yet a regulator is understandably disquieted by the inexactness and relative unpredictability of the approach when the outcome can mean literally hundreds of dollars to the individual policyholder. Filers resist permitting the regulator to develop the intimate familiarity with underlying data required to scrutinize company judgments of this sort. Some even claim formally that company exposure distributions are confidential.[85]

Moreover, even after the application of stabilizing judgments by company actuaries, there remain disproportionate swings in the rate differentials for the small youthful classes. These swings are reflected in the State Farm and Allstate exhibits proposed as support

for their class rating factors. The State Farm comparison of its current New Jersey factors and those factors indicated by New Jersey and countrywide experience reflect fluctuations in average experience for 21-through-24-year old single male principal operators ranging from 16 to 38 per cent, and for single female principal operators of the same age fluctuations ranging from zero to 22 per cent, depending on which data or combinations of data the company chooses to look at in fixing the final rates. By comparison, the indications for the largest adult classes are relatively stable, regardless of the data considered.[86]

Unless differential shifts in class experience can be attributed to some systematic change in the underlying risk characteristics of youths over the most recent several years, the extent to which relative differences between classes turn out to be smaller or larger than predicted amount to overcharges and undercharges of the affected classes. The range of fluctuations observed in the State Farm experience pertain to precisely such differences between actual and predicted relativities. The inaccuracies are substantial; and because several years elapse between predictions and outcomes--State Farm's last review of class factors was conducted in 1976--the cost implications for the affected classes of insureds are potentially enormous. It is no consolation that these fluctuations can be averaged out over an extended period of years. Even if the earliest-collected data resist getting stale, the overcharged and undercharged youths will have long since approached middle-age by the time this hypothetically correct price can be derived.

The Allstate indications, relying exclusively on countrywide data, show similar swings in relativities for the youthful classes.

The observed indications for the youthful classes under age 25 over three review periods (of approximately 2½ years each) show swings up to 38 per cent. Of the ten Allstate classes under age 25, two classes reflected fluctuation in loss experience in excess of 30 per cent, another four showed high-to-low fluctuation in excess of 20 per cent, and three of the remaining four classes showed fluctuation at or above 10 per cent.[87]

To appreciate the significance of these percentage swings, indicating the range of undercharges and overcharges over time for the small youthful classes, as groups, compare them to the various percentage cost impacts attributable to the hypothetical elimination of all or some of the youthful classes.[88] Also take into account that these percentage shifts have disproportionately severe implications in dollar terms for the high rated youthful classes. Each per cent of increase in price for the adult base class costs one-third as much as an identical swing in a youthful class priced three times as high.

Structurally-induced fluctuations in average loss experience from period to period leaves to the discretion of company actuaries the resolution of uncertainties as to the proper pricing of the affected classes. This lattitude for the exercise of discretionary pricing judgments injects into ratemaking precisely the kind of "subjectivity" decried by the industry in their assessment of regulatory attempts to second-guess company ratemakers.[89] Given the companies' admitted tendency to accord highest priority to competitive considerations, departures from objective formula-based pricing techniques is of special concern. The relatively small cost savings which extensive classification refinement promises the majority of drivers are hardly enough on

balance to justify the extent of fractionalization in current plans and the opportunities it presents for unfair treatment of the minority.

4. Pricing

One of the most rudimentary tests for any classification scheme asks whether the magnitudes of difference in price between classes correspond to the magnitudes of difference in class-average losses. Company witnesses seem to agree that at least "a rate which is not reflective of anticipated losses and expenses" (on a class-average basis) is unfairly discriminatory.[90] It is important then to examine the soundness of the system in its own terms.

The significance of this inquiry is underscored by the pre-eminent role given competitive and judgmental considerations in the pricing of classifications.[91] The interaction of subjective judgment and competitive considerations is well summarized in a quote from the Travelers witness:

> "We have gone through periods of observations and periods of management at the Travelers. We have had times when certain management have said let automobile rate itself. Let's assign or let's put less judgment into the rating variables. Let's let the actuaries look at the data and establish the driver record relativities, the classification relativities . . . So we have followed at times very closely the experience being developed by the driver record classes, and other management have come in and said no, there are such strong competitive disadvantages to that kind of an operation, that kind of a philosophy, that you end up with a class of business that is so bad in relation to what other companies are willing to write that you just price yourself completely out of the market, so in the past several years we have not followed the actuarial indications in our driver record class relativities. We have kept them more in line with competition and also looking at our experience to see just how that was working out."[92]

The evidence indicates that indeed indicated differences between classes are not accurately priced under current classification

plans. Prices, to a substantial degree, do not match losses. Specifically, the data reflect a pattern of discrepancies between prices and losses which suggest that the youthful classes and higher-rated classes generally are systematically overcharged.

a. A Comparison of Primary-Class Rating Factors and Class-Average Loss Costs

This analysis concerns the accuracy of class rating factors. These rating factors are generally expressed as numerical ratios reflecting the loss-premium for each class relative to the base class. All rating systems use one of the adult classes as the base class, typically the adult pleasure class, because the adult classes are the largest and most stable of the classes.

The rating factor unique to each class is usually printed in the rate manual. For example, the ISO manual reflects a rating factor of "3.45" for an 18 year old principal operator with a car used to drive to work (or school). This means that before consideration of applicable surcharges and discounts, an insured in this class will pay a loss-premium 3.45 times higher than the loss-premium paid by the adult-pleasure class. The comparable rating factor for the adult-pleasure class is by definition "1.0".

Under the ISO system, the rating factors which are unique to each class are described as "primary" rating factors. The primary classes, with respect to youths, are defined by age, sex, marital status, good student status, driver training and vehicle usage. Rating factors which apply across all classes, namely the surcharges and discounts mentioned above, are referred to as "secondary" rating factors. The analysis will address each type of factor separately.

The analysis presented in testimony by Richard Boer, Senior Rate Analyst for the Department, examined 3 years of combined voluntary market loss experience on single-and multicar liability coverages written in New Jersey by the ISO companies. The results showed that in a preponderance of the youthful class cells under the major coverages the manual rating factor for the class was substantially higher than the ratio of its average losses to average losses for the base class. In other words, for most of the youthful classes relative price exceeded relative cost.

Of the 202 primary classifications pertaining to youths under the ISO system, a total of 144 or approximately 70 per cent are priced above indicated costs.[93] The most consistently overcharged are the unmarried males. Some 84 of the 106 single-male classes, or about 80 per cent, were found to be priced in excess of the average costs reflected in the data. Almost one-third of the overpriced classes have factors more than 20 per cent too high in relation to losses--in dollar terms, more than 20 per cent of an affected insured's rate--and only 4 of the 84 overcharged classes reflected overcharges of less than 10 per cent. Married male classes were found to be overpriced in 33 of 48 cells, or about 70 per cent of the cells; and unmarried females were found to be overcharged in 27 of 48 or about 55 per cent of the unmarried female classifications. Many of the classification cells examined are too thinly populated to generate fully credible data, but the persistency of the pattern across the several hundred classes gives strong evidence of a systematic bias. These results are summarized in Table 13.

A similar analysis based on 3-year State Farm data for the compulsory liability coverages yields similar results, as summarized

in Table 14. Overall, 50 of State Farm's 74 youthful classes are assigned rating factors which exceed the ratio of indicated class-average losses to the average losses of the base class. Of the 50 classes overcharged, 36 are overcharged by more than 20 per cent. Married male classes are overcharged in 13 of 18 classes, unmarried males in 23 of 32 classes, and unmarried females in 14 of 24 classes.[94]

The State Farm results are misleading to the extent 23 of the 50 youthful classes appearing to be overcharged had no loss experience reported for them, presumably because they contained too few insured cars. However, because State Farm claims that its detailed exposure distributions are confidential, the classes have not been aggregated for purposes of analysis. Allstate supplied none of the requested data in a form which used its class definitions.

b. Secondary Rating Factors and Double-Counting

Data supplied by the ISO permits the comparison of class factors and class-average losses to be further refined by consideration of the so-called secondary rating factors--the surcharges and discounts which, for the ISO companies, depend on vehicle performance rating, accident and major-conviction record and number of cars insured. Because State Farm and Allstate failed to supply data in the detail requested, the analysis will be confined to these ISO data, but there is no reason to doubt that the phenomena identified are not of universal significance.

The secondary rating factor analysis underscores the results obtained under the primary-factor analysis and in fact produces even greater discrepancies between premium and loss relativities in the youthful classes. However, especially important here are the double-

TABLE 13

OVERCHARGING THE YOUTHFUL CLASSES: ISO - A SUMMARY OF THE EXTENT TO WHICH LOSS PREMIUMS EXCEED LOSS COSTS

Class Description	Total Classes	Overcharged Classes	Percent of Classes Overcharged
Adults	10	8	80.0
Over 65 Principal Operator	5	5	100.0
Unmarried Female 17-20	32	20	62.5
Unmarried Female 21-24	16	7	43.8
Married Male 17-20	32	21	65.6
Married Male 21-24	16	12	75.0
Unmarried Male			
Occasional Operator 17-20	32	28	87.5
Occasional Operator 21-24	16	11	68.8
Principal Operator 17-20	32	23	71.9
Principal Operator 21-24	16	16	100.0
Principal Operator 25-29	10	6	60.0

Source: Exhibit D-94.

TABLE 14

OVERCHARGING THE YOUTHFUL CLASSES: STATE FARM - A SUMMARY OF THE EXTENT TO WHICH PREMIUM RELATIVITIES EXCEED LOSS RELATIVITIES

Class Description	Total Classes	Overcharged Classes	Percent of Classes Overcharged
Adults	22	13	59.1
Over 65 Principal Operator	20	11	55.0
Unmarried Females			
Occasional Operator 17-24	12	6	50.0
Principal Operator 17-24	12	8	66.7
Married Males 17-24	18	13	72.2
Unmarried Male			
Occasional Operator 17-24	14	8	57.1
Principal Operator 17-24	12	10	83.3
Principal Operator 25-29	6	5	83.3

Source: Exhibit D-94f.

counting phenomena associated with the use of independently priced primary and secondary rating variables in combination. As observed in earlier discussions, even if primary factors are accurately priced, the superimposition of secondary factors without appropriate adjustments makes premiums redundant.

An example of double counting with respect to secondary factors is the use of "inexperience" surcharges when all or a substantial part of any risk attributable to lack of driving experience is already measured by the age variable. ("Inexperience" surcharges are imposed under ISO's accident and conviction-record program and are therefore secondary rating factors.) Unless the respectively unique contributions of age and inexperience are isolated, redundancy is unavoidable.

The same type of problem arises in connection with each of the other secondary rating factors. In the case of vehicle performance surcharges--which are as high as 30 per cent of the territory base rate for cars rated as "high performance"--there is reason to question whether cars in the higher-than-standard performance categories present higher risks on average because they offer temptations to recklessness or because greater numbers of risk-takers tend to own them. If a disproportionate number of the drivers of the higher performance cars are already high-average risks on other grounds, any higher average losses attributable to these cars may only reflect in part the higher class relativities of precisely these drivers. In general, any such correlation between primary and secondary rating factors will lead to double-counting under the current ISO practice of justifying rate differentials. The double-counting problems associated with merit

rating and multicar discounts will be discussed in subsequent sections devoted to them.

In an effort to identify in gross terms the extent of the redundancy caused by independent pricing of interrelated variables, Department staff conducted the same kind of premium-to-loss comparison as described in connection with primary rating factors. For this analysis the average secondary rating factor charged to members of each class was added to the primary rating factor for the class to derive the actual differential in premium paid by the class. Individual-year-of-age classes were aggregated by major age subgrouping to improve credibility.

The class for 18 year old principal operators commuting to work discussed earlier can again serve as an example. This class has a primary rating factor of 3.45, meaning the amount of premium it pays to cover losses--before consideration of secondary rating factors (or loading for profit and expenses)--is 3.45 times the loss-premium of the adult base class. Analysis of combined single- and multicar data indicates that in addition to the primary factor the members of this class pay surcharges and discounts--for vehicle performance rating, accident and driver record, inexperience and multicar--which net out to an average surcharge of +.23. This average surcharge added to the class factor printed in the manual for this class yields a combined factor of 3.68. When comparing the premium burden of this class relative to the base class, it is this combined factor which should be used. Similarly, the average secondary rating factor for the adult-pleasure base class should be added to its manual factor in determining its true relationship to other classes. The average secondary factor

for the adult-pleasure class--based on combined single- and multicar data--is a net discount of -.06, yielding a combined true factor for the class of .94. The true price relationship between the 18-year old commuter class and the adult-pleasure base class thus becomes the ratio of 3.68 to .94, or 3.91. In fact, then, the 18-year old commuter class pays a premium 3.91 times higher than the adult base class instead of the 3.45 factor printed in the manual.

In this fashion the true price relationships between the various classes and the base class were determined. Table 15 and related tables compare these premium ratios to ratios of class-average losses. The "premium relativity" column indicates the ratio of the combined rating factors for each class to the combined rating factors for the base class. The "loss relativity" column indicates the ratio of average losses for the class in question to the average losses of the base class. The "relativity differences" column indicates the difference between the loss relativities and the premium relativities. A positive ("+") sign in the latter column indicates that the ratio of premiums exceeds the ratio of losses and that the class is overcharged by a factor of the indicated magnitude. A negative ("-") sign indicates the converse and a corresponding undercharge for the class.

A review of the results indicates that 41 of the 50 youthful classes are overcharged relative to the base class, 8 are undercharged, and one youthful class is priced about right. The class of youthful drivers most consistently overcharged are the unmarried males who are "owners or principal operators." Each one of the 14 classes comprising this group indicated substantial overcharges, by factors ranging from a low of .29 (29 per cent of the insured's territory base rate) to a

TABLE 15

PRICE - COST COMPARISON

UNMARRIED MALES

Owner or Principal Operator

Driver Training Credit	Pleasure Use Or Farm Use			Drive To Work Or Business Use		
	Aggregate Class			Aggregate Class		
	Premium Relativity	Loss Relativity	Relativity Difference	Premium Relativity	Loss Relativity	Relativity Difference
			Without Good Student Credit			
			Age 17-20			
Without	3.51	2.75	+.76	3.62	2.94	+.68
With	3.08	2.47	+.61	3.22	2.42	+.80
			Age 21-24			
With/ Without	2.45	1.57	+.88	2.62	1.69	+.93
			Age 25-29			
With/ Without	1.76	1.35	+.41	1.93	1.31	+.62
			With Good Student Credit			
			Age 17-20			
Without	2.73	2.44	+.29*	2.86	2.17	+.69*
With	2.50	1.65	+.85*	2.66	1.58	+1.08*
			Age 21-24			
With/ Without	2.09	0.74	+1.35*	2.29	0.61	+1.68*

*Denotes class or class grouping with fewer than 1,000 claims.

Source: Insurance Services Office, New Jersey data private passenger non-fleet automobile liability insurance, voluntary risks B.I., P.D., P.I.P. combined accident years 1975, 1976, 1977 combined
Hearing exhibits D-94, D-94a, D-94b, D-94c, D-95

TABLE 15A

PRICE - COST COMPARISON

UNMARRIED MALES

Not Owner or Principal Operator

Driver Training Credit	Pleasure Use Or Farm Use			Drive To Work Or Business Use		
	Aggregate Class			Aggregate Class		
	Premium Relativity	Loss Relativity	Relativity Difference	Premium Relativity	Loss Relativity	Relativity Difference
			Without Good Student Credit			
			Age 17-20			
Without	2.67	2.26	+.41	2.84	2.06	+.78
With	2.24	1.89	+.35	2.40	1.82	+.58
			Age 21-24			
With/ Without	1.78	1.54	+.24	1.94	1.52	+.42*
			With Good Student Credit			
			Age 17-20			
Without	1.08	2.26	-.18*	2.24	1.38	+.86*
With	1.73	1.43	+.30*	1.88	0.98	+.90*
			Age 21-24			
With/ Without	1.34	3.23	-1.89*	1.50	0.63	+.87*

*Denotes class or class grouping with fewer than 1,000 claims.

Source: Insurance Services Office, New Jersey data private passenger non-fleet automobile liability insurance, voluntary risks B.I., P.D., P.I.P. combined accident years 1975, 1976, 1977 combined
Hearing exhibits D-94, D-94a, D-94b, D-94c, D-95

TABLE 15B

PRICE - COST COMPARISON

MARRIED MALES

Driver Training	Pleasure Use or Farm Use			Drive to Work or Business Use		
	Aggregate Class			Aggregate Class		
	Premium Relativity	Loss Relativity	Relativity Difference	Premium Relativity	Loss Relativity	Relativity Difference
			Without Good Student Credit			
			Age 17-20			
Without	1.89	1.89	0*	2.04	1.28	+.76*
With	1.68	1.48	+.20*	1.87	1.29	+.58*
			Age 21-24			
With/ Without	1.40	1.43	-.03	1.55	1.24	+.31
			With Good Student Credit			
			Age 17-20			
Without	1.46	0.65	+.81*	1.62	1.36	+.26*
With	1.30	1.50	-.20*	1.45	0.77	+.68*
			Age 21-24			
With/ Without	1.24	0.79	+.45*	1.31	0.91	+.40*

*Denotes class or class grouping with fewer than 1,000 claims.

Source: Insurance Services Office, New Jersey data private passenger non-fleet automobile liability insurance, voluntary risks B.I., P.D., P.I.P. combined accident years 1975, 1976, 1977 combined
Hearing exhibits D-94, D-94a, D-94b, D-94c, D-95

TABLE 15C

PRICE - COST COMPARISON

UNMARRIED FEMALES

Driver Training Credit	Pleasure Use Or Farm Use			Drive to Work Or Business Use		
	Aggregate Class			Aggregate Class		
	Premium Relativity	Loss Relativity	Relativity Difference	Premium Relativity	Loss Relativity	Relativity Difference
			Without Good Student Credit			
			Age 17-20			
Without	1.66	1.59	+.07	1.83	1.81	+.02
With	1.55	1.59	-.04	1.72	1.58	+.14
			Age 21-24			
With/ Without	1.16	1.44	-.28	1.33	1.41	-.08
			With Good Student Credit			
			Age 17-20			
Without	1.46	1.29	+.17*	1.62	1.12	+.50*
With	1.32	1.22	+.10	1.50	1.04	+.46*
			Age 21-24			
With/ Without	1.05	1.16	-.11*	1.22	0.59	+.63*

*Denotes class of class grouping with fewer than 1,000 claims.

Source: Insurance Services Office, New Jersey data private passenger non-fleet automobile liability insurance, voluntary risks B.I., P.D., P.I.P. combined accident years 1975, 1976, 1977 combined
Hearing exhibits D-94, D-94a, D-94b, D-94c, D-95

high of 1.68 (168 per cent of the relevant territory base rate for each driver in the class). All but two of the 14 overcharged single-male principal operator classes are overcharged by a factor in excess of .60.[95]

Almost as consistently overcharged as the principal operators are the single-male occasional operators. Of the 12 classes comprising this group, 10 are shown to be substantially overcharged. The overcharges range from a low factor of .24 to a high of .90. The two undercharged classes in this group are in the good student category. One reflects an undercharge of 1.89 based on the ratio of its losses to the losses of the base class.

The "married" males (including resident students) are overcharged in 9 of 12 classes. These overcharges range from a low factor of .20 to a high of .81, relative to the base class. The unmarried females are overcharged in 8 of 12 classes, from a low overcharge factor of .02 to a high of .63.

The significance of these overcharges can be better appreciated by translating loss relativities and premium relativities into percentage terms. For example, the class for 17-through-20 year old single male principal operators, without good student or driver training and with pleasure-use cars, reflects a loss relativity of 2.75 and a premium relativity of 3.51. This translates to mean that the class incurs average losses 175 per cent higher than the adult base class but pays average premiums 250 per cent higher than the adult class. The 21-through-24 year old single male principal operators without good student and with pleasure-use cars incurred average losses 57 per cent higher than the adult-pleasure class (for a loss relativity

of 1.57) but pay average premiums 145 per cent higher than the adult class (for a premium relativity of 2.45). The discrepancies are substantially higher in other classes as reflected in the Tables.

Two methodological aspects of this price-cost comparison limit the precision of its numerical results. First, the analysis uses combined experience for all compulsory coverages--bodily injury liability (BI), property damage liability (PD) and no-fault personal injury protection (PIP). When the manual rating factors were adopted by ISO they applied to all three coverages--for State Farm they still do--but the Commissioner's intervention in 1977 to force the flat-rating of the PIP coverage now restricts the applicability of ISO's class factors to BI and PD coverages.[96] Secondly, the analysis uses combined single- and multicar data. These data obscure the different mixes of surcharges and discounts across single- and multicar groups; and they further conceal differences in loss relativities for single- and multicar classes not accounted for by the multicar discount.

The analysis has been refined to overcome these methodological difficulties. Table 16 and the related tables summarize the results for each of the major youthful variables--age, sex, marital status, principal-occasional, and driver training and good student (considered together). The purpose of the analysis is again the identification of discrepancies between premium and loss relativities for each classification.

The columns labeled "BI + PD" summarize comparisons of the combined primary and secondary rating factor for each class and the average loss relativity for each class under bodily injury and property damage liability coverages only. The columns labeled "BI + PD + PIP"

TABLE 16 - AGE

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING YOUTHFUL AGE CLASSES

		Single-Car Data		Multicar Data	
		BI + PD	BI + PD + PIP	BI + PD	BI + PD + PIP
All Youths	17-29	+ 23.2%	+ 10.6%	+ 13.0%	- 4.8%
All Youths	17-20	+ 13.1	+ 2.6	+ 8.4	- 8.6
	21-24	+ 27.1	+ 10.9	+ 19.6	- 2.2
	25-29*	+ 44.7	+ 28.4	+ 60.2	+ 47.9
Single Youths	17-20	+ 13.5	+ 2.7	+ 8.7	- 9.1
Single Youths	21-24	+ 30.1	+ 13.5	+ 23.0	+ 3.6
Single Youths	25-29	+ 44.7	+ 28.4	+ 60.2	+ 47.9
Single Male	17-20	+ 14.3	+ 2.7	+ 15.0	- 4.5
Single Male	21-24	+ 48.2	+ 31.2	+ 51.2	+ 24.3
Single Male	25-29	+ 44.7	+ 28.4	+ 60.2	+ 47.9
Married Male	17-20	+ 2.4	- .5	+ 3.4	- .1
Married Male	21-24	+ 19.7	+ 14.5	+ 14.9	- 7.3
Married Male	17-24	+ 16.2	+ 11.6	+ 11.0	- 5.2
Single Female	17-24	+ 9.1	- 2.1	- 3.1	- 16.3

*By definition, this group includes males only.

SOURCE: Exhibits D-90 and D-94. The multicar data is generated by the subtraction of D-90 (single-car data) from D-94 (single- and multicar data combined).

TABLE 16A - SEX

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING YOUTHFUL GENDER CLASSES

	Single-Car Data		Multicar Data	
	BI + PD	BI + PD + PIP	BI + PD	BI + PD + PIP
Single Male 17-24	+ 29.7%	+ 16.0%	+ 23.2%	+ 2.3%
Single Female 17-24	+ 9.1	- 2.1	- 3.1	- 16.3
Single Male 17-20	+ 14.3	+ 2.7	+ 15.0	- 4.5
Single Female 17-20	+ 12.5	+ 2.6	- 0.2	- 15.0
Single Male 21-24	+ 48.2	- 31.2	+ 52.7	+ 28.1
Single Female 21-24	+ 4.5	- 7.8	- 12.1	- 20.3

SOURCE: Exhibits D-90 and D-94. The multicar data is generated by the subtraction of D-90 (single-car data) from D-94 (single- and multicar data combined).

TABLE 16B - MARITAL STATUS

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
YOUTHFUL MARITAL-STATUS CLASSES

		Single-Car Data		Multicar Data	
		BI + PD	BI + PD + PIP	BI + PD	BI + PD + PIP
Single Male	17-24	+ 29.7%	+ 16.0%	+ 23.2%	+ 2.3%
Married Male	17-24	+ 16.2	+ 11.6	+ 11.0	- 5.2
Single Male	17-20	+ 14.3	+ 2.7	+ 15.0	- 4.5
Married Male	17-20	+ 2.4	- .5	+ 3.4	- .1
Single Male	21-24	+ 48.2	+ 31.2	+ 51.2	+ 24.3
Married Male	21-24	+ 19.7	+ 14.5	+ 14.9	- 7.3

SOURCE: Exhibits D-90 and D-94. The multicar data is generated by the subtraction of D-90 (single-car data) from D-94 (single- and multicar data combined).

TABLE 16C - PRINCIPAL-OCCASIONAL

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING PRINCIPAL AND OCCASIONAL OPERATORS

		Single-Car Data		Multicar Data	
		BI + PD	BI + PD + PIP	BI + PD	BI + PD + PIP
Prin.	17-20	+ 17.9%	+ 6.7%	+ 14.8%	- 5.3%
Occ.	17-20	+ 6.9	- 5.0	+ 15.3	- 3.7
Prin.	WK/BUS 17-24	+ 38.5	+ 23.6	+ 39.2	+ 17.4
Occ.	WK/BUS 17-24	+ 20.9	+ 2.7	+ 46.0	+ 10.6
Prin.	Pleas. 17-24	+ 35.4	+ 20.9	+ 28.2	+ 6.2
Occ.	Pleas. 17-24	- .3	- 7.2	+ 4.9	- 10.0
Prin.	WK/BUS 17-20	+ 22.1	+ 7.0	+ 16.5	- 1.1
Occ.	WK/BUS 17-20	+ 13.1	- 3.5	+ 50.4	+ 14.3
Prin.	WK/BUS 21-24	+ 48.6	+ 33.7	+ 86.9	+ 53.8
Occ.	WK/BUS 21-24	+ 63.9	+ 33.4	+ 29.2	- 2.4
Prin.	Pleas. 17-20	+ 15.9	+ 6.6	+ 14.2	- 6.6
Occ.	Pleas. 17-20	+ 4.1	- 5.7	+ 4.8	- 9.7
Prin.	Pleas. 21-24	+ 58.0	+ 35.5	+ 71.3	+ 45.0
Occ.	Pleas. 21-24	- 15.7	- 13.0	+ 5.0	- 11.9

SOURCE: Exhibits D-90 and D-94.

TABLE 16D - DISCOUNTS

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING YOUTHS WITH DISCOUNTS

		Single-Car Data		Multicar Data	
		BI + PD	Liability	BI + PD	Liability
Youths W/DISCS*	17-24	+ 24.7%	+ 19.0%	+ 8.3%	+ 5.8%
Youths W/O	17-24	+ 20.0	+ 7.4	+ 12.5	- 7.5
Youths W/DISCS	17-20	+ 26.4	+ 21.4	+ 6.5	+ 4.3
Youths W/O	17-20	+ 15.0	+ 1.8	+ 6.0	- 11.3
Youths W/DISCS	21-24	+ 16.1	+ 29.3	+ 47.2	+ 44.4
Youths W/O	21-24	+ 28.6	+ 13.3	+ 19.3	- 1.7

*Denotes insureds with both driver-training and good-student discounts.

SOURCE: Exhibits D-90 and D-94.

combine experience under all three coverages but also use a premium relativity which reflects the flat-rating of PIP.[97] Like the previous analysis, a positive ("+") sign is used to indicate an overcharge relative to base class and a negative ("-") sign denotes an undercharge. An overcharge (or undercharge) is the per cent by which the class premium relativity exceeds (or is exceeded by) the class-average loss relativity. Separate results are displayed for single- and multicar insureds.

The systematic pattern of overcharges persists but in a format which permits additional insights. The results show that among youths the magnitudes of overcharges differ between those "with and without parents." The results also demonstrate the extent to which ISO's involuntary flattening of PIP reduced (but failed to eliminate) youthful overcharges.

The age comparison (Table 16) confirms that all youths are overcharged; but it also indicates that on average the youngest youths, 17-through-20--those most likely to be covered by their parents' policy--are overcharged the least. The overcharges in fact increase with age through the 20's, particularly for the single-male classes. A group frequently undercharged--or most likely to be priced about right--are the 17-through-20 youths in multicar families.

The gender comparisons for youths (Table 16A) show that single males are overcharged by larger amounts than single females. In 10 out of 12 comparisons premium relativities exceed loss relativities by substantially larger amounts for the males than the females, or the males are overcharged while the females are undercharged. In one additional comparison the males are undercharged by a smaller

amount than the females. On multicar data, the females are consistently undercharged.

The marital status comparisons (Table 16B) indicate that in 11 out of 12 instances the single-male classes are overcharged by larger amounts than the married-male classes or in fact overcharged while married males are undercharged. The most accurately priced classes are the "married" male 17-through-20, or as discussed earlier, the college students living away from home. In contrast, the married males 21-through-24, likely to be married in fact, are substantially overcharged.

The comparisons of premiums and losses for principal and occasional operators--who include only single males under the ISO system--again yield larger overcharges in the higher-rated group (Table 16C). In 20 out of 28 comparisons the principal operators are overcharged by larger amounts than the occasional operators, or the principals are overcharged while the occasionals are undercharged. In one of the remaining seven comparisons, both groups are undercharged but the principals in a smaller amount, and in two other comparisons the two groups are similarly overcharged.

The comparison of youths with and without good-student and driver-training discounts break the pattern (Table 16D). Here the lower-rated group--the youths with both discounts--are more frequently overcharged by larger amounts. The reason is mix of business. The youths with discounts include higher proportions of overcharged males and particularly principal-operator males.[98] The price significance of the discounts is apparently small in relation to these other factors.

The reasons for the observed overcharge patterns are subject to speculation. Because premium relativities are based on "actuarial

judgment," there is no formula to critique. It should be noted, moreover, that the youthful classes are not alone subject to overcharges, although the heaviest overcharges are found there. As will be developed further below, most of the over-30 classes other than the base class are overcharged. The most likely explanation is that the adult-pleasure base class is underpriced in relation to its average losses. In other words, the adult base class simply may be paying too little premium and other classes are forced to pick up the tab.

D. Within-Class Variation

1. A Summary of the Circumstantial Evidence

The analysis thus far indicates that at best the classification process can expect only partial success in the identification of distinct and homogeneous groups. The types of hazards sought to be classified largely resist generalization. Emotional instability is neither uniformly characteristic of the young nor exclusively confined to them. Individual lifestyles are highly diverse and societal norms prescribing roles for the sexes and for marriage partners are rapidly breaking down. Driving skill is more likely the function of individual capabilities and the amount and quality of actual experience behind the wheel than age or minimal amounts of formal training per se. The distribution of motor vehicle violation points among drivers reflects the diversity of attitudes and skills in the driving population. The diversity within the youthful risk classes is enhanced by the sensitivity of the youthful risk to actual miles driven and numbers of customary operators of the car, which are largely not measured under current classification plans.

The problems of class definition also highlight the likely imperfections in the classification net and reveal the difficulties

of using such a crude device to sort out risks. The interpretation and application of important class distinctions can be expected to vary from individual to individual, agent to agent and company to company. Loopholes in the system and the important role given qualitative judgments suggest that how cars are classified depends in significant part on the business strategies of agents and companies and the integrity and sophistication of applicants.

The problems uncovered in the analysis of between-class differences reinforce the probability that many of the risks captured in the youthful classes are not "essentially the same" as fellow class members. The untested company judgments which cause some youths to be treated as youths and others to be treated as adults, and some singles to be treated as single and others to be treated as married, are necessarily suspect. The classification of cars and not drivers is crude. The data used are both restricted and imprecise. The shifts in class average experience from period to period, the redundancy of variables, and the discrepancies between prices and costs underscore the system's imperfections.

The lack of homogeneity in the current classifications is recognized, implicitly, in the industry's traditional emphasis on the importance of underwriting. Indeed, substantial perfection in classification would obviate the application of subjective judgments by agents and underwriters to further screen applicants. Again, Continental's instructions to its underwriters makes this point best:

> "Risks are separated for rating purposes into broad general categories. In theory, these are homogeneous groups and each individual risk has the same loss expectancy. But, despite all efforts at refinement, the individual risks in each group have marked dissimilarities. The underwriter's

> assignment is to determine those that are more likely than the average to produce a loss or a claim.[99]

2. The Explanatory Power of the Youthful Classes

Detailed data provided by the ISO permit analysis of selected "digits" of the ISO classification coding system, based on generalizations about the classification information contained in each. Three of the six digits apply specifically to the youthful classes as follows:

> DIGIT 2: describes broad age categories (17-through-20, 21-through-24, etc. through 65 and over), and, when applicable, sex (including females 30-through-64), marital status, and principal-occasional distinction.
>
> DIGIT 3: describes individual year of age for youths 17-through-29 and, when applicable, driver-training status.
>
> DIGIT 4: describes usage (pleasure, commute, etc.) and, when applicable, good-student status.

The remaining two digits of interest[100] pertain to vehicle-performance rating and merit rating, respectively. The explanatory power of each of the digits was analyzed, alone and in combination with each other, in an effort to assess the relative importance of the underlying variables.

The following is a summary of explanatory power estimates for the all-important 2nd Digit:[101]

property damage:	6%
collision:	10%
comprehensive:	6%

These estimates are improved only slightly by refining the information contained in the 2nd Digit by adding information provided by the 3rd

Digit. The percentages of variation explained by the 2nd and 3rd digits in combination are the following:

property damage:	8%
collision:	11%
comprehensive:	7%

The improvement in efficiency is no more than two points for any coverage. In comparison to the variation explained by the broad age categories, sex, marital status and principal-occasional distinctions, the additional explanatory power provided at the margin by youthful year-of-age and driver training is correspondingly small.

Additional refinement by the 4th Digit--usage and good student status--fails to add as much as a full point to the percentage efficiencies of the 2nd and 3rd Digits. This is not surprising since the usage variable fails to identify consistent differences in class average costs, as will be explored in a subsequent section; and the good student classification applies to a very limited number of drivers in the State.

The 2nd, 3rd and 4th digits combined, containing all the information obtainable through ISO's 217 primary classes, thus leave unexplained no less than 87 per cent of the variation in systematic risk in the insured population as a whole. Of the amount explained, moreover, only a portion is attributable to the primary youthful classes. The information relating to age contained in the 2nd Digit reflects differences attributable to senior citizens as well as youths and "all other" adults; and information relating to sex pertains to adult females as well as youthful males and females.

Furthermore, the degree of explanatory power attributable to the 2nd Digit, relative to other digits in the coding system, is in part the result of its preeminent position in the hierarchy of class variables. The fact that under current practice the 2nd Digit makes the first rough cut of the data augments its apparent explanatory power. Because many factors have overlapping explanatory power, the selection of which factor to consider first assigns to that factor all which is jointly explained; and the same factor applied only to refine other classifications tends to diminish in significance.[102] With respect particularly to the 2nd Digit, the testimony demonstrated that its application to the same data "last" instead of "first" reduced its explanatory power by approximately 31 per cent.[103] To this extent, therefore, the relative importance predicted for age, sex and marital status classifications combined in the 2nd Digit is a self-fulfilling prophecy.

ISO's digit coding system makes estimating the explanatory power of isolated variables cumbersome (if not impossible). The evidence presented on this subject at the hearing therefore limited its attention to a few variables, namely age, sex, good-student and driver training. The explanatory power estimates for each variable are based on claim frequency distributions under the ISO class plan; but these data are more than adequate to reflect the explanatory power of the less refined class plans of State Farm, Allstate and most other carriers as well.[104]

The age categories examined were youths (17-through-29, to the extent classified), senior citizens, females 30-through-64 who are sole operators, and all other adults. These four categories

together are estimated to explain somewhat more than 2 per cent of total risk variation for property damage liability, about 9 per cent of total variation for collision, and somewhat less than 6 per cent for comprehensive.[105] The age variable distinguishing only youths from the rest of the insured population logically explains less.

Classifications based on sex distinctions, exclusive of females 30-through-64, contribute even less to the total explanatory power of current class plans. The gender variable is estimated to explain 1 per cent or less of the total variation in risk among all insureds for each of the three-coverages--property damage liability, collision and comprehensive.[106] The explanatory power of the good student variable is negligible under all coverages.[107]

Each of the efficiency or explanatory power estimates for the youthful variables described here use as the denominator of the relevant fraction total population heterogeneity, that is, the total variation in risk to be explained. This is the relevant measure in any discussion addressed to the fairness of youthful classification vis-a-vis classifications affecting the balance of the population. Another approach would examine the explanatory power of the youthful classes inter se, seeking to determine the amount of variation explained by a particular youthful class variable relative to total variation among youths only. Such an analysis requires estimates of the total variation in risk among youths only.[108]

For comparison with the variable-by-variable estimates described above, revised efficiency estimates have been made for the sex and good-student variables using the same computation of variation explained in the numerator of the explanatory-power fraction but

limiting the denominator to variation to be explained among youths. The age factor is indivisible. The sex factor explains from less than one per cent to about 4 per cent of risk variation among youths, depending on coverage and computational assumptions. The explanatory power of good-student status is again negligible.[109]

Three facts emerge from the analysis thus far. First, the relative efficiencies of classification variables depend significantly on the combinations in which they are used and the sequence in which they are analyzed. The predictive importance of a particular variable is in part a matter of company choice. Secondly, the classification refinement process yields rapidly diminishing marginal returns. If the only issue considered is whether existing classifications may be improved further by subdividing them, improvements will be minimal; and casting the unfair discrimination issue exclusively in these terms perpetuates the status quo. Thirdly, the low magnitudes of explanatory power in the primary classifications suggest that shuffling existing factors and substituting new factors should not jeopardize current efficiency levels.

3. Within-Class Heterogeneity Affecting Youths

The limited explanatory power of the youthful classifications, even among youths only, implies substantial heterogeneity within these classes. Under the most liberal assumptions, 4,040 youthful class combinations explain no more than 30 per cent of total variation among youths.[110] The inaccuracies are highlighted by direct assessments of within-class heterogeneity revealing large individual overcharges for substantial fractions of class populations. These overcharges are of a different kind than the class-average overcharges considered earlier

in this section. The latter overcharges reflect the amounts by which class-average premiums exceed class-average costs. The individual overcharges attributable to within-class heterogeneity concern the amounts by which the expected costs of individuals are below the average for the class, assuming that the class-average is accurately priced. The methodology for making these assessments is explained in the Appendix.

In the so-called Newark Suburban territory--a representative suburban territory priced close to the statewide average--ISO's 17-year old single-male principal operators who drive to work and are ineligible for either good-student or driver-training status pay an average premium of about $635 for the compulsory coverages. Yet in relation to individual expected costs, this premium is at least $300 too high for 17 to 25 per cent of the class--assuming the premium is an accurate reflection of average class costs--and at least $500 too high for 1 to 4 per cent of the class members. If these suburban males purchase full coverage--the compulsory coverages plus collision and comprehensive--they pay an average premium of about $1,240. At this premium level 37 to 43 per cent of the class are overcharged at least $300 and 23 to 31 per cent of class members pay at least $500 too much.[111]

The frequency and magnitude of overcharges are greatest for individuals in the highest-rated classes within the highest-rated territories. Nonetheless, in the highest-rated classes the fractions of insureds overcharged by large amounts are substantial everywhere. In the Plainfield territory, one of the lowest rated territories in the State, no less than 34 per cent of ISO's highest-rated single males

are overcharged a minimum of $300 for full coverage and at least 18 per cent are overcharged $500 or more.[112]

Even the lower-rated youthful classes contain substantial fractions of insureds subject to large overcharges. In the Newark Suburban territory about 18 to 27 per cent of ISO's highest-rated single females are overcharged at least $300 and about 2 to 5 per cent are overcharged at least $500 for full coverage. In the same territory minimum $300 overcharges are incurred by no less than 28 per cent of the 18-year old single male principal operators who are eligible for good-student and driver-training status and drive only for pleasure. No less than 10 per cent of these males are overcharged at least $500.

Direct assessments of within-class variations also reflect the extent to which individuals in different classes have more in common with each other than with members of their respective classes. Overlaps of this sort are characteristic of all classifications to some degree, but the anomalies are greatest in the youthful classes where dollar differences between classes are largest. Within the same territory the highest rated of 4,040 primary and secondary youth classifications pay premiums at least three times higher than the adult base class, yet an estimated 5 to 13 per cent of these youths, depending on coverage and computational method, have expected losses below the average expected loss of adults. About 1 to 2 per cent of the adults have expected losses above the average for the highest-rated youths.[113]

Analyses of within-class pricing errors have been conducted for representative classes in a manner which highlights each of the primary variables applicable to youths. Comparisons among these

youthful classes show substantial overlaps and large related pricing errors. In each case it is assumed (for discussion) that premiums accurately reflect class-average costs.

No less than 23 per cent of ISO's highest-rated 18-year old male operators have lower expected losses than 24-year old males with otherwise the same rating characteristics; and about 10 per cent of the 24 year olds have greater expected losses than the average for the 18-year old group. The younger group pays average premiums about 66 per cent higher than the 24-year olds. The graph in Figure 8 illustrates the overlap under full coverage among the highest-rated 18, 21 and 24-year old males in Newark Suburban territory.[114]

Between 18 and 29 per cent of ISO's highest-rated 17-year old single males have expected losses below the average for the highest-rated single females, but pay over 80 per cent higher premiums. About 7 to 12 per cent of the females have higher expected losses than the average for the males. Similarly, 39 to 44 per cent of the highest-rated class for 17-year old single-male principal operators have expected losses below average for occasional operators with otherwise identical rating characteristics; and about 25 per cent of the occasional operators are about the average of the principal operators.

The graph in Figure 9 plots typical overlaps among highest-rated male-principal, male-occasional and female operators under the compulsory coverages. The territory is Newark Suburban. Figure 10 plots comparable overlaps in the highest-rated Newark territory. Figure 11 provides the same comparisons as Figure 10 but for full coverage. As the spread in class means increases, within-class heterogeneity and related pricing errors increase dramatically.[115]

FIGURE 8

AGE DISTINCTIONS AMONG YOUTHS

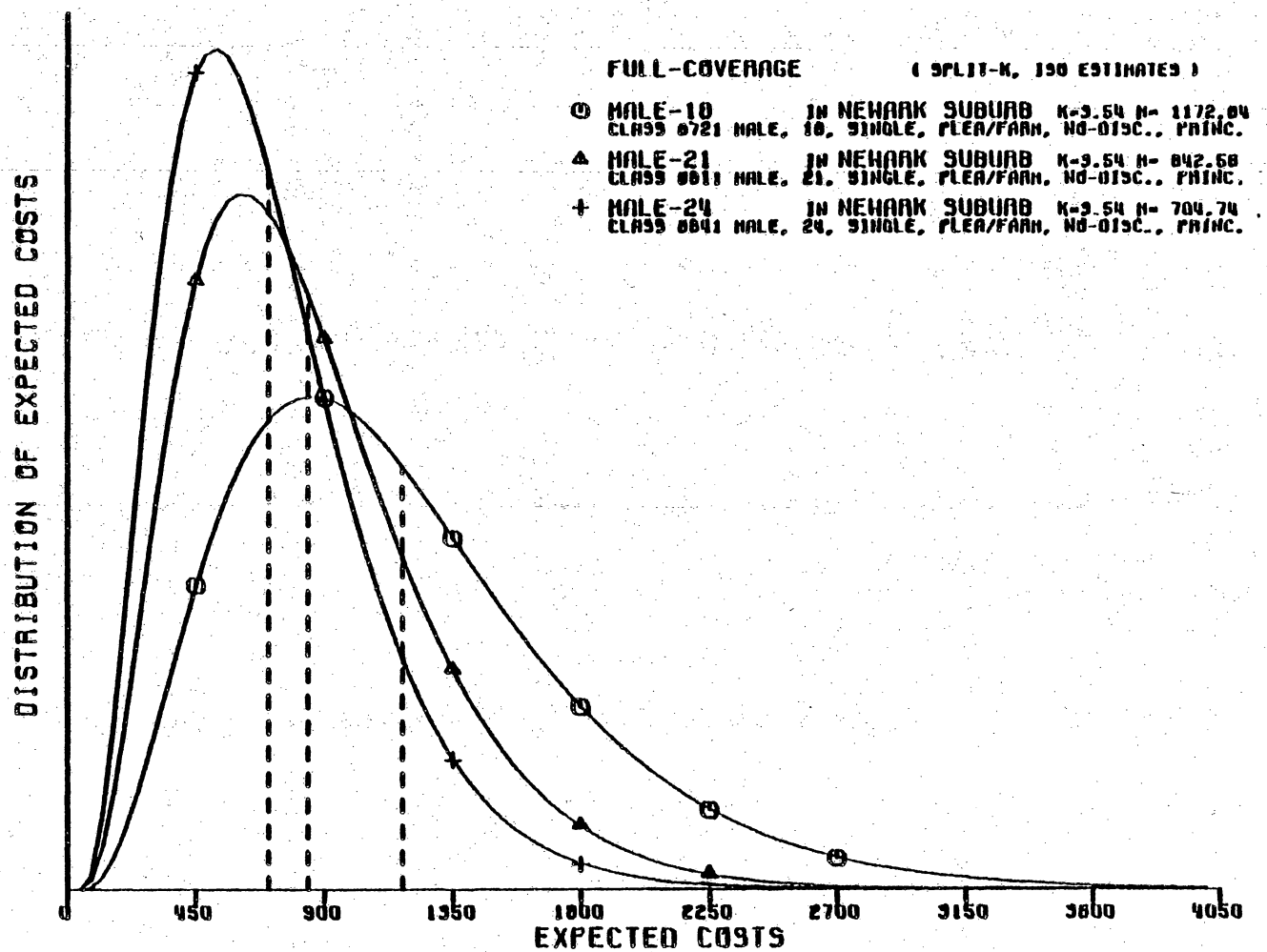


FIGURE 9

GENDER AND DEGREE-OF-USAGE DISTINCTIONS IN THE SUBURBS

COMPULSORY COVERAGES

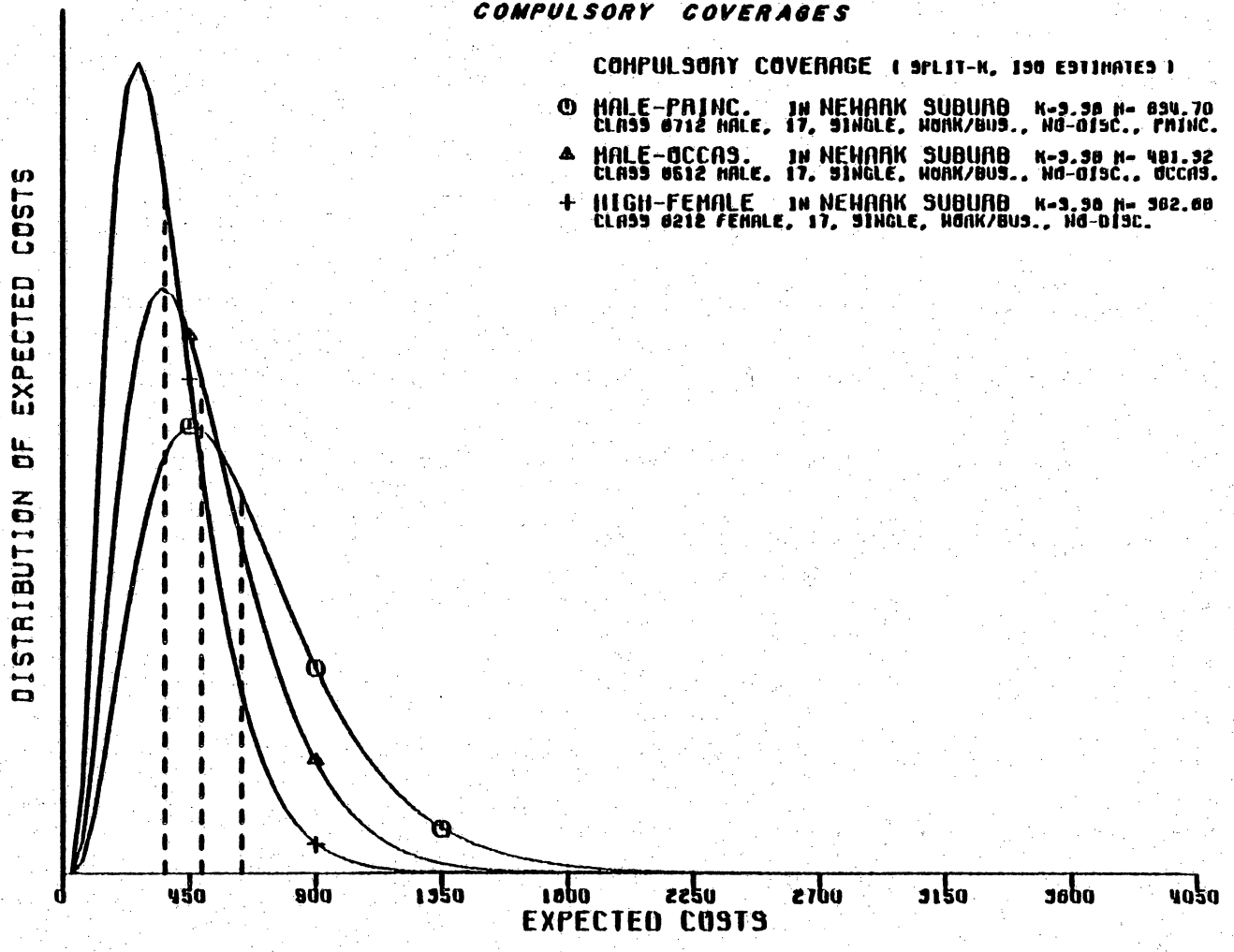


FIGURE 10

GENDER AND DEGREE-OF-USAGE DISTINCTIONS IN NEWARK

COMPULSORY COVERAGES

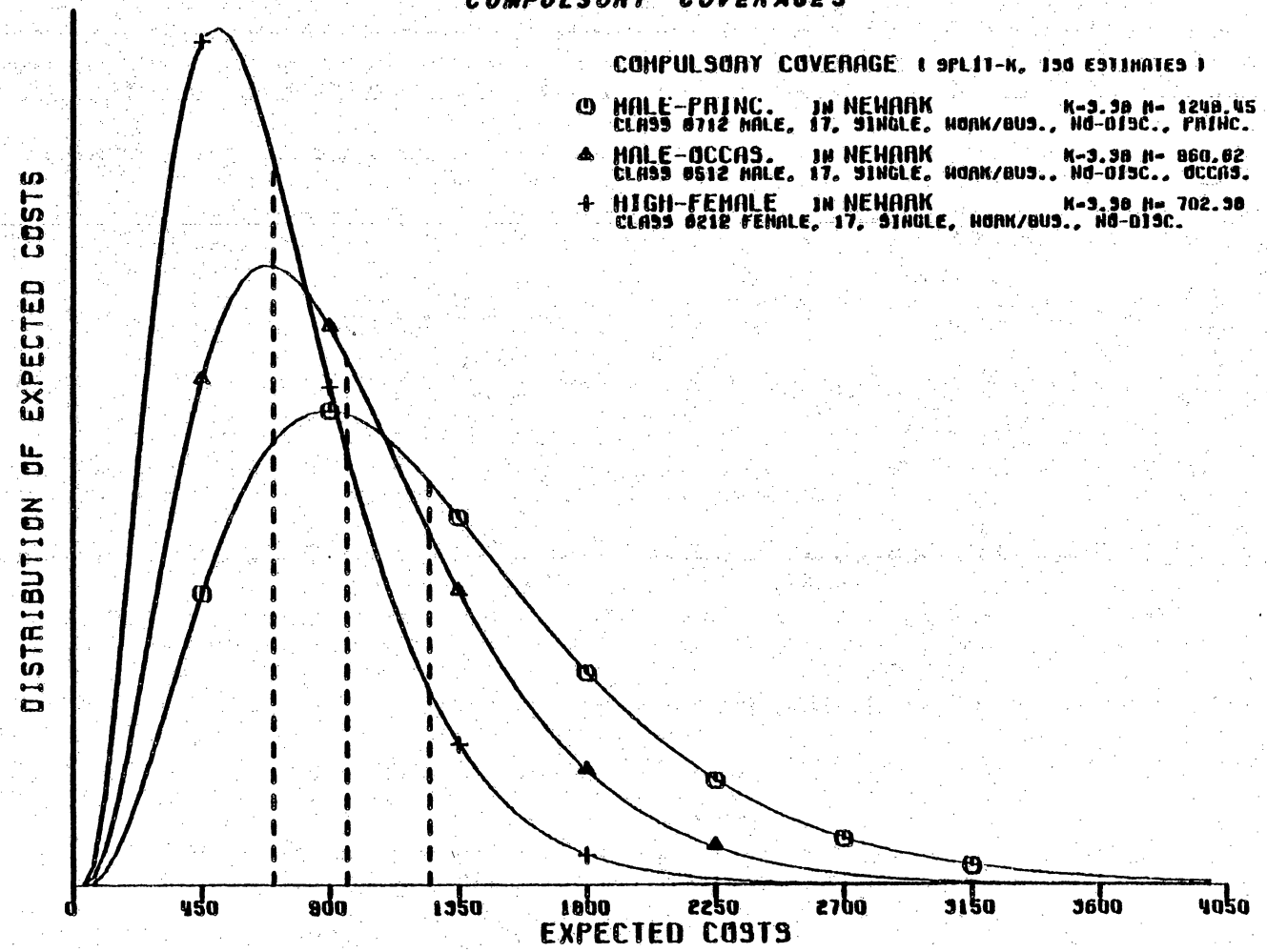
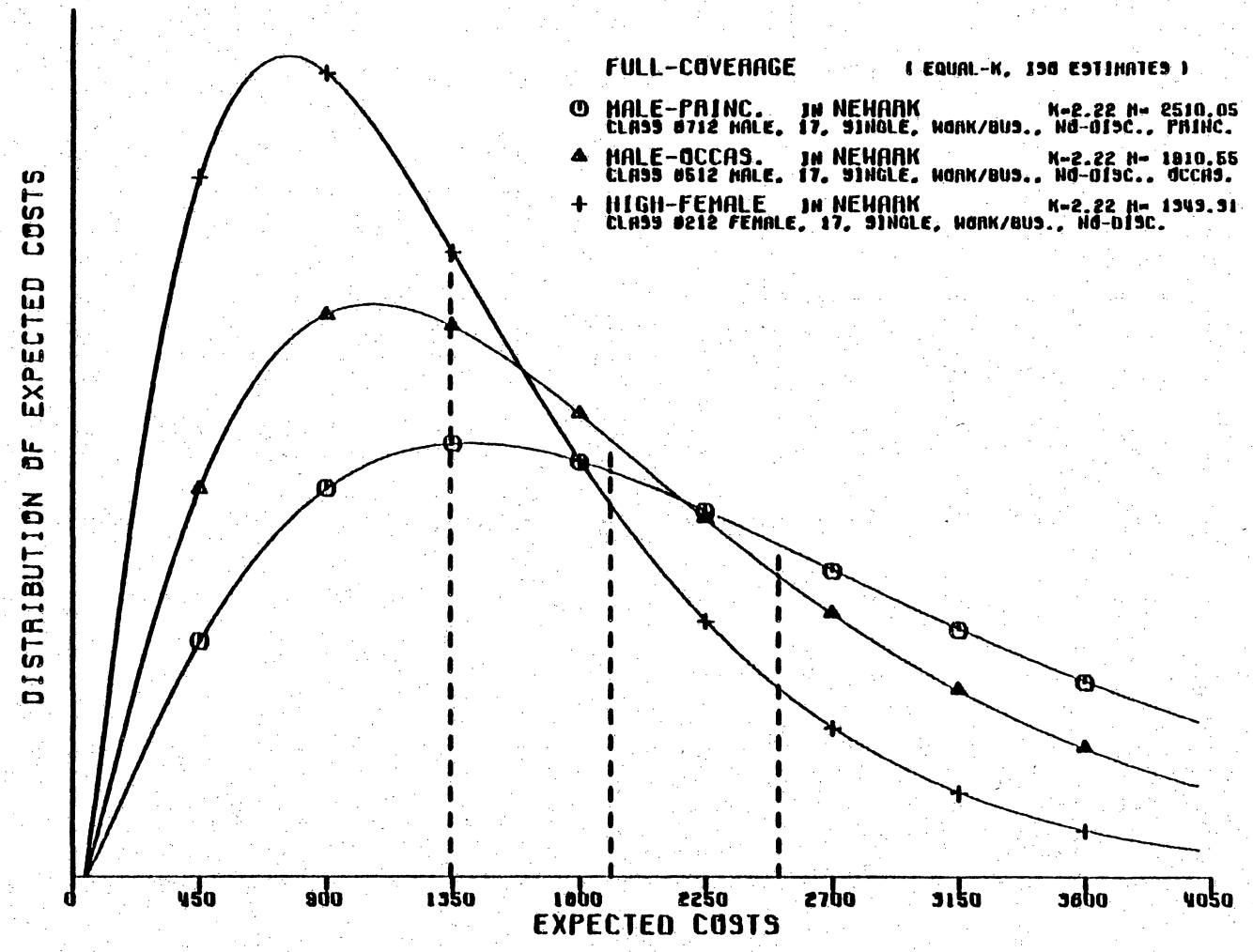


FIGURE II

GENDER AND DEGREE-OF-USAGE DISTINCTIONS IN NEWARK

FULL COVERAGE



About 22 per cent of a representative high-rated class of ISO's single male principal operators have lower expected costs than the average for comparable married males, but pay about 70 per cent higher premiums. About 9 per cent of the married males have expected costs above the average for the single-male class. Figure 12 plots the overlap among 18-year old single males (separately for principal and occasional operators) and 18-year old married males in the Newark Suburban territory.[116]

About 36 per cent of a representative class of ISO's 18-year old single males without either driver-training or good-student status produce expected losses below the average for otherwise identical youths with both qualifications, but pay about 34 per cent more for the same coverages; approximately 22 per cent of the youths with both qualifications have expected losses above the average for the no-discount group. Figure 13 plots overlaps under full coverage among four classes of 18-year old single males in the typical suburban territory: those without either driver training or good student status; those with driver training only; those with good student only; and those with both driver training and good student. The four classes are almost fully overlapping and each is substantially heterogeneous.

The overlaps among classes are more dramatic at points on the risk spectrum less extreme than the class mean. For example, in the Newark Suburban territory, 20 per cent of ISO's adult class who purchase full coverage have expected costs of no less than $533. Forty-nine per cent of ISO's highest-rated youthful females and 20 per cent of its highest-rated young males in the same territory have expected costs below that amount. Under compulsory coverages in this

FIGURE 12

MARITAL STATUS AND DEGREE-OF-USAGE DISTINCTIONS

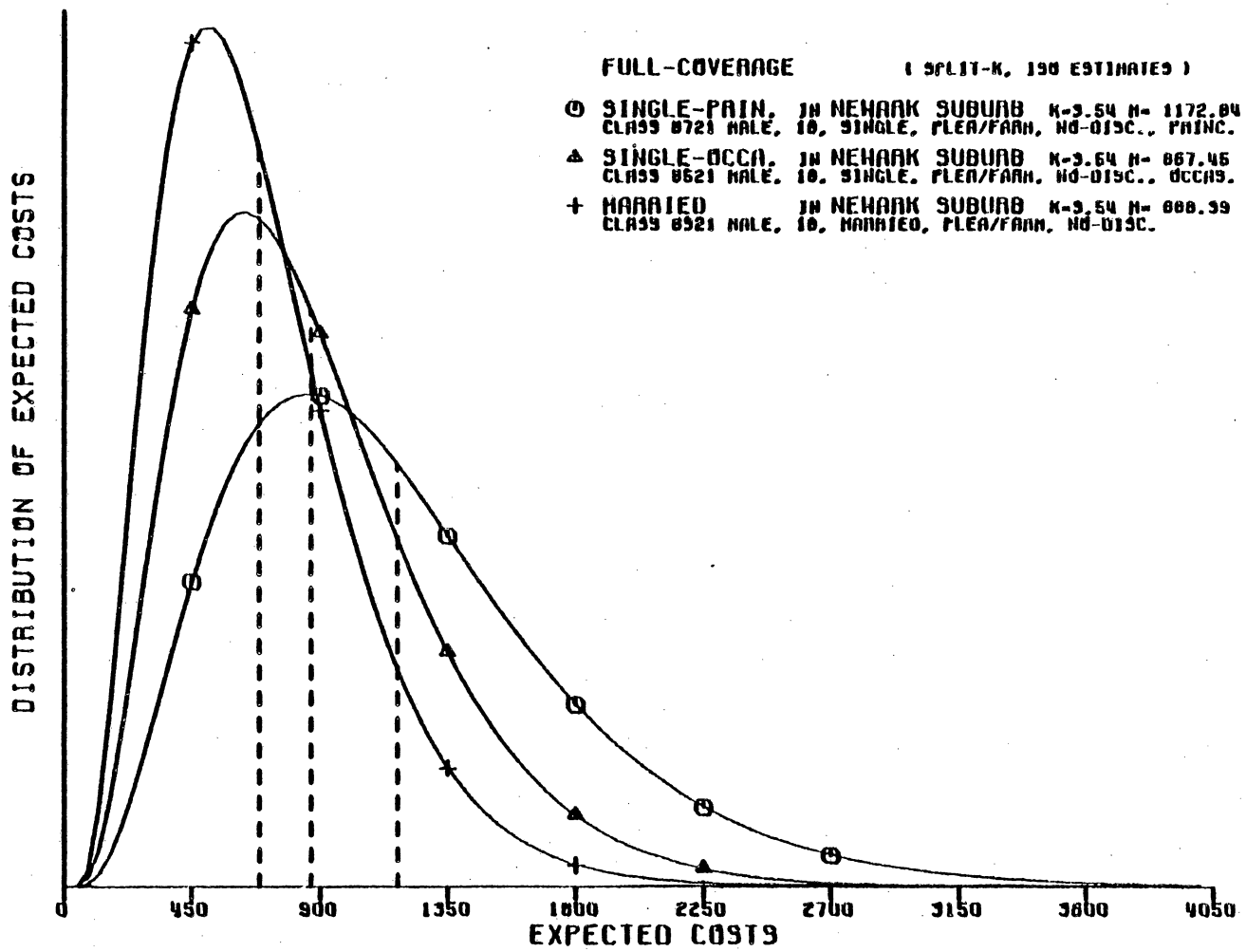
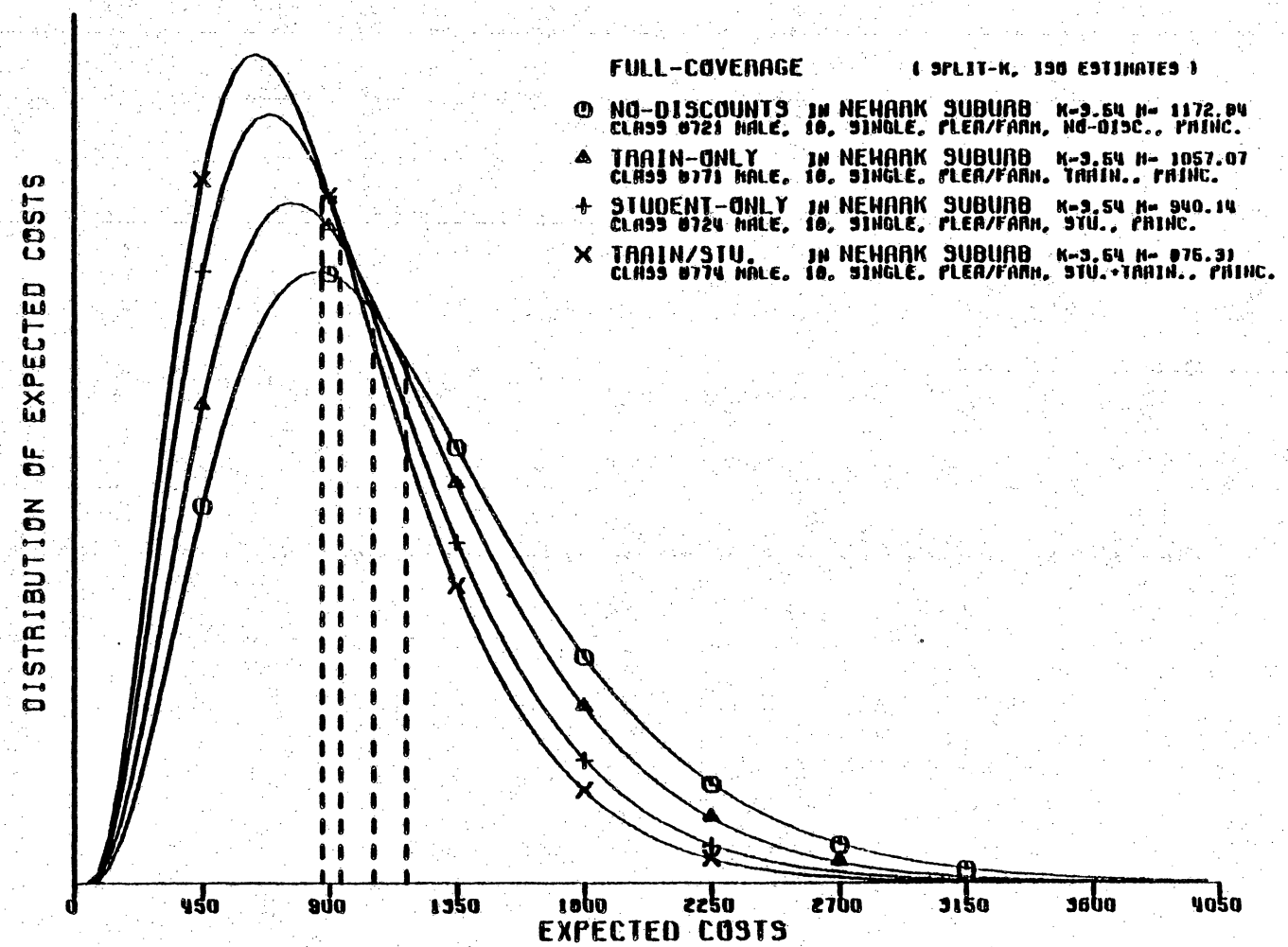


FIGURE 13

GOOD-STUDENT AND DRIVER-TRAINING DISTINCTIONS



territory, 20 per cent of the adults have expected losses of no less than $300. More than 50 per cent of the highest-rated youthful females and about 25 per cent of the highest-rated youthful males have lower expected costs than these adults.

Similarly, in this typical suburban territory, 20 per cent of the highest-rated females who purchase full coverages have expected costs of no less than $886. Continuing to assume that ISO's class-average premiums accurately reflect class-average costs, 36 per cent of the highest-rated male principal operators and 55 per cent of the highest-rated occasional operators show expected costs below this amount.[117]

State Farm classes produce similarly large pricing errors and overlaps--assuming again that premiums accurately reflect class-averages. In the City of Newark, 19 per cent of State Farm's highest-rated females and 37 per cent of its highest-rated males are overcharged at least $500 for full coverage. Two per cent of the highest-rated males have expected costs below the mean for adults and 18 per cent have expected costs below the mean for the highest-rated females. Twelve per cent of these females have expected costs below the mean for adults.

Again assuming full coverage and accurate class-average pricing, 20 per cent of State Farm's adult class in Newark have expected losses of at least $709. Approximately 7 per cent of State Farm's highest-rated males have expected losses below this amount. About 30 per cent of the highest-rated females are also less risky than this 20 per cent of adults.

The tables below summarize pricing-error and overlap analyses for youthful classes. Table 17 records the percentage of class members

TABLE 17

INSURANCE SERVICES OFFICE DATA

DISTRIBUTION OF LARGE INDIVIDUAL OVERCHARGES - ADULTS VS. YOUTHS

Territory	Classification		Premium	% Within Class Overcharged By At Least S/K	$300	$500	% Within Class Overcharged By At Least E/K	$300	$500
Full Coverage									
02-Newark	8111	Adults	$ 783.15	1.85	34.7	15.3	2.22	31.6	12.1
02	8212	High Females	1,343.31	3.54	38.6	25.5	2.22	44.3	33.2
02	8712	High Males	2,510.05	3.54	47.7	40.9	2.22	51.6	46.2
31-Newark Suburban	8111	Adults	$ 402.20	1.85	5.3	0.0	2.22	3.5	0.0
31	8212	High Females	675.01	3.54	18.3	1.6	2.22	26.5	5.4
31	8712	High Males	1,242.50	3.54	36.9	22.8	2.22	42.9	30.8
39-Plainfield	8111	Adults	$ 352.50	1.85	0.3	0.0	2.22	0.1	0.0
39	8212	High Females	592.58	3.54	13.1	0.1	2.22	21.2	1.0
39	8712	High Males	1,091.90	3.54	33.8	18.1	2.22	40.4	26.3
Compulsory Coverages									
02-Newark	8111	Adults	$ 441.45	1.82	11.9	0.0	2.17	9.1	0.0
02	8212	Highest Females	702.38	3.38	21.2	3.2	2.17	28.9	8.2
02	8712	Highest Males	1,248.00	3.38	37.8	24.1	2.17	43.5	31.6
31-Newark Suburban	8111	Adults	$ 232.70	1.82	0.0	0.0	2.17	0.0	0.0
31	8212	Highest Females	362.68	3.38	0.1	0.0	2.17	1.3	0.0
31	8712	Highest Males	634.70	3.38	17.4	1.1	2.17	25.2	3.9
39-Plainfield	8111	Adults	$ 197.70	1.82	0.0	0.0	2.17	0.0	0.0
39	8212	Highest Females	308.28	3.38	0.0	0.0	2.17	0.0	0.0
39	8712	Highest Males	539.70	3.38	10.9	0.0	2.17	18.4	0.0

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis from the appendix.

TABLE 17A

INSURANCE SERVICES OFFICE DATA

OVERLAP ESTIMATES - PERCENTAGE BELOW MEAN - ADULTS VS YOUTHS

Full Coverage

Classification	Newark 02	Newark Suburban 31	Plainfield 39	% Overlaps S/K				% Overlaps E/K			
				S/K	8111	8212	8712	E/K	8111	8212	8712
8111 Adults	$ 783	$ 402	$ 353	1.85	59.8	86.0	98.8	2.22	58.9	87.3	99.3
8212 Highest Females	1,343	675	593	3.54	21.7	57.1	93.5	2.22	29.7	58.9	90.0
8712 Highest Males	2,510	1,243	1,092	3.54	4.5	18.3	57.1	2.22	10.5	26.5	58.9
Compulsory Coverages											
8111 Adults	$ 441	$ 233	$ 198	1.82	59.8	83.2	97.8	2.17	59.0	84.3	98.4
8212 Highest Females	702	363	308	3.38	25.9	57.2	91.7	2.17	33.3	59.0	88.3
8712 Highest Males	1,248	635	540	3.38	6.7	21.1	57.2	2.17	13.3	28.8	59.0

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis from the appendix.

TABLE 17B

INSURANCE SERVICES OFFICE DATA

OVERLAP ESTIMATES- 20 PER CENT CUTOFF - ADULTS VS YOUTHS

Full Coverage

Territory	Classification		Premium	S/K	20% Cutoff	% Below	E/K	20% Cutoff@	% Below
02-Newark	8111	Adults	$ 783.15	1.85	$1,120	80.0	2.22	$1,096	80.0
02	8212	High Females	1,343.31	3.54		46.2	2.22		49.2
02	8712	High Males	2,510.05	3.54		13.0	2.22		20.4
31-Newark Suburban	8111	Adults	$ 402.20	1.85	$ 545	80.0	2.22	$ 533	80.0
31	8212	High Females	675.01	3.54		46.2	2.22		49.2
31	8712	High Males	1,242.50	3.54		13.0	2.22		20.4
39-Plainfield	8111	Adults	$ 352.50	1.85	$ 470	80.0	2.22	$ 460	80.0
39	8212	High Females	592.58	3.54		46.2	2.22		49.2
39	8712	High Males	1,091.90	3.54		13.0	2.22		20.4

Compulsory Coverages

02-Newark	8111	Adults	$ 441.45	1.82	$ 623	80.0	2.17	$ 610	80.1
02	8212	High Females	702.38	3.38		51.5	2.17		53.4
02	8712	High Males	1,248.45	3.38		17.6	2.17		24.8
31-Newark Suburban	8111	Adults	$ 232.70	1.82	$ 307	80.0	2.17	$ 300	80.1
31	8212	High Females	362.68	3.38		51.5	2.17		53.4
31	8712	High Males	634.70	3.38		17.6	2.17		24.8
39-Plainfield	8111	Adults	$ 197.70	1.82	$ 254	80.0	2.17	$ 249	80.1
39	8212	High Females	308.28	3.38		51.5	2.17		53.4
39	8712	High Males	539.70	3.38		17.6	2.17		24.8

S/K - "Split K" as explained in Appendix
E/K - "Equal K" as explained in Appendix

@Premiums do not contain the policy constants approved effective November 18, 1980.

in representative classes whose individual expected costs are, respectively, at least $300 and $500 below the average costs for their classes. The results vary depending on territory, coverage package and assumptions about the differential heterogeneity of the youthful classes vis-a-vis adults. The territories are Newark, Newark Suburban and Plainfield, representing high-, medium- and low-rated areas. The coverage choices are "compulsory," meaning the compulsory coverages only, or "full," meaning the compulsory coverages plus collision and comprehensive. Competing assumptions about the differential heterogeneity of the youth and adult classes are reflected in the noted "k" values, discussed at length in the Appendix.[118] The choice of "k" has a marginal impact on the numerical results.

Table 17A displays estimates of the percentage of each class having expected losses below the mean expected losses of the classes with which they are compared. Each percentage shown under "% Overlaps" indicates the proportion of the class in the row having expected losses below the mean of the class at the top of the column. For example, the figure 86.0 per cent in the first row indicates that 86 per cent of the adult class (8111) have expected loss below the mean for class 8212 (highest females). The proportion of adults above the mean for class 8212 is therefore 14 per cent.

Table 17B pertains to the 20 per cent overlap analysis. The "20 per cent cutoff" figure represents the minimum dollar-amount of risk for 20 per cent of the adult class. The "per cent below" column indicates the percentage of each class with expected costs below the 20 per cent cutoff figure for adults.

II. THE PREDICTIVE ACCURACY OF AGE AND SEX CLASSIFICATIONS AFFECTING DRIVERS OVER 30

A. Classifications for Senior Citizens

Traditionally policyholders over 65, as a class, have not been sought after by insurance companies. In the early 1960's for example, complaints from senior citizens concerning discriminatory underwriting practices prompted legislative hearings and enactment of the current statutory prohibitions against restriction of insurance availability "solely on the basis of age".[119] Company reluctance to insure senior citizens was formally embodied in the class plan of at least one major carrier. During the decade beginning in 1959, Allstate Insurance Company imposed a 25 per cent surcharge on new policies involving drivers 65-and-over using the car a fourth or more of its estimated annual mileage.

The industry did not begin collecting senior citizen loss experience, in New Jersey at least, until about 1962. In that year State Farm introduced a statistical classification for senior citizens designed to collect the needed experience while continuing to price senior citizens at the ordinary adult rate. In 1965 the National Bureau of Casualty Underwriters (NBCU) introduced a similar statistical class.[120]

The 1964 NBCU Survey had examined a small number of senior citizen policies and found higher trends in liability-related accident frequencies, a leveling off of collision frequencies and a below-average trend in comprehensive loss frequencies.[121] The Report hypothesized further that elderly senior citizens involved in accidents

may be disinclined to report small collision and comprehensive losses, thus reducing the frequency but increasing the average size of reported claims.[122] The Report offered no analysis of average losses per car.

Subsequent experience has proved that, in fact, senior citizens as a group have lower average loss experience than the balance of the over-30 population for all coverages. The industry has been slow to recognize this fact, and it has been sluggish as well in implementing the full price discounts owing to senior citizens. This lack of perceptivity attests to the limitations of the market in separating fact from folklore.

In 1969, the Colonial Penn Insurance Company introduced its current classification plan providing a range of pricing refinements for older drivers. This plan contains 5 separate age groupings for drivers 50 and above. When further refined by numerous mileage categories, these classifications yield rates for over-65 drivers as much as 15 per cent below the rates of Colonial Penn's 30-through-50 age group.[123] Colonial Penn's lowest-rated group are the 50-through-64 year old drivers.

In 1970, State Farm introduced a senior citizen discount, for the physical damage coverages only, but discontinued it in 1976. The discount amounted to 10 per cent of the ordinary adult rate. With its filing of December, 1979 State Farm proposed restoring a 5 per cent discount for all coverages but only for seniors in the pleasure-use category only.

In 1971, the IRB introduced a 5 per cent discount for senior citizens. Five years later the ISO, IRB's successor organization, proposed to increase this discount by another 5 points. The latter

proposal was not acted upon because it was coupled with pricing refinements affecting a variety of classifications.[124]

Thus, by the mid-1970's a substantial segment of the market had made some recognition of the unique characteristics of senior-citizen risks. Only Allstate had not at least created statistical classifications for these insureds. In 1977, however, the Commissioner found that the pricing of no-fault personal injury protection (PIP) for senior citizens was inadequate and the discount permitted too small. He directed filers to offer senior citizens at least a 50 per cent discount for the PIP coverage.[125]

The logic favoring a large discount for senior-citizen PIP coverage is simple. The medical-expense and wage-replacement protection provided under the standard PIP policy is of limited usefulness to persons over 65. Under New Jersey law senior citizens injured in an automobile accident must resort first to Medicare for payment of necessary medical expenses and PIP may pay only the balance, if any.[126] For senior citizens who are retired and living on guaranteed incomes, PIP wage-replacement benefits are also uncollectible.

No formal rationale has been articulated for the use of senior-citizen classifications for coverages other than PIP. Although traditional thinking associated senior citizens with physical impairments assumed to make them undesirable risks, the State legislature has prohibited such stereotyping and required attention to the specific capabilities of each individual.[127] A competing stereotype for over-65 drivers leans heavily on the hypothesis that the elderly use their cars less than other drivers, lead a leisurely retirement and have childless households, permitting greater discretion as to when, how

much and in what circumstances they drive. The senior-citizen classification can also be assumed to include a higher than average proportion of one-operator households.

The available evidence bears out that greater proportions of senior citizens use their automobiles for pleasure use and in low mileage amounts than other adults over 30. The ISO's combined single- and multicar data, unrefined for mileage, indicate that approximately 84 per cent of all senior-citizen cars insured by ISO companies are in the pleasure-use category. About 61 per cent of other adult cars are in that category.[128] Colonial Penn data, refined by mileage but not by usage, indicate that a growing percentage of senior drivers join the lowest mileage category as they advance with age.[129] The pertinent comparisons are summarized in Tables 18 and 19.

Mileage distinctions are not recognized at all under the class plans affecting most of the market. Of the mileage classifications presently in use only the Colonial Penn classifications reflect a significant degree of refinement. A correlation between advancing age and diminished annual driving mileage may itself produce lower average loss experience for all over-65 adults. Unless mileage differences among senior insureds are explicitly taken into account, the relative importance of mileage and other risk factors cannot be determined. Number-of-operators also requires explicit recognition.

The likely correlations between advancing age and types and amounts of usage call into question both the directness and inclusiveness of the age variable as applicable to over-65 adults for other than the PIP coverage. High-mileage senior citizens who use the car for commuting or business cannot be assumed to have different risk

TABLE 18

DISTRIBUTION OF SENIOR EXPOSURES & ALL OTHER (ADULT) EXPOSURES
(ISO Data 1975, 1976 & 1977 Combined)

Single Car Data*	Seniors Exposures	%	All Others Exposures	%
Pleasure	180,227	85.9	381,191	57.0
Work 3-10 Miles	21,707	10.3	203,002	30.3
Work 10+ Miles	3,096	1.5	62,062	9.3
Business	3,078	1.5	19,891	3.0
Farm	1,766	.8	3,027	.4
	209,874	100.0	669,173	100.0

Single & Multi Car Data@	Seniors Exposures	%	All Others Exposures	%
Pleasure	235,180	83.8	1,356,173	61.0
Work 3-10 Miles	30,191	10.7	573,292	25.8
Work 10+ Miles	5,278	1.9	208,841	9.4
Business	5,834	2.1	67,950	3.0
Farm	4,125	1.5	17,547	.8
	280,608	100.0	2,223,803	100.0

*Source: Table I Compliance Data
@Source: Hearing Exhibits D-94 a

Adults are defined as "All Others" in the ISO Private Passenger Automobile Manual

TABLE 19

COLONIAL PENN INSURANCE COMPANY
EXPOSURE DISTRIBUTION BY AGE AND ANNUAL MILEAGE

Age	50-64		65-69		70-74		75-79		80 and over	
Annual Mileage	Exposures	%	Exposures	%	Exposures	%	Exposures	%	Exposures	%
Under 6,000	81,036	55.0	85,973	59.0	84,351	66.2	59,361	72.6	26,139	83.6
6,001 to 12,000	60,512	41.1	54,734	37.6	39,906	31.3	21,231	26.0	4,914	15.7
12,001 and over	5,852	4.0	4,986	3.4	3,185	2.5	1,141	1.4	200	0.6
TOTAL	147,400		145,693		127,442		81,733		31,253	

SOURCE: Department Filing No. 77-735, letter dated November 9, 1977, Colonial Penn Insurance Company countrywide data.

characteristics than younger persons with the same driving patterns. Conversely, low-mileage drivers in the younger adult categories are by virtue of age alone excluded from the lower-rated senior citizen category which may owe its price advantage substantially to lower average mileage.

The use of age as a classification factor for senior citizens raises the familiar predictive accuracy concerns. The classification suggests stereotypes for persons over 65 which, with the exception of common eligibility for Medicare, cannot apply uniformly across all insureds of that age group. Certain components of lifestyle usually associated with persons over 65 can be individually identified with far greater precision than the age variable permits: (1) eligibility for Medicare, (2) guaranteed income, (3) annual mileage, (4) one-operator households and (5) the presence of physical impairments in individual cases. Classifications more directly related to hazards of loss and more inclusive of similar risks would apply specific criteria of this sort to all persons regardless of age.

Lifestyle stereotypes should be avoided. A "retirement" classification has superficial appeal as a substitute for age but is likely to identify a population only slightly more homogeneous. A retirement-status classification would also create definitional uncertainties susceptible to resolution along socioeconomic lines. Improved type-of-use variables are preferable.

The over-65 age variable also presents definitional problems. Application of the classification typically depends on an estimate of the <u>degree</u> of total vehicle use attributable to senior drivers. For example, the ISO rule provides that only those cars having a 65-or-

over "principal" operator shall qualify for the senior-citizen classification.[130] This kind of standard is no less elusive than when applied to youths. It permits an agent to make judgments which favor preferred customers whenever senior citizens are not the exclusive operators of the car.

1. Average Cost Comparison

The substantially lower average loss experience of senior citizens under the PIP coverage is confirmed by the available data, as reflected in Table 20.[131] A PIP discount of at least 50 per cent for senior citizens appears clearly in order under the ISO data. Refinement of the classification to include a subgroup for cars whose only customary operators are age 65 or over would probably yield for that subgroup even lower average loss costs. Currently the losses generated by drivers other than senior citizens--seniors need be only "principal" operators--are mixed together with the pure senior losses in determining average costs for the 65-or-over class. The failure to account for number of operators makes average costs for the class even less representative for some class members. Under current rules one-operator senior-citizen households pay the same premium as senior households having multiple non-senior operators on the same policy.

The average-loss indications for coverages other than PIP are subject to these same distortions. Nonetheless, the average loss costs of senior-citizen cars are significantly lower on the non-PIP coverages than is recognized under current class plans. On ISO's single-car data for the pleasure-use category, senior citizens produce average losses per car for the non-PIP liability coverages about 17 per cent below the adult base class, as reflected in Table 20. For

the collision and comprehensive coverages, respectively, pleasure-use senior losses are 40 per cent and 80 per cent below the adult base class.

On ISO's multicar data the senior pleasure-use pure premium is about 14 per cent below the comparable adult pure premium for non-PIP liability coverages. The seniors' pleasure-use pure premiums for collision and comprehensive coverages are lower by about 37 per cent and 55 per cent. These figures are less firm than the single-car results because relatively few seniors have multiple cars.[132] As well, non-senior operators are likely to have a greater impact on the seniors' multicar experience than their single-car experience, and one-operator households are probably less common here.

Senior-citizen cars in other than the pleasure-use category also represent a small minority of the age class. If each usage subclass for seniors is considered individually, the claim counts generated even under the combined single- and multicar data are too small to produce reliable indications by conventional standards. This credibility problem is compounded when the data are further splintered by coverage. Table 20 therefore aggregates all non-pleasure-use classes for senior citizens. The aggregated pure premiums displayed have been standardized to reflect a common distribution of non-pleasure uses across seniors and adults.

The indications for non-pleasure-use seniors reinforce the intuitive expectation that under non-PIP coverages seniors who drive to work or use their cars for business or farming largely resemble other adults engaged in the same activities, although even here there is grounds for a discount on the collision and comprehensive coverages.

TABLE 20

ISO AVERAGE LOSS COST PER CAR BY COVERAGE: SENIORS VS ADULTS

Pleasure Usage	Single Car Data Seniors	Adults	%	Multi Car Data Seniors	Adults	%
Basic PIP	$11.42	$34.07	-66.5	$12.23*	$21.07	-42.0
Bodily Injury	28.78	39.96	-28.0	22.48*	27.94	-19.5
Property Damage	29.10	30.35	-4.1	21.75	23.29	-6.6
BI & PD Combined	57.88	70.31	-17.7	44.23	51.23	-13.7
Comprehensive	3.50	18.03	-80.6	5.74	12.89	-55.5
Collision	32.19	54.78	-41.2	29.19	46.39	-37.1

All Other Usage	Single Car Data Seniors	Adults	%	Multi Car Data Seniors	Adults	%
Basic PIP	$16.63*	$30.80	-46.0	$10.08*	$23.92	-57.9
Bodily Injury	40.46*	41.47	-2.4	27.85*	27.24	+2.2
Property Damage	31.06	31.50	-1.4	26.17*	23.06	+13.5
BI and PD Combined	71.52	72.97	-2.0	54.02	50.30	+7.4
Comprehensive	6.24*	16.01	-61.0	4.78*	11.46	-58.3
Collision	41.48	57.48	-27.8	38.88*	46.13	-15.7

All Other Usage (Standardized)	Single Car Data Seniors	Adults	%	Multi Car Data Seniors	Adults	%
Basic PIP	$18.11*	$30.47	-40.6	$12.15*	$23.85	-49.0
Bodily Injury	40.58*	41.66	-2.6	32.11*	27.28	+17.7
Property Damage	31.27	31.42	-0.5	27.48*	23.02	+19.4
BI & PD Combined	71.85	13.08	-1.7	59.59	50.30	+18.5
Comprehensive	6.23*	16.12	-61.4	4.19*	11.40	-63.2
Collision	40.22	57.83	-30.4	40.01*	45.86	-12.8

*Fewer than 1000 claims

Note: 1. The components of the "All Other Usage" category have been standarized to a common per cent distribution by use for single car & multi car combined and Adult & Senior Classes combined.

2. Adults is the "All Other" class as defined in the ISO Private Passenger Automobile Manual.

Source of Data: Hearing Exhibits D-90 & D-94

On single-car data (Table 20) the non-pleasure-use seniors are slightly better than adults under the non-PIP liability coverages and 28 and 61 per cent better under collision and comprehensive, respectively. On multicar data non-pleasure seniors are about 7 per cent worse than adults for BI and PD combined, about 15 per cent better for collision and 58 per cent better for comprehensive. The results are subject to credibility problems, especially for multicar seniors, but the consistency of the indications is striking.

None of the Table-20 indications are materially influenced by mix of territories and secondary rating factors. As reflected in Tables 20A and 20B, the distributions of these other factors among seniors and adults are about the same. The indications for collision and comprehensive coverages are likely to change somewhat if it can be shown that the average value of insured cars is less for seniors than adults; but available data does not permit an assessment of this factor.[133] Furthermore, even an assumption--for discussion purposes--that senior cars are 20 per cent less valuable than adult cars would produce large adjusted discounts for seniors under the two physical damage coverages.

Current rating plans provide no more than a 5 per cent discount for senior citizens on all non-PIP coverages. For seniors in the pleasure-use category, this discount is too small in every respect. Until such time as distinctions on the basis of age are eliminated, a conservative estimate would require an overall 20 per cent discount on non-PIP coverages for the senior pleasure-use group. Other senior citizens are probably entitled to a large discount for collision and comprehensive and a need for separate pricing of these coverages is indicated.

TABLE 20A

ISO EXPOSURE DISTRIBUTION BY TERRITORY FOR SENIORS AND ADULTS

Rank	Territorial Relativity		Territory	Over 65	%	(Adults) All Other	%
1	1.97	02	Newark	938	1.0	7,296	.8
2	1.50	07	Camden	619	.6	3,628	.4
3	1.38	38	East Orange, Orange	916	.9	5,349	.6
4.5	1.37	01	Jersey City	2,137	2.2	18,893	2.2
4.5	1.37	19	Atlantic City	312	.3	1,215	.1
6	1.26	13	Camden County Balance	1,115	1.1	14,929	1.7
7	1.14	08	Perth Amboy	689	.7	17,775	2.0
8	1.09	14	Burlington, Gloucester, Salem	8,155	8.3	76,178	8.7
9.5	1.07	27	Atlantic, Cape May, Cumberland, Ocean	17,436	17.7	81,223	9.3
9.5	1.07	12	Camden Suburban	3,268	3.3	23,552	2.7
11	1.04	16	Long Branch	4,853	4.9	37,311	4.3
12	1.03	17	Monmouth County Balance	2,671	2.7	19,456	2.2
14	1.00	22	Newark Semi Suburban	1,111	1.1	8,843	1.0
14	1.00	23	Hudson County Balance	425	.4	4,058	.5
14	1.00	24	Essex County Balance	1,160	1.2	11,639	1.3
16	.99	04	Elizabeth	4,295	4.4	33,716	3.9
17	.98	06	Trenton	4,321	4.4	32,291	3.7
19	.97	31	Newark Suburban	6,287	6.4	35,669	4.1
19	.97	11	Southern Bergen County	1,862	1.9	35,050	4.0
19	.97	05	Bayonne	486	.5	5,474	.6
21	.96	26	Hunterdon, Warren, Sussex	3,222	3.3	53,932	6.2
22	.95	10	Northern Bergen County	9,720	9.8	82,217	9.5
23.5	.91	03	Paterson	3,590	3.6	48,521	5.6
23.5	.91	40	New Brunswick	3,952	4.0	56,110	6.4
25	.88	25	Dover, Morristown, Somerville	9,728	9.9	103,436	11.9
26	.85	15	Trenton Suburban	1,654	1.7	21,922	2.5
27	.80	39	Plainfield	3,796	3.8	32,885	3.8
				98,718	100.1	872,568	100.0
(Average Territorial Rating Factor)				(1.015)		(1.000)	
Total Exposures for territory ranks 1-5				4,922	5.0	36,381	4.2
Total Exposures for territory ranks 23-27				22,720	23.0	262,874	30.1

Source of Exposures: ISO Statistical Listing of February 15, 1979.
Rank and Territorial Relativity reflect ISO Liability Base Rates effective December 28, 1979.

TABLE 20B

AVERAGE SECONDARY RATING FACTORS
FOR SENIORS AND ADULTS

Net Surcharges (+) and Discounts (-)

	Single-Car Data	Multicar Data
Seniors - pleasure	+ .05	- .11
Adults - pleasure	+ .05	- .11
Seniors - other uses	+ .054	- .101
Adults - other uses	+ .053	- .100

SOURCE: Insurance Services Office (1975-77) Single- and Multicar data.

The overcharging of seniors as a group is confirmed by the class-average overcharge analysis in Table 21. In 7 of 8 price-cost comparisons ISO's current discounts for senior citizens are too small. The computations are limited to the compulsory coverages under which differences between seniors and the base class are smallest.

State Farm's statewide data does not entirely fit this pattern. The State Farm PIP results indicate a very large discount for senior-citizens, for the most part exceeding the 50 per cent discount directed by the Commissioner in 1977. Indicated discounts for collision and comprehensive are also substantial. However, for the non-PIP liability coverage, State Farm's seniors are above the adults on unadjusted data.[134]

Part of the explanation for the State Farm results relates to credibility. Virtually none of the rating cells compared contained more than 1,000 claims. Another major factor involves mix of business. The "Distribution by Class for Selected Territories" supplied in the State Farm filing shows that a disproportionate share of the company's senior insureds are written in the high-rated territories.[135] Thus, unless State Farm can demonstrate that on credible adjusted data its seniors are entitled to smaller discounts than ISO seniors, it should be held to the same standard as the rest of the market.

The Colonial Penn Insurance Company also requires separate mention because it presents unique problems when dealing with senior classes. Under liability coverages 59 per cent of Colonial Penn's insureds are 65 and older and an additional 35 per cent are between the ages of 50 and 65. The 50 per discount for PIP does not apply to seniors in this company because, as a result of the concentration of

TABLE 21

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING SENIOR CITIZENS (Compulsory Coverages)

	Single-Car Data		Multicar Data	
	BI + PD	BI + PD + PIP*	BI + PD	BI + PD +PIP*
Seniors - pleasure	+ 15.7	+ 20.6	+ 9.3	- 0.4
Seniors - all other uses	+ 11.4	+ 9.3	+ 10.7**	+ 3.7**

*The premium relativity for PIP reflects the 50 per cent discount directed by the Commissioner in 1977.

**Fewer than 1,000 claims.

SOURCE: Derived from data in D-90 and D-94.

TABLE 22

COLONIAL PENN ADJUSTED LOSS COST BY AGE

	Liability			Physical Damage			Comprehensive Only		
	Exposures	Adjusted Loss Cost	Per Cent Difference	Exposures	Adjusted Loss Cost	Per Cent Difference	Exposures	Adjusted Loss Cost	Per Cent Difference
Youthful	1,803	112.29	+ 3.3	1,124	103.85	+ 53.8	385	15.68	+ 88.9
Adult less than 50	3,645	124.43	+ 14.5	2,273	126.04	+ 86.6	854	13.18	+ 58.8
50-64	31,332	108.66	Base	20,443	67.54	Base	7,876	8.30	Base
65-69	23,791	109.90	+ 1.1	16,279	56.15	- 16.9	5,625	5.89	- 29.0
70-74	17,476	106.27	- 2.2	11,149	47.47	- 29.7	4,623	5.52	- 33.5
75-79	8,684	117.89	+ 8.5	4,904	46.30	- 31.4	2,672	3.88	- 53.3
80 and over	2,538	96.84	- 10.9	1,167	63.83	- 3.5	836	3.67	- 55.8

Note: Loss costs are adjusted for premium differences because of classifications, but not adjusted for differences due to liability limits or physical damage age and symbol differences.

SOURCE: Colonial Penn Table I data, submitted with letter dated April 30, 1979.

senior insureds, the redistribution of rates required by the discount would force the non-senior rate up more than it would take the senior rate down.[136] This policy should nonetheless be reconsidered after further study of Colonial Penn experience by coverage within classes.

Table 22 reflects Colonial Penn loss costs per car for the combined liability coverages (including PIP), for combined physical damage coverages, and for comprehensive only. The indications have been adjusted for mix of business but not for different liability limits or age and symbol differences (under the physical damage coverages). The 65-through-74 insureds are about the same as the base class for liability coverages, reflective in part of adjustments for mix of annual mileage differences. These seniors are substantially below the base class for comprehensive and collision coverages.

The Colonial Penn experience suggests that insureds 65-and-over may be somewhat overpriced in that company, although further information is required. Of special importance is whether physical damage differentials are adequately reflected in premium. Also of interest is whether mix of business adjustments overstate the 65-and-over experience as a result of the mispricing of multicar discounts.[137]

2. Within-Class Heterogeneity

The explanatory power of the senior-citizen classification is some fraction of the explanatory power earlier estimated for the age variable.[138] It is well below 10 per cent for any coverage. However, any such explanatory power relates to the magnitude of average-cost differentials attributable to the age variable. Within the class average individual expected costs are varied.

Diversity among senior-citizen insureds has been suggested at various points in the discussion. The class includes cars with

TABLE 23

INSURANCE SERVICES OFFICE DATA

DISTRIBUTION OF LARGE INDIVIDUAL OVERCHARGES - SENIORS VS ADULTS

Territory	Classification		Premium	% Within Class Overcharged By At Least S/K	$300	$500	% Within Class Overcharged By At Least E/K	$300	$500
Full Coverage									
02-Newark	8021	Seniors	$ 689.50	1.85	30.5	8.8	2.22	27.3	6.3
02	8111	Adults	783.15	1.85	34.7	15.3	2.22	31.6	12.1
31-Newark Suburban	8021	Seniors	$ 357.00	1.85	0.6	0.0	2.22	0.3	0.0
31	8111	Adults	402.20	1.85	5.3	0.0	2.22	3.5	0.0
39-Plainfield	8021	Seniors	$ 316.00	1.85	0.0	0.0	2.22	0.0	0.0
39	8111	Adults	352.50	1.85	0.3	0.0	2.22	0.1	0.0
Compulsory Coverages									
02-Newark	8021	Seniors	$ 363.50	1.82	2.4	0.0	2.17	1.3	0.0
02	8111	Adults	441.45	1.82	11.9	0.0	2.17	9.1	0.0
31-Newark Suburban	8021	Seniors	$ 195.00	1.82	0.0	0.0	2.17	0.0	0.0
31	8111	Adults	232.70	1.82	0.0	0.0	2.17	0.0	0.0
39-Plainfield	8021	Seniors	$ 168.00	1.82	0.0	0.0	2.17	0.0	0.0
39	8111	Adults	197.70	1.82	0.0	0.0	2.17	0.0	0.0

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis of the appendix.

TABLE 23A

INSURANCE SERVICES OFFICE DATA

OVERLAP ESTIMATES - PERCENTAGE BELOW MEAN - SENIORS VS ADULTS

Full Coverage

Classification		Newark 02	Newark Suburban 31	Plainfield 39	% Overlaps S/K S/K	8021	8111	% Overlaps E/K E/K	8021	8111
8021	Seniors	$690	$357	$316	1.85	59.8	66.7	2.22	58.9	66.6
8111	Adults	783	402	353	1.85	52.8	59.8	2.22	51.2	58.9

Compulsory Coverages

8021	Seniors	$364	$195	$168	1.82	59.8	70.5	2.17	59.0	70.7
8111	Adults	441	233	198	1.82	49.2	59.8	2.17	47.3	59.0

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis from the appendix.

TABLE 23B

INSURANCE SERVICES OFFICE DATA

OVERLAP ESTIMATES - 20 PER CENT CUTOFF - SENIORS VS ADULTS

Full Coverage

Territory	Classification	Premium	S/K	20% Cutoff	% Below	E/K	20% Cutoff@	% Below
02-Newark	8021 Seniors	$ 689.50	1.85		85.4	2.22		85.9
02	8111 Adults	783.15	1.85	$1,120	80.0	2.22	$1,096	80.0
31-Newark Suburban	8021 Seniors	357.00	1.85		85.4	2.22		85.9
31	8111 Adults	402.20	1.85	$ 545	80.0	2.22	$ 533	80.0
39-Plainfield	8021 Seniors	316.00	1.85		85.4	2.22		85.9
39	8111 Adults	352.50	1.85	$ 470	80.0	2.22	$ 460	80.0
Compulsory Coverages								
02-Newark	8021 Seniors	363.50	1.82		87.9	2.17		88.5
02	8111 Adults	441.45	1.82	$ 623	80.0	2.17	$ 610	80.1
31-Newark Suburban	8021 Seniors	195.00	1.82		87.9	2.17		88.5
31	8111 Adults	232.70	1.82	$ 307	80.0	2.17	$ 300	80.1
39-Plainfield	8021 Seniors	$ 168.00	1.82		87.9	2.17		88.5
39	8111	197.70	1.82	$ 254	80.0	2.17	$ 249	80.1

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

@Premiums do not contain the policy constants approved effective November 18, 1980.

different numbers of operators, and some with multiple operators under 65 who use the car for substantial amounts of its total time and mileage. The class also includes drivers at various stages of retirement who enjoy different degrees of discretion as to where, when and how much they drive. A significant number of retired insureds can be expected to use the car very little. Others are likely to make driving an important source of recreation. This diversity, although unique in some of its particulars, is the kind of diversity observed in other classes of insureds. Nonetheless, because the absolute magnitude of senior-citizen risk is below average for the rest of the driving population, the corresponding magnitude of pricing errors wrought by within-class heterogeneity is likely to be smallest here.

Tables 23, 23A and 23B display pricing-error and overlap analyses for senior-citizen classifications similar to those for youthful classifications discussed above. (See Table 17 and related tables, supra.) The results indicate that large pricing errors affecting individual senior citizens are limited primarily to seniors in the highest rated territories who purchase full coverage. In Newark, for example, more than 30 per cent of the seniors who purchase full coverage have individual expected costs at least $300 below the average for their class. About 12 per cent of the full-coverage Newark seniors are overcharged at least $500.

B. Females 30-through-64 Who Are Sole Operators in the Household

The ISO classification for females 30-through-64 who are the sole operators in the household is unique in at least three respects. First, it represents the only instance in the ISO class plan where the

age variable for persons over 30 has been further refined by demographic characteristics. Secondly, it reflects the only explicit application of a number-of-operators criterion in any classification plan currently in use in this State. Finally, although this particular sex-based classification for "adults" has been in effect more than fifteen years, no other filer has seen fit to adopt it. In recent years Allstate has applied sex and marital status considerations to the over 30 group but for single males only.[139] Typical fears about adverse selection do not appear to be operative here.

The classification does not present significant definitional problems. Neither does the class as defined appear to be uniquely more heterogeneous than other classifications, although its contribution to the overall predictive accuracy of the ISO classification system is small.[140] The predictive accuracy concerns unique to this class concern the absence of a clearly defined rationale.

The classification for females 30-through-64 was introduced on the basis of a limited sample of experience in the 1964 NBCU survey and report. The report concluded that females 30-through-64 who are sole operators were the only category of over-30 insureds observed in the survey which included both a "substantial proportion" of risks and showed a "significant variation from the average".[141] In fact the evidence developed by the survey and report is not clear.

The report fails to indicate the number of exposures or policies on which the survey findings are based and implies only that the experience developed for the sole-operator females involved more than "50 accidents".[142] Conventional actuarial standards would require at least 1,084 claims to generate credible indications. Further detail on the volume of data developed by the survey is not available.[143]

The 1964 survey and report also indicate a significant degree of variability in the loss experience for sole-operator females in the 30-through-64 age group. The reported liability experience produced average frequencies for these females about 12 per cent below the observed average for the balance of the 30-through-64 population; but no differential was indicated under the collision coverage. Given the limited data sample involved, this is hardly a compelling basis for the creation of a separate rating classification without exploration of other possibilities.

On its face the classification implies that a female over 30 who is the sole operator in a household has some unique psychological trait or lifestyle characteristic which makes her more or less likely to have automobile accidents. One stereotype of such a woman would have her living alone but not driving much, in conformance with the behavioral profile suggested for younger women. Another conceivable stereotype would have this woman tied to home by a disabled husband or relative or by children in her custody. However, in neither case is there anything to suggest that a male in similar circumstances or with similar usage patterns would not have similar risk characteristics.

Table 24 confirms the lower-than-average loss experience of ISO's classification for sole-operator females, at least under single-car policies. (For obvious reasons the multicar data are sparse.) Less clear is the extent to which this experience is explained, respectively, by the sex and number-of-operators characteristics of class members.

The sex characteristic is itself unlikely to explain the below-average experience of the class. California motor vehicle data

TABLE 24

ISO AVERAGE LOSS COST PER CAR BY COVERAGE: FEMALES 30-64 VS ADULTS

	Single Car Data			Multi Car Data		
Pleasure Usage	Females 30-64	Adults	%	Females 30-64	Adults	%
Bodily Injury	$31.97*	$39.96	-20.0	$37.64*	$27.94	+34.7
Property Damage	28.13	30.35	-7.3	28.73*	23.29	+23.4
Basic PIP	29.36	34.07	-13.8	70.54*	21.07	+234.8
Liability	89.46	104.38	-14.3	136.91	72.30	+89.4
Comprehensive	10.61	18.03	-41.2	19.58*	12.89	+51.9
Collision	44.01	54.78	-19.7	53.44*	46.39	+15.2

	Single Car Data			Multi Car Data		
All Other Usage	Females 30-64	Adults	%	Females 30-64	Adults	%
Bodily Injury	$30.41*	$41.47	-26.7	$46.31*	$27.24	+70.0
Property Damage	27.64	31.50	-12.3	35.06*	23.06	+52.0
Basic PIP	31.45	30.80	+2.1	24.35*	23.92	+1.8
Liability	89.50	103.77	-13.7	105.72*	74.22	+42.4
Comprehensive	7.99	16.01	-50.1	13.87*	11.46	+21.0
Collision	40.39	57.48	-29.7	58.53*	46.13	+26.9

	Single Car Data			Multi Car Data		
All Other Usage (Standardized)	Females 30-64	Adults	%	Females 30-64	Adults	%
Bodily Injury	$32.30*	$41.65	-22.4	$46.45*	$27.27	+70.3
Property Damage	27.89	31.45	-11.3	36.72*	23.00	+59.7
Basic PIP	30.26	30.63	-1.2	25.01*	23.93	+4.5
Liability	90.45	103.73	-12.8	108.18*	74.20	+45.8
Comprehensive	8.49	16.08	-47.2	13.86*	11.37	+21.9
Collision	40.50	57.79	-29.9	59.70*	45.72	+30.6

*Fewer than 1000 claims

Note: 1. The components of the "All Other Usage" category has been standarized to a common per cent distribution by use for single car & multi car combined and Adult & Females 30-64 combined.

2. Adults is the "All Other" class as defined in the ISO Private Passenger Automobile Manual.

Source of Data: Hearing Exhibits D-90 & D-94

indicate that females between the ages of 30 and 50 have higher accident rates per 100,000 miles driven than males of the same age.[144] More likely is that sex serves as a proxy for mileage, combining with the number-of-operators characteristic to define a class distinguished by its limited average use of the automobile. ISO has not sought to identify the mileage characteristics of this group or gender-based groups generally.

The number-of-operators criterion probably explains a substantial part of the differential class experience. Confining a class to sole operators in the household should have a material impact on class-average risk. In the 1964 NBCU survey males who were classified as sole operators also reflected below-average claim frequencies in a number of instances. For example, one-operator male policies generated average frequencies from 15 to 32 per cent below the average frequencies for three-operator policies.[145] Comparison of one-operator male policies and two-operator "male and spouse" policies produced mixed results. The two groups were about the same overall. However, when the one-operator male group is compared to the group for males with spouses under age 25--considered "adult" insureds under ISO rules--the one-operator males produced an average frequency about 8 per cent below the average for the male-and-spouse group.[146]

The rather sparse survey results contained in the 1964 NBCU report do not permit firm conclusions. However, the number-of-operators results yield sufficient variability across coverages and within clusters of policies grouped by number of operators that other or more refined explanations for any differentiation of frequencies should have been explored. Research concerning the relationship between the

TABLE 25

CLASS-AVERAGE OVERCHARGES (+) AND UNDERCHARGES (-)
AFFECTING SOLE-OPERATOR FEMALES 30-THROUGH-64

	Single-Car Data		Multicar Data	
	BI + PD	BI + PD + PIP	BI + PD	BI + PD + PIP
Females - pleasure	+ 4.7	+ 8.5	-32.4*	- 51.3
Females - all other uses	+32.6	+24.0	-29.7*	-26.6
Females - all uses combined	+15.7	+14.7	-31.7	-46.4

*Fewer than 1,000 claims.

SOURCE: Derived from data in D-90 and D-94.

sex of the operator and miles driven suggests that the use of mileage and number-of-operators criteria in combination is likely to do as good a job of prediction as the current criteria while establishing a more direct nexus to actual driving behavior.

The price-cost comparisons in Table 25 reveal mixed results which parallel the results in Table 24. The sole-operator females are consistently overcharged on single-car policies and undercharged on multicar policies. As observed above, the multicar experience is not credible; but the consistency of the indicated undercharges on these data may simply confirm the expectation that sole-operator and multicar criteria both relate to diminished usage.

Distribution of individual expected costs among sole-operator females suggests substantial overlap with the two other demographic classifications for adults. About 43 per cent of female sole-operators have higher expected costs than the average for senior citizens and about 36 per cent of the class have higher expected costs than the average for "all other" adults. Nonetheless, large individual overcharges are again minimal in comparison to the younger classes. In the representative suburban territory, pricing at the class average overcharges about 2 per cent of the female sole-operators at least $300 for full coverage. No overcharges of $500 are indicated.[147]

III. FAIRNESS PER SE: THE LEGAL IMPLICATIONS OF AGE, SEX, MARITAL STATUS AND OTHER STATUS VARIABLES

The New Jersey insurance rating law prohibits rates which are "unfairly discriminatory." N.J.S.A. 17:29A-1 et seq. The proscribed "unfair discrimination" is not merely an insurance term of art. It contemplates the application of commonly accepted notions of

fairness. See State v. North Carolina Rate Bureau, 255 S.E.2d 557 (Ct. App. 1979). Consistent with the law and public policy which shapes the regulation of insurance, the judgments required to determine fairness are the province of the Commissioner.

It is well settled in this State that insurance is a business "affected with a public interest," subject to considerations of public policy. Attorney-General v Fireman's Insurance, 74 N.J. Eq. 372 (E. & A. 1908). The highest court in New Jersey has likened the business of insurance to a public utility, citing the United States Supreme Court:

> "Property . . . does become clothed with a public interest when used in a manner to make it of public consequence and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good to the extent of the interest he has thus created."

Attorney-General v Fireman's Insurance, supra, quoting Munne v Illinois, 94 U.S. 113 (1876).

A car has long been recognized as a necessity and not a luxury, both for commuting to and from work and for doing essential errands. Even temporary deprivation may have serious effects. Henningsen v. Bloomfield Motors, Inc. 32 N.J. 358, 386 (1960); King v. So. Jersey National Bank. 66 N.J. 161 (1974), Pashman, J. dissenting, at 185. In modern times, the legislature has singled out automobile insurance as a special instrument for implementing public policy. Cooper v. Geico, 51 N.J. 86 (1968); Sheeran v. Nationwide Mutual Insurance Company, 159 N.J. Super. 417 (Ch. 1978), aff'd. 163 N.J. Super. 40 (App. Div. 1978), modified and aff'd 80 N.J. 548 (1979).

Pursuant to N.J.S.A. 39:6A-1 et seq., purchase of specified insurance coverages is a "condition precedent" to the use of the State's highways. State v. McCourt, 131 N.J. Super. 283 (App. Div. 1974). Failure to have coverage subjects a driver to mandatory license revocation for the first offense and imprisonment for a second. N.J.S.A. 39:6B-2. The purpose of mandated insurance and the larger no-fault insurance statute is to ensure compensation to injured victims of accidents, to reduce the cost of insurance, to increase availability of necessary coverage, and to reduce judicial burden. Rybeck v. Rybeck, 141 N.J. Super. 481 (Law Div. 1976).[148]

Previous insurance commissioners have taken the initiative to stop unfair treatment of insureds. In 1952 Commissioner Warren N. Gaffney issued a directive to insurers prohibiting the consideration of race and religion in underwriting as "contrary to the public policy of the State of New Jersey." Again, in 1962, Commissioner Charles R. Howell reiterated the prohibition of underwriting based on race as "not justified in any form of insurance." In a subsequent letter in 1963, Commissioner Howell made clear that this directive applied to all lines, including automobile insurance. The collection of accident statistics based on race--a practice apparently common at the time--and the use of race-related underwriting questions were thereby discontinued.[149]

In May, 1964, by resolution, the General Assembly created a special committee "to study and investigate certain alleged discriminatory practices in connection with the writing of automobile liability insurance," especially with respect to "age and race, and use of quota systems for certain applicants." The committee subsequently approved

A. The Fundamental Fairness of Age, Sex, Marital Status and Other Status-Related Classifications

Fairness requires that legal burdens bear some relationship to individual responsibility. Frontiero v. Richardson 411 U.S. 677 (1973). The "compelling" and "paramount" importance of obtaining automobile insurance is this kind of legal burden. Weathers v. Hartford Ins. Group, 77 N.J. 228 (1978); and see also, Shavers v. Kelley, 267 N.W. 2d 72 (Mich. 1978), cert. denied, 442 U.S. 934 (1979). Although the burden of maintaining insurance is imposed equally on all drivers, the availability and affordability of required coverages vary among classified groups and among individuals within these groups. Considerations of fundamental fairness and individual responsibility under a compulsory insurance regime should disfavor rating systems which needlessly limit the individual's opportunity to influence the costs of a policy.

In 1978 the draft report of the Rates and Rating Procedures Task Force of the Automobile Insurance Subcommittee of the National Association of Insurance Commissioners (NAIC) recommended the elimination of age, sex and marital status classifications in automobile insurance for failing to address "controllable" and "causal" elements related to driver behavior. The Task Force concluded that:

> ". . . the use of age, sex and marital status for purposes of classifying automobile insurance risks lacks sufficient justification and therefore violates public policy standards regarding unfair discrimination."

DRAFT: September, 1978 (Exhibit HO-11 at 6). A desirable insurance pricing system was said to enhance "the ability of an insured to react affirmatively to incentives." Exhibit HO-11 at 2, supra.

An incentive-based system requires a "cause-and-effect relationship" between rating factor and driver performance, especially absent in the case of sex and marital status:

> "The implied causal linkages between sex and marital status and driving ability are largely based on tenuous assumptions regarding traditional social stereotypes. (For example, existing driver classifications and rate relativities imply that young females quickly gain maturity with age, but that young males only develop adult attitudes through marriage.) Given the significant changes in historical sex roles and social attitudes which have occurred since these stereotypes were developed, continued pricing discrimination based on such assumptions is clearly unacceptable."

Exhibit HO-11 at 2, supra.

The draft Task Force report also criticized classification by age because it too is unrelated to causal factors, except as a surrogate for driving experience. The report noted that use of age rather than an experience-based variable imposes surcharges on the young but not on older drivers similarly inexperienced behind the wheel. The Task Force urged adoption of a variable related to number of years licensed as a substitute for age. Exhibit HO-11 at 2, supra.

The Task Force acknowledged that there was "some statistical evidence" supporting the use of age, sex and marital status but noted that the evidence was subject to question in many respects and that similar evidence also supported other factors not now in use. The point implicit in the Task Force discussion was the importance of value judgments in selecting among the range of statistically viable classifications. The report stressed that alternative rating factors perform just as well statistically as age, sex and marital status and "are considerably more acceptable for rating purposes from the public policy perspective." Exhibit HO-11 at 4, supra.

The Task Force concluded that determinations of unfair discrimination in rating should not be confined to actuarial judgments when larger questions of public policy are raised. The Task Force further concluded that discriminatory actions which would amount to unacceptable business practices are no less discriminatory in the rating context. Thus, as noted in the report, life insurance companies have been prohibited from charging different rates based on race for decades "even though actuarial studies indicate higher mortality rates on average for black persons." Exhibit HO-11 at 3, supra.

The NAIC Task Force report was vehemently opposed by the majority of the Industry Advisory Committee (IAC) for reasons similar to those offered by industry witnesses in these proceedings. (Exhibit SF-17). However, the Minority of the IAC issued its own report criticizing the use of factors based on social stereotypes unacceptable in a rapidly changing society:

> "It is noteworthy that factors such as race and creed are rejected [by the industry] out of hand as determinants of insurance rates. However, the [IAC] Majority Report indicates an industry preference that age, sex and marital status continue to be utilized despite the invidious nature of these ratings factors."

NAIC Proceedings, 1979, Vol. I at 937. The Task Force initially retreated by limiting its recommended prohibition of age, sex and marital status classifications to sex and marital status only, and omitted a number of findings. NAIC Proceedings, Vol. I at 910. In subsequent proceedings of the NAIC Subcommittee, the report was tabled until 1981. NAIC Proceedings, 1979, Vol. II at 531.

Regulators in other states have taken action to abolish one or more of the disputed classifications with varying results.[151] The

1977 Decision of the Massachusetts Commissioner eliminating age, sex and marital status remains unchallenged in that state. Commissioner Stone relied on public policy considerations similar to those enumerated by the NAIC Task Force:

> "At every step, the degree of scrutiny applied is intended to be commensurate with the importance to the public of the issue at hand. A proposed classification based on broad generalizations about the characteristics of a heterogeneous group should be subjected to a higher degree of scrutiny than a classification applied on an individual level. A proposed classification loosely or circuitously correlated with the object of its prediction should be subject to a higher degree of scrutiny than a classification which bears a reliable causal relationship to its object of prediction. A proposed classification generating no constructive incentives for policyholders should be subjected to a higher degree of scrutiny than a classification which creates incentives for improvement. Most important, a proposed classification with impacts contrary to established public purposes deserves tighter scrutiny than one classification with implications consistent with public policy. . . . The establishment of a fair and reasonable rate structure is intrinsically an exercise in balancing. The public policy environment in which the insurance system operates cannot be ignored in the weighings."

"Excerpt from the Opinion, Findings and Decision on 1978 Automobile Insurance Rates by James M. Stone, Commissioner of Insurance," Automobile Insurance Risk Classification: Equity & Accuracy, p. 165 and 166. (Exhibit D-28)

These kinds of considerations have governed the decisions of state regulators and reviewing courts elsewhere. The results appear to turn on interpretation of the relevant state statute or constitutional provision in each case.

The Florida Insurance Department adopted a rule, effective in March, 1980 providing that it was unfair discrimination to establish classifications based upon "the sex, marital status or scholastic achievement of a person or persons insured." Florida Administrative

Code, Rule 4-43.03. Members of the insurance industry contested the regulation on the theory, inter alia that it was beyond the scope of the Commissioner's regulatory authority. Insurance Services Office v. Department of Insurance, Florida Division of Administrative Hearings, #79-2432R, April 3, 1980. The pertinent Florida insurance statute expressly prohibited the charging of automobile insurance premiums which "unfairly discriminate solely on the basis of age, sex, marital status or scholastic achievement." Fla. Stat. Annot. Section 626. 9541 (15) (h) (West). After a hearing the administrative officer charged with reviewing the Department's action upheld the industry on the grounds that the unfairness of particular rating schemes had not been determined by the Department and that the subject regulation was merely a blanket prohibition unauthorized by the statute. The evidence was not sufficient, the hearing officer found, to support a deviation from the historic interpretation of the Florida Insurance Code. The dearth of evidence and procedural infirmities coupled with the peculiarities of the Florida statute are not dispositive for New Jersey.

A similar lack of evidence governed the ultimate disposition of Louisiana's regulatory efforts to ban age and sex-based classifications. In 1978, after a one-day hearing, the Louisiana Commissioner held such classifications to be "unfairly discriminatory" and prohibited their further use. La. R.S. 22:1402 and 1404(2). A reviewing court reversed, finding the Commissioner's decision to be "manifestly erroneous" and that the discrimination in question was "reasonably related to the goal sought to be achieved." Insurance Services Offices v. Bernard, La. Dist. Ct., November 15, 1978. The court of appeal affirmed, finding a "sound statistical basis for using

classifications based on age and sex in fixing insurance rates." Ct. App. #12681, cert. denied, La. Sup. Ct., November 30, 1979.

The Louisiana court determinations are not persuasive. The Insurance Department there had relied on conclusory opinions and set forth few facts. Furthermore, the reviewing courts stressed that age and sex discrimination was prohibited by the Louisiana constitution only to the extent that it was arbitrary, capricious or unreasonable, that is, not reasonably related to the goal sought to be achieved. Article I, Section 3 (1974). This "rational relationship test" probably runs contrary to the federal standard for equal protection guarantees under the Fourteenth Amendment, at least with respect to sex. (infra)

The Pennsylvania Commissioner of Insurance has prohibited sex classifications as "unfairly discriminatory" under that state's rating law. In explaining the relevant standards Commissioner Harvey Bartle stated:

> "The words 'unfair' or 'unfairly discriminatory' do not, of course, have exact or immutable definitions. Much often depends on the particular circumstances. Nonetheless, any statutory prohibition of this kind must be interpreted consistently with public policy. This is especially true where the policy has constitutional roots, and where the subject of the prohibition involves automobile insurance which is required by law and the rates for which are subject to governmental approval."

In Re: Mattes v Hartford Accident and Indemnity Co., Docket No. R78-7-2, April 2, 1980.

Commissioner Bartle's findings parallel those of the NAIC Task Force draft report and Commissioner Stone of Massachusetts. Bartle concluded that the insurance department could not "continue to allow the intertwining of social stereotypes and statistics to over-

ride constitutional mandates in the interpretation of automobile insurance laws." Bartle likened sex discrimination to discrimination based on race and religion and denigrated the importance of average cost correlations and administrative convenience when weighed against "all other factors" required to be considered by the rating statute. He also stressed that most males and most females do not have accidents or claims and that, regardless of classification, the many will always subsidize the few. Mattes v. Hartford, supra. (Petition for review, filed May 16, 1980, Commonwealth Court, Docket #1184CD).

The sex and sex-related classifications are probably the most likely candidates for elimination on facial grounds. The Bartle decision amounts to this approach. Nonetheless, at a minimum, it is reasonable to conclude from the totality of regulatory developments in this area that those variables are most questionable which would categorize insureds without reference to individual merits, while imputing to them stereotypical psychological and lifestyle characteristics. These variables should at least be subject to a greater burden of justification than variables more directly related to vehicle operations.

B. The Constitutional Standard

Constitutional standards governing "unfair discrimination" pertain to constitutional guarantees in matters relating to direct governmental control or "state action". Because in this instance the State Legislature has prohibited the use of insurance rating systems which are unfairly discriminatory and charged the Commissioner of Insurance to take necessary action to assure compliance with this standard, the state action theory would arise out of the private activity

of the insurers where there is "affirmative and significant" governmental involvement. King v. So. Jersey National Bank, supra.; accord, Shavers v. Kelley, supra. The declared public and social policy behind No-Fault and its mandatory coverage provisions, the pervasive regulatory scheme and the palpable nexus between governmental and private objectives in implementing the regulatory scheme, is probably sufficient to raise the state action doctrine in the present context.

Nevertheless, resolution of the "state action" question need not be reached here. There is no precedent for interpreting a specific legislative prohibition against "unfair discrimination" so that a separate standard of measurement would apply to the private sector. The legislature cannot authorize action contrary to or less than the constitutional limitations by which it is itself constrained. Moreover, the Supreme Court of New Jersey has extended the equal protection guarantees of the State Constitution to permit a direct right of action against a private entity. Peper v. Princeton University Board of Trustees, 77 N.J. SS, 76-80 (1978), involving a claim of sex discrimination in employment opportunity; N.J. Const. Art. I, para 1. The right to acquire, enjoy and protect property are "fundamental guarantees", the Court said. These rights would be hollow if individuals could be "invidiously denied" opportunities by wholly private conduct. See also State v. Schmid, supra.

Discrimination on the basis of sex is rapidly becoming recognized as no less invidious than discrimination by race or religion. In Frontiero, supra, the United States Supreme Court noted that "[s]ince sex, like race and national origin, is an immutable characteristic determined solely by the accident of birth, the imposition of special

disabilities upon the members of a particular sex would seem to violate the basic concept of our system that legal burdens should bear some relationship to individual responsibility." at 686. In that case a female Air Force officer sought dependent's benefits for her husband but the Air Force required that she prove the actual dependency of her spouse before the benefits could be granted. Customarily, male officers obtained dependent's benefits automatically upon application, whether or not their wives were in fact dependent. The Court held that this "special disability" based on sex violated the due process requirement of the Fifth Amendment.

The Frontiero court found that administrative convenience could not justify differential treatment based on invidious stereotypes. See also, Reed v. Reed, 404 U.S. 71 (1971).[152] In other decisions of the United States Supreme Court, even sex-based classifications predicated on specific statistical evidence have been rejected. With increasing frequency the right to personal autonomony has ruled out classification by sex under both constitutional and statutory standards. Craig v. Boren, 429 U.S. 190 (1976); City of Los Angeles v. Manhart, 435 U.S. 702 (1978).

In Craig, 18-through-20 year old males were prohibited by the State (Oklahoma) from purchasing beer, while females were not, because statistics revealed that males in that age group had greater accident and arrest records for driving under the influence of alcohol. The Court was not impressed with the statistical proofs:

> While such a disparity is not trivial in a statistical sense, it hardly can form the basis for employment of a gender line as a classification device. Certainly if maleness is to serve as a proxy for drinking and driving, a correlation of 2% must be considered an unduly tenuous "fit".

> Indeed, prior cases have consistently rejected the use of sex as a decision making factor even though the statutes in question certainly rested on far more predictive empirical relationships than this. (emphasis supplied).

at 201. In a footnote, the Court elaborated that higher degrees of predictive or empirical accuracy would not change the outcome of its decision:

> Proving broad sociological propositions by statistics is a dubious business, and one that is inevitably in tension with the normative philosophy that underlies the Equal Protection Clause.

at 204.

In a dissenting and concurring opinion, Justice Stevens rejected the "universal tradition" of discriminating against males between 18 and 21. The statistical data in support of the discriminatory law, he said, served to emphasize the unfairness of the generalization--most young males had no accident or arrest records at all. Craig, supra.

Even with empirical supports, sex-based generalizations cannot ignore exceptions. Weinberger v. Wiensenfeld, 402 U.S. 636 (1974). In Weinberger, the Social Security Administration had denied a widower's application for dependents' benefits for his child under a statute which granted such benefits to widows. The Supreme Court overturned the denial on the grounds that although women and children are more likely than men to be dependent on a deceased spouse's income, the law could not ignore the reality of a widower's similar needs, nor arbitrarily diminish the value of the deceased wife's contributions.

Where statistics have been used to prove discrimination, as through showings of low percentages of employment by race or sex, the Court has been consistent:

> We caution only that statistics are not irrefutable; they come in infinite variety and like any other evidence they may be rebutted. In short, their usefulness depends on all the surrounding facts and circumstances.

Teamsters v. United States, 431 U.S. 324, 340 (1977)

In City of Los Angeles v. Manhart, supra., the Court declared that fairness to individuals takes precedence over fairness to classes and prohibited higher pension payments by female employees based on gender-classified actuarial tables. Although the Court acknowledged to be "true" the generalization that women live longer than men, it was more impressed by the fact "that all individuals in the respective classes do not share the characteristics which differentiate the average class representative." City of Los Angeles v. Manhart supra. at 708. The Court acknowledged that "insurance is concerned with events that are individually unpredictable" but concluded:

> "To insure the flabby and the fit as though they were equivalent risks may be more common than treating men and women alike, but nothing more than habit makes one 'subsidy' seem less fair than the other."

Notwithstanding the group coverage aspect of the pension plan, the case rested on guarantees of individual consideration in employment under Title VII of the 1964 Civil Rights Act. 42 U.S.C. 2000e. The Court critiqued the stereotyped assumptions which the Civil Rights Act was designed to counteract.

In sum, the federal standard governing application of Fifth and Fourteenth Amendment guarantees would subject sex-based classifications to "substantial scrutiny." Craig v. Boren, supra. As a practical matter, this measure amounts to strict scrutiny to the extent petitioner will prevail on a showing that the classification at

issue has less than a compelling purpose. A showing of more than mere reasonableness, or lack of arbitrariness, is required.

The New Jersey Constitution affords greater guarantees of equal protection and fundamental rights. Although the State Constitution makes no explicit declaration regarding freedom from sex discrimination, recognition of this civil right is long established in the state. Castellano v. Linden Board of Education, supra. Prior to the adoption of the new Constitution in 1947, women's groups protested the omission of explicit protection for sex discrimination. The Legislature was responsive but did not wish to single out particular groups. As a compromise, the word "person" was substituted wherever the word "man" appeared in the prior constitution. Peper v. Princeton, supra, at 77-78. Thus, the Attorney General's official explanation of the new Constitutional provisions set forth:

> The present New Jersey "Bill of Rights" setting the basic rights and freedoms of all the people, without distinctions of group, class or sex, is carried forward without any change from the Constitution of 1844.

"Official Summary of the Revised Constitution," prepared and signed by Hon. Walter D. Van Riper, Attorney General, to inform voters of its nature and significance." 67 N.J. L.J. 7 (1945).

The New Jersey Supreme Court has held that our State Constitution provides protections "analogous or superior to the Fourteenth Amendment." Robinson v. Cahill 62 N.J. 473, 483 (1973); Peper v. Princeton, supra. The federal standard requiring a showing of compelling state interest when fundamental rights are in jeopardy has been rejected by the Court as a needlessly mechanical approach when considering state constitutional requirements. If a classification is found invidious, further court inquiry is likely to end. Robinson v. Cahill, at 492; McKenney v. Byrne, 82 N.J. 304, 316 and 317 (1980).

Invidious classification is, in the words of Justice Pashman, "peculiarly repugnant in a society which prides itself on judging each individual by his or her own merits." Peper v. Princeton, supra. Eradication of invidious discrimination involves prohibition of generalizations or "archaic and overbroad" stereotypes. Tomarchio v. Township of Greenwich, 75 N.J. 63, 73 (1977). Although it has been argued that the business of insurance requires the use of generalization and precludes completely individual treatment, 92 Harv. L. Rev. 54, 302 (1978), the issue here involves not classification per se but the use of particular kinds of classifiers. Generalizations about risk based on say, average amounts of usage, are an acceptable business practice. Inferences drawn from the presence or absence of particular genetic traits are not acceptable.

Of all existing rating variables, classification based on sex is the most certainly invidious under state constitutional standards and further inquiry may stop there. Discrimination based on marital status has been traditionally co-extensive with sex discrimination. Automobile insurance is no exception. Marital status classifications are founded on sex-role stereotypes. Married women are not explicitly recognized under current plans and no accident statistics are collected for them. Accident experience is examined for married and single males only. The age, scholastic standing, driver training and other rating characteristics of youths given such an important role under current classification plans are ignored for the female marriage partner.

Failure to recognize a separate classification for married females has been said to be based on recognition that virtually every

married woman--young enough to be considered for marital-status classification--is likely to be married to a male already subject to marital-status classification under current plans.[153] The necessary implication is that the rate classification of marriage partners should be determined solely by the rate characteristics of the male because he is presumed by his sex to be a higher risk than his wife, and by his expected role in the family, a more frequent user of the automobile. In turn, married males are presumed to be more responsible and mature than their single counterparts.

These are the types of generalizations which are likely to be found invidious by "contemporary standards of equality:"

> In contemporary times, old stereotypes of the man as the breadwinner and the woman as the housekeeper have broken down and the right to personal autonomy has come to the forefront.

Peper v. Princeton, .supra. at 78. Questions concerning the acceptability of the marital status variable are indistinguishable from questions concerning the acceptability of underlying classifications based on sex.

The age variable shares similar disabilities. Inferred from driver age is a range of stereotypical psychological traits and life-style characteristics which focus on assumptions about maturity and responsibility. The same kinds of assumptions support so-called good student classifications. These assumptions are perhaps less "archaic" than those surrounding sex and marital status but they are no less sweeping. The most offensive aspect of these sociological generalizations, shared with sex and marital status stereotypes, are their needless disregard of the merits of the individual.

The imposition of a special burden on account of age is likely to be contrary to State constitutional standards, although the law is not well settled on this subject. The courts have held that classifications based on age do not "per se" violate constitutional quarantees; but they have also observed that such classes are deemed proper only if they are constituted for the benefit or protection of those classified or for the protection of the public. State in Interest of K.V.N., 116 N.J. Super 580 (App. Div. 1971), aff'd. 60 N.J. 371 (1972).[154] In the latter case, state law survived an equal protection challenge to disparate sentencing procedures for youthful and adult offenders. The protested "indeterminate" sentencing procedures were upheld on the grounds that they rationally related to the state's interest in protecting youthful offenders.

A critical fact in the present matter is that age classification is inextricably intertwined with sex and marital status variables. Youths are classified as such only if they meet sex and marital status criteria. Although it did not specifically so hold, the United States Supreme Court's observations in Craig v. Boren, supra, when read together with Justice Stevens separate opinion, indicate that burdens based on the coupling of age and sex, distinguishing males from females, are constitutionally infirm. See also, Stanton v. Stanton, 421 U.S. 7 (1975). Under the heavier burden imposed by the State Constitution and the specifically articulated "benefit or protection" standard, an age burden dependent on a sex classification does not appear to be constitutionally viable.

C. Statutory Prohibitions Against Discrimination

1. The Law Against Discrimination

In 1977, the State Legislature enacted the following amended declaration to the Law Against Discrimination:

> The Legislature finds and declares the practices of discrimination against any of its inhabitants, because of race, creed, color, national origin, ancestry, age, sex, marital status, liability for service in the Armed Forces in the United States, or nationality, are a matter of concern to the government of the State, and that such discrimination threatens not only the rights and privileges of the inhabitants of the State but menaces the institutions and foundations of a free democratic State . . . The legislature further declares its opposition to such practices of discrimination . . . in order that the economic prosperity and general welfare of the inhabitants of the State may be protected and ensured.

N.J.S.A. 10:5-3.

This commitment to eradicate discrimination in its many manifestations represents a comprehensive statement of the public policy of this State. It makes age, sex and marital status equal partners of historically more familiar forms of stigmatization.

Although the Law exempts employment-related pension and insurance benefits from its enumerated prohibitions, it is significant that it does not exempt other kinds of insurance. N.J.S.A. 10:5-2.1. The exemption has since been overruled as to sex distinctions by City of Los Angeles v. Manhart, supra; and the Legislature has reenacted the State's pension programs to exclude gender-based actuarial tables and any classifications or differential treatment on account of sex. L.1979, Ch. 106.

The Law Against Discrimination provides in pertinent part that it is unlawful for

> "any person to refuse to . . . sell to . . . contract with, or trade with, provide goods, service . . . or otherwise do business with any other person on the basis of . . . age, sex, marital status. . . ."

N.J.S.A. 10:5-12(1). The behavior proscribed by this provision would constitute "unfair discrimination" under the rating law if the differential pricing of automobile insurance based on age, sex and marital status classifications amounts to a refusal to deal or "otherwise do business" on this basis. The cumulative weight of the evidence suggests that it does.

The structure and pricing of current classifications unreasonably reduce the affordability of insurance for select classes of youths, notably youths "without parents" and young principal operators who are single and male. Although the precise nature of company intentions is debatable, the likely effect is that disproportionate numbers of these groups are forced out of the market. The evidence is circumstantial but persuasive.

At least the following aspects of existing classification practices work to "price out" segments of the youthful classes:

1. uneven applicability of rules, without empirical justification;

2. the use of rating variables which relate to generic risk factors but are specifically applicable to only an advantaged few; and

3. the overpricing of youthful classes in relation to observed average experience, especially single male operators.

The most troublesome instance of uneven treatment is the imposition of large "inexperience" surcharges on the youngest principal operators and not on occasional operators of the same age without any evidence that the years-licensed criterion, as applicable to these drivers, identifies differential risk not already identified by the age variable. The principal-occasional distinction is itself applicable to less than all youthful insureds, leaving to the judgment

of agents and underwriters the application of substantial price differentials on this basis. Further examples of uneven treatment include the exemption of youthful married females from classification as youths and the separate treatment of single male principal operators over 25.

Variables with the most apparent socioeconomic bias relate to resident-student and good-student status. The resident-student rule is without statistical support. It recognizes a lower hazard for youths with only limited access to the insured car but applies differentially according to age, sex and marital status and only to such youths whose limited access is attributable to attendance at school away from home. The good-student variable purports to identify youths who are mature and responsible but limits class admission (after age 17) to those who attend college.

Class-average pricing analyses reflect patterns of error consistent with the industry's marketing and underwriting biases. The discrepancies between class-average premiums and class-average losses are greatest among youthful males, singles and principal operators. The overcharges increase as the youths become older and less likely to be dependent on their parents.

Company intentions are at least suspect. Available underwriting guidelines discourage the sale of policies to the youngest single male principal operators and to single males whose parents are not already insured in the same company. Available exposure distributions confirm the small proportions of insured single males. Unmarried males in the 17-20 age category who are owners or principal operators constitute 1.8% of voluntary exposures as compared to 5.8%

of assigned risks. Females similarly situated constitute 4.3% of voluntary exposures and 5.3% of assigned risks. Exhibit D-98; Cox, TR 85A, p. 35.

Company attitudes are further revealed in at least one company's explanation of the economics of the classification process. Allstate's Michael McCabe has indicated that even if rate differentials were precisely accurate and the ratio of expected losses to expected premiums were the same for all classes--the traditional objective of classification pricing methods--all such classes would not be equally attractive to the companies. In McCabe's language, "[i]t's the difference of buying bonds and buying high-fire stocks."[155]

Another formulation of this notion concerns the contribution of classification systems to the reduction of overall losses. McCabe explains:

> "In other words, if young males couldn't buy insurance, they wouldn't drive. That would be an immense loss reduction result."[156]

In McCabe's view it would not be enough to force "bad drivers" off the road:

> "[I]f we took all the bad drivers off the road we wouldn't really reduce losses that much. But concomitantly, if we took all good young drivers off the road, we would reduce losses tremendously, and that is what SRI is saying."[157]

The merits of these views are not the issue at this point. The importance of the testimony is its suggestion that a departure of youths from the market is consistent with the perceived self-interest of insurance companies. The view is probably not uncommon. Another industry witness, ISO's Michael Walters, suggested further that any incidental tendency to price youths off the road is also in the public interest.[158]

The interdependence of classification and underwriting practices[159] gives further cause for invoking the statutory proscription. As long as age, sex and marital status are required to be elicited in the classification process, a prohibited refusal to deal on one or more of these bases can be neither prevented nor detected. Elimination of these rating variables would be analogous to regulations of the Division of Civil Rights which prohibit the designation of the prohibited categories in employment-opportunity solicitations, N.J.A.C. 13:7-1 et seq. (Preemployment Inquiries); N.J.A.C. 13:11-1 et seq. (Employment Advertising).

The acceptability of sex and marital status classifications are further addressed by another provision of the Law Against Discrimination which prohibits in pertinent part:

> "[the act of] any owner . . . agent, or employee of any place of public accommodation directly or indirectly to refuse, withhold from or deny to any person any of the accommodations, advantages, facilities or privileges thereof, or to discriminate against any person in the furnishing thereof . . . on account of the race, creed, color, national origin, ancestry, marital status, sex or nationality of such person. (emphasis added)

N.J.S.A. 10:5-12(f). The sale of insurance can be construed to be a "public accommodation," defined in the statute as ". . . any producer . . . establishment or concession dealing with goods or services of any kind." N.J.S.A. 10:5-5(l). Marketing outlets for insurance are reasonably considered "places of public accommodation" in which no applicant shall receive differential treatment on the basis of sex or marital status.

The uneven application of classification rules and the systematic overcharging of single male operators amount to the kinds of

discrimination this Law was intended to prevent. Under the cited provision as elsewhere in the Law, discrimination on the basis of sex or marital status is no less offensive than discrimination on account of race, creed, color or national origin. Age distinctions are not precluded in public accommodations as they are in contractual matters, presumably to permit imposition of drinking-age restrictions and other "protective" measures (supra).

2. The Trade Practices Act

In 1965, the Special Committee created by the General Assembly to investigate discriminatory practices in automobile insurance reported:

> Restrictive underwriting practices are justifiable when based on valid criteria reasonably related to risk. However, when such criteria are used which are not related to risk, such practice represents discrimination and cannot be permitted to exist.

Report, Feb. 8, 1965 at 7. Pursuant to the Committee's recommendations, the legislature prohibited unfair discrimination in automobile insurance based "solely" on age.

The qualification "solely" was in recognition of the heterogeneity of age classifications. The Legislature was particularly concerned about the stereotyping of senior citizens based on the "various conditions usually associated with old age, such as impaired hearing and eyesight." The Committee stated:

> The existence of such conditions vary with the individual regardless of age and therefore continued insurability should be determined on the facts in each individual case. (emphasis added)

Report supra. at 8

Instead of placing the prohibition in the Law Against Discrimination, as recommended by the Committee, the legislature placed

them directly in the insurance [Unfair] Trade Practices Act, N.J.S.A. 17:29B-4(7)(l). The Act mandates that insurers shall not make or permit "any unfair discrimination solely because of age in the issuance, withholding, extension or renewal of any policy or contract of automobile liability insurance or in the fixing of the rates, terms or conditions therefor. . . ." N.J.S.A. 17:29B-4(7)(e). (emphasis added) The Act also provides that "nothing herein shall be construed to interfere with the application of any applicable rate classification filed with and approved by the commissioner."

Whether automobile insurance classifications are predicated "solely" on age within the intended meaning of the statute is a close question. Although the age variable is used in conjunction with other classification characteristics, age is in fact the threshold consideration on which application of most driver and use-related variables depends; and the variables used to refine age considerations are not related to the merits of individual applicants--"the facts in each individual case"--as seemingly intended by the legislature. However, further uncertainty is raised by the couching of the statutory prohibition in terms of "unfair discrimination," as opposed to discrimination per se, bringing us full circle to the language in the insurance rating law.

The Trade Practices Act nonetheless provides insight concerning important public policy considerations. The "solely because of age" prohibition represents a clear legislative directive that the use of age classifications must be closely scrutinized. Of special importance is whether an age-based classification unfairly stereotypes persons on the basis of characteristics associated with age when in fact such characteristics vary with the individual regardless of age.

The Act appears to require a determination of the reasonableness of particular age classifications on a case by case basis. This interpretation is supported by the Act's exemption of age classifications approved by the Commissioner of Insurance (under the rating law). Accordingly, this exemption should not be read to immunize age classifications in effect at the time the Trade Practices Act was passed. "Unfair discrimination" cannot exclude otherwise prohibited acts merely because public policy historically tolerated them. See Robinson vs. Cahill, supra, at 515 wherein Chief Justice Weintraub observed that the constitutional mandate of a "thorough and efficient" education cannot terminate below the high school level merely because that was the acceptable standard at the time of adoption.

Section 5

THE GEOGRAPHIC VARIABLE: TERRITORIES

I. CLARIFYING THE TERRITORY ISSUES

The fairness of insurance rating territories is one of the most emotional and least understood insurance issues. Because territorial boundaries coincide to a large extent with political boundaries, inquiries into the fairness of these boundaries for ratemaking purposes appear to pit city and suburb against each other. Those in favor of the territorial status quo frequently contend that anyone concerned about unfair discrimination in this context is confusing insurance and social welfare issues and seeking to redistribute income through the insurance mechanism. Those viscerally opposed to territory rating point to the implications of the compulsory insurance laws and the confiscatory costs thereby imposed on an unfortunate minority of drivers. In fact the subject has a number of different aspects; and it is important that this discussion begin by sorting them out.

An insured's place of residence influences the price paid for insurance in at least the following three respects:

(1) Geographical location and related social and economic settings affect company marketing strategies and the likelihood of insureds being able to obtain insurance in the standard voluntary market. Company decisions regarding the positioning of sales outlets, particularly with respect to the retention or cancellation of agents, frequently follow geographical lines; and company underwriting standards appear to vary by locale as well. The result is that rural and urban insureds are the

most heavily represented in the Assigned Risk Plan, irrespective of their individual driving records.[1] Assigned Risk insureds are generally subject to higher premium costs (as well as poor service).

(2) The insurance rating territory, defined as the location in which the insured car is "garaged," has a direct bearing on policy premiums. The premium charged a particular insured is the product of the relevant territory base rate--a separate base rate is computed for each territory--and the numerous classification factors applicable to that insured. Two insureds with identical classification characteristics therefore pay different prices for the same policy if their cars are garaged in different rating territories.[2]

(3) The multiplicative method by which companies combine independently-derived classification and territory factors has disparate impacts among territories. The computation of premiums based on multiplication of class factors and territory base rates yields excessively high insurance prices for youths living in high-rated areas.

Relationships between the price of insurance and place of residence are accentuated by the extent to which territory boundaries define differences in population wealth. Income-based classification advantages, such as discounts for college students and the owners of

multiple cars, are generally less available to drivers in low-wealth areas. This fact contributes to a geographical distribution of protest or concern about insurance affordability independent of territory rates per se.

Only the second cluster of issues, concerning the accuracy and fairness of territorial rating factors per se, will be addressed in this chapter. The other issues are intertwined with this one at various points, but they will be discussed here only to the extent they have such a bearing. The first cluster of issues, concerning the variation of company marketing and underwriting strategies by territory, are addressed in pending legislation.[3] The third series of issues, pertaining to the multiplicative combination of class and territory factors, will be addressed in a subsequent chapter. Issues concerning socioeconomic biases in driver classifications have been addressed separately above.

Analysis of the derivation and pricing of territorial factors is in two parts. The first, as in the discussion of classifications, concerns the question of predictive accuracy: Can or do territories accurately identify and price differences in risk among insureds? The other concerns fairness: Are insureds fairly accountable in whole or in part for the driving hazards attributable to the geographical area in which they reside? These questions will be treated separately.

II. THE PREDICTIVE ACCURACY ISSUES

The analysis of the predictive accuracy of territories pursues the same lines as the analysis of driver classifications. The general question is whether territorial factors can, in concept or as

applied, isolate for similar treatment those risks which are "essentially the same." The specific inquiries required to make this assessment concern (1) whether the territory location of garaging bears a reasonable relationship to the likelihood of accident or loss affecting the car; (2) whether territories are or can be clearly and objectively defined to assure uniform application and to prevent misclassification as the result of mistake or manipulation; (3) whether territorial variables have succeeded in identifying and accurately estimating significant differences in average risk between groups; and (4) whether the average risks of territories reasonably reflect the risks of all insureds within them.

A. Reasonableness in Relation to Hazard of Loss

The reasonableness of territorial rating in the abstract--whether territorial categorization of any kind is a reasonable basis for differentiating the pricing of identical insurance policies--is determinable on the same criteria as applied in the similar evaluation regarding classifications. Any variable used to categorize insureds should have the closest possible relationship to hands-on-the-wheel behavior--how well, how much and where one drives. In addition, the variable should maximize the inclusion of insureds sharing the same behavioral characteristics. Variables correlated with social and economic status limit inclusiveness in this sense.

By these standards territories are an acceptable rating criterion if they serve to differentiate driving environments. The nature of the driving environment--where the insured car is typically driven--bears a common sense relationship to the risk of accidents. However, territories are unacceptable if they serve only to classify

people. Any link between place of residence and quality of driver behavior--how the car is driven--is remote.

Territories which classify driving environments are supported by the presumption that most trips begin and end in the place of garaging. All drivers in the territory share the same driving environment for that part of their total travel occurring close to home. If in fact territories are defined so that drivers in each territory do similar portions of their driving within territory, and the proportions of within-territory driving are similar across territories, resulting rate distinctions should not be unreasonable per se.

There is nothing about the territory concept which necessarily limits the inclusion of drivers sharing similar driving environments or similar mixes of driving environments, although the task of defining appropriate boundaries requires a significantly greater effort than evident to date. The territories currently in use in New Jersey may be better correlated to socioeconomic criteria than driving patterns; and they should be closely scrutinized for the inaccuracies and inequities this suggests. Properly-defined territories must have a direct and palpable connection to driving patterns.

In sum, it would be premature to discard territorial rating in principle. For the time being, at least, this inquiry should focus on the reasonableness of New Jersey territories as they are defined and priced.

1. The Reasonableness of Current Territories: An Assortment of Proposed Tests

The complete absence of documentation reflecting the facts and principles on which current territories were established in New Jersey makes scrutiny of the rationale for these territories difficult.

This gap in the historical record leaves to conjecture whether the boundaries were based on qualitative considerations addressed as much to marketing objectives as concern for overall predictive accuracy. The fact that these territories have not been modified significantly since their inception in 1946 make the chance that they continue to be appropriate today, whatever the initial basis, highly improbable.

The credibility of current territorial lines is further undermined by the absence of any showing that traditional territory principles have any relevance to New Jersey. In defense of the territory concept industry witnesses have recited numerous theoretical explanations for differences in average territory claim costs. Even accepting these theories at face value, most appear to have little or no application to the current territories. None are supported by specific New Jersey data.

a. Differences in the Costs of Products and Services

At least two witnesses asserted that "a particular locality's labor rates for auto repair shops and physician and hospital costs, directly affect the losses paid by insurers in that area."[4] If by implication this assertion is meant to suggest that New Jersey territories reflect such differences in costs, the contention is entirely unsupported. Indeed, available evidence is to the contrary.

A 1978 report compiled by ISO field staff following a survey of ISO territories notes that information on automobile repair costs was "not available" but that "brief contact with insurance adjusters indicated no appreciable difference in rates throughout the state."[5] With respect to hospital costs, the ISO field staff identified the standard semi-private room rate as of January 1, 1978 for one hospital

in each of 26 territories. The hospital rate identified for Newark ($110), by far the territory with the highest insurance premiums in the State, was less than or equal to 22 of the 26 territories surveyed. The three highest hospital rates were identified for comparatively low- and medium-rated territories: Northern Bergen County ($153), Hunterdon/Warren/Sussex ($151) and Southern Bergen County ($150). The report further points out:

> "Rates are according to accounting division of each hospital. Checks of other hospitals in territory indicated similar rates. Department of Health - New Jersey indicated rates do not differ from one section of state to another. Differences in rates are between type of hospital." (Emphasis added)[6]

b. Differences in Legal Climate

Allstate suggests that differences between territories are explainable on the basis of differences in legal climate--"heightened litigiousness on the part of the residents and attorneys . . . and different jury attitudes."[7] New Jersey court data was not offered in support of this contention.

No doubt there are differences in legal climate across the State as a whole; but neither common sense nor the available evidence supports the notion that current territories reflect such differences. Even on the hunch that the northeastern quarter of the state is the most litigious, at least 14 of the 27 territories, including low-, medium- and high-rated territories, are located in this region. Furthermore, because the State court system is organized along county lines and the territories are not, low-rated and high-rated territories share the same juries and lawyers.

c. Differences in Traffic, Population and Accident Densities

Industry witnesses asserted that traffic density is a suitable basis for differentiating driving environments but offered no indication that the current territorial boundaries were determined on this basis.[8] In fact, when the hearing sought to address the issue of cross-territory traffic flows and the impact of such traffic on differences in congestion among territories, the analysis was stymied in part because the current territories fail to reflect systematic differences in congestion.[9]

The only hard evidence on the subject of population densities was contained in the 1978 ISO field report which listed population densities for the municipalities making up each territory. The report made no effort to correlate density and average accident experience and no correlation was apparent. Instead, the data suggested that population densities vary by municipality within territories.[10] Data reflecting accidents per square mile and reported motor vehicle thefts for each municipality also reflect within-territory variation.[11]

d. Urban, Suburban and Rural Differences

Much of the conceptual discussion of territories by industry witnesses focused on popular images of life in center-city. Allstate's Michael McCabe explained that "residents of the central city" pay more for insurance because "the vast majority of their auto travel takes place in congested traffic areas and, thus, their exposure to loss is greater." He further explained:

> "A study performed by the Federal Highway Administration of the U.S. Department of Transportation found that based on total road and street mileage in 1974, there were only 7.96 fatalities per 1,000 miles of streets and roads in rural areas, but

> three times that many in urban areas. With respect to injuries, there were only approximately 136 per 1,000 miles of roads and streets, but in urban areas over twelve times that many."[12]

The cited study was not offered in evidence nor is it clear how the study defined "urban" and "rural" areas and how unmentioned "suburban" areas were classified for purposes of the study. McCabe's reference to the study illustrates the breadth of unrefined statistical recitations typically used in defense of territory rating. To the extent the cited FHA finding suggests greater severity of injury in urban areas (eg, fatalities) it may contradict Allstate's own assertion that there is a mild negative correlation between claim severity and territory rating factor.[13]

The AIA's justification for territories stressed images of urban decay. Mr. Bernstein emphasized the "deterioration of our cities" and "high levels of crime in our urban areas," although he later restricted the point to the cost of comprehensive coverage.[14] Mr. Bernstein also hypothesized that the "unavailability of off-street parking greatly increases accident frequency and the cost of automobile property damage coverage;" and he mentioned the significance of differences in "road conditions," although without specific references.[15]

Singling out urban environments as a major reason for territories fails to address the specific facts of the New Jersey situation. This State is the most densely populated in the nation. Where cities end and suburbs begin is debatable; and the lines of demarcation do not always coincide with municipal boundaries. Summary recitals of statistics and conclusions from unseen out-of-state studies cannot be given much weight without specific application to these facts. The importance of interpreting data in context is critical--by one measure

the municipality reporting the highest accident frequency in the State is the Borough of Alpine (Bergen County).[16]

Bernstein himself was not willing to stereotype urban driving patterns. Testifying on the congestion issue, he hypothesized "a reverse trend in modern driving, particularly the practice of city drivers to shop at suburban malls and to create congestion on turnpikes and parkways on weekends and vacation trips to beaches and other non-urban destinations."[17] By implication, territory boundaries should take account of specific traffic and development patterns. Even shortage of off-street parking is not confined to the cities, as reported by the ISO field staff.[18]

The industry's conceptual focus notwithstanding, current New Jersey territories do not reflect consistent treatment of the most obvious urban-suburban-rural distinctions. The cities of Newark, Atlantic City and Bayonne are defined as separate territories while Trenton, Paterson, Jersey City, New Brunswick and most other New Jersey cities are incorporated in larger territories which include outlying suburban and even rural areas. Atlantic City and Ventnor City are in separate territories although they share the same island; and by splitting off Atlantic City from its contiguous territory it becomes the smallest territory in the State. (The contiguous Southern Counties territory contains almost 35 times as many insured cars as Atlantic City.)[19]

2. Application of the Underlying Principle of Territory Rating: Accidents and Typical Driving Occur Close to Home

The factors discussed above assume that defined territories represent typical driving environments for the people who live in them.

Yet the most important question in any evaluation of territories is whether this assumption is in fact met. On this point industry witnesses provided nothing of specific applicability to New Jersey.

Mr. Bernstein offered the following generalization:

> ". . . [M]ost accidents occur close to home . . . rather than in a distant city or rural location, according to the National Safety Council. Statistics compiled by the Motor Vehicle Manufacturers Association also show that the average one-way trip for family business is only 5.6 miles, the average driving distance to work is only 7.4 miles, and the average for all purposes is only 8.9 miles."[20]

An Allstate witness further cited a Washington State source reporting that "almost 80% of all accidents occur within 15 miles of home (15 miles was the first geographic breakpoint used in the study) and that 84.6 per cent of all injuries and 72.9 per cent of all fatalities occur within that radius."[21] None of the cited studies were produced.

The reasonableness of New Jersey territories depends on the accuracy of the industry's assertions, express or implied, (1) that most driving and most accidents in New Jersey occur "close to home," and (2) that New Jersey territories encompass typical driving areas close to home for territory residents. In numerous respects the evidence fails to support these contentions. The evidence further suggests that the territories weakest on these counts are the territories charged the highest premiums.

If as contended by Messrs. Bernstein and McCabe, average one-way trips by car range from 5.6 to 8.9 miles from drivers' homes, most of the drivers in Newark, East Orange/Orange, Irvington and Belleville (collectively the Newark Semi-Suburban territory), Bayonne, Camden and Atlantic City territories, and others of the geographically

diminutive territories, necessarily drive beyond territory boundaries on a regular basis.[22] Similarly, drivers in most territories who live at other than the very center of the territory are likely to spend a substantial portion of their driving time outside of the territory.

The layout of the road network and the location of work, shopping and recreation centers determine whether "average trips" occur within or without the territory. Reliance on average-distance-of-trips data therefore begs the larger questions concerning actual driving patterns. On these questions the industry has offered nothing.

The best available information on actual driving patterns is in data compiled by the New Jersey Department of Transportation and analyzed by the Delaware Valley Regional Planning Commission.[23] Using 1977 accident records, the analysis tracks the territory-of-registration for cars involved in accidents and compiles for each territory the origins of cars involved in accidents there as well as the territorial distribution of accidents involving local drivers. The results indicate substantial dispersion of accident-involvements across territories and, in turn, a broad diversity of driving patterns among drivers within the same rating territories.

For more than one-third of the cars involved in accidents statewide in 1977, the accident occurred outside of the home territory. Drivers in 7 of the 27 territories were involved in more accidents outside of territory than within territory, as reflected in Table 26.[24] Even here the estimated proportions of out-of-territory accidents are significantly understated because the data used count an accident between two local cars as two local accidents.

A substantial number of territories also experienced a high proportion of accidents within their boundaries involving out-of-

TABLE 26

TERRITORIES HAVING MORE LOCAL CARS INVOLVED IN ACCIDENTS OUTSIDE OF TERRITORY THAN WITHIN TERRITORY

	Territory	% Territory Cars Involved in Accidents Outside Territory to Total Territory Cars Involved in Accidents Anywhere in State
(17)	Monmouth County Balance	68.0
(22)	Newark Semi-Suburban	68.0
(24)	Essex County Balance	67.5
(38)	East Orange/Orange	60.4
(23)	Hudson County Balance	57.2
(31)	Newark Suburban	51.8
(15)	Trenton Suburban	50.4

TABLE 27

TERRITORIES IN WHICH MOST ACCIDENTS INVOLVED OUT-OF-TERRITORY CARS

		% of Drivers Involved in Accidents Within Territory Who Were Local Drivers*
(39)	Plainfield	49.6
(13)	Camden County Balance	49.5
(16)	Long Branch	45.7
(31)	Newark Suburban	45.4
(12)	Camden Suburban	44.2
(17)	Monmouth County Balance	43.3
(11)	Southern Bergen County	41.3
(38)	East Orange/Orange	38.3
(22)	Newark Semi-Suburban	38.2
(02)	Newark	37.7
(07)	Camden	37.2
(24)	Essex County Balance	36.5
(15)	Trenton Suburban	35.6
(19)	Atlantic City	34.4
(23)	Hudson County Balance	32.3

*Total in-territory accidents include out-of-state cars and exclude accidents where the place of vehicle registration is unknown.

territory cars. In 15 of the 27 territories less than half of the drivers involved in within-territory accidents were home-territory drivers, that is, more than half were out-of-towners.[25] Six of the seven territories in Table 26 are also included in Table 27, indicating what amounts to a musical-chairs effect in the driving patterns affecting these territories.

The Department also studied 1970 Census data which tracked "journey to work" patterns of a sampling of the statewide population, aggregated on a territory basis to indicate the proportions of drivers who travel to work within and without their home territories. The results are not unlike those suggested by the DVRPC analysis. In 17 of the 27 territories, as displayed in Table 28, half or more of the drivers sampled traveled to work beyond territory boundaries.[26] Seven of the 9 territories showing the lowest percentages of intra-territory trips, i.e., the highest proportions of out-of-territory trips, were the 7 territories found to have the highest percentages of out-of-territory accidents in the DVRPC analysis, as reflected in Table 26, supra.[27]

These findings are based on the largest bodies of available data reflecting the relationship between place of garaging and typical driving and accident patterns.[28] At best they show only a weak correlation, even on a group-average basis. The overlap of driving patterns among drivers in different territories is likely to be substantial.

The traditional methods of reporting insurance claims experience would not reveal these overlapping patterns. Accidents are charged to the territories in which the involved cars are garaged,

TABLE 28

WITHIN-TERRITORY TRIPS TO WORK

		Percentage of Total Trips Which Are Within Territory
(02)	Newark	50.0
(10)	Northern Bergen	45.7
(07)	Camden	43.8
(08)	Perth Amboy	42.3
(11)	Southern Bergen	40.2
(13)	Camden County Balance	39.7
(39)	Plainfield	39.5
(05)	Bayonne	39.1
(31)	Newark Suburban	34.6
(23)	Hudson County Balance	33.0
(24)	Essex County Balance	30.9
(38)	East Orange/Orange	23.8
(15)	Trenton Suburban	21.9
(22)	Newark Semi-Suburban	16.9
(12)	Camden Suburban	7.4
(16)	Long Branch	4.0
(17)	Monmouth County Balance	--

regardless of place of occurrence. This practice, coupled with the large proportions of out-of-territory accidents, diminish the usefulness of average territory loss experience in judging the quality of risks in each territory. In receiving territories--those territories which receive more cars than they send to other territories--local accident involvements are likely to increase relative to other territories even though local drivers are involved in only the minority of accidents within territory. In other words, even if out-of-territory cars are involved in the majority of accidents in the receiving territory, these involvements may be dispersed across numerous sending territories under the place-of-garaging reporting rule. Newark exemplifies this anomaly.

As reflected in Table 27, supra, only about 38 per cent (6861) of the cars involved in Newark accidents are Newark cars (even counting single accidents involving two Newark cars as two Newark involvements). In contrast, as summarized in Table 29 below, the five territories contiguous to Newark contribute about 24 per cent (4439) of the total accidents occuring in Newark; yet, collectively, these accidents represent only about 13 per cent of the total accidents statewide involving drivers from the contiguous territories. For each of these territories individually, accidents in Newark represent from 7 per cent to 26 per cent of total accidents for territory cars.[29]

These data dramatize the significance of actual driving environment, as opposed to mere place of garaging, in the risk assessment process. With respect to the territorial dimension of risk, each driver represents a risk which is the average of the risks attributable to each of the environments in which he or she drives. Thus, residents

TABLE 29

DISPERSION OF NEWARK ACCIDENTS
AMONG CONTIGUOUS TERRITORIES

Contiguous Territory	Territory Cars Involved in Accidents in Newark	Territory Cars Involved in Accidents Statewide	% Statewide Accidents in Newark
(04) Elizabeth	1041	14058	7.4
(22) Newark Semi-Suburban	1060	4307	24.6
(23) Hudson County Balance	303	1999	15.2
(31) Newark Suburban	837	9720	8.6
(38) East Orange/Orange	1198	4617	25.9
	4439	34701	12.8

Source: D-105A, p. 4.

of low-risk areas who do all of their driving in the low-risk areas subsidize those among their neighbors who drive in higher-risk areas; and drivers who live in high-risk areas and drive in lower-risk environments subsidize their neighbors who only drive close to home.

The administrative problems associated with monitoring place of driving rather than place of garaging are probably insurmountable, although greater recognition of actual driving environment is possible. (Refinement of usage classifications is one such possibility discussed infra.) Inability to solve the administrative problems, forcing use of place-of-garaging as a surrogate measure, diminishes the accuracy of the system; and for drivers in the highest-rated territories, the price of inaccuracy is especially high. The only reasonable application of the place-of-garaging methodology, in the circumstances, is within a framework of territory definitions which as nearly as possible equate place of garaging and place of driving for all drivers.

Even a rejuggling of existing territories can attain better correlations between place of garaging and typical driving patterns. Hypothetically, if Newark were merged with its surrounding territories, 78.3 per cent of the accidents involving drivers in the new territory would have occurred within the borders of this new territory under the 1977 DVRPC data.[30] This represents a percentage increase of within-territory accidents for each of the combined territories ranging from 18 to 145 per cent. Among the current territories, the percentage of within-territory accidents for this hypothetical territory is exceeded only by the Trenton territory, which includes the City of Trenton and the surrounding municipalities of Ewing, Hamilton and Lawrence. Of the total accidents involving Trenton territory drivers in 1977, 81.6 per cent occurred within the borders of the Trenton territory.[31]

This hypothetical juggling of territories and the comparatively good performance of the current Trenton territory suggest that eliminating geographically small territories and better integrating urban centers and satellite areas may be one of the approaches to improving the desired correlation between place of garaging and place of driving. The important point is that substantial improvement is readily accomplishable. The realignment of existing territories is one approach, although limited. Presumably better results would obtain if other building blocks were used and attention were focused on specific driving patterns.

Further empirical study is required to determine a minimally acceptable proportion of within-territory accident involvements. An important consideration is the extent to which the proportions are

similar across territories. A 40 per cent proportion is too small. A 60 per cent proportion is probably too small; but it is certainly unacceptable when other territories produce a substantially higher proportion of within-territory experience. Proportions of local involvements within-territory currently range from 32 to 82 per cent.

The maximization of within-territory driving is further constrained by the ultimate purpose of territory rating--to recognize qualitative differences in driving environments. At some point the two purposes conflict. For example, creation of a one-territory state would maximize the proportion of within-territory accident involvements but at the expense of obliterating discernible differences in driving conditions. The ultimate determination of appropriate territory boundaries is likely to require a balancing of competing purposes at some point short of the one-territory extreme.

3. Social and Economic Correlations

That aspect of the territory discussion which focuses on the supposedly unique characteristics of urban centers gives the misleading impression that territories serve primarily to distinguish between drivers in "inner cities"[32] and everyone else. Preoccupation with urban insureds comes perilously close to suggesting that territories are designed less to differentiate driving environments than to stereotype the people who live in them. Attributing confusion of these purposes to at least some segments of the industry is not without basis. Note again Continental's instructions to its underwriters:

> "Economic and sociological factors have a bearing on automobile accident frequency. Generally, the educational level of an individual or community is relative to income. As the economic and educational level increases the automobile accident frequency declines. Studies have shown that areas

> with a high standard of living have proportionately fewer accidents than areas with a low standard."
>
> "In commenting on above average exposures, we mentioned the physical make up of blighted or slum areas that produce an abnormal number of accidents and/or physical damage losses. Unfortunately, the problem does not end there. Those who reside there usually have a high frequency of accidents elsewhere."
>
> "No matter what our inclinations as individuals may be we must, as underwriters, make a realistic and objective appraisal of automobile risks. We know that there are good and bad drivers in all economic and social groups. This is also true as respects occupations and other underwriting criteria. Our experience has taught us that persons in certain occupational groups have more than the average number of accidents. This can also be said of persons who live in so-called slum and blighted areas."[33]

Under current territory definitions, base rates vary inversely with territory wealth. Table 30 and related tables rank the territories according to base rates and gross income for the three principal industry participants in these proceedings. Spearman rank correlation coefficients reflecting the relationships between base-rate rankings and gross-income rankings are displayed. These inverse correlations suggest the fine line between risk prediction and marketing objectives. The need to demonstrate a palpable connection between territory boundaries and actual driving patterns grows in proportion.

The Legal Services of New Jersey has attempted to demonstrate a correlation between New Jersey's territory boundaries and racial mix. Jonathan Sheldon, an attorney with the National Consumer Law Center who testified for New Jersey Legal Services, described the disproportionate numbers of blacks and poor in Newark and Atlantic City, two of the three New Jersey cities carved out as separate rating territories.[34] He also stressed the difference in size between Atlantic

TABLE 30

CORRELATION OF ADULT PLEASURE BASE RATE TO GROSS INCOME

INSURANCE SERVICES OFFICE

Territory*	Adult Base Rate**	Rank	Gross Income***	Rank
02	651	1	16,374	25
07	472	2	15,656	26
01	470	3	17,984	22
38	447	4	18,298	21
19	411	5	13,396	27
13	386	6	18,835	20
22	356	7	17,595	23
05	350	8	19,779	15
08	345	9	20,080	14
12	342	10	23,336	9
23	337	11	18,974	19
04	332	12	19,715	16
14	331	13	20,406	13
11	328	14	20,907	12
16	324	15.5	23,459	8
27	324	15.5	17,275	24
03	323	17.5	19,203	18
31	323	17.5	30,562	2
17	322	19	25,174	7
06	315	20.5	19,709	17
24	315	20.5	33,982	1
10	314	22	29,966	3
26	307	23	21,294	11
40	291	24	23,067	10
25	287	25	27,743	6
39	276	26	27,960	5
15	272	27	28,183	4

Measure of Spearman Rank Correlation = .7810

*Codes designating insurance rating territories utilized by Insurance Services Office.

**From Exhibit D 101 Pleasure Use Rates in effect September 30, 1979.

***From Exhibit D 105.

For this number of categories (27) any correlation coefficient of at least $\pm$ .38 would be statistically significant at the .05 level.

TABLE 30A

CORRELATION OF ADULT PLEASURE BASE RATE TO GROSS INCOME

STATE FARM MUTUAL AUTOMOBILE INSURANCE COMPANY

Territory*	Adult Base Rate**	Rank	Gross Income***	Rank
02	506	1	16,374	25
01	482	2	17,948	22
07	456	3	15,656	26
05	412	4	19,779	15
38	394	5	18,298	21
19	386	6	13,396	27
22	366	7.5	17,595	23
23	366	7.5	18,974	19
13	358	9	18,835	20
11	356	10	20,907	12
08	348	11	20,080	14
12	346	12	23,336	9
04	330	13	19,715	16
06	326	14	19,709	17
06	320	15	23,459	8
03	314	16.5	19,203	18
31	314	16.5	30,562	2
10	300	18.5	29,966	3
24	300	18.5	33,982	1
14	298	20	20,406	13
39	294	21	27,960	5
17	292	22	25,174	7
40	284	23	23,067	10
27	272	24	17,275	24
25	266	25	27,743	6
26	254	26	21,194	11
15	248	27	28,183	4

Measure of Spearman Rank Correlation = .6723

*Codes designating insurance rating territories utilized by Insurance Services Office.

**From Exhibit D 101 Pleasure Use Rates in effect September 30, 1979 for vehicles driven over 7,500 miles.

***From Exhibit D 105.

For this number of categories (27) any correlation coefficient of at least $\pm$ .38 would be statistically sufficient at the .05 level.

TABLE 30B

CORRELATION OF ADULT PLEASURE BASE RATE TO GROSS INCOME

ALLSTATE INSURANCE COMPANY

Territory*	Adult Base Rate**	Rank	Gross Income***	Rank
02	606	1	16,374	25
01	503	2	17,948	22
07	475	3	15,656	26
38	446	4	18,298	21
19	421	5	13,396	27
05	410	6	19,779	15
22	396	7	17,595	23
23	388	8	18,974	19
13	387	9	18,835	20
08	365	10	20,080	14
11	361	11.5	20,907	12
12	361	11.5	23,336	9
10	354	13.5	29,966	3
03	354	13.5	19,203	18
31	349	15	30,562	2
04	347	16	19,715	16
06	345	17	19,709	17
17	335	18.5	25,174	7
16	335	18.5	23,459	8
14	327	20	20,406	13
24	326	21	33,982	1
40	316	22	23,067	10
27	310	23	17,275	24
25	309	24.5	27,743	6
39	309	24.5	27,960	5
26	306	26	21,294	11
15	285	27	28,183	4

Measure of Spearman Rank Correlation = .6764

*Codes designating insurance rating territories utilized by Insurance Services Office.

**From Exhibit D 101 Pleasure Use Rates in effect September 30, 1979 for vehicles driven over 7,500 miles.

***From Exhibit D 105.

For this number of categories (27) any correlation coefficient of at least $\pm$ .38 would be statistically sufficient at the .05 level.

City and the large Southern Counties territory which surrounds it. Sheldon contended that the Southern Counties territory, encompassing a large portion of southeast New Jersey, "is only 7.2 per cent black because one small pocket in this territory, Atlantic City, is 43.7 per cent black and has been carved out and has been made into its own territory." The creation of a separate Atlantic City territory "is especially suspect," in Sheldon's view, "because the resulting territory only has 8,474 car years, far fewer than any other territory."[35]

Mr. Sheldon's limited analysis fails to demonstrate a pattern of either deliberate or de facto discrimination along racial lines. The percentage figures offered are in fact misleading. For example, if 43.7 per cent of the Atlantic City population is black, no more than about 3,700 of the cars voluntarily insured by ISO companies in that territory could be owned by blacks, using Mr. Sheldon's figure of 8,474 total cars in Atlantic City. If the population of the surrounding Southern Counties is 7.2 per cent black, as many as about 21,000 cars insured in that territory could be owned by blacks, using Mr. Sheldon's figure of 292,841 total cars in the territory.[36]

A more detailed and comprehensive analysis of the demographic characteristics of each of the 27 territories and their relationships to patterns statewide would have been helpful. Nonetheless, the line of inquiry opened by the Legal Services presentation, coupled with our own findings concerning the inverse correlation between territory rates and territory wealth, suggest the real possibility of territorial boundaries doing the work of suspect or unlawful criteria. This possibility requires especially strict scrutiny of territory boundaries.

B. Adequacy of Definition

Territories defined by municipal boundaries and applied according to place of garaging provide a cheap and convenient method for categorizing insureds. Locating the garage of the car is a more manageable task than attempting to account for where the car is driven. The use of municipal boundaries to differentiate garage locations assures that territorial rating categories will remain stable over time and that rating factors can be determined without in-depth questioning of the applicant. However, regardless of definitional method, the accurate application of territory rates ultimately depends on the conscientiousness of agents and underwriters and the integrity of insureds.

The conveniences offered by existing territorial rating concepts do not also immunize them to fraud and manipulation. The true location of a car's garage can always be masked if the insured's incentive to beat the system is great enough. When a change in territory can have a major impact on rates, or mean the difference between an affordable and unaffordable rate, the incentive to deceive should increase proportionately. This fact was lamented in statements by representatives of New Jersey's two most highly rated urban municipalities.

Mayor Kenneth Gibson of Newark observed that "a number of Newarkers actually use the address of friends and relatives in other surrounding suburban cities" to avoid the very high rates in Newark. He said that citizens are "encouraged to lie" by the large premium savings attainable for changing the address of registration a few blocks down the street.[37] Mr. William Murray, representing the City

of Camden and its Mayor Angelo Errichetti, made a similar report. He observed that Camden's insurance rates force students who attend school out of state to register vehicles at the out-of-state location, with the approval of parents.[38]

Large and abrupt differences in territory rates undermine public confidence in the fairness of territory rating. In Newark, for example, residents pay an average premium for compulsory coverages 88 per cent higher than their neighbors in Belleville and Irvington, 96 per cent higher than their neighbors in Bloomfield, South Orange and Maplewood, and 89 per cent higher than neighbors in Kearny, Harrison and East Newark.[39] Additional examples of abrupt differences between contiguous areas are suggested in Table 31.

Observable differences in driving environments between these contiguous areas, certainly at the points they come together, are not comparable to differences in rate. The less visible the environmental differences, the more arbitrary rate differences appear. Suspicion of arbitrariness, coupled with high dollar premium differences, may lead many to believe that deceiving the insurance company is a legitimate means of self-help.

The extent to which cars are being insured in the wrong territories is difficult to quantify. The Massachusetts Insurance Department found the greatest likelihood of fraud when insureds own second homes:

> "In 1975, the vacation area of Cape Cod and the neighboring islands represented only two per cent of the total state population but accounted for more than three per cent of the insured cars. The same discrepancy does not arise in other rural areas, which have the same lack of public transit facilities but which are not as widely used for summer homes. The difference might in part be

TABLE 31

EXAMPLES OF ABRUPT RATE CHANGES BETWEEN CONTIGUOUS RATING TERRITORIES (ISO)

High-Rated Territory	Contiguous Territory	Percentage Difference in Average Premium (D-105 B)
1. NEWARK	EAST ORANGE - ORANGE	43%
2. NEWARK	BALANCE OF HUDSON (Hudson county municipalities located between Hackensack and Passaic rivers)	89%
3. NEWARK	NEWARK SEMI-SUBURBAN (Belleville and Irvington)	88%
4. NEWARK	NEWARK SUBURBAN (Bloomfield, Cedar Grove, Glen Ridge, Maplewood, Millburn, Montclair, Nutley, South Orange, Verona, West Orange)	96%
5. NEWARK	ELIZABETH (including Hillside, Kenilworth, Linden, Rahway, Roselle, Roselle Park, Union and Winfield in Union County)	92%
6. EAST ORANGE - ORANGE	NEWARK SUBURBAN (Bloomfield, Cedar Grove, Glen Ridge, Maplewood, Millburn, Montclair, Nutley, South Orange, Verona, West Orange)	37%
7. JERSEY CITY (all of Hudson County east of Hackensack River except Bayonne)	BAYONNE	39%
8. ELIZABETH (including municipalities in Union County named above)	PLAINFIELD (including Clark, Cranford, Fanwood, Garwood, Mountainside, Scotch Plains, Springfield and Westfield in Union County and Green Brook, North Plainfield and Watchung in Somerset County)	22%
9. ATLANTIC CITY	SOUTHERN COUNTIES (all of Atlantic County--including Ventnor City and Margate--except Atlantic City; Ocean, Cape May and Cumberland counties)	28%
10. CAMDEN (including Gloucester and Brooklawn and that section of Haddon Township west of Black Horse Pike	CAMDEN SUBURBAN (Audubon, Audubon Park, Barrington, Bellmawr, Cherry Hill, Collingswood, Haddonfield, Haddon Heights, Merchantville, Mount Ephraim, Oaklyn, Pennsauken, Tavistock, Wood-Lynne and that portion of Haddon Township east of Black Horse Pike)	35%

> attributed to multi-car ownership, but misrepresentation of place of garaging is also suggested. The reliability problem does not end with the fraudulent use of summer addresses. A priest from East Boston, now the highest-rated territory in Massachusetts, has publicly stated that his car is fraudulently insured in a lower-rated territory at the address of a relative."[40]

Comparable analyses based on New Jersey data are inconclusive but also suggestive. Table 32 displays vehicle-to-population ratios for each of the New Jersey territories.[41] Ratios of registered cars to population are highest in the lowest-rated territories, which include the Southern Counties' shore areas (#27) as well as such inland rural territories as Hunterdon/Sussex/Warren counties (#26). The higher ratios of registered cars in these territories are explainable on grounds in addition to insurance fraud. The most obvious is that a combination of lower insurance costs, greater availability of land and heightened dependence on the automobile encourage a high incidence of multiple car ownership by actual territory residents.

However, even given the high ratios of registered automobiles in the low-rated territories, it appears that in a number of territories, including these low-rated territories, insured automobiles may outnumber registered automobiles. Table 33 provides a territory by territory comparison of numbers of cars insured in the voluntary and assigned markets, all companies combined, and numbers of cars registered.[42]

C. Between-Territory Differences

1. The Skewness of Territory Differentials

The industry's primary justification for existing territories is that they produce differences in average loss costs between defined areas. Little more than that is sought. Michael Walters of the ISO explained that ". . . the most desirable boundary lines are the ones

TABLE 32

PROPORTION OF CAR OWNERSHIP BY TERRITORY

	Territory	Population*	Registered Cars** D-115 Col. 5	Cars to People
01	Jersey City	483,778	136,098	.281
02	Newark	381,930	81,627	.214
03	Paterson	442,869	201,469	.455
04	Elizabeth	306,101	151,195	.494
05	Bayonne	72,743	26,148	.359
06	Trenton	236,793	110,176	.465
07	Camden	120,128	31,167	.259
08	Perth Amboy	160,879	75,260	.468
10	North Bergen County	603,221	321,709	.533
11	Southern Bergen County	267,710	151,393	.566
12	Camden Suburban	212,996	111,883	.525
13	Camden County Balance	123,167	72,273	.587
14	Burlington, Gloucester, Salem Counties	477,569	278,116	.582
15	Trenton Suburban	108,816	65,850	.605
16	Long Branch	338,653	172,455	.509
17	Monmouth County Balance	123,198	70,691	.574
19	Atlantic City	47,859	10,757	.225
22	Newark Semi-Suburban	97,372	44,162	.454
23	Hudson County Balance	51,318	22,343	.435
24	Essex County Balance	70,883	42,473	.599
25	Dover, Morristown, Somerville	615,203	355,818	.578
26	Hunterdon, Warren, Sussex Counties	221,261	144,246	.652
27	Atlantic, Cumberland, Cape May, Ocean Counties	516,582	313,339	.607
31	Newark Suburban	274,077	140,261	.512
38	East Orange-Orange	108,037	40,617	.376
39	Plainfield	217,349	115,113	.530
40	New Brunswick	435,700	234,526	.538
	Statewide Totals	7,116,192	3,521,165	.495

Source:

*Exhibit I.S.O. 29, 1970 Population Census.

**Exhibit D-115 Column 5, territory distribution corrected by resummarizing Motor Vehicle Registration in the State of New Jersey 1977, Delaware Valley Regional Planning Commission.

that are clear, do not change and provide areas which generate different expected loss costs."[43] The 1978 ISO staff report indicates that "the intent of subdividing states into various territories for the purpose of appropriately rating automobile insurance is that the territories will subdivide the state into a number of relatively homogeneous areas with varying expected levels of future loss costs."[44] The industry's approach here is familiar: why particular lines are drawn is not of major concern; the important question is whether the lines as drawn generate significant differences in average loss costs.

As presently defined less than all New Jersey rating territories generate persistent differences in average loss costs. Table 34 reflects a ranking of territories according to the ratios of their base rates, as the filers would compute them, to the statewide average base rate. Some territories have identical base rates. Many territories show substantial variation in base-rate relativities across companies.

Most territories produce only modest differences in expected costs. The largest differences are confined to a handful of territories which also happen to be the smallest in size. As reflected in Table 35 below, 13 of the ISO's 27 territories are priced more than 10 per cent above or below the mean base rate for bodily injury liability coverage; and only 7 of them are priced more than 10 per cent above or below the mean base rate for property damage liability coverage. Comparable figures for Allstate and State Farm are displayed in Tables 35A and 35B, respectively, showing only a slightly more even spread. Overall, Newark insureds are priced disproportionately above the rest of the State and, for some coverages, over 40 per cent higher than insureds in the next most highly rated territory.

TABLE 33

COMPARISON OF INSURED CARS AND REGISTERED CARS BY TERRITORY

	Territory	Earned Insured Cars 1977*	Earned Registered Cars 1977**	Registered Less Insured	% of Difference
01	Jersey City	120,880	141,170	20,290	14.4
02	Newark	60,697	84,618	23,921	28.3
03	Paterson	187,727	208,881	21,154	10.1
04	Elizabeth	140,420	156,787	16,367	10.4
05	Bayonne	24,849	27,058	2,209	8.2
06	Trenton	106,296	114,207	7,911	6.9
07	Camden	26,586	32,337	5,751	17.8
08	Perth Amboy	69,754	77,991	8,237	10.6
10	North Bergen County	301,099	333,542	32,443	9.7
11	Southern Bergen County	142,231	156,985	14,754	9.4
12	Camden Suburban	103,618	116,044	12,426	10.7
13	Camden County Balance	71,439	75,004	3,565	4.8
14	Burlington, Gloucester, Salem Counties	286,293	288,389	2,096	.7
15	Trenton Suburban	71,328	68,321	- 3,007	- 4.4
16	Long Branch	160,769	178,827	18,058	10.1
17	Monmouth County Balance	74,088	73,292	- 796	- 1.1
19	Atlantic City	8,619	11,147	2,528	22.7
22	Newark Semi-Suburban	41,744	45,722	3,978	8.7
23	Hudson County Balance	20,811	23,123	2,312	10.0
24	Essex County Balance	39,636	44,033	4,399	10.0
25	Dover, Morristown, Somerville	352,961	368,952	15,991	4.3
26	Hunterdon, Warren, Sussex Counties	147,798	149,578	1,780	1.2
27	Atlantic, Cumberland, Cape May, Ocean Counties	330,808	324,912	- 5,896	- 1.8
31	Newark Suburban	128,504	145,462	16,958	11.7
38	East Orange-Orange	37,520	42,178	4,658	11.0
39	Plainfield	111,328	119,404	8,076	6.8
40	New Brunswick	222,647	243,238	20,591	8.5
	Statewide Totals	3,390,450	3,651,202	260,752	7.1

Source:

*I.S.O. and N.A.I.I. private passenger non-fleet automobile liability compilations accident year 1977 earned exposures for family auto, special auto, and assigned risk policies combined.

**Exhibit D-115 registered cars adjusted to equal D-103a Earned Registered Cars.

TABLE 34

TERRITORY RANKINGS OF PREMIUMS

1-Highest and 27-Lowest

ISO, Allstate, State Farm
Liability Base Rates including U.M.

	Territory**	ISO	Allstate	State Farm
01	Jersey City	4	3	3
02	Newark	1	1	1
03	Paterson	23*	19	17
04	Elizabeth	16	13	12*
05	Bayonne	20*	9	5
06	Trenton	17	17*	15
07	Camden	2	2	2
08	Perth Amboy	7	6	6
10	Northern Bergen County	22	17*	19
11	Southern Bergen County	19	12	11
12	Camden Suburban	9*	10*	10
13	Camden County Balance	6	7	9
14	Burlington, Gloucester, Salem	8	20*	20*
15	Trenton Suburban	26	27	26
16	Long Branch	11	15*	14
17	Monmouth County Balance	12	14	20*
19	Atlantic City	5	4	4
22	Newark Semi Suburban	13	8	8
23	Hudson County Balance	14	10*	12*
24	Essex County Balance	15	22	18
25	Dover, Morristown, Somerville	25	24	25
26	Hunterdon, Warren, Sussex	20*	26	27
27	Atlantic, Cape May, Cumberland, Ocean	9*	23	24
31	Newark Suburban	18	15*	16
38	East Orange, Orange	3	5	7
39	Plainfield	27	25	23
40	New Brunswick	23*	20*	22

*Denotes territory with same base rate as another territory.

**Codes designating insurance rating territories utilized by Insurance Services Office.

Source: Exhibit D-101 Liability Rates ISO, Allstate long, State Farm long.

TABLE 35

TERRITORIAL RELATIVITIES
DEPARTURES FROM STATEWIDE AVERAGE OVER +10 AND UNDER -10
LIABILITY COVERAGES

INSURANCE SERVICES OFFICE

More than 10% Above Statewide

Bodily Injury

Territory	Difference from Statewide
Newark (02)	+109%
Camden (07)	+76%
Jersey City (01)	+56%
Camden Remainder (13)	+47%
Atlantic City (19)	+44%
East Orange (38)	+37%
Perth Amboy (08)	+29%
Camden Suburban (12)	+25%
Hudson Remainder (23)	+15%

Property Damage

Territory	Difference from Statewide
Newark	+95%
Jersey City	+37%
East Orange	+33%
Atlantic City	+31%
Camden	+25%

Personal Injury Protection

Territory	Difference from Statewide
Newark	+84%
East Orange	+43%
Camden	+39%
Atlantic City	+33%
Camden Remainder	+26%
Burlington, Gloucestor, Salem	+21%
Atlantic, Cape May, Cumberland	+21%
Hunterdon, Warren, Sussex	+20%
Jersey City	+17
Perth Amboy	+11

More than 10% Below Statewide

Bodily Injury

Territory	Difference from Statewide
Morristown, Dover (25)	-23%
Plainfield (39)	-23%
Hunterdon, Warren, Sussex (26)	-16%
Trenton Suburban (15)	-15%

Property Damage

Territory	Difference from Statewide
Hunterdon, Warren, Sussex	-16%
Trenton Suburban	-12%

Personal Injury Protection

Territory	Difference from Statewide
Plainfield	-31%
Paterson	-24%
Hudson Remainder	-23%
South Bergen County	-19%
Trenton Suburban	-17%
Camden Suburban	-16%
New Brunswick	-11%
Newark Suburban	-11%
Elizabeth	-11%

TABLE 35A

TERRITORIAL RELATIVITIES
DEPARTURES FROM STATEWIDE AVERAGE OVER +10 AND UNDER -10
LIABILITY COVERAGES

ALLSTATE INSURANCE COMPANY

More than 10% Above Statewide

Bodily Injury

Territory	Difference from Statewide
Newark	+92%
Camden	+59%
Jersey City	+50%
Atlantic City	+43%
East Orange - Orange	+39%
Perth Amboy	+36%
Camden County (Balance)	+28%
Newark Semi-Suburban	+20%
Hudson County Balance	+17%
Camden Suburban	+16%
Bayonne	+15%

Property Damage

Territory	Difference from Statewide
Newark	+66%
Camden	+35%
Atlantic City	+34%
Jersey City	+30%
East Orange - Orange	+22%
Newark Semi-Suburban	+16%

Personal Injury Protection

Territory	Difference from Statewide
Newark	+58%
Jersey City	+48%
Camden	+42%
Atlantic City	+35%
East Orange - Orange	+24%
Camden County (Balance)	+17%
Perth Amboy	+14%
Newark Semi-Suburban	+11%

More than 10% Below Statewide

Hunterdon, Sussex, Warren Counties	-18%
Suburban Trenton	-16%
Morristown, Dover, Somerville	-15%

Warren, Sussex Hunterdon County	-21%
Suburban Trenton	-18%
Atlantic County (Balance)	-12%

Trenton Suburban	-23%
Plainfield	-23%
Paterson	-12%
Newark Suburban	-12%

TABLE 35B

TERRITORIAL RELATIVITIES
DEPARTURES FROM STATEWIDE AVERAGE OVER +10 AND UNDER -10
LIABILITY COVERAGES*
STATE FARM

Over 10% Above Statewide

Territory	Difference from Statewide
Newark	59%
Camden	54%
Jersey City	49%
Atlantic City	39%
Bayonne	26%
Perth Amboy	24%
East Orange	22%
Newark Semi-Suburban	19%
Camden Balance	15%
Camden Suburban	14%
South Bergen County	12%

Below 10% Under Statewide

Hunterdon, Warren, Sussex	-28%
Trenton Suburban	-26%
Morristown, Dover	-17%
Plainfield	-11%

*State Farm rates for bodily injury, property damage liability and personal injury protection coverages are not provided separately.

The lopsided distribution of differences between territories is even more apparent when only loss costs are examined. A ranking of territories from high to low on the basis of ISO's average loss costs per car (pure premiums) for the bodily injury and property damage liability coverages, and a grouping of territories with less than $10 of difference between them, are set forth in Table 36. Many of the territories are only pennies apart from the next highest and lowest territories. In addition, there is a $25 to $30 spread between the high Newark-Camden group and the next lowest group, and a comparable spread between that group and still the next lowest group. These differences are many times larger than the spreads between the other territory groups.

Examination of the total variation in average loss costs per car among all territories indicates that most of the total variation is attributable to the highest rated territories. For example, when the experience of the five highest territories are subtracted from the overall loss data for the property damage liability coverage, the average loss per car for the State as a whole declines only 4.5 per cent but the total variation in loss costs among territories declines by 56 per cent. Comparable results are obtained for the other coverages as reflected in Table 37.

The four territories consistently segregated at the high end of the scale are among the smallest territories in both geographical size and numbers of insureds. Newark (02) and Atlantic City (19) are single municipalities, the Camden territory (07) consists of three municipalities and the East Orange territory (38) consists of two municipalities. Together these four territories represent only about

TABLE 36

PRIVATE PASSENGER AUTOMOBILE
BODILY INJURY AND PROPERTY DAMAGE PURE PREMIUMS
RANKING BY PURE PREMIUMS

		Over $100
02	Newark	$158.45
07	Camden	150.05
38	East Orange - Orange	125.43
19	Atlantic City	125.07
01	Jersey City	123.90
		$90.00 to $100.00
22	Newark Semi-Suburban	95.86
23	Hudson County Balance	94.23
08	Perth Amboy	92.60
13	Camden County Balance	91.10
		$70.00 to $89.99
04	Elizabeth	87.29
03	Paterson	82.15
16	Long Branch	82.05
12	Camden Suburban	80.26
11	South Bergen County	76.97
05	Bayonne	75.35
06	Trenton	74.50
40	New Brunswick	72.64
31	Newark Suburban	71.29
27	Atlantic, Cape May, Ocean	70.77
14	Burlington, Gloucester, Salem	70.08
17	Monmouth Balance	70.05
		$60.00 to $69.99
24	Essex County Balance	67.35
39	Plainfield	67.05
10	North Bergen County	66.44
		Under $60.00
25	Dover, Morristown	57.70
15	Trenton Suburban	55.30
26	Hunterdon, Warren, Sussex	54.46

Note: This is the underlying data used for exhibit ISO-29, Page 31.

Source: ISO 1977 Official Statistical Compilation Submitted January 17, 1977 (sic) Pure Premiums unloaded for unallocated loss adjustment expenses.

Insurance Services Office accident years 1974, 1975 and 1976 evaluated 3/31/77, voluntary and assigned business combined.

5 per cent of the total cars insured in the voluntary market statewide. The six highest territories together represent less than 10 per cent of the statewide population insured in the voluntary market. Table 37A displays the distribution of voluntary exposures among "low," "medium" and "high" rated territories for major filers.

The definition of territories in a manner which would concentrate the largest rate differences in the smallest groups parallels a similar phenomenon in the context of driver classifications. There seems to be a tendency in both cases to use rate categories to isolate fringe groups rather than make a comprehensive and uniform effort to identify the full range of risk variation in the population. It is possible that the skewness across territories is a reflection of reality--that in fact only a handful of municipalities represent substantial differential risk and that other areas are more or less the same. However, given obvious changes in the State since current territories were conceived in 1946, and the innumerable possibilities for carving up the map, this is highly unlikely.

Industry representatives argue that the distribution of territory differentials is irrelevant to the question of unfair discrimination. They contend that in order to pass the statutory test the difference in average experience between any two territories need only be "statistically significant." This argument greatly oversimplifies.

Statistical significance relates only to the degree of confidence to be given a particular statistical estimate. It is a necessary but not sufficient justification for the selection of territory boundaries. The objectives of territory rating are to define

TABLE 37

CHANGES IN MEANS AND COEFFICIENTS OF VARIATION
BY DELETING HIGHEST TERRITORIES

Terr. Deleted	Mean	Decrease	Percent Deviation	Coefficient of Variation	Percent Decrease
			Bodily Injury		
None	51.80		25.670	.496	
07	51.23	-1.1%	22.226	.434	-12.5
02,07	49.93	-3.6	18.632	.373	-24.8
02,07,38	49.35	-4.7	15.787	.320	-35.5
01,02,07,38	47.89	-7.5	14.398	.301	-39.3
01,02,07,19,38	47.78	-7.8	12.308	.258	-48.0
			Property Damage		
None	40.60		10.333	.255	
02	39.97	-1.6	8.491	.212	-15.3
02,07	39.80	-2.0	7.583	.191	-25.1
01,02,07	39.02	-3.9	6.713	.172	-32.5
01,02,07,38	38.81	-4.4	5.739	.148	-42.0
01,02,07,19,38	38.76	-4.5	4.339	.112	-56.1
			Personal Injury Protection		
None	39.94		13.454	.337	
19	39.84	-0.3	11.384	.286	-15.1
07,19	39.59	-0.9	9.856	.249	-26.1
02,07,19	39.06	-2.2	8.406	.215	-36.2
02,07,13,19,38	38.46	-3.7	5.980	.155	-54.0
			Uninsured Motorists - BI Only		
None	2.25		2.718	1.208	
07	2.18	-3.1	2.049	.940	-22.2
02,07	2.05	-8.9	1.708	.833	-31.0
02,07,38	1.99	-11.6	1.442	.724	-40.1
02,07,19,38	1.98	-12.0	1.250	.632	-47.7
02,07,13,19,38	1.94	-13.8	1.151	.593	-50.9

01 = Jersey City
02 = Newark
07 = Camden
13 = Camden City Balance
19 = Atlantic City
38 = East Orange/Orange

Source: D-120.

TABLE 37A

EXPOSURE DISTRIBUTION BY TERRITORY GROUPING

	Territory Rate Classification*		
Company	Low	Medium	High
Insurance Services Office	42.6%	48.2%	9.2%
Aetna Casualty & Surety	38.0	58.1	3.9
Allstate	41.5	50.3	8.2
Colonial Penn	32.9	59.1	8.0
Hartford	51.4	43.8	4.8
Liberty Mutual	51.9	43.4	4.7
Nationwide Mutual	36.4	55.0	8.6
State Farm	45.1	45.8	9.1

Low = Territories 3, 5, 10, 15, 25, 26, 39, 40

Medium = Territories 4, 6, 8, 11, 12, 14, 16, 17, 22, 23, 24, 27, 31

High = Territories 1, 2, 7, 13, 19, 38

*Ranking based on liability base rates for ISO companies exhibit D-101, Insurance Servicess Office territory codes used.

Source: D-97

different driving environments shared by identifiable groups of drivers. Because there are so many different driving patterns and environments to choose from, merely finding one way to divide the state that produces statistically separated groups is not dispositive.

The magnitude and distribution of estimated differences between territories are a function of the manner in which boundaries are drawn. The use of municipal boundaries significantly limits the extent to which differences in average loss costs can reflect differences in driving environments. In varying degrees each territory contains a mix of driving environments. Individual components of these mixes can be identical between territories; but the relative proportions of components in each mix determine differences in average losses.

Any pretended magic in existing territory lines diminishes in proportion to overlapping traffic patterns. For example, contiguous territories showing large and abrupt differences in rate, such as those examined in Table 31, supra, also show a substantial interchange of traffic between them. These overlapping traffic patterns are characterized by the comparisons set forth in Table 38, based on the 1977 DVRPC data. Tables 38 and 31 can be read in tandem, keeping in mind that for insurance purposes accidents are charged to the territory in which the involved cars are garaged (presumably the "territory of registration") and not to the territory in which the accident occurred.

The lower-rated territories are involved in greater numbers of accidents, and in most cases greater proportions of accidents, in the contiguous high-rated territories than vice versa. Although Newark

TABLE 38

ACCIDENT INVOLVEMENTS: EXAMPLES OF OVERLAP BETWEEN CONTIGUOUS TERRITORIES (D-105A, p. 3)

1.	Number of NEWARK SUBURBAN cars involved in accidents in NEWARK	837
	Ratio of such accidents to total accidents in State involving Newark Suburban cars	8.6%
1a.	Number of Newark cars involved in accidents in Newark Suburban	433
	Ratio of such accidents to total accidents in State involving Newark cars	4.1%
2.	Number of BALANCE-OF-HUDSON cars involved in accidents in NEWARK	303
	Ratio of such accidents to total accidents in State involving Balance of Hudson cars	15.2%
2a.	Number of Newark cars involved in accidents in Balance of Hudson	167
	Ratio of such accidents to total accidents in State involving Newark cars	1.6%
3.	Number of NEWARK SEMI-SUBURBAN cars involved in accidents in NEWARK	1060
	Ratio of such accidents to total accidents in State involving Newark Semi-Suburban cars	24.6%
3a.	Number of Newark cars involved in accidents in Newark Semi-Suburban	467
	Ratio of such accidents to total accidents in State involving Newark cars	4.5%
4.	Number of EAST ORANGE - ORANGE cars involved in accidents in NEWARK	1198
	Ratio of such accidents to total accidents in State involving East Orange - Orange cars	25.9%
4a.	Number of Newark cars involved in accidents in East Orange - Orange	539
	Ratio of such accidents to total accidents in State involving Newark cars	5.2%
5.	Number of ELIZABETH-territory cars involved in accidents in NEWARK	1041
	Ratio of such accidents to total accidents in State involving Elizabeth-territory cars	7.4%
5a.	Number of Newark cars involved in accidents in Elizabeth territory	515
	Ratio of such accidents to total accidents in State involving Newark cars	4.9%

TABLE 38 (cont'd)

6.	Number of NEWARK SUBURBAN cars involved in accidents in EAST ORANGE - ORANGE	628
	Ratio of such accidents to total accidents in State involving Newark Suburban cars	6.5%
6a.	Number of East Orange - Orange cars involved in accidents in Newark Suburban	491
	Ratio of such accidents to total accidents in State involving East Orange - Orange cars	10.6%
7.	Number of BAYONNE cars involved in accidents in JERSEY CITY territory	468
	Ratio of such accidents to total accidents in State involving Bayonne cars	20.9%
7a.	Number of Jersey City territory cars involved in accidents in Bayonne	256
	Ratio of such accidents to total accidents in State involving Jersey City territory cars	1.7%
8.	Number of PLAINFIELD territory cars involved in accidents in ELIZABETH territory	1062
	Ratio of such accidents to total accidents in State involving Plainfield territory cars	11.7%
8a.	Number of Elizabeth territory cars involved in accidents in Plainfield territory	892
	Ratio of such accidents to total accidents in State involving Elizabeth territory cars	6.3%
9.	Number of SOUTHERN COUNTIES cars involved in accidents in ATLANTIC CITY	370
	Ratio of such accidents to total accidents in State involving Southern Counties cars	1.9%
9a.	Number of Atlantic City cars involved in accidents in the Southern Counties	306
	Ratio of such accidents to total accidents in State involving Atlantic City cars	33.4%
10.	Number of CAMDEN SUBURBAN cars involved in accidents in CAMDEN	937
	Ratio of such accidents to total accidents in State involving Camden Suburban cars	12.9%
10a.	Number of Camden cars involved in accidents in Camden Suburban	635
	Ratio of such accidents to total accidents in State involving Camden cars	20.2%

insureds pay 96 per cent more for compulsory coverages than their neighbors in the Newark Suburban territory, for example, the proportion of Newark Suburban cars having accidents in Newark is twice as large as the proportion of Newark cars having accidents in the Newark Suburban territory. Presumably the overlap would increase if the analysis compared contiguous municipalities rather than territories; but the necessary data are not available.

Territory boundaries can be redrawn in various configurations to yield similar magnitudes of difference in average loss costs among affected municipalities. For example, a hypothetical new territory formed by merging Newark with its contiguous territories would have an average premium--presumably reflective of average costs--almost 40 per cent lower than the current Newark average premium and about 13 per cent lower than the current average for East Orange/Orange. The hypothetical average premium would be from 14 to 19 per cent higher than the current average premiums for the other four territories affected by the merger. Yet despite this leveling effect, the hypothetical new territory would produce average loss experience from 43 per cent greater to 14 per cent less than adjacent territories, as summarized in Table 39.

TABLE 39[45]

A. HYPOTHETICAL IMPACT OF MERGING NEWARK WITH ITS CONTIGUOUS TERRITORIES

	Territory	Average Premium Individually*	Merged Average Premium*	% change
(02)	Newark	$423	$257	-39.2
(38)	East Orange	296	257	-13.2
(23)	Hudson Balance	224	257	+14.7
(31)	Newark Suburban	216	257	+19.0
(22)	Newark Semi-Surburban	225	257	+14.2
(04)	Elizabeth	220	257	+16.8

B. COMPARISON OF HYPOTHETICAL TERRITORY WITH ITS CONTIGUOUS TERRITORIES

Hypothetical Territory Average Premium*	Contiguous Territories	Current Average Premiums*	% difference
$257	(08) Perth Amboy	$254	+ 1.2
	(39) Plainfield	180	+42.8
	(24) Essex Balance	226	+13.7
	(03) Paterson	201	+27.9
	(11) Southern Bergen Co.	216	+19.0
	(01) Jersey City	229	-14.0

*For the compulsory liability coverages (D-105B).

If Newark were combined with less than all of its contiguous territories or the contiguous or next-contiguous territories were modified variously, different results would obtain. Each new configuration would continue to identify differences in average loss costs. Only the numbers and amounts of the differentials and the identities of drivers on the low and high sides of the lines drawn would be affected.[46]

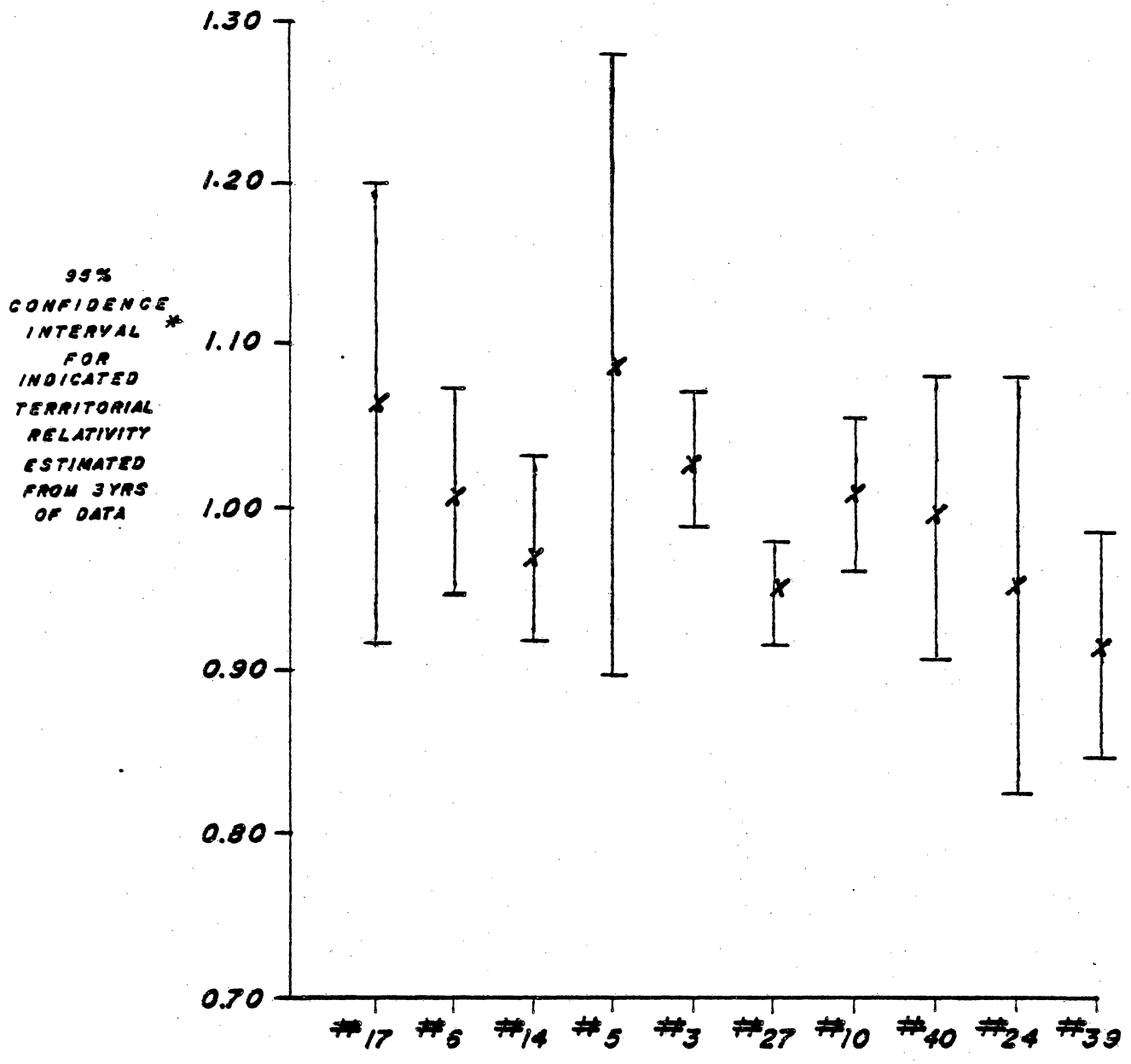
2. Credibility Problems

Territories also fail, variously, on grounds of statistical significance. The estimated differences among a number of territories are so small that, even when fully credible by conventional standards, they are swamped by shifts in experience from year to year. Figure 14 reflects this type of variability for ten ISO territories near the statewide average. The plotted "x" for each territory represents an average of the relativities for the territory in each of five successive years. The length of the line for each average relativity reflects the effects of variation from year to year.

Specifically, the lines or "confidence intervals" in Figure 14 represent the likely accuracy of territory relativities estimated

FIGURE 14

ACCURACY OF TERRITORY AVERAGES



* Confidence Interval is ± 2.55 standard errors around unweighted average of relativities in each of 5 years 1974-1978 (at 15 months). Standard error is $(1/\sqrt{3})$ times standard deviation of each territory's relativity across the five years. This assumes the usual three years of data.

from three years of data--the amount of data typically used in computing such relativities. The size of each interval indicates the lattitude required for any such estimate in order to have a 95 per cent chance of including the correct territory average. The fact that so many of these intervals overlap suggests that typical three-year data are not adequate to identify statistically significant differences among the territories. The extent of the overlap also undermines the feasibility of maintaining the current array of territory distinctions.

Problems associated with small sample size further complicate the accurate estimation of differential risk for territories as currently defined. Although there is no universal standard governing the minimum territory size needed to generate fully credible loss experience (or statistically significant loss differentials), even by the filer's own standards a substantial number of territories contain too few insureds to permit determination of a territory rate based solely on current experience for the territory. By ISO standards, 12 of its 27 territories are less than fully credible on the basis of three-year bodily injury liability experience. Eight of these 12 territories are in the third of the territories having the highest average loss costs per car.[47]

Because ISO companies collectively write the largest market share--at the time of the hearing about 40 per cent--credibility problems in the ISO experience are magnified in the territory experience of other filers. Allstate, which writes less than 25 per cent of the market, judges that 22 of the 27 territories for its bodily injury liability coverage and 21 of the territories for its property damage liability coverage lack full credibility. State Farm, repre-

senting about 9 per cent of the market, has by its standards no territory with maximum credibility for the liability coverages.[48]

The distribution of total voluntary exposures (insured cars) by territory is set forth in Table 40 based on 1977 voluntary data of all companies combined for the compulsory coverages. The smallest territory indicated is Atlantic City (8,343 cars); and the largest territory is Morristown-Dover (317,005). The ratio of largest to smallest is about 35 to 1.

Small size deprives a territory of a stable body of experience. Here random events inject into the prediction process elements entirely unrelated to risk. The significance of territory size can be inferred from Table 41, which displays ISO bodily injury liability pure premiums by territory for each of four successive years.

The Atlantic City experience in Table 41 fluctuated about 124 per cent from low to high during the four years. Its reported average loss per car in 1977 was less than 50 per cent of its reported average loss per car in the previous year. Obviously this severe fluctuation cannot be attributed to changes in statewide loss level or evolution of the risk characteristics of the territory. In territory 25, the largest territory, the observed average loss costs per car remained relatively stable over the period and high to low fluctuation was one-third the fluctuation in Atlantic City. Changes in the pure premiums of the large territories during the four-year period are more easily explained by changes in statewide rate levels and within-territory developments.

In order to stabilize the experience of small territories statistical estimation or "credibility" techniques of various kinds are

TABLE 40

RANKING OF TERRITORIES BY NUMBER OF INSURED CARS - SMALLEST TO LARGEST

Territory		(All Companies Combined) Number of Insured Cars (Compulsory Coverages)	% of Statewide Total
Atlantic City	(19)	8,343	0.3
Hudson County Balance	(23)	19,489	0.6
Bayonne	(05)	24,110	0.8
Camden	(07)	25,644	0.8
East Orange - Orange	(38)	35,572	1.1
Essex County Balance	(24)	35,772	1.1
Newark Semi Suburban	(22)	39,300	1.3
Newark	(02)	58,882	1.9
Perth Amboy	(08)	64,445	2.1
Trenton Suburban	(15)	64,686	2.1
Camden County Balance	(13)	66,527	2.1
Monmouth County Balance	(17)	66,952	2.1
Camden Suburban	(12)	93,760	3.0
Trenton	(06)	97,417	3.1
Plainfield	(39)	99,364	3.2
Newark Suburban	(31)	116,405	3.7
Jersey City	(01)	117,232	3.8
Elizabeth	(04)	129,225	4.1
Southern Bergen County	(11)	129,665	4.2
Hunterdon, Warren Sussex	(26)	139,657	4.5
Long Branch - Asbury Park	(16)	146,760	4.7
Paterson	(03)	176,905	5.7
New Brunswick	(40)	201,799	6.5
Burlington, Gloucester, Salem	(14)	267,654	8.6
Northern Bergen County	(10)	267,765	8.6
Atlantic, Cumberland, Cape May, Ocean	(27)	306,558	9.8
Dover, Morristown, Somerville	(25)	317,005	10.2
		3,116,893	100.0%

Source: D-96 calendar accident year 1977 Family Auto Policy exposures.

TABLE 41

LOSS COSTS PER CAR BY TERRITORY

INSURANCE SERVICES OFFICE
BODILY INJURY PURE PREMIUMS
VALUED AS OF 15 MONTHS FOR YEARS 1974, 1975, 1976, 1977, 1978

No.	Territory	1974	1975	1976	1977	1978
01	Jersey City	34.08	36.71	44.45	54.83	41.99
02	Newark	65.91	54.80	42.10	50.82	68.93
03	Paterson	23.84	27.59	28.96	28.32	31.79
04	Elizabeth	26.99	29.69	30.80	31.16	32.39
05	Bayonne	23.95	24.88	26.33	43.93	39.34
06	Trenton	28.10	26.77	23.82	28.15	31.88
07	Camden	58.61	47.82	45.52	41.07	41.40
08	Perth Amboy	33.14	29.96	36.19	32.11	42.57
10	North Bergen County	23.76	25.81	25.21	27.23	32.66
11	South Bergen County	26.17	30.35	30.12	31.51	30.43
12	Camden Suburban	38.01	26.32	29.29	36.94	40.09
13	Camden County Balance	36.73	36.76	39.76	34.86	48.20
14	Burlington, Gloucester, Salem	29.99	25.66	27.55	29.51	35.90
15	Trenton Suburban	23.61	22.91	16.01	19.98	15.80
16	Long Branch	30.69	26.54	30.21	35.12	34.82
17	Monmouth Balance	26.55	27.73	25.81	34.19	36.19
19	Atlantic City	39.16	45.96	79.35	35.38	52.91
22	Newark Semi-Suburban	23.87	31.59	40.25	38.53	44.70
23	Hudson County Balance	23.12	35.15	35.28	23.19	30.04
24	Essex County Balance	22.56	19.12	31.67	22.66	22.69
25	Dover, Morristown	18.38	20.78	20.92	19.15	26.15
26	Hunterdon, Warren, Sussex	21.26	16.95	22.33	18.94	21.37
27	Atlantic, Cape May, Ocean	28.68	26.49	28.88	27.68	31.13
31	Newark Suburban	23.43	26.48	22.50	28.90	31.76
38	East Orange-Orange	35.86	44.43	32.43	48.19	49.24
39	Plainfield	16.87	23.54	22.41	25.34	28.44
40	New Brunswick	24.40	26.82	30.46	28.62	37.15

Source: Compilations of experience submitted by Insurance Services Office Voluntary business, family automobile policies.

used. The thrust of these techniques involves the averaging of unstable current experience for the territory with some less variable, larger body of experience selected by the ratemaker. Each technique is likely to come up with a different answer.

The three major filers use three different methods to adjust observed territory experience for credibility purposes. The ISO considers fully credible any body of experience reflecting at least 1,084 claims. If the experience falls short of this mark, the territory loss ratio--or ratio of losses to premium--is averaged with the statewide loss ratio assigning to the territory experience a relative weight determined by the extent to which it approaches the full credibility standard. In order to avoid "extreme fluctuations" in territory rates from review period to review period, ISO caps the change in base rate permitted at any one time: no rate is allowed to increase more than 25 per cent nor decline more than 20 per cent.[49]

Allstate has also used a claims-based credibility standard, but has added at least one other step. After arriving at its own indications for territories, Allstate averages in the territory indications of State Farm and ISO. The averaging process uses the competitors' loss experience but assumes Allstate's own distribution of classes among the affected territories.[50]

State Farm considers the number of exposures in each territory. If the territory contains 60,000 exposures for the liability coverages, the most recent six months of experience is given a 50 per cent credibility weight and each preceding six-month segment going back five years receives a declining weight as follows:[51]

Period	Credibility
Latest Six-Month Period	.50 x (1) = .500
First Preceding	.50 x (.50) = .250
Second Preceding	.50 x (.25) = .125
Third Preceding	.50 x (.125) = .063
Fourth Preceding	.50 x (.063) = .031
Fifth Preceding	.50 x (.031) = .016
Sixth Preceding	.50 x (.016) = .008
Seventh Preceding	.50 x (.008) = .004
Eighth Preceding	.50 x (.004) = .002
Ninth Preceding	.50 x (.002) = .001
Tenth Preceding and Older	Negligible

In these cases 98.5 per cent of the territory base rate is derived from the latest three years of experience.

If, however, the State Farm territory has 6,000 or fewer exposures (for the liability coverages), the most recent six months of experience is given only a 5 per cent credibility weight and each preceding segment of experience is given still less weight in the same iterative fashion as described above. In this case only 27 per cent of the territory rate is based on the latest 3 years of experience and only 40 per cent is based on the latest 5 years of experience. About 60 per cent of the territory rate is therefore determined on the basis of loss experience which predates current data by more than five years; and the current data themselves lag several years behind the year for which rates are made. Ten of State Farm's territories, including the four highest territories, are rated in this fashion.[52]

Choice of credibility technique involves a tradeoff. Failing to smooth the data enough permits a high degree of variability in territory differentials unrelated to changes in underlying risk. Smoothing too much may in fact mask real changes in risk. Examples of both findings are reflected in current methods.

TABLE 42

CHANGES IN TERRITORY BASE RATES EXCLUSIVE OF RATE LEVEL CHANGES - AFTER CREDIBILITY ADJUSTMENT
1974-1977 BODILY INJURY LIABILITY
INSURANCE SERVICES OFFICE

No.	Territory	Effective Date 1974	1975	1976	1977	Mean Change
01	Jersey City	-11.3	- 4.2	- 7.1	+ 7.4	- 3.7
02	Newark	+22.9	- 2.3	+11.7	+ 3.1	+ 8.8
03	Paterson	- 7.4	-14.8	- 9.0	- 3.0	+ 4.5
04	Elizabeth	+ 3.3	-11.9	+ 0.8	+ 0.5	- 1.8
05	Bayonne	+10.5	-11.2	- 5.1	- 4.1	- 2.5
06	Trenton	+ 1.1	+ 7.7	- 6.2	+ 5.1	+ 1.9
07	Camden	+ 8.8	- 3.6	+14.8	+ 1.8	+ 5.4
08	Perth Amboy	- 4.3	-12.7	- 3.2	+ 3.8	- 4.1
10	Northern Bergen County	+ 0.2	- 5.5	+11.7	- 2.3	+ 1.0
11	Southern Bergen County	- 6.0	- 2.4	- 1.7	+ 1.8	- 2.1
12	Camden Suburban	- 2.5	- 0.3	+ 9.9	- 1.8	+ 1.3
13	Camden County Remainder	+ 9.1	+17.3	+ 9.4	- 3.8	+ 8.0
14	Burlington, Gloucester, Salem	+12.5	+20.4	+ 4.6	- 0.5	+ 9.2
15	Trenton Suburban	+ 5.9	- 1.3	- 0.5	+ 3.1	+ 1.8
16	Long Branch	- 4.3	+ 0.5	- 4.9	- 1.3	- 2.5
17	Monmouth County Balance	- 3.9	+ 0.8	+ 0.4	+ 1.0	- 0.4
19	Atlantic City	+ 3.3	- 2.8	- 0.4	- 0.4	- 0.8
22	Newark Semi-Suburban	+ 3.3	- 9.3	-10.3	+ 1.6	- 3.7
23	Hudson County Balance	- 5.9	+ 2.6	- 5.0	+ 3.9	- 1.1
24	Essex County Balance	- 0.6	- 2.3	+ 1.5	+ 4.1	+ 0.7
25	Dover, Morristown, Somerville	- 4.5	+11.1	-11.1	- 2.6	- 1.8
26	Hunterdon, Warren, Sussex	+12.2	0.0	+11.1	+ 3.4	+ 6.7
27	Atlantic, Cape May, Cumberland, Ocean	- 1.1	+15.8	+ 5.9	- 2.8	+ 4.4
31	Newark Suburban	+ 4.0	+ 2.3	- 8.3	+ 0.7	- 0.3
38	East Orange-Orange	- 3.6	- 9.4	+ 5.0	+ 2.6	- 1.8
39	Plainfield	+ 7.7	-11.2	+ 6.5	- 1.1	+ 0.5
40	New Brunswick	-11.0	-10.3	- 8.3	- 0.5	- 7.5

Source: Insurance Services Office Private Passenger Automobile Filings Effective November 24, 1974, December 17, 1975, July 1, 1976 and September 1, 1977.

Table 42 displays percentage changes in ISO's territory base rates, after credibility adjustments, for the four most recent years in which ISO modified its territory rates. For Newark, the State's highest-rated territory, base rates were adjusted upward by more than 10 per cent in two of the four years. In 1974 the increase for Newark was almost 23 per cent. The changes indicated in the table are in addition to annual changes in the statewide rate level.

Table 43 displays comparable information for State Farm, although it has modified its territory relativities only two times in recent years. (The company's unique territory codes are indicated.) As reflected in the modest base-rate changes here, the State Farm credibility technique produces stable rates for virtually all territories. Yet this stability is an unlikely reflection of reality. A typical high-rated territory has to wait seven policy periods (or 3½ years) before a 20 per cent change in its differential risk--say, as the result of gasoline prices--has a 10 per cent impact on its territory base rate.

Eliminating extraneous variability from observed experience and isolating real changes in underlying risk cannot be accomplished through mechanical application of averaging techniques. Either territories must be defined so that the reasons for year to year changes can be analyzed, or territories must be made large enough to generate self-sufficient volumes of experience. The present state of the art appears to require the latter course. The absence of a consistent unifying rationale for current territories makes accurate assessment of true differential risk impossible.

The credibility problems associated with the smallest (most highly rated territories) are especially troublesome because territory

TABLE 43

CHANGES IN TERRITORY BASE RATES EXCLUSIVE OF RATE LEVEL CHANGES
1976 TO 1978 - BODILY INJURY, PROPERTY DAMAGE AND PERSONAL INJURY PROTECTION
STATE FARM MUTUAL AUTOMOBILE INSURANCE COMPANY

No.	Territory	Jan. 15, 1976	Aug. 1, 1976	March 10, 1978	Mean Change
1	Hunterdon, Warren, Sussex	- 2.9	0.0	+ 7.6	+1.6
2	Trenton Suburban	- 4.1	0.0	+ 2.8	-0.4
3	Morristown, Dover, Somerville	+ 2.5	0.0	+ 1.2	+0.4
4	Camden County Balance	+ 6.5	0.0	+ 4.4	+3.6
5	Burlington, Gloucester, Salem	+ 9.5	0.0	+ 4.3	+4.6
6	Camden Suburban	+ 4.8	0.0	+ 7.3	+4.0
7	Essex County Balance	- 1.1	0.0	+ 5.4	+1.4
10	Atlantic, Cape May, Cumberland, Ocean	- 2.2	0.0	- 2.2	-1.5
11	Southern Bergen County	- 0.9	0.0	+ 4.5	+1.2
12	Northern Bergen County	0.0	0.0	- 4.9	-1.6
13	Trenton	+ 6.0	0.0	+ 3.8	+3.3
14	Newark Semi Suburban	+13.8	0.0	- 0.8	+4.3
15	Hudson County Balance	+ 0.9	0.0	+ 1.8	+0.9
16	Paterson	0.0	0.0	- 7.5	-2.5
17	Elizabeth	- 2.6	0.0	- 1.8	-1.5
18	Monmouth County Balance	+ 3.2	0.0	- 2.1	+0.4
19	Long Branch	- 0.9	0.0	+ 3.7	+0.9
20	Perth Amboy	- 1.6	0.0	+ 1.6	0.0
21	Camden	+10.1	0.0	+ 7.2	+5.8
22	Atlantic City	- 1.4	0.0	0.0	-0.5
23	Newark	+ 1.3	0.0	+ 4.3	+1.9
24	Jersey City	+ 2.0	0.0	+ 2.6	+1.5
25	Bayonne	+ 1.6	0.0	+ 3.9	+1.8
26	Plainfield	- 5.3	0.0	+ 2.2	+1.0
27	New Brunswick	- 2.1	0.0	+ 1.1	-0.3
28	Newark Suburban	- 8.9	0.0	+ 1.0	-2.6
29	East Orange - Orange	+ 0.9	0.0	+11.5	+4.1

SOURCE: Exhibit HO-6, Exhibit III, pages 4 and 5.

base rate is only one of the building blocks for determining an individual's final premium. The difficulties of making accurate estimates of expected costs are compounded when territory and class factors are combined, resulting in even smaller class-within-territory rating cells. When the territory experience lacks full credibility a layering of approximation methods is required. This layering is heaviest when class factors are also based on less-than-credible data.

3. Methodological Problems

Estimating the magnitude of differences between territories is further hampered by mix of business problems, analogous to those encountered in the pricing of driver classifications. The fact that most filers determine territory relativities by examining the experience of all classes combined in each territory compounds the scope of the difficulties. The problems assume different forms depending on whether average loss costs (pure premiums) or loss ratios are used to measure territory differences. State Farm considers only loss ratios. ISO and Allstate use loss ratios and pure premiums in combination.

The most striking mix-of-business differences between territories involve the larger share of multicar business and youths in the lower-rated territories. In the case of multicars the difference is dramatic. Differences in the distributions of youthful insureds is less marked; but the trend is in the direction of shrinking proportions of youths in the high-rated territories.

Table 44 ranks the territories in the eight-territory sample according to base-rate relativity and displays corresponding multicar distributions. The proportion of multicar business in the lowest-

rated territory in the sample is about 75 per cent larger than the proportion of multicar business in the highest-rated territory. If, as company rating plans suggest, multicar insureds are 10 to 15 per cent better risks than comparable single-car insureds, this disproportionate distribution alone can account for significant differences in average loss costs between territories.

TABLE 44

EIGHT-TERRITORY SAMPLE: DISTRIBUTION OF MULTICAR INSUREDS AMONG HIGH, MEDIUM AND LOW-RATED TERRITORIES

	Territory	Base Rate Relativity*	# Multicars	Percent of Cars Which are Multicars in Territory)
02	Newark	1.97	4,424	40.7
07	Camden	1.50	2,356	43.7
01	Jersey City	1.37	10,439	38.4
14	Burlington/Gloucester/Salem	1.09	70,393	67.3
27	Southern Counties	1.07	72,938	60.5
40	New Brunswick	.91	53,335	69.2
10	Northern Bergen County	.95	81,855	68.9
25	Morristown/Dover	.88	101,909	71.3

* Liability base rates effective 12/28/79, Insurance Services Office.

The distributions of youths in the eight sample territories are set forth in Table 45. In the lowest-rated territories the proportions of youths are several points higher than in the highest-rated territories. The percentage differences range from 20 to 50 per cent. These differences will impact adversely on the relative average loss costs of the lowest-rated territories. However, in a loss-ratio analysis larger proportions of youths may have a beneficial impact on the territory relativities of the lowest-rated territories to the extent youthful classes are overcharged.

TABLE 45

EIGHT-TERRITORY SAMPLE: DISTRIBUTION OF YOUTHFUL INSUREDS AMONG HIGH, MEDIUM AND LOW-RATED TERRITORIES (ISO)

	Territory	Base Rate Relativity*	# Youths**	% Youths
02	Newark	1.97	1,488	13.7
07	Camden	1.50	659	12.2
01	Jersey City	1.37	4,058	14.9
14	Burlington/Gloucester/Salem	1.09	15,404	14.7
27	Southern Counties	1.07	15,129	12.5
40	New Brunswick	.91	13,389	17.4
10	Northern Bergen County	.95	22,034	18.5
25	Morristown-Dover	.88	23,616	16.5

* Liability base rates effective 12/29/79.

**Youths are defined as all youths classified as such between the ages of 17 and 29.

The presence of overcharged classes in any territory will tend to reduce the loss ratio of that territory, much as the presence of underpriced classes will tend to increase loss ratios. A disproportionate or uneven distribution of mispriced classes across territories will distort territorial differentials determined by comparison of territory loss ratios. Similarly, shifts in the mixes of mispriced classes over time will cause movement in territorial differentials without any change in territory risk characteristics. These truisms can be demonstrated through some simple hypotheticals.

Assume four hypothetical classes, three accurately priced with class loss ratios of 50 per cent and one inaccurately priced with a class loss ratio of 25 per cent:

CLASS 1	loss per car = $100 average premium = $200 loss ratio = 0.5
CLASS 2	loss per car = $200 average premium = $400 loss ratio = 0.5

CLASS 3	loss per car = $500 average premium = $1000 loss ratio = 0.5
CLASS 4	loss per car = $300 average premium = $1200 loss ratio = 0.25

If loss ratios are used to compute territory differentials, the presence of any number of different combinations of the "accurate" classes 1, 2 and 3 within the territories would not distort observed differences between the territories.

Consider different mixes of classes 1, 2 and 3 in two hypothetical territories:

TERRITORY A - CLASS MIX	LOSSES	PREMIUMS
Class 1 @ 4	$ 400	$ 800
Class 2 @ 3	600	1,200
Class 3 @ 2	1,000	2,000
	2,000	4,000

COMBINED LOSS RATIO = 2,000/4,000 = 0.50

TERRITORY B - CLASS MIX	LOSSES	PREMIUMS
Class 1 @ 5	$ 500	$1,000
Class 2 @ 1	200	400
Class 3 @ 1	500	1,000
	1,200	2,400

COMBINED LOSS RATIO = 1,200/2,400 = 0.50

Thus, if the territories include only these "accurately priced" classes, the meaning of territory loss ratios is not distorted by differences in the mix of classes between territories.

When the mispriced class is included in the mix a different result obtains:

TERRITORY A - CLASS MIX	LOSSES	PREMIUMS
Class 1 @ 4	$ 400	$ 800
Class 2 @ 3	600	1,200
Class 3 @ 2	1,000	2,000
Class 4 @ 1	300	1,200
	2,300	5,200

COMBINED LOSS RATIO = 2,300/5,200 = 0.44

TERRITORY B - CLASS MIX	LOSSES	PREMIUMS
Class 1 @ 5	$ 500	$1,000
Class 2 @ 1	200	400
Class 3 @ 1	500	1,000
Class 4 @ 2	600	2,400
	1,800	4,800

COMBINED LOSS RATIO = 1,800/4,800 = 0.38

The presence of the mispriced class causes Territory A to appear to represent a 15 per cent higher risk for this reason alone. The greater the disproportion in the distribution of mispriced classes between territories the greater the distortion in estimated territory differentials. The distortion can be avoided only if the mispriced classes are distributed in equal proportions across territories.

The impact of changes in the distribution of mispriced classes from year to year can be illustrated by halving the size of class 4 in Territory B. This change causes the loss ratio for Territory B to increase more than 10 per cent. The smaller the territory's premium base, the larger the impact of each change in the distribution of the mispriced class.

The absence of appropriate exposure data and a precise estimate of pricing errors associated with the multicar discount frustrate any effort to translate these general observations into specific figures based on currently available insurance data. However, adopting what we already know about the distribution of mispriced classes across territories, the accuracy of current differentials are subject to substantial question on these grounds.

Consider the probable pricing errors associated with the multicar discount which lumps together for common treatment all owners of multiple cars regardless of the number of operators using the cars

in question. At least three common situations can be anticipated: (1) multicar insureds where the number of cars exceeds the number of operators--the current multicar discount is probably not large enough for this group; (2) multicar situations where the number of operators exceeds the number of cars--the multicar discount is probably too large for this group; and (3) multicar situations where the number of operators equals the number of cars--the appropriateness of the discount is uncertain here.

Although data reflecting distributions of multicar insureds by number of operators are not available, we can reasonably assume that larger proportions of the first more-cars-than-operators group are in the rural areas. This supposition is supported by the higher ratios of cars to population in the more rural territories displayed in Table 32, supra. Moreover, the costs of maintaining and insuring cars in urban areas suggest that households having more cars than operators should be less common there than elsewhere.

To the extent multicar discounts are not large enough and high proportions of overpriced multicar insureds are located in the rural and suburban areas, the loss ratios of the low-rated territories will be depressed for this reason alone, irrespective of unique territorial risk factors. To the extent multicar insureds in the cities are underpriced, the opposite effect will obtain and affected territory loss ratios will increase. Neither effect is measurable on the basis of available data.

Disproportions in the distribution of youthful insureds have similar implications. As reflected in the eight-territory sample, the proportion of youthful insureds in at least a number of the

lowest-rated territories is significantly higher than the proportion of youthfuls in the highest-rated territories. Because youthful insureds seem to be significantly overpriced, as earlier discussed, the loss ratios of territories having the greater proportions of youthful insureds will be depressed relative to the other territories.

It is also apparent that the proportions of youths in the higher-rated territories are shrinking over time. The most restrictively underwritten group are urban youths.[53] This group is especially overpriced even in relation to other youths.[54] The exclusion of this group from the voluntary market has the paradoxical effect of increasing the apparent losses (relative to premium) of the affected territories. As the proportion of overcharged youths is cut back, disproportionately large chunks are taken from the territory premium base and the loss ratios in these territories are likely to increase for this reason alone.

The likely impact of uneven distributions of mispriced classes across territories depends on the nature of assumptions made about the pricing of the multicar discount. Yet overall, the cards seem stacked against the highest-rated territories. In these territories an overcharge of as little as several percentage points can have a significant dollar impact on premiums.

D. Within-Territory Variation

At best territories can provide only a rough approximation of individual driving patterns. Even if all residents were to do 100 per cent of their driving within territory, a substantial amount of variation as to kind and amount of driving could be expected. Indi-

vidual driving circumstances vary by the time of day and days of the week travel occurs, the particular segments of the territory most regularly frequented, and the diversity of physical hazards--such as hazardous roads and intersections and varying degrees of congestion--encountered on a recurring basis. It is inconceivable that any territory could be defined to account for all or most of this variation, even in connection with improved usage and mileage variables.

Furthermore, the task of defining territories which coincide with the predictable driving patterns of residents is subject to very real limits. Even if one assumes that the typical driver does most driving within a short radius of home, as industry witnesses suggest, a territory would then consist, figuratively, of an aggregation of overlapping circles, each reflecting the driving patterns of different families and individuals. These circles will reach beyond the borders of the territories most frequently for those who live near the edges. The close proximity of New Jersey cities and the density of development in at least the northeast quadrant of the State frustrate the identification of self-contained interrelationships between core and satellite areas. No matter how the territories are aligned driving patterns will not run in one direction nor will they be confined even to the borders of the State.

In the best of circumstances, a line on a map is not likely to define qualitative differences in environment. The task of drawing appropriate lines is difficult even when urban and rural areas are contiguous and the differences between them are abrupt. The difficulties are compounded when the environment is characterized by urban and suburban sprawl and the close proximity of out-of-state destina-

tions typical of New Jersey. An accurate picture of territory differences would indicate continuous change across regions--continually changing shades of difference in traffic congestion and the like. The possibility of municipal boundaries providing the appropriate lines of demarcation is extremely remote.[55]

ISO survey materials support the notion that a high degree of heterogeneity within territories is to be expected. Population densities, accident densities and motor-vehicle theft figures reported by ISO show a significant amount of variation among the municipalities making up each territory.[56] Variation among municipalities within common territories on a number of relevant grounds was also demonstrated in the broad range of non-insurance data unearthed by the Department for this hearing.

A ranking of municipalities according to "total accidents per 1000 people" showed that the twenty-five municipalities with the lowest accident frequencies by this measure were spread across nine different territories.[57] The twenty-five municipalities with the highest accident frequencies were also spread over nine territories, of which six were the same territories containing the lowest-frequency municipalities.[58] All of the municipalities in the highest-frequency group rank above Newark, Atlantic City and Bayonne, the three municipalities in the State which are independent rating territories.

The 1976 Report of the Stanford Research Institute estimated that rating territories explain about 7 per cent of the total risk variation in the driving population, based on New York's territorial definitions and related experience.[59] Liberal estimates for New Jersey, using pure premium variances, indicate that the ISO's differentiation

of rates by territory accounts for about 4 per cent of total variation in the New Jersey driving population for the compulsory coverages; about 5 per cent for collision coverage; and about 8 per cent for comprehensive.[60]

State Farm territories are about the same. The variation in claim frequencies across State Farm territories, ignoring pure premiums because of extreme sample size limitations, explains about 3 per cent of total risk variation in State Farm's insured population under compulsory coverages. By this measure State Farm territories are about 7 per cent efficient with respect to collision and about 2 per cent efficient with respect to comprehensive coverages. If pure premium variances are used, for comparison purposes, the estimates are no larger except in the case of comprehensive coverage which yields an 11 per cent efficiency on this basis.[61] Allstate results are similar.[62] There is no reason to believe that identical territory categories should produce higher efficiencies for any individual company than they do for all ISO companies combined.[63]

These explanatory power estimates imply a high degree of heterogeneity within territories which can only partially by accounted for by combining territory and class factors. The extent of within-territory heterogeneity is confirmed by direct assessments of the distribution of individual expected costs within territories. Table 46 summarizes the frequency of large pricing errors across representative high-, middle- and low-rated territories.

In Newark, the highest-rated territory in the State, as many as 15 per cent of the base-class adults purchasing full coverage are overcharged at least $500 in relation to individual expected costs.

TABLE 46

DISTRIBUTION OF LARGE INDIVIDUAL OVERCHARGES

Territory	Classification	Premium	S/K	% Within Class Overcharged By At Least $300	% Within Class Overcharged By At Least $500	E/K	% Within Class Overcharged By At Least $300	% Within Class Overcharged By At Least $500
Full Coverage								
02-Newark	8111 Adults	$ 783.15	1.85	34.7	15.2	2.22	31.6	12.1
31-Newark Suburban	8111 Adults	402.20	1.85	5.3	0.0	2.22	3.5	0.0
39-Plainfield	8111 Adults	352.50	1.85	0.3	0.0	2.22	0.1	0.0
02-Newark	8712 High Males	$2,510.05	3.54	47.7	40.9	2.22	51.5	46.2
31-Newark Suburban	8712 High Males	1,242.50	3.54	36.9	22.8	2.22	42.9	30.8
39-Plainfield	8712 High Males	1,091.90	3.54	33.8	18.1	2.22	40.4	26.3
02-Newark	8212 High Females	$1,343.31	3.54	38.6	25.5	2.22	44.3	33.2
31-Newark Suburban	8212 High Females	675.01	3.54	18.3	1.6	2.22	26.5	5.4
39-Plainfield	8212 High Females	592.58	3.54	13.1	0.1	2.22	21.1	1.0
Compulsory Coverages								
02-Newark	8111 Adults	$ 441.45	1.82	11.9	0.0	2.17	9.1	0.0
31-Newark Suburban	8111 Adults	232.70	1.82	0.0	0.0	2.17	0.0	0.0
39-Plainfield	8111 Adults	197.70	1.82	0.0	0.0	2.17	0.0	0.0
02-Newark	8712 High Males	$1,248.45	3.38	37.8	24.1	2.17	43.5	31.6
31-Newark Suburban	8712 High Males	634.70	3.38	17.4	1.1	2.17	25.2	3.9
39-Plainfield	8712 High Males	539.70	3.38	10.9	0.0	2.17	18.4	0.0
02-Newark	8212 High Females	$ 702.38	3.38	21.2	3.2	2.17	28.9	8.2
31-Newark Suburban	8212 High Females	362.68	3.38	0.1	0.0	2.17	1.3	0.0
39-Plainfield	8212 High Females	308.28	3.38	0.0	0.0	2.17	0.0	0.0

S/K - "Split K", as explained in the Appendix
E/K - "Equal K", as explained in the Appendix

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis of the appendix.

About 35 per cent of Newark's adult base class are overcharged at least $300 for full coverage. Territories at or below the statewide average base rate fare much better.

In the Newark Suburban and Plainfield territories--representative middle- and low-rated territories, respectively--none of the adult base class pay $500 overcharges in relation to individual expected costs. Only in the Newark Suburban territory do $300 overcharges affect as many as 5 per cent of the base-class adults. The individual overcharges which result from pricing at the territory average are everywhere exacerbated in the high-rated classes and errors are largest in the high-rated classes within the high-rated territories.

Tables 46A and 46B summarize overlap estimates for the representative territories. Table 46A examines the extent of overlap among territory means. Table 46B indicates the percentages of insureds in the high- and middle-rated territories with expected costs below the worst 20 per cent of adult insureds in the low-rated territory. In both analyses the expected costs of individuals within territories show substantial overlap between territories.

As many as 22 per cent of the base-class adults in Newark have expected costs below the average for the Plainfield territory but pay more than twice as much territory premium. About 5 per cent of the adults in Plainfield have expected costs above the average for Newark; and about 20 percent of the Plainfield adults are worse risks than a full one-third of the adults in Newark. Figure 15 illustrates the range of overlap between high-, low- and middle-rated territories for the compulsory coverages.

TABLE 46A

OVERLAP ESTIMATES - PERCENTAGE BELOW MEAN

Full Coverage

Territory	Classification	Premium	S/K	Overlaps 02	Overlaps 31	Overlaps 39	E/K	Overlaps 02	Overlaps 31	Overlaps 39
02-Newark	8111 Adults	$ 783.15	1.85	59.7	26.8	22.0	2.22	58.9	23.5	18.5
31-Newark Suburban	8111 Adults	402.20	1.85	91.1	59.7	52.1	2.22	92.4	58.9	50.5
39-Plainfield	8111 Adults	352.50	1.85	94.6	67.4	59.7	2.22	95.6	67.4	58.9
02-Newark	8712 High Males	$2,510.05	3.54	57.1	15.3	11.1	2.22	58.9	23.5	19.0
31-Newark Suburban	8712 High Males	1,242.50	3.54	95.6	57.1	47.3	2.22	92.4	58.9	51.3
39-Plainfield	8712 High Males	1,091.90	3.54	97.9	66.8	57.1	2.22	95.5	66.5	58.9
02-Newark	8212 High Females	1,343.31	3.54	57.1	15.3	11.0	2.22	58.9	23.5	18.8
31-Newark Suburban	8212 High Females	675.01	3.54	95.6	57.1	47.0	2.22	92.4	58.9	51.0
39-Plainfield	8212 High Females	592.58	3.54	98.0	67.2	57.1	2.22	95.6	66.9	58.9
Compulsory Coverage										
02-Newark	8111 Adults	$ 441.45	1.82	59.8	27.6	21.5	2.17	59.0	23.4	18.2
31-Newark Suburban	8111 Adults	232.70	1.82	90.6	59.8	50.2	2.17	91.9	59.0	48.4
39-Plainfield	8111 Adults	197.70	1.82	95.1	69.5	59.8	2.17	96.1	69.6	59.0
02-Newark	8712 High Males	$1,218.45	3.38	57.2	16.8	11.4	2.17	59.0	24.6	18.9
31-Newark Suburban	8712 High Males	634.70	3.38	94.8	57.2	45.2	2.17	91.7	59.0	49.5
39-Plainfield	8712 High Males	539.70	3.38	97.9	69.3	57.2	2.17	95.6	68.6	59.0
02-Newark	8212 High Females	$ 702.38	3.38	57.2	16.7	11.1	2.17	59.0	24.5	18.6
31-Newark Suburban	8212 High Females	362.68	3.38	95.0	57.2	44.7	2.17	91.7	59.0	49.0
39-Plainfield	8212 High Females	308.28	3.38	98.1	69.8	57.2	2.17	95.8	69.0	59.0

S/K - "Split K" as explained in the Appendix
E/K - "Equal K" as explained in the Appendix

Data reflects 12/18/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis of the appendix.

TABLE 46B

OVERLAP ESTIMATES - 20 PER CENT CUTOFF

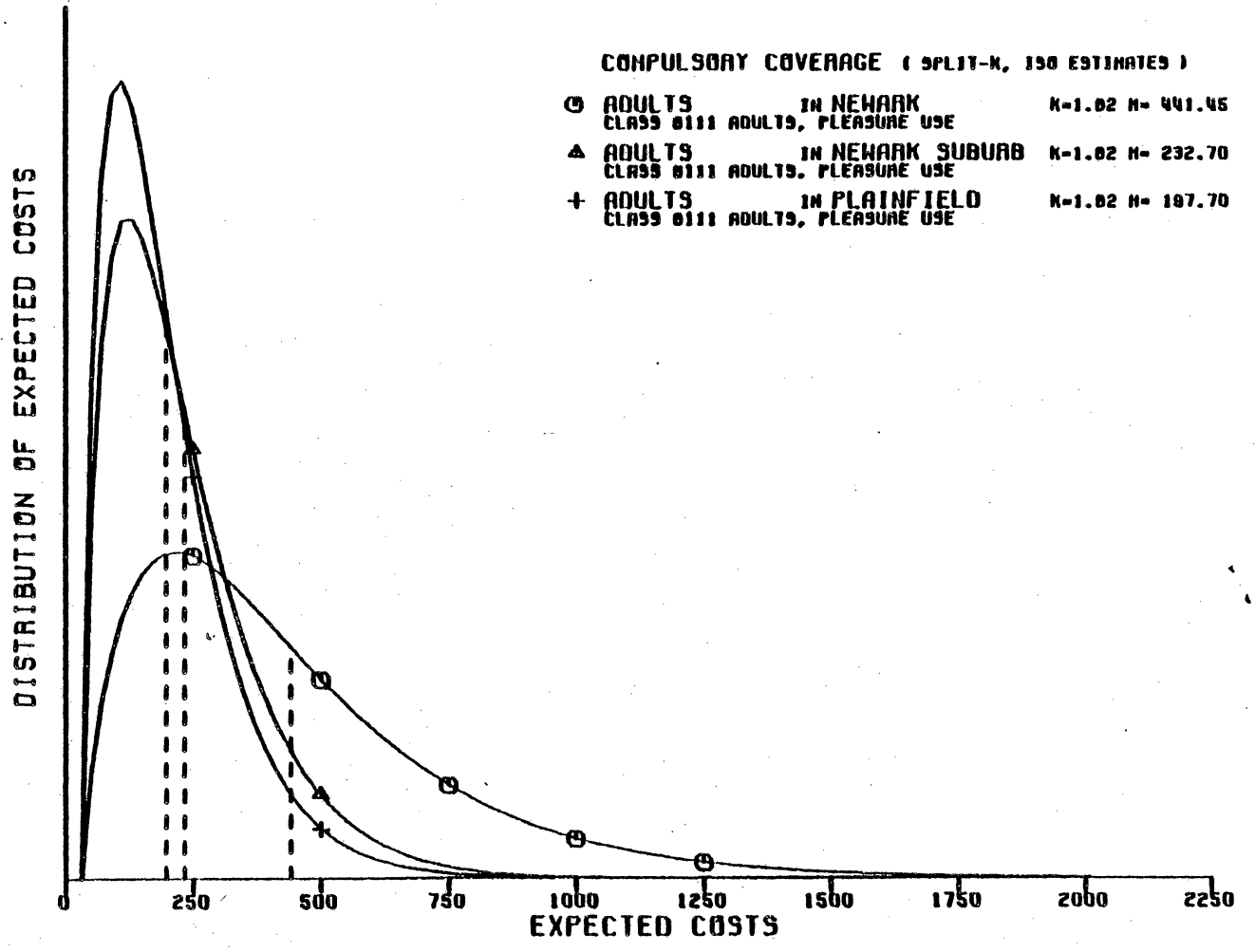
Territory	Classification	Premium	S/K	20% Cutoff	% Below	E/K	20% Cutoff@	% Below
Full Coverage								
02-Newark	8111 Adults	$ 783.15	1.85		37.4	2.22		33.5
31-Newark Suburban	8111 Adults	402.20	1.85		73.3	2.22		72.6
39-Plainfield	8111 Adults	352.50	1.85	$ 470	80.1	2.22	$ 460	80.1
02-Newark	8712 High Males	$2,510.05	3.54		23.7	2.22		34.2
31-Newark Suburban	8712 High Males	1,242.50	3.54		71.5	2.22		73.3
31-Plainfield	8712 High Males	1,091.90	3.54	$1,468	80.0	2.22	$1,554	80.1
02-Newark	8212 High Females	$1,343.31	3.54		23.5	2.22		33.9
31-Newark Suburban	8212 High Females	675.01	3.54		71.1	2.22		73.0
39-Plainfield	8212 High Females	592.58	3.54	$ 771	80.0	2.22	$ 815	80.0
Compulsory Coverage								
02-Newark	8111 Adults	$ 441.45	1.82		36.5	2.17		32.8
31-Newark Suburban	8111 Adults	232.70	1.82		71.3	2.17		70.5
39-Plainfield	8111 Adults	197.70	1.82	$ 254	80.0	2.17	$ 249	80.1
02-Newark	8712 High Males	$1,248.45	3.38		24.0	2.17		33.9
31-Newark Suburban	8712 High Males	634.70	3.38		69.2	2.17		71.4
39-Plainfield	8712 High Males	539.70	3.38	$ 717	80.0	2.17	$ 756	80.0
02-Newark	8212 High Females	$ 702.38	3.38		23.5	2.17		33.4
31-Newark Suburban	8212 High Females	362.68	3.38		68.7	2.17		71.0
39-Plainfield	8212 High Females	308.28	3.38	$ 392	80.0	2.17	$ 413	80.0

S/K - "Split K" as explained in Appendix
E/K - "Equal K" as explained in Appendix

@Premiums do not contain the policy constants approved effective November 18, 1980.

FIGURE 15

TERRITORY HETEROGENEITY AND OVERLAP: HIGH, MIDDLE AND LOW-RATED TERRITORIES



III. FAIRNESS PER SE AND THE CONGESTION ISSUE

Existing territories are sufficiently outdated and imperfect on accuracy grounds that the larger fairness questions need not be reached in order to shape a ruling in these proceedings. Nonetheless, the compelling nature of these larger issues merit further exploration because the concepts involved will be important to rounding out criteria for the determination of appropriate territory boundaries.

A. Uneven Distribution of Traffic Burdens Between Territories

The usual formulation of the congestion issue posits that suburban commuters are at least partially responsible for the traffic congestion which is the cause of higher insurance costs in urban areas, and that to require city drivers to bear the full burden of these higher costs is fundamentally unfair. This formulation relies upon common conceptions of the difference between city and suburb and the flow of commuter traffic between them. For simplification purposes, the discussion here will refer primarily to city-suburb distinctions; but the disproportionate distribution of congestion caused by overlapping regional driving patterns is not easily stereotyped.

The incursion of congestion from extra-territory sources is not confined to the highest-rated territories. In 15 of the 27 rating territories cars from out of territory are involved in more accidents than local cars. (Table 27, supra) Four of these territories are the highest-rated "urban" territories, namely, Newark, Camden, East Orange and Atlantic City; but also included are Plainfield and Trenton Suburban, the two territories generally having the lowest insurance rates.

The territories break into two groups for purposes of analyzing cross-territory traffic flows: (1) net importers of accidents--territories whose residents are involved in fewer accidents outside the territory than there are accidents involving out-of-territory drivers within the territory; and (2) net exporters of accidents--territories whose residents are involved in more accidents outside the territory than there are accidents within the territory involving out of territory drivers. For example, Newark (#02) is a net importer of accidents. In 1977, only 3,590 Newark cars were involved in accidents outside Newark's borders while 11,326 cars from other territories were involved in accidents in Newark. The Morristown-Dover territory (#25) appears to be a net exporter of accidents. In 1977 this territory exported 7,623 accidents while importing only 6,588. In that year 13 territories were net importers of accidents, as reflected in Table 47 which excludes consideration of accidents where the vehicle registration is out of state or unknown.[64]

It has been argued that territory rates should be adjusted to correct for these off-balances in cross-territory accident involvements. Company witnesses resist the notion in principle on the grounds that (1) because accidents are charged back to the territories in which the involved cars are garaged, rates in the receiving or importing areas are not affected by the mishaps which befall out-of-territory cars within their borders; and (2) that higher rates charged commuters already work to offset related costs incurred by the receiving areas.[65] The latter argument is the less substantial and will be considered first.

Commuters pay higher premiums than pleasure-use operators by some percentage of the sending territory base rate. The highest

TABLE 47

NET IMPORTERS AND EXPORTERS OF ACCIDENTS

Code #	Territory	Imported Accidents	% of Total Accidents in Territory	Exported Accidents	% of Total Accidents in State Involving Territory Cars
* 01	Jersey City	4,375	27.6%	3,568	23.7%
* 02	Newark	7,457	52.1%	3,590	34.4%
03	Paterson	5,286	30.7%	6,112	33.9%
* 04	Elizabeth	5,260	37.3%	5,215	37.1%
05	Bayonne	478	27.4%	966	43.2%
* 06	Trenton	1,758	18.8%	1,707	18.4%
* 07	Camden	1,985	50.5%	1,211	38.5%
* 08	Perth Amboy	2,857	39.3%	2,592	37.0%
10	Northern Bergen County	6,719	30.8%	6,773	31.0%
* 11	Southern Bergen County	6,576	47.9%	5,249	42.3%
12	Camden Suburban	3,094	43.0%	3,136	43.3%
13	Camden County Remainder	1,927	40.0%	2,040	41.3%
14	Burlington, Gloucester, Salem	3,546	22.6%	5,087	29.6%
* 15	Trenton Suburban	2,099	53.5%	1,853	50.4%
* 16	Long Branch	6,143	47.5%	2,592	27.6%
17	Monmouth County Balance	2,741	50.4%	5,736	68.0%
* 19	Atlantic City	546	51.5%	401	43.8%
22	Newark Semi-Suburban	1,834	57.1%	2,930	68.0%
* 23	Hudson County Balance	1,216	58.7%	1,144	57.2%
24	Essex County Balance	1,704	58.9%	2,463	67.5%
25	Dover, Morristown, Somerville	6,588	28.2%	7,623	31.3%
26	Hunterdon, Warren, Sussex	1,647	23.8%	3,197	37.7%
* 27	Atlantic, Cape May, Cumberland, Ocean	5,035	25.8%	4,772	24.8%
31	Newark Suburban	4,553	49.3%	5,034	51.8%
38	East Orange-Orange	2,288	55.6%	2,788	60.4%
39	Plainfield	3,843	43.6%	4,099	45.2%
* 40	New Brunswick	6,241	32.4%	5,919	31.3%

*Denotes net importer of accidents.

Source: Exhibit D-105A 1977 Accidents, territory of registration versus territory of accident. Table excludes accidents where the vehicle registration is out of state or unknown.

additional costs for commutation in dollar terms are imposed on those commuters who live in territories with the highest base rates, many of whom commute to territories with less congestion and lower rates. This anomaly is caused by inclusion in the commuter classes of all insureds who drive designated distances to work, regardless of territory destination. Those who commute to lower-risk areas or within low-risk areas are overcharged and those who commute to higher-risk territories are undercharged. This may be one explanation for the absence of significant differences in overall average costs between the drive-to-work classes and the pleasure-use class, infra.

Furthermore, it would probably be a mistake to suggest that drive-to-work patterns are the sole cause of cross-territory traffic imbalances. State Farm's Michael Miller, citing data supplied by the Division of Motor Vehicles, testified that from one-fourth to one-third of week-day accidents occur during the morning and afternoon rush hours. Miller suggested that the most dangerous times to be on the road were from 5 to 6 in the afternoon, especially on Friday, and from 12 midnight to 1:00 am, especially on Saturday.[66] None of the data were keyed to specific geographical locations.

Mr. Bernstein for the AIA testified that a 1978 Connecticut study had found that overall accident rates were higher between 11 and 3 than during the morning rush hour and that, generally, accidents increase in direct relation to time of day and day of the week. The Connecticut study was also said to find that the "frequency" of accidents during rush hours is no higher in "urban" than in "suburban" or "rural" areas.[67] (In 1978 the Connecticut Commissioner of Insurance ruled that the Hartford territory was "unfairly discriminatory.")[68]

Even without further clarification of these recitals, it is likely that commutation is only one of numerous contributors to the observed off-balances in accident patterns. Travel for purposes of shopping, entertainment and a broad variety of other reasons can also be expected to contribute. Part of the challenge in defining appropriate territories is identification of the various kinds of cross-territory traffic flows.

Of more immediate concern is the argument that cross-territory incursions are accounted for by charging back accidents to the territory of origin. It is argued that any accident in the city involving two suburbanites is charged back to the suburban territories and does not affect the loss experience of the urban territory; and that any accident between a city-driver and a suburbanite is charged to the city only if the city driver is at fault.[69] The latter argument would probably concede that no-fault claims and other non-liability claims would be charged to both territories regardless of fault. It nonetheless ignores the fact that under the fault-based coverages "fault" is not always readily determinable and that at least until questions are resolved a claim will be carried on company books as an incurred loss and included in the data used to measure territory differentials.

Generally the charge-back arguments fail to address two important phenomena. First, the practice of charging accidents to the place of garaging works to the advantage of drivers from diverse peripheral areas who converge on a central core area. Even if the majority of accidents in the core area are directly attributable to the outside drivers, these accidents are dispersed across numerous

sending territories while the minority of accidents involving local drivers are concentrated in the receiving territory. Secondly, the argument that charging back accidents avoids hardship to the receiving territory overlooks the effects of congestion. If outsiders were to stay off the streets and highways of the receiving territory the accident likelihoods of local drivers would logically decline. (The same behavior by local drivers is likely to produce fewer accidents when there are fewer cars around to hit each time one makes a mistake.)

B. Exporters and Importers of Congestion and Related Accidents

In 1977 a total of 3,590 Newark-based cars were involved in accidents in New Jersey territories other than Newark. In the same year 7,457 New Jersey cars based in other territories, and an additional 3,869 cars from out of state, were involved in accidents in Newark.[70] The distribution of cross-territory accident involvements between Newark and other New Jersey territories is displayed in Table 48.

Tables 49 and 49A reflect similar comparisons of accident exchanges on a territory by territory basis for a sample of accident-importing and exporting territories. These additional data are provided to further round out the nature of congestion imbalances. Table 49 reflects the cross-territory involvements affecting two sample importing territories, and Table 49A reflects the experience of two exporting territories.

For most of the territories in the State, the accidents imported and exported are relatively close. The largest percentage imbalances on the receiving side are absorbed by Newark, Long Branch,

TABLE 48

COMPARISON OF NEWARK ACCIDENT INVOLVEMENTS IN OTHER TERRITORIES AND OTHER TERRITORY INVOLVEMENTS IN NEWARK

Territory Code	Territory Name	Newark Involvements in Territory	Territory Involvements in Newark
1	Jersey City	200	392
2	Newark	--	--
3	Paterson	153	310
4	Elizabeth	515	1,041
5	Bayonne	11	82
6	Trenton	41	31
7	Camden	4	11
8	Perth Amboy	70	125
10	Northern Bergen County	114	212
11	Southern Bergen County	133	217
12	Camden Suburban	17	17
13	Camden County Remainder	6	12
14	Burlington, Gloucester, Salem	22	81
15	Trenton Suburban	15	28
16	Long Branch	64	86
17	Monmouth County Balance	29	106
19	Atlantic City	6	7
22	Newark Semi-Suburban	467	1,060
23	Hudson County Balance	167	303
24	Essex County Balance	74	159
25	Dover, Morristown, Somerville	164	373
26	Hunterdon, Warren, Sussex	24	79
27	Atlantic, Cape May, Cumberland, Ocean	65	124
31	Newark Suburban	433	837
38	East Orange - Orange	539	1,198
39	Plainfield	139	292
40	New Brunswick	118	274
		3,590	7,457

SOURCE: D-105, p. 3.

TABLE 49

TWO NET IMPORTERS OF ACCIDENTS

COMPARISON OF ACCIDENT INVOLVEMENTS: SOUTHERN BERGEN COUNTY (11) AND THE SOUTHERN COUNTIES (27) VS OTHER TERRITORIES

Territory Code	Southern Bergen Involvements in Other Territories	Other Territory Involvements in Southern Bergen	Southern Counties Involvements in Other Territories	Other Territory Involvements in Southern Counties
01	951	968	* 146	125
02	* 217	133	* 124	65
03	901	1,535	115	187
04	95	115	144	193
05	21	46	23	31
06	21	24	108	185
07	7	7	* 71	66
08	* 46	42	* 115	85
10	1,845	2,265	128	240
11	--	--	92	133
12	24	28	120	261
13	8	13	* 196	169
14	36	62	758	1,045
15	6	22	* 101	91
16	* 59	40	* 563	272
17	45	51	* 817	503
19	* 6	0	* 370	306
22	* 81	80	31	45
23	183	194	25	31
24	41	70	* 89	65
25	164	316	134	287
26	44	74	32	80
27	* 133	92	--	--
31	124	228	61	127
38	47	51	27	31
39	* 50	46	86	107
40	* 94	74	296	305
	5,249	6,576	4,772	5,035

*denotes net exportation of accidents with respect to particular territory

For territory names see Table 47, supra.

TABLE 49A

TWO NET EXPORTERS OF ACCIDENTS

COMPARISON OF ACCIDENT INVOLVEMENTS:
MORRIS-DOVER (25) AND HUNTERDON/WARREN/SUSSEX (26)

Territory Code	Morris-Dover Involvements in Other Territories	Other Territory Involvements in Morris-Dover	H/W/S Involvements in Other Territories	Other Territory Involvements in H/W/S
01	233	116	67	36
02	373	164	79	24
03	646	530	129	93
04	386	311	58	55
05	* 18	19	5	4
06	102	65	74	54
07	15	10	8	3
08	101	69	31	28
10	1,137	602	169	119
11	316	164	74	44
12	* 28	38	17	14
13	* 20	24	* 14	16
14	104	77	* 31	33
15	149	137	97	59
16	155	61	38	29
17	116	68	21	16
19	* 4	7	3	0
22	* 87	101	* 10	17
23	67	47	21	8
24	493	381	35	26
25	--	--	1,672	684
26	* 684	1,672	--	--
27	287	134	80	32
31	489	381	71	56
38	153	119	22	13
39	689	621	194	77
40	771	670	177	107
	7,623	6,588	3,197	1,647

*denotes net importation of accidents with respect to particular territory

For territory names see Table 47, supra.

Camden, Atlantic City and Southern Bergen County. The largest percentage imbalances among the sending or exporting territories pertain to Bayonne, Monmouth County Balance, Newark Semi-Suburban, Hunterdon/Sussex/Warren counties, Essex County Balance and Burlington/Gloucester/Salem counties.

Imbalances in cross-territory accident involvements presumably reflect corresponding imbalances in traffic flows across territories. A net importer of accidents is likely to be a net importer of congestion, in similar proportions. These traffic flows from outside increase the accident likelihoods of local residents.

C. Pricing Congestion Effects

The Public Advocate argues that a fair territory rating system should pass back to visiting territories the costs of the added risk to which visiting drivers expose drivers in receiving territories. Dr. William DuMouchel, an Associate Professor of Applied Mathematics at the Massachusetts Institute of Technology, testifying for the Public Advocate, has proposed a method for making this price adjustment. The method requires cross-classification of accident data according to territory in which accidents occur and territory in which involved cars are garaged.[71] DuMouchel used data of this sort for the contiguous territories of Long Branch and Monmouth County Balance to illustrate the pricing alternatives.

The accident distribution between Long Branch territory and the Balance of Monmouth County is set forth in Table 50 based on the cross-classified DVRPC data for 1977. Long Branch is a net importer of accidents and related traffic flows. Long Branch cars were involved

TABLE 50[71]

Origin of Car	Place of Accident: Long Branch	Monmouth County	Total
Long Branch	6,794	764	7,558
Monmouth County	3,604	2,694	6,298
Total	10,398	3,458	13,856

in 764 accidents in the Balance of Monmouth County while Balance-of-Monmouth cars were involved in 3,604 accidents in Long Branch.

Traditional pricing would hold each territory responsible for all accidents involving territory cars, regardless of location: Long Branch experience would be charged with 7,558 accidents and Monmouth County Balance would be charged with 6,298 accidents, as reflected in the totals reading across the Table. However, DuMouchel argues that if all Monmouth motorists were removed from the Long Branch territory, Long Branch motorists would have fewer accidents within their territory by a factor equal to the ratio of the Long Branch claims in Long Branch to the total number of accidents which occurred in Long Branch.[73] The argument assumes that the total number of accidents in each territory is directly proportional to the congestion in that territory.

Under the distribution in Table 50, about two-thirds of the accidents in Long Branch and (therefore) two-thirds of the congestion are attributable to local drivers. If Monmouth motorists were removed from the territory only two-thirds of the congestion would remain. Specifically, the accident involvements of Long Branch drivers within their own territory, totaling 6,794, would be reduced to only such

accidents as are attributable to the local share of total congestion or 4,439 accidents (6794 x 6794/10398). The balance of 5,959 accidents in Long Branch (10398 - 4439) are attributable directly or indirectly to traffic congestion from Monmouth.

Long Branch drivers are also accountable for accidents in the Monmouth territory. Removal of Long Branch drivers from the Monmouth territory would leave only such accidents as are attributable to local congestion 2099 (2694 x 2694/3458) accidents. Congestion from Long Branch is directly or indirectly responsible for the balance of 1,359 accidents in Monmouth (3458 - 2099).

DuMouchel's computations suggest that a conservative application of his methodology--assuming only a linear relationship between changes in congestion and changes in accident frequencies--could reduce the territory differentials of some importing territories by as much as 18 per cent and increase the differentials of some exporting territories by as much as 23 per cent. Table 51 sets forth hypothetical changes in territory relativities as computed from the DuMouchel congestion model. The "quadratic effect" referred to in the Table assumes a greater than linear relationship between changes in congestion and changes in frequencies--that doubling congestion would quadruple the risk of accidents.[74]

DuMouchel argues that a major advantage of this adjustment method is its reliance on data readibly attainable. An alternative approach might attempt direct observation of commuting patterns, say by counting daily trips from one area to another, and through multiple regression analysis attempt to identify cross-territory congestion effects. This approach would introduce statistical complications and

TABLE 51

CHANGES IN TERRITORIAL RELATIVITIES AS COMPUTED FROM THE CONGESTION MODEL

TERRITORY	NO EFFECT	LINEAR EFFECT	% CHANGE	QUADRATIC EFFECT	% CHANGE
1	136	126	7.1	117	13.9
2	193	164	15.1	154	20.4
3	92	92	0.4	91	0.6
4	99	97	2.2	95	4.3
5	96	108	12.4	115	19.6
6	98	94	4.5	88	10.3
7	146	136	6.8	137	6.5
8	111	110	1.3	110	1.3
10	95	93	2.4	90	5.3
11	97	97	0.4	102	4.9
12	108	111	2.9	115	6.9
13	123	127	3.3	132	7.1
14	107	109	2.3	109	1.5
15	85	93	9.4	105	23.2
16	103	85	17.7	77	25.3
17	102	125	22.9	140	37.7
19	134	137	2.4	149	11.1
22	100	118	18.5	131	31.1
23	101	108	7.3	117	16
24	99	119	20.1	134	35.8
25	88	88	0.1	86	1.8
26	94	104	10.4	109	16.2
27	105	100	4.6	95	9.8
31	98	103	5.2	108	10.1
38	135	149	10.1	159	17.8
39	81	85	4.5	88	9.2
40	91	88	3.3	85	6.6

SOURCE: PA-6, p. 4

necessitate significant added costs for traffic engineering studies. If study were confined to select areas, the analysis would encounter definitional problems, distinguishing between central city and suburb and determining what constitutes a cross-territory trip contributing to congestion.[75]

The application of this methodology to New Jersey territories is not without problems. First, it appears to be sensitive to large discrepancies in the sizes of territories. This sensitivity is reflected in the analysis of congestion effects in Atlantic City (territory 19) and the Southern Counties (territory 27 - Ocean, Cape May, Cumberland and the balance of Atlantic counties).

In 1977, 370 cars from the Southern Counties were involved in accidents in Atlantic City while 306 Atlantic City cars were involved in accidents in the Southern Counties.[76] Elimination of Southern Counties' cars from the Atlantic City territory would reduce accidents of Atlantic City drivers within their own territory by about 42 per cent; and elimination of Atlantic City cars from the Southern Counties would reduce within-territory accidents of that territory's drivers by only about 2 per cent. However, because the volume of accidents in the Southern Counties (attributable to drivers in the two territories) is more than 16 times larger than the comparable figure in Atlantic City, the DuMouchel linear-effects model increases the total number of accidents for which Atlantic City is held responsible. Atlantic City frequencies are increased by 10 per cent and Southern Counties frequencies reduced by 1 per cent. Table 52 summarizes the relevant DVRPC data and related computations.

TABLE 52[77]

ATLANTIC CITY V. SOUTHERN COUNTIES:
CROSS-TERRITORY CONGESTION EFFECTS

	Place of Accident		
Origin of Car	Atlantic City	Southern Counties	Total
Atlantic City	514	306	820
Southern Counties	370	14,449	14,819
Total	884	14,755	15,639

Elimination of each territory's cars from the other territory would reduce within-territory accidents for Atlantic City cars to 514/884 x 514 or 299 and within-territory accidents of Southern Territory cars to 14449/14755 x 14449 or 14,149. Accidents for which Atlantic City would be responsible are the sum of 299 and (14,755 - 14149) or a total of 905 accidents, an increase of 10 per cent over the 820 accidents for which Atlantic City would be responsible under the traditional system. The Southern Counties would be responsible for the sum of 14149 and (884 - 299) or a total of 14,734 accidents, a decrease of less than 1 per cent over the 14,819 accidents for which the territory would be responsible traditionally.

Another problem affecting application of the proposed methodology concerns uncertainty surrounding the relationship between congestion and accident frequencies: specifically, whether or in what circumstances the relationship is described by a linear, quadratic or some other parameter. A variety of possibilities are within reason. The addition of one unit of congestion to an already congested area is not likely to have the same effect as the addition of the same unit of congestion to a non-congested area, however defined; nor would any such effect be expected to remain constant as the mix of congestion in a territory changes over time. A relatively small addition of congestion to an already congested area may have a greater than linear effect on accidents at first, then decline to less than a linear effect as the roads become increasingly packed.[78] Conversely, the introduction of small units of congestion in an uncongested area may have little or no effect at first until some critical point is reached.

A much less complex problem involves the desirability of refining cross-classified data of the DVRPC type. Companies should identify the proportions of accidents involving in-territory drivers only, in-territory and out-of-territory drivers together, and out-of-territory drivers only. A classification of the type of road on which each accident occurs is also desirable, if feasible. These refinements would resolve arguable shortcomings of the DVRPC data alluded to at the hearing.

It is suggested that accidents confined to out-of-territory cars on limited-access roads should not be included in receiving-territory accidents--that at least some through roads represent ribbons of isolated congestion which have no impact on local driving experi-

ence.[79] Although the truth of the latter assertion will vary by road and by territory, the best means for resolving uncertainty is the data maintainable by companies. Until final resolution is reached it is reasonable to conclude that all territories are affected by through-roads--one of the fundamental problems in the territorial rating concept--and that the impact of such roads on local accident frequencies follows no systematic pattern. It is also reasonable to assume that limited access roads are safer than other highways and should not have a major impact on cross-territory accident patterns in any event.[80]

Out-of-state drivers raise another conceptual problem deserving of mention. Efforts to devise the fairest allocation of responsibility for congestion should address the flow of traffic across state boundaries. Because rates are made separately by state there is no means available to hold out-of-state drivers accountable for congestion exported here. However, to the extent New Jersey drivers are equally blameless for the influx of out-of-state congestion, all should share equal responsibility for related costs under the fairness concepts articulated here. Table 53 reflects the variation in out-of-state congestion across current territories.

The most important methodological questions raised by the DuMouchel analysis are complicated by the failure of the designers of current territories to deal explicitly with differences in congestion or to adopt a consistent approach to treating such differences. Overall the territories lack a consistent unifying rationale. As a result it is no less difficult to generalize about the impact of cross-territory traffic flows than to generalize about other territory characteristics.

TABLE 53

PROPORTIONS OF ACCIDENTS INVOLVING
OUT-OF-STATE CARS - BY TERRITORY

No.	Territory	Percentage of Accidents Within-Territory Involving Out-of-State Cars
01	Jersey City	22.0
02	Newark	21.3
03	Paterson	13.0
04	Elizabeth	13.8
05	Bayonne	16.0
06	Trenton	20.2
07	Camden	24.8
08	Perth Amboy	15.4
10	Northern Bergen County	17.9
11	Southern Bergen County	20.7
12	Camden Suburban	22.5
13	Camden County Remainder	17.5
14	Burlington, Gloucester, Salem	24.5
15	Trenton Suburban	23.4
16	Long Branch	13.1
17	Monmouth County Balance	12.6
19	Atlantic City	29.0
22	Newark Semi-Suburban	10.9
23	Hudson County Balance	21.6
24	Essex County Balance	11.0
25	Dover, Morristown, Somerville	12.3
26	Hunterdon, Warren, Sussex	23.9
27	Atlantic, Cape May, Cumberland, Ocean	22.7
31	Newark Suburban	10.5
38	East Orange - Orange	13.8
39	Plainfield	12.0
40	New Brunswick	14.4

SOURCE: D-105A.

The ultimate success of any effort to correct for cross-territory congestion effects will be limited further by the average-cost pricing concept. If the rates of accident-exporting territories are adjusted upward to reflect the burdens they impose on other territories by the travel patterns of resident drivers, the rates of drivers who do not help congest other territories will also go up. This is the kind of pricing anomaly observed under current practices--affecting adversely the accident-importing territories--but in reverse. However, a reason the effects of the averaging process would be less objectionable under a congestion-adjustment theory is that by averaging congestion effects across territories extreme price penalties currently imposed in the most congested territories will be somewhat ameliorated. The system would remain imprecise but the effects of the imprecision would be less severe and more evenly distributed.

Explicit price adjustments for cross-territory congestion effects should be deferred until the problem of congestion is addressed in a comprehensive overhaul of the current territories. Companies should be directed to begin the collection of territory accident data which are cross-classified by territory-of-accident and territory-of-origin for involved cars. Pending such developments, recognition of cross-territory congestion effects must be weighed in the balance when resolving uncertainties affecting the pricing of the highest-rated territories.

Section 6

CLASSIFICATIONS RELATED TO VEHICLE USE: TYPE-OF-USE, MILEAGE, MERIT RATING AND MULTICAR VARIABLES

I. TYPE-OF-USE

Type of use variables have superficial appeal because they appear to relate to risk factors directly related to actual vehicle operations. Upon close examination, however, the specific elements of risk to which these variables relate is not entirely clear. Especially with respect to the large pleasure-use and drive-to-work classes, the link to type of use is tenuous; and the variables may relate as much to quantity as to quality of vehicle use.

Major deficiencies of these classifications also relate to the manner in which they are defined and applied under current rules. The applicable usage class for a vehicle is determined by its highest-rated single use. The use in question need not be the major use of the vehicle, in terms of time or mileage, nor even the use most characteristic of any range of uses to which the car is put. As a result, the fact that the overall usage patterns of any two vehicles are substantially the same will not assure similar classification treatment.

The conceptual shortcomings of existing type-of-use variables, together with the subordinate place given them in existing class plans, account in part for the meager contribution they make to class-plan efficiency. The combined explanatory power of the ISO's use classifications is less than one per cent overall.[1]

A. Pleasure-Use and the Commuter Classes

1. Relation to Hazard of Loss

The pleasure-use classification tells the least in a given case about either type or amount of driving. Some pleasure-use vehicles

may stand unused for extended periods, serving only as limited-purpose vehicles, while other cars in the pleasure-use class can be used on a non-stop basis--for shopping, recreation or a variety of other family transporation purposes--and still qualify for the low class rate. With limited exception[2], the pleasure-use class also includes cars actually used for commuting. Under the ISO system a regular commute of up to just short of 3 miles one way is considered a pleasure use. Under the State Farm system any commute of less than an average roundtrip distance of 30 miles per week is also considered a pleasure use. Cars participating in car pools are included in the pleasure-use class even when longer commuting distances are involved.[3]

The higher-rated commuter classifications apply to cars involved in travel to work or school greater than some threshold amount. The rationale for these so-called drive-to-work classes rests primarily on the imagined risk characteristics of suburban commuters driving to and from congested urban areas during rush hour. The industry suggests, for example, that the higher rates paid by the drive-to-work classifications offset the costs of congestion imposed on urban drivers by outsiders.[4] In fact, the commuter classifications cover a much broader range of driving situations. Included in these classes are those who commute to non-urban locations--for example, the city dwellers who commute to the suburbs or the suburbanites who commute to other suburban destinations--and those who travel on uncongested roads or at off-hours. Also included are commuters who enjoy varying degrees of discretion as to use of the car on a day to day basis. For example, whether a commuter can leave the car home on a given day, say as the result of bad weather conditions, depends at least in part on the

availability of alternate means of transportation to the destination in question.[5] Generally the diversity of the origins and destinations between which commuters travel assure commensurate variability in their expected loss costs.

The mere fact that a car is used for commuting does not per se tell much about relative risk. As explained by an actuary for the Massachusetts Insurance Department in connection with the classification hearings in that state, at least some commuters can be expected to be better-than-average risks:

> "[I]ndividuals who drive to work travel along the same route daily and have less chance of making a driving error under such constant and familiar conditions. Also, their vehicles are then parked and unused a very large portion of the day."[6]

Massachusetts data indicated that losses per car for the drive-to-work class were even slightly lower than for the pleasure-use class.[7] In 1978, the Massachusetts Commissioner prohibited use of the commuter classification--without significant opposition from the industry--noting that "[a]s long as it is unable to separate drivers by destination, it will never be of any statistical or social value."[8]

If there be a connection between commuting per se and increased hazard of loss it is in the extent to which regular driving to work implies higher-than-average annual mileage. Arguably, the only characteristic common to all members of a drive-to-work class is that, at the time they supplied classification information to the company, the road distances between their places of residence and places of work were of sufficient magnitude to meet the mileage criterion established for a drive-to-work class.[9] The mileage criteria governing application of drive-to-work classifications serve only to

assure that on average class members will travel some minimum amount of mileage during the year. This crude proxy relationship between the drive-to-work variable and annual mileage is confirmed by the exposure distributions of the few companies which use annual mileage as a rating variable. These distributions reflect disproportionate numbers of drive-to-work insureds in the long-annual-mileage categories.[10]

The drive-to-work variable is not a good predictor of annual mileage. Certain to differentiate members of any commuter class in this respect is the extent to which the car in question is used exclusively for commuting. Classifications defined by annual mileage per se alone provide the required direct nexus to amount of use. Appropriate application of annual mileage classifications would eliminate the penalty currently imposed on those who drive to work but subject their cars to less overall usage than high-mileage drivers in the pleasure-use class.

A suitable drive-to-work variable, conceptually, would seek to differentiate commuting patterns bearing upon type rather than amount of vehicle usage. Inclusion of destination information is the sort of modification required. A modified drive to work classification--and refinement of the pleasure-and business-use classes as well--could perhaps help fill the inevitable gaps left by territory variables in the differentiation of typical driving environments.

2. The Definitional Problem

Application of the drive-to-work classifications requires a significant degree of judgment by agents and underwriters, as highlighted in the rating hypotheticals discussed in Section 2. ISO rules

necessitate a judgement whether use of the car to drive to work--if it is used at all for this purpose--is "customary." State Farm requires estimation of whether a car used for commuting is used frequently enough for that purpose to generate an "average weekly use" of the magnitude specified by classification criteria. Under all the class plans, determination of drive-to-work status involves some estimate of mileage.

The facts needed to make determinations in each case are themselves subject to problems of verification. The company must rely entirely on the representations of the applicant concerning types of use, related frequencies of use and mileage information. This itself is not a problem except as compounded by the need for subjective interpretation of such information once obtained. Even if applicants are meticulously honest, uniform application of the rules is unlikely.

The extent to which the pleasure-use and drive-to-work classifications have been misapplied in fact is difficult to gauge. The distributions of ISO exposures by usage class indicate that cars assigned to the pleasure-use class are almost two times greater in number than cars assigned to the short-and long-commute classes combined.[11] Cars assigned to the short-commute class, indicating a recorded one-way distance to work of between 3 and 10 miles, represent about 75 per cent of all cars assigned to commuter classes.[12] The latter distribution offers a provocative contrast to 1970 Census data concerning trips to work. The Census data indicate that 52 per cent of the trips to work by New Jersey commuters extend beyond the borders of their home insurance territories.[13] Proper interpretation of these data requires further study.

3. Between-Class Differences

Differences in average cost between the pleasure-use and commuting classes vary significantly in degree and, in some cases, direction. With respect to policyholders in the over-30 age groups combined, ISO's New Jersey data reflect raw loss costs per car for the short-commute class about 4 to 6 per cent higher than the pleasure-use class.[14] State Farm's New Jersey data indicate comparable differentials of from 6 to 13 per cent.[15] However, sharp variation in the average experience of the separate age groups combined in the underlying data severely limits the meaningfulness of these aggregate differentials.

ISO's two New Jersey data sets reflect pure premiums for senior citizens in the short-commute class about 22 per cent greater than the senior pleasure-use class.[16] In contrast, females 30-64 and the "all other" adults in short-commute classes generate loss costs per car from 1 to 5 per cent less than their counterparts in the pleasure-use classes. Table 54 displays ISO's single-car and combined single- and multicar pure premiums for the pleasure-use and short- and long-commute classes, separately for each category of over-30 adults. The State Farm data produce similar results for over-30 drivers, although smaller sample size limits the credibility of indicated differentials.[17]

Other available data, supplied by the Travlers, are not comparable to the ISO and State Farm data because they include youths 25 through 29 in the same use classes as over-30 adults and fail to indicate the distribution of exposures by age group within each usage category. These data reflect a pure premium 16.5 per cent greater for

TABLE 54

PURE PREMIUM COMPARISON BY USE
ISO DATA 1975, 1976 & 1977 COMBINED

Single Car Data*		Exposures	Liability Pure Premiums
Pleasure	All Others	381,191	34.79
	Seniors (65+)	180,227	23.10
	Females 30-64	96,341	29.92
Work 3-10 Miles	All Others	203,002	33.99
	Seniors (65+)	21,707	28.11
	Females 30-64	52,181	29.48
Work 10+ Miles	All Others	62,062	37.77
	Seniors (65+)	3,096	33.18
	Females 30-64	10,595	31.32

Single & Multi Car Data@		Exposures	Liability Pure Premiums
Pleasure	All Others	1,356,173	27.11
	Seniors (65+)	235,180	22.10
	Females 30-64	106,240	31.30
Work 3-10 Miles	All Others	573,292	27.71
	Seniors (65+)	30,191	26.96
	Females 30-64	54,386	29.72
Work 10+ Miles	All Others	208,841	29.14
	Seniors (65+)	5,278	30.49
	Females 30-64	11,335	31.62

*Source: Table I Compliance Data
@Source: Hearing Exhibits D-94a, b & c

the short-commute class than the pleasure-use class, all affected age groups combined. The raw indication, similar in magnitude to the aggregate differentials for ISO and State Farm, cannot be refined by the very important mix-of-age considerations.[18]

The disproportionate concentration of senior citizens in the pleasure-use class distorts aggregate use differentials for all age groups combined. In each of the two sets of exposure distributions displayed in Table 54, the percentage of pleasure-use exposures representing senior citizens is at least eight times greater than the percentage of short-commuters who are senior citizens. The average loss costs of the aggregated pleasure-use class are therefore diminished relative to the aggregated short-commute class by the disproportionate weight of lower average senior-citizen losses in the pleasure class.

When the ISO data for aggregated pleasure and short-commute classes are standardized to approximate identical distributions of exposures by age group, the observed differential disappears. As reflected in Table 55 below, the ISO liability single-car data standardized in this fashion produce a 1.6 per cent difference in pure premium between pleasure and short-commute; and ISO's combined liability single- and multicar data produce a standarized pure premium for the short-commute class 2.5 per cent more than the pleasure-use. State Farm data are likely to produce the same result.[19]

As a matter of routine, observed differentials between use classes must also be checked against average secondary rating factors and the distribution of insureds by territory. However, judging by ISO data--the only usable data available--these considerations do not

TABLE 55

ISO LIABILITY PURE PREMIUM BASED ON STANDARDIZED DISTRIBUTION OF THE COMMUTING USAGE EXPOSURES FOR THE NON-YOUTHFUL CLASSES

	Pleasure	Work 3-10 Miles	%
Single Car Data*	31.49	32.00	1.6
Single & Multi Car Data@	27.29	27.96	2.5
	Pleasure	**Work 10+ Miles**	**%**
Single Car Data*	31.16	35.68	14.5
Single & Multi Car Data@	26.74	29.46	10.2
	Work 3-10 Miles	**Work 10+ Miles**	**%**
Single Car Data*	32.78	36.30	16.5
Single & Multi Car Data@	27.83	29.38	5.6

NOTE: The two use classes compared in each example have been standardized in isolation of the third. This produces the difference in pure premium for the same use (pleasure) when compared to work 3-10 and later compared to work 10+.

*Source: ISO Table I Compliance Data.

@Source: Hearing Exhibit D-94a, b & c.

appear to have a material bearing on the nature or magnitude of observed differentials between the pleasure and short-commute classes. The average secondary rating factors for these classes are very close.[20] In addition, an eight-territory sample reflecting the distribution of use classes by territory indicates almost the same proportions of urban insureds in both the pleasure and short-commute classes--a curious discovery to the extent urban drivers are not commonly viewed as commuters. The eight-territory distribution is set forth in Table 56 for all ISO use classes.

The long-commute classification would appear to produce somewhat larger and more consistent average cost differentials than the short-commute class. When the two sets of ISO data are standardized to simulate equal distributions across adult age groups, as reflected in Table 55, the pure premiums for the long-commute class are between 10 and 15 per cent greater than the pure premiums for pleasure-use. The long-commute pure premiums are between 5 and 17 per cent greater than the pure premiums for the short-commute class.

Average secondary rating factors applicable to the long-commute class are not significantly different from the average factors applicable to the pleasure-use and short-commute classes.[21] However, mix-of-territory considerations may have an impact on the magnitude of observed differentials. As reflected in Table 56, supra, the proportion of ISO's long-commute classes representing urban insureds in the eight-territory sample is less than half the proportion of the pleasure and short-commute insureds living in urban areas. A larger proportion of long commuters living in low-rated territories may cause the average experience for the long-commute class to be understated

TABLE 56

DISTRIBUTION OF EARNED EXPOSURES BY USE CLASSIFICATIONS BY TERRITORY*
Based on 8 Territory Sample

Territory Code	Pleasure Use		Drive to Work Less Than 10 Miles		Drive to Work 10 Or More Miles		Business Use		Farm Use		Pleasure Farm Use		Drive to Work Business Use		All Use Classes Combined	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
02	6,018	1.9	2,700	2.4	540	1.0	130	1.0	4	.1	987	1.6	501	1.5	10,880	1.8
07	3,033	.9	1,299	1.1	286	.5	109	.9	2	.1	413	.7	246	.8	5,388	.9
01	16,973	5.2	4,605	4.0	1,103	2.1	439	3.4	2	.1	3,082	4.9	976	3.0	27,180	4.5
14	54,303	16.6	20,003	17.4	10,653	20.0	2,012	15.7	2,284	53.6	9,767	15.5	5,637	17.2	104,659	17.2
27	71,731	22.0	20,790	18.0	9,117	17.1	2,498	19.5	1,326	31.1	10,263	16.3	4,866	14.8	120,591	19.8
40	37,593	11.5	17,537	15.2	7,084	13.3	1,332	10.4	99	2.3	8,323	13.2	5,066	15.4	77,034	12.7
10	64,156	19.7	20,261	17.6	9,196	17.3	3,113	24.3	86	2.0	15,175	24.1	6,859	20.9	118,846	19.6
25	72,486	22.2	27,991	24.3	15,253	28.7	3,179	24.8	458	10.7	14,958	23.7	8,658	26.4	142,983	23.5
Combined	326,293	100.0	115,186	100.0	53,232	100.0	12,812	100.0	4,261	100.0	62,968	100.0	32,809	100.0	607,561	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary Risks Earned Exposures for all companies reporting to the Insurance Services Office

TABLE 56A

AVERAGE TERRITORY RATING FACTOR*
Based on 8 Territory Sample

Adult Operators

Pleasure Use 1.025	Drive to Work Less Than 10 Miles	1.020	Percentage Difference .995
	Drive to Work 10 or More Miles	.995	.971
	Business Use	1.003	.979
	Farm Use	1.055	1.029

Youthful Operators

Pleasure/Farm Use	1.010	.985
Drive to Work/Business Use	.999	.975

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

relative to the pleasure and short-commute classes unless the data are controlled for mix of territories. In any event, the significance of a disproportionate territory distribution is not self-evident in this case. A high proportion of long-commute mileage can be expected to be driven outside the borders of the home territory.

Usage differentials for cars otherwise classified in the youthful age groups must be accounted for separately because, even to the extent usage distinctions are applied to youths, class definitions are unique. The ISO companies employ two aggregated use classes for youths, one for pleasure and farm combined, the other for commute and business combined. State Farm provides three use-classes for youths--pleasure, business-and-commute combined, and farm.

The use classes applicable to youth-classified cars generate raw average cost differentials which are both small in size and unpredictable in direction. On both sets of ISO data examined the combined work-business class produce loss costs per car from 3 to 4 per cent less than the combined pleasure-farm class for the liability coverages.[22] State Farm's business-commute class for youth-rated cars reflect average losses about 2.4 per cent less than pleasure use on one data set and 7 per cent more on another data set for the liability coverages.[23] The high degree of refinement in the youthful classes effectively prevented Department analysis of mix-of-business considerations affecting these differentials.

With respect to all age groups, none of the indicated differentials for commuter classes reflect an adjustment for inevitable overlap with annual mileage. Travelers countrywide data indicate that the proportion of total cars in the long-annual-mileage class which

are also classified in the short-commute class is more than twice as large as the comparable proportion of cars classified in the pleasure-use class. The proportion of long-mileage cars which are also classified as long-commute cars is also much greater than the proportion of long-mileage cars classified as pleasure-use cars, but the data are not comparable in the form provided because Travelers defines "long-mileage" differently for long commuters than short commuters.[24] The difference in definition confirms the relationship between commuting and mileage: to be classified in the "long-mileage" class a short commuter must travel more than 7,500 miles per year while a long commuter must travel more than 12,000 miles per year. It is therefore likely that controlling for mileage would eliminate observed differentials for the current commuter classes.

B. Business and Farm Uses

The business and farm-use classes contain relatively few insureds and are little discussed.[25] Both classes raise some conceptual questions but the size of average cost differentials they generate tend to lend them credence, assuming there is a proper accounting for redundancy with other rating variables. A substantial amount of variation within each class is likely.

Many of the cars in the business-use category can be expected to be used for pleasure and commutation purposes in addition to business. Whenever the insured's place of employment is outside the home, commutation of some sort is necessarily included in the broader business use; and unless the insured's personal tranportation needs are entirely answered by other cars in the household, some degree of pleasure use is similarly inevitable. The possible combinations of

uses are numerous. The more highly priced the usage classification the greater are the number of possible combinations. Greater also are the cost burdens imposed on members of the class whose usage is confined to the specific type of use contemplated by the class definition.

On the assumption that farming is also a business, conceptual distinctions between the farm and business classes are elusive. Arguably farm usage is unique to the extent it is largely confined to the farm on which the owner of the vehicle resides. Yet many farm vehicles can be expected to be used for recreation and a range of other uses unrelated to farming per se. Probably the most important practical consideration favoring the farm class is that vehicles in this class are likely to be driven in different environments overall than cars in the other three usage categories.

With respect to class definition and the likelihood of consistent and uniform application, neither farm nor business variables appear to present a problem. The observations of Massachusett's Natalie Shayer are persuasive on this point:

> "Farm use discounts can only be given to rural residents so the possibilities for fraud are limited. A person who uses his vehicle for business is either reimbursed by his employer or can deduct a large portion of his auto expenses, including insurance, from his taxes. Since the additional cost of insurance can be defrayed, there is little incentive for fraud."[26]

Both classes produce differences in average losses. When ISO statewide pure premiums are controlled for a standardized mix of adult subgroups, average losses for the business class are about 10 per cent greater than the pleasure-use class; and average losses for

the farm class are 20 to 30 per cent below the pleasure-use class. Table 57 displays standardized pure premiums for these classes by adult subgroups.

Average secondary rating factors should not have an impact on the magnitude of business-use differentials, at least on the data examined.[27] Territory mix should have at least a small impact, to the extent business-use exposures are under-represented in urban areas.[28] However, annual mileage considerations, to the extent recognized, would play a much larger role. The "long-mileage" classes for both Travelers and State Farm contain a higher annual mileage threshold for business-use insureds than pleasure-use insureds. The former enter the long-mileage class at 12,000 miles and the latter at 7,500 miles. Yet even with the higher requirements, available data indicate that the proportion of long-mileage insureds in the business-use class is about 50 per cent greater than the proportion of long-mileage insureds in the pleasure-use class.[29]

Pricing of the farm-use class is more complicated. The average secondary rating factor attributable to this class results in a net discount more than 3 times larger than comparable discounts for the other use classes.[30] This is apparently attributable to the disproportionate numbers of multicar insureds in the farm class. In fact, because the number of vehicles per household probably exceeds the number of operators most frequently in this class, the average multicar discount is even likely to be smaller than it should be.

A significant portion of the differential loss experience of farm-use vehicles is further explainable by geographic factors. Farm-use exposures are necessarily concentrated almost exclusively in

TABLE 57

ISO LIABILITY PURE PREMIUMS BASED ON STANDARDIZED DISTRIBUTION OF BUSINESS & FARM USAGE EXPOSURES FOR THE NON-YOUTHFUL CLASSES

	Pleasure	Business	%
Single Car Data*	30.95	33.79	+9.2
Single & Multi Car Data@	26.68	29.86	+11.9
	Pleasure	**Farm**	**%**
Single Car Data*	30.87	25.60	-17.1
Single & Multi Car Data@	26.67	17.71	-33.6

*Source: ISO Table I Compliance Data.

@Source: Hearing Exhibit D-94a, b & c.

the lower-rated rural and rural-suburban territories; and the average experience of the farm-use and pleasure-use classes are certain to be different for this reason alone. Thus the differential loss experience already accounted for by territory rating variables, together with the differential risk accounted for by the multicar discount, must be carefully factored out of the 20 to 30 per cent differentials observed above for the farm-use class.

II. MILEAGE

The mileage variable is little used under current classification systems. ISO makes no annual mileage distinctions. State Farm and Travelers distinguish between short and long annual mileage, varying the line of demarcation somewhat by type of usage class as explained above. Colonial Penn alone among insurers makes more than

this simple distinction, using up to six different mileage refinements. No New Jersey company uses mileage criteria as the primary means of classifying drivers but only to refine other classifications.

The mileage variable obviously bears direct relation to how much a car is driven. The relationship to risk is clear and comports with common sense: the more a car is driven the more likely it is to have an accident. Data developed by the California Division of Motor Vehicles confirm this simple proposition, indicating that as miles driven increase the average number of accidents and convictions also increase, albeit at a dimishing rate.

The desirability of enlarging the use of mileage as a rating variable has been implicit in much of the discussion in preceding chapters. A number of the variables examined serve largely if not entirely as proxies for mileage. Among these classifications are the principal-occasional driver distinctions, classification by sex, the resident-student-discount rule, and drive-to-work and business-use classes. The multicar classification, to be discussed below, is explicitly predicated on amount-of-usage concepts. Even classifications by age overlap with mileage effects, in that youthful cars involve greater numbers of operators and by implication greater amounts of annual mileage; and, conversely, senior-citizen cars are subject to less average usage.

The use of mileage distinctions to refine variables already correlated with mileage in some respect tends to diminish the significance of mileage as a rate classification. In practical terms, consistent with earlier discussions concerning double-counting, the greater is the concentration of redundant classifications within each

mileage category--the more that observed risk differentials for mileage are already accounted for by other variables--the less mileage distinctions can have an impact on premiums charged. A preferable classification structure would accord explicit recognition to the full mileage effect.

A number of rating factors are likely to enhance the explanatory power of the mileage variable. Massachusetts' Natalie Shayer has argued that driver skill is one such complementary factor. On the basis of California motor vehicle data indicating that youths have higher-than-average accident rates per mile, she concluded that "an experience [number-of-years licensed] factor must first be isolated before mileage driven can be an effective accident predictor."[31] Driver skill and miles driven would appear to be independent variables lending themselves to this sort of complementary relationship. Other complementary variables are less apparent.

The mileage variable is especially appealing because it applies universally to all drivers and is most likely to be broadly inclusive of drivers sharing similar risk characteristics. Focusing on behavior rather than status, it is also devoid of the extraneous socioeconomic implications which surround many of the demographic factors now given greater importance. As a bonus, the greater differentiation of premiums based on mileage should provide meaningful incentives for drivers to reduce discretionary driving, and with it, overall costs to the insurance mechanism.

A mileage variable is also subject to limitations. It may be argued, for example, that varying premiums by miles driven has an income-regressive impact on motorists who have little choice about the

amount of driving they do. Certainly if mileage per se is used to generate the kinds of extreme differences in premium common in the market today, hardships can result. However, it can also be argued that ignoring or subordinating annual mileage considerations works on balance to the detriment of low-income insureds. Jonathan Sheldon, testifying for New Jersey Legal Services, argued that the failure to account for miles driven penalizes the poor because they drive less and with gas costs rising will drive still less in the future.[32]

Another limitation of mileage rating is the relatively few classification possibilities it offers. Annual mileage factors currently in use generate substantial and consistent differentials in average loss experience, even after other classification factors are considered; but these differentials pertain only to broad mileage categories. State Farm mileage data for New Jersey indicates a differential of about 15 per cent between insureds over 30 who drive more and less than 7,500 miles per year, respectively. This differential varies somewhat for adults and senior citizens and is in addition to any differential first generated by the age variable.[33] Travelers countrywide data produce differentials between insureds above and below 7,500 miles per year ranging from 6 to 15 per cent after subdivision by age, and up to 8 per cent after subdivision by usage.[34] Allstate data for New Jersey and countrywide produce differentials for the same two mileage categories ranging from 10 to 30 per cent after consideration of both age and usage.[35] Because ISO does not use mileage as a factor, data are not available to check these differentials against average secondary rating factors, territory mix and other mix of business considerations. Similarly, explanatory power estimates cannot be derived from available data.

Mileage differentials for the over-30 insureds may not hold up after short and long mileage categories are further refined. Colonial Penn's New Jersey data produce differentials of between 17 and 24 per cent for insureds with mileage above and below 9,000 miles per year before consideration of other factors.[36] However, within these two mileage categories differences between 3,000 miles sub-categories do not show up. Statewide data for a company with as small a market share as Colonial Penn are probably too thin to gauge these finer distinctions, if they exist; and Colonial Penn should be required to supply further information to support its premium differentials. There is a possibility that mileage variables are capable of only very broad distinctions among many insureds.

Moreover, no matter how successfully a mileage variable can identify differences in class average costs, it is not saved from problems of within-class variation. With respect to the inherent risks of individual motorists the significance of miles driven will vary in relation to systematic differences in the quality of miles driven--types of roads, familiarity of roads, typical congestion, particular hazards regularly encountered, and so forth.[37] Motorists who drive an identical number of miles each year will vary also with respect to average time behind the wheel. Nevertheless, it is unlikely that class heterogeneity is greater here then in other classes or that such considerations would overcome the desirability of the mileage variable on other grounds.

The major argument against enlarging the use of the mileage variable relates to the problem of verification.[38] Current technology cannot guarantee that mileage information is accurate. Odometers may

be tampered with or simply disconnected for extended periods. Nonetheless, only a small minority of the rating variables now in use rely upon tangible verification. The general trustworthiness of insureds, within reasonable bounds,[39] would appear to be a fundamental presupposition of current classification systems.

A procedure requiring agents to make odometer readings is one approach to addressing the verification problem. The only insureds who could then beat the system would be those willing to commit deliberate fraud. If the problem of fraud is troublesome enough, laws can be enacted to provide policing by law enforcement agencies. Odometer readings have been attempted before by the industry and discontinued, but apparently due less to discovered fraud than to complaints from agents assigned to make the readings.[40]

The simplest verification procedure would elicit detailed information from the applicant concerning the projected uses of the car, in a manner designed to check the internal consistency of answers provided. Questioning directed to common uses of the vehicle and related distances should help substantiate overall mileage estimates provided by the applicant. Exploration of the kinds of untested assumptions now made in connection with usage variables would be an excellent point of departure for the questioner.

Regardless of procedure selected, verified mileage information for a prior period itself cannot guarantee an accurate estimate of future miles driven. This less than perfect correlation between past history and likely future behavior complicates the application of most classification variables--as well as the estimation of expected loss costs identifiable by them. Mileage classification can address this

problem under a procedure which considers miles driven in the prior year and extends credits and surcharges retroactively.

III. MERIT RATING

Experimentation with merit rating dates back to at least 1929 when some companies introduced a simplified plan for recognizing accident experience by surcharging drivers with accidents and crediting drivers without them.[44] The concept of rewarding clean drivers with premium credits was subsequently discarded. The use of conviction records has been experimented with over the years but appears never to have been popular with the companies.

Public interest in enlarging the role of merit rating has grown in recent years. It responds to the belief that drivers with clean accident and conviction records should be somehow spared from dramatic escalation of insurance premiums. Related issues have been the subject of debate before the New Jersey Legislature for more than two years following introduction of legislation which, among other things, would have mandated a uniform merit rating plan marketwide.

The purpose of this discussion is not to resolve the many issues raised in the legislative debate. Modified legislation is now pending which would require the Department to conduct hearings specifically addressed to promulgating a merit rating plan. Most of the technical issues which have been raised concerning merit rating should be deferred for consideration at the anticipated hearings. It is enough here that merit rating pass as a concept under the tests for predictive accuracy. Of special importance is the apparent overlap

between merit rating and other class and territory factors suggesting redundancy in pricing.

A. Reasonableness in Concept

Accident and driver-conviction records bear a direct relation to actual driving behavior and are of universal applicability across drivers independent of industry marketing preferences defined by socioeconomic status and demographic and geographic factors. Regulators have sought to encourage this form of classification on the belief that it is intrinsically more equitable. Prominent in this thinking is that "fault" accidents and traffic convictions are subject to a significant degree of driver control and that use of accidents and convictions in rating provides useful incentives working to improve traffic safety and reduce overall costs of the insurance mechanism.

Industry opponents to enlarging the role of merit rating discount the importance of driver control and incentives. They argue that accident causation is complex and that few accidents occur as the result of conscious risk-taking, the mere instinct for self-preservation giving every driver ample incentive to avoid accidents.[42] These arguments miss the point, however. The incentives inherent in a properly conceived merit rating system seek not to deter accidents *per se* but rather the kinds of behavior which--whether or not the individual recognizes it--increase the likelihood of accidents.

Concededly, as industry witnessess contend, the primary purpose of merit rating, like other classifications, is the prediction of differential risk. Merit rating is not justified as a mere punishment-reward system, nor, incidentally, as a mechanism for recouping the costs of past claims.[43] Within these strictures it is nonetheless clear that the role of merit rating can be enlarged substantially.

B. Conceptual Problems Raised by Current Rules and Definitions

The merit rating plans presently in use raise problems concerning (a) the surcharging of clean drivers for inexperience; (b) the application of surcharges to the comprehensive coverage; and (c) variation in the dollar amounts of surcharges by territory and by class and territory.

1. Inclusion of Inexperienced Operators

As observed earlier in this report, the surcharge imposed on principal operators licensed less than three years is not priced on the basis of loss experience attributable only (or at all) to the subclass of drivers to which the surcharge applies. ISO merges the relevant loss information with the experience generated under its merit rating plan.

The ISO's "Safe Driver Insurance Plan" (SDIP) defines four categories of surchargeable drivers. The categories are assigned according to a point system which takes into account accidents, major traffic violations and years licensed. The "inexperienced" operators, those licensed less than three years, are included in the one-point category otherwise reserved for drivers with a record of one chargeable accident or conviction of a moving traffic violation--subject to exceptions[44]--as a result of which an operator's license was suspended or revoked.[45] There is absolutely no indication that "inexperience" and driving records of this sort are actuarially equivalent.

Moreover, inexperience surcharges are also troublesome to the extent the overwhelming majority of drivers they affect are classified as youthful operators. These youthful classifications are said to be priced on the basis of the average loss experience for

youthful operators. Obviously this youthful loss experience would represent the bulk of any data collected for operators who have been licensed for less than three years. Presumably the average losses for the latter--if separated out from the losses for drivers with accident-and conviction-records--would be no greater than the average losses for youths. Absent a separate accounting by ISO for the losses attributable to drivers licensed less than three years, so that the precise magnitude of the obvious overlap between "inexperience" and "youth" can be identified, it is reasonable to conclude that to impose inexperience surcharges on top of youthful classification differentials is to charge twice for the same risk.

2. Application of Surcharges to the Comprehensive Coverage

The ISO, Colonial Penn, Travelers and Prudential Property and Casualty Company apply driving-record surcharges to the premium for all coverages, including comprehensive. Yet, the reasons for the surcharges relate only to driver behavior when actually behind the wheel and operating the insured automobile. The comprehensive coverage insures against hazards unrelated to driver behavior. Such hazards include fire, theft, vandalism, storm damage and the like. The application of driving-record surcharges to the price of this coverage is without reasonable basis.

The ISO has produced data for New Jersey which reflect small average-loss differentials between merit rating categories even for comprehensive coverages.[46] However, the largest part of these differentials is attributable not to the predictive capabilities of merit rating with respect to comprehensive risks but to the characteristics of the insureds making up each merit rating group already accounted

for by other classification factors. The mix-of-business dimension of merit rating pricing will be treated in general terms below. With respect specifically to full-coverage comprehensive, consideration of the mix of primary and secondary classes reduces the credible differentials between merit rating groups to a mere 8 per cent under the ISO data.[47] The differential surcharges imposed amount to 40 and 50 per cent.

Overlap between territory factors and merit-rating factors explains at least part of the mix of business problem affecting interpretation of merit rating loss experience under the comprehensive coverages. If it may be assumed that territory rates reflect differential levels of traffic congestion between localities, the drivers who live in congested environments can be expected to represent a larger proportion of the drivers with accidents than the drivers without accidents. If the congested environments may also be assumed to have higher average crime rates than noncongested environments, the surcharged drivers--the drivers with accidents--will probably show higher average losses for the comprehensive coverages as well as the coverages relating to vehicle operations. Yet the differential losses relating to congested driving environments is supposed to have been accounted for, under <u>all</u> coverages, by the territory rating factors.

3. <u>Variation of Dollar Surcharges by Territory</u>

Virtually all companies apply merit rating surcharges as a percentage of the applicable territory base rate, so that within the same territory all classes of insureds receive the same dollar surcharge but across territories the amount of the dollar surcharge increases in relation to the territory base rate. Larger questions concerning

relationships between the magnitude of surcharges and the spread in other class and territory factors will be addressed below. The problem addressed at this point concerns this variability of dollar surcharges across territories.

Two hypothetical anomalies are suggested. First, if a Newark driver and a Plainfield driver have an accident in Newark and both drivers are surcharged, the surcharge on the Newark driver will be substantially higher in dollars than the surcharge on the Plainfield driver. Each surcharge will vary in relation to the base rate of each driver's home territory. Similarly, if a Newark driver and a Plainfield driver commit a major traffic violation at precisely the same place and in precisely the same manner at some place far from home for both drivers, surcharges assigned will again vary according to the base rates of the home territories.

The evidence indicates that surcharges should vary across properly defined territories; but they should not vary in direct proportion to base rate, nor should all insureds with accidents be treated the same way within the same territory. If territories were defined to reflect differences in typical driving environments, a bad driver could be expected to be a greater hazard in a congested territory than an uncrowded one, all else being equal. However, drivers in congested territories with only limited blemishes on their records, say one accident, should already be paying higher territory rates which reflect an expectation of above-average accident frequencies. To surcharge these drivers again, in proportion to an already higher base rate, double-counts for the same environmental factors. For these persons a flat-dollar surcharge statewide or a surcharge inversely proportional

to base rate is likely to be the most accurate. In contrast, drivers with many accidents on their driving records are very likely to be high-risk drivers in any environment and the risk characteristics of the territory merely compound the hazard overall. Some multiplicative relationship between the accident surcharge and the territory base rate is probably in order for this group.

C. Definitional and Administrative Problems

The major obstacles to use of accident-and conviction-records as a basis for premium differentiation, whether in the limited fashion seen today or in an enlarged role, relate to administrative feasibility concerns. The most important of these concerns fall into two categories: (1) recordkeeping and verification problems and (2) safeguards affecting determination of "fault".

1. Recordkeeping and Verification

It is not convenient for companies to keep track of accidents on other than vehicles they insure. If a driver in the insured household has an accident on some car not insured under the household policy, the accident will not show up unless either it has been recorded in the motor vehicle record of the individual driver and the company has requested a copy of such record in pricing the policy, or the insured voluntarily discloses the accident to the company. With respect to convictions, the pricing company is entirely dependent on motor vehicle records or an accurate accounting of prior convictions by individual insureds. Companies have traditionally disfavored routine checking of motor vehicle records and have largely depended upon voluntary disclosures except with respect to assigned-risk business.

A problem associated with motor vehicle records concerns inevitable lags in the recording of accidents and convictions, such

that a surchargeable event may be missed if it occurs too close to the next succeeding renewal date and may not be picked up until the subsequent renewal date as much as 6 months or a year later. Conceivably an insured can attempt to manipulate the system by switching companies after every accident or conviction and not disclosing the event to the new company. By the time the motor vehicle record can be obtained it is not impossible for the insured to have switched to still another company.

Hypothetical administrative problems surrounding verification of accidents and convictions should not be a bar to their enlarged use in rating. Although these issues will be explored further in the expected hearings on merit rating, verification problems should be minimized by reliance on voluntary disclosures coupled with subsequent verification in every case by motor vehicle records. The garden variety manipulators can be deterred by the threat of cancellation or non-renewal in the event information supplied proves materially false or incomplete. Existing law governing cancellation or the regulation governing non-renewals can be modified to adopt this standard.[48] Those who go to extreme lengths to avoid detection, say by continually switching companies, should be detected nonetheless in the ordinary cause of the underwriting process.

A larger problem concerns the inclinations of insureds to file small claims if they know that resulting surcharges will cost more than the recovery. The tendency to avoid making small claims is probably not uncommon among savvy insureds and makes sense under the current system. For example, the ISO would require that an insured having any accident involving property damage in excess of $300 be

surcharged 40 per cent of the applicable base rate. If the insured lives in a territory with say a $600 base rate, the surcharge will cost $240 per year for three years. The claim filed would have to equal at least the present value of $720 for the insured to break even. If the insured knows this, he is obviously not going to file. Resulting loss data will therefore be distorted by factors unrelated to risk. A solution to this problem is in the pricing of merit surcharges and the definition of chargeable accidents. In the current economy the definition of a chargeable accident must be increased as base premiums increase.[49]

2. Determination of Fault

It is important to the integrity of the merit rating concept that driving-record surcharges be related to at-fault conduct. Current practices vary on this point. The ISO plan would immediately surcharge for any accident regardless of fault, subject to a refund if the insured later wins a court judgment or is reimbursed by some other party. As a practical matter this approach leaves a burden on the insured to come back to the company with proof of innocence, after perhaps several years of paying surcharges.

Lag between occurrence of an accident and determination of fault is probably inevitable, and as certain is the resentment of the insured when a surcharge is imposed before questions are resolved. Deferring the imposition of a surcharge until fault has been settled may create its own problems but they are mild by comparison. Although incentive effects may be diminished if too much time elapses between the event and the surcharge, the primary purpose of merit rating is differentiation of risk--not behavior modification--and in this respect

lags in updating rating information should be of no greater magnitude or consequence than similar problems under other classifications.

Time-lag problems can be minimized by gearing the imposition of surcharges to the payment of property damage claims. Property damage liability claims are involved in most two-car accidents, they imply fault on the part of the insured, and they tend to be settled rapidly. In one-car accident situations, collision claims are similar. Only in the small faction of accidents confined solely to bodily injury claims--essentially pedestrian cases--are delays likely in a significant number of cases.

The use of traffic convictions as rating factors can have its own problems related to fault-determination. The most frequently cited concerns the possibility of uneven law enforcement. This contention is impossible to evaluate, but as mere supposition it cannot serve as reason for limiting the scope of merit rating. The human factor is not confined to enforcement of the traffic laws. It affects as well all aspects of accident reparations.

D. The Differential Risks of Drivers With Accident and Conviction Records

Average-loss data for merit rating categories confirm their ability to identify differences in risk between groups. Under current pricing methods, however, these differentials cannot be fully reflected in premiums. The subordinate role chosen for merit rating by the industry limits its potential contribution to the predictive accuracy of the system as a whole.

1. The Pricing of Merit Rating Variables

The pricing of accident-record and conviction plans appears highly judgmental under current practices. The Travelers witness

suggested that competitive pressures work to encourage the underpricing of merit rating differentials.[50] A fair inference is that when choosing among alternative approaches to allocating costs, companies prefer the sharpest cost differentials to follow demographic and geographic lines. The aspect of merit rating most appealing to regulators may well represent its greatest deficiency to the industry: a rating system which focuses on actual driving records pays too little heed to the overall desirability of risks in a business sense.

The average-cost data submitted by both State Farm and ISO confirm that the pricing of merit rating differentials does not conform with reported experience. State Farm's own estimate of the indicated surcharge for the one-accident group is 29 per cent. The surcharge State Farm actually imposes on this group is 10 per cent. Similarly, State Farm's estimates of indicated surcharges for the two-and three-accident groups are 67 per cent and 139 per cent. The actual surcharges imposed, respectively, are 30 per cent and 80 per cent.[51]

A representative sample of the ISO merit rating experience is set forth in Table 58. Column 3 reflects the actual surcharges imposed under ISO's Safe Driver Insurance Plan. Column 4 displays the differentials in average loss costs--indicated surcharges--for each group relative to the zero-point group as determined from the raw data. For the bodily injury coverage, only the experience for the zero- and one-point groups can be said to be fully credible by the conventional claim-count standards. For the property damage coverage, only the zero-, one-and two-point groups are fully credible.[52] Nonetheless, the differences between the raw differentials and the surcharges actually in use are substantial and consistent. For example,

TABLE 58

ISO MERIT RATING DATA

(EXPERIENCE REFLECTS SINGLE CAR VOLUNTARY BUSINESS)

	Penalty Points (1)	Earned Exposure 1975-1977 (2)	Surcharge Factor (3)	Indicated Pure Premium Relativity (4)
Bodily Injury	0	1,109,308	1.00	1.00
	1	160,065	1.40	1.58
	2	14,240	1.90	1.99
	3+	1,143	2.61	4.09
Property Damage	0	1,109,308	1.00	1.00
	1	160,065	1.40	1.60
	2	14,240	1.90	2.18
	3+	1,143	2.61	5.46
Comprehensive (Full Coverage)	0	614,016	1.00	1.00
	1	88,716	1.40	1.22
	2	9,278	1.90	1.26
	3+	800	2.61	2.87
Collision ($100 Deductible)	0	474,338	1.00	1.00
	1	69,728	1.40	1.50
	2	7,032	1.90	2.02
	3+	639	2.62	2.85

Source: Exhibit D-74.

the one-accident group is surcharged 40 per cent under the ISO rating manual. The raw data suggest an average cost differential for this group of about 60 per cent.

The accurate pricing of merit rating relativities is important because if the overall classification system is accurately priced, the magnitude of merit rating differentials will impact on the spread required for other class and territory factors. The two types of variables are in fact interdependent. The more the variation in risk explained by classes and territories, the less is left to be explained by merit rating and vice versa.[53]

Table 59 adds to the information displayed in Table 58 certain mix-of-business factors. Column 5 of Table 59 summarizes the average rating factors applied to members of each merit rating group based on primary class and territory characteristics before consideration of merit rating. Applying these mix of business factors to average premiums for each group derives between-group premium differentials before application of merit rating surcharges. These premium differentials are summarized in column 7. The results indicate, for example, that the one-point group pays on average 52 per cent higher premiums for the bodily injury coverage than the zero-point group as the result of class and territory factors other than merit rating surcharges.

The use of the mix of business factors to adjust the raw pure premiums for each merit rating group produces a revised set of merit rating relativities as summarized in column 6. These differentials represent the amounts of difference between merit rating groups--relative to the zero-point group--which are not already

TABLE 59

INTERPRETATION OF ISO MERIT RATING DATA
(EXPERIENCE REFLECTS SINGLE CAR VOLUNTARY BUSINESS)

	Penalty Points (1)	Earned Exposure 1975-1977 (2)	Surcharge Factor (3)	Indicated Pure Premium Relativity (4)	Mix of Business Factor (5)	Column (4) Adjusted For Mix of Business (6)	Relativity For Present Average Premium (7)
	0	1,109,308	1.00	1.00	0.996	1.00	1.00
	1	160,065	1.40	1.58	1.169	1.35	1.52
Bodily Injury	2	14,240	1.90	1.99	1.560	1.27	2.34
	3+	1,143	2.61	4.09	2.955	1.38	4.38
	0	1,109,308	1.00	1.00	0.989	1.00	1.00
	1	160,065	1.40	1.60	1.165	1.37	1.53
Property Damage	2	14,240	1.90	2.18	1.558	1.40	2.36
	3+	1,143	2.61	5.46	2.964	1.84	4.44
	0	614,016	1.00	1.00	1.009	1.00	1.00
	1	88,716	1.40	1.22	1.138	1.07	1.49
Comprehensive	2	9,278	1.90	1.26	1.178	1.07	1.96
(Full Coverage)	3+	800	2.61	2.87	1.342	2.14	2.73
	0	474,338	1.00	1.00	0.993	1.00	1.00
	1	69,728	1.40	1.50	1.093	1.38	1.35
Collision	2	7,032	1.90	2.02	1.161	1.74	1.74
($100 Deductible)	3+	639	2.62	2.85	1.274	2.24	2.60

Source: Exhibit D-74.

accounted for by other class and territory factors. Thus the raw differentials in column 4 are accurate indications of group-average risk differences only if merit rating classifications are the variables used first to differentiate insureds. Because merit rating is today used only after other class and territory factors have stratified drivers, the adjusted differentials in column 6 are a more accurate indication of unique additional differences in risk across merit rating groups.

The merit rating surcharges specified in the ISO manual (column 3) are somewhere in the middle. They are too low if merit rating is the only variable considered and too high, especially for the multiple-point groups, if the effects of other class factors are taken into account. In order to price these surcharges correctly (1) they must be scaled down for those insureds with the worst driving records, or (2) discounts must be extended to clean risks in high-rated classes and territories, or (3) surcharges must be increased consistent with the raw indications coupled with reduction in the spread of other class and territory differentials--affecting alike those drivers with and without clean driving records--to avoid redundancy.[54] The first approach is unfair to drivers with clean records. Of the remaining choices, the latter is the more feasible provided multiple-accident risks are properly differentiated from other surcharged risks in the same territory.

Redundancy in the pricing of merit rating surcharges, observed after mix of business factors are taken into account as in column 6 of Table 59, has especially important implications for insureds in the highest-rated classes and territories. For example, the average

loss experience of the high-rated youthful classes indicate that youths as a group have disproportionately high accident frequencies and losses. The data used to support surcharges for the drivers with one or more accidents therefore must also include a disproportion of youthful loss experience. Hence the same losses are counted twice--once in developing the youthful differential and once in developing merit rating surcharge levels. Viewed another way, if the premiums for youthful drivers reflect the higher loss probabilities for youths, surcharging these youths when the losses actually occur amounts at least in part to charging twice for the same risk.[55]

2. The Explanatory Power of Merit Rating

Even with its current imperfections merit rating ranks surprisingly well as a predictor of accident likelihoods, at least in comparison to demographic and geographic variables. ISO's Safe Driver plan explains about 6 per cent of the total variation in risk among insureds for the compulsory coverages. This explanatory power figure is the equivalent of that generated by ISO's "2nd digit" (which includes age) on the same data.[56] Enlarging the role of merit rating and refining the use of traffic convictions should enhance this result.

The prevailing view in the industry is that merit rating, especially with respect to traffic convictions, has significant but limited predictive value and should be used only as a supplement to primary variables. The ISO considers only the following types of traffic convictions in the pricing of policies: (1) drunken driving (or driving under the influence of drugs); (2) hit and run; (3) homicide or assault arising out of the operation of a motor vehicle; (4) driving while license is suspended or revoked or (5) any other

moving traffic violation as a result of which a license is suspended or revoked. The Travelers, unique among companies in New Jersey, considers almost all "moving" violations, and a variety of equipment violations; but it does not impose surcharges for first convictions on simple moving violations.[57]

The secondary importance attributed to merit rating is largely self-fulfilling. Evidence adduced at the hearing indicates that a broader use of conviction records is likely to identify actuarially significant differences in inherent risk not now identified by current rating systems. Data developed by the Travelers in studies during the early 1960's indicate that groups of drivers with one "minor" traffic conviction demonstrate significantly higher accident frequencies than groups with no convictions.[58] Still additional studies, offered by Travelers, show that according to motor vehicle data in each of three states examined--California, North Carolina and Texas--groups with one traffic conviction have twice as many accidents as conviction-free groups. The groups with two and more convictions develop average accident frequencies no less than three times higher than the conviction-free groups.[59]

The Travelers own loss results, based on 1963 countrywide data, indicate that insureds with only one "minor" conviction generate an average loss per car about two times the average for insureds with no convictions.[60] Even drivers over age 30 with one or more convictions on their driving records show no less than 50 per cent greater accident frequencies than the conviction-free groups in the same age brackets.[61] The capacity of conviction rating to differentiate group-average risks is confirmed by the oft-cited California Driver Fact

Book[62] and the exhibits offered by Allstate. The consistency of the indications is reflected in the data samples displayed in Table 60.

A potential drawback of conviction rating is that a relatively small segment of the total driver population are convicted of traffic offenses in any three year period--the typical experience period for reviewing traffic conviction records. In the New Jersey motor vehicle data examined at the hearing, about 8.5 per cent of New Jersey drivers showed one or more convictions over a four-year period.[63] This percentage is likely to be understated as the result of point forgiveness accompanying the 1977 motor vehicle law reforms in this State, the omission of drivers whose licenses were revoked for driving-under-the-influence (for which no points are assigned), and inclusion in the sample of drivers who have not been licensed for the entire period. However, inflating the data for insurance purposes are drivers with convictions who do not own cars or have parents who do, and drivers without convictions who are licensed but do not drive. Nonetheless, diminutive size is characteristic of a number of classification variables currently in use, especially those generating the extremes in rates observed for some of the youthful classes. Conviction-rating can be no more arbitrary in this respect.

The use of traffic conviction records as a primary basis for rating was proposed in testimony by the Department's former Chief Actuary, Philipp Stern. Mr. Stern proposed the plan as a "logical substitute"[64] for current dependence on age and other demographic variables, commending it as a practical approach to preserving industry revenues and price differentiation while addressing public displeasure over the imposition of large premium differentials on drivers with

TABLE 60

ACCIDENT RATES BY NUMBER OF CONVICTIONS

Average Accident Frequency Relative to Zero Conviction Group

Number of Total Convictions	California Driver Fact Book		California Driver* Record Study	University of North Carolina#
	Table 5	Table 6		
0	1.00	1.00	1.00	1.00
1	1.95	1.40	1.82	1.86
2	2.70	1.80	2.56	2.61
3	3.54	2.15	3.21	3.27
4	3.98	2.43	4.14	3.65
5	5.17	2.60	4.55	3.39
6	5.34	3.24	4.70	3.92
7	6.72	2.99	5.77	3.49
8	8.11	3.55	5.04	
9+	9.03	3.68	6.52	

*Exhibit A-5, "Good Driver Plan Violation Rating Plan", Exhibit G, page 1.

#Exhibit A-5, Exhibit G, page 5, 7 convictions group includes 7 or more convictions.

clean driving records. Mr. Stern contends that enlarging the use of traffic conviction records in rating would respond to industry concerns that (some) youths generate a disproportionate share of bad driving records but would also include in the same class with errant youths the adults who are known to have engaged in similar kinds of behavior.[65]

New Jersey Motor Vehicle data presented by Mr. Stern indicate that licensed drivers under the age of 30 represent about 30 per cent of all licensed drivers in the State but accumulate about 60 per cent of total points for motor vehicle violations. The ratio of points to drivers among the under-30 youths is about three times as high as points to drivers among adults (.577 per driver under 30 vs. .189 per driver 30-through-64).[66] If dollar values were assigned to these points for insurance rating purposes, the kinds of rate differences now identified between youths and adults would persist but they would be realigned across the age barrier to relate directly to demonstrated instances of driver misconduct. The rate burden shouldered exclusively by the youthful classes--youths with and without convictions alike--would be shifted to those youths and adults with motor vehicle convictions.

IV. THE MULTICAR DISCOUNT

Department records indicate that some form of multicar discount dates back to at least the 1940's when a standard rule provided a discount on coverages for cars which exceeded the number of named operators. By 1955 the Automobile Liability Manual of the National Bureau of Casualty Underwriters, ISO's predecessor, provided a percent-

age reduction of rate for adult insureds with more than one car regardless of the number of operators. The practice of ignoring number of operators prevails today, although Colonial Penn still provides additional discounts in situations involving vehicles in excess of operators.

A. Conceptual Problems Relating to the Current Definition and Application of the Multicar Discount

The conceptual basis for the present multicar discount is the hypothesis that availability of more than one car for a family's use--regardless of number of operators--reduces the exposure on each car:[67]

> "The multi-car discount program was originally based on the theory that both cars would not be used full time by a two car family because it was speculated that only one car would be used during the evening hours or when a family was on trips or vacations."[68]

Whatever the logic of this hypothesis, failure to distinguish among multicar families according to number of operators necessarily increases the diversity of risks included in the multicar classification. A significant portion of the multicar policies with more cars than operators are inevitably overpriced and a comparable portion of multicar policies covering more operators than cars are correspondingly underpriced. Two-car families with two, three and four operators inappropriately enjoy the same per-car discount as the two-car risk with only one operator.

The diversity of risk within the multicar category is probably enhanced by the susceptibility of the classification to manipulation. By merely listing multiple cars under one name they can automatically qualify for the discount, whether or not in fact

the named owner has effective control over the car in question or any intention of ever using it. The temptation to twist the truth in this respect is probably greatest in the case of cars purchased by youths and used exclusively by youths but registered and insured in the parents' names in order to qualify for lower rates.

The multicar discount raises additional conceptual problems with respect to methods of application. In the case of ISO, the discount reduces premium on all affected policies by a percentage of the applicable territory base rate, so that within the same territory all classifications of insureds receive the same dollar-amount of discount. The approach effectively grants discounts amounting to a higher proportion of premium for the low-rated classes than the high-rated classes within the same territory. Only across territories does the discount amount to a uniform proportion of premium with the highest-rated territories receiving the largest discount in dollars.

State Farm applies the multicar discount as a uniform percentage of premium across both classifications and territories.[69] Under this approach the highest discounts in dollars go to insureds who pay the highest premiums overall, as determined by both class and territory factors. Within the same territory higher-rated classifications receive larger discounts in dollars than lower-rated classifications. Allstate has two separate percentage discounts with the smaller percentage discount applying to youthful operators for the liability coverages. Discounts are not given on the comprehensive coverage to any class.

Questions concerning the correctness of methods for applying the multicar discount are related to but separate from the more general

issues surrounding methods for combining class and territory factors (assuming a lack of credible experience for each multicar class-by-territory cell.) In whatever manner expected loss costs are estimated before application of the multicar discount, logic dictates that the higher risks, so estimated, receive the larger discounts in dollars from otherwise applicable rates. To the extent multicar ownership is supposed to involve diminished usage per car, such reduction in usage should reduce the total risk of high-risk insureds by larger absolute magnitudes than it reduces the total risk of low-risk insureds. In other words, if this reasoning is correct, the interaction of risk factors should be multiplicative (and the State Farm approach is the most accurate).

Available data, however, fail to confirm the likely interactive relationship between the multicar variable and other class factors. ISO's statewide loss experience confirms a multiplicative relationship for some classes and something less than multiplicative for others, as reflected in Tables 61 and 61A, infra. State Farm's raw experience produces similar results but is too thin to permit firm conclusions.[70] The absence of a clear reading from the data is probably responsible in some part for the diversity of pricing approaches among the filers.

Failure to account for number of operators frustrates efforts to interpret the Table 61 data and similar multicar comparisons. Adult-only multicar policies are likely to have two or fewer operators regardless of the number of cars, so that the number of operators should be less than or equal to the number of cars in most cases. Typical multicar policies involving youthful operators can be expected

to represent family situations with three or more operators. The additional operators on these policies should tend to blunt the class-average impact of diminished per-car usage otherwise attributable to ownership of multiple cars. Yet the minority of youth-rated policies involving more cars than operators probably deserve the largest discount; and the adult multicar policies with more operators than cars should receive the smallest discount or none at all.

The distortions caused by failure to control for number of operators are reflected in the Allstate proposal to eliminate the multicar discount for seven youthful classes. Allstate submitted loss-ratio data which indicated better average loss experience for adult-only multicar policies than adult-youth multicar policies.[71] (Nothing was submitted for youth-youth multicar policies.) The suggested differential impact of multicar status is probably explained by differences in average number of operators.

The applicability of multicar discounts across coverages, in particular the application of the discount to the comprehensive coverage, raises still another conceptual problem. ISO, Colonial Penn, Travelers and State Farm apply the discount to all coverages, while Allstate applies it to all coverages except comprehensive. Because the discount relates to supposed usage patterns and comprehensive coverage relates primarily to environmental hazards, separate pricing of the comprehensive coverage is in order. Some comprehensive hazards do relate to amount of usage--such as collision with animals and birds or glass breakage--but the coverage is sufficiently unique in this sense to require separate treatment.

TABLE 61

AVERAGE LOSS COST PER CAR
SINGLE CAR VERSUS MULTICAR

LIABILITY COVERAGES

	Single Car	Multicar	Per Cent Difference
Adult, pleasure	$ 34.79	$ 24.10	-30.7
Senior, pleasure	23.10	18.82	-18.5
Females 30-64	29.83	43.08	+44.4
Single Females 17-20	47.28	39.43	-16.6
Single Females 21-24	41.48	33.82	-18.5
Married Males 17-20	52.06	35.36	-32.1
Married Males 21-24	38.29	33.53	-12.4
Unmarried Males			
Occasional 17-20	68.40	47.98	-29.8
Occasional 21-24	52.03	40.78	-21.6
Principal 17-20	76.84	61.91	-19.4
Principal 21-24	48.00	32.02	-33.3

Source: D-90, D-94 ISO Data
Loss costs are average of the three coverages bodily injury, property damage, personal injury protection.

TABLE 61A

AVERAGE LOSS COST PER CAR
SINGLE CAR VERSUS MULTICAR

PHYSICAL DAMAGE COVERAGES

	Collision		
	Single	Multi	Per Cent Difference
Adult, pleasure	$ 54.78	$ 46.40	-15.3
Senior, pleasure	32.19	29.22	- 9.2
Single Female 17-24	72.06	64.10	-11.0
Unmarried Male 17-24			
Occasional	104.60	83.38	-20.3
Principal	132.14	109.62	-17.0
	Comprehensive		
Adult, pleasure	$18.03	$12.89	-28.5
Senior, pleasure	3.49	5.77	+65.3
Single Female, 17-24	12.21	10.52	-13.8
Unmarried Male 17-24			
Occasional	14.47	11.05	-23.6
Principal	24.74	18.45	-25.4

Source: D-90, D-94, ISO Data

B. Average Cost Differentials and Related Pricing Problems

Average loss cost comparisons indicate lower losses for multicar insureds but of uncertain proportions. Tables 61 and 61A display differences in average losses based on three-year ISO data.[72] Average multicar losses range from 12 to 33 per cent below single-car losses. One class group, females 30-64, produce higher losses under multicar policies but on a limited number of exposures.[73]

Comparisons of average loss costs for single- and multicar categories are sensitive to mix of business considerations. The detailed eight-territory distribution sample for ISO policyholders indicates that the largest proportion of multicar risks reside in low-rated territories. Insureds residing in the three urban territories represent a proportion of single-car insureds in the eight-territory sample almost three times as large as their proportionate representation among multicar insureds.

Specific territory distributions for the eight-territory sample are displayed in Table 62. The average territory differential or factor for the single-car insureds is between 5 and 6 per cent higher than the average territory factor for multicar insureds. This is a substantial difference for a sample involving a small population of urban insureds in absolute numbers. On the reasonable assumption that the distribution is typical, five or six points of any multicar differential can be explained solely by differences in territory mix.

The eight-territory sample provides less striking but nonetheless significant contrasts with respect to mix of age classifications across single- and multicar categories. Specific distributions are displayed in Table 63. The multicar experience includes a larger

TABLE 62

DISTRIBUTION OF SINGLE AND MULTICARS
(TOTAL POPULATION) BY TERRITORY*

Based on 8 Territory Sample

		Multicars		Single Cars	
	Territory	Number	%	Number	%
02	Newark	4,424	1.1	6,456	3.1
07	Camden	2,356	0.6	3,032	1.4
01	Jersey City	10,439	2.6	16,741	8.0
14	Burlington, Gloucester, Salem Counties	70,393	17.7	34,266	16.3
27	Southern Counties	72,938	18.4	47,653	22.7
40	New Brunswick	53,335	13.4	23,699	11.3
10	Northern Bergen County	81,855	20.6	36,991	17.6
25	Dover, Morristown, Somerville	101,909	25.6	41,074	19.6
	Combined	397,649	100.0	209,912	100.0

*Based on accident year 1977 New Jersey Private Passenger Non-Fleet Automobile Liability Voluntary risks earned exposures for all companies reporting to the Insurance Services Office.

TABLE 62A

AVERAGE TERRITORY RATING FACTOR*

Based on 8 Territory Sample

Multicars	Single Cars	Percentage Of Difference
.999	1.055	1.056

*Based on liability base rates effective December 28, 1979 for the Insurance Services Office.

TABLE 63

DISTRIBUTION OF SINGLE AND MULTICARS BY AGE

	Single		Multi	
Class	Number	Percent	Number	Percent
Adult	669,173	30.1	1,554,630	69.9
Operator 65 & Over	209,874	74.8	70,734	25.2
Only Operator Female 30-64	160,897	92.5	13,133	7.5
Total Adult Classes	1,039,897	38.8	1,638,497	61.2
17-20	89,128	32.9	181,903	67.1
21-24	119,084	53.8	102,203	46.2
25-29	36,896	78.1	10,371	29.1
Total Youthful Classes	245,108	45.4	294,477	54.6
Grand Total	1,285,005	39.9	1,932,974	60.1

Source: D-90, D-94. ISO Data, property damage liability exposures.

proportion of adults and single-car experience includes a larger proportion of youths.

The majority of cars insured under the rating plans of the major filers are in the multicar category. (Colonial Penn is probably the only exception.) Multicars represent about 60 per cent of ISO exposures. Any inaccuracy in the pricing of multicar discounts can have a significant impact on both the level and distribution of premium income. The evidence indicates that the discount is in fact not accurately priced. Failure to account for number of operators, the failure to resolve proper interpretation of interactive effects, the variability of indicated differentials across age groups, and sensitivity to mix of business considerations suggest that current discounts do not represent an accurate reflection of differential risk in many or even most cases.

Section 7

PRICING METHODOLOGIES

I. ESTIMATION OF CLAIM EXPERIENCE BY CLASS-WITHIN-TERRITORY CELL: THE MULTIPLICATIVE-ADDITIVE ISSUE

Under traditional pricing methods, territorial cost ratios and driver-class ratios are multiplied to compute a final price. A policyholder in a driver class whose average claim cost is three times the statewide average, and in a territory whose average claim cost is two times the statewide average, would traditionally be charged a premium six times the statewide average rate.

Whether this is an accurate or equitable method of computing a premium is a question that has been raised with increasing insistence in recent years, and with good reason: Steadily rising automobile insurance rates during these years mean that the premiums computed by this method have reached truly awesome size, particularly when the ratios being multiplied are those of the highest-rated driver classes and territories. Since the highest-rated driver classes have been those for youthful drivers and the highest-rated territories are urban areas, the insureds who have paid the largest premiums under this method are urban youths. For example, the multiplication of the high territorial and driver-class ratios applicable to a young male living in Newark, even one with a clean driving record, could have produces a premium of $2,494 for a full package of liability and physical damage coverage.

Premiums of this magnitude would be a problem in any event, but they are unconscionable if they result in part from a rating method that systematically overcharges the highest-rated drivers. Fortunately, it is possible to test the accuracy of the traditional multiplicative method of combining information about class and territory.

At bottom, the multiplicative method of computing a rate is valid only if it is an accurate means of estimating the expected losses, or expected claims, that will be incurred by insureds in a particular combination of driver class and territory. In making rates, insurers first compute their loss cost requirements statewide and in each class and territory; provision for adequate expense costs, profits and taxes is traditionally made by appropriate adjustments to the loss cost figures. It is the presumed ability of the multiplicative method to accurately estimate loss costs for every combination of class and territory that makes it a valid method, after such adjustments, of computing a final price or premium for each insured.

For purposes of analysis, it is most important to examine the performance of the multiplicative method in its basic function as an estimator of loss cost variations for each combination of driver class and territory. It is useful to think of such combinations as individual cells in a matrix in which driver classes are arrayed across the top, and territories are arrayed along the side. Using such a matrix to identify at least a large representative sampling of all possible combinations of class and territory, we can produce a table showing the estimated average claim amounts per cell for any insurer in any designated previous year. These are obtained by multiplying the insurer's driver class and territorial ratios (relativities) by its statewide average claim amount. We can also produce a comparable table showing the observed average claim amounts for each cell in the same year. By comparing estimated with observed losses, it is possible to draw conclusions about the accuracy of the multiplicative method.

The bases for such conclusions are not immediately obvious to the untrained eye. No estimating method can yield perfectly

accurate results, and the series of larger or smaller discrepancies between estimated and observed losses must be subjected to rigorous statistical analysis employing a variety of performance criteria. Our conclusions may be relative as well as absolute. The performance of the multiplicative method can best be understood through detailed comparisons with the results obtained when an alternative method is applied to the same estimating task and to the same loss data. Since one of the most important attributes of an estimating method is to perform reliably when applied to new and different loss data, however, the extensive statistical literature describing the inherent characteristics of various methods is also relevant.

The principal Department witness on estimating methods was Dr. William B. Fairley.[1] Dr. Fairley was a statistician and economist with the Massachusetts Division of Insurance between 1976 and 1979, and had served before that as associate professor in the Kennedy School of Government, Harvard University. He holds a doctorate in statistics. The author of numerous studies on statistical subjects, Dr. Fairley has had occasion to study in depth the performance of several estimating methods which can be used in automobile insurance rating. With Dr. Lena Chang, he authored "An Estimation Model for Multivariate Insurance Rate Classification" appearing in the Massachusetts Division of Insurance publication Automobile Insurance Risk Classification: Equity and Accuracy in 1978. Dr. Fairley and Dr. Chang also authored "Pricing Automobile Insurance under Multivariate Classification of Risks: Additive versus Multiplicative," which appeared in the March, 1979 issue of The Journal of Risk and Insurance.

As part of his hearing testimony, Dr. Fairley presented a detailed analysis of the performance of the multiplicative method as

evidenced by comparison of estimated and observed losses for New Jersey companies represented by the Insurance Services Office (ISO) in each year between 1975 and 1977.[2] A separate analysis was made for each of three coverages or coverage groups: combined compulsory, collision and comprehensive. The accuracy of this method was then contrasted with the accuracy which would have been obtained if an alternative estimating method--the additive least squares method--had been applied to the same ISO data for New Jersey. The additive method, which involves the addition to or subtraction from the statewide average claim amount of specific differential amounts computed for each class and territory, has been used in Massachusetts since 1978.

A central procedure in the Fairley analysis was the determination of discrepancies between estimated and observed losses, overcharges and undercharges, for each combination of class and territory resulting from the separate application of the multiplicative and the additive methods. When the empirically derived overcharges or undercharges produced by each method were compared for a particular cell, the differences in many cases were quite striking. As suspected, some of the largest variations were for the cells combining the highest-rated classes and territories. Compared with the multiplicative estimate of $387 in average collision claim costs for drivers in ISO Class 8711 and Territory 02--young men living in Newark--the additive estimate was $230, or over $150 less. The observed average claim amount was still less, at $212. The multiplicative method thus overcharged drivers in this cell by an average of $175 for collision coverage, while the additive method would have overcharged them by an average of $18.

Measured more systematically, the differences in accuracy between the two methods were also revealing. Compared for four statistical measures of global accuracy, i.e. their overall success in correctly estimating the observed variations in claim amounts, the multiplicative method proved somewhat less accurate than the additive method. This was true, not in every case but in the majority of cases, whether errors were treated symmetrically or asymmetrically--by global measures assigning equal weight to overcharges and undercharges, or by a global "maximum overcharge" criterion expressing a relatively greater concern about large overcharges.

Although significant, the observed differences in the global accuracy of the two estimating methods were less dramatic than the differences pertaining to systematic bias--the inherent and consistent tendency of a method to generate erroneous estimates for certain groups of policyholders. The multiplicative method performed extremely badly on this score. The "maximum overcharges" associated with the multiplicative method were not only greater than those associated with the additive method but, predictably, they tended to be coalesced in those cells combining the highest-rated classes and territories. In the four cells combining the highest-rated classes and territories for each of the three coverages studied, the average weighted overcharge for combined compulsory coverage was $76; for collision and comprehensive coverages, the multiplicative method produced average weighted overcharges of $34 and $18 respectively in the four highest-rated cells. In contrast, in the same cells the additive method generated an average weighted overcharge of $15 for combined compulsory coverage and undercharges of $13 for collision and $5 for comprehensive. Much closer

on the whole to the observed average claim amounts for the highest-rated driver-class and territory combinations, the estimates produced by the additive method showed no evidence of a systematic bias affecting any groups of policyholders. Its average errors were both smaller and more random, lacking a predictable defect in any particular classification cells.

It is the predictable systematic defects of the traditional multiplicative method that make it fundamentally unsound, and Dr. Fairley has carefully and extensively documented these defects in his analysis of ISO data--data amassed by some 150 companies collectively accounting for about 45 percent of New Jersey's voluntary insurance market. The empirical documentation of these defects is very helpful in pinpointing precise areas of inaccuracy and inequity in the State's present ratemaking system. Yet, as Dr. Fairley has also observed, these empirical findings should hardly come as a complete surprise:

> In a multivariate classification system, some statistical estimation model will generally be employed. Classification ratemaking in autombile insurance has traditionally used a method that assumes a completely interactive model for combining the effects of the variables. A model of this sort may perform well when the differences in claim experiences among driver classes are small and when the differences in claim experiences among territories also are small. However, when substantial differences are found to exist both among territories and among driver classes, a multiplicative formula becomes an inaccurate estimator of claim amounts and works severe undeserved penalties through insurance pricing on those groups having the high average claim amounts. The defects in the traditional multiplicative formula for claims estimation are predictable from its mathematical form. (Emphasis added.)[3]

In other words, as Dr. Fairley has still more succinctly testified: "It's when the product is very large that you expect a problem with

the multiplicative model, because the product gives you [a] geometric effect which becomes really absurd as the individual factors increase."[4]

It is hard to imagine that so simple and plausible a notion could have entirely escaped the attention of insurance industry actuaries who argued during the hearing for the continued use of the multiplicative method. In two separate exhibits purporting to demonstrate the validity of the traditional method, however, spokesmen for both ISO and Allstate presented data analyses whose most salient feature was the failure to isolate and study the geometric and possibly systematically biased estimating effects on groups combining the highest territorial and driver-class relativities.

Much less comprehensive and much more roughly hewn than the Fairley study of its data, ISO's own analysis aggregated all territories into three broad categories and included only three sample driver classes, thereby producing a matrix of only nine cells from which to draw conclusions about either the global accuracy or the systematic bias effects of the multiplicative method.[5] The matrix is too small to provide sufficient information about overall accuracy, and too generalized to isolate and study the method's specific effects on those policyholder groups comprising only the highest-rated territories and classes. The broad territorial definitions are in fact well suited to obscuring evidence of systematic bias, because they are likely to contain heterogeneous populations, and thus to divide and commingle with other policyholders those drivers who have the highest territorial relativities. Further flawed by its use of countrywide loss ratio data combining information about loss costs with information about expense costs, and its unwarranted implicit assumptions about the

expected behavior of the undifferentiated expense cost elements, the ISO analysis is inadequate to support any meaningful conclusions about the validity of the multiplicative method.

The Department requested Allstate to provide similar detailed New Jersey loss cost information by class and territory. These data were to be used by Dr. Fairley to test systematically the accuracy of multiplicative estimation as applied to Allstate data. The company failed to provide sufficiently detailed data to facilitate this independent study, and instead presented its own limited data analysis of multiplicative effects.[6] Like ISO, Allstate sharply narrowed the potential for significant findings from the outset by its aggregation of territories into extremely broad and heterogeneous groupings. A "rural versus non-rural" comparison, for example, presented two broad territorial groupings each of which, according to Allstate's actuary Mr. Young, contained both high and low territorial relativities.[7] Most of the data were countrywide rather than for New Jersey specifically. Drawn from a 1975 Allstate study, the data actually were from the years 1971 to 1973. No historical analysis was presented to clarify whether the relativities then in effect were as high as those used by the company in more recent years. The analysis relied in part on loss ratios, a form of data whose limitations have already been discussed. Although the company concludes that "the multiplicative system of classification relativities is more accurate than an additive system," Allstate's very selective data actually provide considerable support for the validity of an additive estimating method.[8]

Neither ISO nor Allstate actuaries had the opportunity, prior to their testimony, of reviewing Dr. Fairley's more extensive compar-

ison of the performance of multiplicative and additive methods as applied to a large New Jersey data base. It may be significant that attorneys for neither party reaffirmed support for the multiplicative method in their lengthy closing summations.[9]

The third major industry party which chose to present testimony at the hearing on the relative merits of multiplicative and additive estimating methods was State Farm. Alone of the industry witnesses, State Farm's actuary, Mr. Miller, agreed from the beginning that a strictly multiplicative method might not be the ideal way of combining information about driver class and territory. The company's examination of various data had convinced it, according to Mr. Miller, that "the interaction of the class rating factor and the territorial rating factor is not strictly multiplicative, neither is it additive; the answer is somewhere in between."[10] Mr. Miller testified that the pursuit of this elusive answer had motivated State Farm to introduce in some states (but not in New Jersey) "a tempering of the youthful class rating factor consistent with the statistics."[11] This objective is apparently achieved by a variant on the multiplicative method in which territories are divided into two or more separate groupings characterized by low or high relativities. Driver class relativities are computed separately on the basis of the different loss experience in each group, so that the class relativities in the high-rated territorial group might be expected to be different from (and lower than) the corresponding class relativities in the low-rated territories.[12] Mr. Miller presented no additional details on State Farm's experimental method, however, and no data analysis systematically evaluating its performance in comparison to either the traditional multiplicative or an additive method.

Despite Mr. Miller's acknowledgment that the traditional multiplicative method is not the most accurate means for estimating losses for the highest-rated drivers, the position of State Farm's counsel in his closing statement was that the company should be permitted to use either the experimental multiplicative method that Mr. Miller had sketchily described, or the traditional multiplicative method which is currently used in New Jersey.[13] In support of the experimental method, counsel quoted an opinion of Dr. Fairley that "simple additive or multiplicative models are not the only alternatives. It is possible to define models that are intermediate between the two."[14] In support of continued use of the existing multiplicative method, he cited several specific cell comparisons from Dr. Fairley's analysis of State Farm data as demonstrating that this method is "far more accurate"[15] than an alternative additive method.

With due respect to State Farm's position, the best that can be said of its current multiplicative method from the evidence of record is that it performs somewhat better than the same method as applied to ISO data. It does not, however, entirely escape the systematic bias effects associated with the multiplicative method. Neither does it match or surpass the performance of the additive method.

It is possible, of course, to take a particular data set and--on the basis of known values in each cell--select for comparison individual cells that will make any method look better than another in its accuracy results. However, the relevant question about errors in such cells is whether they are part of a consistent pattern that can be expected to repeat itself with different data or whether they are examples of random error inevitable for any estimating method.

In his study of State Farm data--which had been made available to him by the company at the Department's request--Dr. Fairley found that the global accuracy of the multiplicative method was almost as great as that of the additive method, but that it performed less well on the global "maximum overcharge" criterion.[16] When maximum overcharges were more carefully scrutinized in connection with the issue of systematic bias, it was found that they follow the predictable pattern of multiplicative errors, clustering in the cells where the highest driver-class and territorial relativities converge. For each of the four State Farm coverages analyzed, the multiplicative method produced a larger average overcharge than the additive method in the four cells combining the highest driver-class and territorial relativities.[17] These overcharges were much smaller than those observed for the ISO data, most likely because State Farm uses fewer driver classes than ISO and the "spread" between its lowest and highest relativities is not as wide. Nevertheless, the pattern of errors was systematic, predictable, and significant for the policyholders involved.[18] It confirmed the existence of a systematic bias effect which Dr. Fairley has observed in every data set he has examined:

> The conclusions I draw from this survey of average overcharges is that in nine out of the nine cases considered here, that is the three New Jersey ISO coverages, the four New Jersey State Farm coverages, and the two Massachusetts coverages, the multiplicative method produced a larger overcharge. In nine out of nine cases, that is a very strong indication that the method produced a bias in that direction.[19]

In the face of the very persuasive theory for and evidence of systematic bias effects in the use of the multiplicative method, the most that State Farm might plausibly have argued is that the effects

measured in its data are not sufficiently large to be of concern to its policyholders or the State. Even if plausible, such an argument would be unconvincing. While no one expects perfection, it hardly seems acceptable for any rating system to be more tolerant of errors than it need be. When the errors, even though relatively small, can be shown to work consistently to the detriment of particular groups of policyholders--as in this case--the presence of discrimination unlawful under New Jersey's statutes could hardly be more clear. Surely it does not take specialized statistical training, but only a modicum of common sense, to conclude that State Farm's policyholders would prefer that their rates be computed by an estimating method without such systematic bias effects. That was the recommendation of the New Jersey Public Advocate, after having participated actively in this proceeding and availed itself of all pertinent testimony;[20] and that is the result which New Jersey law seems most certainly to require.

Although State Farm had the opportunity to do so, it did not present evidence systematically evaluating the performance of its proposed method. The only information available on the record about this <u>type</u> of method is Dr. Fairley's testimony that, when proposed for use and tested for accuracy results in Massachusetts several years ago, a method of this general description proved inferior in performance to the additive method,[21] which was consequently implemented in that jurisdiction. The forum provided by this hearing was, by express definition and invitation, the one for State Farm to make any case that its proposed method was accurate and workable for New Jersey. Having foregone this responsiblilty, it now ill becomes the company to advocate the trial of this largely undocumented method in preference

to another alternative method whose superior accuracy results have been extensively documented on the record.

On the basis of the information contained on the hearing record, the least inequitable estimating method is the specific additive method whose theoretical and practical attributes have been described or demonstrated by Dr. Fairley. Unflawed by systematic bias effects and generally more accurate by relevant global measures, the additive method is likely to perform better than the multiplicative method as applied to any existing set of driver-class and territorial relativities. The additive method is also devoid of the tendency of the multiplicative method to produce ever more distorted results if the spread between the lowest and the highest class or territorial relativities continues to widen in the future as it has in recent years.

As the record indicates, the additive method enjoys several other theoretical and practical advantages. Its attributes are better known and more clearly documented in the theoretical literature of statistics than the multiplicative method. It produces loss estimates that are more stable over time and less susceptible to dramatic fluctuations due to untypical events, because it is automatically weighted to give greater or less weight to individual cell data depending on the number of exposures a cell contains. The detailed computations necessary to implement the method are readily available in the technical writing of Dr. Fairley contained in the hearing record.[22] In its less specialized and more numerous applications for the computation of an individual insured's final automobile insurance premium, the additive method is as inherently logical and simple in

its way--adding or subtracting predetermined figures, rather than multiplying them--as the traditional method. The use of the additive method in this larger context poses no special administrative problems, as its recent successful implementation in Massachusetts clearly attests.

Given the availability of a fairer and more accurate estimating method, the continued use of the traditional multiplicative method in New Jersey would be a wholly avoidable and therefore intolerable act of discrimination of the kind specifically prohibited by State law. The Department should not permit the continued use of that method by any insurer beyond the present calendar year and will approve no new or pending rate filings relying on that methodology.

II. THE EXPENSE ALLOCATION IN AUTOMOBILE INSURANCE RATES

Besides accurately estimating the expected losses or claims of different policyholders, a fair insurance pricing system must also have an appropriate method for allocating among policyholders a second major component of the premium dollar: an amount large enough to cover an insurance company's expenses. These include the costs of marketing, underwriting, servicing claims, and all other expenses--including an allowance for taxes and profits--that are generally incurred in the business of insurance.

Traditionally, the estimation of average expected claims for different groups of policyholders has also served as the basis for estimating each group's contribution to expense costs. The expenses generated by each group have been assumed to vary in proportion

to their average claim costs. After calculating the average expected claim costs for a group, a company has added a proportional loading to cover expenses, and this in turn determines the total premium payable by a policyholder in that group.

In practice this has meant that different policyholders' contributions toward insurance expenses could be expressed as a percentage of their total premium. While every policyholder has paid roughly the same percentage (the percentages vary for different companies and for different coverages, but average out to about 30 to 35 percent of each premium dollar), the amounts payable by different policyholders have varied dramatically. Policyholders in the higher-rated classes and territories have paid much larger amounts than others. A policyholder with an annual premium of $1,500 would make a contribution to company expenses of $525, for example, while a policyholder with an annual premium of $300 would contribute only $105 of that total toward the same categories of insurer expense. In this example both policyholders pay the same percentage of their premium--35 percent--toward expenses, but the amount payable by the higher-rated policyholder is five times as much.

It is not intuitively obvious that the expenses generated by different policyholders in fact vary in exact proportion to their expected claims, and should therefore be calculated as a percentage of their premiums. This estimating and pricing technique is a very rough ratemaking tool. It was first developed some 50 years ago, at least in part because of the limitations which then existed in the collection and analysis of complex insurance data. At that time, according to one authority, "all ratemaking data had to be compiled

by hand; losses were tabulated by class and territory, a formidable task. In the interest of saving time and work, expenses were compiled by line on a national basis only and then loaded into the rate as a percentage."

As a common-sense proposition, it seems very evident today that there are at least some categories of expense which do not vary with a policyholder's expected claims. It is very hard to see, for instance, why an urban policyholder should pay a much greater share of a company's advertising costs, or of the salary of its chief executive officer, than does a policyholder living in a suburban or rural area. Yet, because of the gradually increasing differentials in the premiums charged to different policyholder groups, some high-rated policyholders now pay higher amounts than ever before as their contribution to these and other kinds of insurer expense. With the advent of sophisticated computer technology, insurance companies now have the means to implement more accurate cost-accounting procedures and to justify any contentions that certain expenses do vary in proportion to a policyholder's expected loss. Technological limitations no longer dictate, and elemental notions of fairness can no longer tolerate, a pricing system that charges much higher expense amounts to some policyholders solely on the basis of unexamined assumptions and an excessive regard for administrative convenience or tradition.

The need to re-examine conventional thinking about insurance expenses has been brought to the industry's attention insistently and repeatedly in recent years. In 1977, the Massachusetts Division of Insurance requested companies to rethink their position on the issue, and the response of the industry's advisory rating organization in

that state was to flatten completely several significant categories of company expense in 1978 rates. A year later, the portion of expenses allocated to agent compensation was also substantially flattened. In 1978 a task force of the National Association of Insurance Commissioners concluded that expenses "should not be presumed to vary with class or territory relativities based on losses" and recommended that expense categories be reviewed individually by regulators to determine which vary with losses and which are incurred independently of loss costs.

In New Jersey, insurers were advised in 1977 that expenses could no longer be presumed to vary by territory and were admonished in 1978 that expenses could no longer be presumed to vary by class. Companies were expected to determine what portion of expenses if any, should continue to vary as a percentage of premium and to flatten all other expenses so that they would no longer vary from one policyholder to another.

As part of its instructions to New Jersey insurers regarding the 1979 hearing on risk classification issues, the Department of Insurance clearly indicated the intention to examine the proper distribution of expenses among policyholders in greater detail than previously. "With respect to the distribution of expenses and commissions," the companies were informed, "the hearing will explore whether or to what extent such costs should be allocated among policyholders on a per-premium (percentage) or per-policy (flat) basis. The analysis will seek to distinguish between those company and producer costs which are common to all policyholders and those which vary in relation to the risk characteristics of classification groupings."

Despite the opportunity and the responsibility explicitly tendered to the industry to come forward and document its views on a proper division of insurance expenses on either a per-premium or per-policy basis, and despite the stimulus to systematic study of this issue provided by regulatory action in previous years in New Jersey and elsewhere, industry hearing witnesses for the most part did not present systematic and detailed analysis of the facts and judgments necessarily underlying any proper distribution of expense costs. Instead, the industry perspective on these issues had to be indirectly ascertained from explanations of the treatment of expense cost distribution in the pending filings of the hearing's three major parties--the Insurance Services Office, State Farm and Allstate. Building on this foundation, questioning by the Department sought to draw forth from industry spokesmen the information necessary for a more general understanding of expense distribution issues.

The Department also introduced into evidence the only reasonably systematic analysis of expense distribution which the record now contains: a research paper by actuary James H. Hunt, who served between 1976 and 1979 as director of the State Rating Bureau in the Massachusetts Division of Insurance and who had earlier been a commissioner of insurance in the state of Vermont. The study, entitled "The Allocation of Insurance Expenses among Automobile Policyholders," was published in 1978 as part of the Massachusetts department's book Automobile Insurance Risk Classification: Equity and Accuracy. Dr. Stefan Peters, a Fellow of the Casualty Actuarial Society and currently the chief actuary of the Massachusetts department, presented additional comments on the Hunt study and provided his own testimony regarding the appro-

priate allocation of commission and non-commission expenses among automobile insurance policyholders.

Making full use of all relevant testimony presented by every witness at the 1979 hearing, the intent of the Department was to develop a record from which the most pressing questions about the accuracy and fairness of present expense distribution methods could be fittingly resolved. One obstacle to achieving this purpose was the proliferation of similar-sounding but sometimes differently construed terms that insurers use to label their expense components, and the less-than-precise knowledge of industry witnesses about the company activities generating each kind of expense.

Although the industry parties made their own selections of witnesses and represented them as competent to respond to the Department's need for information about expenses, the imperfect knowledge of these witnesses about the nature of activities grouped under each category of expense made it more difficult to judge whether or to what extent each expense component actually varies with premium size or, alternatively, should be considered a fixed expense. State Farm, which provided the most detailed written descriptions of expense components and its conclusions as to whether each is fixed or variable, nevertheless provided precious little information about the kinds of methods and judgments applied to reach such conclusions. The Insurance Services Office, which surveyed about a dozen of its 150-odd member companies to obtain their opinions about a proper division of costs as either fixed or variable, apparently requested no information about the nature of the methods and judgments used to reach these important conclusions, and could provide none--except the second-hand inferences of its hearing witnesses--to the Department.

The most general and inescapable conclusion possible from the record is that recent divisions companies have established between fixed and variable costs have been made, in many cases, primarily on the basis of judgment. The witness for Allstate, in particular, testified that his company's decision to partially flatten certain categories of expense had been made solely on the basis of corporate judgment. Regrettably, however, the record indicates that the foundations for such industry judgments have often been as vague and casual as the earlier industry judgment that all expenses should vary as a percentage of premium. Where there is a lack of hard information, the inclination of the companies is to continue to resolve uncertainties to the disadvantage of the highest-rated policyholders by continuing to vary substantial expense elements as a percentage of premiums.

The hearing record compels several other important observations about industry attitudes and practices in regard to expenses. One is that industry officials have trouble focusing on the crux of the problem at hand, which is to determine whether some policyholders generate higher expense costs for the company than others, and to reasonably measure the extent of any differences. Especially in regard to expense components like agent commissions, where traditional industry judgments about expense distribution have been enshrined in contractual arrangements, industry witnesses often implied that tradition and convenience were sufficient support for current methods.

A second observation is that, where they have so far made judgments favoring some moderate flattening of expense allocations, insurers have resorted to a variety of implementing methodologies.

In two out of the three filings examined in depth at the hearing, the treatment of expenses has taken a relatively simple task and made it complicated. Complexity is not inherently to be feared in insurance ratemaking. Where methodologies are necessarily complex, and where they are properly attuned to a valid objective, they can render service which is valuable to the industry and the public. Where they are needlessly complex, they merely raise further obstacles to industry credibility and product intelligibility.

The expense component of the premium dollar, representing about one-third of all revenue collected by companies--comparing to expenses of about five cents per premium dollar for group health insurance--is an extremely large and critical part of what the consumer pays for automobile insurance. The size and cost of accident losses sustained by policyholders are not within the direct control of insurers, but the expense component of the premium reflects elements--organizational efficiency, employee productivity--which are intrinsic to a particular company and are a valid measure of its competitive standing. The traditional proportional loading of expenses onto average expected losses has tended to obscure a company's performance in regard to expenses and to suggest that all price variations have to do with differences in the expected losses of the policyholders. The recognition that many expense costs do not differ from one policyholder to another gives insurers the opportunity to reflect such expenses as a "flat" loading to other premium charges and thereby to provide consumers with a clear-cut measure of competitive pricing performance: the amount, which could be expressed as a dollar fee, that a company must charge to every policyholder to cover the fixed costs which are generated in the conduct of its business.

The methodology necessary to allocate the statewide aggregate fixed expenses of an insurer among its policyholders in the state is relatively straightforward; it essentially involves the division of one number by the other. Allowing for the further adjustments necessary to relate this calculation to customary ratemaking formulas, the concept is still simple and the opportunity--for informing consumers and promoting expense competition--is still large. Of the three major industry participants in the hearing, however, only the Insurance Services Office proposed the expression of fixed expense costs in the form of an easily identifiable expense fee. State Farm, using a method which is similar in effect but very different in form, chooses to alter its classification and territorial relativities to reflect the addition of a constant dollar loading for fixed expenses. Although it is possible to calculate the flat dollar amount for fixed expenses which State Farm charges all New Jersey policyholders, the amount is not expressed as a separate fee or in any manner emphasized by the company, and is not available to agents or indirectly to the general public through the pages of the rate manual.

The methodology employed by Allstate to implement its version of partial expense flattening is even more opaque. According to testimony by Allstate's actuary Mr. Young, the company modifies class and territorial relativities (increasing the lower ones and reducing the higher ones) to reflect some flattening of expense costs. However, the company's traditional ratemaking procedure seeks to maintain equal loss ratios in every class and territory; and in each succeeding year steps are taken to reduce the loss ratio in any class or territory that has risen above the targeted uniform level. As Mr. Young conceded,

the effect of partial expense flattening is to reduce premiums and therefore increase loss ratios in the highest-rated classes and territories. In a subsequent year it would be largely a matter of judgment whether increases in loss ratios had been caused by increases in losses or the intentional flattening of expenses, and the effort to restore acceptable loss ratios could eliminate the previous year's expense flattening. Moreover, as Mr. Young also testified, Allstate's method for flattening some expenses by class and territory does not produce a flat expense payment common to all New Jersey policyholders. Within different classes and territories, the "fixed" expenses still vary from policyholder to policyholder depending on the limits of coverage selected, the applicability of discounts and other factors. In Mr. Young's view, the effort to compute and compare the different dollar amounts of fixed expenses actually charged to two different policyholders under Allstate's system "would be very complex, admittedly, it would be." Although Allstate's methodology assumes that fixed expenses vary among policyholders to whom different coverages, limits, surcharges and discounts apply, the company's spokesman said Allstate has no empirical study to justify this assumption. The ambiguity of its expense flattening method in fact masks an underlying ambiguity of judgment as to how much certain expenses should be flattened; "It's, in effect, a middle ground that we chose not knowing the real answer."[23]

It is very apparent that the "real answer" everyone seeks on the question of an accurate and equitable distribution of expense costs must be based on a much greater sensitivity to the unfair discrimination inherent in the present distribution system, and on more

rigorous review of traditional assumptions, than has so far prevailed. In the face of uncertainty, the continued variation of expense costs as a percentage of premium is the worst possible transitional solution. To the extent that mistakes are being made, they continue to be systematically targeted on those who pay the highest premiums. By definition, the overcharges under this arrangement continue to be largest for those who pay the highest premiums. In the absence of an empirical showing by insurers whether and to what extent specific expense components actually vary by policyholder, the only defensibly non-discriminatory approach to such components is to divide them equally among all policyholders.

The kinds of expenses to be wholly or partially allocated on a per-policy rather than a per-premium basis were the subject of extensive questioning at the hearing. Cost-accounting procedures used by different insurers vary greatly in sophistication and detail. State Farm, for example, has a fairly elaborate system which divides expenses into 23 major accounts and 200 sub-accounts. Many insurers have considerably fewer categories. Although the names and sometimes the content of major expense categories therefore vary from company to company, conventional usage recognizes five broad functional areas of company activity within which nearly all expenses can be classified. The following list briefly describes each of these principal kinds of expense:

1. Production costs, sometimes called acquisition costs, refer to expenses incurred in the marketing and sale of insurance. These are usually divided into commission expenses, involving compensation for agents and brokers, and other acquisition expenses such as corporate advertising.

2. Loss-adjustment costs are those incurred in servicing policyholder claims. Allocated loss-adjust-

ment costs are those which can be associated with a particular claim, such as the fee for an outside lawyer retained to represent the policyholder and the company in pursuing or defending a liability claim. Unallocated loss-adjustment costs are those which cannot be associated with any particular claim. An example would be costs incurred by a company's "in-house" attorneys who work on a number of claim settlements.

3. Taxes, licenses and fees include premium tax payments usually imposed by the state in which a sale is made; payments to state and municipal governments for licenses and fees required to engage in the business of insurance; and payments necessary to support industry associations such as the Guaranty Fund which protects the public against the ill effects of insurer insolvency.

4. A profit allowance is the amount set aside to provide a reasonable return on capital, after the payment of federal corporate income taxes.

5. General administrative expenses is a residual category containing costs not counted in one of the other principal categories. It includes general actuarial and underwriting activity, and home and field office overhead.

Each of the three major rate filings examined during the hearing reflected a different percentage of the premium dollar attributable to total expenses; a different breakdown of these expenses among the principal functional categories; and different conclusions about the need to allocate part or all of each category on a per-premium or per-policy basis.

The filings submitted by State Farm and Allstate, as is commonly the case for insurers engaging in direct sales and employing an in-house agency sales force, allocated a smaller total percentage of each premium dollar to expense costs than the filing submitted by the Insurance Services Office. For bodily injury coverages, total expenses average 35.8 per cent per premium dollar for State Farm and 35.4 for Allstate, compared with 38.3 per cent for ISO. Of its total

expense allowance, State Farm would allocate on a fixed basis expenses accounting for only 7.9 per cent of premiums. This allocation reflects the company's conclusion, which has been implemented in rates for several years, that the fixed portion of expenses actually includes only a fraction of taxes, licenses and fees and the other acquisition expense element of production costs plus the entire general administrative expense category. In contrast, the Insurance Services Office proposes to flatten only three-quarters of its general administrative expenses and three-quarters of a portion of taxes, licenses and fees, together accounting for about 7.1 per cent of premium. Allstate would continue the practice, implemented several years ago, of flattening a substantial but unknown portion--reflecting its decision to flatten only by class and territory, and not by other rating variables--of administrative expenses and other acquisition expenses. Since these two expense components account for 7.2 per cent and 3.8 per cent of premiums respectively, the company would in effect flatten an unknown portion of 11 percent of premiums.

The decision of these three filers to flatten so small a proportion of their total expenses, and the inconsistency of judgment in regard to the fixed or variable nature of major categories of expense--like other acquisition costs and taxes, licenses and fees--at once suggests the need to apply some uniform and realistic criteria to the separation of fixed and variable expenses. In his 1978 study of automobile insurance expense distribution,[24] James H. Hunt defined fixed expenses as "those which management expects to incur regardless of the number of units of production" while variable costs are those which vary "directly with the number of units produced." In analyzing

expenses in connection with the determination of premium rates, Mr. Hunt added, the expense horizon is effectively limited to one year. Although expenses like home office rent may vary over the long term, for the short-term period covered by a rate filing they "may be assumed to be fixed. To put this another way, items that are easily budgetable in advance may be considered fixed expenses."

After detailing a seven-point theoretical model which insurers could use to identify expenses by multiple measures of variability and allocate them accordingly, Mr. Hunt proposed a more practical procedure would simply allocate fixed costs on a per-policy basis, variable costs on a per-premium basis, and divide expense components combining both fixed and variable elements in some reasonable manner. Mr. Hunt cautioned that a "policy" contains numerous coverages and that per-policy costs will therefore have to be allocated in some manner among the various coverages. He also suggested that for purposes of simplification, it is easiest to analyze commission and non-commission expenses separately, a plan of organization we shall follow here.

A. Non-commission Expenses

1. Administrative Expenses

Among non-commission expenses, the expense component whose primarily fixed character appears most obvious is that of administrative expense. The salary of the company's chief executive officer and other management employees is a cost which would be incurred regardless of the number of units produced, and is easily budgetable in advance. So too for the actuarial department which develops rates for all policyholders, and for nearly all the administrative overhead costs

that can be imagined or identified. In a study of cost-accounting data supplied by one insurer, Mr. Hunt concluded that only one activity covered under this expense component--underwriting--might vary to some degree with the risk characteristics of different insureds, and that the costs attributable to this possible variation did not exceed four or five per cent of the total category. This conclusion is similar to State Farm's finding that only about two per cent of administrative expenses are variable by premium; and it is compatible with that company's decision to flatten the entire category of expense.[25]

This conclusion is not consistent with ISO's decision, on the basis of an informal, undocumented, apparently non-extant survey of the judgments of a few member companies, to continue to calculate 25 per cent of administrative expenses as a percentage of premiums.[26] ISO produced no compelling evidence on the record for its implicit contention that 25 per cent of general administrative expense in fact varies with premiums. Allstate's unsupported corporate policy of flattening administrative expenses by class and territory but not by other rating factors is also an inadequate response to the need for a fair allocation of expenses in this category.

Except in the case of an incontrovertible showing that a particular insurer's administrative expenses vary by premium in a larger degree, any pricing method which allocates less than 95 per cent of this expense component equally among policyholders shall be deemed unfairly discriminatory.

2. Other Acquisition Costs

The non-commission element of production costs, commonly called other acquisition costs, is also not likely to vary with pre-

miums. The Hunt study found no expense items in this category which seemed to vary with the riskiness of the insured; and this view is apparently shared by State Farm, which proposes to flatten entirely the non-commission costs generated in this category.

ISO's decision to continue to allocate all other acquisition costs as a percentage of premium is entirely without evidentiary support. ISO's witness, Mr. Walters, described this category as including "internal company expenses in monitoring the field force, in advertising, anything related to the production of business," and further clarified that it has to do with "the market force as opposed to the policy writing or underwriting force."[27] It does not include the costs, for example, of issuing a policy or adding a car to a policy or processing other policy endorsements. Mr. Walters made no suggestions as to how the company marketing activities included in this component actually vary with the riskiness of the insured. The well known and well documented aversion of most companies to high-risk business suggests, if anything, that the advertising and other direct marketing expenses generated by the insurers might be inversely proportioned to risk, with preferred risks being targeted for the more intensive public relations and sales campaigns.

ISO's objection to flattening other acquisition expenses seems not to be based on the conviction that such costs actually vary for different policyholders, but rather on the desire to spare itself administrative inconvenience and practical problems. Unlike individual filers which report other acquisition costs as a separate expense component, ISO chooses to aggregate this expense with agent and broker commission costs under the general heading of "production costs" and

not to disclose where a dividing line falls between the two. To flatten other acquisition costs, it would be necessary to segregate such costs and thus indirectly to indicate the remaining percentage allowance in the rate for agent and broker commissions. This ISO apparently believes it cannot or should not do. In response to questioning, Mr. Walters described his thinking this way:

> Q. You seem to indicate . . . that in addition to general expense a portion of other acquisition expenses and some part of commissions could be included in the flat fee, is that correct?
>
> A. Yes. If commissions were, in fact, flattened by companies in their contractual relationships with agents, then we would reflect it in the ratemaking. . . . . .
>
> Q. What would flattening commissions to contracts with agents have to do with other acquisitions?
>
> A. . . . [T]o be candid, ISO at the present time can't file separate loadings for commission and other acquisition. It could be construed as filing a commission rate which is beyond, I believe, the charter of ISO, but speculating down the road some change in the way companies do business somehow, and there are contractual commission rates with flats and variables, once that area were . . . gotten into, then I believe you could expand to other acquisitions.[28]

Mr. Walters' idea seems to be that if elements of both other acquisition costs and agent compensation eventually came to be calculated on a flat basis, these elements could be broken out as part of ISO's flat expense fee in a way that would preserve an imprecise dividing line between the remaining percentage-based commission and non-commission expenses. Whether or not this is exactly what he envisions, the implication of his remarks is plainly that accurate expense distribution for policyholders is a less urgent priority than the avoidance of real or imagined administrative headaches for ISO.

Nothing in the statutory prohibition of unfairly discriminatory rates can be read to subordinate this standard to ISO's administrative concerns, however, and the organization's proposed calculation of other acquisition costs as a percentage of premiums is unacceptable.

Allstate's decision to flatten other acquisition costs by class and territory is more reasonable than ISO's proposal, but is still inadequate. The company presented no evidence that other acquisition costs vary by policyholder on the basis of coverage limits, discounts and surcharges, and other rating factors not subject to the flattening.

Except in the case of incontrovertible showing that a particular insurer's other acquisition costs are variable by premium, any pricing system which allocates less than 100 per cent of this expense component equally among policyholders shall be deemed unfairly discriminatory.

3. Taxes, Licenses and Fees

The principal expense incurred by insurers in this category is state premium (and municipal franchise) taxes, which are generally levied as a percentage of premiums. The remaining miscellaneous expenses in this category include licensing and examination fees and the payroll (primarily social security) taxes paid by an insurer in behalf of its employees. ISO proposes to flatten 75 per cent of these miscellaneous expenses, while the Allstate filing continues to reflect all of them as variable with premiums.

When questioned about the justification for varying any of the miscellaneous taxes, licenses and fees in this category, Mr.Young of Allstate acknowledged that the company "didn't consider" whether

it would be more accurate to express them as per-policy costs and rationalized that they are "a minimal piece of the expense components."[29] ISO's spokesman also seemed to dismiss the need for a precise demonstration of any variable percentage of expenses in this category. "There is a well known and accepted principle," said Mr. Walters, "that there is more activity generated, relatively more, not a hundred more claims adjusters on high-risk policies than low-risk policies, but relatively speaking there is a little more activity. Whether it's 25 per cent, or 20 per cent, or 35 per cent, it's not worth setting up the mechanism to measure it. It's impractical." Asked about the specific variability of employee social security taxes, Mr. Walters added: "Let me illustrate it, and it's not a large amount . . . It's a small part that could be construed as varying with the risk in that if you only wrote the low-risk insureds, you did not write high-risk insureds, you wouldn't need as many personnel. Whether that number is an extra five percent of personnel, or 15 percent, or whatever, there is more activity on a policy if you write high risks relatively speaking. Policy writing, number of claims activity, underwriting. We have done an analysis of the general administration expense. One could take a position, let's say, it could be reasonable that the same proportion on general administration expense should be allocated to the high risk versus the low risk."[30]

The Department agrees with Mr. Walters that any variability by premiums of miscellaneous taxes, licenses and fees is a "small part" of the total amount and that if a precise measurement has not been made, it is necessary to make a judgment regarding the appropriate degree of flattening. The Department cannot agree with the industry's

arguments that if an expense component is a "minimal piece" of total expenses, or if precise measurement is "impractical," it is therefore appropriate to continue calculating all or a significant part of the component as a percentage of premiums. It is noteworthy in this context that State Farm, the only insurer purporting to have measured the variability of miscellaneous expense, concluded that this entire category "should be allocated as a flat amount in our ratemaking procedure." In regard to payroll taxes--including social security taxes--specifically, the company said: "Since this type of account would not be appreciably affected by a change in premium or losses, we conclude that it is non-variable."[31]

In the absence of an incontrovertible showing by an insurer that its miscellaneous licenses, taxes and fees are variable by premium in a greater degree, any pricing method which allocates less than 95 per cent of this expense component equally among policyholders shall be deemed unfairly discriminatory.

4. Loss Adjustment Expenses

Of all the expense components, loss-adjustment expense is the most stubbornly held by tradition and current industry opinion to be actually variable with premium. The relationship between claim payments and claim settlement costs has been so close that some or all loss-adjustment expenses have traditionally been counted as part of the "loss" rather than the "expense" portion of the premium dollar. The result of this practice is that loss ratios, often styled as benefit-to-premium ratios, actually include a sizeable element of insurer expense which consequently escapes scrutiny when the expense portion of the premium dollar is discussed. However or wherever

counted, the sheer size of loss adjustment expenses suggests they are too important to be ignored. Allstate, for example, devotes 5.5 per cent of each premium dollar to allocated loss-adjustment expense and another 9.7 per cent to unallocated loss-adjustment expense for bodily injury liability coverage.

In his study of automobile insurance expense distribution, James Hunt did not analyze the flat or variable character of loss-adjustment expenses. "For purposes of this paper," wrote Mr. Hunt, "we accept the traditional method of dealing with loss-adjustment expenses as providing reasonable equity among policyholders in different rate classes, although we suspect that a careful cost accounting analysis would indicate that actual loss adjustment expenses vary somewhat less than in direct proportion to claims."

The practice of the three insurers whose filings were reviewed during the hearing was to lump allocated loss-adjustment expenses with losses in calculating their rates. ISO and Allstate also included unallocated loss adjustment expenses as "a function of losses," meaning that they developed a ratio of unallocated loss-adjustment expenses to losses and allocated loss-adjustment expenses based on historical data (usually the average for a three-year period) which is then expressed as a percentage and multiplied by losses to compute an unallocated loss-adjustment expense allowance. The assumption underlying these methodologies is that loss-adjustment costs vary in direct proportion to losses and can therefore be appropriately calculated as a percentage of premium.

State Farm was the only insurer which straightforwardly included unallocated loss-adjustment expense as part of the expense

portion of the premium dollar, or even addressed whether such expenses should be expressed as a percentage of premiums. After scrutinizing its elaborate cost-accounting data, State Farm reported that "unallocated loss adjustment expenses have proven to be more difficult [than other expense components] to analyze." The company concluded that 24 per cent of such expenses were for agent service compensation and therefore paid on a percentage basis; less than one per cent had "a very weak relationship to the loss function and, in our estimation, can be considered as not varying with losses;" and the remaining 75 per cent "vary to some degree with losses or claim frequency."[32]

State Farm did not detail either the cost-accounting methods or the numerous judgments necessary to support its conclusions. Like Allstate and ISO, it provided no empirical demonstration or careful rationale for the validity of its method of apportioning unallocated loss adjustment expense. The ambiguous observation that 75 per cent of such expenses vary "to some degree" with losses was not explained.

Questioning attempted to establish the industry's implicit rationale for varying unallocated loss-adjustment expenses as a percentage of premiums. According to ISO's Walters, "in-house attorneys would be a major part of" this category, along with other costs incurred by a company's claim division which cannot be easily allocated to a particular claim. Conceding that in-house lawyers do not get involved with every claim, Mr. Walters suggested that the lawyers might become involved "if the company intends to fight a questionable claim, or a claim of questionable liability."[33] Mr. Walters felt that the number of such claims is likely to vary with claims frequency for all claims, which is generally higher for the higher-rated policyholders:

"I don't think it's necessary for in-house counsel to get involved in every claim. If they are involved, for example, in 10 percent of the claims, but 10 percent of the claims for one coverage, or one territory, or one class . . . is a much higher number than 10 percent of the claims elsewhere, then the activity is proportional to the number of claims."[34]

Although it is slightly more specific than State Farm's general conclusion, Mr. Walters' argument for varying unallocated loss-adjustment expenses as a percentage of premiums begs as many questions as it answers. It is true that claim frequencies tend to be higher in the higher-rated classes and territories, and this fact may plausibly suggest that unallocated loss adjustment expenses are at least partially variable with premiums. On the other hand, it seems intuitively obvious that at least some of these expenses are fixed. Services provided by the manager and other management employees in the claims division, for example, would hardly vary in proportion to each policyholder's expected losses. It also appears that some substantial portion of the salaries and operating costs generated by a company's in-house attorneys and other claims-related employees could appropriately be considered fixed expenses. They will be incurred no matter what the mix or growth of business in a particular year. The addition of new business undoubtedly involves a variable claim expense element, but the proper question for scrutiny is the marginal cost of servicing such business. Although claim frequency may explain some of the variation in costs by classes and territories, it also strongly suggests balancing economies of scale.

Moreover, to assume--as Mr. Walters' argument appears to--that costs vary by premium in a consistent pattern across all different

coverages and types and sizes of claims is to assume too much. First-party physical damage claims, which tend to be smaller and more routine, would hardly appear to merit the same degree of involvement by the in-house legal team (described by Mr. Walters as a "major part" of this expense category) as the larger and potentially more complicated bodily injury liability claims. Indeed, it is plausible that the average dollar size of claims may be as important as simple claim frequency in determining how the attention and activity of the in-house claim staff are divided among different policyholders. In this context, it is critical to recognize that the average size (or severity) of losses is not correlated to class and territory relativities in the same manner or to the same degree as claim frequency. Allstate contends that ". . . expected severity is not constant. It is positively correlated to frequency by classification. Frequently though, expected severity will be negatively correlated to frequency by territory. This happens because the high frequency territories tend to be urban areas where the driving speed is slower and, thus, accidents less severe." If the involvement of the claims staff--and particularly the in-house legal staff--depends in part on the size of claims to be paid or defended against, then these expenses should not vary in exact proportion to premiums.

The available evidence regarding unallocated loss-adjustment expenses, limiting our findings here to the non-commission aspect of this category, clearly indicates that they cannot be considered entirely variable with premiums. The too-easy traditional assumption on this point has not been adequately supported by the insurers, despite our insistent encouragement that they do so. At the same time, the size

of this expense component in the overall scheme of things is quite large, and the continued failure to make an accurate division of the component into fixed and variable parts cannot fail to have a significant discriminatory impact on some policyholders.

The Department should expect insurers to conduct sufficiently detailed and reasonably premised cost-accounting and other studies of this expense component to permit a demonstrably accurate division into flat and variable parts. In the meantime, except where an insurer makes a convincing demonstration to the contrary, any pricing method apportions less than a conservative 10 per cent of unallocated loss-adjustment expenses equally among policyholders. Our suspicion is that when more refined evidence becomes available, the flat portion of this expense category will be increased.

5. Profit Allowance

The final non-commission component of insurer expense considered at the hearing was the traditional loading for "profit and contingencies" for stock insurance companies. Since insurers customarily develop the loss portion of premium in a manner calculated to cover a variety of contingencies, there was some discussion of the reason for this expense category name. According to testimony by Mr. Walters, the industry does not have separate data or computations for the profit and the contingency parts of this category, and the two names in fact describe the same reality. If the company has accurately projected its losses and expenses for a rate period, the additional income generated in this category will accrue to the company as profits. If unforeseen "contingencies" occur, they may reduce or eliminate the hoped-for profits. The dual name was chosen, Mr. Walters said, to emphasize that the profit loading in the rate is "not a guarantee."[35]

In a time of rapidly rising insurance rates, it is understandable that insurers might want to preserve a category name that emphasizes the susceptibility of the business to higher-than-anticipated underwriting loss. By focusing attention primarily on underwriting results, however, the traditional "profit and contingencies" terminology diverts attention from an even more important source of insurer profitability, which is the income deriving from investment of large pools of money created from stockholder equity and the advance payment of automobile insurance premiums by policyholders. In recent years an increasing number of state insurance regulators have concluded that the traditional loading of five per cent of premiums for profit and contingencies, without regard to an insurer's additional earnings from investments, is insupportable. New Jersey was one of the first states to officially demand that some portion of investment earnings be considered, along with underwriting results, in achieving a reasonable "rate of return" on capital. Following the suggestion of a 1944 U.S. Supreme Court decision (in the Hope Natural Gas case) that regulated industries should be accorded a rate of return "commensurate with returns on investments in other [non-regulated] enterprises having corresponding risks," New Jersey Insurance Commissioner Robert Clifford issued a 1972 ruling intended to provide substantially that result.

Whether examined in terms of its appropriate distribution among policyholders or in terms of its size and purpose in the general rate level, the subject of insurer profits inevitable raises questions about the nature of insurance risk-taking and the kind of return the business needs and merits. In response to questioning, ISO's Walters frequently reiterated his view of profit as a "reward for risk-taking."

However, he focused almost exclusively on the underwriting side of the business: ". . . [T]his is a risk business, the reward for risk-taking is proportional to the size of the risk [i.e. the expected loss of the insured]. If there is a greater risk, although the percentage is the same, the dollars should be higher."[36]

In a somewhat different vein, the special counsel appointed by the Attorney General to represent the public in the pre-1972 hearings before the Insurance Commissioner had argued that the risk which insurers encounter on the underwriting side of their business is in reality minimal, subject as the rates are to periodic review and revision. He suggested that the principal risk comes from fluctuating returns on investments, a risk insurers voluntarily assume. Commissioner Clifford found this position to be "well supported" by the hearing record.

More recently Dr. William B. Fairley, writing in the Spring 1979 Bell Journal of Economics, has provided some quantitative analysis of insurer profitability and has concluded that "the underwriting component of the systematic risk of property-liability insurers . . . is for all lines combined, only about one-fifth of the total systematic risk. The investment component is about four-fifths. Thus, although very substantial fluctuations are characteristic of underwriting profits, there is no evidence that the market regards these swings as cause for much additional return over the returns it expects for the systematic risk of investments."

There are many as yet unexamined implications in the basic perception that the risks and the rewards of insurance companies today are found more on the investment than the underwriting side of the

business. This observation possible weakens, although it does not necessarily cut, the connection many profess to see between the loss potential of particular insureds and the size of the contribution that each should make to an insurer's overall rate of return from underwriting and investment activity. It raises even more fundamental questions, however, about the precise nature of the link which should exist between underwriting results and investment results in the setting of the general rate level. The most obvious question is whether rate level should be made to depend entirely or even partly on an insurer's relative success or failure in the investment of policyholder funds in a particular rating period, or whether a way should be found to reduce rates in consideration of reasonable investment income expectations while reserving to insurers the full rewards or penalties resulting from their choice of investment strategies. The present New Jersey ratemaking procedure, based on Commissioner Clifford's 1972 order, has the effect of partly insulating policyholders from--and partly rewarding or penalizing them for--the industry's actual investment results.

A more recent approach based on the Capitol Assets Pricing Model--and now utilized with some variations in Massachusetts and New York--allows insurers to earn an overall rate of return from underwriting and investments equal to that of comparable industries. Included in this return is a minimum amount of investment income which any insurer could expect to earn from a highly cautious or "risk-free" investment of available capital. Under this approach, underwriting profits (and therefore, insurance rates) are reduced by the amount of the reasonably expected investment yield. Yet an insurance company's

management and shareholders remain free to pursue more aggressive investment strategies than those indicated in the risk-free minimum-yield strategy, and it is they who assume the financial rewards or penalties which such investment strategies actually produce.

Although the purpose of this hearing was to determine how the overall profit or rate of return due to an insurer should be reflected in the automobile insurance premiums of different policyholders, it appears that the hearing record does not provide sufficient evidence to reach a conclusion at this time. It also appears that a valid answer may depend on a more thorough examination than has so far been attempted of the proper relationship between underwriting and investment returns, and of the best methodology for computing an acceptable overall rate of return in the general rate levels. Since 1972 there has been a significant growth in scholarly analysis and specific methodological tools applicable to this problem, and regulatory developments in other jurisdictions also provide a valuable source of relevant information. Preparation of updated profitability studies should be given high priority in future regulatory activities.

B. Commission Expenses

The final expense component to be considered in this opinion is agent and broker compensation, which traditionally has been paid by insurers in the form of commissions computed as a level percentage of premiums. Recall that both agents and brokers are generally called "producers," meaning that they sell insurance and thus produce business for insurers. Brokers generally have no ongoing contracts with particular insurers, but search the market for coverage to meet the needs of the consumer or commercial clients whom they represent. Unlike

brokers, agents do have contractual or other stable relationships with particular insurers and thus formally represent those insurers, although "independent" agents have also aspired through the years to be advocates for the interests of the consumers and businesses to whom they sell insurance. While some agents are the employees or exclusive representatives of one insurance company, independent agents generally have contracts with several insurers. The majority of companies currently sell insurance through independent agents, and the commissions paid for their services generally range between 10 and 15 percent of premiums. Companies which have employee or exclusive agents usually pay them less in commissions while incurring greater costs in the complementary "other acquisition expense" category.

In bare outline, the problem posed by the distribution of agent and broker compensation costs among policyholders is a replica of the problem posed by the distribution of other non-commission expenses. At an illustrative commission rate of 15 percent, a policyholder with an annual premium of $300 would pay only $45 for the services of an agent, while a high-rated policyholder with an annual premium of $1500 would pay a five-times-higher commission of $225. Common sense suggests that the services provided to the high-rated policyholder are not actually five times more costly. Thus the burden falls on companies and especially on agents and brokers to demonstrate that the existing differentials are in fact equitable.

Representatives of insurance companies appeared to some extent to evade this responsibility in replying to questions. The fact that they now have contracts with agents providing the compensation to be rendered as a percentage of premiums, they suggested, is sufficient

to demonstrate that such costs are incurred on a variable rather than fixed basis. This argument is, in a word, superficial. Although companies are relatively free to compensate agents and brokers by any mutually agreeable method, it cannot be simply assumed that a compensation method based on tradition and convenience is also an accurate method of dividing actual agency costs among policyholders in insurance rates.

While insurers cannot abdicate their responsibility to assure that different policyholders are fairly charged for producer costs, agents and brokers themselves are in the best position either to demonstrate the validity of the present method of cost allocation or to help determine the shape of necessary reform. Their traditional concern for the interests of their clients should make them sincere supporters of efforts to distribute agency costs more accurately among policyholders. At the same time, it is obvious that more accurate methods of allocating agency costs in insurance rates are likely to be accompanied by corresponding changes in the manner of paying agent and broker compensation. Although the total amount of compensation paid under a revised cost allocation plan would remain unchanged, the amount of compensation received by some agencies could be significantly affected. Many agencies are small and somewhat fragile businesses. Along with the primary objective of achieving accuracy in insurance pricing, the producers as well as the Department can hardly ignore the likely long- and short-term effects of change on the producers themselves. In a time of increasing financial pressure caused by inflation and by competition from insurers relying on direct marketing methods, improved agency cost studies could help the producers to pin-

point and correct inefficiencies in their operations, to implement cost-saving procedures made possible by the economies of scale, and most importantly to review and--if appropriate--to redefine the scope of their services in response to financial realities and a more accurate reckoning of consumer needs. The failure to make such studies, and the inclination to retain without examination the existing procedures for paying agency compensation and reflecting agency costs in the rates, can only leave producers ill prepared to cope with changes that are inevitable.

Through their various trade organizations, New Jersey's agents and brokers accepted the Department's invitation to participate actively in the recent public hearing. Their presentations indicated a lively concern about the possible financial impacts of any changes in their present commission structure. However, the challenge to demonstrate objectively and scientifically the validity of present cost allocation procedures, or to share the responsibility for devising needed reforms, was only partially met.

Perhaps understandably, spokesmen for agents and brokers used the forum provided to list their overriding concerns about the adequacy of their compensation. An apparent decline in the average commission rates paid by insurers on their voluntary business, as well as the allegedly voluminous, inefficient and partially uncompensated procedures necessary to maintain a growing number of insureds in the Assigned Risk Plan, were two of their foremost concerns. Thus preoccupied, the representatives of the State's principal agent and broker associations were initially disposed to see any alternative to percentage-based commissions as only the latest in a long line of injuries.

In response to this perceived threat, they argued generally for continuing to calculate commissions as a level percentage of premiums.

The Department fully shares the producers' concerns that the present unwieldy and unnecessarily expensive Assigned Risk Plan be replaced by a more efficient residual market mechanism and continues to advocate legislation for that purpose. The Department also agrees that costs rationalized in rate filings as production costs should actually be devoted to that category of expense, and will institute additional controls in its rate review procedures to assure that is the case. Yet both of these concerns, fundamentally important as they are, pertain more to the proper setting of statewide average rates than to the distribution of those rates among different groups of insureds.

When they focused on the main point of the Department's hearing, the equitable distribution of producer costs among policyholders, the producer witnesses did offer helpful testimony. Often more anecdotally than scientifically based, their specific observations on agency costs and services did not entirely support the position that producer commissions should be 100 per cent variable with premiums.

Testimony of John H. Muetterties,
Independent Producers Council

The first producer organization to present testimony at the hearing was the Independent Producers Council, a coalition that includes the Independent Insurance Agents of New Jersey, the Professional Insurance Agents of New Jersey, the Insurance Brokers Association and the Surplus Lines Association. The Council was represented by Mr. John H. Muetterties, a consulting actuary.[37]

Mr. Muetterties laid a useful foundation for further discussion by pointing out, at the beginning of his presentation, that independent producers are not exclusively engaged in the "sale" of insurance. Although selling is the original and probably remains the basic function of producers from the vantage point of insurers, Mr. Muetterties argued that it is only one of several major categories of services that producers in fact provide. Another is risk activity, described as the effort to elicit necessary rating information from the applicant and to place the applicant with a particular insurer. A third category, claim activity, describes the producer's work in filling out claim reports and assisting claimants to obtain payment. In Mr. Muetterties' opinion, a large proportion of the costs incurred in connection with risk activity would vary "in relation to the risk characteristics" of an insured, and all the costs of claim activity would similarly vary "by territorial loss cost or by classification loss cost."

The conclusion to be drawn from these observations, according to Mr. Muetterties, is that "a large proportion of the producer's costs vary in relation to the risk characteristics and a lesser proportion are common to all the policyholders." When informed that a study by Mr. James Hunt of the Massachusetts State Rating Bureau had concluded in 1977 that 37.5 per cent of agency costs vary with premiums and the remaining 62.5 per cent are common to all policyholders, Mr. Muetterties responded that he could "hardly believe the proportions are that way. I would think they would be at least in the reverse." In the effort to clarify whether the witness meant to suggest that about 60 percent of agency costs are variable with premiums, Mr. Muetterties commented

that "off the top of my head, I'd say it is higher than that. As much as 80 percent or 90 percent that varies with the size of the premium."[38] The reason for this recognition that at least some portion of agency costs does not vary with premiums was that "if I did a cost accounting study, I have got to admit there would be a certain portion that I would not know how to allocate . . . and that's the same in any cost accounting study in any corporation or even for your personal finances."[39] Nevertheless, because of a belief that percentage-based commissions are simpler and easier to administer than any alternative, Mr. Muetterties doubted the value of trying to identify the size of non-variable agency costs.

Testimony of William O. Minter, Jr.
Independent Insurance Agents

The Independent Insurance Agents of New Jersey, an association of some 5,000 professional agents, was directly represented during the hearing by its president, Mr. William O. Minter, Jr. The head of a Morristown agency, Mr. Minter contributed a number of detailed observations about the principal kinds of activity carried out in his office and, by inference, in other independent agencies throughout the State.[40]

In a brief opening statement, Mr. Minter emphasized that "commissions do not involve only selling expense, but also cover the many other services provided by agents throughout the period in which the insurance is in effect." In restrained and cautious language, Mr. Minter argued generally that

> there is a relationship between the size of the premium for automobile risks, whether influenced by the rating territory or the classification involved, and the activity and servicing required.

> For example, risks in high-rated territories have a higher accident frequency. While the agent is seldom compensated directly by the insurance company for the services which he renders when one of his insureds becomes involved in an accident, the costs for the agent's services are substantial. Additionally, agents find that more time and effort is required to place coverage for higher-rated risks, such as youthful operators in urban areas or risks which have had adverse experience.[41]

Mr. Minter also pointed out that "companies dealing through the American Agency System incur no direct expenses for those services performed by the agent. These may include loss adjustment services, employee benefit plans and other clerical and overhead expenses that would otherwise be direct company expenses."

In his general remarks about the pattern of agency costs, Mr. Minter implicity reinforced Mr. Muetterties' earlier observation that such costs are partly fixed and partly variable. The conception of certain kinds of agency costs as surrogates for the same kinds of costs otherwise directly incurred by insurers is a compelling and an instructive one, and the inclusion among these costs of such examples as employee benefit plans and overhead expenses is a useful reminder that many such company expenses are primarily fixed rather than variable in nature.

The impression of agents that high-rated policyholders tend to generate higher costs at least for certain kinds of agency services was, however, an even more insistent theme of Mr. Minter's testimony. Questioning drew out in greater detail a very rough identification of the areas of service thought to be subject to the most variability. In the area of sales, which Mr. Minter testified represents 32 per cent of total costs in his agency, several distinct activities--including canvassing the area to find out about the needs of prospective

clients and availability of policies from insurers; organization and deployment of sales staff; and advertising--were identified. Mr. Minter acknowledged that he does no advertising currently. Although he first indicated the perception of some variability among sales costs, he clarified that the perceived variation is in the cost to place high-rated risks and not in the activities to attract business. For his own agency, Mr. Minter eventually agreed that sales efforts are "the same for all, regardless of the nature of the risk."[42]

Among the remaining costs in his agency, Mr. Minter's impression of variability seems to differ from category to category. After prospective insureds are in hand, Mr. Minter testified that it is harder to place a high-rated risk "than to place the non-high-rated risk." Of the nine insurers represented in his office, Mr. Minter identified only three which would accept new business. The total allotment of new business from these companies is 11 policyholders per month, and some of these are used by the agency to provide automobile insurance in connection with a client's purchase of commercial insurance.

The aversion of most companies to accepting high-rated risks may make the actual decision where to place such risks less time-consuming than it would otherwise seem. For the most desirable risks who can be placed within the available allotments, Mr. Minter's staff spends time trying to determine which would be the best company for the applicant's personal needs: "Maybe this man is going to get an outboard motorboat or a yacht later on . . . Maybe we'll take his auto now and later take his yacht or his outboard motorboat or his motorcycle or whatever it is, but I have to doubly make sure it's the right company

for him that will carry the right product for him."[43] In contrast, the few available allotments do not apply to "under-age" [under age 30] drivers. For the under-age driver, Mr. Minter confirmed, "there is no underwriting decision." Instead, "I can speak for my agency and a majority of my members. It goes automatically [to the Assigned Risk Plan]."[44]

Mr. Minter also testified that, for either Assigned Risk or voluntary business, it is customary for a member of his office staff to compute the rate to be charged a particular insured. The staff member "has all the rating procedures for all the different companies. There used to be a lot of different ratings . . . it's very standard right now. The rate is almost the same for all companies at the present time." The witness indicated no manner of variation in the time and effort required to calculate the rate for different insureds.

After a policy has been issued by the insurer, the agent's routine services include assisting clients with claims. Yet asked to give examples of services which are not claims-related, Mr. Minter provided the following list of routine policy inquiries which his agency had received during the previous week:

> One, I'm going to Canada. What [coverage] do I need?
>
> Two, I'm going to Mexico. Do I need higher limits?
>
> Three, I've got a bigger job now. Do I need higher limits? Do I need a million or do I need a half million?
>
> Four, I want to change my car this week. Will it cost more for a Mercedes versus a Porsche or for a Ford versus a Chevy?
>
> These are just a few things that happened this week . . . not counting claims and claim questions.[45]

Although this list of inquiries seem definitely more reflective of low-rated than of high-rated policyholder concerns, Mr. Minter rejected the conclusion that the cost of answering customer inquiries may be greater for low-rated insureds, or "at the very least equally distributed among all the customers." Notwithstanding the examples, Mr. Minter felt that, on the whole, costs are greater for the high-rated insureds:

> The questions that we receive are more, I would say, for the young driver than . . . for the 35 and over driver, mainly because number one, they don't understand the no-fault procedures, even after you tell them two or three times.
>
> Number two, they continually lose their ID cards and are always back on them.
>
> Three, in the same vein, when they ever get their car inspected, they never have an ID card.
>
> And another thing is insurance to them, when they talk about it . . . they talk about no-fault but then they get it confused with workmen's compensation coverages, so they're continually coming back on that.
>
> As a person gets older and little bit more into the system, they seem to negate those questions.[46]

On the related matter of routine policy endorsements, Mr. Minter also testified that the coverage changes sought by high-rated drivers are more frequent than those of other policyholders: "The younger driver, again, change of car. You know, we're going from a '68 Chevy to a '67 Chevy to a '65 Chevy, and so forth . . . I do find that quite often. I find, if you go into the older categories, you're going to find change of car used to be three years, but the way the financing is now, it's going into the four-year and five-year bracket."

Although he did not go into detail, Mr. Minter was most emphatic in describing the perceived variability among costs for

voluntary market business as compared with business placed in the Assigned Risk Plan. "When you get to the Assigned Risk Plan, it's similar to filling out an IRS certificate every time. It's definitely harder to do this. The follow-up procedure is about five times what a normal company would be. The money procedure is disastrous. The follow-up on claims in horrendous. There's a great deal more work on that category." The impression of greater costs generated for Assigned Risk policyholders is thus apparently all-encompassing, ranging from the initial policy application through most major aspects of agency servicing including follow-up on the payment of claims.

Taken in its entirety, Mr. Minter's testimony well illustrates both the strengths and the weaknesses of agent perceptions in the attempt to measure the patterns of variation in agency costs. First-hand observation of agency operations is obviously an indispensable condition for arriving at any precise breakdown between fixed and variable costs. In his concrete descriptions of current agency operations, Mr. Minter was able to provide useful corrections on a priori judgments about the nature of certain kinds of agency costs. For example, contrary to Mr. Muetterties' more actuarially oriented conclusion of substantial (though not complete) variation by premiums of "risk activity" including rating and placement of applicants, Mr. Minter's testimony indicated--if anything--more effort to decide on a proper placement of low-rated voluntary market business than on the almost automatic assignment of high-rated business, and a uniformity of time and effort required to rate the prospective insured. Compared with Mr. Muetterties' basically intuitive judgment that perhaps 10 to 20 per cent of agency costs are likely to be flat rather than variable,

Mr. Minter's empirical confirmation of mainly non-variable costs in the areas of sales, rating and risk placement suggests that an even larger proportion of agency costs ought to be allocated on a flat basis. On the other hand, Mr. Minter's perception of a major difference in costs for voluntary and assigned risk business suggests a possible basis for variability that Mr. Muetterties' statement did not explore.

The limitations of this kind of perceptual and anecdotal information are also, nonetheless, painfully clear. Although a systematic cost-accounting study might confirm, for example, that youthful drivers generated proportionately more policy inquiries than other policyholders, it is difficult to know in the absence of such a study exactly what conclusion is justified by Mr. Minter's impressions in this regard. The temptation to over-simplify experience, or to over-generalize the meaning of limited experience, is one from which none of us is immune; it results in the kind of half-accurate stereotypes which have too often influenced insurance ratemaking in the past. Without doubting that in Mr. Minter's personal experience a number of youthful drivers lose their insurance identification cards and confuse auto coverage with workmen's compensation, it is still reasonable to ask whether these observations are matched in the experience of other agents and whether, even in Mr. Minter's own experience, such incidents occur often enough to weigh more heavily than the many possible inquiries from adults that are also illustrated in his testimony. A more systematic cost study would be better able to answer these questions, and in addition to analyze the relationship between the greater frequency of certain kinds of services and the potentially offsetting economies of scale.

Testimony of Willard R. Young, III,
Professional Insurance Agents

The Professional Insurance Agents (PIA) of New Jersey is an association of some 7,000 producers. It was directly represented during the hearing by its president, Mr. Willard R. Young, III, who appeared twice to present testimony. On the first occasion he made a general statement in behalf of the association and provided answers to questions from personal knowledge as the head of a Somerville-based agency. During a later appearance he summarized the principal findings of a more systematic agency cost study commissioned by the PIA and conducted by the Finance Study Group at the School of Business, State University of New York at Albany.[47]

In his personal observation on agency costs, Mr. Young's views were similar but not identical to those of Mr. Minter. Some additional ground was covered. Mr. Young did not attribute as much cost variation to territorial differences as did Mr. Minter. "Factors that are much more impactive," he said, "are the number of vehicles insured in the policy, the age of the drivers, the assessment of penalty surcharges due to adverse driving records, credits granted for proof of driver training and high scholastic marks by young motorist, existence of certain automotive equipment such as impact bumpers and safety belts."[48]

In response to a question, Mr. Young said he agreed with Mr. Minter that among youthful drivers "you will find a greater frequency of service from vehicle change, from coverage change, questions . . . The older driver tends to have a more stable relationship or less frequency of the need of advice." In exploring the specific factors that he had initially cited as "impactive" on cost variations,

however, Mr. Young conceded that not all of them translate into variation by driver age. The number of vehicles insured in a policy, he acknowledged, is not a variable factor for the young driver insured on his own policy and having a single vehicle. Paperwork required to document eligibility for driver training discounts is not equally applicable to all youths because "many schools today are dropping driver education from their curriculum." Paperwork required to document eligibility for "good student" driver discounts is not applicable to youths in the Assigned Risk Plan, which does not offer the discount. Paperwork required to document eligibility for safety discounts is no more applicable to youths than to adults: "I don't think you can characterize one group as having more or less than the other." For services that are more frequently provided to one group than another--for services more frequently provided to any customers--Mr. Young acknowledged the cost "is related to the volume and economy of scale." The per-incident cost with one customer "is going to be much higher than the per-incident cost with 100 customers."[49]

When looked at in terms of the variability of agency costs within and among three or four major categories of activity, Mr. Young's perceptions were equally interesting. Besides perceiving irregular patterns of both flat and variable costs by age within the "risk activity" category just described, Mr. Young also acknowledged irregular cost variations within the claims service category and "certain efficiencies of scale, declining per-incident cost as the volume of these transactions increase." Over time, the variability among major activity categories is also irregular: "The number of new policies that are issued in the first year [which] have claims generally is lower than

the number of policies in the second, third, and subsequent years that have claims . . . So . . . while it is possible to theorize that the sales cost in the first year of a policy would, of course, be much higher than the second and subsequent years, I think it's also possible that the service costs, particularly in the area of claims, may be lower in the first year and higher in the second and subsequent years."[50] This observation would apply, Mr. Young clarified, to youthful as well as adult drivers and to those in both the voluntary market and the Assigned Risk Plan.

In regard to the category of costs incurred in maintaining contractual responsibilities to insurers and accounting for agency funds, Mr. Young noted that one important source of variability is whether a policy is directly billed by the company or billed by the agency. Direct-billed policies involve less work for the agent. Mr. Young said that about 60 percent of policies handled by his agency are direct billed, but that the ratio of agency-billed to direct-billed policies has been on the increase because of the placement of most new business with the Assigned Risk Plan, where policies must be billed by the agent. A 1979 survey of PIA agency members showed that 92 per cent of all new auto insurance policies are now placed in the Assigned Risk Plan.

Like Mr. Minter, Mr. Young indicated that on the whole, Assigned Risk Plan business involved more agency handling and more agency costs than voluntary market business. He carefully pointed out that costs attributable to Assigned Risk policies are not necessarily the same as costs attributable to a policyholder's risk characteristics: ". . . [T]here are a lot of people in the [involuntary]

market who are really voluntary market customers, that's where they should be. So that I would hate to characterize drivers on that basis."[51]

Viewed in their entirety, Mr. Young's perceptual observations tend to cast substantial doubt on the traditional wisdom that agency expenses vary in exact proportion to the size of expected losses as determined by a policyholder's geographic location and other risk characteristics. Mr. Young did not make a case for large territorial variations in agency costs. Mr. Young did argue that agency costs vary proportionately with other risk characteristics, but the concrete observations underlying this general argument appear to indicate instead (1) a substantial element of fixed costs and of cost savings due to the economies of scale for the most frequently performed services; and (2) numerous bases of claimed cost variations--for example, driver training and good student discounts, safety equipment discounts, and placement in the Assigned Risk Plan--that do not coincide with current pricing variations based on a policyholder's assignment to a particular rating class. Instead of varying directly with expected loss costs, Mr. Young testified that the agent may do more work and incur higher costs for youthful drivers who qualify for driver education and good student discounts, and who therefore pay lower premiums and lower agent commissions, than for youthful drivers who do not qualify for such discounts and thus pay higher premiums and higher commissions. If--as Mr. Young argued--placement in the Assigned Risk Plan causes a policyholder to generate substantially higher costs for the agent, then it is obvious that under current market conditions which Mr. Young also emphatically described, such costs may have little to do with the objective risk characteristics of the affected adult or youthful drivers.

In his observation that the "service" component (as distinguished from the "sales" component) of agency activity becomes greater in the later years of a policy's life, moreover, Mr. Young established a plausible basis for arguing that youthful drivers may be currently overcharged for both sales and service costs: overcharged for sales, because they are the least desirable business from the traditional viewpoint of insurers and are the targets of the least selling effort and costs; and overcharged for service, because the "aging" of their policies and the increased claim activity that Mr. Young described may occur only later, outside the period when they are charged the highest price for agent services.

The PIA Study

During his second appearance at the Department hearing, Mr. Young was able to supplement his individual preceptions with the findings of a more general analysis of New Jersey costs which was undertaken in behalf of the Professional Insurance Agents. Entitled "An Analysis of Agency Costs for Personal Lines of Insurance, "the PIA study was conducted during 1979 by a faculty-student group directed by Professors Alan W. Frankle and W. Christian Buss of the State University of New York at Albany, who also appeared to discuss the study findings and methodology.[52]

As the only systematic analysis of New Jersey agency costs identified during the hearing, and apparently only the second such analysis performed anywhere in the country, the PIA study deserves strong commendation. At the same time it is necessary to point out that the study does not altogether escape the weaknesses which have been noted with respect to the more personal comments on agency costs

by Mr. Young and Mr. Minter. Like those comments, the study seems more vigorously addressed to producers' concerns about the overall adequacy of their compensation than to the Department's present concern about the equitable allocation of agency costs among different policyholders. Like those comments, the study relies primarily on the perceptions of agents--rather than objective observation and measurement--for information about the various patterns of agency costs and services. The perceptions were obtained, however, from a much larger number of agents. The study was based on a questionnaire mailed to 927 PIA agency members and returned by 156 of them.

Overall agency costs and compensation. The general findings of the PIA study seemed to support several of the principal points made by Mr. Young and Mr. Minter in their personal observations and comments. As regards the overall level of agent compensation, the study showed an average commission of 12.9 per cent for combined voluntary and assigned risk business; for voluntary business alone the average rate was 14.2 per cent, and for the Assigned Risk Plan it was 10 per cent. According to the study, the voluntary market commission rate has declined 1.6 points, or about 10 percent, during the past three years.

The study concluded that because of this decrease and the increasing proportion of agency business placed in the Assigned Risk Plan with its lower commission rate, the average agent is losing about $8.00 per policy on his personal automobile business overall. About 61 percent of current premiums are written in the voluntary market. While the study found that agents make about $7.50 per policy on voluntary business, it calculated a net loss of about $43 per policy on

assigned risk business. (Agency profits and losses were considered to be the difference between agency revenue and agency costs for each line. Agency principals also earned salaries averaging $37,000 statewide, considered part of agency costs in the study methodology.)

The implication of the PIA study findings is that agencies commonly subsidize assigned risk costs from their voluntary business, and the entire personal auto line from other personal (e.g. homeowners) and commercial lines. The study indicated that the ratio of commercial to personal writings increases as agencies grow, and income from commercial writings now accounts for about 52 per cent of the average agency's revenue.

The PIA study found, strikingly, that it costs the average agent about $99 a year to provide service on a policy issued through the Assigned Risk Plan, compared with an annual cost of about $40 to handle a voluntary market policy. To help explain this large differential, Mr. Young cited a 1978 report on "The Automobile Industry Involuntary Market" prepared by the American Insurance Association, a national insurer trade organization.[53] That report contained, according to Mr. Young, a catalog of horrors characterizing typical Assigned Risk Plan operations. The list included "unwieldy and poorly designed" application forms; the random interaction--caused by the assignment of unwanted policies to participating companies on a rotating basis--of hundreds of companies with thousands of agents who do not have ordinary contractual relationships and may not either trust each other or understand each other's diverse and unfamiliar standards and procedures; premium collection and accounting procedures which are elaborate, time-consuming and inefficient; the necessity to deal with a

company's assigned risk processing center, which may be in a remote out-of-state location; and the tendency of insurers to forego their usual mechanized systems due to differences among the Assigned Risk Plans in various states and, further, to use their residual market departments as "dumping grounds for their less efficient employees, compounding an already difficult service problem." Mr. Young concluded that if a more efficient Joint Underwriting Association (JUA) were substituted for the present Assigned Risk Plan, "the JUA, because it is similar to the mechanized systems that the producers are used to, would probably reduce that $99 cost figure by a large amount--a plug for JUA."[54]

Cost variations for different policyholder groups. While its findings on overall agency compensation levels are emphatic and clear-cut, it is unfortunately in the consideration of the prime issues raised by the Department in this proceeding--the equity of traditional means of allocating agency costs among different policyholder groups--that the PIA study findings turn sluggish, ill-focused and possibly contradictory. The conclusion that Assigned Risk Plan policyholders generate higher agency costs than voluntary market policyholders is quite clear in the PIA study, but this broad twofold grouping of insureds--under current New Jersey market conditions--is itself a blatant departure from traditional notions of equitable classification and pricing. Today's assigned risk market contains thousands of drivers placed there arbitrarily, for reasons having little to do with their objective risk characteristics. Likewise, a very large part of the additional agency costs identified for assigned risk policyholders have less to do with their risk characteristics than with the severe

administrative inefficiencies inherent in the present assigned risk mode of operations. Agents lose money unnecessarily under the present assigned risk mechanism, consumers lose money, and insurers lose money: Everyone agrees it is a severely flawed system in which no one wins.

However, the issue here concerns allocations of agency costs to different policyholders. As already seen with respect to insurer expenses, the implicit rationale underlying the traditional practice of billing producer commissions as a percentage of premiums is that a policyholder's expected costs for producer services will vary in exact proportion to the size of his expected losses or claims, and ultimately in proportion to the size of the premium he is charged. This in turn assumes that the territorial and classification differentials used to predict variations in the expected losses of policyholders--and to compute variations in their premiums--are also accurate predictors of variations in producer costs. One approach to substantiating this traditional wisdom is, therefore, to compare variations in expected losses (or premium charges and, proportionately, agency revenues) with variations in producer costs by classification and by territory. The PIA study tried elements of this approach, but with very limited success.

Cost Variations by Territory. Of the two kinds of differentials, cost and revenue variations by territory would appear somewhat easier to measure and compare. Most agencies have not segregated their costs by the age and sex of their policyholders--two of the variables traditionally reflected in classification differentials--but every agency office is physically located in one rating territory or another and may do most or all of its business with consumers living in that

territory. It would seem, therefore, that observed cost variations among agencies in different rating territories could be compared with premium or revenue variations for those territories to determine whether the two are in fact proportionate.

In summarizing the findings of the PIA study, Mr. Young reported that it had addressed and "was able to determine" variances by territory. Surprisingly, the study concluded that territorial variations in agency costs were minimal, but so also were territorial variations in revenue:

> The New Jersey study did not find a significant increase in agency costs in higher-rated territories as the TBS report identified in Massachusetts . . . [High-rated territories] had the lowest per policy direct handling costs for both voluntary and assigned risk business.
>
> The [study] also shows that the difference in revenue per policy differential between the low and high territories is less than would be expected based on the range in rates between these territories. In fact, the differential between low and high territories is only 1.07. We theorize that this differential is less than expected because of fewer vehicles per policy, more basic coverage (fewer options, lower limits) carried by the policyholders, and older vehicles on which no physical damage coverage is required.[55]

If they could be convincingly demonstrated, these conclusions might be highly significant for the Department's inquiry. On the one hand, they suggest, there is no basis for the traditional assumption that agency costs differ by territory in exact proportion to losses; but on the other hand, agencies do not actually earn the two or three times higher commissions in higher-rated territories that the current territorial rating relativities imply.

These conclusions were not in fact substantiated. In trying to measure cost and revenue variations by territory within the con-

straints of their chosen method, a mail questionnaire, and within the overall constraint of the limited budget available for the survey, it appears that the authors of the PIA study succumbed to a temptation which has been noted previously in similar contexts in this opinion: the temptation to draw conclusions about the extent of variations in territorial revenues and costs based upon aggregate groupings of territories which are inappropriately considered--often for reasons of convenience--to be adequately representative of the actual range from high to low within the traditional rating system.

Dr. W. Christian Buss, a professor of marketing at the School of Business, State University of New York at Albany, provided the principal hearing testimony regarding the methodology employed in the PIA study. According to Dr. Buss, the PIA study group faced a difficult dilemma as it sought to draw meaningful conclusions about variations among territories from the 156 agency responses it had received. It wanted to obtain a true picture of costs and revenues in different territories; but with 27 rating territories in the State and an average of only six responses per territory, it felt that its data were insufficient to assure the credibility of any conclusions it might make regarding particular territories. To improve credibility the 156 agency responses were divided into three territorial groupings--styled "high," "medium" and "low"--arranged along a continuum determined by base premiums for compulsory coverages. With roughly 50 observations in each of these three categories, it was felt that the data would be credible to support accurate conclusions about revenues and costs within these groups.

The effort to increase the credibility of findings ran the risk of making irrelevant the more credible findings thus obtained,

as Dr. Buss seems to have recognized. Dr. Buss testified that the base premiums supplied by PIA for the purpose of grouping territories from high to low ranged from $98 to "over $200" [supplementary data supplied by the PIA indicated that the highest base premium was $254] and that the decision to divide all agency responses into three groups produced a "fairly large range" of premiums within both the low and high-rated groups. The high-rated group, particularly, included all agencies with base premiums of $135 or more. In general, Dr. Buss testified, "most of the agencies are between about 110 and 150, and then there are four or five territories that are 170, 190, 210 on the ratings that we use." In deciding whether to combine the four or five responses from extremely high-rated territories with the larger number much closer in premiums to the middle group, Dr. Buss recognized a trade-off:

> We had to make a trade-off between using those three or four territories and having few agencies, and having more agencies and still trying to capture the flavor of what's going on in those territories. So we sort of took a middle ground and we went down into some base premium territories, which are not really true cities, center city; very, very high risk. But we got--we had to take a few off of that, off the top of that spectrum . . . in order to have enough observations in high rated territories to give our estimates some reliability.[56]

What unfortunately resulted from this trade-off is a highly heterogeneous grouping of territories.

However, it is doubtful that the PIA sample of agency responses would in any event have been adequate to draw a clear and accurate comparison of agency costs and revenues in the State's highest-rated territories. As the PIA study authors probably recognized, the return of only a handful of questionnaires from agencies

in the state's highest-rated territories made it a virtual impossibility from the start to learn much about the pattern of agency costs and revenues in those areas. In information supplied to the Department following their hearing appearance, PIA office staff confirmed that in fact there had been no responses whatever from the two rating territories (Newark--02; Camden--07) which, according to their calculations, were the highest on the rating continuum.[57]

In the final printed copies of the PIA study which were distributed to the association membership, there were no observations and no conclusions about cost and revenue variations by territory. In their place had been substituted a different threefold categorization of agencies by low, medium, and high premium volume (i.e., by agency size) without regard to territory. The published study offered no justification for the traditional practice of varying commission amounts in exact proportion to the expected losses by territory of automobile insurance policyholders.

Cost Variations by Rating Classification. When asked whether the PIA study had been able to show any justification for the second major element determining commission amounts, the rating classification relativities assigned to different policyholders, Mr. Young disclaimed from the outset any ability do so so. "We were unable to determine cost variances by classification," he said. This would be "almost an impossible task," he added, "because it would require total automation of the agent's office to record all the specific risk variables of every insurance policy . . . I really doubt that that kind of information is available."

Although the direct measurement of correlations between the risk classification of policyholders and the costs they generate for

agents would admittedly be a complex undertaking, it is conceivable that a few rough and indirect approaches to the same result could be devised. A basic starting point for this exercise would be in the division of agency costs into three or four principal--and clearly defined--service categories. Since there has been general if reluctant recognition in the testimony of various agency witnesses that at least some kinds of agent activity (for example, advertising and sales) are not now more time-consuming or more costly for some policyholders than for others, the accurate breakdown of agency work time into such categories might facilitate, through process of elimination, an accurate breakdown of agency costs into flat and variable elements. The one major predecessor study of agency costs, the TBS study conducted in 1977 for the Independent Insurance Agents of Massachusetts, had divided agency costs and services into four broad functional categories.[58] Aside from a vehicle registration function not applicable in New Jersey, these categories included (1) carrier communications and requirements; (2) customer contracts and service; and (3) claims processing.

The PIA study did not borrow from the earlier TBS work either this specific set of activity categories or the recognition of the importance of some similar set of principal categories, however defined. Perhaps reflecting a different set of study priorities that have already been commented upon, the PIA analysis mainly emphasized a differentiation between commercial and personal lines of insurance and, within personal lines, among voluntary and assigned risk auto business and homeowners insurance. From cross-examination of the PIA study authors at the hearing, it also developed that the PIA mail questionnaire had inquired, promisingly, about the relative allocation

of agency staff time to a miscellaneous list of functional activities--for example, obtaining new accounts; preparing applications; reviewing coverages with client at renewal; and servicing claims. Disappointingly, however, Dr. Buss testified that this information "is not included in this report and...has not been analyzed either." These questions were asked, he explained, "in case there would be some sort of a need in the future."[59]

Following Mr. Young's appearance at the hearing, the Department requested him to have the PIA office staff examine the previously unanalyzed responses it had collected regarding the allocation of agency staff time to different services for policyholders. In complying with this request, the PIA staff discovered significant discrepancies in the information agencies had provided regarding the allocation of staff time by lines of insurance (voluntary auto, assigned risk auto, and homeowners) and, within each line, to the specific service activities inquired about. When they thought in terms of the specific activities performed by employees within each line, agency respondents estimated total hours per week of employee work which were in general substantially higher than the total time allocations by line that they had previously estimated. This was true even though they were clearly instructed that their time estimates for specific activities should add to the total time they had already estimated for each line.[60] (Interestingly, the addition of the separate time estimates for specific activities produced total time estimates by line which were most discrepant from the original by-line time estimates for agencies located in the "high" rated territories. In this group, reflection on specific agency activities produced only a slight increase in the total time

estimated for assigned risk business; the estimate of total time required to service voluntary market business was, in contrast, more than doubled.)

The inconsistency in the PIA time estimates for different agency activities forecloses one of the few avenues of inquiry in the study that seemed to offer some basis for relating the pattern of agency costs to the risk classifications of policyholders. The inconsistency in these data is most disturbing, however, for a different reason. It seems illustrative of a more general flaw in the PIA study methodology, and one which could undercut to an unknown degree many of the study's findings. That defect is the substantial and nearly exclusive reliance of the study on the accuracy of perceptual observations and judgments by its agency respondents.

Methodology Based on Agent Perceptions. In explaining their choice of mail questionnaire as the exclusive method of gathering needed information, the PIA study authors briefly recognized and rejected the possibility that the quality and accuracy of the resulting data might be seriously compromised:

> . . . [T]his procedure also has some potential shortcomings. First, the agency principals may not have an entirely accurate idea as to how much time is spent on these activities, what percentages of their income comes from each line and so on. Second, if the principals do not use care in filling out questionnaires, the estimates may also be biased. However, in-depth interviews and survey pre-testing with various agency principals showed that they felt [emphasis added] that (1) they could give fairly accurate estimates of most of the factors which required estimation, and (2) completing this survey represents a task which could have a significant effect on their economic well-being, so they would be careful in filling it out.
>
> The other aspect of this study which enhances its usefulness is that the cost of revenue data are

> measured directly from each respondent's income statement. Since these statements are prepared by accounting professionals using commonly accepted accounting principles, they represent an accurate measure of the agency's financial performance.[61]

The PIA study group was probably justified in its contention that a request for cost information drawn directly from an agency's financial statement increased the objective content of the survey responses. However, many of the most critical determinations in the PIA study depended not only on the accuracy of cost data supplied from financial statements, but also on the agency principals' perceptual judgements as to the accurate allocations of these overall costs. Merely to determine the breakdown of commission income by line of insurance, for example, Dr. Buss testified that "we used the perception of revenue--or the perception of commission income that comes from personal property and casualty and other sources. Then within personal property and casualty we asked what percentage of your revenue comes from assigned risk, what percentage from voluntary auto, what percentage from homeowners, and what percentage of other lines of personal insurance."[62] Likewise, to determine the proper allocation of direct agency costs among the various lines of insurance, Dr. Buss explained that the study relied on agent perceptions of the amount of time devoted by various classes of employees (salesmen, clerical workers and agency principals) to each line.

In retrospect, the confidence which agents expressed--and which the PIA study authors embraced--that the agents "could give fairly accurate estimates of most of the factors which required estimation" seems to have been less than totally vindicated. On the evidence of record, one set of estimates of the time worked by various

classes of employees (either the total estimates by line or the added totals for specific activities within each line) is seriously in error. Moreover, the PIA study methodology seems, in many respects, to put the cart before the horse. Many of the estimates and judgments which the PIA study methodology required to be made as starting points--amounts of time and effort devoted to assigned risk as compared with voluntary business, for example, or the amount of revenue generated by assigned risk business as compared with voluntary business--seem suspiciously like the fundamental questions to which an agency cost study should be geared to provide objective answers. Although the study authors professed great confidence in these judgments, there is more than little reason to wonder whether they may not be in part reflections of the very traditional and stereotyped assumptions whose validity the PIA study should have been designed to test.

In the first chapter of the PIA study, its authors acknowledged that the 1977 TBS agency cost study in Massachusetts had used a somewhat different methodology involving "detailed on-site studies of a few agencies." The PIA study authors would not use this vaguely referenced methodology, they said, because they wanted their analysis to be done "in the most cost-effective manner" and because the TBS approach "does not provide a large enough sample to adequately narrow the precision of the variables used in this study."[63]

The cost of a study adequate to validate traditional methods of assessing producer costs to policyholders, or to suggest alternatives, is of course a legitimate concern. It seems likely that a New Jersey study adopting the TBS approach of on-site agency cost analysis would be more expensive than the work so far completed for

the PIA. Conceding the greater costs, however, it also seems likely that a methodology loosely following and improving upon the TBS study would be better suited to the provision of reliable information that New Jersey agencies--and the Department--currently need. The TBS study itself had important methodological defects, but its virtues were not clearly represented in the PIA study comments rejecting its approach. The on-site observation of agency costs (which in Massachusetts was carried out in about 20 agencies) has the advantage of objectively reinforcing agent perceptions on the questions that matter, and a sufficiently large and stratified sample of agencies visited on-site could help provide credible data for desirable generalizations. Generalizations could also be facilitated through a supplementary mail survey of a larger number of agencies like that carried out by the PIA in New Jersey, and it is important to clarify that the TBS study also employed such a questionnaire. Compared with the PIA response rate of 16 per cent (156 returns out of 927 questionnaires mailed) the TBS study reported a response rate of 33 per cent (610 responses from about 1800 members). Far from impeding the "precision of variables" which the PIA study group hoped to obtain, a two-pronged TBS approach could certainly have enhanced the refinement and the credibility of the PIA study findings. It could still do so.

Meanwhile, the apparent limitations of the PIA study should not be allowed to obscure its strengths. The management of the Professional Insurance Agents deserves great credit for its foresighted commitment to the interests of both its membership and the general public in commissioning this preliminary professional inquiry into what is admittedly a still largely uncharted research field. As the

only study of its kind so far undertaken in New Jersey, the PIA study affords us the best glimpse currently available of the complex variety of agency operations throughout the state. As the PIA study authors have pointed out, some of its findings seem reasonably consistent with the few other published materials on agency costs and revenues, and also with common sense expectations.

Fixed Agency Costs

From the Department's perspective, the fundamental point of common sense corroborated in a somewhat systematic way by the PIA study is the incontrovertible existence of a substantial element of fixed costs in agency operations.

In describing the PIA study methodology, Dr. Buss summarized some of the conventional accounting procedures that had been used to determine the breakdown of overall agency costs between direct and indirect costs. Referring to voluntary market auto insurance, Dr. Buss explained that "direct costs are those that you incur when you write voluntary personal auto. The indirect costs are the other costs that you incur to stay in business, and then [a portion of those costs] are allocated to voluntary auto." He elaborated:

> In other words, if you can allocate--when you service an auto claim, you have got time taken up servicing the claim and you have got postage taken up sending the claim to the company. The time taken up by the people is allocated directly to the line.
>
> The other costs like postage and phone, and so on, we have no idea of knowing how many stamps it takes to service a claim, so we just allocate it across lines as an overhead expense.[64]
>
> The [indirect costs] that we could not assign directly . . . we allocated based on the revenue generated by that line of insurance.[65]

The conventional accounting distinction between direct and indirect costs is not exactly parallel to the distinction between variable and fixed costs that has been discussed throughout this opinion. Particularly as applied by the PIA study group, the distinction between direct and indirect costs is merely a rough cleavage between payroll and other agency costs. The evidence of this record shows, however that many agency activities--and therefore, a significant percentage of payroll costs--may also be considered fixed or non-variable in relation to the size of premium which a policyholder pays.

But as a recognition in principle and in fact that there is a significant group of agency costs--however large or small--which are not obviously attributable to any particular transaction or class of transactions, Dr. Buss's comments are germane. Some costs, at least, would be incurred whether an agency had 100 customers or 1,000. These are the cost for rent and electricity and office equipment, basic costs of doing business, which bear no relationship to the characteristics of individual customers. Although other overhead costs, like telephone service and postage, may bear some limited relationship to specific customer transactions, the agency has "no idea of knowing" what the relationship is, and tracing the nature of the relationship might be more trouble than it is worth. The PIA study did not attempt to identify and estimate all fixed agency costs, but even its more narrowly focused estimate of "indirect costs" is instructive: 28 per cent of all agency costs for automobile insurance were so identified.

To the extent they are not directly associated with a particular transaction or class of transactions or line of business, the important question posed by indirect costs--or fixed costs, more

broadly understood--is how to charge them off to customers. As Dr. Buss suggested, the only thing that can be done with such costs is to pass them on to customers on the basis of some allocation method that seems rational and equitable. Dr. Buss's method was to allocate all indirect expenses among lines of insurance--and among groupings of agencies by territory or by premium volume--on the basis of gross premiums generated by each line or group. This choice of allocation method is consistent with the traditional ratemaking judgment that when the connection between costs and classes of policyholders is not known, costs are allocated as if they varied with the size of premiums.

It is not necessary to accept Dr. Buss's choice of an allocation method to appreciate his basic point that indirect costs may not be automatically associated with a particular agency transaction or customer, but must be allocated according to a plan. In a related context it will be remembered that the Independent Producer Council's Mr. Muetterties conceded that "at least some proportion of agency costs are common to all policyholders" because there would inevitably be "a certain portion that I would not know how to allocate." The puzzlement confessed by Mr. Muetterties seemed to result from his inclination to think in terms of expense allocation only as it has traditionally been practiced in the insurance industry, on the basis of gross premiums or revenues. An alternative allocation method that seems clearly more rational and more equitable for such automobile insurance costs is to divide them among policies (or coverages) equally.

Conclusion on Producer Costs and Compensation

Neither insurers nor producers who took part in the Department's hearing were able to provide compelling evidence that the pro-

duction costs (including miscellaneous service costs) generated by different policyholders are 100 percent variable with loss costs and therefore with premium size. Mr. Muetterties recognized, merely on the basis of common accounting expectations, that a percentage of such costs are likely to be fixed rather than variable. Mr. Minter and Mr. Young both acknowledged areas of agency activity in which costs for the highest-rated policyholders would be no greater--and possibly would be less--than the costs for other policyholders. No party to the hearing made any systematic demonstration that the territorial and rate class differentials used to predict a policyholder's expected losses (and premiums) are also accurate predictors of variation in production costs. The published PIA study pointedly avoided any claims that agency costs vary by territory or by rating classification.

Dr. Stefan Peters, a Fellow of the Casualty Actuarial Society, a former associate professor of insurance at the University of California in Berkeley, and currently the chief actuary at the Massachusetts Division of Insurance, rejected fundamentally the underlying assumption of the traditional ratemaking system that commission and non-commission expense costs vary in proportion to loss costs.

> We feel that if from one year to the next, say, for example, the losses in a policy go up because of inflation--assume for the moment that there is no other reason that losses go up, but because of inflation--we do not feel that the inflationary factors that affect losses are necessarily identical with the inflationary factors that affect premiums [i.e. with the factors that affect expense costs and all other costs reflected in total premium computations]. So that even if by any chance expenses were proportionate to losses on one year, they wouldn't be any more in the next year.[66]

Pointing out that the range in applicable premium charges--and therefore, in commissions--can be as much as five to one between a tradi-

tional rating system's highest and lowest-rated policyholders, Dr. Peters testified in behalf of the Massachusetts department:

> It is our judgment, but I would say it isn't just guesswork, that it is inconceivable that the agent . . . in the higher-rated risk and territory classification really does five times as much work or [that] it costs him five times as much to render the services than . . . the agent in the lower-rated classification. I mean, it's true it's not based on any statistics, but it's based on ordinary common sense about business operations and the operations of an agency that it can't be that much.[67]

Mr. James Hunt, an actuary and the former director of the Massachusetts department's State Rating Bureau, did attempt to make a statistically-based measurement of fixed as distinguished from variable agency costs. In his 1978 research paper which is a part of the hearing record, Mr. Hunt concluded, on the basis of cost data supplied by the TBS agency cost study in Massachusetts, that more than 60 per cent of all production costs are fixed. He recommended that 62.5 per cent of agency costs be loaded into 1978 Massachusetts auto insurance rates on a flat basis and the remaining 37.5 per cent continue to be allocated as a percentage of premiums.[68]

Former Massachusetts Insurance Commissioner James M. Stone, an economist, carefully examined both Mr. Hunt's paper and the TBS study in order to determine an appropriate method of reflecting commission expenses in his state's 1978 rates. In his Opinion, Findings and Decision Stone concluded that the TBS study had in fact overestimated the extent of cost variations by territory. One methodological defect contributing to this result was the failure of the study to separate the returns to principals and their relatives from overall salaries in an accurate manner:

> Several witnesses acknowledged that in a closely held business book profits often have little mean-

> ing. Principals' salaries will consume whatever true profits are earned. As a result costs will rise to match any level of paid commissions. The agents' defenses that "insurance has not yet been nationalized", that the Internal Revenue Service can reallocate excessive salaries as dividends, and that agents' compensation is not out of line with that of doctors, lawyers and accountants, all miss the point. What matters here is whether the TBS indices of cost by location can reasonably be described as measurements of necessary expenses incurred in performing services. Neither tax treatment nor overall statewide income comparisons tell us anything useful about the variation in true costs and the variation in principals' return from territory to territory.[69]

A similar defect of the TBS study was the failure to correct for efficiency differences among firms:

> Just as principals' salaries may rise to consume any payments received by an urban agency, so might inefficiencies rise to help swallow the same revenues.[70]

The TBS study methodology was faulted, finally, for failing to accurately separate costs by line of insurance and for failing to use an adequate sampling technique:

> . . . the selection of agencies studied was not random and . . . the number of agencies in each territorial grouping was insufficient to draw firm conclusions about locational variations. Moreover, the TBS study did not use a stratified sampling technique to correct for any biases that might arise as a consequence of economies of scale in the sample.[71]

On the basis of all the evidence available to him at the time, Commissioner Stone concluded: "There is scant reason to believe that any significant portion of agency costs varies more than slightly by territory. There is no reason at all to believe that agency costs other than claim costs differ by driver class."[72]

Thus there is nearly unanimous recognition among all the experts who were represented at the New Jersey rate classification

hearings--either through their published writings or through direct testimony and cross-examination--that the present method of allocating agency costs among policyholders is not a wholly accurate pricing method. The extent of inaccuracy is, however, a matter of strong disagreement. At one end of the spectrum of views, Mr. Muetterties was willing to concede an element of fixed costs amounting to 10 to 20 per cent of the total production costs. At the other end, Commissioner Stone concluded that the preponderance of production costs are fixed. Mr. Hunt's estimate of 62.5 per cent fixed costs turned out to be the middle ground in this argument. The acknowledgments of Mr. Minter and Mr. Young regarding the non-variability of certain categories of agency services also placed them on the middle ground, although Mr. Young's original formal statement supported an unchanged approach to the traditional allocation of production costs.

It is impossible to see, after a careful examination of all the evidence now available in the New Jersey hearing record, how a position in support of the traditional allocation method can any longer be maintained. The record plainly shows the injustice of continuing to allocate commission costs as though they were entirely variable with premiums. This method systematically overcharges the State's highest-rated policyholders.

This inequity demands an adequate and speedy remedy. If the size of the fixed cost element were the only remaining uncertainty, a fair if admittedly rough resolution of the issue could be immediately devised. For purposes of rate allocation, a dividing line could be drawn down the middle of this expense component. The record does provide reasonable indications that at least 50 percent of production costs should be regarded as fixed.

The choice of an appropriate method for implementing a partial flattening of commission costs is not self-evident, however, and an important corollary question has not been fully addressed in the existing hearing record. This question is the extent to which agency costs may be fixed or variable in relation to the number and kind of coverages a policyholder selects. At present, production costs are loaded separately into the rate for each constituent auto coverage. Under this approach, a revised ratemaking formula would need to include both a flat and a variable element of costs for each coverage. To the extent that some agency costs are actually fixed on a per-policy rather than a per-coverage basis--for example, the costs of billing an agent-billed policy--a policyholder's selection of an incomplete package of auto coverages could conceivably leave an agency under-compensated for its total costs. It is generally thought that high-rated policyholders in urban areas are the most likely to settle for the minimum compulsory coverages which the law requires, and to forego optional (and expensive) collision and comprehensive coverages. With the removal of the traditional subsidy to urban agencies resulting from percentage-based commissions, the mix of coverages selected by policyholders is likely to assume greater importance. The purchase of partial packages of coverages may already have been a problem for agencies in the State's lowest-rated territories, where even the traditional percentage-based commissions would not necessarily produce adequate amounts to compensate actual fixed costs.

One method of assuring that agencies are compensated for all their per-policy fixed costs, regardless of the number of coverages purchased, would be to express such costs as a per-policy flat fee

applicable to every auto insurance purchase. Another method would be to load all per-policy fixed costs into the rate computations for the minimum compulsory coverages every driver is required to buy. Variable costs would continue to be computed for each coverage as a percentage of premiums. Each of these methods has its virtues, the separate flat fee concept being especially attractive as a partial disclosure of costs incurred in exchange for presumably useful and desirable agency services. Both methods would require extensive changes in the existing pattern of rate computations by coverage, however, and both might require a more careful distinction between per-policy and per-coverage costs than has so far been attempted.

There is at least one other plausible method of correcting the largest inequities in existing production cost allocation. Implemented in Massachusetts approximately two years ago, this method involves the setting of minimum and maximum commission charges for agency services which are intended to preclude both inadequate compensation for fixed per-policy costs by policyholders at the lower end of the premium scale, and excessive compensation by policyholders at the upper end of the scale. Responding to separate but surprisingly similar proposals from Massachusetts producer associations and from the insurance department's State Rating Bureau, Commissioner Stone determined in his Opinion, Findings and Decision on 1979 Automobile Insurance Rates that no commission charges would thereafter be less than $30 per policy, nor more than $100. Within this range, however, commissions continue to be calculated as a percentage of premiums.

As explained by Dr. Peters, the maximum-minimum approach achieves a more accurate partial flattening of producer compensation

while respecting both the need for administrative convenience in rate computations and the less-than-precise knowledge of the true breakdown between fixed and variable producer costs:

> When Commissioner Stone wanted us to look at various ways of determining commissions other than by mere percentage of premium . . . he also asked two of the major Massachusetts agent associations to come up with proposals themselves. They agreed with the fact that, rather obviously, [the traditional method] of allocating commissions is one that really had nothing directly to do with agents' costs.
>
> . . . it so happened that the [method] they preferred the most was also the one which I came up with, to me as the most equitable in the light of a certain uncertainty what the true costs are: . . . you fix the commissions as a percentage of premiums, as before, but in such a way that in no policy, regardless of whom it covers, in what territory and what kind of coverage he buys, in no way--for no policy should it be less than $30 and for no policy should it be more than $100. We felt that these two figures bracket what the true agency costs probably are. There may be--as a matter of fact, I suspect that the margins are still too wide. That is to say even the most costly policies don't cost as much as a hundred in agency services. But in view of the uncertainty, this was considered a likely upper limit.
>
> And the two were in addition, balanced, that is to say, we determined the minimum, the maximum, and the percentage in between in such a way that for the average mix of policies and drivers and old cars, new cars, whatnot in the Commonwealth of Massachusetts, the overall commissions that would be payable by that formula would be just what they had been--the amount that had been payable under the previous traditional method.[73]

Although the maximum-minimum approach is conveniently simple for producers to use in calculating policyholder premiums, it does require--as Dr. Peters also testified--some relatively complex actuarial calculations by insurers and by the Department of Insurance. Dr. Peters submitted several technical papers that describe in detail the imple-

menting methodology that was developed in Massachusetts.[74] The availability of these technical papers, and the evidence that the maximum-minimum approach has met with practical success where it has been tried, further enhance the appeal of this prospective remedy. So, too, does the fact that it has been studied and endorsed by professional associations representing the producer community in at least one other state.

Taken in its entirety, therefore, our hearing record is sufficient to provide not only a rough measure of the problem caused by inaccurate allocation of production costs, but also a serviceable remedy. No one would claim that a framework of maximum and minimum charges for production costs is the perfect solution for the existing problem. The ultimate goal must be to allocate all identifiably fixed per-policy costs equally among policyholders. More extensive and precise information on the nature of agency costs can and must be developed in the years just ahead. As this information becomes available, more precise methods of production cost allocation will also be possible. In the absence of refined information, the maximum-minimum framework offers one practical means of eliminating the worst overcharges inherent in percentage-based production cost allocations while avoiding--for the present--the need for a more sweeping change in the traditional method of computing commission charges.

Section 8

OVERALL ASSESSMENT

I. THE "DISSIMILARITY" OF RISKS WITHIN CLASSES

The discussion thus far has focused on the relative virtues of individual classification variables. The evidence has shown these classifications to be roughly hewn in concept and loosely defined in practice. Many variables have demonstrated only a limited capacity to identify stable differences in class-average costs. Numerous variables are redundant. Major discrepancies between price and class-average costs have emerged. Estimates of the explanatory power of individual variables suggest that no single variable accounts for more than a small fraction of the total variation in risk among insureds; and even these predictive powers are likely to be a function in part of the ordering of the classification hierarchy.

The observed deficiencies of the classification system are in no small part a reflection of the extreme complexity of the task attempted. To the extent psychological factors, or in the parlance of underwriting manuals "attitudes," are the most important determinant of differences in risk between individuals,[1] generalizations are difficult. The possibility that demographic and geographic variables can effectively sort out these factors is extremely remote. This impossible task is further complicated by the need to apply static categories to inherently dynamic phenomena. Classes are based on present or past differences between groups of insureds which do not necessarily reflect future differences. It is only the future differences in risk among insureds--during the period of coverage purchased--which are an appropriate basis for differentiation of premiums.

The crudeness of current classification systems has unfolded in the broader context of competitive realities in the industry, of

which more will be spoken. The limited predictive capabilities of individual variables coupled with the multiplicity of possible combinations has diluted the importance of actuarial risk estimates and encouraged the selection of those variables and pricing techniques which serve larger marketing objectives. In the process, the industry's assessment of the multi-line business value of classes of customers is likely to have become as important as actuarial determinations of differential driving risk in its pure sense.

A. The Explanatory Power of New Jersey Class Plans

In 1976 the SRI estimated at 22 per cent the combined efficiency of a 217-class plan (of the sort used by ISO in New Jersey), merit rating, and representative territorial relativities (from New York).[2] This finding implied that about three-fourths of the total variation in risk among members of the driving population was left entirely unaccounted for by the classification process. In 1978 the Massachusetts Commissioner of Insurance stressed the significance of this kind of finding when ordering comprehensive modification of classification practices in that state:

> "An accuracy rating of 20% to 25% on the SRI scale is hardly distinguished. With over 75% of the variance left unexplained, the average policyholder with a $400.00 annual premium is likely to be undercharged or overcharged by hundreds of dollars. Those policyholders with four figure annual insurance bills will be subject to far greater classification errors.
>
> A classification system which leaves three-fourths of the risk variation among policyholders unexplained is not an accurate system. Two separate classification cells, ten per cent apart in premium, will overlap for more than ninety per cent of their combined distribution. More than two out of every five policyholders in the higher rated cell will, in fact, have an inherent risk below that of the average member of the lower rated cell. . ."[3]

Industry witnesses in this proceeding have criticized the SRI estimates as too low. They correctly point out that the SRI's use of motor vehicle data to estimate population heterogeneity (the denominator of the explanatory power fraction) probably overstates the amount of risk variation that classification systems should be expected to explain. However, the SRI's use of pure premiums rather than claim frequencies to estimate variation in class average costs offsets this overstatement by in turn overstating the variation explained by classifications. Any uncertainty about the validity of the SRI results has been resolved by the separate estimates proposed for New Jersey at this hearing. The methodological aspects of the SRI estimates and each of the estimates to follow below, including choice of data questions, are discussed in the Appendix.

A consultant to the SRI in statistical methods and a member of the 1976 study team, Dr. Joseph Ferreira, now an Associate Professor of Urban Studies and Operations Research at the Massachusetts Institute of Technology, was a principal witness for the Department of Insurance in these proceedings making the core presentation on homogeneity issues. He estimated the combined explanatory power of ISO's New Jersey classes and territories at 23 per cent, using collision data entirely different from that used by SRI. (His estimates were lower for the other major coverages.)[4] The estimates were based on ISO class-average claim frequencies and a population variance derived from Massachusetts insurance data--the most credible data available at the time.[5]

Late in the hearing Allstate produced sufficient New Jersey data to permit estimates based exclusively on New Jersey experience. When these data are substituted for that part of Ferreira's estimate

which had used Massachusetts data, the 23 per cent estimate of overall efficiency declines to 20 per cent. This adjusted estimate must be given substantial weight because, for reasons explored at length in the Appendix, the Allstate data appear to be the best available evidence of the heterogeneity of the New Jersey risk population.

The limited data supplied by State Farm indicate that the efficiency of its class plan is comparable to the ISO plan, again using the Allstate population variance. The explanatory power of the eight State Farm classifications which utilize age, sex and marital status variables, combined with 27 territories, is about 17 to 19 per cent for property damage liability and collision coverages, the two coverages typically producing the most homogeneous class experience, and 5 per cent for the comprehensive coverage.[6] Using ISO data to supplement the explanatory power of State Farm's classes, these estimates can be extrapolated to yield upper-bound estimates for all State Farm classes and territories of between 23 and 29 per cent for property damage liability and collision and about 8 per cent for comprehensive. Combined explanatory power estimates are generally less than the sum of individual variable efficiencies, reflecting the diminishing marginal effectiveness of individual variables when used in combination.[7]

Various industry witnesses, notably Richard Woll, the Hartford's actuary, have sought to establish the efficiency of existing classes and territories at much higher orders of magnitude. Mr. Woll initially estimated the combined explanatory power of ISO's classes and territories at about 80 per cent. This estimate was developed from the SRI formula using a numerator derived from Massachusetts pure premium data and a denominator derived from California and North

Carolina motor vehicle data, together with a number of additional steps and assumptions.[8] Adopting in part the Woll methodology, Thomas Kozik, an actuary for Allstate, proposed what he called a "lower-bound" efficiency estimate of about 44 per cent for liability and 51 per cent for collision coverage for all Allstate driver classes combined and 27 New Jersey territories (using single- and multicar policies combined). For reasons developed in the Appendix, both estimates are grossly exaggerated.[9]

Making realistic adjustments in Mr. Woll's methodology and substituting the Allstate data for his motor vehicle data shrinks his estimate to about 24 per cent. Substituting for Woll's motor vehicle data the Massachusetts data used in Ferreira's initial estimates yields an estimated efficiency of about 26 per cent. The remaining difference between the Woll and Ferreira estimates is explainable by Woll's failure to make adjustment for sample size bias which by his own testimony were necessary to some degree. Ferreira's adjustment may have been too large but no adjustment yields even more bias the other way.[10]

Critical evaluation of Mr. Kozik's estimates, focusing largely on his use of actual premiums paid rather than loss experience for estimating variations in average class and territory costs, result in similar modification of his proposed estimates. For Allstate's single-car policies, the 16 driver classes, namely those classes which contain age, sex, and marital status variables, explain about 12 per cent for liability and 7 per cent for collision. Extrapolation from the modified estimates, using ISO data to fill gaps as in the case of State Farm, yields upper-bound efficiency estimates for all of the Allstate classes and territories combined amounting to 24 per cent for liability coverages and 20 per cent for collision.

Overall the original SRI estimates hold up well in New Jersey. The observations which accompanied the original SRI estimates appear of similarly lasting validity:

> "Current risk assessments are far from resolving completely the uncertainty about each insured's expected loss.
>
> Classification subgroups are generally quite heterogenous. There may be wide overlaps among the ranges of risks in each class. The high-risk classes are also the most heterogeneous, i.e., have the largest absolute range from low to high risk."[11]

B. Estimates of Heterogeneity Within Classes

It is important to interpret explanatory power estimates in context. The greatest practical significance of these estimates is that they debunk myths about the predictive powers of age, sex, marital status and other "crucial variables"[12] with respect to identification of the expected loss costs of individual motorists. Explanatory power estimates can also indicate the marginal impact of juxtaposing and substituting variables on overall classification precision. Yet the measure informs only at a high level of generalization. Without specific information about the distribution of risks left unexplained by current variables, it is difficult to fashion appropriate improvements.

As discussed in the Appendix, the degree of diversity in inherent risks across a population of insureds is expressed by the mathematical symbol "K". The lower the numerical value of "K," the greater the heterogeneity of risks in the sample. In the case of perfect homogeneity, "K" equals infinity. A convenient rule of thumb for interpreting "K" in percentage terms relates to the dispersion of inherent risk about the mean for the population. For example, a K-

value of 4 means that roughly one-third of the policyholders have claim propensities or expected losses more than 50 per cent above or below the mean for the population; a K-value of 2 means that about one-third of the policyholders have a systematic risk more than 70 per cent above or below the population mean; and a K-value of 1 means that the inherent risk of one-third of the policyholders is greater than 100 per cent above or below the mean.[13]

The translation of K values into absolute pricing errors depends on the dollar-value of average expected losses for the population. For example, a population with an average expected loss of $150 might be considered homogeneous if its K-value were at least 20. Roughly two-thirds of the population would then be predicted to have an individual expected loss within 22 per cent of the mean, i.e., $150 ± $33. Yet a population with an average expected loss of $300 would require a K-value of 80 to achieve the same degree of homogeneity in dollar terms, i.e., two-thirds of the population within $300 ± $33. In order for two populations to be equally homogeneous in dollar terms the ratio of respective K-values must equal the square of the ratio of population means. If one population has average expected losses two times as high as another it must show a K-value four times as high as the K-values of the other population in order to be equally homogeneous in dollar terms.[14]

Estimates of within-class heterogeneity vary somewhat according to the method of estimation and corresponding assumptions employed. The major difference between competing approaches concern disagreement as to whether all classes should be presumed to be equally heterogeneous in <u>percentage</u> terms. The merits of the different

approaches and resolution of related issues will be addressed in the Appendix.

Briefly, as contended by Mr. Woll, it is possible that some of the higher-rated classifications are less heterogeneous in percentage terms than some of the lower-rated classes. However, no systematic relationship between K and class mean has been demonstrated. In the absence of such a showing, it is reasonable to assume that classes are equally accurate in percentage terms--a concept which at the time this hearing commenced had never been seriously contested. If there be any systematic variation in percentage heterogeneity across classes, it would appear to be confined to differences between youths as a group and adults as a group, without further variation by subclass. The critical point is that any such variation in percentage terms is not nearly great enough to equalize the absolute heterogeneity, or dollar pricing errors, across classes.

The results of the within-class heterogeneity analysis described in Table 64 have been bifurcated to produce separate K estimates for the two most plausible assumptions, first the assumption of equal percentage accuracy, then the assumption of differential percentage accuracy between the youth and adult groups. The results employ population heterogeneity estimates adopted in the Appendix together with (normalized) claim frequency variances for ISO's 217 primary classes and 40 secondary classes amounting to 8,680 different class cells. Separate class K estimates are stated for each major group of coverages.

A separate analysis was conducted to determine the extent to which further refinement of classes by territories increases these

TABLE 64

HOMOGENEITY OF DRIVER CLASSES

		Effect of Classes -- Equal K			Effect of Classes -- Split K	
Coverage	Population K	Within Class K	Explanatory Power	Group	Within Class K	Explanatory Power
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Compulsory (all liability)	1.52	2.01	16.3%	Youth	3.05	26.0%
				Adult	1.70	8.6%
Collision	1.56	2.03	15.5%	Youth	3.24	21.8%
				Adult	1.70	6.9%
Comprehensive	0.83	1.02	9.4%	Youth	1.35	8.4%
				Adult	0.91	6.7%
Full Coverage	1.53	2.02	16.2%	Youth	3.11	24.7%
				Adult	1.70	8.2%

Notes:

Column (2): Allstate value for liability and collision; Massachusetts value for comprehensive. Full coverage value is a premium weighted average for compulsory and collision coverage (see Appendix for details)

Columns (3) and (4): From Table A-8 in Appendix

Columns (5), (6) and (7): From Table A-10 in Appendix

TABLE 65

HOMOGENEITY OF CLASSES WITHIN TERRITORIES

	Effect of Classification -- Equal K			Effect of Classification -- Split K		
Coverage (1)	Population K (2)	Within Cell K (3)	Explanatory Power (4)	Group (5)	Within Cell K (6)	Explanatory Power (7)
Compulsory (all liability)	1.52	2.17	20.5%	Youth	3.38	31.5%
				Adult	1.82	12.6%
Collision	1.56	2.33	23.1%	Youth	3.94	32.8%
				Adult	1.92	14.0%
Comprehensive	0.83	1.08	12.0%	Youth	1.44	11.9%
				Adult	0.96	9.0%
Full Coverage	1.53	2.22	21.4%	Youth	3.54	33.9%
				Adult	1.85	13.5%

Notes:

Column (2): Allstate value for liability and collision; Massachusetts value for comprehensive. Full coverage value is a premium weighted average for compulsory and collision coverages (see Appendix for details)

Columns (3) and (4): From Table A-9 in Appendix

Columns (5), (6) and (7): From Table A-11 in Appendix

estimates (in favor of greater homogeneity). The derived class-by-territory K values are displayed in Table 65. The addition of territory considerations contributes little to the overall picture.

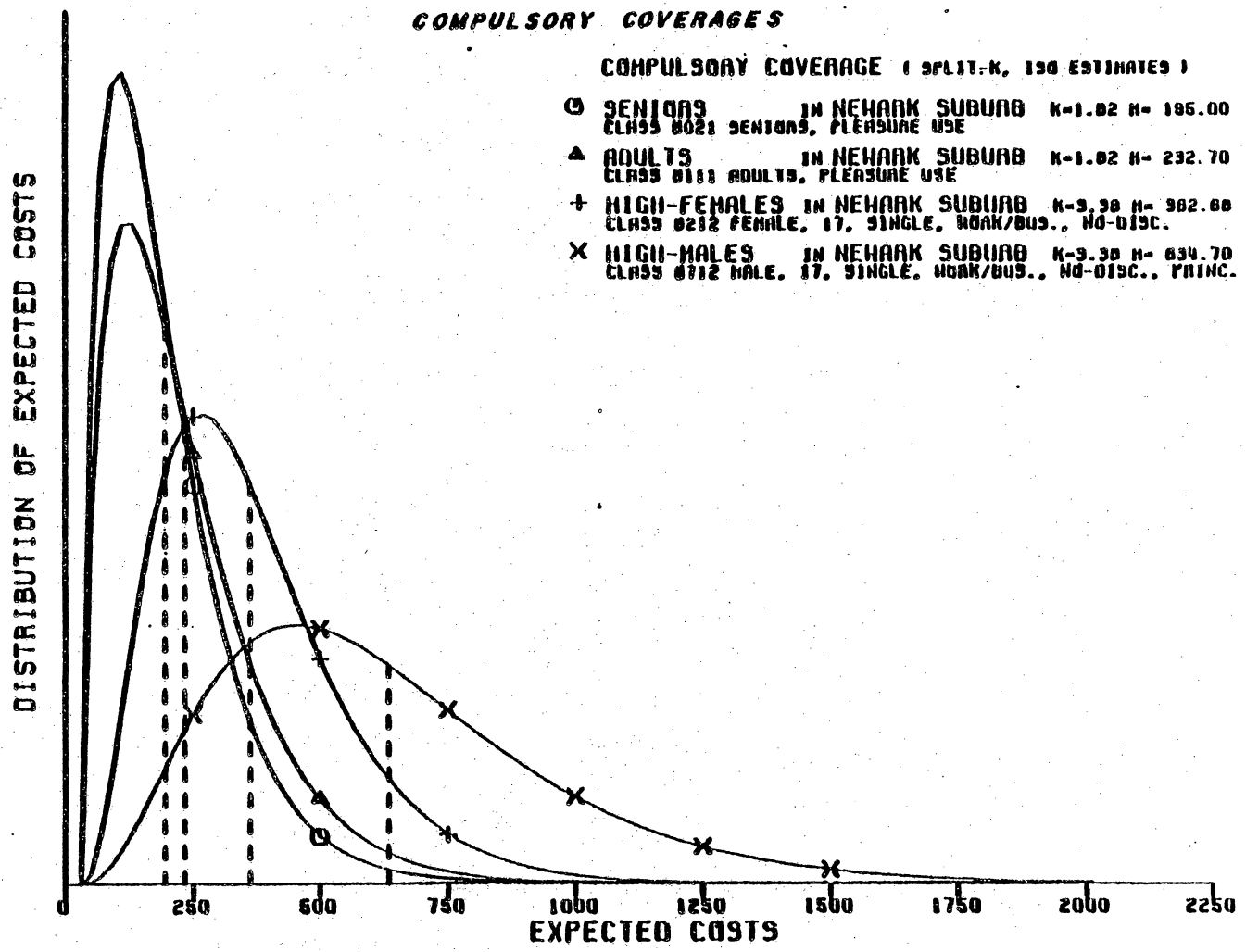
The estimates of class K values displayed in these tables reflect a picture of within-class heterogeneity in New Jersey almost precisely the same as that for the hypothetical heterogenous classes illustrated in Figure 3 of the Standards of Evaluation (p. 76, supra.) The classes depicted in that graph are plotted to reflect a K value of 2. Under no circumstances would the New Jersey classes look anything like the classes depicted in Figure 4, reflecting K values of 20 and 80, respectively.

With the equal K assumption, the estimated K value of about 2.3 for ISO's collision coverage (the most homogeneous case in the table) suggests that more than one third of the New Jersey insureds in each class have average risks that are at least 60 per cent above or below the average for their class. For the other coverages the comparable per cent deviations are higher. Even with the split-K assumption the figure is never below 45 per cent for any class by territory cell. These percentage deviations translate into significant pricing errors when all insureds within a driver class and territory subgroup are charged the same class-average premium.

Figure 16 below provides a familiar picture of class heterogeneity and overlap. It depicts two pairs of classes at opposite ends of the classification rating spectrum, namely, the lowest-rated senior citizens and the lowest-rated adults on the one hand, and the highest-rated female youths and the highest-rated male youths on the other. Even here the degree of heterogeneity within classes and overlap between classes is substantial.

FIGURE 16

HETEROGENEITY AND OVERLAP AMONG THE HIGHEST AND LOWEST-RATED DRIVER CLASSES COMPULSORY COVERAGES



As many as 13 per cent of the highest-rated young males in Figure 16 have expected losses below than the class-average for adults but pay almost three times as much for compulsory coverages; and no fewer than 1 per cent of the adults are predicted to have expected losses greater than the "average" young male. As many as one-third of the high-rated females have expected losses below the class-average for adults; but another 10 per cent of these females have expected costs above the average for the young males. About 30 per cent of the senior citizens have expected losses above the average for the highest-rated females. A majority of insureds in each class have expected losses below the average for their class.

Greater overlap occurs at points on the risk continuum other than the class mean. For example, in the typical suburban classes considered above, about 54 per cent of the young females and 25 per cent of the young males have lower expected losses than 20 per cent of the adults for the compulsory coverages. For those buying full coverages the overlap is only slightly less but resulting overcharges are substantially larger in dollars.[15]

The amounts by which class-average costs differ from individual expected costs represent overcharges and undercharges for individual insureds. The classes with the highest average costs produce the largest overcharges; classes with the lowest average costs contain the largest undercharges. In the typical Newark Suburban territory, as many as 25 per cent of the highest-rated males are overcharged <u>at least</u> $300 for the basic compulsory coverages. None of the adults and none of the senior citizens are overcharged by this amount.[16]

In Newark, the State's highest-rated territory, 38 to 44 per cent of the highest-rated males are overcharged by at least $300

for the compulsory coverages; and 24 to 32 per cent of these males are overcharged no less than $500. Here 9 to 12 per cent of adults and 1 to 2 per cent of the senior citizens also pay at least $300 too much for the legally-mandated coverages.[17]

In practice, misestimation of class-average costs further exacerbates individual overcharges and undercharges within classes. The evidence suggests that numerous classes, particularly the highest-rated classes within the highest-rated territories, are substantially overcharged as groups. The explanations for these class-average pricing errors are potentially numerous; but the consequences for affected individuals are devastating. Class overcharges produced by the multiplicative combination of class and territory factors provides one example of the impact of class-average estimation errors on individuals.

Under current practice the multiplication of separately priced class and territory factors for the highest rated class in the highest rated territory produces an average premium of about $2,500 for full coverage. At this price no less than 41 per cent of the class is overcharged at least $500--in relation to individual expected costs--even if the multiplicative assumption is correct. However, if class and territory risks do not interact multiplicatively and the separate factors should be combined additively, as the evidence suggests, the average class premium is itself about $900 too high. Under this assumption at least 74 per cent of the class are paying overcharges of $500 and more; and more than 50 per cent of the class members are paying at least $1,000 too much.[18]

Individual overcharges are an inevitable part of any rating system which averages costs across less than perfectly homogeneous

groups. Nevertheless, at some point a line must be drawn limiting the extent of permissible imperfection. The statewide average premium for compulsory coverages is only $256 on ISO data. For full coverage ISO's statewide average premium is only $408.[19] These amounts define the largest overcharges possible if there were no classification at all. Yet pricing errors produced by current classification systems far exceed these amounts and with alarming frequency.

II. THE MARKET IMPLICATIONS OF CLASSIFICATION REFORM

Industry witnesses testify variously that "severe" and "unfortunate" economic consequences will result from any effort by regulators to "force" the pricing of classifications "different from these dictated by expected costs".[20] The types of remedies feared include (1) the prohibition of classification variables which, without the substitution of other variables, will reduce the prices of some classes and increase the prices of others through averaging, and (2) the more sophisticated pricing remedies proposed which adjust class and territory differentials to mitigate large overcharges. The dire predictions of company witnesses raise a number of highly debatable conceptual issues concerning the economics of the insurance industry in general and the classification process in particular.

The industry's major points are: (1) that regulatory intervention in the definition and pricing of insurance classifications impedes the workings of economic forces to the detriment of the public; (2) that regulatory mandates which depress the rates of high-cost insureds will reduce the availability of insurance for these groups; and

(3) that mandated elimination of classification factors or deviations from class-average pricing will disrupt the market for insurance, give an unfair competitive edge to some companies, threaten the solvency of others, and work ultimately to defeat the objectives of reform. The first point is essentially argumentative, relying on major exaggerations of the role of classifications in the monitoring of economic costs. The second two points raise issues of more immediate importance. Salient aspects of each argument will be addressed in turn.

A. Customer-selection Competition

The most common assaults against mandated modifications of classification practices accuse the concerned regulator of "social engineering." Although this epithet has not been formally defined, it appears to serve as a multi-purpose allegation relating variously to obstructing the workings of competition, ignoring the principles of "cost-based" pricing, and forcing low risks to "subsidize" high risks. These assertions provide a useful opportunity to eliminate common misconceptions about the dynamics of customer-selection competition and the extent of public benefits flowing from it.

These proceedings do not raise for the first time the issue of regulatory intervention in the insurance marketplace. Law and public policy articulated by the legislature and the courts of this State leave no doubt that automobile insurance is a vital commodity to consumers and the proper subject of responsible regulatory activity in the public interest. For example, the legislature has imposed on the existing market a number of regulatory constraints which limit the degree of permissible competition among insurers. Of major importance are laws which (1) require comprehensive regulatory review and prior

approval of all automobile insurance rates and rating systems; (2) limit company rights to cancel and non-renew automobile insurance policies; and (3) require the regulator to assure the availability of insurance for risks which companies are not willing to write voluntarily. Implicit in these constraints is a legislative determination that such competitive forces as exist in the automobile insurance market do not adequately protect the public interest. The issue then is not whether the regulator may intervene in the market but whether such intervention is needed to better serve New Jersey consumers.

The forced modification of classification definitions and pricing practices restricts one form of customer-selection competition. In evaluating the need for this restriction it is imperative to recognize the passiveness of the consumer's role in the selection process. Compulsory insurance requirements make the motorist a captive buyer. The only lawful alternative to purchasing insurance is a decision not to drive.

The buyer's bargaining position is further weakened by the intricacies of classification systems. Comparative price shopping is difficult. Price comparisons are not available in printed form and even company rate manuals cannot be translated into individual policy premiums without expert assistance. In this respect, simplification of classifications should facilitate price comparisons and even increase the level of competition in the marketplace.[21]

The use of risk classification as a competitive tool has not secured for New Jersey consumers the kinds of economic benefits which competition is supposed to promise. Basic economic principles hold that market competition for consumer dollars promises the follow-

ing benefits: (1) the most efficient allocation of resources; (2) maximum efficiency in the production of goods and services which minimize overall costs; and (3) innovation in productive systems and products and services.[22]

1. Allocation of Resources

The thrust of industry arguments on allocative efficiency issues is that classification effects the most efficient allocation of resources by pricing certain insureds out of the market for insurance. Allstate's Michael McCabe argues, for example, that current classification systems allocate resources "maximally" because they "tend to isolate the most wasteful of the groups, those who use a disproportionate share of the resources."[23] These allocative efficiency arguments are subject to various formulations; but they are all of limited relevance in a system which so severely restricts consumer choice. If every driver obeys the mandate of the law and stays in the insurance market, digging down to pay excessive charges, there can be no gain in systemwide efficiency. Relative burdens and benefits are redistributed among policyholders but overall loss costs are left entirely unaffected.

Furthermore, an unfortunate premise of allocative efficiency arguments is the apparent belief that forcing groups of drivers out of the insurance market will also force them off the road. In fact, the more likely possibility is that faced with both unaffordable insurance prices and a mandatory insurance requirement, only responsible insureds will stay off the road while the least responsible drive uninsured. This probability hardly serves the desired efficiency of societal resource allocation. Under reasonable assumptions about con-

sumer behavior in a compulsory insurance regime, significant allocative efficiency gains must stem from changes in actual driving behavior rather than decisions whether or not to own a car. Classification variables which permit insureds to influence their premiums by modifying their driving habits hold the most promise in this regard.

2. Minimizing Price

Current classification and pricing practices do not serve to minimize the overall cost of insurance. Classification refinement reduces the price of insurance for certain segments of the market at the expense of increasing prices for others. These differences are accentuated by company pricing decisions which serve to overprice insureds with the highest average costs while underpricing the base class, as discussed earlier in this report. The process of overpricing some and underpricing others can have an adverse impact on overall rate level unless both the high-priced and low-priced risks continue to be written in the same proportions from year to year. If the underpriced classes each year represent an increasingly large proportion of a company's book of business, as appears to be the case, an increase in overall voluntary rate level will be required in some degree.

The overcharging of some and the underpricing of others can be expected to have other effects on overall costs which are difficult to measure in the marketplace. Although at least one company witness "intensely" disagrees on this point,[24] the extremely high prices for insurance at the high end of the average-cost spectrum can only engender cynicism among high-premium insureds who see themselves as good drivers. Cynicism arguably translates into fraud and overutilization when claims arise, as an effort by insureds to recoup

premium. This tendency was noted in the 1978 Massachusetts ruling on classification issues.[25]

A major opportunity for competition to reduce overall costs is through pressure on companies to maximize operational efficiencies. Yet risk classification does not encourage companies to reduce expenses in this manner. In fact, the costs of administering risk classifications are a dead-weight loss to the system if they serve only to redistribute costs among policyholders and have no impact on overall loss levels. Highly intricate classification schemes also make it very difficult to monitor operating expenses relative to individual driver groups. The distribution of these expenses is further obscured by company efforts to minimize premiums for the most pursued demographic classes. The loading of premiums for expenses in proportion to class-average loss costs has served this customer-selection objective but in the process has concealed expense overruns on the largest part of the business.

3. Innovation

Industry witnesses contend that market competition encourages creativity in risk assessment, leading to an optimal classification design. Dr. Irving Plotkin, an economist appearing for The Hartford and ISO, echoed a number of industry witnesses on this point:

> "There is tremendous profit potential and, accordingly, tremendous incentive to subdivide a heterogeneous group into subclasses and maximize profit by identifying and marketing to such subclasses. Accordingly, the existing classifications across the several interactive factors, such as age, gender, marital status, territory, type of vehicle and use, etc., represent the result of continuing refinement motivated by economic interests which serve the greater concerns of economic efficiency and equity."[26]

The assertion that classification refinement is motivated by perceived "economic interests" is borne out by the evidence. The contention that the process so motivated has resulted in optimal risk assessment is not. In fact the influence of customer-selection competition appears to have been a negative force, discouraging comprehensive and objective assessments of differences in risk across the population as a whole.

Existing classification plans tend to overclassify small segments of the market while leaving the bulk of insureds relatively unclassified. The rationale for this tendency is embodied in the underwriter's rule-of-thumb that old business is better than new: "new business has much worse experience than renewal business even in the adult classifications."[27] The tendency to split off groups on the fringes instead of subjecting the entire book of business to comprehensive classification saves existing clientele from the destabilizing influences of underwriting competition. If classification refinement were to reduce the rates of a substantial portion of the adult class, the company may begin to attract "new" customers in this lower priced subclass but at the same time begin to lose "old" customers in the higher priced remainder.

Another formulation of the old-business-is-better-than-new mentality is contained in the statement of Andrew Giffin, Massachusetts' former First Deputy Commissioner of Insurance. Describing the so-called "negative posture of underwriting," he quotes from a 1979 study by the Stanford Research Institute:

> "By necessity, the underwriting process has maintained a basically negative posture . . . The potential underwriting loss from accepting the wrong risk far outweighs the potential gain from searching out the right risk. And the costs of resolving uncertainties about an individual risk

> often outweigh the benefits, thus predisposing the underwriter to reject the marginal or atypical applicant."[28]

Giffin attributes to this thinking the tendency of companies to "fear that more business, unless carefully screened, will include many bad risks."

The industry has avoided numerous opportunities for further refining classifications applicable to the 70 per cent of insureds who are over 30. Sex and marital status distinctions should be no less valid for adults than they are for youths; and the over-30 group can be further subdivided by age if the industry chooses.[29] Failure to make these distinctions for adults amounts to selective blindness. The inconsistency is further reflected in traditional industry resistance to the rating of drivers based on "minor" traffic convictions, notwithstanding demonstrated differences in loss costs among drivers classified on these grounds.[30] These oversights call into question the companies' "tremendous incentive to subdivide a heterogeneous group into subclasses" as asserted by Dr. Plotkin.

As a counter example Plotkin cites the recent discovery that senior citizens have below-average loss costs as the kind of innovation assured by the competitive process.[31] Ironically, the lower average loss costs of senior citizens are not universally reflected in rates; and the largest carrier in the market, Allstate, has never implemented a senior-citizen class. The largest rate distinction presently made for senior citizens resulted from the Commissioner's 1977 directive requiring a 50 per cent rate reduction for senior-citizen no-fault coverages to account for overlap with Medicare.

Classification pricing errors further exemplify the failure of innovation, inspired by customer-selection competition. Issues

relating to double-counting, the multiplicative combination of class and territory factors, and the percentage loading of expenses should not have required regulatory intervention to resolve. Because these failings are nationwide in scope they cannot be explained by a general lack of interest in the New Jersey market.

B. Cost-Based Pricing, Subsidies and Social Engineering

Industry insistence on the sanctity of "cost-based" pricing depends on a number of false implications: that prediction is precise, that definitions of policyholder categories are ordained by risk-assessment considerations, and that the pricing of classifications somehow flows mechanically from observations about average costs in each class. References to "subsidy" concepts and "social engineering" rely upon the same kinds of false implications. The discussion thus far relating to the origins and functions of classification variables, together with the extensive evidence detailing systematic pricing errors affecting both groups and individuals, reduce these issues to matters of semantics.

A very basic semantic problem involves the confusion of average costs and economic costs. Company testimony suggests that current methods of classification and pricing yield estimates of expected loss costs tantamount to economic costs.[32] Allstate's Mr. McCabe likened the automobile insurance classification system to a cost-accounting system wherein the rate attributable to each classification represents the cost of providing insurance to that class of the driver population. He argued that to require the abolition of classes would be as anomalous as requiring General Motors to charge the same price for a Cadillac as for a Vega.

Average costs attributable to driver classifications are in fact different from economic cost in numerous respects. Unlike economic costs, estimated average insurance costs for any group conceal a substantial dispersion of costs among the individuals making up the group. In fact company underwriting practices are predicated on the inevitability of this within-group variation in costs. The Continental's instructions to underwriters are again enlightening:

> "The next question is that if we are able to distinguish between risks on the basis of loss or claim probability and slot them accordingly, why does not the rating structure measure this difference, then adjust the rate to compensate for it, and thereby make all risks equally attractive, notwithstanding any difference in loss or claim probability? The answer to this question is what underwriting is all about.
>
> Risks are separated for rating purposes into broad general categories. In theory, these are homogeneous groups and each individual risk has the same loss expectancy. But, despite all efforts at refinement, the individual risks in each group have marked dissimilarities. The underwriter's assignment is to determine those that are more likely than the average to produce a loss or a claim . . ."[33]

This recognition of the high degree of cost variation within broad class averages gives the question of "subsidies" an entirely different cast. The quantitative assessments of within-class heterogeneity developed in these proceedings reflect substantial within-class subsidization among insureds. Indeed, because classifications limit the spreading of risks, it is classification and not the absence of it which causes the largest dollar subsidies across individuals.

Furthermore, a critical difference between class-average insurance costs and traditional economic costs is the sensitivity of the former to definitional choices by which the raw data are sorted

for analysis. The magnitude of average costs for any class depends on how that class is defined. Significant modification of class definitions will cause a corresponding shift in estimated class-average costs. Classification selection and refinement therefore inject a significant subjective element into determinations of comparative insurance costs. Andrew Giffin would go further by underscoring the social value judgments implicit in these determinations:

> "[A]ctuarially determined rate classes are equated with measures of economic cost. Industry representatives vigorously defend actuarial determinations as being above social judgment. Yet, when data is collected to produce class averages, someone must choose the characteristics which separate the data. The use of sex and marital status for this purpose expresses a social choice of acceptability despite only vague connections with risk of loss. The rejection of race and nationality, regardless of the possibility of obtaining a distinct class average rate, is part of the same process. These are not economic costs discovered outside social judgment."[34]

Judgment plays as large a role in the pricing of classifications as in their definition. The persistence of traditional expense-loading methods is a case in point. The unfairness of the percentage loading is obvious; but it makes as little sense from an accounting standpoint. Treating administrative expenses as wholly variable in proportion to risk causes the companies to overstate the profitability of its low-rated business--in fact making it blind to real losses on that business--and to understate the profitability of high-rated risks. On this record it is difficult to defend classifications as a system of cost accounting.

The testimony discloses numerous indications that the role of classification systems is only partially if at all addressed to the monitoring of economic costs. Until some time in 1979 Allstate

rated Cherry Hill in Camden County and Fort Lee in Bergen County as "rural" areas.[35] Allstate and the other filers continue to recognize Atlantic City as a separate territory even though its diminutive size renders the loss data collected there only 17 per cent credibile, by Allstate's own standards, for purposes of predicting future losses. This means that 83 per cent of the experience which went into computing the Allstate relativity for Atlantic City territory came from a source other than direct observation of Allstate experience in that territory. Allstate has addressed this credibility problem by averaging in the territorial loss experience of ISO and State Farm, not only "to broaden the experience base" but also because "it keeps us from getting far out of line competitively."[36]

Clearly the companies do not rely solely on classification cost information in pricing their coverages. Both Travelers and State Farm underprice merit rating categories in relation to class-average costs. Travelers admitted that the underpricing is deliberate, a function of competitive considerations.[37] Company judgments also intervene in pricing to soften year to year changes. For example, State Farm permits college students who have completed two years of study with a "B" average to retain the good student discount even if they drop out of school. The same applies for someone who graduates from college with a "B" average. The discount is retained until the person marries or reaches age 25, whichever comes first.[38]

Logically, even if differences in "true average costs" were properly estimated and vigorously pursued throughout the market, they would probably not define the only cost factors influencing company pricing judgments. As in any business, such additional factors as

marginal costs and opportunity costs are also highly relevant. For example, a company decision that it is cheaper to write the children of existing policyholders than other youths would reflect marginal cost assessments encouraging the creation of classifications which favor youths "with parents." A company decision to design and price classifications in a manner which favors insureds with the greatest buying power or use automobile insurance as a loss-leader for other lines would reflect considerations of opportunity cost.

In sum, the economic costs and incentives referred to by industry witnesses take into account far broader and more complex considerations than mere differences in class-average loss costs. Similarly, competitive pressures do not appear to focus on optimizing the identification of these average costs in the pricing of insurance classifications. Any assertion that competition can assure the accuracy and fairness of these average cost estimates and related prices must fail, accordingly. A market entirely unfettered by regulation will produce its own "subsidies," subject to manipulation by its own "engineers".

Company efforts to characterize regulation of classification practices as "social engineering" further underscore the politics of demographic classifications. Because premium distinctions follow demographic lines, any decision regarding who pays more and who pays less is necessarily suspicious. The motives of both companies and regulators can always be questioned and political controversy is inevitable. The most likely way to insulate classification systems from both political and marketing biases is to use classification variables which are neutral on both grounds. It is hard to imagine that the

classification debate would have quite the emotional pitch if it concerned the relative risk of high-mileage and low-mileage drivers rather than the stereotypical behavior patterns of males and females.

C. Availability of Essential Insurance

The industry warns that classification changes resulting in reduction of pre-reform prices for some insureds will lead to company refusal to write these insureds, at least in the short run. These potential availability problems are of serious concern; but in perspective, market dislocations of this sort are already a fact of life and are manageable. It is impossible to predict precisely who will pay more and who will pay less for insurance as the result of substituting factors, correcting pricing errors and tempering the price structure overall. However, as a general proposition, insureds who now pay the highest prices for insurance are already having the greatest difficulty obtaining it in the voluntary market.

As noted in earlier discussion, legislation is now pending which would eliminate the pricing penalties associated with negative company underwriting decisions. This legislation would abolish the present Assigned Risk Plan and substitute a new underwriting mechanism which would assure that risks relegated to the secondary market for reasons unrelated to driver record pay the same prices they would otherwise pay on the voluntary market. Implementation of the new mechanism would obviate the kinds of hardships predicted for those groups likely to be discriminated against through underwriting.

Furthermore, recall that State statutes restrict the ability of companies to refuse to do business on specified grounds. The Law Against Discrimination expressly prohibits a refusal to deal on the

basis of age, sex and marital status. The Trade Practices Act prohibits a refusal to deal "solely because of age". If, notwithstanding the elimination of demographic classifications for pricing purposes, companies persist in refusing to do business with the underlying groups, they would do so illegally. Obviously, company underwriting manuals suggest that refusals to deal have been predicated on precisely these grounds heretofore. Enforcement of the statutory proscriptions should be intensified regardless of the specific outcome in this proceeding.

The dimensions of the problem should also be viewed in perspective. Most industry characterizations of reform are vastly overdrawn. The persistent implication is that the only available options are to maintain the status quo or throw out all variables entirely. Most of the horror stories assume that the major variables are eliminated and nothing is substituted for them. In fact, however, the reforms at issue do not require that everyone pay the same price for insurance. Reform assumes only that differences in premium must be based on factors directly related to risk and that the costs of uncertainty about true costs be shared equally by all policyholders. The substitution of factors will have profound impacts on the amounts that certain individuals pay for insurance; but, on average, large distinctions across groups will remain and new ones will be added.

In addition, realigning rates in keeping with average costs should enhance rather than limit the availability of overall insurance. Flattening some portion of expenses, adopting an additive combination of class and territory factors and eliminating double-counting should improve the accuracy of the system on its own terms. Some upward

pressure on rate level is also likely to be alleviated. The only remedies which portend possible availability problems relate to elimination of factors--without adequate substitute--and tempering.

D. Other Potential Market Disruptions

The likely reaction of the market to substantial changes in the classification and rating of insureds is impossible to predict. However, hypothesizing a worst-case scenario, it is not inconceivable that a combination of unwitting market forces and deliberate company manipulations could threaten the ultimate success of reform. The source of this uncertainty relates to mix-of-business differences across companies.

Identical changes in classification structure or pricing formula can yield different results across the market depending on the mix of classifications (or "mix of business") within each company. For purposes of illustration consider two hypothetical companies: a "high mix company", meaning a company with a concentration of high-priced classes greater than the statewide average; and a "low mix company", meaning a company with a greater than average mix of low-priced classes. Assume further that the classification variable distinguishing high and low risks is eliminated and high risks go down in price and low risks come up in price as a result of averaging. The source of potential market problems is that the high risks in the low mix company will go down in price more than the high risks in the high mix company and, conversely, low risks in the low mix company will go up in price less than their counterparts in the high mix company.

If it can be assumed that consumers have perfect knowledge of classification price differences and changes across companies, and

can be expected to be highly sensitive to even the smallest price fluctuations, it can then be hypothesized that both the low risks and the high risks in the high mix company will attempt to obtain insurance from the low mix company in order to obtain the lower prices available there. The low risks will succeed in changing companies under this hypothesis because they are "overpriced" by pre-reform standards; but the high risks will not succeed because they are correspondingly "underpriced". A polarization process results: the low-mix company develops an even greater mix of insureds with low average risk--notwithstanding formal classification criteria and prices--and the high-mix company will become increasingly high cost. Over time the overall rates of the low mix company will tend to go down and the rates of the high mix company will tend to go up as a result of the mix of average risk characteristics in the respective company pools. Eventually, the theory goes, differentials between classes eliminated by reform will reappear as differentials across companies.[39]

This worst-case hypothesis, assuming large differences in business mix between high-mix and low-mix companies, is probably not realistic. Most companies belong to a rating bureau whose rates reflect a statewide mix of business representing the composite mixes of its numerous company members. This statewide average mix of business is not too different than the mix of business in the large independent filers.[40] In addition, the independent filers or the low mix companies represent a very small percentage of the market and a flood of new business requests would severely tax their capacities. The worst-case hypothesis nonetheless suggests an important potential problem if companies form subsidiaries to specialize in business which by pre-reform standards was considered low-average risk.

Mix of business problems may also jeopardize the revenues of some bureau companies for reasons unrelated to competition. Because the bureau rates are derived from an average mix of business, high-mix companies within the bureau may lose revenues under modified bureau rates which reduce the prices of high-average risks. Similarly, low-mix companies within the bureau will be overcompensated by using bureau rates. This problem is of the same kind currently experienced by rating bureau companies. Every change in rate level affects company revenues differently as a function of mix of business. Nonetheless, because reform amounts to changing the rules of the game, new uncertainties substantially different in degree may be likely.

It is also not inconceivable that companies can suffer a net loss of revenues as the result of classification changes if competitive pressures continue to suppress prices for the lowest risk classes. This type of revenue loss, stemming from the underpricing of the lowest risk groups, is probably occurring in today's market; but reform may accentuate the tendency if it eliminates the overcharging required to make up the deficit. The best long-run solution to this problem is elimination of overlap between pricing and marketing categories. Reform is less a problem than an opportunity in this respect.

Overall, the conceivable worst-case possibilities are not without mechanisms to handle them. The secondary market and the Commissioner's authority to control non-renewal of automobile policies can avoid major problems. The secondary market will be priced on a statewide mix of busines and will effectively provide an outer limit to the extent of pricing distortions possible. The Commissioner may

further modify the regulations governing non-renewal of policies to permit companies to shift to the secondary market or to other companies risks which, as the result of mix of business, they cannot afford to carry in the short run. A likely modification of existing rules would permit a company to shift business if it has a mix of high average risks greater than the statewide average and the shifts are limited to restoring a statewide average mix. Companies can be further encouraged to write an average mix of business through incentives built into the secondary market.[41] Regulatory policies governing both policy renewals and the secondary market can as well head off problems relating to proliferation of subsidiaries.

More importantly, the severity of the market problems hypothesized exceeds the likely possibilities. Again, the purpose of eliminating variables is not to make all insureds pay the same rate for insurance but to make them pay different rates based on factors more directly related to risk and more likely to be priced without marketing bias. The price shifts attributable to tempering are not highly sensitive to mix of business differences. Testimony developed differential impacts across companies amounting to only several dollars for low rated business on a hypothetical using an extreme difference in mix across companies.[42] Insureds are not likely to attempt to switch companies for amounts of this magnitude. Classifications currently in use show significant differences in price across companies for insureds with identical rating characteristics. In fact, the failure of prices to merge across companies suggests a competitive weakness in the market, perhaps attributable to consumer ignorance or the insecurity of consumers about the continued availability of coverage if they try to switch companies.

E. The Overiding Importance of Cost-Containment

Any modification of classification structure or pricing will cause shifts in premium among insureds. The fact that the victims of discrimination are a minority of the population minimizes the per-policy impact of changes required in the present case; but when insurance premiums are already high for everyone, shifts of any kind complicate resolution of the merits. Important to the success of distributional reforms is reduction of overall rate level.

To the majority of insureds increases in the general rate level are of greater significance than shifts in price as the result of classification. The typical industry requests for annual rate level changes in recent years--exceeding 20 per cent in most cases, and going as high as 40 per cent--would in any one year cost low-rated policyholders far more than the required overhaul of classification systems. The major concern of these policyholders is, and properly should be, containment of overall insurance costs.

Pending legislative reforms would launch a major cost-containment effort to attack fraudulent insurance claims and to eliminate nuisance litigation involving non-serious injuries. Implementation of meaningful changes in the right to sue for minor injuries--when all medical bills are automatically paid under "no-fault"--would alone offset shifts in rate required by classification changes. A 30 per cent reduction of costs under the bodily injury liability coverage would permit overall rate reductions for most insureds even after major modification of classification pricing.[43]

Classification changes can themselves have a favorable impact on general rate level. Accurate pricing of base-class insureds should

reduce upward pressure on rates. Reducing the cynicism which engenders fraud and enlarging the use of incentive-based variables--prompting insureds to reduce exposure to loss--can only have salutary effects as well.

Concern for cost-containment prompted attention in this proceeding to the so-called damageability and repairability issue: whether classifications for collision and comprehensive coverages can be modified to reduce premiums on cars which are less readily damaged and more easily repaired than others. Properly designed damageability and repairability classifications could encourage insureds to purchase those vehicles which impose the smallest burdens of cost on the overall insurance mechanism. Ideally, automobile manufacturers would eventually note consumer preferences in this regard and begin to improve the damageability and repairability of their cars in response to competitive pressure.

Collision and comprehensive coverages are subject to a unique classification scheme. In addition to driver class and territory factors the prices of these coverages are determined by the age and initial purchase price ("symbol") of the vehicle in question. Separately-derived factors for age and symbol are multiplied to determine price.[44]

Two filers have recently proposed to refine these traditional classifications. In July 1979 the Insurance Services Office proposed a two-part program called Vehicle Series and Model Year Rating. The "vehicle-series" portion of the program supplements the current symbol system for determining collision and comprehensive premiums; and "model-year rating" would replace traditional age classifications for

vehicles.[45] Allstate proposed a program similar to the vehicle series program, known as "make and model rating," in the fall of 1976. This program was disapproved by the Commissioner on various grounds. Allstate has reintroduced the filing in response to the notice of hearing in this proceeding but, regrettably, without significant change.[46]

1. Vehicle-Series or Make-and-Model Rating

Both Allstate and ISO programs would modify physical damage classifications to vary rates by make and model of automobile. Both claim that these rate variations would reflect the relative damageability, repairability and loss potential of certain vehicles. ISO also indicates a desire to encourage manufacturers to design safer, less damageable, more repairable and more theft-resistant cars. Both proposals fall substantially short of their promise.

The proposed systems would rely on interpretations of past average loss costs for different makes and models under the physical damage coverages. If the average losses of a particular make and model are greater by some threshold percentage than other makes and models in the same price range (or "symbol" group), the car is rated as if it belongs to the next highest symbol group. Similarly, if the model produces lower average loss experience by some threshold percentage, the rate is reduced by one symbol group.

The programs share two interrelated problems: (1) they fail to demonstrate a direct connection between past average losses and the current design features of each make and model; and (2) they fail to resolve a variety of statistical problems affecting estimation of differential average losses. These deficiencies make the programs unlikely to accomplish their stated purposes.

a. Absence of Direct Connection to Damageability and Repairability

Interpretation of past loss experience is not self-evident. Average insurance losses associated with any car model may be less influenced by the damageability or repairability of the model than, say, the relative risk characteristics of its typical users or the geographical areas in which it is typically driven. As discussed further below, the data used to determine relative loss costs by make and model are not adequately controlled for this purpose under either program.

The use of loss experience which predates by several years the current model being priced further obscures the connection between average loss costs and vehicle design features. For example, the proposed programs would price 1980 models on the basis of 1977 and 1978 loss data.[47] The damageability and repairability features of 1980 models, however, may have little in common with 1977 and 1978 cars which share the same model name. Design changes from year to year are common and, indeed, are sought to be encouraged by this classification program.

The arbitrary nature of proposed pricing methods is underscored by the treatment contemplated for new car models as they are introduced in the market. Lacking prior experience for cars by the same name, the programs would price these new models in the same manner as existing models they most resemble in size and body style. Whether the new model contained the same damageability and repairability features as these other models would not be considered.

The absence of a direct relationship between average losses and specific vehicle design features not only limits the likelihood

of homogeneous groupings but also reduces the incentive effects intended by the programs. Neither consumers nor manufacturers can be told the specific design features affecting vehicle repair costs. Nor can either be assured that the insurance price classification of particular makes and models will remain constant from model year to model year. For example, if 1977-78 data for a make and model were to differ from the 1978-79 experience for the same make and model, the 1980 and 1981 versions of these cars--governed respectively by these separate sets of data--could be classified differently. A change of as little as one per cent can determine whether the classification threshold is reached.

b. Between-Class Estimation Problems

The proposed estimates of differential average costs by make and model are highly dubious. The estimation problems include credibility, choice of data, and inadequate controls for factors unrelated to vehicle design features. Collectively these problems undermine the feasibility of the proposed programs except as underwriting and marketing devices.

It is unlikely that every make and model of car is owned by enough insureds to produce credible loss statistics. Neither Allstate nor ISO has provided the necessary exposure data to permit critique of these credibility problems, but recognition of the problems is implicit in the estimation methods used by the filers. Allstate has chosen to aggregate or to combine in one class different makes and models of automobiles based (apparently) on a subjective judgment that the makes and models are in fact similar.[48] ISO does not aggregate models but supplements its data with data supplied by the Highway Loss

Data Institute (HLDI).[49] Even after combining ISO and HLDI experience, at least some model groups are less than fully credible; and ISO averages the available data for these makes and models with data generated by vehicles of similar size and body style. To the extent this procedure solves the credibility problem, it further obscures the relationship between average loss costs and the design features of particular makes and models.[50] The merger of ISO and HLDI data creates additional problems. HLDI data classify cars by wheel base and body style. The ISO data classify cars by symbol group (defined by purchase price).

Neither program contemplates separate treatment for the two physical damage coverages. Allstate averages collision and comprehensive indications and, if together these indications reach the percentage threshold, applies a common classification factor to both coverages. ISO examines collision data only but applies the classification so determined to both collision and comprehensive coverages. Failing to give independent significance to comprehensive experience ignores individual efforts to reduce comprehensive losses. The comprehensive coverage permits individual behavior to have a significant impact on reducing losses--even on vehicles highly susceptible to theft--through installation of anti-theft devices, caution in garaging the vehicle and similar measures.

The quality of controls used to isolate the predictive contribution of particular classification variables has been addressed at various points in this report under the rubric "double counting". The double-counting problem here concerns whether make and model loss differentials identify the relative risk characteristics of particular

types of vehicles or rather their relative popularity with certain types of drivers. For example, Table 66 displays the percentage of youthful operators insured for types of vehicles found by ISO to have higher- or lower- than average experience for their respective symbol groups. The makes and models having higher than average loss experience are described as "up-symboled." Those with lower than average loss experience are "down-symboled." The up-symboled cars have a strikingly high percentage of youthful operators in comparison to the down-symboled cars.

Other mix considerations relate to geographical factors. Both ISO and Allstate use countrywide data to determine vehicle differentials. Yet it is reasonable to assume that different makes and models of cars have different distributions geographically, as determined by manufacturers' marketing strategies, consumer preferences and other factors affecting supply and demand across regions.

Although ISO reports that it controls for "class and territory mix," the adjustments it makes are unlikely to be adequate. Under the ISO system, which uses common classification factors for all coverages, average rating factors do not accurately reflect average cost differentials among groups under the physical damage coverages. Table 67 is an excerpt from an ISO filing purporting to show indicated differentials by age, sex and marital status groups based on countrywide data. Because the indications for youths are substantially larger under the collision coverage than under the liability coverages, ISO's decision to use a common factor for all coverages tends to overstate liability differentials and understate collision differentials. Adjustments to collision data for average factors across all coverages

TABLE 66

DISTRIBUTION OF YOUTHFUL OPERATORS WITHIN VEHICLE SERIES

Sample Results: Vehicle Series Up-Symboled

	Youthful Operator Exposures	No Youthful Operator Exposures	Total Exposures	Per ce Youthf
Chevrolet Camaro	7879	10716	18595	42.4
Datsun 200SX	611	1526	2137	28.6
Oldsmobile Starfire	452	909	1361	30.2
Plymouth Arrow	533	880	1413	37.7
Volkswagan Sirocco	411	1690	2101	19.6

Sample Results: Vehicle Series Down-Symboled

Buick Electra	4 Dr.	193	3711	3904	4.9
Chevrolet Nova	2 Dr.	1702	7139	8841	19.3
Dodge Aspen	4 Dr.	168	2050	2218	7.6
Oldsmobile Omega	4 Dr.	127	1371	1498	8.5
Pontiac Phoenix	4 Dr.	185	1717	1902	9.7

Sources: Exposures from "Research Report HLDI R 78-2", Appendix A, Highway Loss Data Institute.

Sample vehicle series up-symboled and down-symboled from Exhibit ISO 41A, p. 15.

are probably too small for this reason. In addition, ISO's methods for territory adjustments are unclear.

The HLDI data are subject to even less adequate controls. HLDI makes only a rudimentary standardization of its data for mix by "youths" and "non-youths;" and it does not standardize at all for single- and multicar classifications or geographical mix.[51] The latter failing should have a significant impact on observed cost differentials because the adult classes are heavily populated with multicar risks and the youthful classes, particularly in the 21-through-24 and 25-through-29 single male principal operator groups, are comprised primarily of single-car risks. Table 68 displays single- and multicar distributions by class group for the collision coverage.

In sum, the proposed make-and-model rating programs are likely to produce rates which are excessive and unfairly discriminatory. The filings shall be disapproved without prejudice. Hopefully the filers can be prompted to pursue further the refinement of damageability and repairability rating concepts.

An approach equally feasible but more likely to accomplish stated objectives would adopt classifications more directly related to hazard. Damageability and repairability have been the subject of extensive research by insurance companies. This research has identified the most troublesome (generic) design features of private passenger automobiles. Such features, causing the vehicle to be easily damaged or expensive to repair, can be discouraged through surcharges; and devices designed to reduce physical damage losses can be encouraged through discounts. Passive-restraint discounts and anti-theft-device discounts are examples of likely approaches already in effect.[52]

TABLE 67

AGE, SEX, AND MARITAL STATUS DIFFERENCE
BY LIABILITY, COLLISION, AND COMPREHENSIVE
SEPARATELY

Age, Sex and Marital Status Class	Present Additive Surcharge	Indicated Additive Surcharges		
		Liability	Collision	Comprehensi
No Youthful Operator - Age 65 or Over	- .05	+ .05	- .32	- .60
No Youthful Operator - All Other	+ .00	+ .00	+ .00	+ .00
No Youthful Operator - Female Age 30-64	- .10	- .16	- .17	- .33
Unmarried Female - Age 17-20	+ .42	+ .61	+ .68	- .33
Unmarried Female - Age 21-24	+ .08	- .01	+ .52	+ .10
Married Male - Age 17-20	+ .61	+ .76	+1.21	+ .70
Married Male - Age 21-24	+ .32	+ .20	+ .54	+ .68
Unmarried Male - Not Owner Age 17-20	+1.18	+ .81	+1.41	+ .12
Unmarried Male - Not Owner Age 21-24	+ .65	+ .15	+ .48	+ .40
Unmarried Male - Owner - Age 17-20	+1.84	+1.89	+2.94	+1.29
Unmarried Male - Owner - Age 21-24	+1.24	+ .72	+1.79	+ .95
Unmarried Male - Owner - Age 25-29	+ .64	+ .62	+1.04	+1.10

Source: Exhibit ISO-35, Exhibit 1.

TABLE 68

DISTRIBUTION OF SINGLE- AND MULTICAR RISKS
BY CLASS GROUP FOR THE COLLISION COVERAGE

	Single	Multi	Total	Percent Multi
All Others	556,670	923,804	1,480,474	62
Seniors	125,592	41,091	166,683	25
Unmarried Females				
17-20	28,626	52,332	80,958	65
21-24	33,008	22,317	55,325	40
Married Males				
17-20	2,567	7,773	10,340	75
21-24	14,613	17,599	32,212	55
Unmarried Males				
Occasional 17-20	7,689	31,295	39,984	80
21-24	2,632	8,976	11,608	77
Principal 17-20	7,586	12,987	20,573	63
21-24	22,138	12,131	34,269	35
25-29	22,217	5,955	28,172	21

Source: D-90, D-94, ISO Data.
Multi-Car exposures derived by subtracting D-90 exposures from D-94 exposures.

B. Model Year Rating

The ISO's proposed "model-year" rating program is less related to classification than to rate level. The proposal would modify traditional vehicle-age classifications in a manner which would increase physical damage premiums for all insureds. The rate increases contemplated are without adequate justification and shall be denied.

Cars are now grouped into six different age categories: new cars are classified as age group 1, cars one year old are classified as age group 2, two-year old cars are classified as age group 3, three-year old cars are in age group 4, four-year old cars are in age group 5, and all other cars are in age group 6. Age groups 2 and 3 and age groups 4 and 5, respectively, are priced identically, so that in practice the six age groupings produce four price distinctions.[53]

This pricing scheme works to reduce the premium for physical damage coverages as the car ages. A new car requires the highest premium. Each year the car automatically changes age classification and in most cases collision and comprehensive premiums decline accordingly. The reductions in premium reflect the depreciation of the automobile. As the vehicle depreciates, the likely severity of collision and comprehensive losses also declines.

The ISO proposal would eliminate this down scaling of physical damage premiums as the car ages, thus subjecting all vehicles to fixed premiums for physical damage coverages except as modified through changes in overall rate level. Each model year--that is, all models of cars sharing the same model year--would be assigned a common rating factor. Each year the new models would be assigned a model-year rating factor 5 per cent above the factor of the previous model year.[54] The

model-year factor would be multiplied by the symbol-group factor to determine physical damage premiums, much as age and symbol factors are now multiplied in computing rates.

ISO argues that downward adjustment of premiums each year is unrealistic because inflation offsets the effects of depreciation--old cars can sell for higher prices than when they were new. ISO also argues that the model-year program is easier to administer and eliminates the roller-coaster interaction of age discounts and overall rate-level increases; but the major thrust of the proposal and its major defect, relate to its provision for automatic rate increases for physical damage coverages without the prior approval of the regulator. The proposal assumes that inflation will increase unabated from year to year and at a constant rate. Nothing is provided to support the proposed 5 per cent differential between model years.

The effects of inflation on physical damage coverages are largely accounted for by existing symbol classifications. As purchase prices for new cars increase each year the mix of high-symboled cars also increases and so too do premium revenues. At least partially as a result of this "symbol drift," there has not been a rate increase for collision coverages since 1977 and comprehensive coverage premiums were last adjusted in 1979. Other offsetting factors include changes in policy deductibles and changes in vehicle design.

The ISO proposal is also inconsistent with respect to interaction of model-year and symbol factors. Another filing submitted by ISO acknowledges that age and symbol factors do not interact multiplicatively; and it proposes to change age and symbol relativities for insureds who remain subject to current classifications.[55] (The

model-year concept would apply prospectively.) The data submitted by ISO confirm that the relationship between age and symbol is not multiplicative. Yet model-year and symbol factors would be combined multiplicatively under the proposed program.

III. CONCLUSIONS AND REMEDIES

The comprehensive review of classification systems leaves little to commend them as a basis for risk assessment. As an integrated whole these systems and the methods used to price them produce rates which are, variously, inadequate, excessive and unfairly discriminatory for and among New Jersey insureds. There are ample grounds for abolishing the current system in its entirety.

Abolition of all classifications would minimize the largest overcharges affecting any individual; and every insured would then be priced at the average cost for the statewide population. Under a compulsory insurance regime which requires equitable treatment of similar risks this approach has considerable appeal. Although elimination of classes would tolerate a maximum degree of heterogeneity among similarly-priced risks, heterogeneity per se is of less concern than its consequences. The natural expectation is that all insureds pay the same premium for the same coverage; and the law imposes no duty to classify drivers. It is only a decision to classify--to charge different premiums for the same coverage--which places at issue the homogeneity of similarly priced risks.

Nonetheless, the overall interests of New Jersey consumers are probably not served by a narrow focus. The best remedies would

balance the diverse concerns bearing upon the classification problem. Specifically, these remedies should be designed to serve and reconcile the following purposes: (1) the design of a more equitable system based on factors more directly related to actual driving behavior, that is, how well, how much and where insured cars are driven; (2) assurance that the pricing of classifications, however defined, require all insureds to bear an equitable share of the burdens of imperfection; (3) immediate attention to remedies which can be implemented in the short term, later phasing in major structural changes; (4) minimization of disruption in the marketplace which can only confuse the public and undermine the credibility of the insurance mechanism; and (5) delineation of standards which can offer predictability to the classification review process so that the role of both actuarial and regulatory subjectivity can be suitably limited.

Prohibition of certain types of variables is necessary in the present case. Remedying deficiencies by redefining some variables is another option. Pricing adjustments are still a third approach. One such pricing remedy would seek to account more accurately for actual differences in class average loss and expense costs, adopting arguendo the principle of class-average pricing. Another type of pricing remedy would modify class-average prices to effect a more equitable distribution of pricing errors among insureds. The latter remedy acquiesces to unavoidable imperfections and seeks to adjust prices so that the burdens of imperfection are more evenly distributed among classes and unreasonably large overcharges to low-risk drivers are avoided.

With limited exceptions, no one has advocated increasing the general level of class-plan refinement. The point of rapidly

diminishing returns has probably long since been reached.[56] Further refinement of an already very detailed class plan is likely to compound statistical estimation problems and raise privacy and cost-benefit concerns as well. Refinement would not assure the creation of new rating cells uniformly more homogeneous;[57] and by causing additional spread in premiums, it would increase the already high costs of pricing errors.

No one seriously contests that the ISO's 260- and 217-class plans have gone too far in making fine distinctions among groups and should be scaled down. The 1974 report of the Federal Insurance Administrator noted that current classification systems contain too many rating slots to be credible.[58] As early as 1975 in New Jersey, ISO proposed a slightly less refined 161 class plan.

ISO's limited industry initiative promises little meaningful change. The proposed 161 class plan would retain all existing variables and merely reduce the number of primary combinations by 58. This cosmetic alteration of the existing plan would replace the current 234,000 rating cells with no less than 176,000 similar cells.

A. Prohibition of Variables

Variables which fail the tests of accuracy and fairness need not be eliminated in every case. Prohibition should be limited to situations in which the source of the defect cannot be remedied by redefining the variable or adjusting its price. Necessarily prohibited are variables found inherently unfair as a matter of law and public policy; but included in this group as well are variables irremediably defective on predictive accuracy grounds.

The variables properly eliminated are age, sex, marital status, good-student status--the status or lifestyle classifications--

and the principal-occasional operator distinction. Reasons for this conclusion vary. All the cited variables are irremediably defective on predictive accuracy grounds. The status classifications are also inherently unfair and unacceptable, especially distinctions based on sex.

1. The Status Classifications: Age, Sex, Marital Status and Good Student Status

The status classifications share numerous shortcomings with other classification factors. However, on predictive accuracy grounds, the deficiencies of these classifications are both unique and irremediable in the following two respects: (1) they depend on psychological and sociological stereotypes which even by their own logic include identifiable subdivisions and sub-stereotypes too numerous to classify; and (2) they are closely attuned to underwriting and marketing considerations which undermine the objectivity of necessary pricing judgments.

Age, sex, marital status and good-student status are essentially indivisible. Once the underlying premise of the age variable is adopted--that degrees of "maturity" and "responsibility" can be classified at a level of specificity suitable for pricing purposes--all related stereotypes become a suitable basis for premium differentiation. Age, sex, marital status and the good-student discount define the particular lifestyle stereotypes selected by the industry but numerous others are conceivable--and likely to be supported by class-average cost differences--if only a tenuous connection to driving behavior is required. Industry underwriting guidelines are suggestive of some of the other dubious possibilities, such as nature of occupation, length of time in the same job or same residence, credit rating,

and educational level.[59] Occupational categories alone provide a rich assortment of lifestyle stereotypes. One company's underwriting guidelines contend that high-risk occupational categories include (among others) farm workers; professional athletes, entertainers and certain types of musicians; busboys and kitchen helpers; waiters, waitresses and cooks; dock workers; parking lot attendants; certain janitors and porters; young unmarried military personnel; and generally the unemployed, unless retired.[60] If the absence of "clearly identifiable subsets" is an appropriate test of class homogeneity, as the industry contends, the use of status classifications without identifying these and similar class "subsets" is itself fatally inconsistent.

The close alliance among status classifications and underwriting and marketing considerations substantially reduce the likelihood that class factors will be accurately priced. Pricing decisions necessarily involve judgmental resolution of uncertainties. Who pays more and who pays less as a result of these decisions is determined by classification grouping. If the groupings also serve as underwriting and marketing categories--across multiple lines of insurance, especially--any such decisions are inherently suspect. The earlier discussions of biased pricing methodologies and systematic discrepancies between prices and average costs confirm the need to redefine risk categories on neutral grounds. Actuarial assessments of risk should be insulated as much as possible from concerns for business expediency.

Elimination of age, sex, marital status and good-student status need not mean that all insureds pay the same price for insurance. More objective risk-assessment categories are available to

substitute for the status classifications. Use of these alternatives will continue to differentiate premiums but on grounds more directly related to risk and more likely to be accurately priced.

The status classifications are also unfair per se. Price classification based on sex-related stereotypes amount to the type of discrimination which has been targeted for elimination in all phases of commercial life by New Jersey's courts and legislature. Sex discrimination is no less offensive to the public policy of this State than discrimination based on race or religion. Discrimination based on marital status is intertwined with discrimination based on sex; and the price classifications founded on marital status should also fail for this reason alone.

The age variable is conceptually allied with sex and marital status variables. All three involve a needless disregard of the merits of the individual. Nothing in the record suggests a purpose served by such classification sufficiently important to overcome this defect. Furthermore, classifications based on age are generally disfavored under New Jersey law except for the benefit or protection of those classified or for the protection of the public. The systematic overcharging of single-vehicle youths and senior citizens indicates that neither condition is met in this case.

The socioeconomic implications of the status classifications compound their difficulties. Under a compulsory insurance regime all four of the cited variables--age, sex, marital status and good-student status--are rightfully viewed with suspicion for this reason as well. On the particular facts developed in these proceedings, the numerous predictive imperfections of these classifications cause them to fail the scrutiny which the law requires.

2. Degree of Usage: The Principal-Occasional Operator Distinction

The predictive failings of the principal-occasional operator distinction have been developed in the earlier discussion. Most of these failings, all else equal, can be corrected through pricing. However, the unique and fatal defect of the principal-occasional distinction is its elusiveness. Although application of any variable requires judgment, the role of subjectivity in this case is substantially different in degree.

The principal-occasional distinction requires the kind of judgments characteristic of the underwriting process. The criteria governing these judgments are impossible to define or to monitor; and resolution of nuances in particular cases are necessarily affected by overall interest in the customer's patronage. In the case of youths, subjective applications of the principal-occasional distinction can translate into substantial savings for those customers most sought after. With respect to older drivers, similarly, the distinction determines whether some under-65 adults may be charged over-65 rates. For reasons of predictive accuracy and fairness the distinction is properly prohibited.

Elimination of the principal-occasional distinction does not require eliminaton of all degree-of-usage classifications. Distinctions of this sort are likely to work well if applied only in those situations not subject to substantial uncertainty. When an operator "resident" in the household is physically absent from the home for extended periods, for attendance at school or service in the armed forces or any other reason, separate classification is reasonable. Similarly, when drivers of specified risk characteristics are deemed

"exclusive" operators of the vehicle, separate class treatment is also acceptable.

B. Modification of Variables

A number of rating variables are unfairly discriminatory as defined or applied but otherwise reasonable conceptually. These variables include resident-student status, driver training, driver experience (or number-of-years licensed), territories, commute-to-work, and multicar ownership. The greatest predictive imperfections of these variables, developed at length above, can be substantially ameliorated through modification of class definitions and refinement of pricing techniques.

The immediate discussion will address the definitional aspects of each variable cited. A subsequent discussion will treat pricing questions. Merit rating will be deferred entirely, pending the outcome of legislative reform efforts.

1. Resident-Student Classifications

The major definitional shortcoming of the resident-student classification is its restrictive application to youths who attend boarding schools and colleges. Any prolonged absence from the home of any "resident" operator should affect premium if the risk characteristics of that operator are otherwise considered in computing premium. Resident-student rules must be modified accordingly. Rules of broader application already used by some filers shall be acceptable only if defined to cover all absence-from-home situations.

2. Driver Training

The major conceptual deficiencies of the driver training discounts are twofold: (1) the discounts apply for up to three years

when evidence suggests that at best successful completion of driver training affects differential risk for no more than one year after the training; and (2) application of the discounts is restricted to drivers under 21. Another complicating factor is the likelihood that on-the-road high-school driver training programs will be among the earliest casualties of State-mandated caps on school budgets.

The reason for keeping any driver-training discount at all is the belief that every effort to improve driver performance should be encouraged. Retention of some discount while limiting its scope should also stimulate further research to improve the quality of these training programs and to shape them to the needs of particular driver groups.

Driver-training discounts should be limited to one year in duration and should be extended to all drivers who complete the required training, regardless of age. Discounts for longer than one year can be granted upon a showing that the effects of some types of training persist longer than presently indicated. On a proper showing, the magnitude of the discount may also vary across risk classes.

3. Driver Experience

Number-of-years licensed is an appropriate basis for risk classification and a suitable substitute for the age variable if applied to all drivers. Under current practice, inexperience surcharges double-count the age variable as applied to youths. As long as age distinctions persist, application of inexperience surcharges to youth-rated policies shall be prohibited.

4. Territories

Current territory boundaries unfairly discriminate among groups of insureds. These boundaries must be redefined to solve the

numerous territory-rating problems discussed in the text. Acceptable territories shall (1) reflect a common rationale supported by empirical proofs relating to traffic patterns, differences in driving environment, and, if demonstrable, other factors bearing on the cost of claims; (2) represent typical driving environments for territory residents, maximizing the proportions of in-territory driving and equalizing such proportions across territories; (3) avoid abrupt rate differences between contiguous areas while maximizing the visibility of differences in traffic patterns and driving environment; (4) generate self-sufficient current experience having full credibility in an individual year for all compulsory coverages; and (5) eliminate large imbalances in cross-territory congestion effects.

Territory boundaries most likely to satisfy these criteria would encompass broad geographical areas reflective of regional traffic patterns. Resolution of territory accuracy questions therefore requires larger rather than smaller territories. Proposals to make each municipality or even zip code area a separate rating territory are not acceptable.[61] Although refinements of this sort may increase the similarity of <u>living</u> environments within territories, they would be certain to diminish the probability of capturing typical <u>driving</u> environments. Such refinements would also compound the already difficult statistical problems relating to estimation of true differences in cost between territories.

5. <u>Commuter Classifications</u>

Type-of-use variables relate directly to vehicle operations and should be encouraged. However, as currently defined, variables relating to commute-to-work (or school) serve largely as proxies for

mileage distinctions. These variables should be redefined to incorporate destination information. The commuters who use their cars exclusively for commuting may also be treated separately.

6. Multicar Discounts

The major problem affecting the multicar discount relates to pricing. Nevertheless, a definitional obstacle to resolving the pricing question involves the failure to account for number of operators. Clearly the risk with cars outnumbering operators is entitled to a large discount while the risk with operators outnumbering cars probably deserves no discount at all. Until the variable can be priced to reflect different car-to-operator ratios, the discount must be denied to risks with more operators than cars; and substantially larger discounts must be granted on those policies covering more cars than operators. Situations involving the same number of cars and operators may reflect the status quo until the pricing questions are resolved with further study. Implementation of this change can be deferred until companies have had a reasonable time to sample existing policies to determine the distribution of multicar policies by number of operators. However, within three months of the effective date of this Order, all filers shall report such distributions to the Department; and beginning six months after the effective date of this Order, no rate filing shall be approved which fails to price the multicar discount or limit its application as specified herein.

C. Pricing Remedies

Most variables considered raise questions of pricing accuracy. The most recurring of these questions relates to the inadequacies of current methodologies in accounting for interactive effects among

variables. As a general proposition attention must be given to development of the necessary multivariate techniques needed to price an intricate class plan.

Although the degree of pricing complexity will depend ultimately on the nature of the restructured system, immediate attention to the most glaring pricing problems is in order. Expectable time lags in the redesign of the current system make attention to pricing the more imperative. Within the context of class-average pricing, some of the severest pricing errors are also the most easily remedied. They include (1) discrepancies between class-average costs and class-average premiums, (2) the multiplicative combination of class and territory factors, and (3) the percentage loading of certain expenses. Measures are also required to effect an equitable distribtuion of overcharges caused by the substantial heterogeneity of risk within classes. The appropriate remedy here involves the "tempering" of rate differentials. Each pricing remedy will be discussed in turn.

1. Discrepancies Between Class-Average Costs and Class-Average Premiums

The discussion in Section 4 (Demographic Factors) demonstrated persuasively that youths, senior citizens and certain other driver classes pay average premiums substantially in excess of average costs. Until the offending variables can be modified or eliminated, substantial adjustments of rates are required to eliminate these class overcharges. If classifications must be retained in their present form for some reasonable period, say up to a year, to permit an orderly redesign and restructuring process, at least the following steps are required immediately to realign premiums and costs:

1. Eliminate the double-counting effect of using inexperience surcharges on top of age variables for youths under 21. This result may be approximated by setting the average secondary rating factor of all youths under 21 equal to the average secondary rating factor of occasional single males of that age and then increasing the primary differential of all under-21 youths by 5 points (i.e. 5 per cent of base rate).

2. Reduce by 5 points the primary differential of all drive-to-work classes.

3. Add the adjusted primary and secondary rating factors for each of the 217 driver classes to obtain a combined rating factor (CRF).

4. Reduce the CRF for single youths 21-through-24 by 15 per cent; and reduce the CRF for youths 25-through-29 by 25 per cent.

5. Reduce the CRF for the senior pleasure-use class to 0.80 (relative to the CRF of the adult base class) under the bodily injury (BI) and property damage (PD) liability coverages; and set (or maintain) the CRF for all 65-and-over classes at 0.50 under the personal injury protection (PIP) coverage.

6. Reduce by 10 per cent the CRF of all classes except youths, pleasure-use seniors, and the adult base class.

7. Adjust CRF's (as modified in steps 1 through 6) so that (a) the ratio of principal/occasional CRF's is 1.15 for youths under 21 and 1.00 for youths 21-through-24; (b) the ratio of single male/single female CRF's is 1.70 for those under 21 and 1.25 for those 21-through-24; and (c) the ratio of single male/married male CRF's is 1.50 for those under 21 and 1.35 for those 21-through-24.

8. From these revised CRF's for each of the 217 classes subtract out the adjusted secondary rating factor to derive new primary factors for the BI and PD coverages. PIP relativities shall remain flat except with respect to the 0.50 factor for the senior classes.

9. Readjust the new primary relativities so that no youthful factor is less than 1.00 (without any other compensating adjustment).

10. Smooth as necessary so that rates decrease with age.

A number of these changes are smaller than suggested by the data but the flat-rating of PIP and the uncertainty surrounding interactive effects among variables prompt the most conservative possible choices. When simulated on 1975-1977 ISO "table 1" data (for single-car policies, all compulsory coverages combined), the enumerated

adjustments bring premium relativities for the major age, sex, marital-status, principal-occasional and usage class combinations to within 5 base points of the corresponding average-cost indications. If used for the BI and PD coverages, retaining current ISO rating procedures for PIP, these adjusted relativities would eliminate the largest class overcharges observed on the ISO data. These adjusted relativities are also appropriate for use by independent filers, defining for them the maximum permissible differentials between comparable age, sex, marital status, principal-occasional and usage groups. Individual companies may argue for larger differentials but only if supported by a persuasive multivariate analysis based on particular company experience in New Jersey.

The adjusted relativities, while based on data for the combined compulsory coverages, are also applicable to the collision and comprehensive coverages. The use of common class relativities for all coverages is the rule under current practices. Exceptions are again possible but only if based on a persuasive multivariate analysis demonstrating that relativities under a particular coverage exceed those determined above.

2. Multiplicative Combination of Class and Territory Factors

It was determined in Section 7 (Pricing Methodologies) that use of the multiplicative method for combining class and territory factors produces rates which are excessive and unfairly discriminatory for certain classes of insureds. This method shall be discontinued in favor of the so-called additive method discussed in the text for all coverages except PIP. Use of the additive method shall be required of all filers and companies. Other methods may be substituted for

the additive method only upon a showing that such methods eliminate systematic bias and produce estimates of expected loss for class-within-territory rating cells superior to the additive method.

The multiplicative method is retained for PIP (at least temporarily) because the only classification distinction now made under this coverage is for senior citizens. All other no-fault risks are priced at the adult base rate. The reason for the senior-citizen exception pertains to limitations of coverage uniquely applicable to insureds 65 and over. Substantial differences in average PIP costs between seniors and other insureds are attributable to the primacy of Medicare and the numbers of senior citizens on guaranteed incomes. The limitations of coverage are constant across territories, suggesting that the interaction of class and territory factors for PIP is likely to be multiplicative. In any event, because this issue was not developed at the hearing, maintaining the status quo is appropriate for now. Age and symbol relativities for the physical damage coverages--which also relate to cost of claims--shall also continue to be applied in a multiplicative fashion.

3. Allocation of Expenses

The discussion in Section 7 also defined minimally acceptable degrees of expense flattening. Consistent with those findings and absent a persuasive incontrovertible showing that a particular insurer's expenses vary by premium in a larger degree, all filers and companies shall allocate the following amounts equally among policyholders:

(a) no less than 95 per cent of administrative expenses;

(b) no less than 100 per cent of other-acquisition costs;

(c) no less than 95 per cent of miscellaneous licenses, taxes and fees (other than premium taxes and related franchise taxes); and

(d) no less than 10 per cent of unallocated loss adjustment expenses.

It is further clear from the record and the preceding discussion that some substantial portion of commission expenses must also be distributed equally among policyholders. The magnitude and method of required flattening remains to be determined in a number of particulars. Therefore, within three months after the effective date of the Order in these proceedings, the New Jersey producer associations, jointly or individually, shall be expected to propose specific recommendations regarding the implementation of an improved production cost allocation method consistent with the findings and discussion in this report. Effective six months after the date of the Order, no rate filing shall be approved without some reasonable flattening of production costs among policyholders.

4. Tempering

The evidence has consistently revealed substantial heterogeneity of risk within classes. Heterogeneity translates into major discrepancies between expected costs of individuals and the expected costs of groups. These discrepancies are largest in the groups with the highest average costs and are an inevitable consequence of pricing at the class average. Improvements in the variables used to stratify

insureds and refinement of statistical estimation techniques can only affect the scope of the problem. In addition to needed changes in these areas, explicit measures are required to minimize individual overcharges inherent in class-average pricing.

The classification process involves tradeoffs between equity for groups and equity for individuals. Most classification variables imaginable tend to define groups which are somewhat more homogeneous than the population as a whole. Each step in the refinement of classifications tends to reduce the average magnitude of individual overcharges and undercharges systemwide. In the process, however, low risks trapped in high-risk classes pay increasingly large overcharges. The effects of classification refinement in this respect were illustrated by the two-class hypothetical in Figure 5 (p. 79, supra).

The "tempering" of rates seeks to eliminate unreasonably large overcharges to low-risk drivers while spreading the burden of classification errors more evenly across groups. In its simplest formulation tempering reduces the rates of the most heterogeneous classes at the expense of increasing rates for the least heterogeneous classes. In New Jersey, on the facts developed in this proceeding, it would attempt to strike a compromise between class-average and statewide-average pricing, moving all class prices part but not all of the way to the statewide average.

Tempering therefore does not affect the total premium collected across all classes but only the manner in which total costs are distributed among classes. The typically diminutive size of classes with high average costs permits large reductions in the rates

of these classes--and corresponding reductions in the frequency and magnitude of individual overcharges--at the cost of only small increases for lower-rated classes of insureds. The amount of tempering depends on the extent of within-class heterogeneity and the degree to which the adverse effects of individual pricing errors are sought to be alleviated.

Two methods for translating aversion to pricing errors into specific deviations from class-average pricing were discussed in testimony: the so-called "minimum squared overcharge" method and the exponential utility function. These tempering methods are explained and compared by Dr. Joseph Ferreira in his testimony in these proceedings and in the research papers produced by the State Rating Bureau in connection with the 1977 Massachusetts hearing.[62] Both methods seek to minimize the sum of weighted pricing errors, that is, to reduce pricing errors in a manner which places different emphasis on pricing errors of varying size.

Both methods also assign disproportionate weight to the largest overcharges. This would force a greater deviation from class-average rates to avoid one $1,000 overcharge than ten $100 overcharges. As noted in the Standards of Evaluation (Section 3, supra), this asymmetrical concern for the largest overcharges is appropriate. The practical difference between the two methods relates to the weights they assign to degrees of error.

The rates determined by the minimum squared overcharge method are those rates which result in the smallest possible sum of squared overcharges while still collecting the required overall premium across all classes. A higher degree of sensitivity to the largest overcharges would require increasing the exponent in this type of weighting scheme.

For example, a minimum "cubed" overcharge approach would require even more tempering than the minimum squared overcharge method.

The exponential utility function provides a set of weights which grow exponentially with the size of pricing errors. This utility function is calibrated by a so-called "C" value which measures the degree of "aversion" to uneven distribution of pricing errors. High C values imply a high degree of tolerance to uneven pricing errors and low C values imply a low degree of tolerance to such errors. In addition, the exponential utility function implies a tolerance for uneven pricing errors which depends only upon the uneveness of the errors and not their individual size.[63]

Company witnesses have opposed the concept of tempering because of the opportunities it offers for judgments by regulators. In order to implement tempering--to determine the exponent for a minimum-squared-overcharge type of approach or a "C" value for the exponential utility function--someone must determine the appropriate degree of "aversion" to unequal pricing errors. Accordingly, substantial discussion was addressed to developing standards for making a determination of this sort.

As proposed by Dr. Ferreira, and confirmed by two experts in decision theory testifying for the Public Advocate,[64] utility theory provides an appropriate analytical framework. The thrust of the utility analysis is to focus on the consequential overcharges and undercharges of different pricing schemes. The vehicle for doing this is the formulation of simple hypotheticals, say of the sort described in the two-class hypothetical in Figure 5, in which the tradeoffs between such overcharges and undercharges are clearly identified. The use of

a utility function permits judgments made in these simple situations to be translated into consistent pricing adjustments for the more complicated classification schemes used in practice.[65]

There has been testimony and debate concerning the extent of subjectivity required in assessing utility functions even on this basis. Clearly the assessment techniques required place the regulator in the awkward position of making value judgments about which reasonable people can differ in numerous hypothetical cases. Nonetheless, the significance of the value judgment required is diminished substantially when viewed in context. The objective is a compromise between class-average pricing and the elimination of classifications. The elimination of variables and the pricing of previously separate populations at the same price amounts to 100 per cent tempering. Smaller degrees of tempering preserve rate distinctions but fix them at some point between the two extremes. Where on the spectrum the point is selected is subject to limits; but no matter what choice is made class differentials will remain while overcharges are reduced.

Quantification of aversion to overcharges is not difficult at the extremes presently evident in the New Jersey marketplace. Under compulsory coverages, for example, 12 per cent of the adult class in Newark and 34 per cent of the highest rated males in the suburbs are overcharged at least $300 in relation to their individual expected costs. Few should disagree that for a system which pretends to be scientific, $300 is an extremely liberal margin of error. If there were no classifications at all, everyone would today pay $269 for the compulsory coverages; and the largest possible overcharge affecting any individual could be no greater than that amount.

Recognition of the limited size of pricing errors without classification must figure prominently in the derivation of standards governing the pricing of risk classes. At some point pricing errors wrought by classification refinement become so large that the need for containing them cannot be reasonably debated. Extremes of this sort are the basis for the following limitations on maximum overcharges under class-average pricing. Henceforth, no classification may be priced so that it fails either of the following tests: (1) more than 10 per cent of the class is overcharged by more than the statewide average rate for coverages purchased, or (2) any member of the class is overcharged by more than two times the applicable statewide average rate. These standards shall be considered met if the risk model used to compute pricing errors in the Appendix predicts, respectively, that more than 10 per cent and 1 per cent of a particular class exceed the constraints.

A standard which permits these margins of error for class-average pricing effectively provides that the near-zero risk cannot be overcharged as a result of classification more than two times what he or she would be overcharged without classification. Note, however, that this standard does not also require that the rate charged any class be no more than two times the statewide average rate in every case. Classifications producing higher rates need only meet the prescribed constraints on within-class pricing errors.

Estimates of the number of risks in each class which are overcharged by specified amounts are subject to methodological assumption and some margin for error is required. However, the fact that by reasonable statistical estimates, after correcting premiums to eliminate the largest overcharges, one in ten risks can

still be subject to overcharges greater than the statewide average rate in some classes is not a happy situation. As a temporary expedient few should contend that modifying prices to eliminate the most extreme overcharges is going too far.

A more exacting standard must await further refinement of the estimation techniques used to identify the frequency of these overcharges across classes. Moreover, given the complete overhaul of classification systems required in this State, this is not the time to resolve once and for all optimal standards for the tempering of rates in systems otherwise adequate. The constraints specified are only a cautious first step.

The statistical techniques for measuring within-class heterogeneity and overcharges permit an identification of those rates needed to satisfy the constraints. To illustrate, consider the highest-rated youthful male in Newark now paying an average of $1,248 for compulsory coverages. Class-average price corrections specified earlier--reducing discrepancies between class-average costs and class-average premiums, combining class and territory factors additively, and flattening expenses--will produce a revised compulsory rate of $772 for this class. Assuming the most generous estimate of class homogeneity--the "split k" of 3.38 assumption--the determination whether pricing the class at the average meets the prescribed constraints depends on the fractions of class members whose expected costs are less than $503 and $234, respectively. Because the proportions of insureds with expected costs below these amounts are 27 per cent and 3 per cent, the class is too heterogeneous (in absolute dollar terms) for class-average pricing to be acceptable. The rate must be reduced to $620 in order for both constraints to be met.[66]

Similar computations could be made for other classes; but the large number of classes makes this procedure cumbersome. The exponential utility function provides a much simpler approach. The same constraints on pricing errors can be met by tempering rates using an exponential utility function with C-values ranging from 100 to 250, depending on the specific heterogeneity estimates used (i.e., whether an equal k or a split k is assumed). To further simplify the tempering procedure, the effect of tempering New Jersey rates with C-values in this range is approximated by shrinking classification relativities by an exponent of less than 1.0. The exponents corresponding to C = 100 and C = 250 are .66 and .79 respectively for the compulsory coverages.[67]

Because tempered relativities shall be applied to all coverages, the lower exponent is appealing. The higher premiums generated by full coverage policies increase the magnitude of within-class pricing errors and heighten the degree of tempering required. However, balancing this consideration against the need for caution at this stage, an exponent of .75 is a reasonable choice. In conjuction with the other pricing remedies discussed earlier, therefore, premium differentials shall be tempered by this .75 exponent to meet the specified constraints on maximum permissible overcharges.

D. Implementation Schedule

The remedies discussed suggest a variety of different time frames. The redesign of classification systems, modifying and eliminating variables and substituting others, cannot be accomplished overnight. Reasonable efforts must be made to avoid disruption in the marketplace likely to be caused by eliminating variables without adequate substitutes. Pricing remedies, in contrast, are uniquely

suited to implementation in the short term. Indeed, the reduction of discrepancies between class-average premiums and class-average costs, based on existing class definitions, is only acceptable as a short-lived interim measure. Other pricing remedies requiring additional information to be finalized suggest still another implementation schedule.

The remedies are logically implemented in three stages: (1) pricing remedies subject to immediate implementation; (2) pricing remedies requiring additional information; and (3) elimination, modification and substitution of variables. Reasonable time frames for full implementation of each type of remedy are 60 days, 6 months and one year, respectively. Within these time limits the following steps shall be required of the filers:

1. Within 30 days following the effective date of the Order in this proceeding, all filers shall submit new or amended filings incorporating the four adjustments to rates specified above--adjustments to reduce discrepancies between class-average premiums and class-average costs, the additive combination of class and territory factors, the flattening of expenses, and the tempering of rates. The combination of all such adjustments shall cause no increase of premium for any class-within-territory cell exceeding the larger of 10 per cent or ten dollars per coverage. These changes shall be reviewed and approved by the Department and become effective simultaneously for all filers.

2. Within 90 days of the effective date of the Order filers and interested producer organizations shall submit information requested above for pricing the multicar discount and flattening some portion of producer commissions.

3. Within 90 days of the effective date of the Order filers shall submit proposed specifications for classification variables they seek to substitute for the variables prohibited by the Order. Within 180 days the filers shall submit new or amended filings incorporating the redesign and restructuring of variables and any price adjustments proposed.

APPENDIX:

METHODOLOGICAL QUESTIONS

A. The Basic Concepts Affecting Assessment of Class Homogeneity

The methodology for assessing class homogeneity looks directly at actual claim frequency distributions among policyholders. The data indicate for a given population of policyholders how many had 0, 1, 2, 3, . . . etc. accidents during a given period of time. This distribution of accidents is then compared to the distribution one would expect under the laws of probability if all accidents were due entirely to chance. To the extent the actual deviates from the predicted, degrees of difference among the inherent or systematic risks of individuals within the risk population can be detected and measured.[1]

The mathematics of probability theory permit two analyses critical to this assessment. The first concerns estimation of accident probabilities for the individual. The second concerns prediction of the distribution of accident probabilities across a population of individuals. The assumptions and statistical methods used to calibrate these probabilities, described collectively as a "probabilistic model of the accident involvement process," are explained in depth in the Supplement to the 1976 SRI study.[2]

The probabilities of an individual having 0, 1, 2, 3, . . . or more accidents over a given time period are described by use of a statistical model known as the Poisson model. This statistical model is familiar to industry analysts[3] and is the standard model for describing the accident involvement and claim generation processes for individuals in the context of automobile insurance.[4] The model assumes that the timing of accidents occur entirely at random and that each

accident is an independent occurence, i.e., one accident does not cause less or greater likelihood of another.

Two individuals who happen to have the same accident likelihood or inherent risk may differ, as the result of chance factors, in the actual number of accidents they have during a particular time period; but their probabilities of having 0, 1, 2, 3 . . . etc. accidents is described by the same Poisson distribution. Generally, however, individuals differ in their accident likelihoods. The distribution of individual accident likelihoods across a population of insureds can be described mathematically and is referred to in the testimony as a "compounding" distribution. This compounding distribution can be combined with the Poisson distribution to estimate the fractions of all insureds who incur a total of 0, 1, 2, 3 . . . etc. accidents during a given time period.

The compounding function chosen by Dr. Joseph Ferreira and used as a basis for the estimates presented in his testimony is the so-called "gamma function," hence the repeated reference in testimony to the "gamma Poisson model." This compounding assumption was adopted in both the 1976 SRI Report[5] and the 1978 Opinion and Findings of the Massachusetts Commissioner.[6] Discussion of heterogeneity issues by industry witnesses also can be interpreted in terms of a compound Poisson model, but these terms were not used in every case. In the course of the hearing Richard Woll, supported by several other company witnesses, developed and presented an alternative methodology which differed from the basic compound Poisson model with respect to treatment of time-variation in systematic risk. Although company testimony made much of distinctions between the two approaches, most of them

appear to wash out when controlled insurance data are examined. The arguments and evidence will be discussed further below.

A comparison of the distribution of accident probabilities defined by the compound Poisson model to an observed distribution of actual accident occurences across the population indicates the extent to which accidents are not occuring only by chance, that is, the extent to which some insureds in the population have a greater chance of having zero accidents and other insureds have a greater chance of having multiple accidents than one would expect in a wholly random environment. The comparison of predicted and actual accident distributions also permits estimation of the degrees of heterogeneity or diversity among insureds with respect to this non-random ("inherent") risk.[7] In a wholly random environment all insureds are necessarily homogeneous risks.

The degree of diversity in non-random risk across a population is expressed by the mathematical symbol "K". Technically, K is the square of the reciprocal of the coefficient of variation for the underlying claim-frequency distribution.[8] Variability of risk across the entire insured population is denoted "Big K" (K); and the variability of risk within classes is referred to as "little k" (k). Similar interpretive rules apply in both cases. The significance of the little k in percentage terms is a function of the absolute dollar value of variation in expected losses within the class in question. The same value of k has different dollar significance for the classes depending on differences in mean expected losses.

The small size of most class cells frustrates the ability to estimate k-values on a class by class basis using the type of claim

frequency distribution data available for the population at large. The sparseness of available data make indistinguishable variations in systematic risk and random variations in experience due strictly to small sample size.[9] Therefore, within-class heterogeneity must be inferred largely from systemwide data. This within-class heterogeneity is essentially the residual heterogeneity in the population left unexplained by variations in class averages. Since individual estimates of little k on a class by class basis cannot be estimated with great precision, their relevance is largely limited to the statistical interpretations of any patterns in the variation of little k as a function of class average.

The estimates of residual heterogenity presented in evidence by Dr. Ferreira, the Department's lead witness on this subject, are the product of observed Big K values for the population at large and observed variances in average claim frequencies by class, by combination of classes, and by combination of classes and territories. Inferences are drawn for individual classes on the assumption that all classes are equally heterogeneous in percentage terms. The latter assumption is consistent with the 1976 SRI Report and supported by the 1978 Opinion of the Massachusetts Commissioner and the testimony of witnesses at the hearing.[10] Some evidence, as yet inconclusive, suggests that homogeneity may increase somewhat in percentage terms for certain relatively high-rated classes. However, any such increase is not sufficient to make these high-rated classes equally accurate in dollar terms.

B. Estimation of Population Heterogeneity (Big K)

1. The Appropriate Data

In order to derive estimates of the explanatory power and homogeneity of classification variables one must first estimate the

diversity of systematic risk within the insured population before classification. The latter estimate requires data for all classes and territories combined which reflect the distribution of claim frequencies across the population, i.e., the fractions of policyholders who have 0, 1, 2, 3, . . . etc. accidents, respectively, during a period of observation. Although no company indicated that it examines this type of data in the ordinary course of reviewing the effectiveness of its class plans, and extraction of the information from company files required some revision of computer programs, six companies ultimately responded to the request to provide some such data in a form sufficiently close to that requested to be of some value in estimating homogeneity. The specifications governing this request for data, referred to throughout the testimony as "Table 2," are reproduced in the Attachments.

The Table 2 data used in the Department's analysis generally covered one policy year of experience for single-car voluntary policies.[11] The use of single-car data is important not only because it tracks the type of data used by the companies in pricing existing classifications, but also because it provides a relatively full picture of risk-variation across cars. Multicar policies--unless analyzed on a per car basis--tend to average the experience of high and low risks, obscuring the true range of individual risks in the population. John Conners, the actuary for Liberty Mutual, aptly observed that "when you average a bunch of dissimilar drivers, they become more similar."[12]

The data were further controlled to avoid the intervention of variations in the incidence of claims not attributable to variation in systematic risks across individuals. Care was taken to assure (1)

that all policyholders in the respective samples had been insured for the full twelve months of the policy year covered by the sample in order that the observed number of claims reflect experience over equally long time periods, (2) that physical damage coverages for which experience was examined had common deductible features, and (3) that the definition of claims reported in the sample was controlled to combine multiple claims relating to one accident and to count subrogated or closed-without-payment claims in a consistent fashion for all insureds. These controls were designed to make certain that observed variations in claim frequencies would not be attributable to differences in the period or type of coverage or claims settlement practices. Controls of this sort protect against underestimating population homogeneity and, in fact, probably lead to an overestimate. Data pertaining only to insureds who remain with a company for the entire year studied are likely to understate the broad spectrum of variation among all insureds.

2. Summary of Proposed K-estimates

The results of the analysis disclose a high range of diversity in the New Jersey risk population, as reflected in uniformly low values of "Big K" in each of the data sets examined. The array of K-values proposed in the testimony are summarized in Table A-1. These K-values suggest a very heterogeneous insured population. The highest estimate of K in the Table is USAA's 2.03 for collision coverage. A K of 2 implies that the inherent risk associated with about one-third of all insureds is more than 70 per cent above or below the statewide average. The two heterogeneous classes hypothesized in Figure 3 of the Standards of Evaluation illustrate the likely mixture

TABLE A-1

SUMMARY OF INDICATED K-VALUES*

Company	Source of Data	Exposures	Controls	Population K-values
	Liability Coverages			
Aetna	NJ (a)	19,144	1, 3, 6	0.44
Hartford	NJ (a)	15,727	1, 3, 7	0.54
Travelers	NJ (b)	26,123	1, 5, 6	0.68
USAA	NJ (c)	17,146	1,2,4,6,8	1.60
Liberty Mutual	Countrywide (a)	325,207	1, 3, 7	1.94
Combined Aetna, Liberty Mutual, Travelers and Commercial Union)	Massachusetts	361,886	1,2,3,6,8	1.50
Allstate	NJ	137,709	1, 3, 6	1.52
Allstate	7-State	999,028	1, 3, 6	1.56
	Collision Coverage			
Aetna	NJ (e)	12,061	1,2,3,6	0.52
Hartford	NJ (f)	15,727	1, 3, 7	0.48
USAA	NJ (g)	6,848	1,2,4,6,8	2.03
Combined Massachusetts)	Massachusetts	330,910	1,2,3,6,8	1.70
Allstate	NJ (b)	91,036	1, 3, 6	1.56
Allstate	7-State (h)	709,827	1, 3, 6	1.57
	Comprehensive Coverage			
Aetna	NJ (e)	16,364	1,2,3,6	0.36
Hartford	NJ (f)	15,727	1, 3, 7	0.24
USAA	NJ (g)	5,767	1,2,3,6,8	0.99
Combined Massachusetts)	Massachusetts	339,433	1,2,3,6,8	0.83

*Notes to Table are on the following page.

NOTES TO TABLE A-1

References to Source Exhibits

(a) D-66, p. 1, property damage liability coverage.

(b) D-66, p. 1, all but comprehensive combined on a per-accident basis.

(c) D-71, p. 2, property damage liability coverage.

(d) A-17 and HO-9, property damage liability coverage.

(e) D-66, p. 1, $100 deductible collision on "full" comprehensive.

(f) D-66, p. 1, mixed deductibles.

(g) D-71, p. 2, $200 deductible collision and $100 deductible comprehensive.

(h) A-17 and HO-9, mixed deductibles.

Controls

(1) single-car policies, voluntary market, continuous coverage or at least covered at beginning and end of period.

(2) similar deductibles and limits.

(3) one year period.

(4) two year period.

(5) three year period.

(6) Accident year.

(7) Policy year.

(8) Clearly identified and consistent treatment of closed-without-payment, claims, multiple claim accidents, and subrogation effects. Distinctions among claims which were reserved, paid, closed without payment or subrogated are unclear for most data submissions.

of high and low risks in a population of insureds for whom estimated K is 2.0. Most K estimates in Table A-1 are substantially below 2.

Three of the four claim frequency distributions pertaining exclusively to New Jersey--specifically, the data supplied by Aetna, Hartford, and Travelers--showed K-values in the neighborhood of 0.5 and below and no value greater than 1.0.[13] The fourth New Jersey distribution, supplied by USAA, supported K-values of 1.6 for property damage liability coverage, 2.03 for $200-deductible collision and 0.99 for $100-deductible comprehensive, although the collision and comprehensive estimates are likely to be overestimates since they are based on samples of less than 7,000 exposures.[14] In order to avoid the use of totally unreliable K-values, homogeneity estimates were not computed for any category of coverage having no policies with at least three accidents.[15]

The Table 2 data supplied by Liberty Mutual contained 1973 and 1974 countrywide experience relating to its property damage liability coverage.[16] Both Dr. Ferreira and John Conners, the actuary for Liberty Mutual, developed K estimates from these data.[17] The K-estimates ranged from 1.92 to 1.97, depending on policy year and estimation formula, for the countrywide single-car data. Mr. Conners also presented K-estimates on two-and three-car policies which were somewhat higher--2.46 and 2.11 for the 2-car policies and 3.53 and 2.16 for the 3-car group--although the data were not broken down on a per-car basis. He acknowledged that these estimates would come down if each car were made to stand on its own.[18]

Dr. Ferreira testified that judging by available data, New Jersey's insured population was even more heterogeneous than the

Massachusetts population, as developed in connection with the 1977 classification hearings in that state;[19] and he proposed that, in the interest of conservatism, the Department adopt the Big-K estimates derived from Massachusetts data. These data had been supplied by four major carriers in Massachusetts--Aetna, Liberty Mutual, Travelers and Commercial Union--representing about 60 per cent of the statewide market.[20] They reflected single-car experience on no less than 330,000 policies in any coverage category, a sample larger than any examined at the hearing and more than 12 times as large as the largest New Jersey-only sample provided by Aetna, Hartford, Travelers, and USAA. The K-values estimated on these data are 1.50 for property damage liability, 1.70 for collision and 0.83 for comprehensive.[21]

Allstate initially refused to supply the Table 2 information which would have permitted independent computation of the homogeneity and explanatory power of its classes and territories. Instead, in the final weeks of the hearing after the explanatory power of other company plans had been discussed in testimony, Allstate proffered its own estimates based on single- and multicar data for New Jersey.[22] A subsequent submission included additional single-car-only data separately for a seven-state sample including New Jersey.[23] The data are 1977 calendar accident year data with all deductibles mixed and all limits of liability mixed.[24] Policies had to remain in force for the entire year to be included.

Allstate seeks to estimate homogeneity and explanatory power on a class by class basis using claim frequency distributions for each of its 16 major classes, and it proposes no overall population estimate. However, the data provided permitted estimation of Big-K values using

the gamma Poisson methodology; and under questioning, Michael Kozik, the actuarial sponsor of this material for Allstate, computed a K of 1.3 for combined liability coverages and 1.4 for collision, based on single- and multicar policies combined.[25] Because some policies had a single car and others had multiple cars, this K estimate of homogeneity across policies is lower than estimates based only on single-car policies. Accordingly, Allstate's single-car-only data reflect a higher value of Big K. With respect to Allstate's New Jersey policyholders, the single-car data yield K values of 1.52 for the combined liability coverages and 1.56 for collision coverages. The corresponding single-car estimates of Big K for the seven-state sample are 1.56 and 1.57, respectively.[26]

3. Selection of an Appropriate Big K

Arguably, any of the described Big K estimates based on single-car data could be used for estimating the explanatory power of current classification variables and the homogeneity of resulting classes. The lower the Big K value adopted, the lower the class plans will score on either explanatory power or within-class homogeneity; and the higher the Big K selected, the better the class plans will do on both counts. The more heterogeneous the insured population, as indicated by a low value of Big K, the more variation in risk across individuals the class plan is expected to explain.

At face value the K-estimates of less than 1.0 for Aetna, Hartford and Travelers, based exclusively on New Jersey data, have substantial intuitive appeal. Any New Jerseyan can be easily persuaded that this State is more heterogeneous demographically and geographically than most states, and certainly more diverse than most of the

largely rural states and regions which dominate countrywide experience. However, the relatively small sample sizes involved, our expert witness's caution concerning the interpretation of K values less than 1.0,[27] and the possibility that the degree of heterogeneity shown may be the result of inadequate controls on the data,[28] discourage heavy reliance on these estimates without further study.

The K estimates based on the USAA data set inspire similarly little confidence at this point. The USAA sample contained even fewer exposures than the Aetna, Hartford and Travelers samples. Although the data were controlled,[29] only for the property damage liability estimate (resulting in a Big K of 1.6) were there more than 10,000 policies in the sample. Simulations using Massachusetts data for samples of different sizes indicate that samples of less than 10,000 result in K estimates biased high and a low level of statistical confidence.[30] A claim frequency distribution based on too few exposures is not likely to reflect a realistic number of persons in the three-and-more accident categories.[31] Furthermore, the concentration of USAA underwriting in select military personnel probably causes its book of business to be much more homogeneous than the New Jersey market as a whole.

The Liberty Mutual estimates are plausible and are based on a large sample size of about 325,000 policies. Because the data are drawn from countrywide experience, and the geographical distribution of the data is not clear, they may well understate New Jersey heterogeneity. In contrast, the Massachusetts data represent a much larger piece of a single, metropolitan market. We also know that these data probably understate heterogeneity because they are carefully controlled

with respect to coverage and claim definition and yet examine only those policies insured for virtually the entire year.

With respect to liability and collision coverages, however, the eleventh-hour Allstate submission simplifies the question of choice. The Big K estimates for liability (1.52) and collision (1.56) based on Allstate's single-car New Jersey data are extremely close to the estimates based on Massachusetts data. The sample, consisting of about 137,000 single-car policies, is of ample size; and Allstate is the single largest writer of private passenger automobile insurance in the State. The values of Big K based on Allstate's single-car New Jersey data can therefore provide a conservative basis for explanatory power and within-class homogeneity estimates affecting these coverages--the two coverages for which Allstate supplied data.

With respect to comprehensive coverage, the population K estimate of 0.83, based on Massachusetts data, is a conservative choice. This is the largest value of K for comprehensive found in any of the data, save the 0.99 estimate based on the too-small USAA sample. Although K estimates of less than 1.0 are generally more difficult to interpret, all the data reviewed suggest a high degree of disparity in comprehensive claims and the claim frequency distributions have several people with 4 and 5 claims "so that the tail of the distribution seems pretty well defined."[32]

All of the proposed estimates are conservative and tend to understate the degree of heterogeneity in the insured population largely as the result of controls imposed on the data. Independent expert testimony confirms that the dual requirements that distributions (1) must have policyholders in the 3-or-more claim categories before

homogeneity can be estimated and (2) may include only those policyholders who have been covered for the entire twelve months, are likely to dampen estimates of heterogeneity.[33] The screening eliminates a significant number of policies and, in all likelihood, a large number of atypical policies, such as the youngest drivers who purchased a car mid-year or those cancelled during the year for non-payment of premium or multiple accidents and violations, which would otherwise increase observed variation. For example, Allstate's Exhibit A-17 shows 137,471 single-car and 116,454 multicar liability policies included in the Allstate claim frequency distributions for New Jersey. Even assuming that an average of 2.25 cars are covered under each multicar policy, total cars in the sample for single- and multicar policies combined would amount to only 399,492. Yet data supplied by the National Association of Independent Insurers (NAII) on behalf of Allstate, reflect that in the year in question Allstate voluntarily insured 565,256 private passenger non-fleet cars for property damage liability in New Jersey.[34] About 29 per cent of total exposures were therefore dropped out of the Table 2 sample, presumably as the result of screening.

C. Conceptual Questions Concerning the Gamma Poisson Model

The estimates of population heterogenity discussed thus far have been derived through use of the gamma Poisson probability model described and adopted in the 1976 SRI report and discussed at length in these proceedings by Dr. Ferreira. The suitability of this model has been challenged by several of the company representatives, principally Richard Woll, actuary for The Hartford. The principal grounds for the challenge are twofold: (1) that the assumption of a gamma

distribution of accident liklihoods across individuals is invalid because it does not fit the data, and (2) that the use of the Poisson model of the accident process in the manner proposed by SRI and Ferreira does not accurately measure variations in systematic risk because it fails to eliminate all random elements of exposure from the observed variations.

1. The Validity of the Gamma Distribution Assumption

This challenge to the gamma Poisson model is predicated on an aspect of risk assessment which permits inferences about the homogeneity of classes through examination of merit rating relativities. Merit rating--that is, further classification of insureds based on actual accident experience, after consideration of demographic and geographic factors--is unique among classification factors. When used in this fashion, as a secondary variable, its predictive significance depends on the relative predictive accuracy of the classification variables which define the primary classes. If, for example, age, sex, marital status and the other primary variables succeed in putting all like risks together, such that each class is homogeneous with respect to systematic or inherent risks, the actual accident experience of the members of these homogeneous classes says nothing more about the non-random risks of these individuals. Because the classes are perfectly homogeneous with respect to systematic risks, the future experience of those with and without past accidents will be statistically indistinguishable and no merit rating surcharges would be warranted.

Examination of merit rating experience therefore can provide useful information concerning the efficacy or homogeneity of the pri-

mary classes and the size of merit rating relativities which are appropriate as a result of whatever heterogeneity remains within the classes. The challenge to the gamma compounding function of the Poisson model purports to test its ability to make accurate inferences about merit rating relativities. To the extent observed merit rating relativities are not accurately predicted by the gamma function, it is argued, inferences derived from the gamma Poisson model concerning the homogeneity of classes are similarly invalid.

Mr. Woll has derived merit rating relativities for populations of North Carolina and California licensed drivers based on accident experience reported for a span of years by their respective motor vehicle departments. The data divide the populations into groups according to the number of accidents experienced during a base period--one group consists of licensed drivers with no accidents on record during the base period, a second group consists of drivers with one accident on record during the base period, etc.--then tracks and compares the reported accident experience of each of these groups during a subsequent period. The differentials in accident frequencies among the groups in the second period amount to merit rating relativities.

Mr. Woll compares "actual" merit rating relativities derived in this manner from the North Carolina and California data to the relativities predicted on the same data by the gamma Poisson model. For most of the defined merit rating classes the "predicted" relativity exceeds the "actual" relativity by some amount, although no analysis was offered as to the statistical significance of these differences or standards for identifying any pattern. This alleged overstatement of merit rating relativities is contended to indicate systematic understatement of homogeneity by the gamma Poisson model.[35]

However, the differences between the actual and predicted relativities developed by Mr. Woll appear to say less about the validity of the gamma function as used by SRI and Ferreira than the effects of variations in accident likelihoods over time. The motor vehicle data used by Mr. Woll purport to track the experience of licensed drivers over several years--four in the case of North Carolina, six in California. Over these periods of time some of the heterogeneity observed in any one year averages out when the experience of several years are combined. This averaging effect is especially important in the case of motor vehicle data where year to year fluctuations in the driving patterns of licensed motorists can be expected to be most pronounced.[36]

Within the population of people who are listed on motor vehicle files as licensed there is understandably a high degree of variability over time. Because it costs very little to obtain a license and to keep it in force, the fact of a license says little about actual driving habits. Some are licensed but do not drive, others give up driving for long periods and return to it periodically, still others leave the state but keep a license in effect. The type of analysis conducted by Mr. Woll is especially sensitive to this type of variation. A number of the drivers for whom no accidents were reported in the base period presumably had driver licenses but were not in fact driving. If the driving habits of these people changed over time it could only be in the direction of increased driving, thus worsening the accident experience of the zero-accident group in the second period. Similarly, a number of drivers for whom accidents were reported in the base period are likely to have curtailed their driving

in the second period, and the accident experience of this group would tend to be depressed in the second period as a result. As Mr. Woll acknowledges, these kinds of effects can shrink the differences between the merit rating groups over time.[37]

This averaging or offsetting-effects process is inevitable whenever driving habits change over time. Insurance data are likely to be self-correcting for the largest of such changes because it is generally too expensive to continue insurance in force unless the car is actually driven. Yet changes in driving habits which result from changes in the attitudes or personal circumstances of drivers from year to year will be picked up by both insurance and motor vehicle data. This type of year to year fluctuation is probably the most abrupt in the case of young drivers.[38] The impact of changes in the driving habits of youthful drivers is another reason to expect the compression of "actual" merit rating relativities over time in the type of analysis conducted by Mr. Woll, again saying nothing about the ability of the gamma function to identify variations across individuals in any given year.

The significance of time-varying claim frequencies for individuals from year to year will be discussed further below in the section addressed to the randomness of exposure over time. The issue for the moment is limited to the choice of a compounding function for the Poisson process assuming that the Poisson methodology stands up on other grounds. Given the relatively simple explanation of the reasons for the differences between actual and predicted relativities, relating to time-variation in the data, there is nothing in the industry's merit rating analyses which would invalidate the choice of

either the gamma function or the Poisson model with which it is compounded.

In addition, the hypothetical alternative to the gamma, a so-called "distribution-free" compounding function suggested by ISO's Robert Giambo, fares worse.[39] The merit rating relativities predicted by this compounding function are neither systematically higher nor lower than the gamma relativities when one compares the relativities generated by each method for all accident groups. In fact, the distribution-free relativities fluctuate more than the data. In contrast, the gamma function accurately predicts the nearly linear relationship between merit rating relativities and the number of accidents in the base period reflected in the actual data.[40]

In any event the choice of a particular compounding function is not critical to the contemplated homogeneity analysis which focuses on the distribution of overcharges and undercharges among policyholders. The simplified assumption that all drivers are either "high" risks or "low" risks, as in the hypothetical two class example discussed earlier involving $450 and $150 risks, is another type of model which would posit even greater extremes in the distribution of overcharges and undercharges.[41] The gamma function merely smooths out the data on the reasonable assumption that differences in risk among drivers are largely of degree and fall on a smooth albeit asymmetrical continuum.

Dr. John Pratt, Professor of Business Administration at Harvard University and an authority of world reknown on statistics and statistical decision theory,[42] testified at length in these proceedings concerning the conceptual issues raised by the gamma Poisson model. Dr. Pratt observed that the assumption of a gamma distribution need

not be "literally true" to permit analysis of the heterogeneity of systematic risk and its implications for the fairness of insurance premiums.[43] He commented:

> "The gamma distribution of that time-varying parameter across individuals in any particular category is a convenient assumption; other assumptions could be used. I do not see that it would make any appreciable difference at any level of precision that would matter here whether you used the gamma prior distribution or whether you used some other prior distribution that fit the data a little differently."[44]

Pratt further noted that he could not see any reasonably likely distribution which would give a very different result, even in the simplified high/low examples.[45] His intuitive preference was "a smooth distribution somewhere near the gamma."[46]

2. The Debate Concerning Time-Variation of Exposure

The debate over the validity of the compound Poisson model which surfaced at various points in the testimony essentially comes down to differences of opinion as to the kinds of risk elements which ought to be measured in determining the homogeneity of classes. SRI and Ferreira measured homogeneity in terms of variations among insureds in their average accident likelihoods during a one-year period--the period for which an insurance policy is normally written. Any variation in the observed claim frequency distribution in excess of that predicted by a purely random Poisson process was then attributed to differences among insureds in their systematic risk. (Hence, in much of the testimony, this method was called the "excess variance" method.) Richard Woll argued for the Hartford and ISO that part of any difference between variation predicted by the Poisson model and total observed variation--that is, part of any excess variance--in-

cludes risk elements which fluctuate over time and ought not be counted when determining the heterogeneity of classes.

Woll claimed that the Poisson process does not take into account the variations in an individual's exposure to accidents from time to time because it assumes that the mean and the variance of the individual risk process are equal.[47] Woll contends that this assumption of the Poisson process fails to recognize variations in an individual's exposure which turn on such events as changes in the weather, illness, changes in employment and other events which affect where and how much one drives. He likened these seemingly random changes in circumstances to the flip of a coin and adapted Ferreira's earlier dice-rolling analogy to make his point:

> "Dr. Ferreira pointed out [in his dice-rolling analogy] . . . that the difference between the loaded die and the non-loaded die represented systematic differences that should be, according to the expected cost price ideal, charged for, whereas the outcome of rolling the [non-loaded] die was a random event that insurance was designed to protect.
>
> "Now, I liken the exposure random element as a situation somewhat similar only instead of rolling the die and seeing what happens, you toss a coin first, and if the coin comes up heads, you toss the die once, whichever die it is. If the coin comes up tails, you toss the die twice."[48]

Pursuing the analogy briefly, Woll would contend that the deficiency in the gamma Poisson methodology is its inclusion in systematic risk of not only differences among individuals as to comparative degrees of loading on the dice for each individual but also entirely random variations among individuals which determine how many times each rolls the dice. He argues essentially that the effects of this additional randomness should be excluded from one's definition

of systematic risk lest observed variations in claims experience across individuals overstate differences with respect to truly non-random risk.

Woll proposes a methodology to substitute for the excess variance method of estimating homogeneity. This method, he claims, would effectively remove this "random exposure" element from systematic risk by tracking actual accident distributions over time and using as a basis for estimates of systematic risk only those variations which remain constant through successive periods. The proposed methodology would derive competing heterogeneity estimates--dubbed "BK" as distinguished from mere "K"--by estimating the amount of heterogeneity implied by merit rating relativities derived from the claims experience of individuals over several years. The formula for deriving homogeneity estimates from merit rating relativities is derived from analysis of credibility techniques. An important part of the formula is the discount suggested in the data for those individuals who have been claim-free during a previous time period. (Thus variations of the method are referred to in testimony as the "credibility" or "claim-free discount" method.)

Although Mr. Woll originally offered this method as an alternative to the compound Poisson model,[49] subsequent testimony--notably that of Dr. Herbert Weisberg, a statistical expert appearing for the Department--demonstrates that the method is not inconsistent with a compound Poisson model.[50] In effect Mr. Woll interpreted the compounding distribution as the sum of two components, one reflecting systematic risk that varies randomly from year to year and the other reflecting systematic risk that is time-invariant. His method measures

homogeneity only in terms of variations among individuals in their time-invariant risks. By definition, therefore, the resulting BK estimates are larger than the K-estimates based on the excess variance approach because there is necessarily less overall variation.

Mr. Woll applied his methodology to the 4-year North Carolina motor vehicle data and the 6-year California data. His heterogeneity estimates (BK values) were derived by dividing each data set into two time periods (eg the first two years and the last two years) and then multiplying the variance of the claims distribution during the initial time period by the so-called "claims-free discount" (then normalizing the result and taking the inverse). The discount is defined as the percentage by which the experience of drivers without claims in the base period--recalling the merit rating methodology discussed above--is better than the average for the sample as a whole in the subsequent period. The lower the claim-free discount the higher the BK values derived.[51] Using the claim-free discount factors out variations in risk because the people who are claim free in the base period have to continue to be low risks in order for their experience in the second period to be better than average. To the extent they do not the claim-free discount shrinks and estimates of BK rise. As expected, the BK estimates derived by Mr. Woll in this manner are higher than the K estimates obtained using the excess variance approach.[52]

Issues concerning the methodological aspects of Mr. Woll's arguments are of significantly less importance at this point than the underlying question whether only time-invariant systematic risk should be considered in estimating population and class heterogeneity. The rebuttal testimony of Dr. Ferreira, appearing for the Department,

defines the competing standards of homogeneity implicit in the two approaches. The excess variance approach measures heterogeneity in terms of differences among drivers in their average accident likelihoods over the year covered by the policy; and the credibility or claim-free-discount method stresses differences among drivers in their average accident likelihoods over the longer run.[53]

This difference between the two methods can be illustrated by reexamining the four-year North Carolina experience for 22-to-25 year olds. Splitting the data into two 2-year periods, Woll derives a BK estimate of 1.421. The corresponding K estimate using the excess variance method and the first two years of data is 0.816.[54] The difference between these two estimates is the largest in any of the comparisons of BK and K presented by Mr. Woll.

Yet the comparison of BK estimates derived from 4 years of data with K estimates derived from 2 years of data exaggerates the difference between the two methods because more year to year variation in individual risk necessarily averages out over the longer period.[55] If, for example, the excess variance method is applied to the entire four years of North Carolina data for 22-to-25 year olds the resulting K estimate is 1.055, an amount much closer to the BK estimate derived by Mr. Woll on the same four years of data. Nevertheless, the four-year K estimate is still less than the BK estimate because the Woll method only measures differences in the average risks of individuals which do not vary at all from one period to the next. This is a highly restrictive measure unlikely to reflect the extent of inherent or systematic differences among individuals in any given year.

Ferreira provides a convincing explanation for the importance of the one-year focus:

> "Now, if insurance were priced at a fixed rate that was guaranteed over a long time period, I'd have no problem with using the average claim propensity over the entire time period . . . as the proper measure for determining whether or not that person is fairly priced. If, on the other hand, one is trying to price insurance for a one year interval, or in some cases over even shorter intervals, with no guarantee of a similar price over a long time period, then I think that differences in exposure or differences in other factors that contribute to a person's claim propensity, but may vary from year to year, those differences ought to be reflected in that year's rates, just like youthful categories we are told by the companies should pay a rate that's different from the adult drivers, even though in the long run young people become older . . . I don't think you can have it both ways. You can't say that to the extent you're able to identify youths as individuals who, because they are age 17 instead of something else, on average tend to have higher claim frequencies, you can't say that they ought to be priced at the average price, and then by the same token argue that it is only the long-term average propensity to have accidents that ought to be the focus of proper pricing." (emphasis added)[56]

Mr. Woll denies that his methodology requires multi-year periods and points out that successive periods of less than a year can be used to make the analysis he proposes. However, subdividing the year into, say, two intervals of six months and then applying the claim-free discount method will treat seasonal variations in driving patterns as time-varying risk elements that are then excluded from the BK estimate of heterogeneity. The use of time intervals shorter than one year therefore may raise even more serious definitional questions about which risk elements are considered in estimating heterogeneity under the claim-free discount method.

A fundamental shortcoming of the proposed Woll analysis is that it either glosses over or ignores the within-individual variation already allowed for in the Poisson model. As pointed out by Ferreira,

any assertion that the Poisson model does not allow for any random variation in individual exposure is flatly incorrect.[57] The Poisson distribution, as Woll acknowledges, has a variance equal to its mean.[58] This result holds true even if an individual's risk varies over time. Only the differences among individuals which do not average out over time contribute to excess variance and heterogeneity.[59]

The real difference between the two methodologies goes only to extraordinary variations in an individual's exposure during the year, such as the prolonged illness or the change in jobs which has a very substantial impact on where and how much one drives. Only these types of variations will lead to sizeable differences across individuals which are not likely to persist from year to year and may not average out within the individual--as would, say, ordinary changes in the weather--in any given year. This fact deprives the Woll argument of much of its first-blush appeal and supports the excess-variance approach. Extraordinary variations in individual exposure from time to time should be considered part of within-class heterogeneity.

Especially troublesome about the Woll approach is that it ignores any fraction of within-class heterogeneity which is not present in each time period considered, regardless of the cause of the variation. Some of the time variation is of the purely fortuitous kind, such as prolonged illness and substantial change in job location, as Woll has suggested. Other variation over time, however, is uniquely related to the ineptness of current variables. For example, current plans consider youths to be better risks when unhappily married than when blissfully divorced. At any given time the trauma of unhappy home life will be afflicting some portion of the married class and

causing their driving behavior to deteriorate. Yet because the particular individuals afflicted will vary from year to year the heterogeneity which unhappily married people inevitably contribute to the married classes will be largely ignored by the Woll approach.

Generally, because the youthful classification variables are based on generalizations about attitudes, emotional stability and lifestyles, changes within-individuals from year to year are likely to be greatest in these classes. The tendency of the Woll approach to yield lower heterogeneity estimates than the excess variance approach would be most pronounced here.[60] Focusing only on variations in time-invariant risk, as Woll suggests, therefore permits the failings of current variables to be substantially understated.

Nonetheless, the distinctions between excess-variance and claim-free discount approaches are likely to be of limited quantitative significance. The motor vehicle record data used by Mr. Woll exaggerate the difference between the two methods compared to what one would probably find in carefully controlled insurance data with large sample sizes of the type called for in the Table 2 data specifications. For the reasons discussed earlier in connection with Woll's critique of the gamma-distribution assumption, the impact of time variation in risk is likely to be much larger in the motor vehicle data.[61]

Late in the hearing Allstate supplied New York data for several hundred thousand cars of exposure in a form suitable for developing both K and BK estimates.[62] (The-BK estimates require claim frequency information over multiple time periods and cannot be computed from Table 2 data.) For liability coverages the K and BK estimates derived from the Allstate data (with single-and multicar policies com-

bined) are 1.35 and 1.51, respectively. For collision coverage K is 1.50 and BK is 1.52. The differences are considerably less in both absolute and percentage terms than those reported by Mr. Woll in the North Carolina or California motor vehicle data.[63]

After introduction of the Allstate data Mr. Woll supplied Hartford data for New Jersey (single and two-car policies combined) in a form which also permitted derivation of comparative K and BK estimates.[64] While the differences between the two methods are much larger on these data than for the Allstate data, the estimates of both K and BK are themselves much lower. The BK estimates for collision and comprehensive coverages are 1.1 and 0.6, respectively, considerably less than the K estimates from the (combined single and multicar) Allstate data for either New Jersey or New York. Of the liability coverages, only property damage liability coverage has a BK estimate higher than the K estimate for the combined liability coverages in the Allstate data. The Hartford BK estimate is 2.08 and the Allstate K estimates are 1.31 for New Jersey and 1.41 for New York (for combined single and multicar data). For the BI and PIP coverages, Hartford BK estimates are .56 and .93.[65] No company supplied multiple-time-period claim frequency data for only single-car policies.

A review of the variety of K and BK estimates presented at the hearing suggests the following explanation. The size of the difference between the BK and K estimates depends upon the magnitude of the year to year variations in risk. These time variations may be substantive--resulting from changes in driving habits and skills--or artificial--resulting from changes in deductibles, insured vehicles or reporting practices. Carefully controlled data will tend to exhibit

more homogeneity (i.e. higher K estimates) but will also have less of the artificial time variations and therefore smaller differences between K and BK. Controlled single-car insurance data will yield greater homogeneity than data for single- and multicar policies combined, but will also have fewer time variations of both types compared to motor vehicle data. On balance, much of the purported difference between the excess-variance and claim-free discount methods probably can be attributed to the limited controls on the data from which the estimates were developed.

D. Methods for Deriving Estimates of Explanatory Power

The explanatory power of a classification plan has been described as the ratio of the variation in expected costs across risk classes to the total variation in expected costs across all insureds:

$$\text{Explanatory power of class plan} = \frac{\text{variation in expected class-average costs}}{\text{variation in expected costs of all individuals in population}}$$

To the extent the "between-class" variation is less than total variation, the explanatory power of the class plan is less than 100 per cent.

This measure of explanatory power is logical and conceptually appealing. However, two practical problems complicate the computation of numerical estimates. First, the use of class average pure premiums in computing between-class variation will overstate the numerator of the explanatory power formula to the extent that sample sizes in each class present credibility problems. In such cases the observed variability in class-average costs would reflect random fluctuations as well as underlying differences in class average risk.

Secondly, the estimate of total variation in risk among all insureds--Big K--required for the denominator of the formula is limited under the proposed methodologies to differences across insureds with respect to claim likelihoods. Since insureds may differ with respect to claim severity factors as well as frequency, such estimates of total variation will be incomplete and not compatible with estimates of between-class variation that are developed from pure premium data. No one has yet presented a theory for empirically estimating total variation due both to claim frequency and severity differences.

The first matter, relating to sample-size problems, appears to be addressed adequately by the various corrective adjustments proposed in testimony.[66] These problems are also alleviated by the use of claim frequency data for the estimation of between-class variation because frequency data are inherently less volatile than pure premium data when small samples are involved. The use of claim frequency data in the numerator is consistent with the use of such data in the denominator and assures comparability.

There appears to be general agreement that the use of claim count data for both numerator and denominator estimates is preferred whenever the data permit.[67] Accordingly, the Department's expert developed explanatory power estimates using class-average claim frequency data rather than pure premium data (in the numerator) together with K estimates developed from Table 2 claim-frequency distributions (in the denominator). Some companies, such as Allstate, were not able to provide the required claim data for each of their detailed driver-class categories. As a result, the development of explanatory power estimates for the various insurers required careful consideration and adjustment of data developed from several sources.

The formula for explanatory power is easily applied. The explanatory power of a set of risk classes equals the Big K value for the insured population times a normalized estimate of between-class variation. When claim frequency data are used to develop the between-class variance estimate, it is called the "normalized claim count variance".[68] Although other terminology was used in exhibits of other witnesses and normalized variances based on pure premium or premium data were sometimes substituted for normalized claim count variances, the underlying formula for computing explanatory power was not disputed. For example, Allstate's "Premium Coefficient of Variation" is numerically equal to the square-root of the reciprocal of what is called the normalized premium variance.[69] The use of these premium coefficients of variation in computing explanatory power (or "efficiency") is equivalent to the formula used by the Department's expert.[70] Exhibit H-18(b) explains in detail how the formulas for explanatory power used by Ferreira and Woll are also conceptually equivalent. It is in the numerical estimates of the K-values and normalized variances that the witnesses often disagreed.

1. The SRI Efficiency Estimate

In 1976 the Stanford Research Institute estimated the combined efficiency of a 217-classification plan, typical territory relativities (borrowed from New York), merit rating and underwriting at 30%. The separate estimates for each of these features were as follows:[71]

217-class plan	-	12%
territories	-	7%
merit rating	-	5%
underwriting	-	8%

The combined efficiency is less than the sum of the separate estimates due to the diminishing marginal effectiveness of these factors when

used in combination. The estimated efficiency of underwriting was derived from comparisons of pure premiums for identical classes in different companies. When population heterogeneity estimates are based on the voluntary data of a single company, as in the New Jersey analysis to follow, a separate estimate for underwriting effects is inappropriate because they are already built into the data.

Industry witnesses have attacked the SRI estimate on grounds that its use of motor vehicle data to estimate population heterogeneity (Big K) resulted in overstatement of the variation to be explained by the classification system. These witnesses correctly point out characteristics of the licensed-driver population not likely to be found in a typical population of insureds--persons who are licensed but not driving (and therefore not maintaining insurance), licensees who have left the state but kept business in effect, drivers who are uninsured and drivers who are uninsurable in the voluntary market. The presence of these types of persons in the licensed-driver population cause motor vehicle data to overstate, relative to the insured population, the numbers of persons with zero accidents and the numbers of persons with multiple accidents.[72]

This criticism of the SRI is unlikely to disturb the accuracy of the SRI estimates. Together with overestimating the denominator of the explanatory power formula, SRI also overestimated the numerator. Its use of pure premium variances instead of claim frequency variances probably overstated the magnitude of between-class variation in average costs. Pure premium data are subject to greater volatility than claim frequency data as the result of small sample size in numerous classification cells. Pure premiums also reflect the combination of both

the severity and frequency of claims, necessarily inflating the amount explained whenever frequencies-only are used in the denominator.

2. New Jersey Estimates for ISO and State Farm

Dr. Ferreira estimated the explanatory power of ISO's New Jersey classes and territories at 23 per cent for collision policies, the coverage generally producing the most homogeneous experience. This estimate used normalized claim-frequency variances for ISO's 217 primary classes, 40 secondary class and 27 territories based on voluntary single- and multicar experience for the three accident years 1975 through 1977 combined. The Massachusetts Big K estimate for collision --the largest K observed in Massachusetts, as described earlier--was used in the denominator.[73] Substitution of the Allstate Big K for collision increases the estimated heterogeneity of the population and reduces estimated efficiency to 21 per cent.

Small sample size prevents analysis of the entire State Farm class plan. However, the explanatory power of the eight State Farm classifications which utilize age, sex and marital status variables, combined with 27 territories, is about 17 to 19% for property damage liability and collision coverages and 5% for comprehensive, again using the Allstate Big K. Explanatory power estimates for the eight classes taken alone are 16% for property damage liability, 10% for collision, and 3% for comprehensive. The small difference in results is attributable to the fact that the territories have limited explanatory power by themselves and combining the two types of factors produces diminishing amounts of additional explanatory power.[74]

ISO data can be used to estimate an upper bound for the likely explanatory power of the entire State Farm class plan. The normalized

claim count variances for State Farm's eight classes can be increased by the difference between ISO claim count variances for its 4,340 single-car classification cells and its ten "2nd digit" classes (similar to State Farm's eight classes). Such an adjustment should overstate State Farm's explanatory power by a considerable extent since ISO's second digit classes may well explain less than State Farm's primary eight. The adjustment should further inflate State Farm's explanatory power because (1) no adjustment is made for the fact that State Farm uses combined single and multicar data, (2) State Farm uses far fewer than 4,340 driver classes, and (3) conservative estimates of population heterogeneity are used. The resulting explanatory power of all State Farm's classes, when combined with estimates of adjusted normalized claim count variances for State Farm territories, amounts to 29% for property damage, 23% for collision and 8% for comprehensive.[75]

3. Allstate Efficiency Estimates

Allstate did not supply data in sufficient detail to enable normalized claim-count variances to be computed across classifications more refined than 16 primary classes. Instead, Allstate proposed its own estimates of explanatory power based on an adaptation of the SRI methodology which promised improvement in the results. The efficiency estimates suggested by Allstate for all its classes and territories amounted to 39 per cent for the liability coverages and 50 percent for collision.[76]

The unique feature of the Allstate analysis is its substitution of premium variances, that is, variation in annual earned premiums across individual policies, for claim-count and average loss variances

in the numerator of the explanatory power formula. The use of premium variances assumes that differences among insureds in the amounts they actually pay for insurance correspond precisely with those differences in their underlying risks reflected in total population heterogeneity. This assumption is highly dubious. Under the premium-variance approach used by Allstate any change in premium for any policy for any reason during the course of the policy year will add to variations in premiums across people without necessarily measuring variations in underlying claim-frequency risks that are reflected in the Big K estimate. Changes in deductibles, modifications of coverage limits or type of vehicle, or any policy endorsement causing variation in premium will inflate the variation appearing to be explained by the class plan when used in conjunction with estimates of population heterogeneity--the amount of risk variation to be explained--which have screened out this superfluous variation.

The use of earned premiums also assumes that Allstate prices each and every one of its classes precisely in accordance with true average risk. This kind of accuracy is not likely. As developed in an earlier chapter, for example, Allstate's use of a multiplicative method for combining class and territory factors tends to overstate premium variation at the extremes relative to observed losses. Another consideration, in the case of collision and comprehensive coverages, is that age and symbol variations would be included in premium variances even though age and symbol are intended to reflect severity and not frequency differences.

Deriving an independent estimate of Allstate efficiency requires computation of normalized claim-count variances from the claim

count data provided by Allstate for its sixteen primary driver classes.[77] These data reflect average experience on the same policies used to develop the Big K estimates for Allstate. Mr. Woll used these data to develop explanatory power estimates for Allstate's sixteen driver classes amounting to 12.3% and 7.0% for liability and collision coverages respectively.[78] These estimates exaggerate explanatory power to some extent because Mr. Woll did not adjust his variance estimates for sample size bias which he later admitted would have an inflationary impact. The results are nonetheless comparable to those for State Farm's eight classes and ISO's 217 class plan. For convenience the three sets of estimates are compared in Table A-2.[79]

Woll further attempted to extrapolate from the 16-class Allstate data to an estimate of Allstate's explanatory power for classes and merit rating combined. The merit rating relativities are hypothetical, yet they fail to reflect the time variations in risk which Woll has argued elsewhere will reduce the explanatory power of merit rating compared to its theoretical effect. Nonetheless, Woll's estimates of the combined explanatory power of these hypothetical merit rating classes and Allstate's 16 classes were only 23.6 per cent for liability and 24.8 per cent for collision.[80]

Alternatively, it is possible to extrapolate from the 16-class Allstate results to estimate an upper bound for the explanatory power of all of Allstate's classes in the same manner earlier done for State Farm. The normalized claim-count variances for State Farm territories may be added to the normalized claim-count variances for Allstate's 16 classes together with the difference between the normalized claim count variances for ISO's ten second-digit classes and for

TABLE A-2

Company	Category	Normalized Variance PD	All Liab.	Collision	Comp.	Explanatory Power PD	Collision	Co
ISO	10 "second-digit" classes[b]	3.9	4.4	6.2	7.6	5.9%	9.9%	6.
	217 classes[b]	5.2	5.6	7.7	9.1	7.8%	12.3%	7.
	4,340 classes[b]	10.7	10.2	9.9	11.1	16.0%	15.8%	8
	27 territories[c]		2.5	3.2	9.8	3.8%	5.1%	7
State Farm	8 classes[d]	10.6		6.5	3.7	15.9%	10.4%	3
	27 territories[d]	2.0		4.4	2.7	3.0%	7.0%	2
Allstate	16 classes[e]		8.1	4.5	--	12.3%	7.0%	
	27 territories[f]		1.1	3.2	--	1.7%	5.0%	

[a] Obtained from normalized variances by multiplying by "big K" estimates: 1.52 and 1.56 fo Allstate property damage and collision coverages and 1.5, 1.6 and 0.8 for PD, collision, and comprehensive for ISO and State Farm.

[b] D-86 pages 1 and 2 (ISO data for single car policies, 1975-1977).

[c] Developed from ISO liability data and NAII physical damage data as explained in D-68 page 4 and 5 for pure premium data.

[d] D-91 (State Farm data for single and multicar policies combined).

[e] A-17 (ex. 36 to 51) data as analyzed in H-18 and H-18A.

[f] HO-9 (ex. 2 and 3) Allstate claim frequency data for 1976 combined with ISO exposure distribution from D-68 p. 4. Allstate territorial exposures were not entered into evidence although, late in the hearing, Allstate did provide exposure distributions via NAII. Ferreira testified that results using Allstate data was similar to ISO normalized varianc results (T-74).

all 4,340 classes. The results, when combined with Allstate's Big-K values, yield explanatory power estimates of 24 per cent for liability and 20 per cent for collision.

4. The 80-Per Cent Woll Estimate

Mr. Woll's analysis of within-class variation produced estimates of population heterogeneity and the overall explanatory power of the ISO class and territory system which if valid could have significant implications for the discussion of residual heterogeneity within the New Jersey classes. Mr. Woll estimated the combined efficiency of ISO classes and territories at approximately 80 per cent, meaning that in his view only 20 per cent of the risk heterogeneity in the population would be left unaccounted for by the existing system and that residual within-class heterogeneity would diminish accordingly. Although the significance of leaving 20 per cent of risk variation unexplained would depend on the magnitude of resulting pricing errors--and with the extreme spread in rates under the current system it is likely that many such errors would be substantial in dollars--the smaller size of the fraction left unexplained under the Woll estimates could change the thrust of the debate substantially.

The analysis leading to Woll's 80 per cent efficiency estimate is predicated in part on contentions and assumptions which would serve to shrink the denominator of the explanatory power fraction. These contentions were previously discussed, dispositively, but bear repeating here for purposes of clarifying the magnitude of their contribution to the Woll results. Woll contends:

(1) that classification plans should be expected to explain less of the observed variation across

individuals than the SRI methodology would require; in particular, that variation in individual exposures over time should be deducted from the variation to be explained so that only time-invariant exposures are considered;

(2) that based on an examination of four-year North Carolina motor vehicle data and six-year California motor vehicle data, population homogeneity estimates derived pursuant to the SRI methodology should be increased 40 per cent for the effects of time variation in risk; and

(3) that the 40 per cent adjustment can be applied to controlled Massachusetts insurance data to increase the estimated homogeneity of that insured population from a Big K of 1.715 to a Big K of 2.40.

Rejecting the 40 per cent adjustment for the reasons discussed earlier, while adopting every other step in the Woll analysis, would itself reduce the Woll results from an estimated efficiency of 80 per cent (for collision coverage) to an estimated efficiency of about 57 per cent. In the alternative, adopting the adjustment but applying it to the excess-variance estimate of K for Woll's own Hartford collision data pertaining to New Jersey, again adopting everything else for the sake of discussion, would shrink Woll's explanatory power estimate from 80 per cent to 22 per cent.

In addition to his efforts to reduce the denominator of the explanatory power fraction, Mr. Woll has taken or omitted the following steps to enlarge the numerator:

(1) he has used normalized pure premium variances computed from Massachusetts collision data for Massachusetts classes and territories to indicate the amount of variation explained by ISO's 217-class plan in New Jersey;

(2) he has made no adjustments to the Massachusetts pure premium variances for sample size bias; and

(3) he has adjusted the pure premium variances upward by a judgmental 10 per cent to reflect his anticipation of finding higher explanatory power in the ISO 217-class plan than in the less refined Massachusetts class plan.

Each of these steps involve methodological errors which serve to inflate further the proposed efficiency estimate.

The use of pure premium variances instead of claim-count variances to estimate the explanatory power of classes has distorting effects for at least two reasons. First, as noted earlier, pure premium variances are especially sensitive to sample size problems. Claim severities are so variable that a considerable number of claims must have occurred in each cell in order for class average costs to be indicative of the actual risk of the class. Secondly, and more importantly, the denominator of the explanatory-power fraction, the estimate of population heterogeneity or Big K, is measured only in terms of claim counts or frequencies. Including severity differences among insureds in the estimate of population heterogeneity--something no one has yet figured out how to do--would substantially enlarge the total risk variation to be explained.

Woll's use of pure premiums to compute variances among classes includes the effects of severity as well as frequency even though his denominator continues to focus only on frequency differences. This mix of estimates based on different types of data compares apples and oranges. The use of pure premium variances in the numerator and claim-count distributions in the denominator maximizes variation explained and minimizes variation to be explained, necessarily enlarging the resulting estimate of percentage of variation explained. If Woll had used claim-count variances in the numerator (even without any reduction to account for small sample sizes), his proposed 80 per cent efficiency estimate would have been reduced to 41 per cent by this fact alone.[81]

Woll's failure to make adjustments for sample-size fluctuations further inflates his results. The need for such adjustments is especially acute in connection with pure premium variances; but even the less volatile claim frequency variances are subject to sample bias and significant distortions will occur if countervailing adjustments are not made. Mr. Woll eventually conceded this point, although he argued that the adjustment proposed by the Department's expert went too far in the other direction.[82]

Mr. Woll's objections to the sample-size adjustment employed by Dr. Ferreira amount to counter-criticism of the Department's estimates of explanatory power, but a brief digression on the Woll contentions would serve to clarify at least the significance of the adjustment question. Mr. Woll demonstrated that in an extreme case when (1) only two years of data are used, (2) the number of exposures in the second year is twice that in the first year, i.e., the company

doubles its book of business in one year, and (3) the number of exposures is very small--his hypothetical sample has one exposure in the first year and two exposures in the second year--the Ferreira adjustment procedure understates true variance by almost 50 per cent.[83] However, no adjustment on the same facts yields an overestimate of 168 per cent.

The competing merits affecting choice of adjustment were sharpened under cross-examination by modifying the hypothetical assumptions used by Woll and computing errors of under-and-over-estimation resulting from a variety of scenarios. Four hypothetical cases were examined yielding the following results.[84]

(1) Increasing Woll's hypothetical exposures in the first year to 10 and in the second year to 20 reduces the Ferreira underestimation error to 4.3 per cent. Failing to make any adjustment results in overestimation of variance by 17 per cent.

(2) Returning to Woll's one- and two-exposure situation but using three instead of two years of data, and still assuming extreme shifts in exposures from year to year--doubling exposures in the second year, halving them in the third--the underestimation error caused by the Ferreira adjustment is 20.5 per cent. Failing to make any adjustment results in overestimation by 125 per cent under these facts.

(3) Using three years of data and the smallest possible number of exposures as in case two but assuming

that exposures remain constant in the second and third years--thus one exposure in the first year and two exposures in the second and third years--the Ferreira adjustment causes underestimation of variance by 18.2 per cent. Failing to make an adjustment, however, causes overestimation of variance by 100 per cent.

(4) Using three years of data, but again multiplying exposures by ten and reversing the direction of shifts from year to year--thus assuming 20 exposures in the first year and 10 exposures in the second and third years--the Ferreira procedure underestimates variance by 2 per cent. Failing to make any adjustment overestimates by 12.6 per cent.

In a real-world situation there is no reason to expect the extreme sample fluctuations hypothesized by Woll, nor is there reason to doubt that the procedure employed by Ferreira yields more than adequate precision. It is noted that some underestimation may occur in some cases. It is also noted that the estimates offered by Dr. Ferreira in the current proceedings were based on three-years of data; and when an indicated adjustment was too great the resulting variance estimates were discarded because underlying data samples were obviously too small. However, the critical point is that over-adjusting in even the extreme case is better than making no adjustment at all. The fact that Mr. Woll's failure to make any adjustment of this sort contributed significantly to the inflation of his proposed efficiency estimate

is underscored. The ratio of percentage overestimation to percentage underestimation is at least 4 to 1 in the hypothetical two-year scenarios and 5 to 1 in the three-year situations.[85]

Returning then to the third step of Mr. Woll's analysis of variation explained by current class plans, curiously the one adjustment he did make in his variance estimates was upward. On his assumption that the Massachusetts class plan from which his data were derived would necessarily yield lower amounts of variation explained than the more refined ISO plan in New Jersey, he adjusted his estimates upward by an entirely judgmental ten per cent. This adjustment begs the question as to the actual explanatory power of the New Jersey plan and is essentially mooted by the analyses based on New Jersey data. Elimination of this 10 per cent adjustment from Woll's computations would itself reduce his 80 per cent efficiency estimate to 56 per cent.

In sum, there is little difference left between the competing Woll and Ferreira estimates of explanatory power once wrinkles in underlying methodologies are ironed out. Continuing to use Woll's BK estimate of 2.4 for collision but correcting Woll's numerator and denominator by using the claim count variances from ISO and State Farm with 4/5 of Ferreira's adjustment would reduce Woll's 80 per cent efficiency estimate to about 36 per cent. Applying the same analysis to the Massachusetts Big K estimate of 1.715 for collision without Woll's 40 per cent adjustment for time variation effects further reduces this 36 per cent figure to 26 per cent. Using instead Allstate's Big K of 1.56 for New Jersey collision coverage reduces the figure to 24 per cent, only slightly higher than Ferreira's 23 per cent estimate.

The discussion emphasizes the importance of interpreting the numerical results proposed by the experts in terms of the assumptions and procedures which support them. The variations sought to be measured here are sufficiently fine to warrant the utmost care in delineating each methodological step. Similar care is warranted with respect to control and refinement of data and the proper blending of data developed from separate sources.

E. Conceptual Questions Concerning Estimation of Within-Class Heterogeneity

At this point all but one of the major conceptual questions pertaining to estimates of explanatory power have been resolved. The additional question concerns estimating the distribution among classes of the residual heterogeneity, or variation left unexplained.

1. The Question of Equal Percentage Heterogeneity Across Classes

Estimates of within-class heterogeneity offered by the Department's witness, Dr. Ferreira, assumed that risk classification divided insureds into classes that are equally heterogeneous in percentage terms--in which case they have equal "little k" values. Necessarily springing from this assumption is that classes are unequally heterogeneous in dollar terms and that absolute heterogeneity increases with class mean--an observation that was noted in the 1976 SRI Report. The precise relationship between heterogeneity and class mean is likely to depend upon the nature of particular risk factors.

Both the SRI report and the testimony of Dr. John Pratt suggest that the pattern by which heterogeneity varies with class mean is likely to fall within a range, of which one extreme is the situation in which k is constant and the other extreme is a situation in which

k is proportional to the class mean.[86] The former case corresponds to equal heterogeneity in percentage terms; and the latter represents somewhat less heterogeneity in the higher-rated classes. Even in this extreme latter case, however, the improved accuracy is not sufficient to imply equal accuracy across classes in dollar terms.

The SRI analyses of California motor vehicle department accident records by years of age indicated patterns that fell in between the constant k and "proportional to the mean" extremes.[87] Subsequently, the Massachusetts Insurance Department analyzed claim-frequency distributions for a large sample of motorists insured in that state during 1975. Comparisons of homogeneity and class mean estimates for the various territories into which the data were divided evidenced no trend or clear pattern.[88] After reviewing the SRI and Massachusetts analyses, and making an independent evaluation of claim-frequency data for New Jersey insurers, Dr. Ferreira has concurred with the earlier findings that higher-rated classes are more heterogeneous in dollar terms than low-rated classes.[89] He reported in fact that the higher-rated classes may even be more heterogeneous than previously thought due to biases in k-estimates for those classes with small sample sizes; but he suggested that equal percentage heterogeneity be used as a reasonable first-order approximation.[90]

The assumption of equal percentage heterogeneity is disputed by industry witnesses led by Mr. Woll of the Hartford and Mr. Kozik of Allstate. They argue that percentage accuracy increases with class mean and suggest that the increase may even be sufficient to imply equal dollar accuracy in all classes. For this to be the case, the variance would have to remain constant across classes, and the k-values would have to increase in proportion to the square of the class mean.

In support of his contention Mr. Woll analyzed claim frequency distributions from several sources. He split the classification groups within each data set into above-average and below-average claim frequency groups and then compared k-values for each of the subgroups. In addition, Mr. Woll further subdivided the high-and low-rated subclasses using a hypothetical merit rating plan and compared the estimated homogeneity of the more refined subcells. The results show consistently higher k-estimates in the high-rated groups.[91]

Mr. Kozik's Allstate data, submitted late in the hearing, represented the most extensive claim frequency distributions for New Jersey experience presently available. The final submission, submitted at the close of the hearing, provided claim frequency distributions broken down by each of Allstate's sixteen primary driver classes for liability and collision coverages on voluntary business written in New Jersey and each of six additional states. Mr. Kozik agreed with Mr. Woll's assertion that k-values differed systematically by class mean and offered k-estimates for his company's data as evidence.[92]

Each of the industry presentations has one or more of three failings with respect to proving the unequal k hypotheses. First, each attempts to estimate k-values directly for individual classes or groupings of classes in which the highest-rated classes contain a small number of exposures. While some of the Woll estimates aggregated the higher-rated classes before estimating k, the subsequent efforts at disaggregation omitted normalized variance adjustments to account for sample fluctuations and thereby overstated whatever difference in k-values may, in fact, exist. Secondly, each presentation estimates differences in k-values between classes and between aggregate high-and

low-frequency groupings but fails to identify a systematic pattern which would correlate class k-values and class-average frequencies. There is some indication that youthful classes, as a group, may be more homogeneous in percentage terms than adult classes; but even this does not suggest that percentage homogeneity varies systematically across the high and low youthful classes inter se. Thirdly, the estimated increases in k-values, even if adopted, would not reasonably support the suggestion that classes are equally accurate in dollar terms. The following discussion will address each of these subjects in turn.

Sample Size Problems and Estimation Bias

In each of the sets of data from which k-estimates were developed, the highest-rated classes were consistently among those with the fewest exposures. When the sample size is small, the number of multiple-accident policies is too limited to reflect the entire range of variations in risk within the class.[93] For example, in the case of youthful Allstate classes in New Jersey, none of the individual classes examined contain anything close to 10,000 exposures and five of the sixteen classes had no policies with 3 or more claims.[94] Even the combined seven-state collision data for Allstate contain fewer than 10,000 exposures for five of the nine youthful classes.[95]

The small sample sizes make the k-estimates for individual classification cells especially volatile and unreliable. In Allstate's class no. 1, estimated to have a k-value of 14.0 for liability coverages, the distribution is so thin that hypothetically moving one claimant from the 2-claim category to the 3-claim category reduces the k-estimate to 6.1, a greater than 50 per cent decline. Similarly, in

class no. 2, having an estimated k-value of 9.2 for liability coverages, the movement of one claimant from the two-claim category to the three-claim category reduces the estimated k-value for the class to 3.7, about a 60 per cent decline.

The significance of sample-size problems shows up readily in the comparison of Allstate's New Jersey estimates with its seven-state estimates in Table A-3. The seven-state k-estimates show considerably less fluctuation across classes than the New Jersey estimates. The k-estimates for two New Jersey liability classes and one collision class were negative, suggesting very high homogeneity. No negative estimates were obtained for the seven-state data (which included the New Jersey data).

The average k-estimate for Allstate classes with positive k-estimates is significantly higher in the New Jersey data than the seven-state data--42 per cent higher for liability and 13 per cent higher for collision. Although it might be argued that these differences suggest greater homogeneity in the New Jersey classes, the higher k-estimates for these classes are much more likely to reflect sample size problems. If the sixteen Allstate classes are aggregated, so that the number of exposures used to estimate k is much larger, k estimates derived from the aggregated data for New Jersey and the seven states are quite similar, with New Jersey in fact a little more heterogeneous than the seven states combined. (The k-estimates are 1.52 and 1.56 for liability and 1.55 and 1.57 for collision, respectively, for New Jersey and the seven states.)

The sample size problems in question occur disproportionately in the higher-rated youthful classes. Even in Allstate's seven-state

TABLE A-3

THE EFFECT OF SAMPLE SIZE ON THE STABILITY OF K ESTIMATES

	Liability				Collision			
	New Jersey*		All 7-States**		New Jersey*		All 7-states**	
Class***	Policies	K	Policies	K	Policies	K	Policies	K
1	1,992	14.0	9,733	2.7	569	1.4	3,565	3.2
2	3,440	9.2	24,658	2.5	1,627	5.4	13,383	5.3
3	1,804	3.5	12,418	2.8	1,065	1.3	8,248	3.0
4	1,954	1.2	17,193	1.9	1,267	3.6	12,134	2.3
5	2,083	-4.1	8,969	5.2	1,102	-7.3	5,544	10.5
6	3,853	2.3	24,728	3.8	2,831	1.9	18,818	3.4
7	1,718	0.9	11,129	4.7	1,173	0.8	8,251	2.5
8	886	-2.3	5,022	1.7	623	5.0	3,361	2.6
9	3,250	1.3	25,385	1.1	2,086	1.4	16,353	1.5
10	4,299	5.2	30,291	1.2	2,976	2.4	22,717	1.6
11	4,486	3.0	27,789	2.0	3,449	7.1	22,100	1.8
12	10,272	1.8	67,743	2.2	7,626	1.1	53,423	1.7
13	17,924	1.5	119,758	1.4	12,876	1.6	94,939	1.7
14	45,350	1.5	266,308	1.9	31,185	1.6	191,316	1.5
15	3,474	0.7	36,133	3.8	2,302	3.9	28,355	2.4
16	30,933	1.5	311,770	1.3	18,279	1.8	207,315	1.3

*From A-17 Exhibits 36-52

**From HO-9 Exhibits 4-20

***A description of the sixteen driver classes is given on the next page.

TABLE A-3 (part 2)

ALLSTATE'S SIXTEEN DRIVER CLASSES

CLASS	DESCRIPTION
1.	Single males aged 16 to 20 who drive the car more than 25% of the mileage.
2.	Single males aged 21 to 24 who drive the car more than 25% of the mileage.
3.	Married males aged 16 to 20 and single males aged 16 to 20 if they drive the car less than 25% of the mileage.
4.	Married males aged 21 to 24 and single males aged 21 to 24 if they drive the car less than 25% of the mileage.
5.	Single females aged 16 to 20 who drive the car more than 25% of the mileage.
6.	Single females aged 21 to 24 who drive the car more than 25% of the mileage.
7.	Single females aged 16 to 20 who drive the car less than 25% of the mileage.
8.	Single females aged 21 to 24 who drive the car less than 25% of the mileage.
9.	Single males aged 25 to 29.
10.	Single males aged 30 to 49.
11.	Adults who drive to work more than 20 miles or use the car for business.
12.	Adults who drive to work 10 to 20 miles.
13.	Adults who drive to work 4 to 9 miles and have an annual mileage of more than 7500.
14.	Adults who drive to work 0 to 3 miles or for pleasure use only and whose annual mileage is over 7500.
15.	Adults who drive to work 4 to 9 miles and whose annual mileage is less than 7500.
16.	Adults who drive to work 0 to 3 miles or for pleasure use only and whose annual mileage is less than 7500.

data, none of the youth classes contained policies with three or more claims in all seven states. A comparison of youth and adult classes in this regard, detailing for each class the number of states reporting no policy with three or more claims, is displayed in Table A-4.

TABLE A-4

NUMBER OF STATES REPORTED NO POLICY WITH THREE OR MORE CLAIMS

	Class	Count for Liability	Count for Collision
	1	3	3
	2	4	2
Youth	3	2	2
Classes	4	4	2
(1 through 9)	5	4	4
	6	6	2
	7	7	5
	8	2	5
	9	6	3
	10	6	4
Adult	11	4	3
Classes	12	3	2
(10 through 16)	13	1	0
	14	1	0
	15	5	2
	16	0	0

Evidence furnished by the Department's expert confirms that k-estimates developed from small data samples overestimate homogeneity. Dr. Ferreira reported that simulation runs designed to test the effect of small sample sizes on the Massachusetts k-estimates indicated that homogeneity is likely to be over-estimated in the small classes.[96] Since the youthful classes tend to be smallest, this bias could explain the apparent tendency of some of the youthful classes to yield above-average k-estimates.

Absence of a Systematic Pattern Correlating Frequency and Homogeneity

Combining some of the small classes and then comparing k-estimates across groups of high- and low-rated classes overcomes the most extreme sample size problems. Mr. Woll presented such a comparison using data from Allstate, Travelers, California motor vehicle records (SRI) and Massachusetts.[97] The k-estimates for each of the high and low groups are furthest apart for the Massachusetts collision data (1.66 for the low-rated group and 2.42 for the high-rated group) and closest together for the Traveler's data (0.68 for the low-rated group and 0.89 for the high-rated group).

The data used by Mr. Woll are suspect, for several reasons. The California data are not only based on motor vehicle records but also cover a sample of California drivers who remained licensed in that state during a fourteen-year period. Such a sample is unlikely to be representative of each year's pool of insured motorists. The Massachusetts and Traveler's data are based on averages of k-estimates for subclasses which are small--especially within the high-rated groups. For example, the total Traveler's sample included 26,123 exposures and only the senior adult subgroup had more than 3,000 exposures in it. In addition, the Traveler's data were not tightly controlled.

The Massachusetts sample was much larger and more carefully controlled but the sample sizes in some of the high-rated subclasses, whose k-estimates were used to compute the group average, were still small. The four single-youthful-male classes, for example, had 232, 794, 6353 and 9730 car years of exposure, respectively.[98] For the reasons explained in the previous section, the k-estimates developed from data with such small sample sizes tend to overstate homogeneity;

and the small classes tend to fall in the high-rated groups. Because Mr. Woll's k-estimates for the aggregated groups were obtained by averaging the class by class k-estimates, the difference in the overall estimates of k for the high-rated and low-rated groups is also exaggerated.

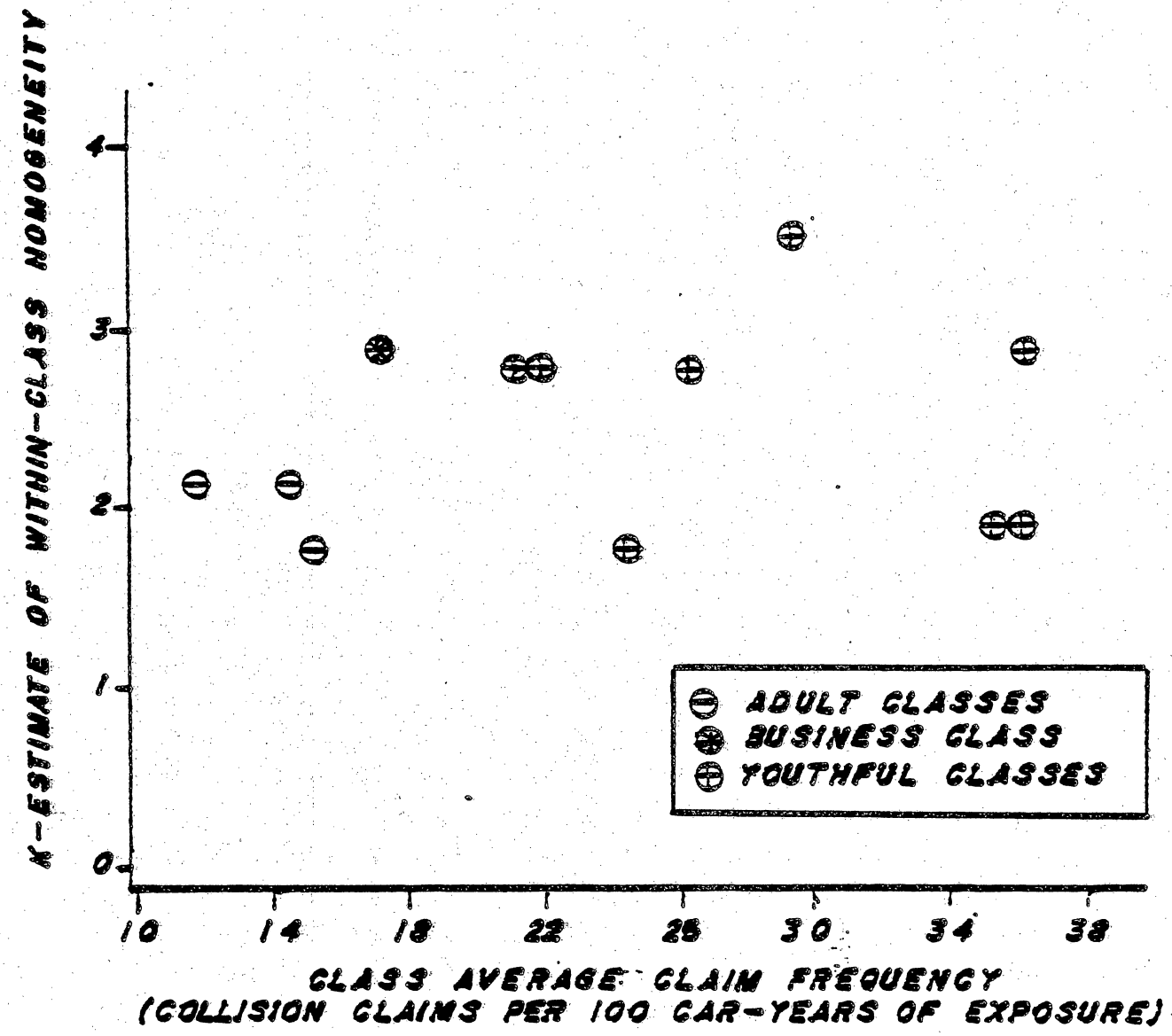
Even if one ignores any bias due to sample size, the pattern of k-estimates across driver classes or territories do not indicate a systematic correlation between class-average frequencies and class homogeneity. The estimates of k for individual classes and territories from the Travelers' data defy any pattern. The plotted k-values for each class and territory appear thoroughly scattered. Furthermore, the standard errors of all these k-values are within one standard deviation of 0.6, not inconsistent with the assumption of constant k under these facts.[99]

The graph in Figure A-1 plots the k-estimates and class-average claim frequencies for each Massachusetts class,[100] illustrating the limitations of the kind of comparison attempted by Mr. Woll. While the average k-value for the three classes in the "low group" is indeed lower than the average k-value for the eight classes in the "high group", the variability of the k-estimates is so large that the extent of true difference between the two groups is questionable. The small sample size for many of the high-rated classes and the resulting bias further weaken the analysis. Moreover, the observed difference between the "high" and "low" groups does not appear to suggest any systematic relationship between homogeneity and class-averages <u>within</u> each of the two groups.

The strongest evidence of a pattern in the relationship between k-value and class mean is in Woll's analysis of Allstate's New

FIGURE A-1

HOMOGENEITY CLAIM FREQUENCY RELATIONSHIP
(MASSACHUSETTS DATA)



Jersey data. Here Woll aggregated the New Jersey claim frequency data across the low- and high-rated groups before estimating k-values so that any bias would depend upon the aggregate sample size and not the individual cell sizes. He aggregated the first seven of Allstate's sixteen driver classes into the "high" group and the last nine classes into the "low" group.[101]

The sample size for the "high" group was 16,835 exposures for liability and 9,634 for collision--possibly sufficient to overcome most of the bias that Ferreira warned against. Nevertheless, the sample size is not sufficient to estimate k with precision. The formula for the accuracy of k-estimates reported by Ferreira suggests a confidence interval for the k-value of the "high" group ranging between .91 and 3.87 for liability and between 1.12 and 2.88 for collision.[102] Hence, the observed differences between the groups could well be spurious.

Graphs of the individual k-value and class-mean estimates for each of the 16 driver classes supports this skepticism, as reflected in Figures A-2 and A-3. The graphs show the results for liability and collision coverages respectively. The values for the seven "low-rated" classes are shown with the symbol "-". Those for the nine "high-rated" classes are shown as "+".[103]

As in the case of the Massachusetts data, the differences in homogeneity observed here between the "high-" and "low-rated" classes are suspect. Furthermore, there is no evidence of a systematic pattern relating k-values and class means among the nine high-rated classes or among the seven low-rated classes inter se. Finally, any apparent difference in k-estimates between the high and low groups

FIGURE A-2

HOMOGENEITY VS CLAIM FREQUENCY RELATIONSHIP
ALLSTATE NEW JERSEY DATA (LIABILITY)

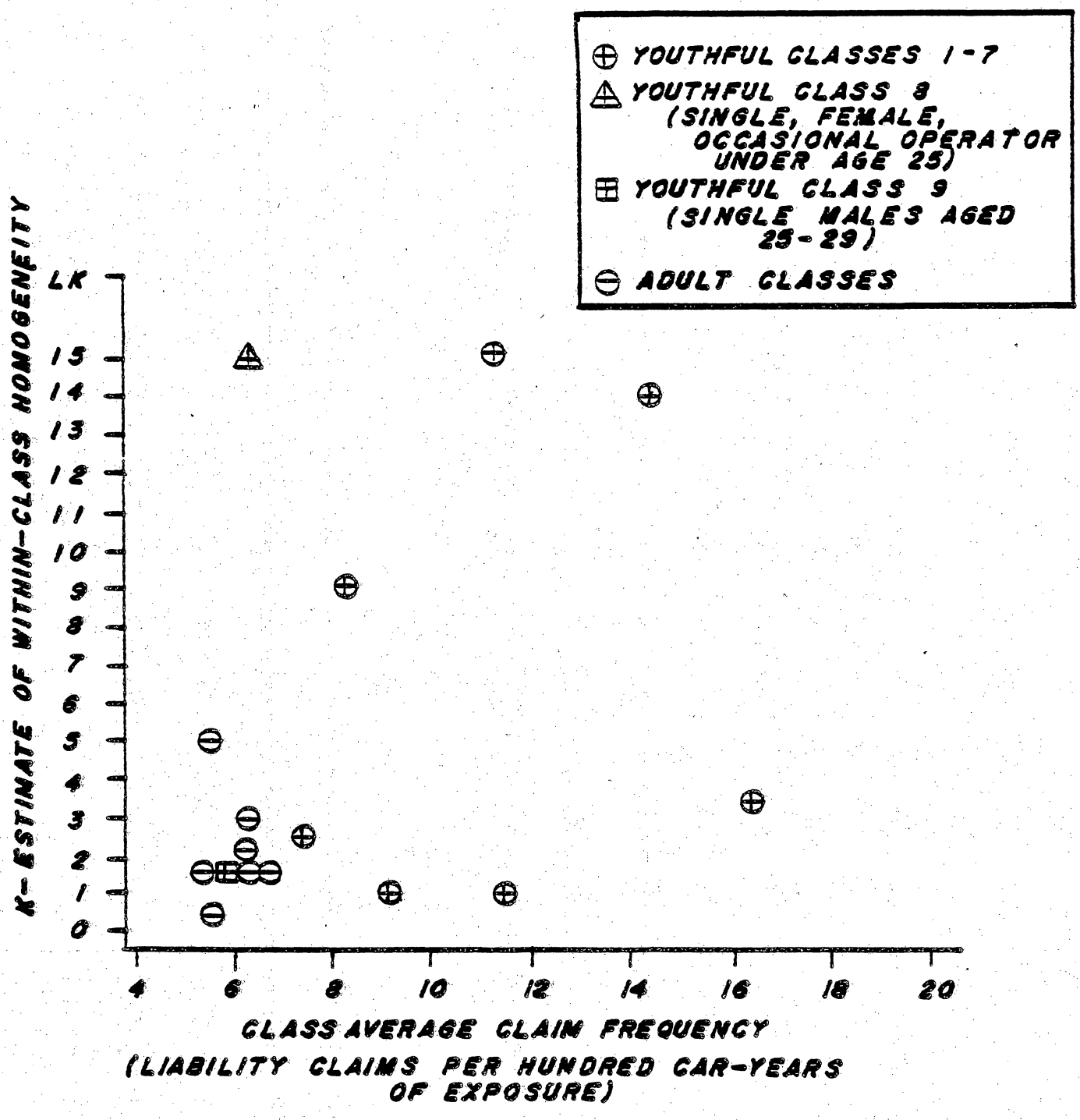
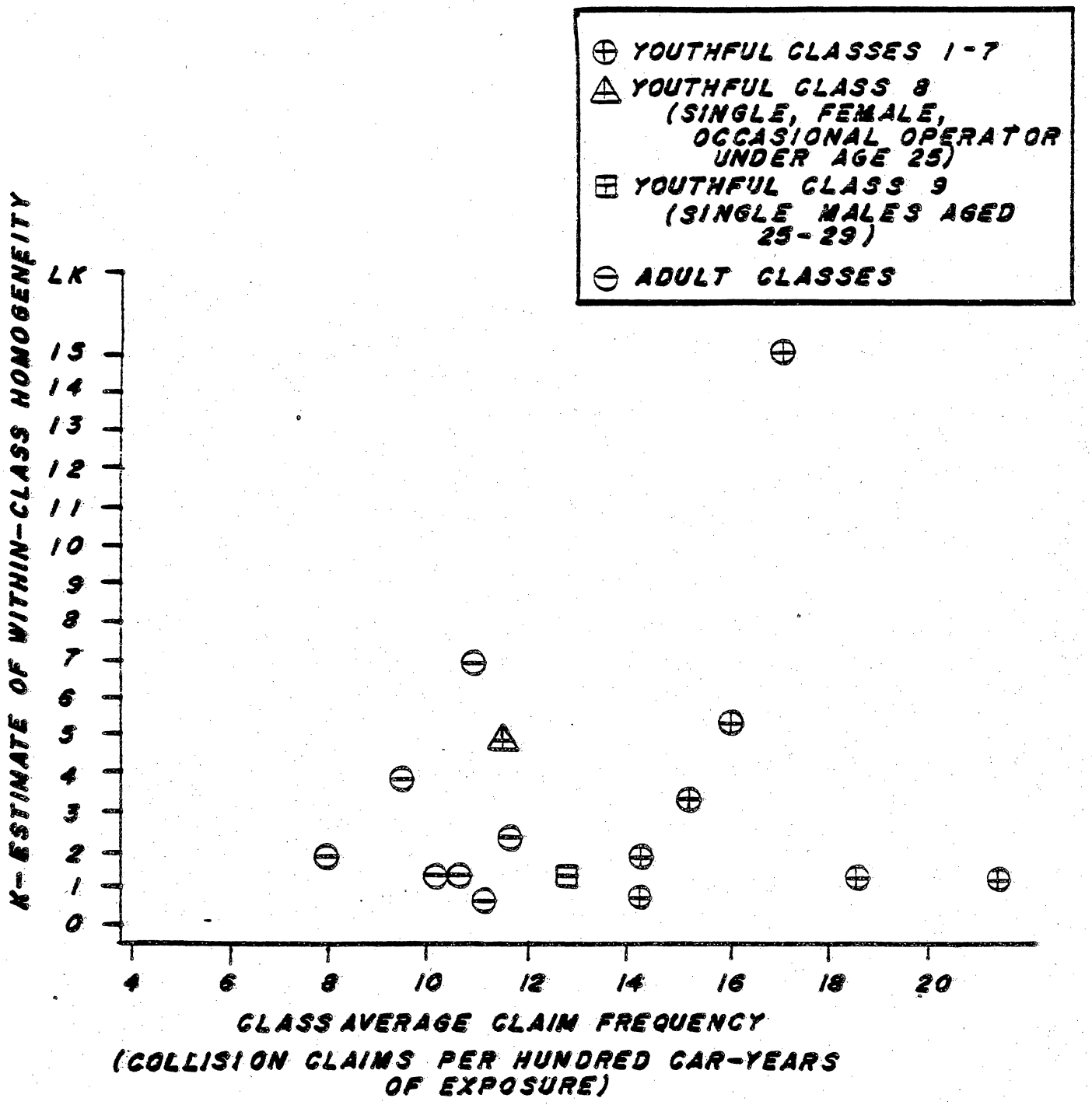


FIGURE A-3

HOMOGENEITY VS CLAIM FREQUENCY RELATIONSHIP
ALLSTATE NEW JERSEY DATA (COLLISION)



could well result from the screening process used to control the so-called Table-2 data from which the estimates were developed. The tendency of this process to eliminate atypical policies from the data, as earlier discussed, would have a differential impact on the youthful classes which make up the high-rated group.

Mr. Woll also offers estimates of the average level of homogeneity within each of the classes which comprise the high- and low-rated groups. Beginning with normalized variance estimates for the primary driver classes and the estimated k-values for the high- and low-rated groups, he estimated the additional explanatory power that might in theory result from subdividing the classes in each group using a hypothetical merit rating plan. For the Massachusetts data Woll also estimates the combined effects of class and territory factors. The end result of these extrapolations are estimates of typical homogeneity in the refined, hypothetical sub-cells that make up the high- and low-rated driver classes. The results produce even larger differences between k-estimates for subgroups of the high- and low-rated groups. They also produce k-estimates for the highest-rated classes ranging as high as 7.7 for the Massachusetts collision data and 4.4 for the Allstate liability data.[104] While such k-values remain far from the k's of 20 and 80 in the homogeneous classes hypothesized in Figure 4 of the Standards of Evaluation, they do suggest somewhat more homogeneity than was assumed by Ferreira when he illustrated the effects of tempering.[105]

Problems in the Woll extrapolations exaggerate the homogeneity estimates. The little k values for the subclasses in the "high" and "low" groups were derived from normalized variances which Woll did

not adjust for sample fluctuation; and the resulting bias logically impacts most heavily on the higher frequency classes. For example, derivation of k-values for Allstate's seven high frequency classes and nine low frequency classes yield k-values of 3.24 and 1.56, respectively, when unadjusted normalized variances are used; but when the average k-values for each grouping are derived directly, the k-value of the higher frequency grouping declines to 3.0 while that for the lower frequency grouping remains the same.[106]

Woll's refinement of all classes by simulated merit rating data and further refinement of some of the class groupings by hypothetical territories inflate these artificial differences in k introduced in the earlier stages. The hypothetical territories also exaggerate homogeneity differences by assuming a multiplicative interaction with classes. The end result yields k estimates that are considerably higher than those suggested by Ferreira for the relatively high-rated classification cells and very different for the high- and low-rated classes. Much of these differences appear to be spurious or unrealistic or both.

However, biases in the estimates do not necessarily explain all the observed differences between high- and low-rated groups. The consistency with which the high-rated groups have high k-estimates provides some evidence of consistent differences in homogeneity between some types of high- and low-rated classes. The plots of the class by class estimates of homogeneity and average frequency do not indicate a systematic correlation, but the fluctuations in the k-estimates due to small sample sizes are large enough that it would be difficult to see a pattern if it were there.[107]

Allstate's aggregated claim frequency data for seven states offers some prospect for improved estimation.[108] The k-estimates for individual driver classes are much more stable on these data than on data for New Jersey alone. While there is some concern that the data for the other six states might not be representative of New Jersey, the overall homogeneity and claim frequency estimates for all seven states and for New Jersey individually are not far apart. Claim frequencies in New Jersey are about 5 per cent lower for liability and 10 per cent higher for collision coverage compared with the seven-state totals. Overall homogeneity estimates indicate slightly more heterogeneity in New Jersey than the seven states combined, but the differences are not significant (less than one percent for collision and two-and-one-half percent for liability.)

Graphs of the relationship between k-values and class-average claim frequency are presented in Figures A-4 and A-5. Correlation coefficients (similar to those reported by Allstate for the New Jersey data)[109] indicate 0.46 for liability coverage and 0.40 for collision. The large sample sizes in the seven-state data makes the estimates of these coefficients more reliable but they are still not large enough to pass a standard 5 per cent significance test. (In the case of liability coverage there is a 7 per cent chance that the correlation could be at least this high for spurious reasons and for collision the chances are 13 per cent.) Focusing only on the rank ordering of claim frequency and homogeneity lends somewhat more credence to the suggestion that there is a relationship between k and mean. The Spearman rank order correlation coefficients for liability and collision coverages are 0.65 and 0.74 respectively. Both these amounts are significant at levels even less than one per cent.

FIGURE A-4

HOMOGENEITY VS CLAIM FREQUENCY RELATIONSHIP
ALLSTATE SEVEN-STATE LIABILITY DATA

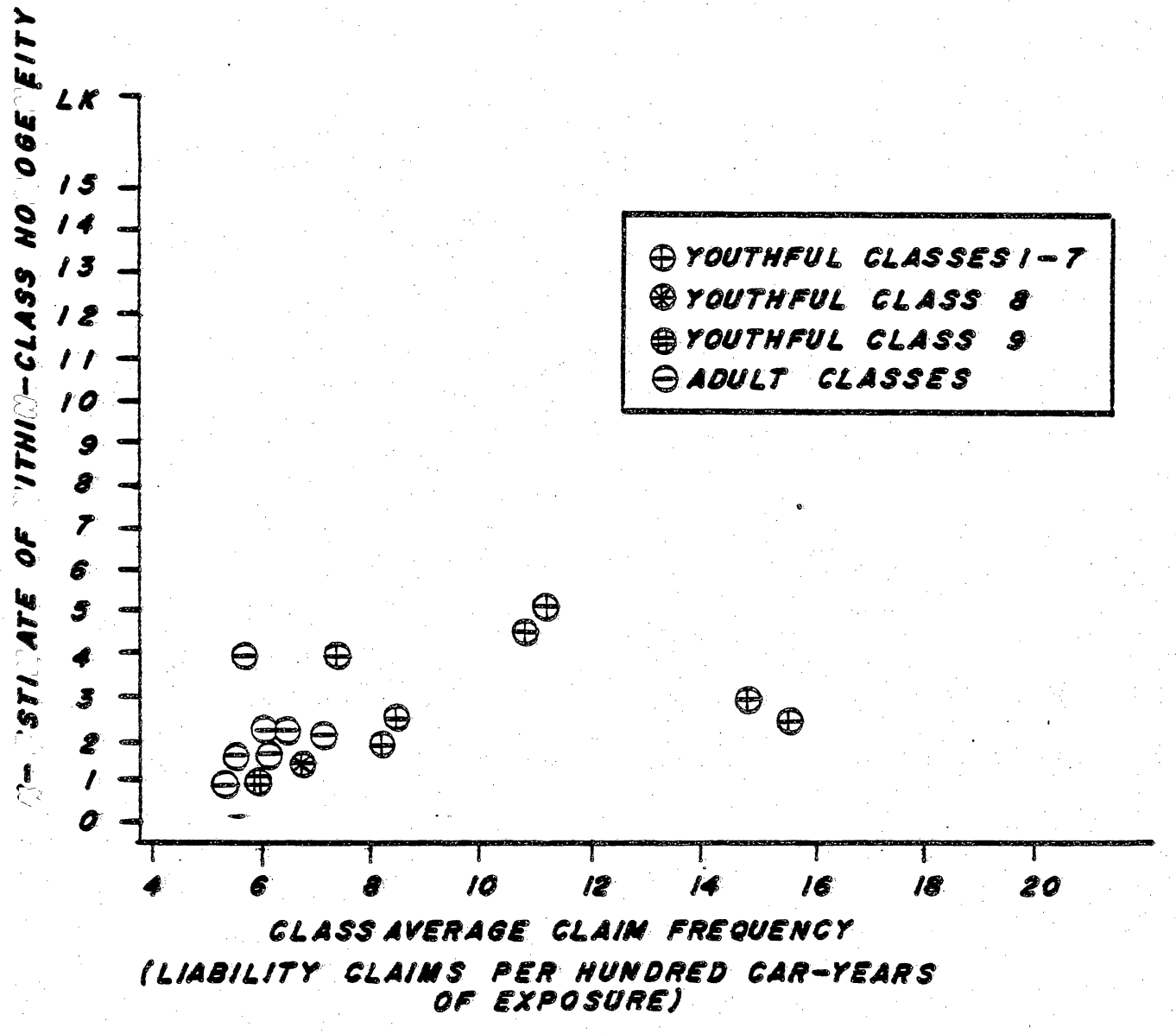
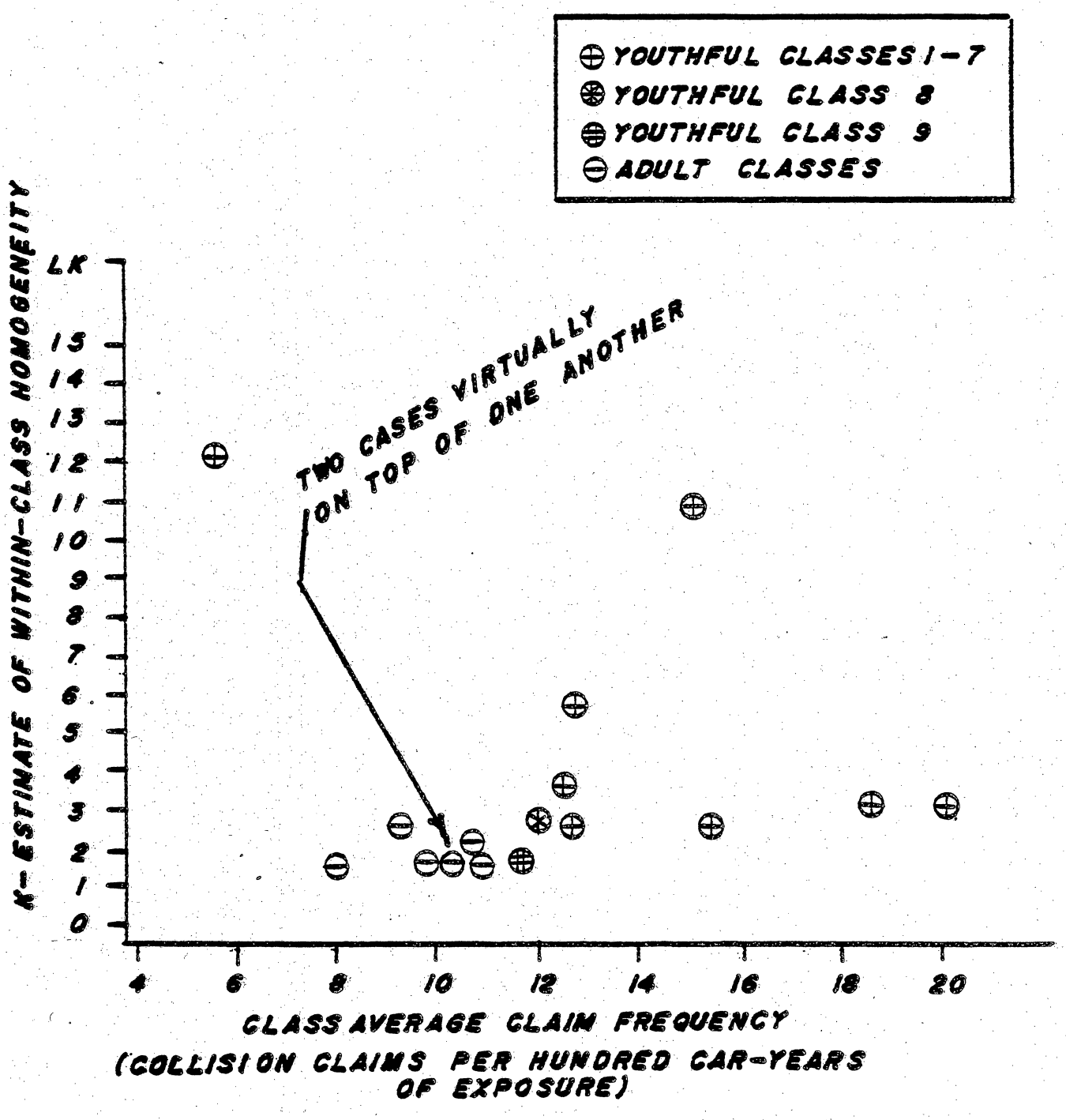


FIGURE A-5

HOMOGENEITY VS CLAIM FREQUENCY RELATIONSHIP
ALLSTATE SEVEN-STATE COLLISION DATA



Any evidence of correlation between class average frequencies and class homogeneity does not suggest that k-values increase systematically across the entire range of claim frequencies. A better formulation of the question is therefore whether certain types of variables identify more homogeneous classes than others. To examine this question further, the sixteen classes can be grouped in a manner similar to that used by Woll. Recall that he placed in his "high" group those New Jersey classes with liability claim frequencies above the statewide average. Driver classes 1 through 7 met this condition and are denoted by the symbol "+" in the homogeneity-frequency graphs for the New Jersey data. On the seven-state data, two additional driver classes have liability claim frequencies above the overall average (6.64 claims per hundred car years of exposure). Driver class 8 comprises single females aged 21-through-24 and had a claim frequency of 7.0; driver class 11 comprises adults who drive to work more than 20 miles or use the car for business and had a claim frequency of 7.1. For the collision coverage, an additional four classes had average claim frequencies somewhat above the seven-state average.

The first eight of the sixteen classes comprise youths--both male and female--under the age of twenty-five. Driver class nine comprises single males aged 25 to 29. The remaining seven classes contain all other adults. In the graphs, driver class 8 is denoted by the symbol "*" and driver class 9 is denoted by the symbol "#".

Within the under-25 classes (the first eight), there is no evidence whatsoever of any correlation between homogeneity and class average frequency. None of the correlation coefficients (whether one uses the product-moment correlation coefficient used by Allstate or

the Spearman rank-order measure) come close to being statistically significant. Similarly, there is no significant correlation between homogeneity and frequency within the adult classes. (Classes 10 through 16 are denoted by the symbol "-" in the graphs). Driver class 9--the 25-29 year old males--seems logically to fall in the middle.

The claim frequency distributions for the sixteen classes can be aggregated into "adult" and "youth" groups before the k-estimates are computed. The results are presented in Table A-5. For the seven-state data, the difference in the k-estimates for youths and adults appear to be significant, or slightly larger than the standard error of the estimate for liability and considerably larger than the standard error of the collision estimate. If only the New Jersey data are used, the k-estimates for youths are not estimated with sufficient precision to permit confidence that the difference is significant (as noted earlier for Woll's "high" and "low" groupings of the New Jersey classes.)

Two conclusions emerge from this analysis. First, there appear to be some consistent differences in degrees of heterogeneity between the youth and adult groups, although the differences may result from the differential effects of the screening process used to control the underlying Table-2 data. Secondly, within the youthful grouping there appears to be no evidence of further correlation between homogeneity and either type of variable or class-average frequency.[110]

Difference in Absolute Heterogeneity Between Classes

The discussion thus far has been limited to whether there are identifiable patterns between the homogeneity of a class and its class average frequency. The question which will have the more sig-

TABLE A-5

HOMOGENEITY ESTIMATES FOR ALLSTATES'S 16 DRIVER CLASSES

Coverage	Group*	Exposures	Class Average Claim Frequency (x 100)	Within-Class K-Values Estimate	Standard*** Error	$\frac{K_y}{K_A}$	$\frac{M_y}{M_A}$	$\frac{(M_y)^2}{(M_A)}$
New Jersey								
Liability	Youths	20,971	9.56	2.12	±0.58			
	Adults	116,738	5.93	1.54	±0.22	1.38	1.61	2.60
	Total	137,709	6.48	1.52	±0.18			
Collision	Youths	12,343	15.34	1.82	±0.37			
	Adults	78,693	10.02	1.62	±0.18	1.12	1.53	2.34
	Total	91,036	10.74	1.55	±0.14			
7-states								
Liability	Youths	139,236	9.30	1.87	±0.19			
	Adults	859,792	6.19	1.61	±0.08	1.16	1.50	2.26
	Total	999,028	6.63	1.56	±0.07			
Collision	Youths	89,662	13.50	2.51	±0.27			
	Adults	620,165	9.31	1.50	±0.06	1.67	1.45	2.10
	Total	709,827	9.84	1.57	±0.06			

*"Youths" consists of Allstate classes 1-9; "Adults" consist of classes 10-16.

**These ratios are youth to adult k-values, youth to adult claim frequencies and youth to adult claim frequencies squared. This latter ratio is how large the k-ratio would have to be in order to imply equal estimated dollar error within youth and adult groups.

***An estimate of the precision of the k-estimate using the formula from D-71, p.2.

nificant impact on the outcome of these proceedings is the question of "differential homogeneity,"[111] that is, whether any variation in k across classes is sufficiently large to equalize the absolute heterogeneity of the classes. On this latter question there can be no doubt at this point. Nothing in the record would support differences in k between high and low groupings great enough to indicate that the groupings are equally heterogeneous in dollar terms.

As previously discussed, in order for two classes to be equally homogeneous in dollar terms the ratio of their respective k-values must equal the square of the ratio of their means. The differences in k-values for high-and-low-frequency groupings suggested by Mr. Woll, even though biased high, do not come close to attaining the degree of spread required to equalize dollar errors.

Each of the differences in k proposed by Mr. Woll based on analysis of Allstate New Jersey data are displayed in Table A-6, with the addition of several columns containing interpretive data. Column (5) indicates the precision of the estimated k-values. Column (6) indicates the ratio of the low- and high-k-estimates. Column (7) indicates the ratio of the means. Column (8) indicates the square of the ratio of the means, or how large the column (6) ratio would have to be in order for the higher- and lower-rated groups to reflect the same dollar heterogeneity. Similar comparisons for the Department's estimates of k for Allstate's youth and adult groups are included in Table A-5, supra.

The k-estimates at the bottom of Table A-6 (below) reflect Woll's estimates of the homogeneity of Allstate's 16 driver classes after further refinement by a hypothetical merit rating plan. Although

TABLE A-6

WOLL HOMOGENEITY ESTIMATES FOR ALLSTATE'S 16 DRIVER CLASSES AND HYPOTHETICAL SUBDIVISIONS

Coverage	Group*	New Jersey Exposures	Class Average Claim Frequency (x 100)	Within-Subgroup k-Values Estimate	Within-Subgroup k-Values Standard*** Error	$\frac{K_h}{K_L}$	$\frac{M_h}{M_L}$	$\frac{(M_h)^2}{(M_L)}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High/Low Split by Woll								
Liability	High	16,835	10.44	2.39	±0.74			
	Low	120,874	5.93	1.55	±0.22	1.54	1.76	3.10
	Total	137,709	6.48	1.52	±0.18			
Collision	High	9,634	16.09	2.00	±0.44			
	Low	81,402	10.10	1.61	±0.08			
	Total	91,036	10.74	1.55	±0.14			
High/Low Extrapolations by Woll								
Liability	High	+	10.44	4.39	?			
	Low	+	5.93	1.88	?	2.33	1.76	3.10
	Total	137,709	6.48	2.30	?			
Collision	High	+	16.09	3.40	?			
	Low	+	10.10	2.21	?	1.54	1.59	2.53
	Total	91,036	10.74	2.41	?			

*The "High" group comprise Allstate classes 1-7; "Low" includes 8-16.

**These ratios are youth to adult k-values, youth to adult claim frequencies and youth to adult claim frequencies squared. This latter ratio is how large the k-ratio would have to be in order to imply equal estimated dollar error within youth and adult groups.

***An estimate of the precision of the k-estimate using the formula from D-71, p. 2.

+The basic driver classes in each group are split into hypothetical merit rating subgroups. The exposures for each subclass combine to equal same overall total as shown here.

the estimates are biased high, as explained earlier, the k-ratios are still not large enough to equalize dollar errors. Furthermore, even if the differences in average k between groupings were of sufficient magnitude to equalize the (average) absolute heterogeneity of the groupings, substantial disparities between classes within each grouping would remain.

Nonetheless, final resolution of the theoretical and methodological issues discussed at length in testimony is not necessary to arrive at reasonable conclusions. The fact that gray areas exist is conceded by all. As Dr. Ferreira observed:

> "My own belief is that k's do vary across classes, but that what variation there is is of second order of importance and can't be detected, at least with these kinds of sample sizes, and I am not sure that there is a systematic variation between k and claim frequencies . . . Indeed, in the SRI report . . . we have the suggestion that k might increase somewhat with claim frequency, although not at a fast enough rate to indicate the constant homogeneity in dollar terms, but possible increase homogeneity in percentage terms with the higher rated classes."[112]

Dr. Pratt suggested two extreme cases which might be considered reasonable:

> "Let me put it in terms of the variance. If the variance goes like the square of the mean, that seems to be about as fast as you would expect it to go up. If the variance goes up like the mean, that's about as slow as you would expect it to go up. In either case you are going to have greater heterogeneity in the higher-rated classes."[113]

The two cases correspond to situations in which k is constant across classes or increases in proportion to the class mean. The conceptual underpinnings of the heterogeneity estimates suggested by Ferreira would therefore appear reasonable. The only reasonable debate goes to questions of degree and choices of numbers.

Ferreira's estimates of within-class heterogeneity are in fact conservative. The careful screening of the data used to make these estimates tend if anything to understate both overall heterogeneity and differential heterogeneity. The observations of Dr. Pratt are again helpful:

> "[T]he extreme cases that might be eliminated by the kind of careful control of the samples that he [Ferreira] used . . . would tend to be at least as much in high-rated classes as in low-rated classes and that . . . he would be understating somewhat the differential heterogeneity rather than overstating it."[114]

Pratt explains that Ferreira's estimates are further likely to understate differential heterogeneity because "the uncertainty about the true means in the extreme cells" is not factored into the analysis.[115] Credibility problems are especially severe and pure premiums are least accurately estimated in the highest-rated classes. The dollar errors which result from the inherent heterogeneity of youthful classes compounded by inaccurately estimated class means is likely to be much worse than the k-estimates suggest.

On the need for further research, as suggested by company witnesses, there can be no doubt. Fairness to individuals can only be served by further investigation of the variability of systematic risks among individuals. However, meaningful steps forward should not be deferred until the last word is heard on this subject, if that unlikely day ever comes. The call for further research in this area is not new. The industry's own consultants made a similar suggestion in the 1976 SRI Report; but, short of the work done in connection with this hearing, there has been no discernible progress to date.

The diversity of individuals within the broad types of risk classes used in the current system comports with logic and ordinary

daily experience. It is the necessary function of the numerous problems of definition and consistency of interpretation inherent in the current plans. Recognition of this inevitable diversity, coupled with the fundamental soundness of the compound Poisson methodology, and the consequences of failing to pay heed to the extent of imperfections in the current system, do not permit resolving methodological uncertainity in favor of the status quo.

Selection of different k-values to describe the heterogeneity of New Jersey classes may alter the specific picture in small degrees but hardly enough to alter the conclusion that most variations in risk are unexplained by classification. The classifications in use in New Jersey reflect the kind of heterogeneity illustrated in Figure 3 of the Standards of Evaluation. They bear no resemblance to the picture of near-homogeneity in Figure 4.

2. The Question of Overlap

A final conceptual issue concerns the extent to which the gamma Poisson model is appropriate for estimating overlap between classes. State Farm contents that the model can lead to misleading results in certain extreme circumstances. The discussion has reference to the type of overlap in Figure 3 of the Standards of Evaluation, which utilizes gamma distributions.

State Farm's effort to invalidate the gamma Poisson model in this respect is technically flawed.[116] As subsequently demonstrated in testimony, the hypothetical risk distribution posited by State Farm actually reflects a picture of overlap no different than that produced by gamma functions fitted to the same hypothetical data. In addition, no other model was suggested which would yield either a more accurate picture or a substantially different picture of overlap.

Nonetheless, the challenge by State Farm serves to place the overlap issue in its proper context. The critical issue in these proceedings concerns the relative homogeneity of rating classifications. Overlap estimates merely dramatize the anomalies of class-average pricing and the related problem of overcharges and undercharges. It is theoretically possible that in some extreme cases heterogeneous classes would not overlap; but the absence of overlap in even these cases would not diminish the significance of the within-class heterogeneity itself.[117]

Finally, the fact that there is substantial overlap between classifications currently used in New Jersey is confirmed even by the crude class-average data analyzed earlier. Overlap, like heterogeneity, is not revealed for the first time through the gamma Poisson analysis. Both deficiencies of current classifications are made inevitable by the elusive nature of driver personality traits sought to be classified, by definitional problems, and by an assortment of structural difficulties. The formal analysis of within-class risk variation serves only to convert the notion of heterogeneity to quantitative estimates which provide a specific sense of comparative degrees of imperfection between classes. The analysis also provides quantitative information which can be used to fine tune the pricing of classifications in an effort to minimize the adverse impact of pricing errors. To the extent that graphical pictures of homogeneity and overlap are helpful in explaining the effects of classification, the gamma distribution remains the most plausible choice yet presented.

F. Illustrative Insurance Premiums and Homogeneity Estimates

The discussion of homogeneity can be translated into specific examples of the accuracy of insurance premiums presently being charged

in New Jersey. Table A-7 displays the current ISO premiums for each of the major coverages charged to single-car, voluntary market insureds in each New Jersey territory who qualify for the base class--"all other" adult risks who use the car for pleasure only and have "clean" driving records.[118] The premium for an insured in another driver class would equal the base premium for the applicable territory (less the flat "policy constant" allowed in the rates as of November 18, 1980) times the sum of the applicable primary and secondary rating factors (plus the flat "policy constant"). The one exception is personal injury protection coverage where driver class factors are applicable to senior citizens only. (The senior citizen discount is 50 per cent in this case.)

To simplify the illustration, insureds within any particular risk class are assumed to have different risks only to the extent that they have different claim-frequency likelihoods. (Added heterogeneity differences due to claim severities are not considered.) In addition, the expenses and class average claim costs attributed to each risk class are assumed to be accurately estimated. The heterogeneity described earlier in terms of k-values is the only source of unexplained variation that remains within class-by-territory subcells.

These assumptions produce an illustrative but exaggerated picture of classification accuracy. Insureds within a particular class are probably not equally likely to have minor and major accidents and they do not necessarily generate the same acquisition or general expense costs. Moreover, current ISO rates use nationwide classification relativities and assume a multiplicative combination of class and territory relativities. The evidence suggests that neither practice

TABLE A-7

ISO BASE PREMIUMS FOR NEW JERSEY TERRITORIES

Territory	BI	PIP	PD	Collision	Comprehensive
1	135.	94.	79.	171.	76.
2	177.	141.	110.	229.	97.
3	85.	65.	64.	130.	45.
4	95.	74.	62.	126.	44.
5	92.	76.	58.	140.	55.
6	90.	76.	63.	113.	40.
7	151.	109.	72.	151.	77.
8	114.	90.	56.	118.	40.
10	85.	76.	62.	124.	32.
11	93.	69.	64.	128.	41.
12	111.	71.	65.	116.	51.
13	128.	100.	59.	126.	54.
14	97.	97.	56.	110.	41.
15	79.	70.	53.	102.	32.
16	98.	81.	61.	117.	36.
17	97.	81.	61.	119.	34.
19	126.	105.	76.	135.	49.
22	87.	81.	65.	142.	50.
23	103.	66.	64.	127.	46.
24	89.	85.	59.	118.	32.
25	73.	82.	54.	110.	32.
26	78.	106.	51.	114.	35.
27	96.	97.	54.	108.	39.
31	87.	74.	65.	125.	37.
38	120.	112.	77.	163.	56.
39	73.	60.	59.	114.	34.
40	86.	74.	55.	108.	34.
Statewide	94.	83.	61.	119.	39.

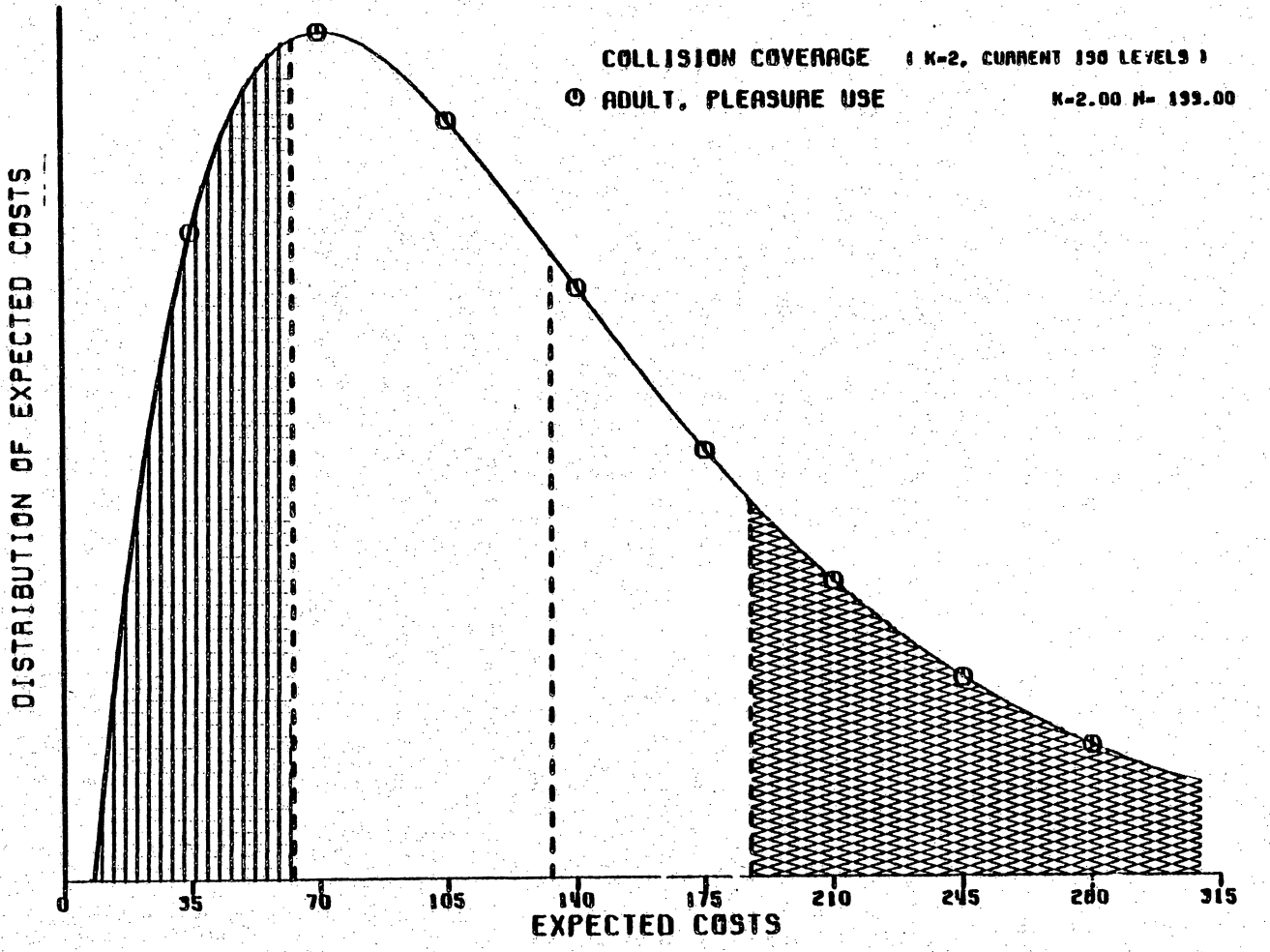
accurately reflects New Jersey experience and both practices lead to a wider spread in class by territory relativities than is indicated by the data. The examples will, nevertheless, provide an estimate of the accuracy implied by the current rating practices in the best of all possible circumstances.

Gamma distributions will be used to provide graphical illustrations of the mixture of high and low risks within classes. Because insureds are presumed to differ only with respect to likelihoods, these distributions can be scaled up by severity factors and expense, tax and profit loadings to portray the mixture of premiums which would be charged to the individuals in the class if each individual's expected costs (or ideal premium) were known with perfect accuracy.[119]

An example will clarify the procedure. Suppose the heterogeneity of those single-car insureds who qualify for the base class and who reside in territory 31 (Newark Suburban) were characterized by a "little k" value of 2.0 for collision coverage. The applicable premium for collision coverage, assuming a 1980 Chevette, an eight-dollar policy constant, and $200 deductible coverage, is $125 (as reflected in Table A-7). The graphical picture of the accuracy of this $125 premium is Figure A-6. The height above the horizontal axis for any particular premium level indicates the relative fraction of all insureds in the group whose inherent risk warrants the specified premium level.[120] The class is substantially heterogeneous. For example, 43 per cent of the insureds have expected costs at least 50 per cent above or below the premium actually charged.[121]

Similar graphs can be drawn for the other coverages and for other class and territory combinations. However, all insureds must

FIGURE A6


COLLISION COVERAGE (K=2, CURRENT 198 LEVELS)
ADULT, PLEASURE USE
K=2.00 N= 199.00
DISTRIBUTION OF EXPECTED COSTS
0
35
70
105
140
175
210
245
280
315
EXPECTED COSTS

purchase at least the compulsory coverages and many insureds purchase full coverage. Rather than draw graphs for each coverage, it will be simpler and more meaningful to examine the levels of accuracy associated with aggregated premiums for typical packages of coverages. In order to draw graphs for these typical coverages it is necessary to decide how k-values for each coverage ought to be aggregated across coverages. It is also necessary to resolve which k-values are to be assumed for each coverage.

Tables A-8 through A-11 summarize the various k-values to be used for each coverage and classification cell. The estimates are developed for ISO driver classifications from hearing testimony using techniques discussed earlier. The results for other companies are expected to be similar, as discussed further below. Table A-8 develops k-estimates for insureds who have been divided into ISO's 4,340 primary and secondary driver classes (for single-car policies). The estimates begin with the Allstate" Big-K" values in the second column.[122] Combining the adjusted normalized claim count variances in the third column, assuming that within-class k-values are constant across classes yields the within-class k-estimates given in the fourth column and the explanatory power estimates in the fifth column.[123]

Table A-9 combines the effects of territory and driver classification. Again, k-values are assumed to be constant across class-within-territory cells. In the fifth column conservative normalized variance estimates are combined with the within-class k-estimates from Table A-8 to produce "little k" estimates of class-within-territory heterogeneity.[124] The sixth column indicates the implied explanatory power of classes and territories combined.

TABLE A-8

HETEROGENEITY OF DRIVER CLASSES -- EQUAL K ASSUMPTION

Coverage (1)	Population K (2)	Between Class Variance (3)	Within-Class K (4)	Explanatory Power of Classes (5)
Compulsory (all liability)	1.52	.102	2.01	16.3%
Collision	1.56	.099	2.03	15.5%
Comprehensive	0.83	.111	1.02	9.4%
Full Coverage	1.53	-	2.02	16.2%

Notes:

Column (2): Allstate, single car New Jersey policies (A-17) for compulsory and collision coverages; Massachusetts single car policies (D-66) for comprehensive. Full coverage K is a premium-weighted average of the square-root of (1/k) for compulsory and collision coverages (see text)

Column (3): ISO adjusted, normalized claim count variance for single car policies using 4,340 primary and secondary driver classes (D-86).

Column (4): Within-class homogeneity measure derived from columns (1) and (2) assuming equal K values across classes (for formula see D-66 p.3). Full coverage value is derived from compulsory and collision results as explained in column (2) note.

Column (5): 100 x column (2) x column (3); Full coverage value is derived from K value in columns (2) and (4) using D-66 p.3 formula.

TABLE A-9

CLASS WITHIN TERRITORY HOMOGENEITY -- EQUAL K CASE

Coverage (1)	Population K (2)	Within Class K (3)	Between Territory Variance (4)	Little k (Class by Terr.) (5)	Overall Explanatory Power (6)
Compulsory (all liability)	1.52	2.01	.025	2.17	20.5%
Collision	1.56	2.03	.044	2.33	23.1%
Comprehensive	0.83	1.02	.027	1.08	12.0%
Full Coverage	1.53	2.02	-	2.22	21.4%

Notes:

Columns (2) and (3): Figures from columns (2) and (4) of Table A-8.

Column (4): Maximum of ISO/NAII normalized pure premium variances from D-68 and State Farm adjusted normalized claim count variance from D-91.

Column (5): Within-Class homogeneity measure derived from columns (3) and (4) using D-66, p. 3 formula with equal k assumption. Full coverage value is derived from compulsory and collision in Table A-8.

Column (6): 100 x column (3) x column (4); full coverage value derived from columns (3) and (5).

Table A-10 and A-11 are similar in content to Tables A-8 and A-9 but they allow different homogeneity measures for youth and adult classes. (As explained earlier, it is possible that homogeneity estimates differ systematically between youth and adult classes. The possible difference is described as "split k.") The estimates in the Tables assume youths, as a group, and adults, as a group, have homogeneities characterized by k-values which are proportional to group-average claim frequencies.

ISO Table I data for 1975-1977 provide exposure and claim frequency data for ISO's adult classes combined and for ISO's youth classes combined.[125] The adjusted normalized claim count variances which result from splitting all drivers into either the adult or youth group are displayed in the third column of Table A-10. In the fifth column of the Table these variances are combined with the "Big K" estimates in the second column to produce separate "Group K" estimates for youths and adults.[126] The seventh column displays normalized variances after each group is split into individual driver classes--300 classes in the case of adults and 4,040 classes in the case of youths. In the ninth column these variances are combined with the Group K's in column 5 to produce separate "little k" estimates for youths and adults after classification.[127]

Column 8 of Table A-10 sets forth implied explanatory power estimates. These estimates indicate the percentages explained by subdividing the youth and adult groups into 4,040 and 300 classes, respectively. For example, the 21.8 per cent figure for youths in the case of collision coverage indicates that the 4,040 youth classes explain 21.8 per cent of all that there is to explain about differences

TABLE A-10

"SPLIT K" HOMOGENEITY ESTIMATES FOR ISO CLASSES

Coverage (1)	"Big" K (2)	Effect of Adult/Youth Split: Variance (3)	% Explained (4)	Group K (5)	Group (6)	Effect of Subdividing Adult/Youth Groups: Variance (7)	% Explained (8)	"Little" k (9)
All Liability Combined	1.52	0.0182	2.8%	2.000	Youth	0.130	26.0%	3.05
				1.464	Adult	0.059	8.6%	1.70
Collision	1.56	0.0342	5.3%	2.318	Youth	0.094	21.8%	3.24
				1.510	Adult	0.046	6.9%	1.70
Comprehensive	0.83	0.0270	2.2%	1.149	Youth	0.073	8.4%	1.35
				0.784	Adult	0.086	6.7%	0.91

Notes:

Column (2): Figures from column (2) of Table A-8.

Column (3): ISO adjusted normalized claim count variances between average of 300 adult classes and 4,040 youthful classes (derived from computer run on ISO data part of which is shown in D-89)

Column (4): 100 x column (2) and column (3).

Column (5): Implied within-group homogeneity derived from columns (2) and (3) assuming K's for adult and youth groups are proportional to the group's claim frequency.

Column (6): ISO definition of youthful vs. non-youthful classes (D-67A)

Column (7): Adjusted normalized claim count variance derived from computer run on ISO data part of which is shown in D-89.

Column (8): 100 x column (5) x column (7); percent of variation within youth or adult group that is explained by the 4,040 youthful classes and 300 adult classes.

Column (9): Within class homogeneity measure derived from columns (5) and (7) using D-66, p. 3 formula assuming one k value for youthful classes and another for adult classes.

TABLE A-11

CLASS WITHIN TERRITORY HOMOGENEITY ESTIMATES FOR ISO -- SPLIT-K CASE

Coverage (1)	Group (2)	Little k (Within Classes) (3)	Variance (Territories) (4)	Little k (Class by Terr.) (5)	Explanatory Power of Classes and Territories (by Group) (6)
Compulsory (all liability combined)	Youth	3.05	.025	3.38	31.5%
	Adult	1.70	.025	1.82	12.6%
Collision	Youth	3.24	.044	3.94	32.8%
	Adult	1.70	.044	1.92	14.0%
Comprehensive	Youth	1.35	.027	1.44	11.9%
	Adult	0.91	.027	0.96	9.0%
Full Coverage	Youth	3.11	-	3.54	33.9%
	Adult	1.70	-	1.85	13.5%

Notes:

Columns (2) and (3): Within-class K values from columns (6) and (9) in Table A-10. Full coverage values K are premium-weighted average of the square-root of (1/k) for compulsory and collision coverages (see text)

Column (4): Maximum of ISO/NAII normalized pure premium variances from D-68 and State Farm adjusted normalized claim count variances from D-91.

Column (5): Within class by territory homogeneity measure derived from columns (3) and (4) using D-66, p. 3 formula using one K value for youthful subgroupins and another for adult classes. Full coverage values computed as in column (3).

Column (6): Percent of variation within youth or adult group that is explained 4,040 youthful classes and 300 adult classes within each of 27 territories. Derived from columns (5) of Table A-10 and column (6) in this Table using D-66, p. 3 formula.

in claim likelihood among youths. Table A-11 translates the "split-k" estimates for driver classes from Table A-10 into split-k estimates for class-within-territory subcells. The procedure is the same as in the equal-k analysis in Table A-9.[128]

Hearing evidence provides separate estimates of homogeneity for all liability coverages combined, for collision coverage and for comprehensive coverage. The k-values for the combined liability coverages provide an estimate of accuracy for the most basic package of insurance--the minimum coverage required by law. Developing a comparable estimate for full coverage, that is, compulsory coverages plus collision and comprehensive, requires assumptions about the extent to which insureds are consistently better or worse risks than the average for their class across all coverages. A plausible assumption is that the ranking of high to low risks within a class does not change from one coverage to the next. In such a case, the k-estimate for a package of coverages is the premium weighted average of the typical pricing errors for each coverage.[129] However, to assure that the accuracy of premiums is not underestimated, a more conservative assumption will be adopted. The full coverage k-estimates will be developed from the collision and compulsory k-estimates only. While the comprehensive premiums are the smallest of the coverage groups, corresponding k-estimates reflect considerable heterogeneity and including them in the weighted average would reduce the full-coverage k's. Since there is some question as to whether the ranking of high and low risks within a class is the same for comprehensive as it is for the other accident-related coverages, this omission of comprehensive coverage in the average is reasonable. The various k-estimates

for the full coverage package in Tables A-8 through A-11 were computed in this manner.

If homogeneity estimates are assumed to differ between youth and adult classes, the estimated homogeneity of the youth class is substantially higher than under an equal-k assumption. Under this split-k assumption the within-class k's for youths are as high as 3.24 (for collision coverage). After subdivision by territories, this estimate increases to 3.94. Because the homogeneity estimates for the compulsory coverages are slightly lower, the estimate of k for the full coverage package, after subdivision by all classes and territories, is 3.54 for youths and 1.85 for adults.

Although these split-k estimates of homogeneity were developed for ISO, the "little k" estimates for other companies, after subdivision by class and territory, are expected to be in the same 2 to 4 range. Either the absence of appropriate data or sample size problems prevents direct estimation of comparable split-k estimates for most other companies. However, the Allstate data used to estimate population k values for liability and collision coverages can be used as a starting point for developing split-k estimates for Allstate's youth and adult classes. A range of estimates are possible depending upon which classes are considered to have the higher k-values and whether the New Jersey or the seven-state data are used. Two different split-k estimates are presented in Table A-12.

The top half of the table uses New Jersey data and Mr. Woll's choice of only the first seven Allstate driver classes, for the higher-k group. The bottom half of the table uses the combined seven-state data and places all nine youthful classes in the group with higher k-estimates. Each set of estimates will be discussed in order.[130]

TABLE A-12

HOMOGENEITY OF ALLSTATE CLASSES AND TERRITORIES

Coverage (1)	Group (2)	K-estimate for Group (3)	Variance within Primary Classes (4)	K-estimate within group (5)	Variance within all ISO Classes and Territories (6)	Residual Variance (6) - (4) (7)	"Little-K" Estimate (8)	Explanatory Power (9)
Woll's division of Allstate New Jersey Classes								
All Liability (compulsory)	High	2.39	.0839	3.24	.155	.0711	4.51	38.5%
	Low	1.55	.0025	1.56	.084	.0825	1.93	13.1%
Collision	High	2.00	.0192	2.12	.138	.1188	3.17	28.1%
	Low	1.61	.0140	1.67	.090	.0760	2.06	14.7%
Full Coverage	High	2.26	-	2.81	-	-	4.01	34.9%
	Low	1.57	-	1.59	-	-	1.97	13.5%
Youth/Adult Split of Allstate Classes (Seven States)								
All Liability (Compulsory)	Youth	1.87	.1179	2.68	.155	.0371	3.09	29.8%
	Adult	1.61	.0026	1.62	.084	.0814	2.02	13.6%
Collision	Youth	2.51	.0367	2.87	.138	.1013	4.46	35.7%
	Adult	1.50	.0111	1.54	.090	.0789	1.89	13.5%
Full Coverage	Youth	2.04	-	2.74	-	-	3.27	28.8%
	Adult	1.57	-	1.59	-	-	1.98	13.8%

Woll's estimates for high and low groups result in youth/adult Group-K estimates of 2.39/1.55 for the liability coverages and 2.00/ 1.61 for collision, as displayed in column 3 of Table A-12. Column 4 provides between-class normalized claim-count variances for each group after it is divided into individual classes. Woll's estimates of within-class homogeneity for classes in each group are set forth in column 5.[131]

Because the Allstate data were not provided in full detail, extrapolation beyond the column-5 estimates requires further assumptions. The assumption made earlier for Allstate equal-k estimates was that the entire array of Allstate classes explain no more of the variance among drivers than do the 4,340 ISO driver classes. This assumption is at least equally valid in deriving split K's.[132]

Column 6 of Table A-12 reflects the combined variances of ISO classes and territories in full detail. The differences between these ISO variances and the amounts explained by Allstate's primary classes within high/low groups in column 4 are the amounts which can be assumed to be explained by the remaining Allstate classes and territories. These differences yield the "residual variances" in column 7. Column 8 combines these residual variances and k-estimates for classes within each group, as displayed in column 5, to produce little-k and explanatory power estimates for Allstate classes and territories in full detail. These estimates are set forth in columns 8 and 9, respectively.

The bottom half of Table A-12 presents comparable estimates for the seven-state data. The Woll and seven-state estimates are similar. Woll finds more homogeneity in the high-rated liability

NOTES TO TABLE A-12

Column (2): The "High" group comprises Allstate's driver classes 1-7.
The "Low" group comprises Allstate's driver classes 8-16.
The "youth" group comprises Allstate's driver classes 1-9.
The "adult" group comprises Allstate's driver classes 10-16.

Column (3): Implied group homogeneity from Tables A-5 and A-6.

Column (4): Unadjusted normalization claim count variance from exposure and claim frequency of each group of driver classes given in Table A-5 and A-6.

Column (5): Implied within group homogeneity after classification by the primary driver classes. Derived from columns (3) and (4) using D-66, p. 3 formula with the equal k assumptions.

Column (6): Adjusted normalized claim count variance of ISO's 4,040 youth classes and 300 adult classes combined with 27 territories (derived from column (7) of Table A-10 and column (4) of Table A-11.

Column (8): Implied homogeneity measures after all Allstate classes and territories. Derived from columns (5) and (7) using D-66, p. 3 formula with the equal k assumptions.

Column (9): Estimated percent of variation within each youth/adult or high/low group explained by all Allstate classes and territories derived from columns (3) and (8).

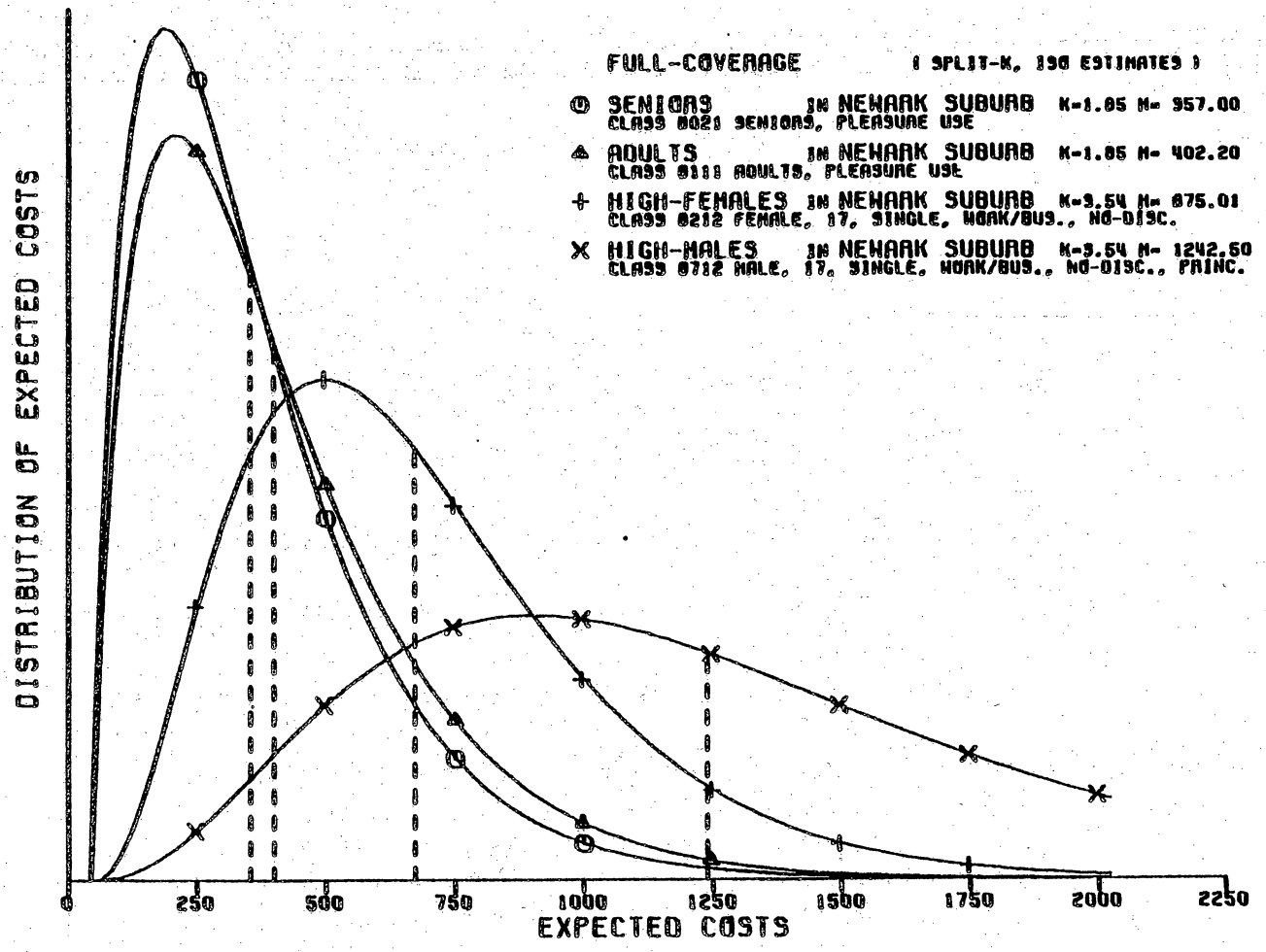
classes and the seven-state estimates find correspondingly higher k's in the high-rated collision classes. The latter finding is the likely since it is based on the more reliable data and is similar to the Massachusetts results in which collision coverage was the most homogeneous. Note that the full-coverage k-estimate for youths in the ISO case falls in-between the Allstate estimates using the Woll and the seven-state analyses.

These estimates for Allstate do not change the impression of classification accuracy from that obtained using the ISO estimates. The illustrations of classification accuracy discussed below rely on the ISO estimates under both equal-k and split-k assumptions. These estimates are preferable because they are derived from the largest and most detailed body of data available. Nevertheless, the above Allstate analysis suggests that the picture of inaccuracy reflected in the ISO graphs is applicable to all companies. Differences in estimated homogeneity of the degree found in the above comparisons of ISO and Allstate estimates do not alter the basic conclusion that rating classes are heterogeneous.

G. Illustrating the Heterogeneity of Driver Rating Classes

Using these estimates developed from hearing evidence it is now possible to illustrate the accuracy of individual class-within-territory classification cells for typical coverage packages. One such graph is shown in Figure A-7, relating to single-car, voluntary market policyholders purchasing the full coverage package and residing in the Newark Suburban territory. Four driver classes are compared: senior citizens and adults who use the insured vehicle only for pleasure, and youths who match the characteristics of ISO's highest-rated female and male classes.[133]

FIGURE A7


FULL-COVERAGE (SPLIT-K, 190 ESTIMATES)
SENIORS IN NEWARK SUBURB K=1.85 M= 957.00
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK SUBURB K=1.85 M= 402.20
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK SUBURB K=3.54 M= 875.01
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK SUBURB K=3.54 M= 1242.50
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
250
500
750
1000
1250
1500
1750
2000
2250
EXPECTED COSTS

Although these class-within-territory groups represent only four of the 117,180 possible combinations for single-car policies, the lack of homogeneity is striking. This heterogeneity persists even in the graphs reflecting the split-k assumption, where the highest rated male and female classes are as homogeneous as can reasonably be expected for a typical classification cell.[134] The area under any portion of the curves indicates the fraction of insureds in the particular classification cell who have expected losses in the specified range. Illustrative areas have been computed to estimate the extent of overlap among the four classification cells as reflected in Table A-13.

Since each of the distributions are skewed to the right, somewhat more than half the insureds in each class are estimated to have expected losses below their class average. For the senior citizens and adults the estimate is 59%; for the youths it is 57%. There is little overlap between the lowest-rated seniors and the highest-rated single males. Nevertheless, 3.5% of the highest-rated males are predicted to have expected losses less than the class average for the seniors ($315 in this case); and 0.5% of the seniors are predicted to have expected losses greater than the class average for the high-rated males ($1200). The overlaps among other pairs of classes are much higher. For example, 18% of the high-rated males are predicted to have expected losses below the class average for the high-rated females; and 6.5% of these high-rated females are predicted to have expected losses above the class average for the high-rated males. Fully 21% of the high-rated females are predicted to have expected losses below the class average for the adults.

These overlap estimates indicate that only a few percent of the highest-rated males are predicted to be better risks than the typical adult or senior citizen in the same territory. Likewise less than a per cent of the adults and senior citizens are predicted to be worse risks than the typical highest-rated male in the same territory. But these comparisons indicate only the most extreme of overlaps. Another way to interpret the curves is to examine the per cent of insureds in one class who are better risks than the worst risks in another class. For example, in Figure A-7, 20 per cent of the adults are estimated to have expected costs in excess of $587. Fully 46 per cent of the highest-rated females and 13 per cent of the highest-rated males are predicted to have expected costs that are less than $587 per year. Moreover, the heterogeneity of the high-rated classes is substantial in dollar terms--regardless of the extent of overlap with other classes. Fully 37 per cent of the highest-rated males are estimated to be overcharged by more than $300 and 23 per cent by more than $500. These overlap and heterogeneity comparisons are summarized in Table A-13.

A comparison of the same classes but this time in Newark is shown in Figure A-8. Since a multiplicative model is assumed in developing the current ISO premiums from class and territory data, the overlap estimates are the same for any pair of classes as they were for the Figure A-7 graphs for the Newark Suburban territory, but the dollar overcharges and undercharges are now much larger. Within the high-rated male class, 48% are overcharged by $300 and 41% are overcharged by more than $500. The corresponding graphs for a low-rated territory--Plainfield--is shown in Figure A-9.[135]

TABLE A-13

OVERCHARGES AND OVERLAPS FOR FOUR ILLUSTRATIVE CLASSES

ISO Class*	Homogeneity (K-Value)	Premium For Full Coverage	Overlap Results: Estimated Percent with Expected Costs Below the Average for Class 8021	Class 8111	Class 8212	Class 8712	Below Worst 20% of Adults (Class 8111)	Overcharge Results: Estimated Percent Overcharged by More than $300	$500
Figure A-7: Full-Coverage, Split-K Estimates for "Newark Suburban" Territory									
8021--Seniors	1.85	$ 357	59.8%	66.7%	90.4%	99.5%	85%	0.6%	0.0%
8111--Adults	1.85	402	52.8	59.8	86.0	98.8	80	5.5	0.0
8212--High Female	3.54	675	16.1	21.6	57.1	93.5	46	18.3	1.6
8712--High Male	3.54	1,242	3.1	4.5	18.3	57.1	13	36.9	22.8
Figure A-9: Full-Coverage, Split-K Estimates for "Plainfield" Territory									
8021--Seniors	1.85	316	59.8	66.7	90.4	99.5	85	0.0	0.0
8111--Adults	1.85	352	52.8	59.8	86.0	98.8	80	0.3	0.0
8212--High Female	3.54	593	16.1	21.7	57.1	93.5	46	13.1	0.1
8712--High Male	3.54	1,092	3.1	4.5	18.3	57.1	13	33.8	18.1
Figure A-8: Full-Coverage, Split-K Estimates for "Newark" Territory									
8021--Seniors	1.85	690	59.8	66.7	90.4	99.5	85	30.5	8.8
8111--Adults	1.85	783	52.8	59.8	86.0	98.8	80	34.7	15.3
8212--High Female	3.54	1,343	16.1	21.7	57.1	93.5	46	38.6	25.5
8712--High Male	3.54	2,510	3.1	4.5	18.3	57.1	13	47.7	40.9
Figure A-13: Full-Coverage, Equal-K Estimates for "Newark" Territory									
8021--Seniors	2.22	690	58.9	66.6	91.7	99.7	86	27.3	6.3
8111--Adults	2.22	783	51.2	58.9	87.3	99.3	80	31.6	12.1
8212--High Female	2.22	1,343	24.3	29.7	58.9	90.0	49	44.3	33.2
8712--High Male	2.22	2,510	8.2	10.5	26.5	58.9	20	51.6	46.2

FIGURE A8

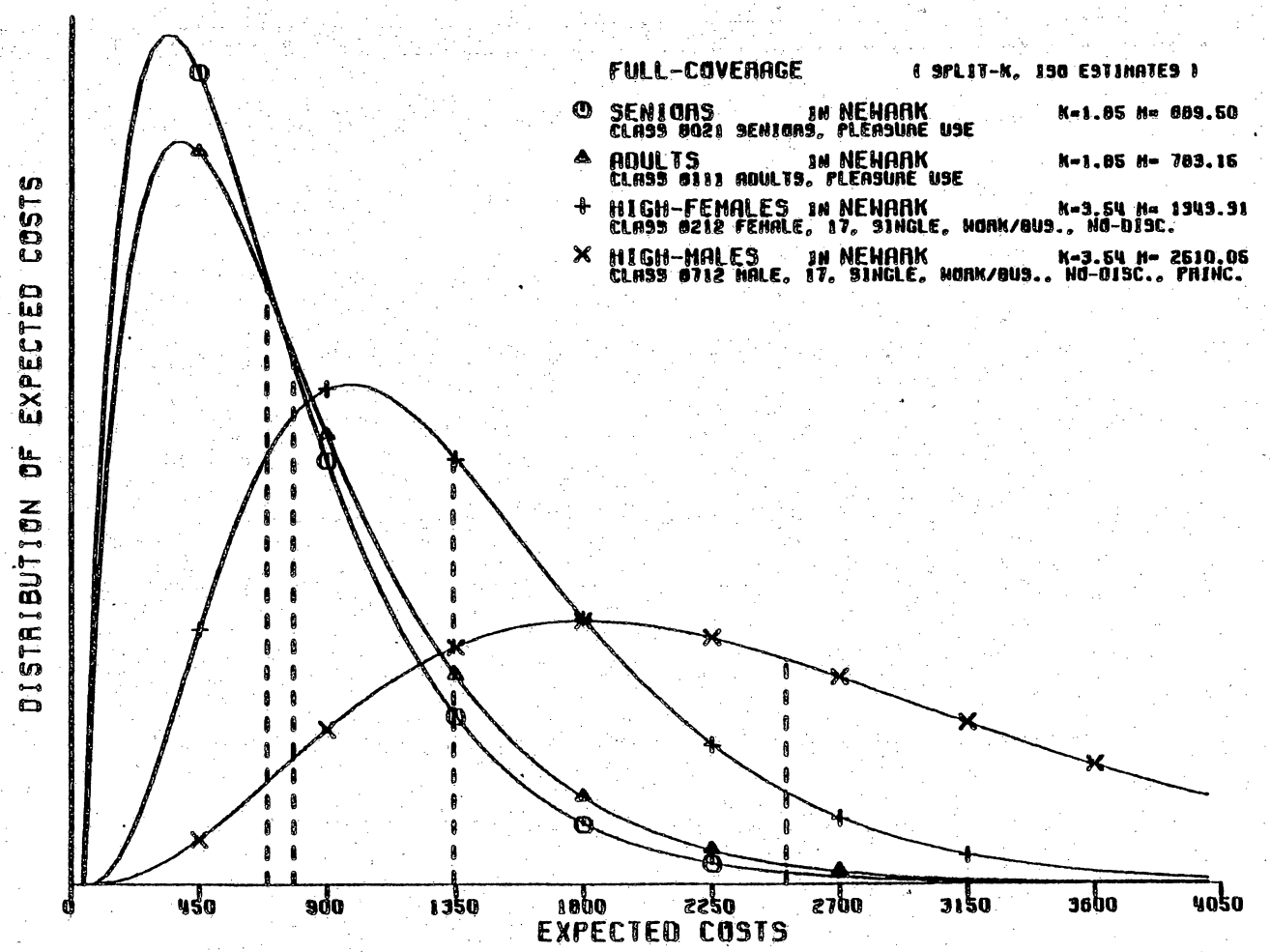
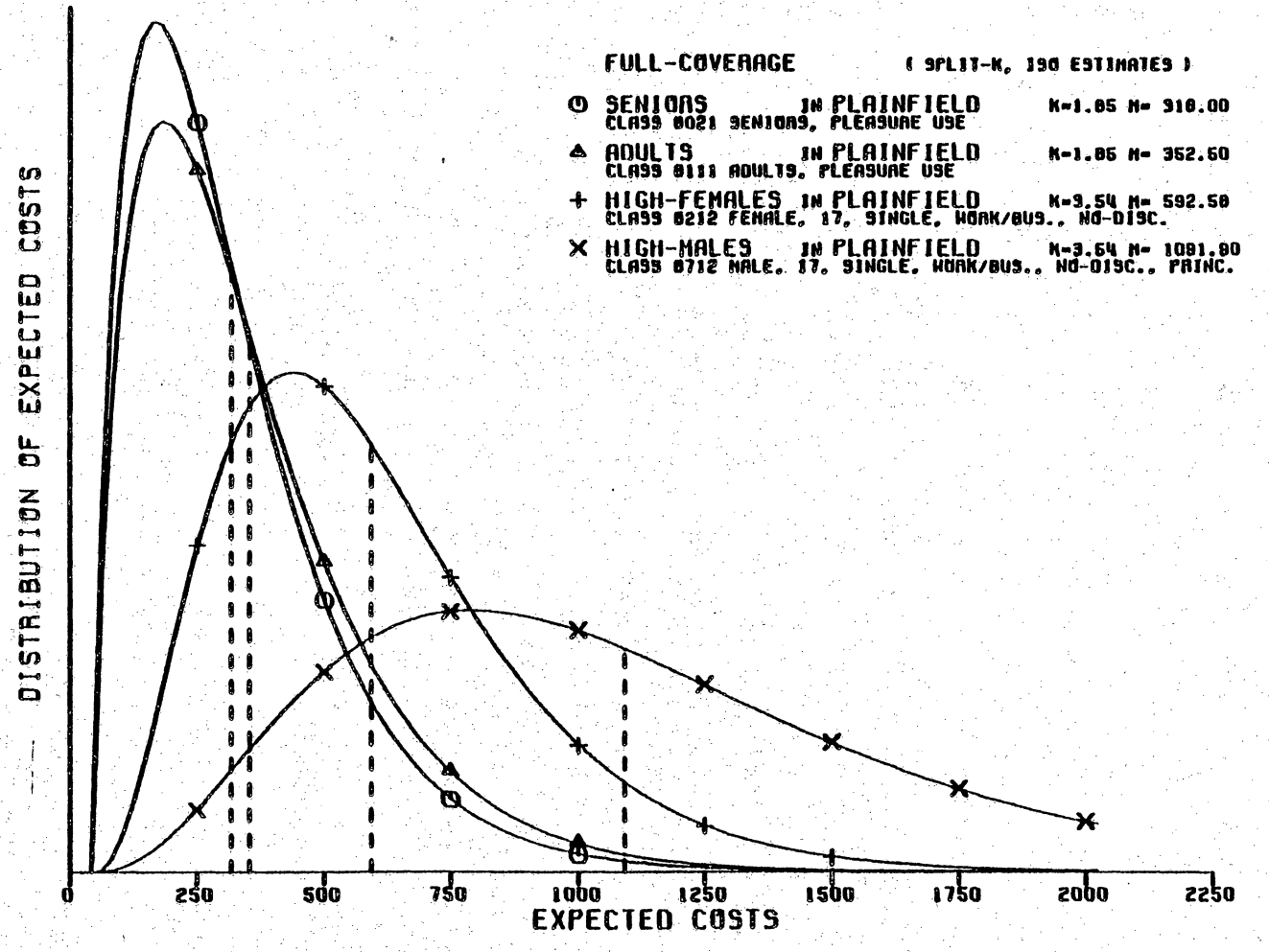

FULL-COVERAGE (SPLIT-K, ISO ESTIMATES)
SENIORS IN NEWARK K=1.85 M= 889.50
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK K=1.85 M= 783.16
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK K=3.54 M= 1349.91
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK K=3.54 M= 2610.06
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

FIGURE A9


FULL-COVERAGE (SPLIT-K, 190 ESTIMATES)
SENIORS IN PLAINFIELD K=1.85 M= 310.00
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN PLAINFIELD K=1.86 M= 362.50
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN PLAINFIELD K=3.54 M= 592.50
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN PLAINFIELD K=3.64 M= 1081.80
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
250
500
750
1000
1250
1500
1750
2000
2250
EXPECTED COSTS

In these graphs, the premiums for each class are assumed to be an accurate reflection of class-average costs. Inaccuracies in estimating the class averages would only increase the picture of heterogeneity. Systematic biases in the premium relativities could affect the overlap estimates significantly. Consider, for example, the assumption of multiplicative class by territory combinations. Use of an additive model instead would yield very different class average premiums in the very highest and lowest-rated cells. The three sets of graphs just discussed would change to those shown in Figures A-10, A-11 and A-12. In these figures, the dotted vertical lines indicate the actual premiums that ISO charges but the curves have been shifted to reflect the risk estimates implied by an additive model. The corresponding overlap estimates are given in Table A-14.

Although the differences between the additive and multiplicative model are minor for the Newark Suburban territory, they can be substantial for Newark.[136] Pricing Newark youths using the multiplicative model when an additive model should have been used results in 73.6% of the highest-rated males being overcharged by at least $500.

The differences between Figure A-8 and Figure A-11 arise only because of the switch from a multiplicative to an additive model. In both cases the class relativity for the highest-rated male class is presumed to be correct,[137] and a split-k assumption is used--the assumption about homogeneity patterns across classes which makes the highest rated classes the most homogeneous. Assuming instead that k-values are equal across class-by-territory cells increases the overlaps. For example, Figure A-13 redraws the four class example (for Newark) but with the equal-k assumption. The individual overlap

FIGURE A 10

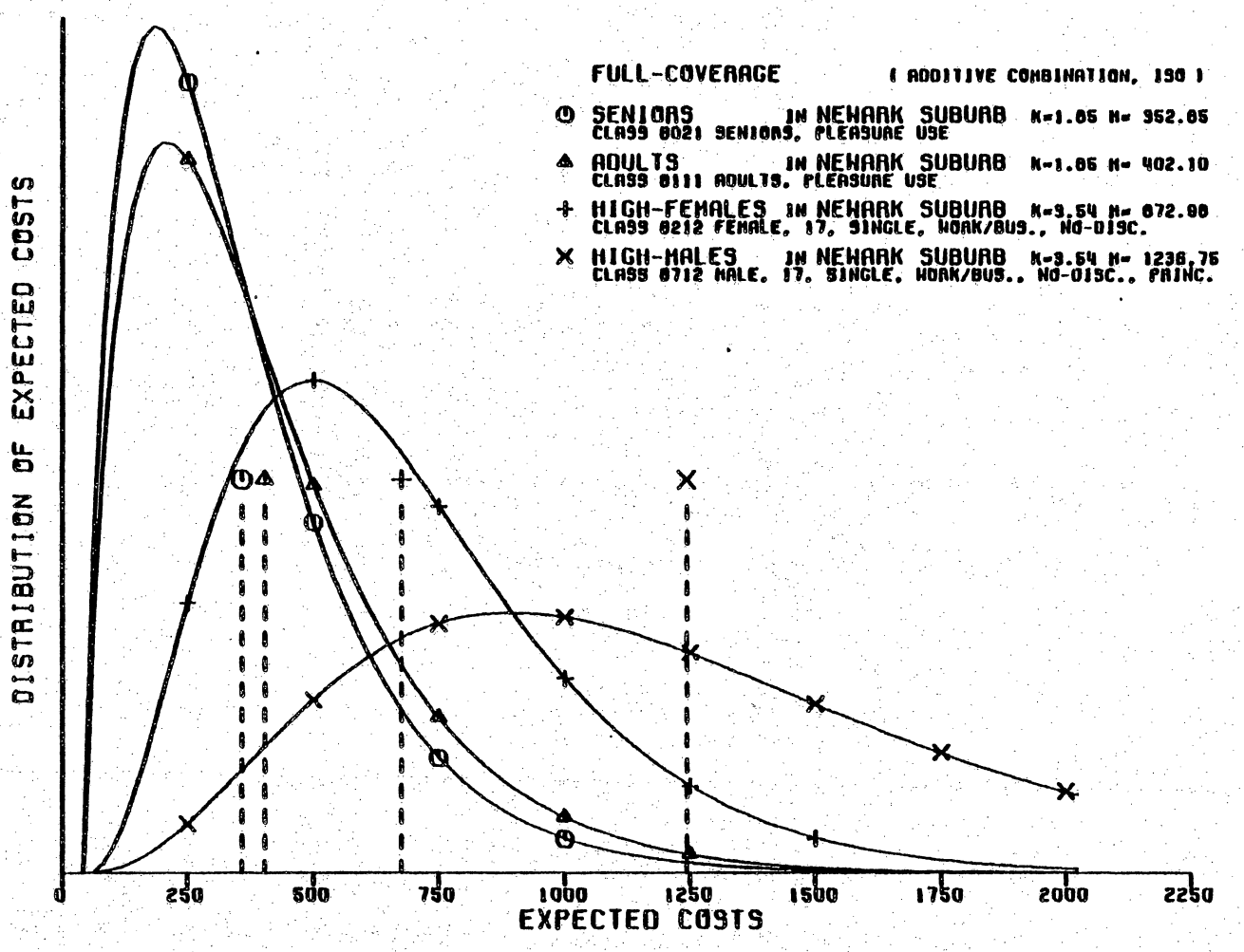

FULL-COVERAGE (ADDITIVE COMBINATION, 190)
SENIORS IN NEWARK SUBURB K=1.85 M= 952.85
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK SUBURB K=1.85 M= 402.10
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK SUBURB K=3.64 M= 672.90
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK SUBURB K=3.64 M= 1238.75
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
250
500
750
1000
1250
1500
1750
2000
2250
EXPECTED COSTS

FIGURE A11

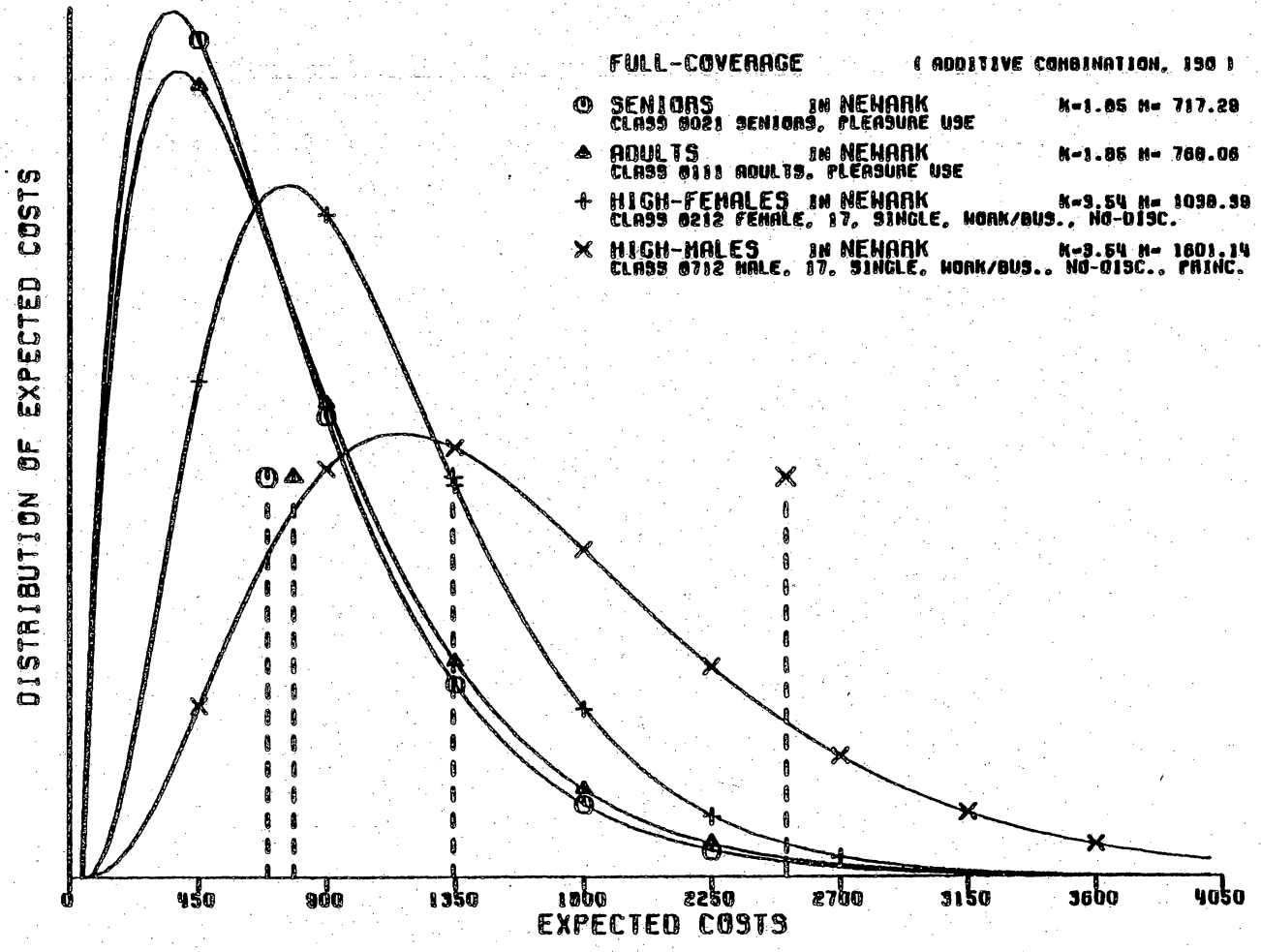

FULL-COVERAGE (ADDITIVE COMBINATION, 150)
SENIORS IN NEWARK K=1.85 M= 717.28
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK K=1.85 M= 768.06
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK K=3.54 M= 1038.38
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK K=3.54 M= 1601.14
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

FIGURE A12

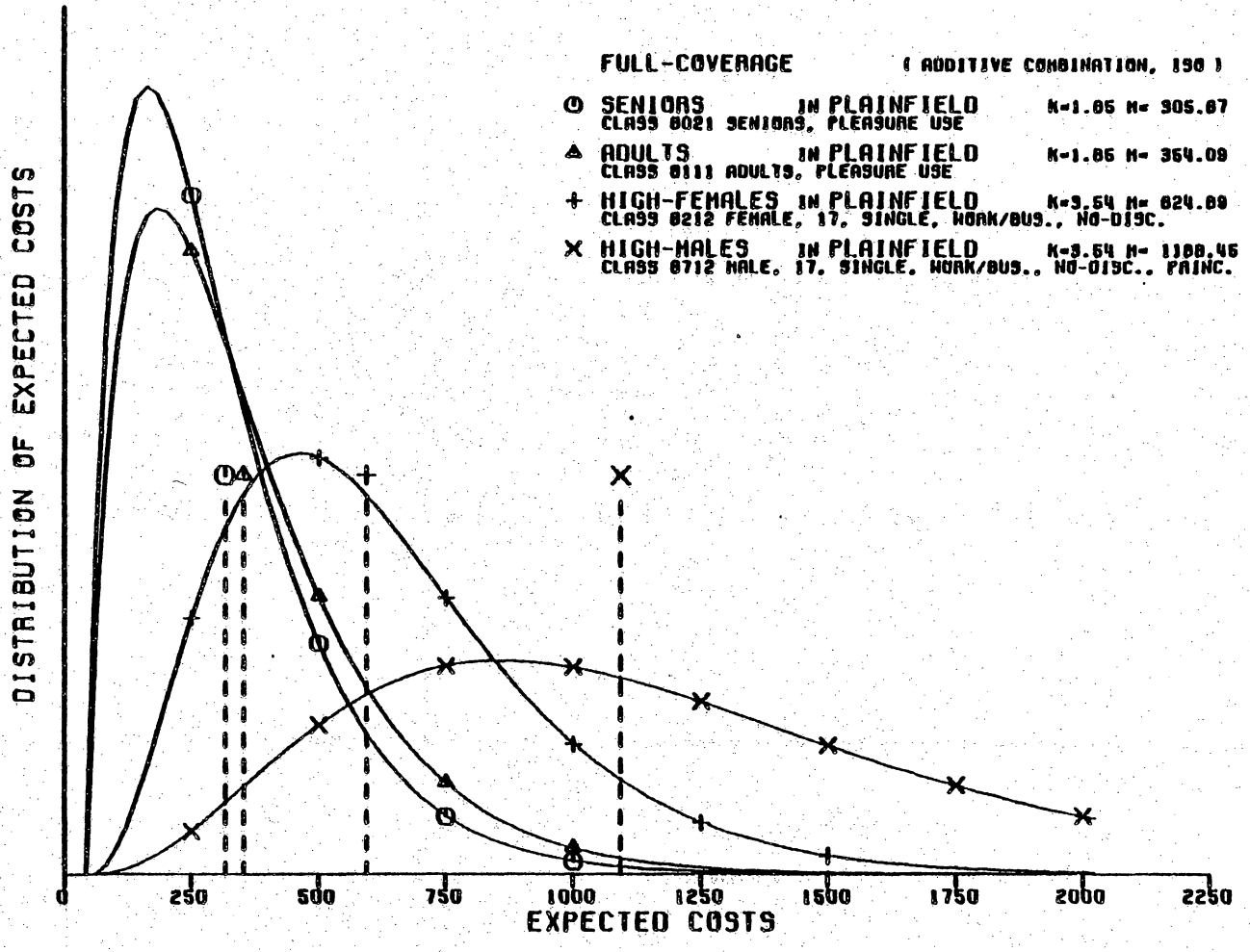

FULL-COVERAGE (ADDITIVE COMBINATION, 190)
SENIORS IN PLAINFIELD K=1.85 M= 305.87
CLASS 8021 SENIORS, PLEASURE USE
ADULTS IN PLAINFIELD K=1.85 M= 364.09
CLASS 8111 ADULTS, PLEASURE USE
HIGH-FEMALES IN PLAINFIELD K=3.54 M= 624.89
CLASS 8212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN PLAINFIELD K=3.54 M= 1108.46
CLASS 8712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PAINC.
DISTRIBUTION OF EXPECTED COSTS
0
250
500
750
1000
1250
1500
1750
2000
2250
EXPECTED COSTS

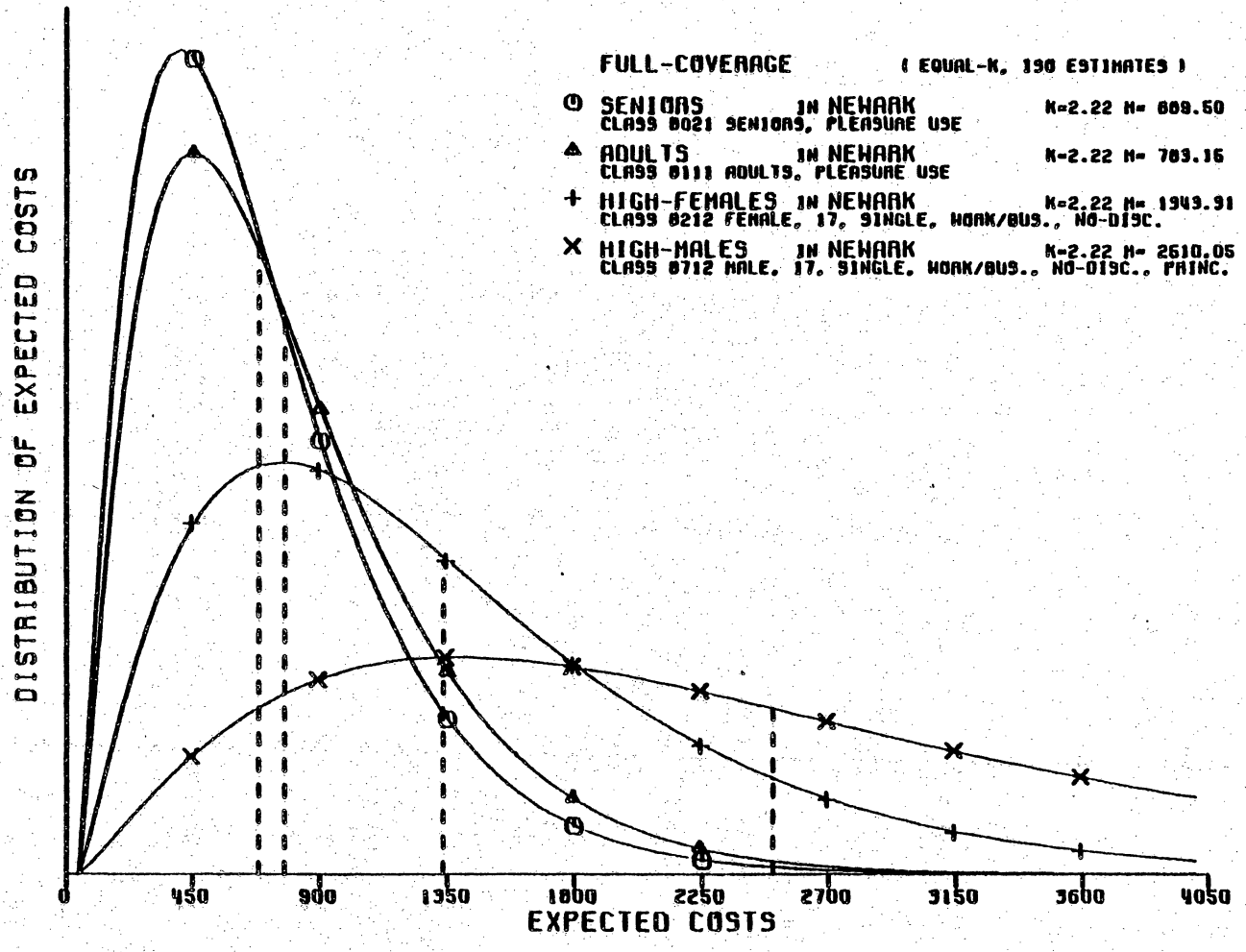
TABLE A-14

OVERCHARGES AND OVERLAPS--EFFECT OF INACCURATE CLASS AVERAGES

ISO Class	Homogeneity (K-Value)	Premium For Full Coverage		Overlap Results*: Estimated Percent with Expected Costs Below Multiplicative Premium for Class 8021	Class 8111	Class 8212	Class 8712	Below Worst 20% of Adults (Class 8111)	Overcharge Results*: Estimated Percent Overcharged by More than $300	$500
		Mult.	Additive							
Figure A-10: Full-Coverage, Split-K Estimates for "Newark Suburban" Territory										
8021--Seniors	1.85	$ 357	$ 353	60.5	67.4	90.8	99.5	86	0.6%	0.0%
8111--Adults	1.85	402	402	52.9	59.8	86.0	98.8	80	5.6	0.0
8212--High Female	3.54	675	673	16.2	21.8	57.3	93.6	46	18.4	1.6
8712--High Male	3.54	1,242	1,237	3.1	4.5	18.5	57.4	13	37.9	23.0
Figure A-11: Full-Coverage, Split-K Estimates for "Plainfield" Territory										
8021--Seniors	1.85	316	306	61.8	68.2	91.5	99.6	87	0.0	0.0
8111--Adults	1.85	352	354	53.0	59.5	86.2	98.9	80	0.4	0.0
8212--High Female	3.54	593	625	14.1	18.8	52.9	91.9	42	11.4	0.1
8712--High Male	3.54	1,092	1,188	2.4	3.4	14.8	50.7	10	28.7	14.8
Figure A-12: Full-Coverage, Split-K Estimates for "Newark" Territory										
8021--Seniors	1.85	690	717	57.6	64.6	89.2	99.3	83	28.9	8.3
8111--Adults	1.85	783	768	53.9	60.8	86.7	98.9	80	35.6	15.8
8212--High Female	3.54	1,343	1,038	28.3	36.4	75.8	98.5	64	57.4	41.5
8712--High Male	3.54	2,510	1,601	10.5	14.5	44.1	86.6	33	79.7	73.6

*These overlaps and overcharges arise if premiums are based on a multiplicative class by territory combination but actual risks reflect an additive combination of class and territory factors.

FIGURE A13


FULL-COVERAGE (EQUAL-K, 190 ESTIMATES)
SENIORS IN NEWARK K=2.22 M= 809.60
CLASS 8021 SENIORS, PLEASURE USE
ADULTS IN NEWARK K=2.22 M= 783.16
CLASS 8111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK K=2.22 M= 1943.91
CLASS 8212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK K=2.22 M= 2610.05
CLASS 8712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

estimates change (see Table A-13), but the basic picture of heterogeneity does not.

Even if the k-values were assumed to be much larger, the classes would still not come close to the homogeneous ideal. Figure A-14 redraws that same four-class example but with split-k values that are twice as large as those estimated for ISO and considerably larger than the highest estimates of k generated for Allstate in Table A-12. The corresponding overlap percentages are given in Table A-15.

Substantial homogeneity requires k-values many times larger. Figure A-15 redraws the four-class graph for Newark assuming k-values that are 20 times as large as those in Figure A-8. The corresponding overlap percentages are shown in Table A-15.[138] The curves now appear much more homogeneous although the pricing errors for the high-rated classes are still substantial--15.3% of the highest-rated males are still overcharged by at least $300. A similar illustration of the effect of homogeneity on class accuracy is shown in Figures A-16, A-17 and A-18 for three young male groups in Newark. Figure A-16 uses the split-k estimates developed earlier, Figure A-17 doubles these k-estimates to get the "high-k" case and Figure A-18 multiplies the k-estimates by 20 to get the homogeneous case. The corresponding overlap estimates are given in Table A-16. For the homogeneous case, there is little overlap among the 17-, 21- and 24-year old groups. Nevertheless, 13.9% of the seventeen-year olds are estimated to be overcharged by more than $300.

Switching to another company's class plan also has little effect on the overall impression of inaccuracy. Figure A-19, for example, presents similar curves for comparable State Farm classes.[139] Overlap results are displayed in Table A-17.

FIGURE A14

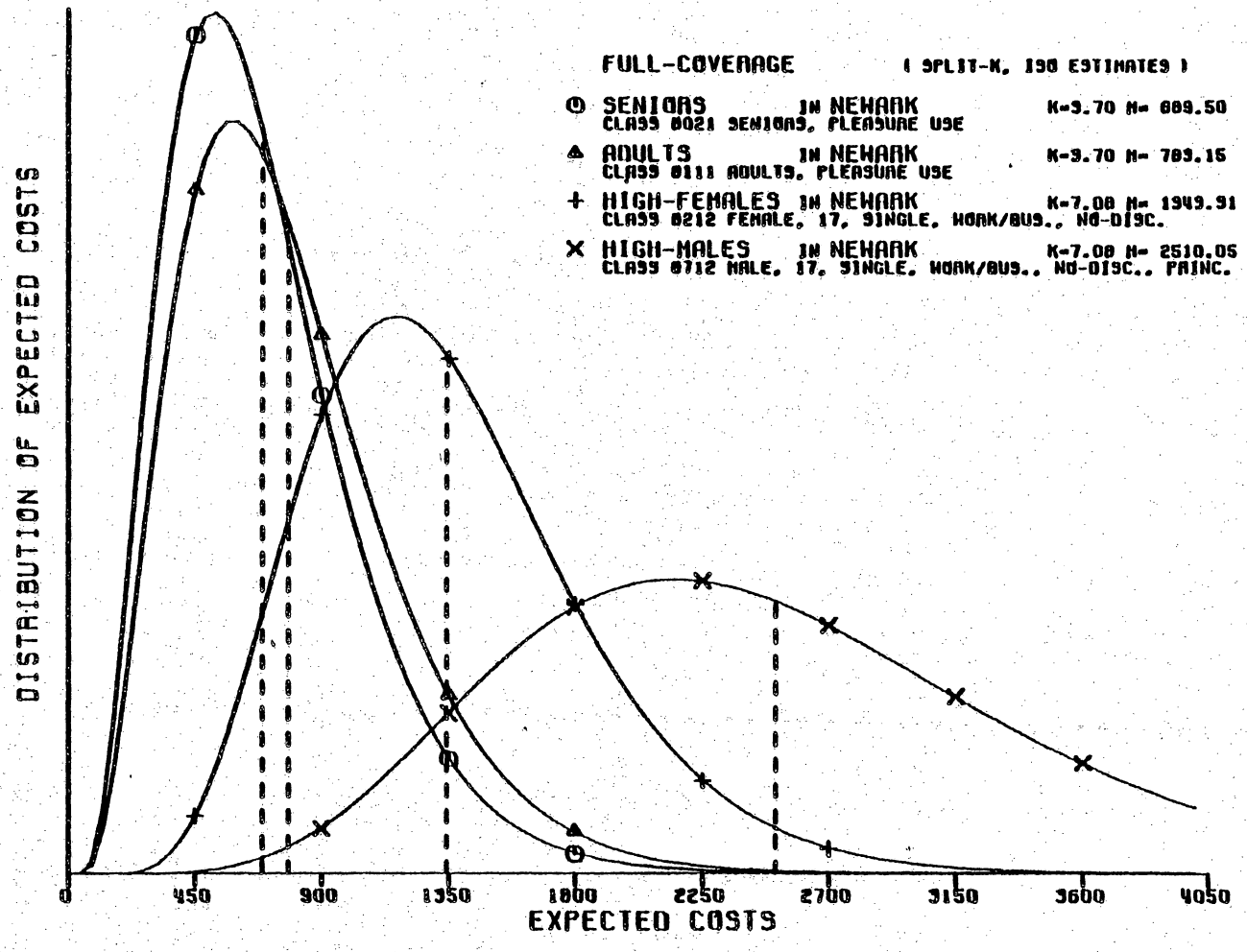

FULL-COVERAGE (SPLIT-K, 198 ESTIMATES)
SENIORS IN NEWARK K=9.70 M= 889.50
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK K=9.70 M= 789.15
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK K=7.00 M= 1949.91
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK K=7.00 M= 2510.05
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PAINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

TABLE A-15

OVERCHARGES AND OVERLAPS--THE EFFECT OF HOMOGENEITY

ISO Class	Homogeneity (K-Value)	Premium For Full Coverage	Overlap Results: Estimated Percent with Expected Costs Below the Average for Class 8021	Class 8111	Class 8212	Class 8712	Below Worst 20% of Adults (Class 8111)	Overcharge Results: Estimated Percent Overcharged by More than $300	$500
Figure A-8: Full-Coverage, Split-K Estimates for "Newark" Territory									
8021--Seniors	1.85	$ 690	59.8%	66.7%	90.4%	99.5%	85%	30.5%	8.8%
8111--Adults	1.85	783	52.8	59.8	86.0	98.8	80	34.7	15.3
8212--High Female	3.54	1,343	16.1	21.7	57.1	93.5	46	38.6	25.5
8712--High Male	3.54	2,510	3.1	4.5	18.3	57.1	13	47.7	40.9
Figure A-14: Full-Coverage, High-K Estimates for "Newark" Territory (K increased by a factor of 2									
8021--Seniors	3.70	690	56.9	66.9	95.4	100.0	87	18.3	17.9
8111--Adults	3.70	783	46.8	56.9	91.3	99.9	80	23.0	5.1
8212--High Female	7.08	1,343	6.3	10.8	55.0	97.9	32	29.5	14.4
8712--High Male	7.08	2,510	0.3	0.6	8.0	55.0	3	41.7	32.5
Figure A-16: Full-Coverage, Homogeneous Example for "Newark" Territory (K increased by a factor of 20)									
8021--Seniors	37.0	690	50.0	81.1	100.0	100.0	97	0.2	0.0
8111--Adults	37.0	783	22.1	50.0	100.0	100.0	80	0.7	0.0
8212--High Female	70.8	1,343	0.0	0.0	50.0	100.0	0	2.6	0.1
8712--High Male	70.8	2,510	0.0	0.0	0.0	50.0	0	15.3	4.4

FIGURE A15

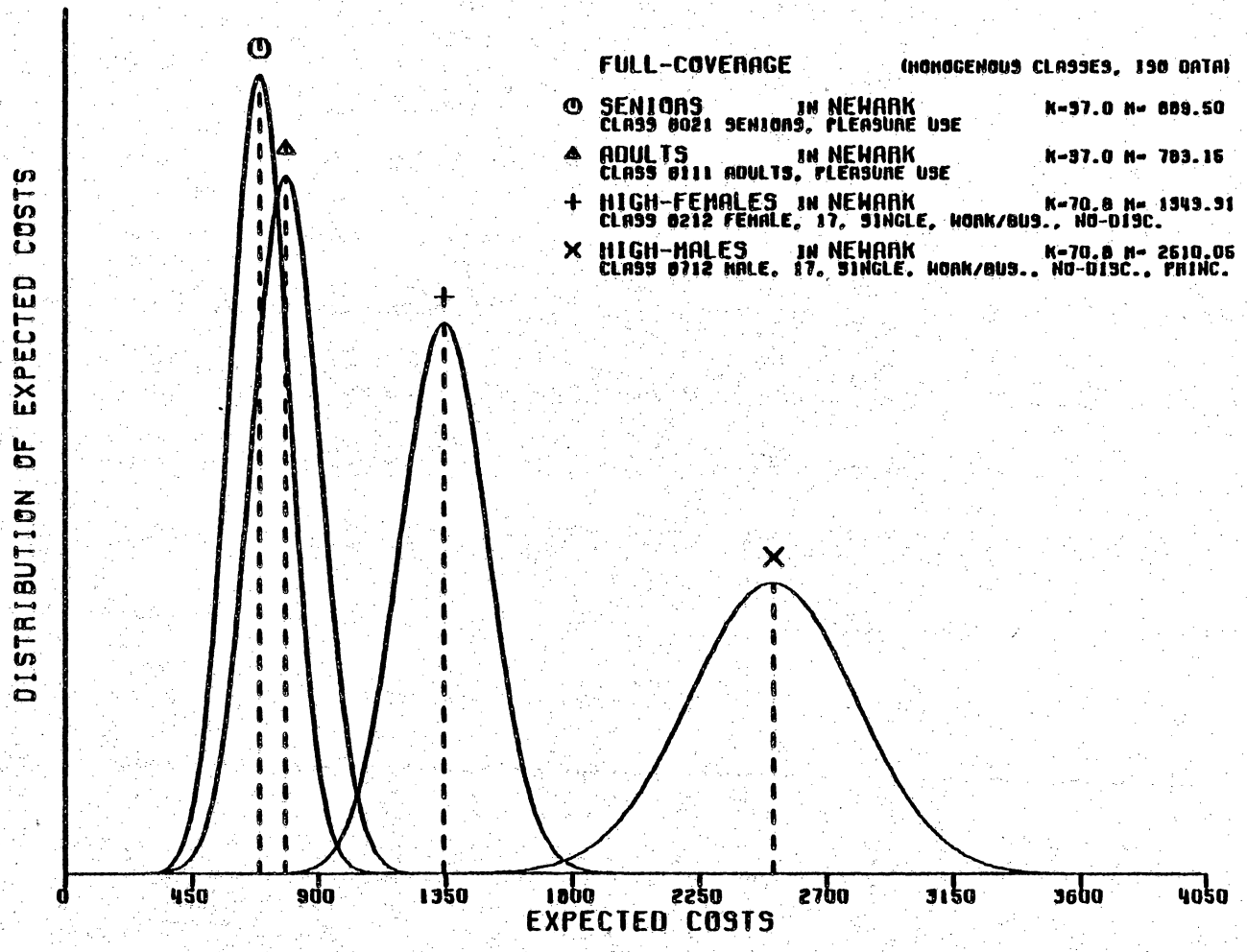

FULL-COVERAGE (HOMOGENOUS CLASSES, 190 DATA)
SENIORS IN NEWARK K-97.0 M= 889.50
CLASS 0021 SENIORS, PLEASURE USE
ADULTS IN NEWARK K-97.0 M= 783.16
CLASS 0111 ADULTS, PLEASURE USE
HIGH-FEMALES IN NEWARK K-70.8 M= 1349.91
CLASS 0212 FEMALE, 17, SINGLE, WORK/BUS., NO-DISC.
HIGH-MALES IN NEWARK K-70.8 M= 2610.06
CLASS 0712 MALE, 17, SINGLE, WORK/BUS., NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

FIGURE A16

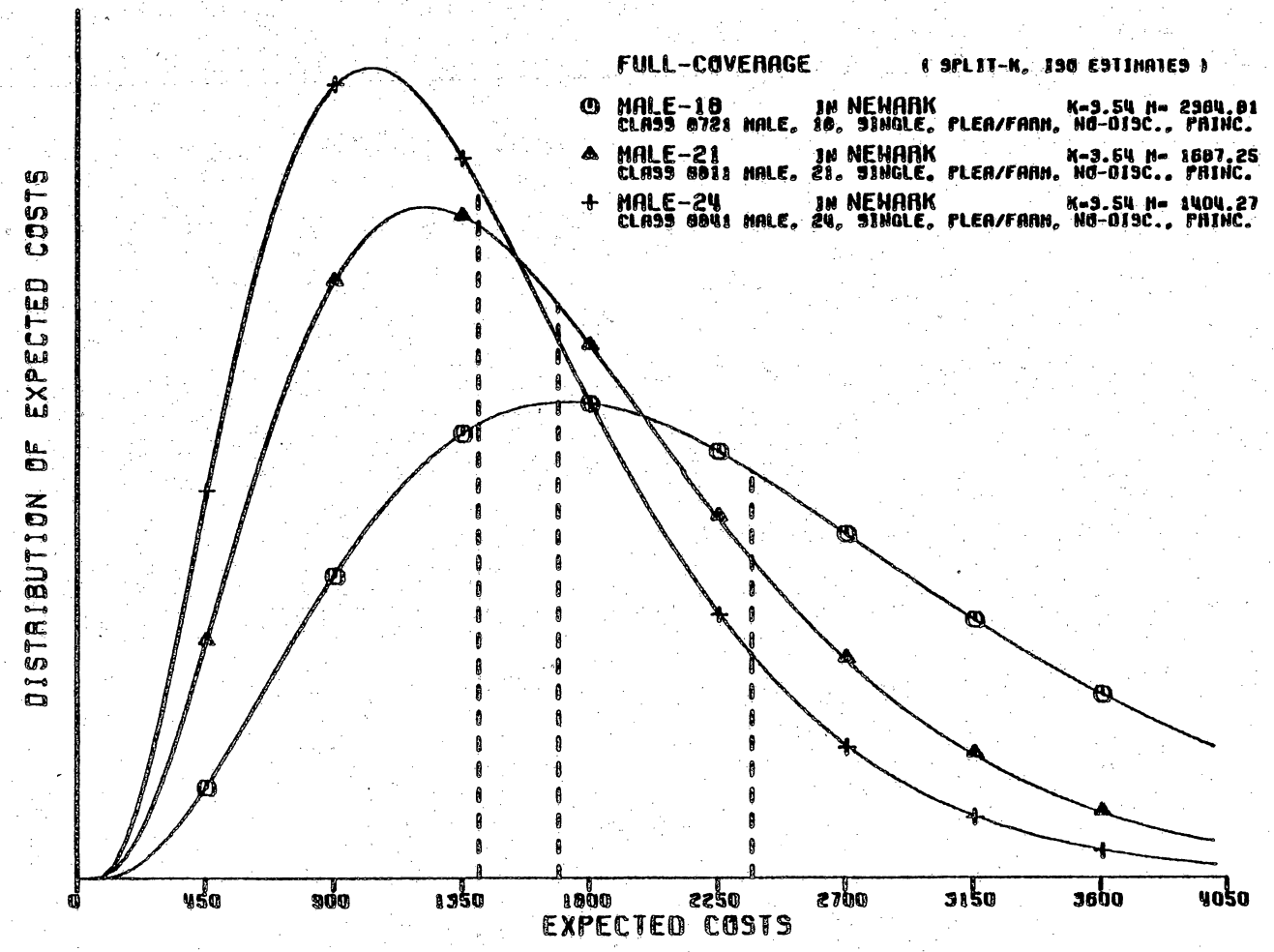

FULL-COVERAGE (SPLIT-K, I90 ESTIMATES)
MALE-18 IN NEWARK K=3.54 M= 2984.81
CLASS 0721 MALE, 18, SINGLE, FLEA/FARM, NO-DISC., PRINC.
MALE-21 IN NEWARK K=3.54 M= 1687.25
CLASS 0811 MALE, 21, SINGLE, FLEA/FARM, NO-DISC., PRINC.
MALE-24 IN NEWARK K=3.54 M= 1404.27
CLASS 0841 MALE, 24, SINGLE, FLEA/FARM, NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

FIGURE A17

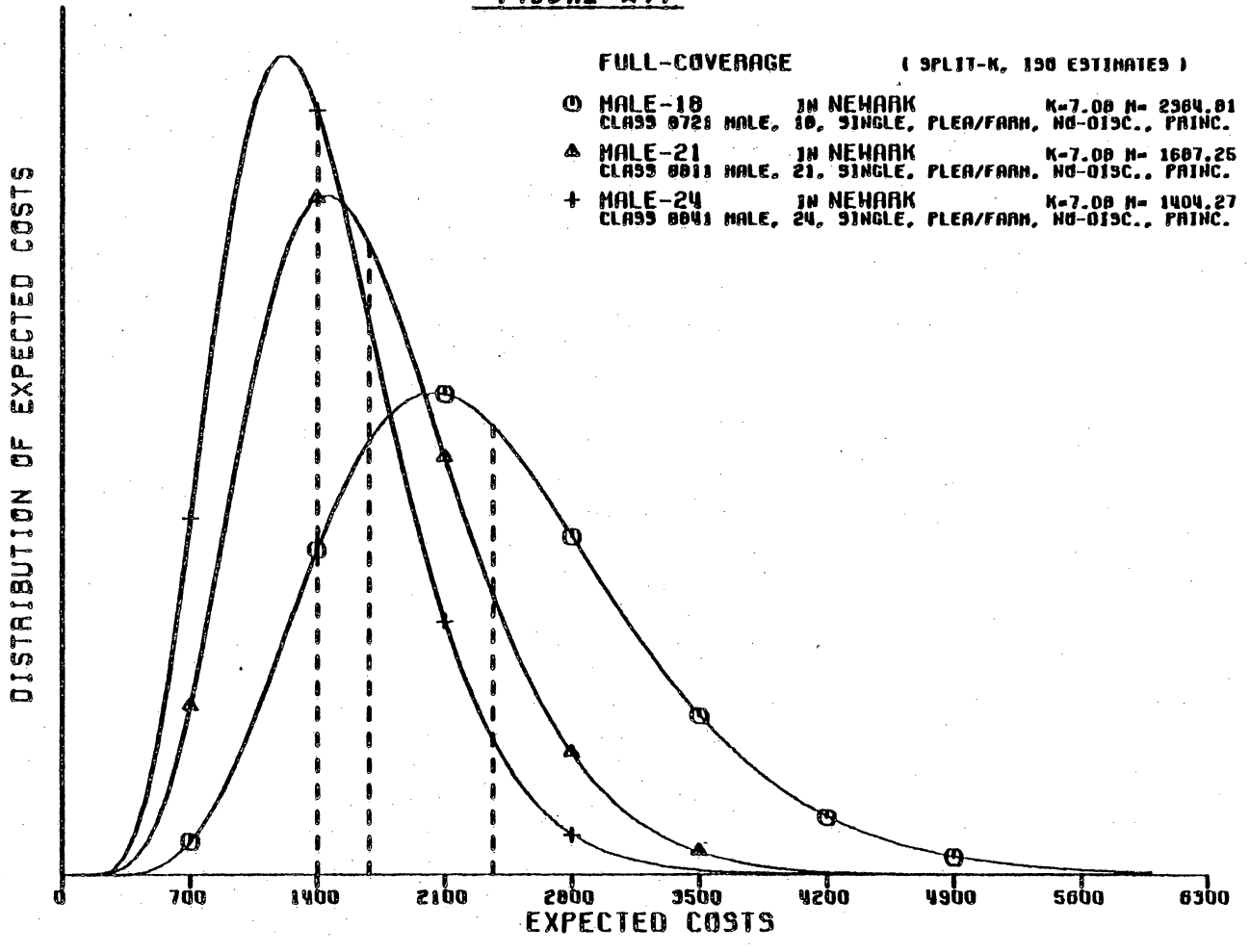

FULL-COVERAGE (SPLIT-K, 150 ESTIMATES)
MALE-18 IN NEWARK K=7.00 M= 2384.81
CLASS 0721 MALE, 18, SINGLE, PLEA/FARM, NO-DISC., PAINC.
MALE-21 IN NEWARK K=7.00 M= 1607.25
CLASS 0811 MALE, 21, SINGLE, PLEA/FARM, NO-DISC., PAINC.
MALE-24 IN NEWARK K=7.00 M= 1404.27
CLASS 0841 MALE, 24, SINGLE, PLEA/FARM, NO-DISC., PAINC.
DISTRIBUTION OF EXPECTED COSTS
0
700
1400
2100
2800
3500
4200
4900
5600
6300
EXPECTED COSTS

FIGURE A18

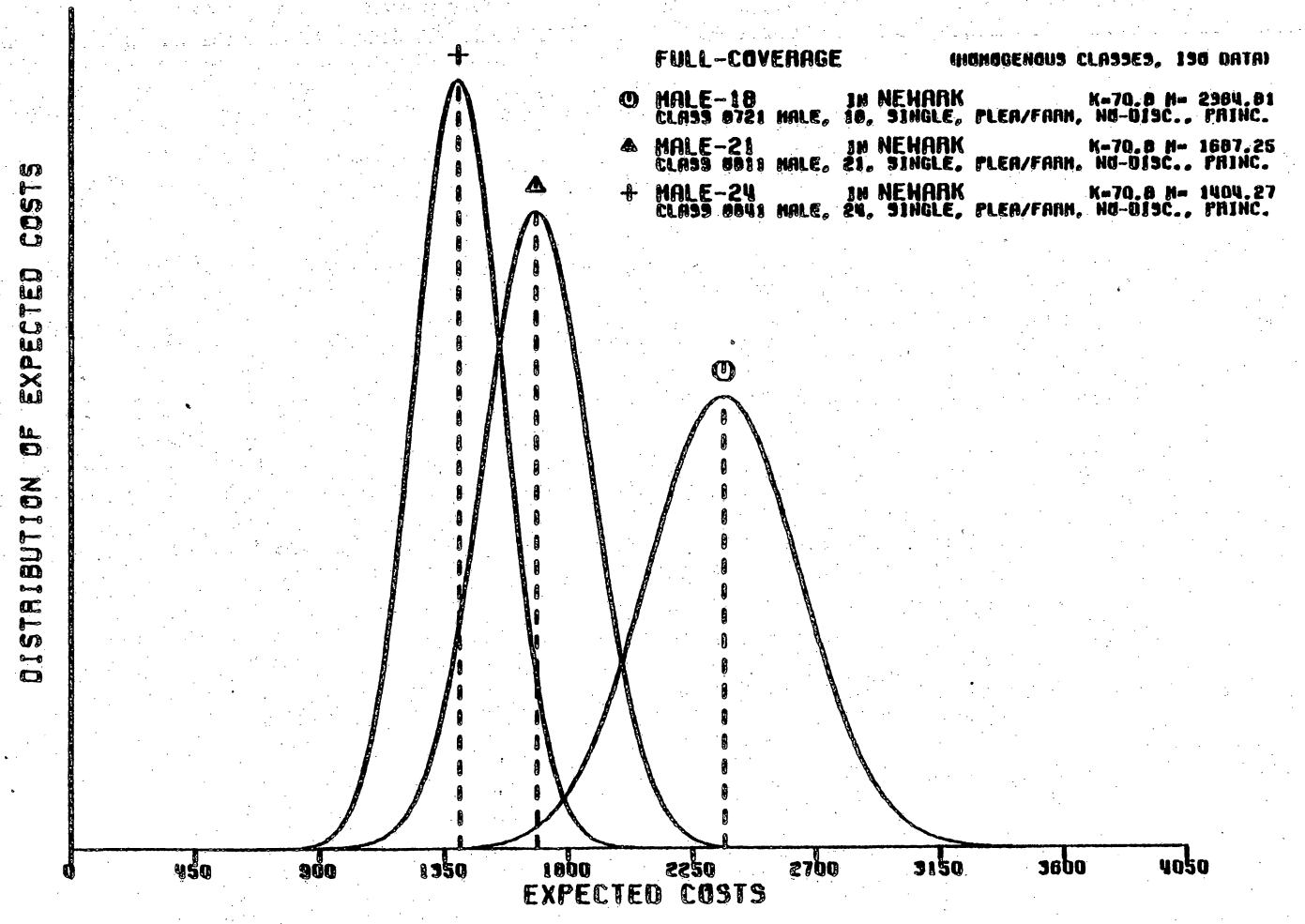

FULL-COVERAGE (HOMOGENOUS CLASSES, 190 DATA)
MALE-18 IN NEWARK K-70.8 M= 2984.81
CLASS 0721 MALE, 18, SINGLE, FLEA/FARM, NO-DISC., PRINC.
MALE-21 IN NEWARK K-70.8 M= 1687.25
CLASS 0811 MALE, 21, SINGLE, FLEA/FARM, NO-DISC., PRINC.
MALE-24 IN NEWARK K-70.8 M= 1404.27
CLASS 0841 MALE, 24, SINGLE, FLEA/FARM, NO-DISC., PRINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

TABLE A-16

OVERCHARGES AND OVERLAPS--THE EFFECT OF HOMOGENEITY

ISO Class*	Homogeneity (K-Value)	Premium For Full Coverage	Overlap Results: Estimated Percent with Expected Costs Below the Average for Class 8841	Class 8811	Class 8721	Below Worst 20% of Adults (Class 8111)	Overcharge Results: Estimated Percent Overcharged by More than $300	$500
Figure A-16: Full-Coverage, Split-K Estimates for "Newark" Territory								
8841--male, aged 24	3.54	$1,404	57.1	70.6	89.8	80%	39.4	26.9
8811--male, aged 21	3.54	1,687	43.5	57.1	80.5	68	42.6	32.3
8721--male, aged 18	3.54	2,365	23.1	33.3	57.1	43	47.0	39.9
Figure A-17: Full-Coverage, High-K Example for "Newark" Territory								
8841--male, aged 24	7.08	1,404	55.0	74.0	95.3	80	30.6	15.8
8811--male, aged 21	7.08	1,687	36.0	55.0	86.3	62	34.8	21.8
8721--male, aged 18	7.08	2,365	12.0	23.0	55.0	28	40.8	31.1
Figure A-18: Full-Coverage, Homogeneous Example for "Newark" Territory								
8841--male, aged 24	70.8	1,404	50.0	96.0	100.0	80	3.2	0.1
8811--male, aged 21	70.8	1,687	7.4	50.0	100.0	23	6.2	0.5
8721--male, aged 18	70.8	2,365	0.0	0.7	50.0	0	13.9	3.5

*Each of the three ISO classes include only unmarried males who are principal operators, use the vehicle for pleasure or farm and are not eligible for good student or driver training discounts.

Table A-16A

Part 1

OVERCHARGES AND OVERLAPS WITHIN YOUTHFUL CLASSES

Full Coverage

Territory	Classification	Premiums	K	% Overlaps			% Within Class Overcharged By At Least		20% Cutoff@	% Below
				8712	8212	8512	$300	$500		
02-Newark	8712	$2,510	3.54(s)	57.1	18.3	37.5	47.7	40.9		35.8
	8212	1,343	3.54(s)	93.5	57.1	81.5	38.6	25.5	$1,820	80.0
	8512	1,911	3.54(s)	76.5	32.3	57.1	44.5	35.4		55.1
02-Newark	8712	$2,510	2.22(e)	58.9	26.5	43.4	51.5	46.2		45.0
	8212	1,343	2.22(e)	90.0	58.9	78.6	44.3	33.2	$1,930	80.0
	8512	1,911	2.22(e)	74.3	39.1	58.9	49.1	41.7		60.6
31-Newark Suburban	8712	$1,243	3.54(s)	57.1	18.3	37.5	36.9	22.8		35.9
	8212	675	3.54(s)	93.5	57.1	81.5	18.2	1.6	$ 886	80.0
	8512	909	3.54(s)	76.5	32.3	57.1	30.0	12.6		55.2
31-Newark Suburban	8712	$1,243	2.22(e)	58.9	26.5	43.4	42.9	30.8		45.0
	8212	675	2.22(e)	90.0	58.9	78.6	26.5	5.4	$ 937	80.1
	8512	909	2.22(e)	74.3	39.1	58.9	37.2	20.8		58.4
				8712	8711	8721				
31-Newark Surburban	8712	$1,243	3.54(s)	57.1	55.1	52.7	36.9	22.8		76.5
	8711	1,212	3.54(s)	59.0	57.1	54.5	36.4	21.9		78.0
	8721	1,173	3.54(s)	61.4	59.6	57.1	35.6	20.7	$1,584	80.1
02-Newark	8712	$2,510	3.54(s)	57.1	55.1	-	47.7	40.9		78.5
	8711	2,446	3.54(s)	59.0	57.1	-	47.7	40.5	$3,364	80.0
				8721	8521	8321				
31-Newark Suburban	8721	$1,173	3.54(s)	57.1	35.2	21.8	35.6	20.7		41.2
	8521	867	3.54(s)	78.8	57.1	39.7	27.2	9.2		63.8
	8321	688	3.54(s)	90.8	74.3	57.1	19.0	2.0	$ 905	80.1

Table A-16A

OVERCHARGES AND OVERLAPS WITHIN YOUTHFUL CLASSES

Full Coverage

Territory	Classification	Premiums	K	% Overlaps			% Within Class Overcharged By At Least		20% Cutoff@	% Below
				8811	8841	8721	$300	$500		
31-Newark Suburban	8811	$ 843	3.54(s)	57.1	43.5	80.6	26.3	8.1		67.8
	8841	705	3.54(s)	70.6	57.1	89.9	19.9	2.5	$ 928	80.1
	8721	1,173	3.54(s)	33.3	23.0	57.1	35.6	20.7		42.9
				8771	8724	8774				
31-Newark Suburban	8771	$1,057	3.54(s)	57.1	48.2	42.9	33.0	16.8		67.1
	8724	940	3.54(s)	66.0	57.1	51.6	29.7	12.3		75.4
	8774	875	3.54(s)	71.2	62.5	57.1	27.5	9.5	$1,166	80.0
				8721	8811	8841				
02-Newark	8721	$2,365	7.08(s)	55.0	23.0	12.0	40.8	31.1		28.4
	8811	1,687	7.08(s)	86.3	55.0	36.0	34.8	21.8		62.3
	8841	1,404	7.08(s)	95.3	74.0	55.0	30.6	15.8	$1,765	80.0
Compulsory Coverage				8712	8212	8512				
02-Newark	8712	$1,248	3.38(s)	57.2	21.1	38.6	37.8	24.1		39.7
	8212	702	3.38(s)	91.7	57.2	79.1	21.2	3.2	$ 946	80.0
	8512	961	3.38(s)	75.7	35.2	57.2	31.4	14.4		58.4
02-Newark	8712	$1,248	2.17(e)	59.0	28.7	44.1	43.5	31.6		47.7
	8212	702	2.17(e)	88.3	59.0	76.7	28.9	8.2	$ 997	80.0
	8512	961	2.17(e)	73.8	41.3	59.0	38.1	22.1		62.0
31-Newark Suburban	8712	$ 635	3.38(s)	57.2	21.1	38.6	17.4	1.1		39.7
	8212	363	3.38(s)	91.7	57.2	79.2	0.1	0.0	$ 469	80.1
	8512	491	3.38(s)	75.7	35.1	57.2	7.3	0.0		58.4

Table A-16A

Part 3

OVERCHARGES AND OVERLAPS WITHIN YOUTHFUL CLASSES

Compulsory Coverage

Territory	Classification	Premiums	K	% Overlaps 8721	% Overlaps 8521	% Overlaps 8321	% Within Class Overcharged By At Least $300	% Within Class Overcharged By At Least $500	20% Cutoff@	% Below
31-Newark Suburban	8712	$ 634.70	2.17(e)	59.0	28.7	44.1	25.2	3.9		47.7
	8212	362.68	2.17(e)	88.3	59.0	76.7	1.3	0.0	$ 494	80.1
	8512	491.32	2.17(e)	73.8	41.3	59.0	14.1	0.0		62.9

Notes

Classification Description

8212 - 17 year old - Single Female - Work/Business - No Discounts
8321 - 18 year old - Married Male - Pleasure/Farm - No Discounts
8512 - 17 year old - Single Male - Occasional-Work/Business - No Discounts
8521 - 18 year old - Single Male - Occasional-Pleasure/Farm - No Discounts
8711 - 17 year old - Single Male - Principal-Pleasure/Farm - No Discounts
8712 - 17 year old - Single Male - Principal-Work/Business - No Discounts
8721 - 18 year old - Single Male - Principal-Pleasure/Farm - No Discounts
8724 - 18 year old - Single Male - Principal-Pleasure/Farm - Good Student Discount
8771 - 18 year old - Single Male - Principal-Pleasure/Farm - Driver Training - No Good Student Discount
8774 - 18 year old - Single Male - Principal-Pleasure/Farm - Good Student Discount & Driver Training Discount
8811 - 21 year old - Single Male - Principal-Pleasure/Farm - No Discounts
8841 - 24 year old - Single Male - Principal-Pleasure/Farm - No Discounts

Data reflects 12/28/79 rates of the Insurance Services Office together with estimates of the homogeneity analysis from the Appendix.

(s) next to the K values signifies "Split K" as explained in the Appendix
(e) next to the K values signifies "Equal K" as explained in the Appendix

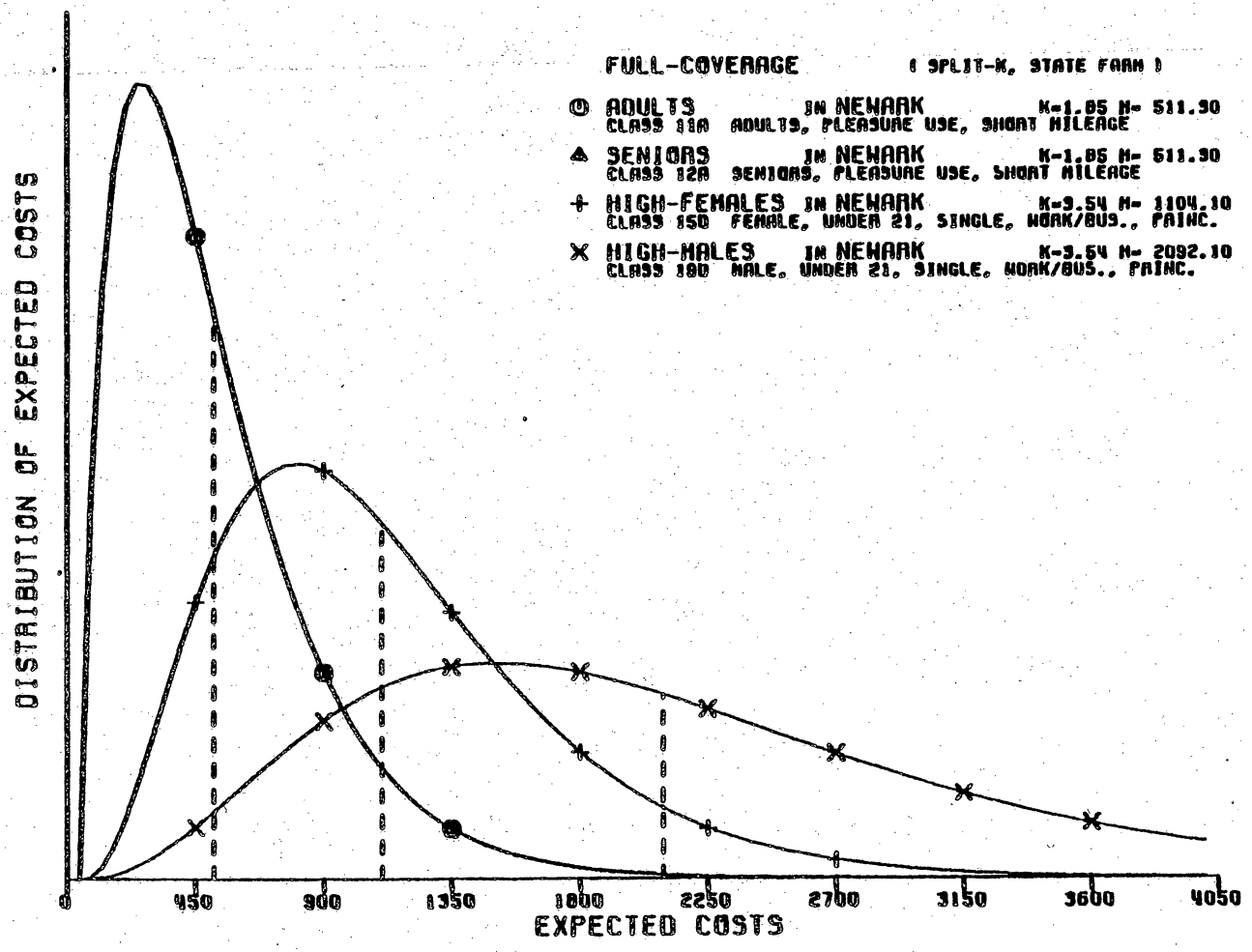
@Premiums do not contain the policy constants approved effective November 18, 1980.

TABLE A-17

OVERCHARGES AND OVERLAPS--ISO VS. STATE FARM

Driver Class	Homogeneity (K-Value)	Premium For Full Coverage	Overlap Results: Estimated Percent with Expected Costs Below the Average for Class 8021	Class 8111	Class 8212	Class 8712	Below Worst 20% of Adults (Class 8111)	Overcharge Results: Estimated Percent Overcharged by More than $300	$500
Figure A-8: ISO Full-Coverage, Split-K Estimates for Newark Territory									
8021--Seniors	1.85	$ 690	59.8%	66.7%	90.4%	99.5%	85%	30.5%	8.8%
8111--Adults	1.85	783	52.8	59.8	86.0	98.8	80	34.7	15.3
8212--High Female	3.54	1,343	16.1	21.7	57.1	93.5	46	38.6	25.5
8712--High Male	3.54	2,510	3.1	4.5	18.3	57.1	13	47.7	40.9
Figure A-19: State Farm Full-Coverage, Split-K Estimates for Newark Territory									
2A--Seniors	1.85	511	59.8	59.8	93.5	99.8	80	17.8	0.0
1A--Adults	1.85	511	59.8	59.8	93.5	99.8	80	17.8	0.0
5D--High Female	3.54	1,104	12.2	12.2	57.1	94.0	30	34.1	18.5
9D--High Male	3.54	2,092	2.1	2.1	17.6	57.1	7	45.6	37.4

FIGURE A19


FULL-COVERAGE (SPLIT-K, STATE FARM)
ADULTS IN NEWARK K=1.85 M= 511.90
CLASS 11A ADULTS, PLEASURE USE, SHORT MILEAGE
SENIORS IN NEWARK K=1.85 M= 511.90
CLASS 12A SENIORS, PLEASURE USE, SHORT MILEAGE
HIGH-FEMALES IN NEWARK K=3.54 M= 1104.10
CLASS 15D FEMALE, UNDER 21, SINGLE, WORK/BUS., PAINC.
HIGH-MALES IN NEWARK K=3.54 M= 2092.10
CLASS 18D MALE, UNDER 21, SINGLE, WORK/BUS., PAINC.
DISTRIBUTION OF EXPECTED COSTS
0
450
900
1350
1800
2250
2700
3150
3600
4050
EXPECTED COSTS

Traditionally, automobile insurance risk classification has been assumed to work as well as indicated in Figure A-15. The estimated differences in the average costs of the various driver classes have been large enough that the classes have been presumed to be distinct, well-defined, homogeneous subdivisions of insureds. This is clearly a misconception. The overwhelming weight of the evidence suggests that the true picture of class homogeneity resembles Figure A-13.

NOTES

SECTION 1: INTRODUCTION

[1]As of 1977, 71.9 per cent of total exposures in the Assigned Risk Plan were "clean." (Exhibit D-100). A "clean" risk is someone who has had no chargeable accidents nor more than one "minor" traffic violation in the most recent 3 years. See New Jersey Automobile Insurance Plan Manual, Section 16, Rates, pp. 10-12, effective April 1, 1978.

[2]A 30-year old female farm-use risk in Trenton Suburban territory pays $239 for full coverage under ISO rates while a 17-year old single male principal operator who drives to work pays $2,494 for full ISO coverage.

[3]Exhibit D-103A estimates 259,000 uninsured motorists on 1977 data.

[4]The proposed no-fault threshold changes are contained in Senate Bill 1033 (1980). The anti-fraud proposal is contained in Senate Bill 120 (1980). The other proposals are merged in Senate Bill 118 (1980). All of these bills are sponsored by Senator Eugene Bedell. Assembly Bill 1760 (1980), sponsored by Assemblyman Michael Adubato, incorporates much of the substance of S-118.

[5]This ruling is contained in Automobile Insurance Risk Classification: Equity and Accuracy, Massachusetts Division of Insurance, Boston, 1978, beginning at p. 144. (Exhibit D-28) The latter volume also contains five research papers prepared by the Massachusetts State Rating Bureau which figured prominently in the Commissioner's ruling.

[6]See Section 4, subsection III-A, "The Fundamental Fairness of Age, Sex, Marital Status and Other Status-Related Classifications," infra.

[7]The Ad Hoc Committee was authorized by motion of the Assembly Banking and Insurance Committee adopted June 19, 1978. The Committee issued its final report (Ad Hoc Committee Report on Automobile Insurance Reform in the State of New Jersey) reflecting majority and dissenting views on January 3, 1979. Representatives of the New Jersey Department of Insurance participated actively in the deliberations of the Committee but did not vote.

[8]The original Adubato bill was captioned Assembly Bill 3455 (1979). The current Adubato bill is Assembly Bill 1760 (1980).

[9]A Notice of Inquiry was sent "to all companies authorized to write automobile insurance in this State, the Insurance Services Office, the National Association of Independent Insurers and all interested parties" notifying them of the Commissioner's intent to hold a public hearing on the classification issues. The Notice of Inquiry also called a series of pre-hearing conferences beginning on December 1, 1978. On December 19, 1978, a more formal Notice of Hearing was sent to 32 named companies "and all other interested parties." On December 22, 1978, an ORDER to Sever and Consolidate Classification Issues and ORDER to Present Evidence was sent to Aetna Casualty &

Surety Company, Amica Mutual Insurance Company, Colonial Penn Insurance Company, Crum and Forster Insurance Companies, General Accident Group, Harleysville Mutual Insurance Company, I.S.O., Hartford Insurance Company, Liberty Mutual Insurance Company, National Grange Mutual, Nationwide Insurance Company, State Farm Mutual Automobile Insurance Company, Travelers Insurance Company, Utica Mutual Insurance Company, Security Mutual Insurance Company, and Lumbermen's Mutual Casualty Company. (Allstate Insurance Company and Prudential Property & Casualty Insurance Company were later added when each filed an automobile rate revision.)

[10]The details concerning Allstate's attempts to join the ISO for private passenger automobile are summarized in the findings of fact in In Re: Allstate Insurance Company (INS 6002-80), published by the New Jersey Office of Administrative Law on December 19, 1980. The findings of fact had been requested by the Appellate Division, Superior Court of New Jersey in connection with pending litigation captioned In Re Allstate Insurance Company, A-3972-79 (September 25, 1980).

[11]Testimony of Michael Miller, In Re Hearing on Automobile Insurance Classifications and Related Methodologies, Transcript, Volume XV, p. 108 (Miller, TR 15, p. 108).

[12]See Section 4, subsection I-C.1.f, "The Implications of Loss-Ratio Pricing Methods," and Section 5, subsection II-C.3., "Methodological Problems," infra.

[13]See Section 4, subsection I-C.1.c., "The Implications of Reliance on Countrywide Data," infra.

[14]The issues concerning Allstate's right to use ISO rates without the prior-approval of the Commissioner of Insurance are joined before the Appellate Division in In Re Allstate Insurance Company, A-3972-79 (September 29, 1980), n.10, supra.

SECTION 2: THE ROLE OF CLASSIFICATION PLANS IN THE INSURANCE MARKET

[1]See generally Stanford Research Institute (SRI), The Role of Risk Classifications in Property and Casualty Insurance - A Study of the Risk Assessment Process, Menlo Park, California, May, 1976 (Exhibit ISO-7); and Federal Insurance Administration (FIA), Full Insurance Availability, Washington, D.C., September, 1974 (Exhibit D-51).

[2]SRI, Exhibit ISO-7, p. 28.

[3]See N.J.A.I.P. Manual, Section 9, Eligibility, p. 4, effective April 1, 1978.

[4]Non-renewal provisions are contained in N.J.S.A. 39:6A-3 and N.J.A.C. 11:3-8.1 et seq. Cancellation provisions are in N.J.S.A. 17:29C-6, 7, 8.

[5]FIA, Exhibit D-51, p. 53.

[6]See generally Section 4, especially pp. 175-187, and Section 7, infra.

[7]See for example the testimony of Joseph Ferreira, In Re Hearing on Automobile Insurance Classifications and Related Methodologies, Transcript, Volume VII, p. 30 (Ferreira, TR 7, p. 30).

[8]SRI, Exhibit ISO-7, p. 3.

[9]The million rating possibilities would apply to those who purchase physical damage coverages. The 234,360 figure is the product of 217 primary classes times 27 territories times 40 secondary factors.

[10]ISO Personal Auto Manual, Rule 4, Classifications, Section C.2., Exception 2, p. GR-3, effective September 1, 1980; State Farm Mutual Automobile Insurance Company, Auto Manual, "Definitions and Interpretations - Children away at school," p. MF50-7407, effective January 15, 1976. See also Allstate Insurance Company Private Passenger Auto Insurance Manual, New Jersey Rule 11, Resident Student Discount, p. 12, effective January 1, 1976.

[11]The Travelers Indemnity Company, Private Passenger Auto Manual, Rule 27, Driver Record Classification, pp. C-10 to C-14, effective June 1, 1974.

[12]The ISO rule offers its members this option. ISO Personal Auto Manual, Rule 5, Safe Driver Insurance Plan (SDIP), pp. GR-5 to GR-7, effective September 1, 1980.

[13]See Rating Hypothetical No. 3, beginning at p. 34 of this section of the Report. ISO determines territory as the place in which the car is "principally garaged" but does not define this term. State Farm determines territory by the insured's "residence." Allstate mixes both concepts.

[14]See for example Michael Miller, TR 37, p. 28; and Edward Young, TR 47, pp. 50-59.

[15]State Farm Manual, Private Passenger Automobile Rules, Section 200, Rule 203B, p. 203, effective July 1, 1976. ISO Personal Auto Manual, Rule 5 (SDIP), Section II, p. GR-7, effective September 1, 1980.

[16]See the statement of Mayor Kenneth Gibson suggesting that owners of expensive cars drive carefully to protect their investment. TR 12, pp. 20-21.

[17]See generally the current rating manuals of the major filers: ISO Personal Auto Manual, State Farm Mutual Automobile Insurance Company Manual, and Allstate Insurance Company Private Passenger Automobile Insurance Manual.

[18]The illustrative rates are based on ISO private passenger rates effective December 28, 1979; State Farm private passenger rates effective March 24, 1980; and Allstate private passenger rates effective December 31, 1979.

[19]Exhibit ISO-27, History of Classification Rating - ISO and Its Predecessors.

[20]Exhibit ISO-28, History of Rating and Statistical Territories - ISO and Its Predecessors.

[21]Miller, TR 71, p. 170.

[22]SRI, Exhibit ISO-7, p. 28.

[23]FIA, Exhibit D-51, p. 5.

[24]Richard Reeves, TR 48, pp. 27-28.

[25]Ibid, p. 30.

[26]Ibid, p. 35.

[27]Ibid, pp. 28 and 30.

[28]Philipp Stern, TR 5, p. 35.

[29]Miller, TR 71, p. 183.

[30]Miller, TR 37, p. 26 and TR 49, p. 5.

[31]George Bernstein, TR 17, p. 5.

[32]Ibid, p. 49.

[33]FIA, Exhibit D-51, pp. 55-56.

[34]Exhibits ISO-31 and 32, A Report on a Revised Classification and Rating System (with Appendix), National Bureau of Casualty Underwriters - National Automobile Underwriters Association, April, 1964.

[35]See Exhibit ISO-27, pp. 2 and 3, for timing of the introduction of age, sex and marital status.

[36]See for example Miller, TR 49, pp. 5-9.

[37]Bernstein, TR 17, pp. 82-88.

[38]See Miller, TR 51, p. 7.

[39]The California Driver Fact Book, Revised July, 1976, p. 7 (officially noticed).

[40]Edward Young, TR 45, pp. 47-49.

[41]Michael Walters, TR 42, pp. 88-89.

[42]Edward Young, TR 39, pp. 26-30.

[43]Reeves, TR 48, pp. 30 and 41-44.

[44]Miller, TR 50, p. 42.

[45]Ibid, p. 43.

SECTION 3: STANDARDS OF EVALUATION

[1]The evidence is mixed on the question whether severity of accidents as well as frequency of accidents is correlated by classification. The discussion is largely confined to frequency considerations because frequency is the dominant factor; and it is the basis for the homogeneity estimates central to the findings in this matter. Consideration of variations in severity as well as frequency would greatly enlarge the estimates of within-class heterogeneity discussed in this Report. See Ferreira, TR 57 A, pp. 33-34. Nonetheless, between-class differentials are estimated on the basis of pure premiums which embody both frequency and severity effects.

[2]Ferreira, TR 7, pp. 30-52; SRI, Exhibit ISO-7, p. 35.

[3]See Ferreira, "Identifying Equitable Insurance Premiums for Risk Classes: An Alternative to the Classical Approach," in Automobile Insurance Risk Classification: Equity and Accuracy, Massachusetts Division of Insurance, Boston, 1978, pp. 74-120, especially p. 111, n.2. (Exhibit D-28)

[4]See Ferreira, TR 7, pp. 30-52 and 134-137 and Exhibit D-35.

[5]Ibid, pp. 44-48. See also SRI, Exhibit ISO-7, Chapter 8, "Issues Arising From Risk Assessment."

[6]An observation by Mayor Kenneth Gibson of Newark, TR 12, pp. 21-22.

[7]N.J.S.A. 17:29A-1 et seq.

[8]Walters, TR 29, p. 75.

[9]SRI Executive Summary Report, May 1976, Exhibit D-29B, p. 9.

[10]Ibid, p. 10.

[11]Ibid, p. 14.

[12]Ibid, p. 15.

[13]SRI Supplement, Exhibit D-29, p. 174.

[14]See for example Walters, TR 29, pp. 69-70.

[15]Walters, TR 26, p. 29.

[16]Walters, TR 29, p. 57.

[17]Ibid, p. 69.

[18]Walters, TR 26, pp. 41-42.

[19]Ibid, p. 41.

[20]Ibid, p. 29.

[21]SRI Executive Summary, Exhibit D-29B, p. 9.

[22]Walters, TR 26, p. 29.

[23]This is a slight modification of Michael Walters' fifth proposed standard, TR 26, p. 29.

[24]Natalie Shayer, "Driver Classification in Automobile Insurance," in Automobile Insurance Risk Classification: Equity & Accuracy, at p. 3 (Exhibit D-28) The proposed "separation" standard was adopted by the Massachusetts Commissioner at pp. 177-178 of Exhibit D-28.

[25]See for example Miller, TR 50, pp. 29-30.

[26]See for example Miller, TR 49, p. 64 and Exhibit SF-16; also Walters, TR 26, pp. 28 and 31.

[27]Walters TR 26, p. 28 and TR 29, pp. 55-56.

[28]Walters, TR 29, p. 57.

[29]Ibid, p. 56.

[30]Ibid, p. 58.

[31]Michael McCabe, TR 32, p. 25.

[32]See Section 7, subsection II, "The Expense Allocation in Automobile Insurance Rates," infra.

[33]See Walters, TR 29, p. 75-76.

[34]Walters, TR 26, p. 31.

[35]Walters, TR 29, p. 57.

[36]Exhibit SF-16, p. 1.

[37]Exhibit H-1, p. 35.

[38]See generally SRI, Exhibit ISO-7, pp 46-55.

[39]Ferreira, TR 54, p. 151.

[40]See generally Ferreira, TR 54, pp. 44-55, especially p. 52.

[41]Ferreira, "Identifying Equitable Insurance Premiums for Risk Classes," Exhibit D-28 at pp. 75 and 113, n.5. Figures 3 and 4 in the Report correspond to Figures 1 and 5 on pp. 76 and 83 of Exhibit D-28. Similar graphs are used in the 1976 SRI Report (Exhibit ISO-7).

[42]Dr. Ferreira is an Associate Professor of Urban Studies and Operations Research at the Massachusetts Institute of Technology and a former staff member of the Massachusetts State Rating Bureau. See Exhibit D-27.

[43]Exhibit D-33. See Ferreira, TR 7, pp. 62-68.

[44]See Exhibit D-30, p. 1.

[45]Ibid, p. 2.

[46]There is no obligation to classify drivers. See Section 4, subsection III, "Fairness Per Se: The Legal Implications of Age, Sex, Marital Status and Other Status Variables," infra.

[47]Howard Clark, TR 4, p. 24.

[48]Andrew Giffin, TR 52, p. 52.

[49]See Robinson v Cahill, 62 N.J. 473,500 (1973) and cases below.

[50]See Ferreira, TR 7, p. 50.

[51]Ibid.

SECTION 4: DEMOGRAPHIC FACTORS: AGE, SEX, MARITAL STATUS AND RELATED CLASSIFICATIONS

[1]See Bernstein, TR 17, p. 75, citing U. S. Department of Transportation studies.

[2]Exhibit A-6.

[3]Bernstein, TR 17, pp. 75-77.

[4]Ibid, p. 74.

[5]Stern, TR 5, p. 36.

[6]Ibid, p. 38.

[7]Natalie Shayer, "Driver Classification In Automobile Insurance," Exhibit D-28 at p. 12.

[8]Ibid, p. 10.

[9]State Farm Mutual Automobile Insurance Company Manual, "Definitions and Interpretations - Married," p. MF50-7407; also ISO Personal Auto Manual, Rule 4, Classifications, p. GR-3; Allstate Insurance Company Private Passenger Automobile Insurance Manual, p. 6.

[10]Exhibit LSNJ-9, pp. 13-14.

[11]State Farm Mutual Automobile Insurance Company Manual, "Good Student Credit," p. F-2. The State Farm rule provides that the good-student credit will be continued to age 25 or marriage, whichever comes first, if the youth in question "attended college for at least two consecutive years" and had a scholastic record meeting the requirements during that period.

[12]Exhibit LSNJ-8, p. 2.

[13]See Exhibit D-23.

[14]Exhibit LSNJ-9, p. 9.

[15]The ISO rule provides that principal operators licensed for less than 3 years shall be treated as if they had on their driving records one chargeable accident or a moving traffic violation resulting in suspension or revocation of license. All losses of the inexperienced group would therefore be merged with the losses of drivers having such accidents and violations. ISO Personal Auto Manual, Section 5 (SDIP), p. NJ-E-3.

[16]The California Driver Fact Book, July, 1976, pp. 42-43.

[17]Exhibit LSNJ-9, p. 12.

[18]Ibid, p. 14.

[19]Ibid, p. 12.

[20]Ibid, p. 5.

[21]Ibid, p. 20.

[22]See "Illustrative Rating Hypotheticals," Section 2, supra. The ISO rule provides, for example, that "if the number of youthful operators exceeds the number of autos, the Youthful Operator Classifications with the highest Primary Rating Factors apply." ISO Personal Auto Manual, Rule 4, Classifications, C.5.a., p. GR-4.

[23]Exhibit LSNJ-9, p. 19.

[24]Stern, TR 5, p. 62.

[25]Relative wealth indicators used were "gross income," "number of homesteads," and "market value of homesteads." The relevant data are contained in Exhibit D-105. "Gross income" is average gross income per homestead, using income data from the New Jersey Division of Taxation. "Number of homesteads" is a count of homesteads by municipality, summed by insurance rating territory, using data from the Division of Taxation. "Market value of homesteads" is the average market value of homesteads summed by insurance rating territory, again using Division of Taxation data. See Jerome Gordon, TR 79, pp. 127-129.

[26]Constructed from ISO voluntary private passenger non-fleet automobile liability exposures, calendar/accident year 1977. Exhibit D-96.

[27]There are a total of 1,157 "married" 17-through-20 year olds in territories 07, 02, 01, 27, 14 and 40. There are 2,040 such "marrieds" in territories 25 and 10.

[28]The California Driver Fact Book, July, 1976, p. 34. See also Bernstein, TR 17, p. 69.

[29]See for example McCabe, TR 22, pp. 33-35.

[30]Exhibit ISO-32, p. 19 (Appendix II, Sheet 3). When cars which included female operators under 25 were subtracted from the 3-per cent 3-operator group the number of cars remaining in the 3-operator group was too small to analyze. ISO's Michael Walters was not able to report the number of cars analyzed in this section. Based on the percentage distributions indicated and an estimate of the total number of single-car policies in the total sample, the analysis of 3-operator policies seems to have been limited to about 5,000 cars.

[31]California Driver Fact Book, p. 34.

[32]Ibid, p. 14.

[33]Ibid, p. 17, reproduced in part in Exhibit SF-5. The seven annual mileage categories were (1) under 1,000 miles, (2) 1,000 to 4,999 miles, (3) 5,000 to 9,999 miles; (4) 10,000 to 14,999 miles, (5) 15,000 to 19,999 miles; (6) 20,000 to 29,999 miles; and (7) 30,000 and more miles.

[34]Ibid, p. 34.

[35]Exhibit D-28, p. 180.

[36]Edward Young, TR 66, p. 63 and Exhibit A-1.

[37]See Section 6, subsection III-D, "The Differential Risks of Drivers With Accident and Conviction Records," infra.

[38]Exhibits D-124 and 124A.

[39]See Exhibit A-2, p. 2.

[40]Ibid. Note that State Farm does not use inexperience surcharges.

[41]See Section 6, subsection III-B.1., "Inclusion of Inexperienced Operators," infra.

[42]State Farm Mutual Automobile Insurance Company Manual, p. MF50-7407.

[43]Miller, TR 49, pp. 124-125.

[44]These percentages are computed by comparing ISO primary class factors for "principal" and "occasional" operators. The 40 per cent surcharge for inexperience is the surcharge imposed for one SDIP point. ISO Personal Auto Manual, pp. NJ-E-9 and 11, and NJ-E-12.

[45]The percentages for State Farm are computed by comparing State Farm rating factors for "principal" and "occasional" operators, State Farm Mutual Automobile Insurance Company Manual. The Allstate percentages compare actual rates for "basic" and "restricted" operators in a sample territory (Trenton) rated close to the statewide average. (Allstate does not publish its class factors.)

[46]See Walters, TR 30, pp. 149-150.

[47]With respect to using "countrywide date," State Farm is the exception. It gives weight to statewide experience. See Miller, TR 50, pp. 22-26.

[48]See Miller, TR 71, pp. 189-190.

[49]Stern, TR 6, p. 91.

[50]See Exhibit LSNJ-9, pp. 12 and 19.

[51]These percentages are derived from Exhibit D-17. See also Stern, TR 5, pp. 97-98.

[52]See Stern, TR 5, pp. 59-68.

[53]Thomas Kozik, TR 69, p. 12.

[54]See Section 6, subsection IV, Tables 62 and 63, infra.

[55]See for example Robert Waldman, TR 9, pp. 76-79.

[56]See Section 4, subsection I - C.4., "Pricing," infra.

[57]Flattening of expenses alone invalidates the uniform target loss ratio approach. With a more accurate allocation of expenses, the permissible loss ratios of the high-rated classes should be larger than the loss ratios of the lower rated classes if all classes are to carry a proportionate share of overall loss costs. conversely, the ratios of expense to premium--the inverse of loss ratios--for

the high rated classes can be less than lower rated classes and still contribute the correct amount for expenses. See Edward Young, TR 39, pp. 80-82.

[58]See Ferreira, TR 58, pp. 86-90.

[59]ISO's designation of the adult class as "all other" reflects the mix of age groups in this class, including married female youths, single female youths away at school and other selected youth groups. The analysis here does not treat average-cost comparisons by individual year of age because differentials by individual year of age are entirely judgmental. ISO examines differential experience by "key" classes, that is, 17-through-20, 21-through-24 and 25-through-29. See Walters, TR 31, pp. 35-40.

[60]Based upon State Farm's 1975-1977 data (submitted in response to the table 1 call) for the compulsory coverages, youths 17-through-29 generate loss costs 55% and 57% above the adults for single and single and multicar respectively. Although the claim counts for these two broad groups across three years and multiple coverages are credible by traditional standards, they are not credible by individual coverage or class sub-group. For the actual counts, see Exhibits SF-1-F, SF-1-G and SF-1-H. The claim counts contained in these exhibits do not indicate whether they are based on single car or single and multicar data.

[61]Based upon State Farm's data (submitted in response to the table 1 call) for the compulsory coverages, youths 17-20 generate 67% higher loss costs than the 21-24 group, 123% higher than the 25-29 group and 44% higher than all youths in the 17-29 age group, and the 21-24 group generates only 34% higher loss costs than the 25-29 group for the single car insureds. Under the multicar data, similar indications are generated. The same comments with respect to credibility applies as in footnote 60.

[62]Male youths outnumber female youths by 55% based upon 1975-77 ISO combined liability exposures for single car data (D-90). For single and multicar data, (D-94) male youths outnumber female youths by somewhat less than 50%.

[63]See n. 59, supra.

[64]Female youths outnumber male youths by approximately 2% under the single and multicar data (Exhibit D-94) for the liability coverages. The ratio of married males to single males is also based upon the single and multicar data.

[65]The ratio of males to females

[66]Miller, TR 71, p. 190.

[67]Walters, TR 41, pp 44-5.

[68]Walters, TR 31, p. 35-37.

[69]In varying degrees, the State Farm comparisons based on sex are similar to those of the ISO for both single car and single and multicar data for the liability coverages. For example, single males generate 31% and 13% higher loss costs than single females, respectively, for the 17-20 and 21-24 groups under single car data; and 45% and 12% higher loss costs under single and multicar data. Reference should be made to Exhibits SF-1-F, SF-1-G and SF-1-H for the credibility aspects. See n.60, supra.

[70]The State Farm classification system is similar to the ISO system in that the married females are merged into the adult group thereby limiting the marital status comparison to males. As is the case with ISO, State Farm's liability indications point to higher loss costs for the single male when compared to the married male. For example, single males have 7% and 18% higher loss costs than married males for the age brackets of 17-20 and 21-24, respectively, on single car data; and 75% and 2% higher costs on single and multicar data. Reference is again made to exhibits SF-1-F, SF-1-G and SF-1-H for claim counts.

[71]Exhibit A-15, sub-exhibit O, pp. 17-18.

[72]Stephenson, TR 13, pp. 149-150 and Exhibit A-15, sub-exhibit O, p. 20.

[73]Exhibit LSNJ-9, p. 19.

[74]The ISO rule provides that principal operators licensed for less than 3 years shall be treated as if they had on their driving records one chargeable accident or a moving traffic violation resulting in suspension or revocation of license. All losses of the inexperienced group would therefore be merged with the losses of drivers having such accidents and violations. ISO Personal Auto Manual, Section 5 (SDIP), p. NJ-E-3. Similarly, resident students are classified and coded as "married" and all losses of the resident student would therefore be merged with the losses of Drivers who are in fact married. See ISO manual, Section 4.C.2., 2nd exception.

[75]The analysis of the ISO data comparing occassional and principal operators is limited to single males because the distinction does not exist for youthful married males nor youthful females. State Farm, however, applies this distinction to both youthful single males and females, although not to the married male class. The comparisons for State Farm, like those for ISO, show mixed results for the liability coverages. The principal operator 17-20 years old shows loss costs 21% and 30% higher than the occassional operator of the same age for single and single and multicar, respectively. The principal operator 21-24 years old, however, has loss costs 13% and 1% lower than the occassional operator. Additionally, see exhibit SF-4.

[76]State Farm's presentation (SF-18) was unusual because it used pure premiums. Exhibit SF-18 reflected two one-year comparisons between good students and other youthful operators in New Jersey. The com-

parisons showed that the average experience of good students was 20 per cent below the other youths in one case and about 47 per cent below in the other. The comparative sizes of the groups were not indicated and an analysis of the statistical significance of the indicated differences is not possible. As a general proposition the good student classification pertains to relatively few youths, about 21 per cent of male youths in the case of State Farm and about 9 per cent of affected youths in the ISO companies.

[77]State Farm Exhibit SF-19.

[78]In other words, the procedure used to compute the width of the interval from the three years of data will have at most a 95% chance of including the actual class relativity.

[79]Each of the five groups shown in Figure 7 meets the ISO standard of credibility requiring 1,084 claims. The group containing the fewest claims are the females 21-24 with 3,195 property damage claims. Because the data used in the table encompass both bodily injury and property damage, the conventional credibility test is more than met.

[80]FIA, Exhibit D-51, p. 53.

[81]Stephenson, TR 13, p. 108.

[82]Miller, TR 50, pp. 22-23.

[83]Ibid, p. 27.

[84]Edward Young, TR 36, p. 49 and TR 45, pp. 145-146.

[85]Miller, TR 15, p. 108.

[86]Exhibit SF-3, p. 1. The males are class 9A and the females are class 5A. The 9A indications are below present classification factors. The 5A indications equal or exceed the present classification factors. The adult class (class 1) in SF-3 shows only small percentage differences between present and indicated classification factors.

[87]Exhibit A-15, A through O, provides a history of Allstate's classification indications. The indications are based on the liability coverages for policy year 1966-1968, 1971-1973, and 1973-1975, which are developed in A-15A, p. 6, A-15G, p. 15, and A-15M, p. 15, respectively. The indications utilized are based on Table 3, which includes the largest number of policy years.

[88]In Exhibit SF-6, p. 1, under 21 year olds would decrease 40.2 per cent and 21-24 year olds would decrease 35.3 per cent. Exhibit ISO-19 shows that elimination of age, sex, and marital status would decrease rates for the youthful classes 33 per cent and increase rates 10 per cent for the 25-64 age group.

[89]Bernstein, TR 17, p. 47.

[90]Miller, TR 37, p. 111.

[91]Michael Miller spoke of mixing actuarial and economic considerations. TR 71, p. 186. He also described the rationale for continuing good student discounts after graduation to avoid wide short-term swings in rate. TR 71, p. 130. Edward Young acknowledged the practice of judgmentally tempering rates. TR 45, pp. 146-147. For other examples of the role of judgment in pricing, see Young, TR 45, pp. 61-62 and 98-100; TR 34, p. 27; TR 36, p. 49. Michael Walters acknowledged the use of "informed underwriting judgment" in the pricing of classifications, TR 31, pp. 99-100.

[92]Reeves, TR 48, pp. 22-23.

[93]Exhibit D-94. The comparisons are based on the five major coverages: bodily injury liability, property damage liability, personal injury protection, collision and comprehensive.

[94]Exhibit D-94F. The comparisons are based on the three liability coverages: BI, PD and PIP.

[95]All eight of the single male principal operator classes who do not receive the good student credit generate more than 1,000 claims for the compulsory coverages.

[96]Commissioner James J. Sheeran directed the flat rating of PIP on the recommendation of Hearing Officer Philipp Stern, dated June 3, 1977, with respect to the then pending ISO private passenger filing (Department file no. 76-1116). For State Farm's pending filing the Hearing Officer did not make a similar recommendation. (Department file no. 76-1272).

[97]The primary and secondary rating factors are combined for the BI and PD coverages and averaged with the PIP which does not have secondary rating factors. The ratios are .657 for BI and PD and .343 for PIP. (e.g. class 8112 BI and PD primary rating factor equals 1.15, secondary rating factor equals .05 (1.20 x .657 + 1.00 x .343 = 1.131).

[98]See Table 10A, supra.

[99]Exhibit LSNJ-9, p. 3.

[100]The first digit of the ISO statistical code merely indicates a private passenger vehicle. See Automobile Statistical Plan, p. 49, effective 9-1-80.

[101]These explanatory power estimates for the 2nd digit are based on the normalized claim-frequency variances set forth in Hearing Exhibit D-86 and the population heterogeneity values adopted in the Appendix, Section D, "Methods for Driving Estimates of Explanatory Power," infra. See also Table A-2.

[102]Exhibit ISO-7, p. 49.

[103]Exhibit D-89, p. 1.

[104]See Ferreira, TR 74, beginning at p. 51.

[105]Exhibit D-90, pp. 2-3. See Ferreira, TR 74, pp. 39-42. The normalized variances in D-90 are combined with the Big K's selected in the Appendix (1.52 for liability, 1.56 for collision and 0.83 for comprehensive.)

[106]Exhibit D-90, p. 4. Normalized claim count variances are again combined with the Big K's derived in the Appendix. See also Ferreira, TR 74, pp. 42-43.

[107]Exhibit D-90, pp. 6-7.

[108]See the derivation of "K" values for youths in the Appendix, section E, "Conceptual Questions Concerning Estimation of Within-Class Heterogeneity."

[109]The 4 per cent efficiency for the gender estimated by combining the normalized count variances in Exhibit D-90, p. 4 with the k-value for youths under the compulsory coverage in Table A-10 of the Appendix.

[110]See Table A-10 and related discussion in the Appendix.

[111]See Table 17. The ranges of the estimates are determined by whether an "equal k" or "split k" assumption is made.

[112]Ibid.

[113]See Table 17A. Results again depend on whether an "equal k" or "split k" assumption is made.

[114]The graph assumes that youths as a group are more homogeneous than adults as a group (the so-called "split K" assumption).

[115]For specific overlap estimates see Table A-16 and related tables in the Appendix.

[116]See n. 115.

[117]See n. 115.

[118]See Section E of the Appendix, "Conceptual Questions Concerning Estimation of Within-Class Heterogeneity."

[119]See Report of the Special Assembly Committee on Allegedly Discriminatory Practices in Connection with the Writing of Automobile Liability Insurance, Pursuant to Assembly Resolution Number 2, 1964, dated February 8, 1965.

[120]State Farm introduced a statistical class for senior citizens effective March 12, 1962. See Exhibit SF-2. The NBCU proposal is

contained in Exhibit ISO-31. The Allstate senior-citizen surcharge is reflected in the new superceded Allstate manual for that period. See Allstate Insurance Company, "Crusader Automobile Manual" (1966), p. 53.

[121]Exhibit ISO-32, Appendix II, Sheets 6 and 7.

[122]Ibid, Appendix II, Sheet 6.

[123]Colonial Penn Insurance Company Private Passenger Automobile Manual, p. 15. The classes compared are 0141 and 0641.

[124]The proposal was included with ISO's proposed 161-class plan. See Exhibit ISO-35. The lower average losses of senior citizens were addressed separately by the Commissioner in his 1977 directive requiring a 50 per cent PIP discount for insureds 65 and over.

[125]The 50 per cent PIP discount for senior citizens was recommended by Hearing Officer Philipp Stern in his June 1977 Report on the then pending ISO filing. The Report also recommended flattening of PIP for all other classes. See n.96.

[126]N.J.S.A. 39:6A-6.

[127]See Report cited in n.119 and N.J.S.A. 17:29B-4.

[128]The cited exposures pertain to the PIP coverage as in Exhibit D-94a.

[129]Note that the mileage classifications actually used by Colonial Penn are more refined than those shown in Table 19 but the company has not reported its exposure on this basis.

[130]ISO again fails to define "principal" operator. See ISO Personal Auto Manual, p. NJ-E-8.

[131]The standardization procedure mentioned in Table 20 adds the exposures for seniors and adults in each usage class, then sums all combined usage classes, then divides each usage class by the sum of combined exposures overall, then multiplies the pure premium for each class (adults and seniors separately) by this ratio.

[132]See Table 18. The ISO single-car data reflect 209,874 single-car senior citizens but only 70,734 seniors with multiple cars. The adults have 669,173 single-car exposures and 1,554,630 multicar exposures.

[133]The ISO data on collision and comprehensive coverages are not adjusted for age and symbol relativities.

[134]State Farm's long-mileage single-car seniors in the pleasure-use category produce a PIP pure premium 74 per cent below comparable adults. State Farm's long-mileage single-car seniors in the "all other usage" categories combined produce a pure premium 57 per cent below comparable adults. Short-mileage single-car seniors produce

comparable differentials of 60 per cent and 47 per cent under the PIP coverage. Under the non-PIP coverages, the single-car seniors are in all but one case above the adults by percentages ranging from 2.1 per cent to 88.1 per cent. Under the multicar data, the results are highly mixed. The statewide data producing these indications are subject to numerous credibility problems.

[135]This exhibit, "Distribution by Class for Selected Territories," is taken from the State Farm filing submitted in December, 1979 (Department file no. 79-1127). This exhibit shows that statewide 6.3 per cent of State Farm's business is in the senior category, but in Atlantic City, Newark and East Orange the respective percentages of senior business are 17.8, 10.7 and 9.1.

[136]A company with 60 per cent of insureds age 65 and over, and 40 per cent of insureds under 65, would create premium reductions of 28.5 per cent for the 65 and over insureds and premium increases of 42.9 per cent for the remaining insureds if the company were required to price PIP so that 65 and over insureds pay half as much premium as other insureds.

[137]Colonial Penn's Table 1 data provides aggregated mix-of-business factors but does not provide detail concerning single- and multicar distributions. The ISO experience suggests that adults are heavily concentrated in multicar risks and seniors are heavily concentrated in single-car risks. With respect to the possible mispricing of multicar discounts, especially as the result of failing to account for number of operators, see Section 6, subsection IV, "The Multicar Discount."

[138]The four major age categories together--youths 17-through-29, females 30-through-64, adults and seniors--explain somewhat more than 2 per cent of total risk variation for property damage liability, about 9 per cent for collision, and somewhat less than 6 per cent for comprehensive on ISO data. (Exhibit D-90 and Big K-values selected in the Appendix.)

[139]Allstate has a separate class for single male operators 30-through-49 who use the car more than 50 per cent of its estimated annual mileage. Allstate Private Passenger Auto Insurance Manual, Rule 6A-1-d, p. 5.

[140]See n.138. Females 30-64 account for some fraction of the explanatory power of the four major age groupings.

[141]Exhibit ISO-32, Appendix II, Sheet 2.

[142]Ibid, Sheet 3. The only indication of claims volume is a notation for those comparisons involving "less than 50 accidents."

[143]See Walters, TR 42, pp. 51, 57-60.

[144]The California Driver Fact Book, July, 1976, Chart 3, p. 14.

[145]Exhibit ISO-32, Appendix II, Sheets 3 and 4.

[146]Ibid, Sheet 3.

[147]These estimates assume a "split k" of 1.85. About 76 per cent of the adults have lower expected costs than the worst 20 per cent of sole-operator female risks.

[148]The interrelated statutory provisions include the following: an initial 15% reduction of rates was mandated. N.J.S.A. 39:6A-18. PIP benefits must be paid within 30 days after a claim is made. N.J.S.A. 39:6A-5. Subrogation is prohibited. N.J.S.A. 39:6A-9. Where there is dual liability, inter-company recovery is only by arbitration or agreement. N.J.S.A. 39:6A-11. Cancellation of policies by insurers for other than non-payment of premium and license revocation is forbidden. N.J.S.A. 17:29C-7. Unless like insurance is available, an insurer may not refuse to renew. N.J.S.A. 11:3-8.1, N.J.S.A. 39:6A-3. Insurers are compelled to participate in the assigned risk plan. N.J.S.A. 17:29D-1. Unfair Discrimination, or arbitrary and capricious action is prohibited in underwriting. N.J.S.A. 17:22-6.14 al.

[149]In 1952, the Wisconsin Supreme Court overruled the insurance commissioner's refusal to insure the life of a "Negro" under the State plan on the grounds of statistically proven "substandard" mortality risk. The commissioner could not show the race was a "causal" factor, the court held, and in any event the "primitive and crude" underwriting consideration had to yield to more important social policy. Lange v. Rancher, 56 N.W.2d 542 (Sct. Wisc. 1952).

[150]The legislature acted on the Committee's findings both with regard to race and age, but placed the prohibitions in the [Unfair] Trade Practices Act, N.J.S.A. 17:29B-4.

[151]Some states have abolished certain classifications by statute, including Hawaii, North Carolina and Michigan. The Michigan statute was enacted pursuant to the state's Supreme Court holding that while the No-Fault Act was a valid response to problems affecting the general welfare, the actual mechanism for protecting motorists compelled to purchase insurance was constitutionally deficient and devoid of due process.

[152]A plurality of the Frontiero Court found sex, like race, to be a "suspect classification." The concurring majority, however, rejected that finding as premature since the states had not yet (1973) enacted the Equal Rights Amendment. The Federal two-tiered test is still applied by the New Jersey courts when considering equal protection guarantees under the 14th and 15th Amendments. However, sex classification is afforded as middle ground requiring, "substantial scrutiny" of a State interest, as opposed to the lesser test of "rational relationship" of a classification to a real or perceived legislative goal. Craig v. Boren, supra., but cf Peper v. Princeton.

[153]See Exhibit ISO-32, Appendix II, Sheet 2.

[154]Thus, included in the 198th Legislature's 1979 enactments are: Ch. 126 (Exclusion from State Park admission fees for disabled and those over 62); Ch. 140 (Reverse Mortgages for Homeowners over 60); Ch. 27 (Reimbursement for Cost of Drugs for Elderly); Ch. 125 (Disabled Homemakers Act for those over 40, "an age at which discrimination based on age is likely"); Ch. 260 (Extends basic civil rights to citizens over 18, prohibits alcohol consumption under 19). Federal standards distinguishing burdens for benefits are likely to be similar, e.g. The Age Discrimination Act of 1975", 42 U.S.C.A. 6101 (1977) which prohibits age discrimination in any federally funded program specifically exempts an activity which "provides any benefits or assistance to persons based upon the age of such persons."

[155]McCabe, TR 32, pp. 24-25.

[156]Ibid, p. 42.

[157]Ibid.

[158]See Walters, TR 42, pp. 95-98. Mr. Walters was asked to comment on the assertion in Exhibit ISO-31, p. 8, that charging 17-year olds the highest premiums would have "great appeal to traffic safety experts, educators, parents" and others concerned about "the youthful driver problem." The only conceivable reason for this "appeal" is the contribution high premiums can make to keeping the youngest drivers off the road.

[159]As stated in Allstate's written submission to the 1964 Assembly Committee: There are major limitations to the effectiveness of any plan of classifications. At best, rating classifications is [sic] an aid to underwriting, but it is not substitute for judgment . . . the moral character of the individual risk--his irresponsible nature--is far more significant to the underwriter than his accident record. (Hearings, 1964 at 86A.)

Section 5: THE GEOGRAPHIC VARIABLE: TERRITORIES

[1]In the "urban" territories of Newark (02), Camden (07) and Jersey City (01), almost 49 per cent of total exposures are written through the assigned-risk plan (officially the New Jersey Automobile Insurance Plan). In the "rural" territories of Hunterdon, Warren, Sussex (26), Atlantic, Cumberland, Cape May, Ocean (27), and Burlington, Gloucester, Salem (14), almost 22 per cent of total exposures are written through the AIP. In the "suburban" territories of Northern Bergen (10), Camden Suburban (12) and Newark Suburban (31) only a little more than 17 per cent of total exposures are in the AIP. In total numbers, the "rural" territories are the most heavily represented in the AIP. See Exhibit D-96.

[2]Some territory base rates are the same. See Table 34, infra.

[3]Two pending bills would eliminate the assigned risk plan and substitute a joint underwriting association (JUA) using ISO voluntary rates and class plan. The bills are S-118 (Bedell) and A-1760 (Adubato). See Section 1, n.4 and 8.

[4]Bernstein, TR 17, p. 49.

[5]Exhibit ISO-29, p. 1A.

[6]Ibid, p. 32. See also Kozik, TR 69, pp. 15-16 asserting that there is a mild inverse correlation between frequency and severity in urban areas.

[7]Exhibit A-6, pp. 10-11.

[8]See Bernstein, TR 17, pp. 48-9. See also Exhibits ISO-29, -30 and -30A.

[9]See subsection III-C, infra.

[10]See Exhibit ISO-29, p. 300 and comparable density analyses in ISO-29.

[11]See Exhibits ISO-30 and -30A. Note that the accident data reported pertain only to place of occurrence and not to place of garaging for the involved vehicles, which is the critical fact under current industry rating practices.

[12]Exhibit A-6, p. 9.

[13]Kozik, TR 69, pp. 15-16 and Exhibit HO-9, pp. 2 and 3.

[14]Bernstein, TR 17, pp. 45-46, 49.

[15]Ibid, pp. 49, 87.

[16]Exhibit D-105 (computer run).

[17]Bernstein, TR 17, p. 86.

[18]Exhibit ISO-29, p. 14.

[19]Jonathan Sheldon, TR 38, p. 15. Note that incorporation of city and suburbs in one territory affects price but does not guaranty equal availability of insurance.

[20]Bernstein, TR 17, p. 85; and Exhibit A-6, p. 8.

[21]Exhibit A-6, p. 9.

[22]The ISO field report indicates for example that 95 per cent of Newark commuters travel more than 5 miles to work. Exhibit ISO-29, p. 50.

[23]Exhibit D-105A.

[24]Exhibit D-119, col. 6.

[25]Exhibit D-116. Accidents involving cars with "unknown" registrations were subtracted from the total accidents in making computations. The numerator is the number of drivers involved in accidents within their own territory. The denominator is the total number of drivers with known registration involved in accidents within that territory.

[26]Exhibit D-118.

[27]These journey-to-work data include commuter trips by all modes of transportation. The estimated amount of out-of-territory travel by car would therefore tend to be understated in proportion to the availability of mass transit facilities in each territory.

[28]The Public Advocate requested of the companies insurance data reflecting place-of-garaging and place-of-accident for a sampling of cars involved in property damage liability claims. Apparently the little data developed was not helpful. See Exhibits PA-5 and related exhibits and TR 60, pp. 111-116.

[29]Exhibit D-105A, p. 4. If out-of-state cars are excluded from the count, local involvements still amount to less than half or about 48 per cent of the total accident involvements in the territory; and the five territories contiguous to Newark, contribute about 31 per cent of total accidents occurring in Newark, representing only 9 per cent of the total accidents statewide involving drivers from these territories.

[30]Exhibit D-105A, p. 3.

[31]Exhibit D-119 and D-105A.

[32]Bernstein, TR 17, p. 84.

[33]Exhibit LSNJ-9, p. 14.

[34]Sheldon, TR 38, p. 14. Sheldon noted that 54.2 per cent of the population in Newark, the State's highest-rated territory are black, while only 8.3 per cent of the rest of the State's residents are black.

[35]Ibid, p. 15.

[36]Ibid.

[37]Gibson, TR 12, pp. 6-7.

[38]William Murray, TR 2, pp. 15-16.

[39]Exhibit D-105B.

[40]Exhibit D-28 at p. 15 (Shayer).

[41]Table 32 registered car figures are based on Exhibit D-115, column 5. After the close of the hearing these computer-generated figures were checked against the source document (Motor Vehicle Registration

in the State of New Jersey 1977, Delaware Valley Regional Planning Commission, Philadelphia, Pa.) and the following changes were made to eliminate discrepancies: in territory 16, the figure 123,189 was changed to 172,455; in territory 17 the figure 121,648 was changed to 70,691; and total registered cars were increased by 648.

[42]The earned registration figures in Table 33 are derived from the registered cars by territory in Table 32 adjusted upward to correspond to the total registration figure reported in D-103a, column 3 for 1977. The difference of 130,037 total registrations is distributed among the territories in proportion to each territory's percentage of total registrations in Table 32. This adjustment procedure probably over-allocates registrations to non-rural areas but no better method is available on the basis of available information. The reason for the discrepancy between total registrations in Table 32 and total registrations in D-103a relates to the computer program used by the DVRPC to break down statewide aggregate registrations by insurance rating territory. The program attempted to match registrations with addresses but omitted registrations which for any reason did not match with an address or matched only with P. O. Box, R.D., R.F.D., R.T. or R.R. designations.

[43]Walters, TR 31, p. 131.

[44]Exhibit ISO-29, p. 1.

[45]Exhibits D-96 and D-105B.

[46]In the case of Atlantic City, merger with the adjoining Southern Counties territory would reduce the average compulsory rate for Atlantic City by 21 per cent but increase the Southern Counties' rate by less than 1 per cent. Data contained in Exhibits D-96 and D-105B were used in the calculation of this hypothetical.

[47]Walters, TR 43, p. 113.

[48]Exhibit A-6, sub-exhibit B, p. 2 and p. 7; exhibit SF-1-I, and Miller, TR 5, p. 73.

[49]Exhibit ISO-36, pp. 1 and 2.

[50]Exhibit A-6, sub-exhibit B, pp. 3, 8, 13, 18 and 23.

[51]Miller, TR 51, p. 73. In his testimony, Miller used 50,000 exposures.

[52]Exhibit SF-1a-d.

[53]See for example Table 45, this Section, supra.

[54]Exhibit D-28, p. 29.

[55]In defense of municipal boundaries as the basis for territories it is argued that a line must be drawn somewhere. Bernstein analogizes territory rates to differences in tax burdens between neighbors who

live in different municipalities: by virtue of lines on a map, which sometimes split neighborhoods, citizens are expected to assume different tax burdens. The analogy is not apt. First as Philipp Stern points out, the lines drawn on the map for purposes of collecting taxes and administering services are not designed also for the prediction of relative accident likelihoods. The fact that they are expected to do double duty under current territory plans underscores their arbitrariness. Secondly, the tax burdens on the different sides of municipal boundaries are tied to entirely different services. Stern, TR 5, pp. 29-33. If the analogy to automobile insurance were to hold up, families would pay taxes to one municipality but send their children to the public schools of a variety of different municipalities.

[56]Population densities are reported in exhibit ISO-29, the 1978 ISO field report; accident densities and motor vehicle thefts by municipality are contained in exhibits ISO 30 & 30A. These data should be interpreted with caution. Municipalities are generally too small to generate reliable data on a short-term basis, and the results are highly sensitive to extraneous factors in any event. With respect to the so-called accident densities, for example, two municipalities with virtually identical driving environments and driver accident frequencies can generate very different accidents-per-square-mile simply as the result of differences in acreage.

[57]Exhibit D-112.

[58]Exhibit D-113.

[59]Exhibit ISO-7, p. 49.

[60]These efficiencies are the product of Allstate's Big K of 1.52 for liability and 1.56 for collision and Massachusetts' Big K of 0.83 for comprehensive (as explained in the Appendix) and variances on p. 5 of D-68.

[61]These efficiencies are the product of Allstate's Big K of 1.52 for liability and 1.56 for collision and Massachusetts Big K of 0.83 for comprehensive (as explained in the Appendix) and claim variances on p. 1 of D-91.

[62]See Appendix, Table A-2.

[63]Ferreira, TR 74, pp. 53-55.

[64]Exhibit D-105A.

[65]Bernstein, TR 17, pp. 84-86.

[66]Miller, TR 71, pp. 146-48. Rush hour accidents are lowest on Monday and reach a high on Friday. Miller defined rush-hour as a 6-hour period but mentioned only "6 to 9" and "4 to 6" (p. 146).

[67]Bernstein, TR 17, pp. 86-87. Bernstein did not address the definitional distinctions among "urban," "suburban" and "rural" areas.

[68]"State of Connecticut Insurance Department, Memorandum of Decision - Declaratory Ruling" December 14, 1978. This ruling is the result of a petition filed by the City of Hartford which claimed the existing territorial system violated the Constitutional and statutory provisions of the State of Connecticut. The petitioners voted that the City of Hartford comprised one of eighteen territories in the State. It was argued the class average pricing did not identify who caused the losses in the city and that loss experience was distorted by many of the non-city residents who drove into the city. The insurance industry argued that the mechanism of charging claims back to the territory of the at-fault driver responds to the congestion issue. The Commissioner, however, found that the territory system was unfairly discriminatory under the Connecticut General Statutes.

[69]Bernstein, TR 17, pp. 84-86.

[70]Exhibit D-105, p. 3.

[71]DuMouchel, TR 60, p. 15.

[72]Exhibit PA-6, p. 1.

[73]DuMouchel, TR 60, pp. 32-3.

[74]DuMouchel, TR 60, p. 41.

[75]DuMouchel, TR 60, pp. 14-15.

[76]Exhibit D-105, p. 3.

[77]Exhibit D-105, p. 3.

[78]State Farm's Miller argues for less than a linear effect in the already "highly congested" areas. He suggests that if more vehicles are introduced into these areas his "intuitive expectation" is that frequencies will go down: "If you can't move the automobile down the street, you can't have an accident." (TR 71, p. 150-1) Of course, any determination of which territories are "highly congested" before outside drivers are introduced requires a completely subjective determination because traffic-congestion data by territory have not been examined or assembled by the companies. Furthermore, Miller conjures up images of bumper-to-bumper rush-hour traffic jams when it has already been decided that rush hour traffic is not the only cause of cross-territory flows and any appeal in Mr. Miller's intuition breaks down when other the main commuter arteries and prime drive times are considered. Finally, Miller's argument might at best relate to reductions in the severity of accidents as a result of outside congestion. However, elsewhere in his testimony, Miller indicated that he sees no systematic reduction of accident severities in the high-rated territories.

[79]DuMouchel, TR 65, pp. 45-55.

[80]DuMouchel, TR 65, p. 47.

SECTION 6: CLASSIFICATIONS RELATED TO VEHICLE USE: TYPE OF USE, MILEAGE, MERIT RATING AND MULTICAR VARIABLES

[1]See Exhibit D-90 and combine normalized claim-count variances for "y-use" with Big K's developed in the Appendix.

[2]ISO Personal Automobile Manual, Rule 4.C.1.c., NJ-E-1, effective September 1, 1980. Travelers separates those who commute up to 3 miles one way from pleasure-use for statistical purposes but does not charge different rates for these classes.

[3]ISO Manual, Rule 4.C.1.c.2.b., and State Farm Automobile Manual, "Definitions and Interpretations," P. MF50-7407.

[4]Bernstein, TR 17, p. 85.

[5]Differences among insureds with respect to degrees of discretion as to use of a car for commuting on a day to day basis probably mean differences in risk; but the extent to which discretion is limited by differential availability of alternate transportation raises an issue of fundamental fairness, especially under a compulsory-insurance regime.

[6]Shayer, Exhibit D-28, p. 13.

[7]Ibid.

[8]Stone, Exhibit D-28, p. 182.

[9]The ISO mileage criterion for the "short commute" is one-way distance of 3 or more but less than 10 miles (for more than 2 days per week or 2 weeks in any 5-week period). The mileage criterion for "long commute" is one-way distance of 10 or more miles (for more than 2 days per week or 2 weeks in any 5-week period). State Farm's short-commute class requires "average weekly use" for commuting of more than 30 miles and up to 100 miles per week. Long-commuters drive more than 100 miles per week on average.

[10]Allstate in fact eliminated the "short mileage" category for the long commuters. See Exhibit A-15G, pp. 1-2.

[11]This estimate is based on combined single- and multicar data. (Pleasure exposures = 1,697,593. Commuter exposures = 883,323.)

[12]Among single-car risks the short commuters in fact represent 94 per cent of total commuters. (Exhibit D-90 exposure data). The combined single- and multicar data produce a 74 per cent figure (Exhibit D-94 exposure data).

[13]Derived from Exhibit D-115 (column 7 divided by column 6).

[14]Derived from data in Exhibits D-90 and D-94 for the compulsory coverages.

[15]Derived from State Farm's table 1 data submission--single-car and combined single and multicar data for New Jersey compulsory coverages.

[16]See n.14.

[17]On both sets of data examined, State Farm's senior citizens in the short commute class produce average losses more than 40% greater than the senior pleasure-use class. All coverages single = 52%; multi = 45%. Average losses for State Farm adults in the short commute classes are 8 per cent greater than average losses for pleasure-use adults on single-car data and 1 per cent less on multicar data.

[18]See Exhibit T-2.

[19]The alleged "confidentiality" of State Farm exposures prevents further pursuit of this question.

[20]On ISO data, the average secondary rating factors for pleasure-use adults are .05 on single-car data and -.06 on combined single- and multicar data. For the short-commuter adults these factors are .05 and -.05, respectively. See Exhibit D-95.

[21]The average secondary factors for the long-commute adults are .06 on single-car data and -.05 on combined single- and multicar data. See D-95 and n.20.

[22]Derived from data used in Exhibits D-90 and D-94. Note that ISO and other filers have been reducing use classes applicable to youths. See Exhibit ISO-27, p. 4.

[23]The State Farm data produce about 1,920 claims for the business-commute class.

[24]Travelers Manual of Private Passenger Automobile Insurance, pp. C-8 and C-9.

[25]On ISO's combined single- and multicar data, the business class represents 2.8 per cent of total exposures and the farm class represents 0.8 per cent of total exposures.

[26]Exhibit D-28, p. 13.

[27]See Exhibit D-95.

[28]See Tables 56 and 56A, supra.

[29]Exhibit T-2.

[30]See Exhibit D-95.

[31]Exhibit D-28, p. 17.

[32]Sheldon, TR 38, p. 21.

[33]State Farm 3-year table 1 data for New Jersey compulsory coverages, all uses except business and farm.

[34]Exhibit T-2.

[35]Exhibit A-16(a)-through-(g).

[36]Colonial Penn table 1 data (1975-6/78). The 17 per cent is for liability and the 24 per cent is for physical damage.

[37]See McCabe, TR 20, pp. 98-99.

[38]See for example McCabe, TR 22, pp. 15-18.

[39]But see Reeves, TR 48, pp. 35-45.

[40]See Stern, TR 5, p. 36.

[41]Exhibit ISO-27, p. 1.

[42]McCabe, TR 20, p. 78.

[43]Edward Young, TR 36, p. 55.

[44]Exhibit D-2, pp. 11-12.

[45]ISO Personal Auto Manual, Rule 5B(3)(a), p. GR-6.

[46]Exhibit D-74, pp. 5-7.

[47]Full-coverage comprehensive is used because until the early part of 1976 this was the most common comprehensive coverage purchased. Consequently it contains the most earned exposures during the 1975 to 1977 period.

[48]The law governing cancellations is N.J.S.A. 17:29C-7. The regulation governing non-renewals is N.J.A.C. 11:3-8.1.

[49]Note, however, that ISO has increased the chargeable-accident threshold substantially in recent years, at least in percentage terms. The current $300 threshold is three times as large as the threshold in effect through most of 1973.

[50]See Section 4, n.92.

[51]Exhibit SF-11 and Miller, TR 71, p. 61.

[52]Walters, TR 42, pp. 48-49, 55.

[53]See Ferreira, TR 58, pp. 60-61 and Exhibit D-28, pp. 56-57.

[54]See Ferreira, TR 58, pp. 68 and 74.

[55]Ibid, pp. 70-71.

[56]These explanatory power estimates are derived from Exhibit D-86 using the reported normalized claim-count variances for the 6th digit only and the 2nd digit only together with the Big K-value for liability (1.52) derived in the Appendix.

[57]Travelers Manual of Private Passenger Automobile Insurance, Rule 27D4-d, p. C-13, and Rule 27E6, p. SE-8.

[58]Exhibit T-1, p. 1, items 1, 2 and 3.

[59]Exhibit T-1, p. 2, item 1.

[60]Exhibit T-1, p. 1, item 3.

[61]Exhibit T-1, p. 2, item 2 (albeit a very small sample).

[62]The California Driver Fact Book, July 1976, pp. 5-6.

[63]Exhibit D-23, p. 2.

[64]Stern, TR 5, pp. 68-69.

[65]Ibid, p. 71.

[66]Derived from Exhibit D-23.

[67]See Exhibit ISO-32, Appendix VI, Sheet 3.

[68]Allstate private passenger automobile filing dated January 10, 1979, p. 13 (of cover letter). Department filing no. 79-20.

[69]State Farm has separate classification factors for single and multicar insureds. The multicar rating factors are 10 per cent below the single car rating factors, rounded to the nearest .05 (e.g. 1.30 single car rating factor becomes 1.15 multicar rating factor).

[70]The State Farm multicar pure premium divided by single-car pure premium produced the following raw indications under the combined compulsory coverages: adult-pleasure = -21.5%; adult-other uses = -26.4%; seniors-pleasure = -9.1%; seniors-other uses = +21.3%; single male principals 17-24 = +21.9%; single male occasionals 17-24 = -12.5%; single female principals 17-24 = +5.8%; single female occasionals 17-24 = -22.6%. New Jersey calendar years 1975-1977.

[71]Allstate private passenger filing dated January 10, 1979, exhibit F, p. 17. This exhibit is based on policy years 1972 and 1973 as of June 30, 1973, countrywide experiences. (There is no reason indicated for Allstate's five-year delay in submitting these data. The delay is difficult to reconcile with Allstate's claim that classification systems are essentially cost-accounting mechanisms.)

[72]These data have not been adjusted for mix of business considerations. The average classification factor exclusive of the multicar discount was within additive ±.05 for all classes except unmarried male principal operators 17-24, and unmarried female 17-24. Both of these class groups have higher rating factors under multicar policies.

[73]Females 30-64 show only 13,133 multicar exposures on 3 years of ISO data.

SECTION 7: PRICING METHODOLOGIES

[1]See generally Fairley, TR 53 and 64.

[2]Exhibit D-64.

[3]Chang, Lena, and William B. Fairley, "Pricing Automobile Insurance Under Multivariate Classification of Risks: Additive versus Multiplicative," The Journal of Risk and Insurance, vol. 46, no. 1, (1979). (See Appendix, Exhibit D-64.)

[4]Fairley, TR 64, p. 44.

[5]Exhibit ISO-40. See comments by Fairley, TR 53, pp. 61-71.

[6]Fairley, TR 51, pp. 60-61. Exhibit A-12.

[7]Edward Young, TR 63, p. 85.

[8]See comments by Fairley, TR 51, pp. 73-80.

[9]Closing Statements, TR 85.

[10]Miller, TR 37, p. 100.

[11]Ibid., pp. 100-101.

[12]Miller, TR 49, pp. 59-62.

[13]Thomas Weidner, Closing Statement, TR 85, pp. 59-62 and 83.

[14]Ibid., p. 61.

[15]Ibid., pp. 60-61.

[16]Fairley, TR 64, pp. 48-50. See Exhibit D-65.

[17]Fairley, TR 64, p. 41.

[18]Ibid., pp. 47-50 and 64-65.

[19]Ibid., p. 42.

[20]Jasper Jackson, Closing Statement, TR 85, pp. 117-118 and 123.

[21]Fairley, TR 64, p. 35.

[22]See Exhibit D-64, Appendix

[23]Mr. Young's response to Department questions on Allstate's expense allocation methods can be found in TR 39 and 44. Quotations in this paragraph are from TR 39, p. 120 and p. 118.

[24]See Exhibit D-28, pp. 121-143

[25]State Farm's "Automobile Expense Study" was submitted as Exhibit III attached to a December 14, 1979 letter from Actuary M. J. Miller to Commissioner James J. Sheeran.

[26]Mr. Michael Walters' response to Department questions on ISO's expense allocation methods can be found in TR 59 and 77. Discussion of ISO survey is in TR 77, pp. 84-90.

[27]Walters, TR 77, pp. 12-13.

[28]Ibid., pp. 100-101.

[29]Edward Young, TR 44, pp. 23-24.

[30]Walter, TR 77, pp. 83-84.

[31]State Farm "Automobile Expense Study," pp. 4-5.

[32]Ibid., p. 1 and p. 6.

[33]Walters, TR 77, p. 68.

[34]Ibid., p. 72.

[35]Ibid., p. 40.

[36]Ibid., p. 26.

[37]Mr. Muetterties' testimony can be found in TR 25A & B.

[38]Muetterties, TR 25A, p. 77.

[39]Ibid., p. 75.

[40]Mr. Minter's testimony can be found in TR 25B.

[41]Ibid., pp. 31-32.

[42]Ibid., p. 43.

[43]Ibid., p. 50.

[44]Ibid., p. 57.

[45]Ibid., pp. 43-44.

[46]Ibid., p. 46.

[47]Willard Young's testimony can be found in TR 25B and 55.

[48]Willard Young, TR 25B, p. 65.

[49]Ibid., p. 76.

[50]Willard Young, TR 55, p. 66.

[51]Ibid., p. 67.

[52]See Exhibit PIA-2. Testimony of Professors Frankle and Buss is in TR 55.

[53]Willard Young, TR 55, p. 11.

[54]Ibid., p. 82.

[55]Ibid., pp. 24-26.

[56]Ibid., pp. 95-96.

[57]December 18, 1979 letter of Ellen Kiehl to Deputy Commissioner Walter R. Bliss, Jr., p. 3.

[58]"Analysis of Agency Costs: Personal Auto and Homeowner," Temple, Barker and Sloan, Wellesley Hills, Massachusetts, 1977.

[59]Buss, TR 55, pp. 89-90.

[60]December 18, 1979 letter of Ellen Kiehl to Deputy Commissioner Walter R. Bliss, Jr., p. 2 and attached Exhibit 4.

[61]Exhibit PIA-2, pp. 4-5.

[62]Buss, TR 55, pp. 123-124.

[63]Exhibit PIA-2, p. 4.

[64]Buss, TR 55, p. 122.

[65]Ibid., p. 136.

[66]Peters, TR 28, p. 80.

[67]Ibid., pp. 113-114.

[68]Exhibit D-28, p. 140.

[69]Ibid., p. 190.

[70]Ibid., p. 191.

[71]Ibid.

[72]Ibid., p. 192.

[73]Peters, TR 28, pp. 90-91.

[74]Exhibits D-50A and D-50B.

SECTION 8: OVERALL ASSESSMENT

[1]Exhibit LSNJ-9, pp. 4-5.

[2]Exhibit ISO-7, p. 49. SRI's additional 7 per cent estimate for underwriting was based on a comparison of pure premiums between identical classes in different companies. Because the ISO data used in the hearing aggregated across all ISO companies, they did not include estimates for the differences among companies. Therefore ISO estimates presented at the hearing are comparable to the 22 per cent of the SRI. Homogeneity estimates developed from individual company data, however, begin with data which have already excluded variations due to homogeneity. The additional 7 per cent should not be added to the individual company estimates.

[3]Exhibit D-28, p. 153.

[4]Exhibit D-71, p. 3.

[5]Ferreira, TR 57B, pp. 30-31.

[6]Based on Exhibit D-91.

[7]Exhibit ISO-7, p. 47; Exhibits D-66 and D-86.

[8]Woll, TR 21, pp. 71-74; Exhibits H-2 and H-5.

[9]Exhibit A-17, sub-exhibit 1.

[10]See Appendix, Part D. Methods for Deriving Specific Estimates of Explanatory Power.

[11]Exhibit D-29, p. 173.

[12]Walters, TR 26, pp. 36-38.

[13]The K of 4 is explained in TR 54, p. 14; the K of 2 in TR 54, p. 52; the K of 1 in TR 54, p. 109. These dispersion estimates do not provide an exact picture because they assume a normal distribution In the gamma case, the closer the K to 1, the more skewness to the right, thus the more the deviation above as opposed to below the mean.

[14]Exhibit D-28, pp. 118-19.

[15]See Table 17B, supra.

[16]See Table 17, supra.

[17]Ibid.

[18]See generally the Appendix, Part G, "Illustrating the Heterogeneity of Driver rating Classes."

[19] The premiums are based on ISO rates effective December 28, 1979 and include the policy constants effective November 18, 1980. Coverages are for basic compulsory (excluding uninsured motorists) with $200 deductible collision and $100 deductible comprehensive. The automobile considered is a 1980 Chevette (symbol 5/Age 2).

[20]See Exhibit H-29, pp. 9 and 14.

[21]Andrew Giffin, TR 52, pp. 35-36.

[22]Exhibit H-29, p. 3.

[23]McCabe, TR 32, p. 78.

[24]Ibid., p. 43.

[25]Stone, Exhibit D-28, p. 151.

[26]Exhibit H-29, p. 7.

[27]Exhibit LSNJ-8, p. 729.

[28]Giffin, TR 52, p. 34.

[29]See Exhibit ISO-3, p. 7; Exhibit ISO-32, appendix II, sheet 7.

[30]Exhibit T-1, pp. 1-3.

[31]Irving Plotkin, TR 80B, pp. 74-75.

[32]Exhibit H-29, p. 3.

[33]Exhibit LSNJ-9, p. 3.

[34]Giffin, TR 52, p. 47.

[35]Edward Young, TR 39, pp. 39-40.

[36]Ibid, pp. 87-88.

[37]Richard Reeves, TR 48, pp. 22-23.

[38]Miller, TR 71, p. 130.

[39]Ferreira, TR 73B, pp. 50-67.

[40]Exhibit D-97 displays exposure distributions for different companies. These distributions are similar between the companies. Class distributions can be derived from exhibit D-94 for ISO and exhibit A-15-0 for Allstate. Allstate displays premiums in the classification exhibits and these premiums must be adjusted. This requires that

the displayed adjusted premium be divided by the underlying relativity. ISO has 53.4% of its business in the adult pleasure class and 6.4% in male principal operator 17-through-29 classes. Allstate has 51.2% and 6.1% respectively in these classes. State Farm data are not unlike the data of the other companies.

[41]See Ferreira, TR 73B, p. 69, where he suggests involuntary risks be assigned in proportion to companies differences in statewide mix of business.

[42]Ferreira, TR 73B, p. 61.

[43]New Jersey has only a $200 threshold on pain-and-suffering lawsuits under the No-Fault law. See N.J.S.A. 39:6A-8. Any increase in the threshold would arguably decrease bodily injury liability claim frequencies, reducing the cost of the bodily injury liability coverage. The ISO filing, submitted March 11, 1980, displays an average bodily injury liability rate of 89.90. Adding the November 18, 1980 increase produces an average rate of $102. A 30 per cent reduction in the cost of this coverage amounts to a 12 per cent decrease in the average cost of compulsory coverages, using $256 as the cost of these coverages; and a 7 per cent decrease in the cost of full coverage, using a $408 premium.

[44]Exhibit ISO-39, p. 36; and Exhibit D-6.

[45]Exhibit ISO-41A.

[46]Exhibit A-9.

[47]Michael Walters letter dated November 9, 1979 to Walter Bliss, Exhibit 1, sheet 1.

[48]Exhibit A-9, p. 4.

[49]Highway Loss Data Institute is a recognized advisory organization in New Jersey pursuant to N.J.S.A. 17:29A-29. The latest listing of directors indicates that only one of eleven directors is not an employee of an insurance company.

[50]Walters, letter dated November 9, 1979, Exhibit 3, sheet 2.

[51]HLDI standardizes information by taking established percentages for youthful and non-youthful exposures. HLDI also normalizes by deductible. The 1978 data are normalized according to the following distribution:

	Youthful	Non-Youthful
$ 50 Deductible	.05	.35
$100 Deductible	.15	.45

[52]ISO Personal Auto Manual, Rule 4.C.6 and 7. See also Miller, TR 49, p. 10.

[53]Exhibit D-6, p. 1; and Exhibit ISO-41D.

[54]Exhibit ISO-41-A, p. c-1.

[55]Exhibit ISO-39, p. 2.

[56]Exhibit D-51, pp. 53-56.

[57]Ferreira, TR 14, p. 42.

[58]Exhibit D-5, p. 53.

[59]See generally LSNJ-9 p. 13.

[60]Ibid.

[61]See Stern, TR 5, p. 34.

[62]See generally Ferreira, "Identifying Equitable Insurance Premiums Risk Classes: An Alternative to the Classical Approach," in Exhibit D-28, pp. 74-120. See also Ferreira, TR 7, pp. 111-112 and Exhibits D-37 and D-68.

[63]Exhibit D-28, p. 91.

[64]The Public Advocate offered testimony by John W. Pratt, a Professor at the Harvard Business School and an acknowledged expert in statistics and decision theory (Exhibit PA2 and 2A), and Ralph L. Keeney, a consultant with extensive academic credentials in decision analysis (Exhibit PA-9A). See Pratt, TR 34, pp. 126-142; and Keeney TR 68, pp. 22-40.

[65]See Pratt, TR 34, p. 130, where he says that "the idea is to go from the simple to the complex, to make your judgments in situations that are simple enough so that you really know what you're judging, even though the judgment may be difficult, and then use that to arrive at what judgments would be consistent with that in the more complex problem that you really face."

[66]The $503 figure is merely the class mean ($772) minus the statewide average rate ($269), corresponding to the 10 per cent standard. The $234 figure is merely the class mean minus two-times the statewide average, corresponding to the 1 per cent standard. The derivation of the proportions of the class deviating from the mean by more than these amounts uses the same method used in computing pricing errors and overlaps as discussed in the Appendix.

[67]See Exhibit D-92. Specific runs for classes and territories after the rate adjustments specified earlier produce exponential fits close to .75 for a C-value of 250.

APPENDIX: METHODOLOGICAL QUESTIONS

[1]See Section 3, n. 1.

[2]Exhibit D-29, Chapter IV.

[3]Kozik, TR 72, p. 100.

[4]Exhibit ISO-7, pp. 35-35.

[5]Ibid, pp. 42-44.

[6]Exhibit D-28, p. 71.

[7]Ferreira, TR 54, pp. 15-16.

[8]Exhibit D-30, p. 3.

[9]Ferreira, TR 54, p. 37.

[10]Pratt, TR 34, p. 109.

[11]Travelers data did not equal one year, but its data differed in other respects from that requested in the call for data.

[12]Conners, TR 19, p. 56.

[13]Exhibit D-66, p. 1.

[14]Exhibit D-71, p. 5.

[15]Exhibit D-66, p. 1. Mr. Woll's estimate of Big K in exhibit H-17 differs from the exhibit D-66 estimate because he uses single and two-car policies combined and the D-66 estimates use only single-car policies.

[16]Exhibits ISO-2 and ISO-3; "countrywide" includes all states except North Carolina, Texas, Massachusetts and New Hampshire (Conners, TR 19A, p. 52).

[17]Exhibits ISO-2, ISO-3 and D-66, p. 1.

[18]Conners, TR 19, p. 55; insureds who were with the company for less than a year were excluded from the Conners data consistent with table 2 controls (TR 19, p. 52).

[19]Exhibit D-68, p. 5.

[20]Ferreira, TR 57B, p. 26.

[21]Exhibit D-66, p. 1.

[22]Exhibit A-17, Kozik, TR 72, p. 134.

[23]Exhibit HO-9.

[24]Kozik, TR 72, p. 129.

[25]Ibid., p. 135.

[26]Exhibit HO-9.

[27]Ferreira, TR 54, p. 148.

[28]Ibid., TR 54, p. 149.

[29]Ferreira, TR 57B, p. 26.

[30]Exhibit D-71, p. 5.

[31]Ferreira, TR 57B, p. 26.

[32]Ferreira, TR 54, p. 148.

[33]Pratt, TR 62, pp. 82-84.

[34]Kozik, TR 72, p. 45. With respect to any item submitted by the N.A.I.I., Mr. Kozik indicated that he was "not familiar with the N.A.I.I. data."

[35]Essentially the same analysis was performed by Robert Giambo of ISO except he compared only zero- and one-accident categories and used additional California motor vehicle data. See TR 18, pp. 56-57.

[36]Ferreira, TR 57, pp. 71-72.

[37]Woll, TR 23, pp. 46 & 46A.

[38]Ibid., p. 46.

[39]Exhibit D-72.

[40]Ferreira, TR 57B, pp. 69-70.

[41]Ferreira, TR 57B, pp. 69-70.

[42]Professor Pratt's credentials are contained in Exhibit PA-2.

[43]Pratt, TR 34, p. 103.

[44]Ibid., p. 105.

[45]Pratt, TR 62, pp. 65 and 100.

[46]Ibid., p. 64.

[47]Exhibit H-1, p. 32.

[48]Woll, TR 23, pp. 21-22. See Exhibit D-31 for Dr. Ferreira's dice rolling analogy and TR-7, pp. 34-37 for related testimony.

[49]Exhibit H-1, pp. 8-10.

[50]Weisberg, TR 38, pp. 126-127. See Exhibit D-54 for Dr. Weisberg's credentials.

[51]Woll, TR 21, pp. 59-69.

[52]Exhibit H-2.

[53]Ferreira, TR 57B, pp. 70-73.

[54]Exhibit H-2.

[55]Woll, TR 23, p. 55.

[56]Ferreira, TR 57B, pp. 74-75.

[57]Ibid., p. 75.

[58]Exhibit H-1, p. 5.

[59]Ferreira, TR 57B, pp. 75-76.

[60]Exhibit H-2.

[61]Ferreira TR 57B, pp. 76, 78-79; Exhibit D-73, p. 4 - labeled p. 7.

[62]Exhibit A-17, sub-exhibits 11 & 12.

[63]Exhibit H-2.

[64]Exhibit H-17.

[65]Exhibit H-17; Exhibit A-17, pp. 16 and 17.

[66]Exhibit D-66, p. 6; Exhibit H-20.

[67]Exhibit A-17; Kozik, TR 72, pp. 107-112.

[68]Exhibit D-66, p. 4; Exhibit D-86.

[69]Exhibit A-17, sub-exhibits 2; Kozik, TR 72, p. 123.

[70]Exhibit D-66.

[71]Exhibit ISO-7, p. 49.

[72]Conners, TR 18, pp. 8-9.

[73]Exhibit D-71, p. 3.

[74]Source of State Farm's explanatory power estimates is Exhibit D-91. At first blush the limited State Farm analysis appears to indicate that the eight State Farm classes analyzed explain more than ISO's second digit which contains comparable age, sex and marital status information. This result is probably attributable, at least in part, to the fact that State Farm has not separated single and multicar policies in the data. The use of combined single and multicar data to compute normalized variances among classes is likely to inflate the amount of variation explained by class average experience.

[75]Normalized claim count variances for State Farm's eight classes and for its territories are set forth in Exhibit D-91. The ISO variances are found in D-86.

[76]Exhibit A-17, sub-exhibits 1 and 2.

[77]Exhibit A-17, sub-exhibits 34-52; Exhibit HO-9.

[78]Exhibits H-18 and H-18A reflect the Woll estimates. Note that the 8.1% figure in the third row, sixth column of the data in H-18, page 2, should instead be 12.3%. The 8.1% figure is the normalized variance and has yet to be multiplied by 1.52.

[79]The fact that the explanatory power estimates for Allstate's sixteen classes are similar to those for ISO's comparable driver classes further supports the contention that Allstate's normalized variance estimates based on variation in actual premiums grossly overstate the explanatory power of all its classifications. While the differences between the actual-premium and normalized-variance methods in Exhibits 34 and 35 of A-17 appear small, only 16 categories are considered. For so few subdivisions of the data the inflation due to a multiplicative model for combining classes and territories and the lack of adjustment for policy endorsements, choice of deductibles etc. are likely to be washed out. But the premium variances in Exhibit 3 of A-17 were developed from policy by policy comparisons of Allstate's entire book of business--all those not screened out for Table 2 estimates. In this case each policy is treated as a separate "class" so that the number of categories runs into the hundreds of thousands.

[80]Exhibit H-18.

[81]Three-year ISO data for 4,340 classes from Exhibit D-86 combined with State Farm territory claim count variances from Exhibit D-91 for collision coverage. Using unadjusted pure premium variances from the same ISO and State Farm data would increase the 41 per cent figure to 70 per cent. Using ISO's unadjusted territory pure premium variances instead of State Farm's would yield 74 per cent.

[82]Woll, TR 82, p. 90.

[83]Exhibit H-20, p. 7.

[84]Exhibit D-122.

[85]In his testimony at the close of the hearing, TR 82, pp. 18-19, Woll suggested other methods for adjusting the estimates (H-20). However, these methods were not applied to any data entered into evidence by any witness.

[86]Exhibit D-29, p. 204; Pratt, TR 62, p. 87.

[87]Exhibit D-29, pp. 233-236.

[88]Exhibit D-28, p. 118.

[89]Ferreira, TR 54, p. 140.

[90]Exhibit D-51, p. 5; Ferreira, TR 54, p. 138.

[91]Exhibit H-18.

[92]Exhibit HO-9, sub-exhibit 4; Exhibit A-17, sub-exhibit 52.

[93]Ferreira, TR 57B, p. 38; and TR 54, pp. 138-139.

[94]Exhibit A-17.

[95]Exhibit HO-9.

[96]Exhibit D-71, p. 5.

[97]Exhibit H-18.

[98]The percentages in Exhibit D-28, p. 69 were combined with the 330,910 total exposures in exhibit D-66, p. 2, column labeled "collision".

[99]Ferreira, TR 54, p. 137 and exhibit D-66, p. 8.

[100]The graph shows only 11 of the 13 classes for which data were presented in Exhibit D-28. The excluded classes are #31, for commercially rated vehicles, and #00, representating a subset of class 10 for Boston drivers here merged with class 10. These changes are consistent with Woll's estimates in H-18, p. 1.

[101]The first seven classes had New Jersey liability claim frequencies, as reported in Exhibit A-17, sub-exhibit 52, that were above the statewide average. Mr. Woll applied the same split to collision coverage even though classes 8, 9, 10, 11 and 12 were slightly above the statewide average collision claim frequency. Classes 1 through 8 refer to those under age 25, classes 9 comprises single males aged 25-29, and classes 10 through 16 contain other adults.

[102]See Exhibit D-71, p. 5. The interval is the k-estimate plus or minus twice the standard error from D-71, p. 2.

[103]Where k-estimates are less than zero, a value of +15 is used in the graph in order to emphasize the possibility that such a lack of excess variance implied a relatively large amount of homogeneity and not simply small sample size.

[104]Exhibit H-18.

[105]Exhibit D-68, p. 5.

[106]Unadjusted normalized variances are in Exhibit H-18. The data needed for direct derivation of average k-values for each grouping are in H-18A.

[107]Ferreira, TR 57B, p. 39 and TR 54, p. 138.

[108]Exhibit HO-9, supplied by Allstate at the close of the hearing.

[109]Exhibit A-17; Kozick, TR 72, pp. 111-114.

[110]Mr. Woll suggests that the existence of a correlation between class-average frequencies and class k-values is consistent with current thinking that differences between youths and adults in high-rated territories are less pronounced than in low-rated territories. This thinking supports the notion that class and territory factors should be combined additively instead of multiplicatively. Woll's analogy has intuitive appeal although it also has definite limitations. In Exhibit H-19 Mr. Woll assumes that every risk factor interacts with every other risk factor in an additive fashion. The additive-multiplicative debate is limited to the question of how best to combine information provided by risk variables currently in use, not whether all risk characteristics both known and unknown have a similar interactive relationship. The variables currently in use are known to have relatively little explanatory power. With respect to the larger part of overall risk variation left entirely unexplained by current variables, there probably exist risk characteristics or factors which if identifiable would interact multiplicatively. An example would be factors which are capable to identifying regular drinkers and, within that group, regular drinkers who also drive on crowded streets after drinking. The factors which identify the drinking on one hand and the driving conditions on the other would probably combine at least multiplicatively. No such definable factors exist nor can be reasonably expected to be found, but the interaction is taking place nonetheless and is buried in the large fraction of risk variation unexplained by current variables.

[111]Pratt, TR 62, p. 82.

[112]Ferreira, TR 54, p. 138.

[113]Pratt, TR 62, p. 87.

[114] Ibid., p. 82.

[115] Ibid., p. 108.

[116] Compare Figure 3 in Exhibit SF-16 with Exhibit D-88.

[117] Pratt, TR 62, p. 116.

[118] The premiums are for basic limits and standard deductibles. In the case of physical damage coverages, a symbol 5 vehicle aged 2 or 3 years is assumed (e.g. a Chevette). The base premiums in Table A-7 include the so-called "policy constants" added to the allowable rates as of November 18, 1980. These amounts are $12. for Bodily Injury and PIP coverages, $6. for Property Damage, $8. for Collision and $4. for Comprehensive. These amounts are added on a flat basis to all premiums regardless of class or territory.

[119] Any expenses that are to be loaded in a flat, per-policy basis would not be used to scale the gamma distribution but would be added to the scaled gamma distribution in the final step.

[120] Technically, the curve is a gamma distribution with a mean of $117 and a k-value of 2.0 which has been shifted by the $8. flat expense that is deemed appropriate for all insureds to pay on a flat per policy basis.

[121] Numerically, the 43 per cent figure equals the fraction of the area under the curve in Figure A-6 that is in the shaded area. Note that this computation assumes that the actual premium accurately reflects class average expenses and expected costs.

[122] These "Big-K" values are those estimated from Exhibit A-17 data using the "excess variance" estimation method. For comprehensive coverage, k-estimates were not available from Allstate and the Massachusetts estimate (see exhibit D-66, p. 1) is used. Since the k-estimates for the other coverages were quite close to one another for Allstate and Massachusetts, this substitution should present no problems.

[123] The variances are taken from Exhibit D-86.

[124] To assure conservative estimates for use in Table x-3, the largest estimates for ISO/NAII are taken from Exhibit D-68, and the largest estimates for State Farm are taken from Exhibit D-91.

[125] Once again, the analysis focuses on single-car data in order to avoid aggregation over class factors that are presently in use and to track the type of data traditionally used to establish classification relativities. The computer runs referred to were used to produce Exhibit D-89.

[126] The formula on page 3 of Exhibit D-66 for translating "Big K" estimates and normalized variances into "little k" estimates assumes equal little k values across subcells. A similar sum-of-squares

analysis but with the assumption that k's are proportional to the cell means yields the formula: $(1/1k) = (1/k) - v$ where 1k is the "little k" value for a class whose mean claim frequency matches the grand mean for all classes, k is the "Big K" value and v is the normalized variance. The "little k" values for each subcell can then be computed by multiplying k by the ratio of the cell mean frequency to the grand mean.

[127] As explained earlier, little k's do not appear to vary systematically among adult classes or among youth classes. Hence, these little k's are computed using the formula on page 3 of Exhibit D-66.

[128] Since class and territory factors combine in a manner that seems closer to additive than multiplicative, it is likely that territories explain a larger percentage of the variation among adults than among youths. However, the territories--as presently constructed--explain little so that the way they interact with class factors will have only a small impact on the final k estimates. Moreover, assuming that territories explain the same percent variation for youths and adults will exaggerate the homogeneity estimate for the youths estimate for the youths and underestimate it for adults. Hence, the classes and territories will appear to be even closer to the "equally-accurate-in-dollar-terms" ideal than is likely to be the case.

[129] The standard deviation of the pricing error for any one coverage is simply the standard deviation of claims likelihoods for insureds in the particular class scaled up by expense, tax, profit and severity loading. This standard deviation of claims likelihoods, by definition, is the inverse of the square root of k. Hence, the k-estimate for a package of coverages is simply the premium weighted average of the inverse of the square root of k for each individual coverage.

[130] Recall that the K-estimates for individual classes derived from the New Jersey data were much less reliable than those developed from the combined seven-state data even though the overall homogeneity estimates were similar. Recall, also, that the only systematic differences across classes in the k-estimates appeared to be based on a youth/adult split.

[131] See Exhibit H-18, p. 2. Note that these normalized variances are not adjusted to remove sample size biases. Also, as was explained earlier, the apparent higher k-values in the "high" group may well result from the screening process used to select the Allstate sample of insureds.

[132] The Allstate split into two high and low groups explains more than the ISO split in two adult and youth groups. Hence, it is quite likely that the remaining Allstate classes explain less than do the subdivisions of ISO's adult and youth groups.

[133] The Newark Suburban territory (ISO territory 31) is considered since its experience is close to the statewide average. The

highest-rated youthful male class (ISO driver class 8712) comprises single males 17 years of age or younger who are principal operators of the vehicle, use it for work or business, and do not qualify for driver training or good student discounts. The highest-rated youthful female class (ISO driver class 8212) comprises single females 17 years of age or younger who use the insured vehicle for work or business and do not qualify for driver training or the good student discounts.

[134]Only territories and primary and secondary rating factors are included in this count. Value-of-car categories add further to the level of refinement in the present classification structure.

[135]Plainfield is ISO territory 39.

[136]The computation of premium amounts under the additive model is approximate because, for simplicity, a uniform mix of classes across territories is assumed.

[137]This relativity is 4.05--the manual rating factor plus average secondary rating factor.

[138]For such high k-values, the gamma distributions are very close to normal distributions. To facilitate the computations in this case, the normal approximation was in fact used.

[139]Current State Farm rates for classes comparable to the ISO seniors, adults, high-female and high-male classes are considered. The same split-k estimates of within class homogeneity are used for ISO and State Farm. As was explained earlier; the ISO estimates for k-values are judged equally reasonable for State Farm.