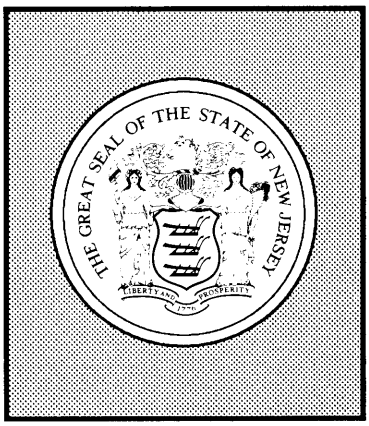


21st Annual Report

Economic Policy Council and Office of Economic Policy

STATE OF NEW JERSEY
1989

21st Annual Report

Economic Policy Council and Office of Economic Policy

STATE OF NEW JERSEY
1989

ECONOMIC POLICY COUNCIL

DR. JOSEPH J. SENECA, *Chairman*
Professor of Economics, Rutgers University

DR. WILLIAM C. FREUND, *Member*
New York Stock Exchange Chair Professor of Economics and International Business, Graduate School of Business, Pace University

DR. DAVID F. BRADFORD, *Member*
Professor of Economics & Public Affairs, Woodrow Wilson School, Princeton University

OFFICE OF ECONOMIC POLICY

DR. ADAM BRONER, *Director*

DR. LAURENCE FALK, *Economist*

DR. BRUCE McNEVIN, *Economist*

DR. JONG KEUN YOU, *Economist*

MR. JERZY ZACHARIASZ, *Economist*

CAROL MASLOWSKI, *Administrative Secretary*

STATE OF NEW JERSEY
ECONOMIC POLICY COUNCIL
20 WEST STATE STREET
CN 830
TRENTON, NEW JERSEY 08625-0830

DR. JOSEPH J. SENECA
CHAIRMAN

MEMBERS
DR. WILIAM C. FREUND
DR. DAVID F. BRADFORD

DR. ADAM BRONER
SECRETARY
(609) 292-1890

October 25, 1989

The Honorable Thomas H. Kean
Governor of New Jersey
Trenton, New Jersey

Dear Governor Kean:

In accordance with Chapter 129 of the New Jersey Laws of 1966, the Economic Policy Council and Office of Economic Policy are pleased to submit our *21st Annual Report*.

As the decade of the 1980s closes, New Jersey and your Administration can take considerable pride in the economic accomplishments of the State. The decade's initial years were characterized by high levels of unemployment, fiscally distressed urban centers, budget deficits, and a deep concern over the long-run competitive position of New Jersey in national and world markets. In contrast, the State ends the decade with a seventh consecutive year of economic expansion. Although economic growth has slowed recently, in part constrained by the extent of our past success, the State's economy has been extensively transformed and greatly strengthened.

The 1990s hold great promise for New Jersey. However, the problems which have developed from our recent prosperity combined with concerns over economic development trends within the State will continue to pose major public policy challenges. Accordingly, we focus this year's *Report* on an analysis of several issues which we believe will dominate public discussion in the 1990s. Specifically, we examine long-term economic trends in New Jersey in order to identify some of the constraints which will increasingly confront the State's economy -- labor supply and housing affordability. We go on to discuss the latter issue of housing affordability in some depth. We also provide an assessment of educational performance in a large sample of New Jersey schools. Finally, we measure differences in economic performance between the northern and southern parts of the State. Our purpose in all these studies is to contribute to informed discussion.

We appreciate your continued interest in our activities and your efforts to improve the performance of the State's economy and extend its prosperity to all its citizens.

Respectfully submitted,

Joseph J. Seneca

Joseph J. Seneca

TABLE OF CONTENTS

STATISTICAL TABLES

INTRODUCTION AND REVIEW OF REPORT'S CONTENTS

This Annual Report focuses on several interrelated policy issues that have increasingly concerned our State over the last decade. In each case, we present evidence of the past behavior of key economic variables in the context of these issues. However, although our analysis is necessarily directed to what has already happened, we expect these issues to persist in the future. We believe they will remain important and difficult policy questions, whose solutions, or lack thereof, will shape the nature of the economy and the quality of life that New Jersey takes into the 21st century. Thus, our objective in this Report is to contribute to an understanding of the complex interrelationships among a number of New Jersey's most pressing and important economic concerns.

In **Chapter I — "A Long-Term Forecast of the New Jersey Economy: 1989-2010"** — we provide a series of projections for the New Jersey economy. These projections are derived from an econometric model of the State's economy developed by the Office of Economic Policy. They are presented here with two purposes. First, they offer an internally consistent long-run forecast of the State's economy given its current institutional and economic structure. They are intended to provide the state planning process with an independent, baseline assessment of the likely direction and magnitude of New Jersey's economic performance in the absence of a state plan. A second purpose is to reveal, in this process, the critical constraints on the New Jersey economy of the future -- chronic shortages of labor and skills, and a concomitant need for affordable housing.

Chapter II — "Economic Growth Versus Environmental Protection: A Further Analysis of the Tradeoff" — continues the examination begun in last year's Report of the tradeoffs between economic growth, income, and employment. Although the analysis is complex, the purpose of the Chapter is simple. Namely, to show how the past performance of the New Jersey economy reveals that a slowing population growth rate is associated with slower economic performance. The evidence leads to the unappealing conclusions that any slowdown in economic growth may result in slower income and employment gains for the State as a whole. What this suggests is that constraints on future economic development, for whatever considerable and desirable quality of life benefits these constraints entail, may also adversely affect the rate of growth of income. Thus, partially closing the door on economic growth may adversely affect all New Jerseyans, and not just those who are not able to live and work here because, as a State, we have decided to limit our growth. These results challenge the state planning process to reduce, or even eliminate, the historical tradeoff that has existed between employment, population and income, and to design policies in such a way as to get the best of both worlds — a sustained and healthy growth in economic activity combined with an improved quality of life. The Chapter concludes that on-going monitoring and an economic assessment of the Plan are necessary for its ultimate success.

Chapter III — "Evidence of House Price Changes in New Jersey — 1984 to 1987"— reports on the recent behavior of house prices in New Jersey. The complex linkages among housing costs, labor availability, and land use controls make an understanding of house price behavior especially important. Sharply different regional trends occurred in household formation, population growth, new housing construction, and house prices within New Jersey in the mid-1980's. As a result, housing affordability declined dramatically in large areas of the State. The chapter documents these trends in house prices and argues that the necessary next step is to identify the specific factors which are responsible for the markedly different behavior of prices within the State. The importance of housing affordability to labor force growth — a key relationship in the forecasts of Chapter I — again indicates the interdependencies among the issues raised throughout this Report.

Chapter IV — "Education Expenditures and Student Achievement in New Jersey" — provides evidence on the relationship between educational performance and resources. This complex and controversial topic is examined in the context of data from 171 New Jersey school districts. The results point to the important role of demographic and economic variables in school test performance. However, the analysis also shows that the level of teacher salaries is a statistically significant factor in this relation. The linkage between urban school performance and resources is one of the central elements for the success of any redevelopment strategy for urban New Jersey. The attractive vision of the Preliminary State Plan — a redeveloping and economically prosperous urban New Jersey which, in turn, reduces environmental pressures on rural New Jersey — requires improved urban school performances in order to be successful in any sustained way. This is another example of the complex interrelationships between land use strategies and economic variables.

Chapter V — "Economic Development in Southern New Jersey" — traces the economic performance of the southern region of New Jersey during the economically prosperous 1980's. Favorable employment, income, and housing cost trends characterize this region's performance. The availability of land, and relatively lower costs of labor and housing make the region's economic prospects bright. However, there are concerns about the effects of current and possible future land use controls on the economic potential of the region.

Our Report raises a variety of difficult, complex, and at times, controversial policy questions. Our analysis of these issues provides evidence of what has happened in the recent past, and suggests that policymakers must increasingly structure solutions which account for the interdependencies of these problems. Addressing these problems in isolation, one at a time, is no longer a viable approach. New Jersey, a small, but dynamic State has great economic potential. This potential can only be fully realized with public policies which recognize that our problems are interdependent and must be addressed as a whole.

Chapter I

A LONG-TERM FORECAST OF THE NEW JERSEY ECONOMY: 1989-2010*

Introduction

As New Jersey continues with the cross-acceptance stage of the State Development and Redevelopment Plan, issues relating to the economic impact of the Plan have received increasing attention. A thorough understanding of all aspects of the relationship between the Plan and the economy is essential if it is to succeed. Not only will the Plan impact the economy, but the economic environment will have an important influence on the course that the Plan follows. The priorities of a growth management program for a high growth economy will differ from those for a moderate growth economy characterized by a chronic labor shortage.

This paper presents a trend forecast of the major economic indicators for the State through the year 2010. The forecast is the product of an econometric model of the New Jersey economy developed by the Office of Economic Policy. Our intention is to provide a baseline forecast of the State economy prior to the implementation of the State Development Plan. This "no plan" forecast can be used as an aid in identifying areas that require special attention in the planning process.

The paper is organized as follows. Section I contains a brief outline of the structure of the econometric model and an evaluation of its accuracy. Section II discusses the forecast results. Section III presents a simulation exercise in which the effect of an increase in the relative price of housing is analyzed. Section IV gives an alternative forecast scenario.

Section 1

A. An Outline of the Model Structure

This section provides an overview of the model design. A more detailed discussion, along with equation estimates, is available upon request from the Office of Economic Policy.

It is difficult to provide a complete characterization of the lines of causality in the model due to its simultaneous nature. However, by grouping the model into blocks of equations, the major causal relationships can be examined. Table 1.1 contains an outline of the model.

Block one contains the employment equations, which for expository purposes may be viewed as the core sector. Presently, block one consists of ten industry level equations.[1] Each equation has a labor demand specification, with labor a function of wage and output.

The wage variables used in the block one employment equations are calculated in block two. Wage is defined as average wagebill per employee. There is one wage equation for each major industry group. Data availability precludes the use of a more disaggregate average wagebill. Each wage equation is specified as a function of its national counterpart[2] and a state-specific variable such as the unemployment rate.

Block five provides the output variables for the employment equations. Retail sales is an input into the trade employment equation. Housing starts and nonresidential construction contracts awarded are used to measure economic activity in the construction employment equation. The housing starts variable is also used in the finance, real estate and insurance employment equation. The three gross state product series are inputs into their corresponding employment equations. In several employment equations, exogenous

---

*Prepared by Dr. Bruce McNevin, Research Economist, Office of Economic Policy.

1. Future research plans include the construction of two-digit SIC code equations for manufacturing, for a total of 25 manufacturing employment equations.

2. All of the national forecasts are derived from the Wharton Econometrics Forecasting Associates Long-Term Economic Outlook, the WEFA Group, Bala Cynwyd, PA, Fall 1988.

Table 1.1

THE NEW JERSEY ECONOMETRIC MODEL

Block 1

- Nonagricultural Employment
  - Manufacturing Employment
    - Durables
    - Nondurables
  - Private Service Producing Employment
    - Services
    - Wholesale and Retail Trade
    - Finance, Insurance and Real Estate
    - Transportation and Public Utilities
  - Construction and Mining Employment
    - Construction
    - Mining
  - Public Employment
    - State and Local Government
    - Federal Civilian
  - Resident Employment

Block 2

- Average Wagebill per employee
  - Manufacturing
  - Private Service Producing
  - Construction and Mining
  - State and Local Government

Block 3

- Personal Income
  - Wagebill
    - Manufacturing
    - Private Service Producing
    - Construction and Mining
    - State and Local Government
    - Federal Government, Military and Civilian
    - Agriculture
  - Other Income Components
    - Other Labor Income
    - Proprietors' Income
    - Social Security contributions
    - Interest and Dividend Payments
    - Resident Income Adjustment
  - Disposable Personal Income

Block 4

- Demographics
  - Net Population Migration
  - Labor Force
  - Population
  - Unemployment

Block 5

- Other Economic Indicators
  - Retail Sales
  - Housing Starts
  - New Car Registrations
  - Gross State Product
    - Manufacturing
      - Durables
      - Nondurables
    - Services
- Nonresidential Construction Contracts Awarded

national variables serve as output proxies.

The product of the employment forecasts (block one) and the average wagebill forecasts (block two) produces the wagebill forecasts (block three) for each industry group. The nonwage income components in block three are generally defined as functions of national variables, and in some instances, state-specific variables. For instance, Other Labor Income is determined by other labor income for the nation, and the unemployment rate for the State.

Block four contains the demographic variables for the model. Net population migration is a function of the ratio of unemployment rates for New Jersey and the United States. Labor force is determined by the share of the population age 16 years and older.[3] Unemployment is the difference between labor force and resident employment, and the latter is determined in block one as a function of total nonagricultural employment. The portion of the population forecast that is not attributed to migration is determined exogenously.[4]

B. Testing the Accuracy of the Model

The only true test of the accuracy of a model is its accuracy over time. However, there are several second-best methods for measuring model accuracy in the absence of a long record of forecasts. One method is to determine how well the model would have forecast the past. That is, by simulating the model over an historical time period and comparing the historical forecast to the actual series, it is possible to make a partial, but immediate, determination of the forecasting accu-

3. The share of the population age 16 years and older is derived from the New Jersey Department of Labor, Population Projections, 1990-2030, February 1989.

4. This series is the zero migration population projection from the New Jersey Department of labor, Population Projection, 1990-2030, February 1989.

racy of the model. The link between the past accuracy and the potential future accuracy of the model depends upon the extent to which the past and future are driven by the same or a similar economic mechanism.

A comparison of the historical "forecast" with the actual series can be made with a variety of summary statistics. One statistic is the mean absolute percent error (MAPE). The MAPE is defined as follows:

$$MAPE = \sum_{t=1}^{n} \frac{|X_{ft} - X_{at}| / X_{at}}{N}$$

X_{at} = value of the time t.

X_{ft} = forecasted value of the series at time t.

N = number of observations.

The MAPE is a mean percent error adjusted for any offsetting caused by opposite signs in the percent errors. The mean percent error itself is also a useful summary statistic. Since this model is to be used for very long-term forecasting, it is important to know whether or not the percent errors over time are centered about zero.

Thus, the mean percent error indicates the tendency of the historical forecast to be centered around the actual series, and the MAPE provides a measure of the degree to which the forecast deviates from the actual series.

The model was simulated from the third quarter of 1978 through the third quarter of 1988. The mean absolute percent error and the mean percent error for ten major series in the model are presented in Table 1.2.

Table 1.2

EX POST ANALYSIS OF THE NEW JERSEY ECONOMETRIC MODEL

	Mean Percent Error	Mean Absolute Percent Error
Total Nonagricultural Employment	-0.34	0.55
Manufacturing Employment	-0.37	1.34
Nonmanufacturing Employment	-0.26	0.73
Total Personal Income	0.04	0.59
Wagebill	0.11	1.16
Nonwage Income	-0.04	1.13
Resident Employment	-0.69	1.25
Labor Force	-0.36	1.29
Retail Sales	-0.70	2.78

Table 1.3

DISTRIBUTION OF MEAN ABSOLUTE PERCENT ERRORS (MAPE)

MAPE	Distribution
0 - .99%	13.95%
1 - 1.99%	44.19%
2 - 2.99%	16.28%
3 - 3.99%	6.98%
4 - 4.99%	0
5 - 5.99%	0
6 - 6.99%	6.98%
7 - 7.99%	0
8 - 8.99%	2.33%
9% and over	9.3%

n=43 forecast series

Although there are no objective standards against which to compare the mean percent error and the MAPE, Table 1.2 gives some indication that the model is reasonably accurate in its duplication of history. The mean percent errors are all close to zero, ranging from a low of 0.04 percent for Total Personal Income, to a "high" of -0.69 percent for Resident Employment. This indicates that there is little bias in the historical forecast. This is a particularly desirable characteristic in a model which is being used to produce a 22 year projection.

The mean absolute percent errors in Table 1.2 range from a low of 0.55 percent for total nonagricultural employment to a high of 2.78 percent for retail sales. The MAPE for total personal income is also low, only 0.59 percent.

A frequency distribution of the mean average percent errors for all 43 series forecasted by the model is presented in Table 1.3. The distribution is bimodal, with a majority of the series at the lower end of the distribution. Of the 43 series forecasted (historically for the period 1978:Q3 - 1988:Q3), 58 percent had a mean absolute percent error of less than two percent, and 81.4 percent (35 series) had a MAPE below four percent.

II. Forecast Results

Table 1.4 contains annual forecasts for total nonagricultural employment, and its components

Table 1.4

EMPLOYMENT FORECAST

Employment	1988	1990	1995	2000	2005	2010
TOTAL NONAGRICULTURAL EMPLOYMENT	3648.3	3735.2	3921.7	4141.6	4359.7	4588.0
Manufacturing	666.2	636.1	565.6	538.7	519.0	506.9
Durables	306.4	287.0	242.0	224.5	212.2	204.9
Nondurables	359.4	349.2	323.5	314.2	306.9	302.4
Private Service Producing	2255.5	2354.1	2584.6	2782.8	2991.0	3206.6
Services	902.2	965.6	1140.8	1293.6	1427.7	1544.6
Trade	874.4	885.0	906.5	933.2	977.3	1038.2
Finance, Insurance & Real Estate	235.6	252.1	273.4	282.9	300.9	326.3
Transportation & Public Utilities	243.3	251.4	263.9	273.1	285.1	297.5
Public Sector	551.6	572.2	597.2	622.2	629.5	635.8
State & Local Government	473.3	497.2	527.8	554.7	562.0	568.2
Federal Civilian	70.3	75.0	69.4	67.5	67.5	67.7
Construction & Mining	175.6	172.7	174.4	198.0	220.2	238.7
Construction	173.2	170.7	172.8	196.6	219.0	237.8
Mining	2.3	2.0	1.6	1.3	1.1	1.0

Average Annual Rates of Growth

	1990/1985	1995/1990	2000/1995	2005/2000	2010/2005
Total Nonagricultural Emp.	1.81	0.98	1.10	1.03	1.03
Manufacturing	-2.28	-2.32	-0.97	-0.74	-0.47
Durables	-3.19	-3.35	-1.49	-1.12	-0.70
Nondurables	-1.44	-1.52	-0.58	-0.47	-0.30
Private Service Producing	3.04	1.89	1.49	1.45	1.40
Services	4.03	3.39	2.55	1.99	1.59
Trade	1.70	0.48	0.58	0.93	1.22
Finance, Insurance & Real Estate	5.28	1.64	0.69	1.24	1.63
Transportation & Public Utilities	2.15	0.98	0.69	0.86	0.86
Public Sector	1.50	0.86	0.82	0.23	0.20
State & Local Government	1.78	1.20	1.00	0.26	0.22
Federal Civilian	-0.24	-1.54	-0.55	0	0.06
Construction & Mining	3.81	0.20	2.57	2.15	1.63
Construction	3.88	0.24	2.61	2.18	1.66
Mining	-1.71	-4.36	-4.07	-3.29	-1.89

by major industry group, for 1989-2010. Total employment is expected to increase by 940,000 jobs between 1988 and 2010. This is the equivalent of an average annual rate of growth of 1.05 percent.

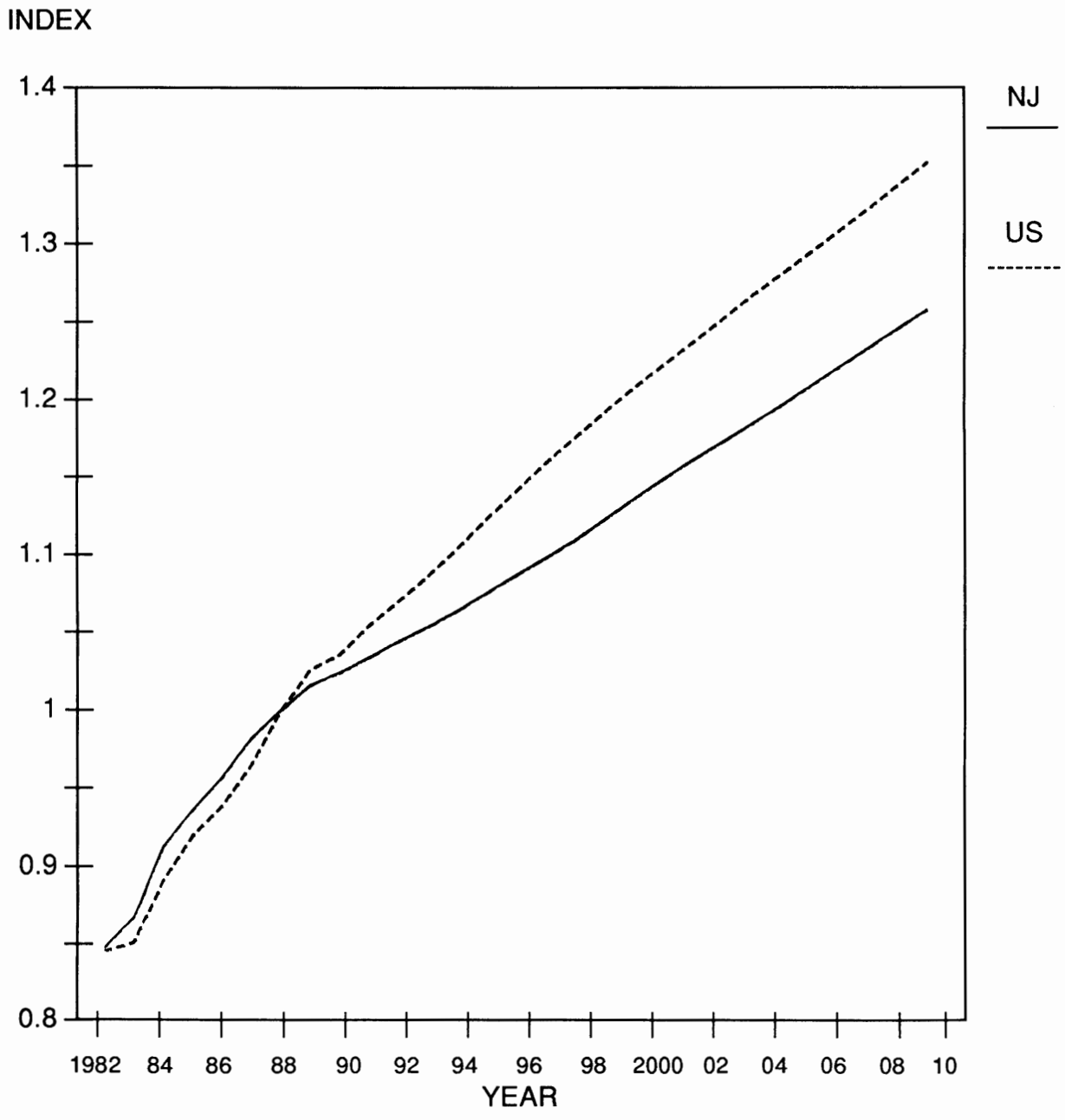
This projected growth in employment is low relative to recent history. During 1978-88, total nonagricultural employment grew at an average annual rate of 2.1 percent. Employment growth is also low relative to the forecast of nationwide employment.

Figure 1.1 compares indices of nonagricultural employment in New Jersey and the nation for 1982-2010.[5] The base year of the indices is 1988. During 1982-1988, employment growth in New Jersey paralleled growth in the the nation. How-

5. The index is the ratio of the series in a given year to the base year, 1988. It can be interpreted as the cumulative growth of the series relative to the base year. For example, the nonagricultural employment index for New Jersey is approximately 1.26 in 2010, indicating that employment in the year 2010 is 26 percent greater than in 1988. This procedure is used in Figures 1.1 to 1.4.

Figure 1.1

TOTAL NONAGRICULTURAL EMPLOYMENT
US & NJ, 1982-2010
(Index 1988 = 1.0)



ever, the indices diverge during the forecast period, indicating that U.S. employment is forecasted to grow faster than employment in New Jersey throughout the entire 1989-2010 period. National employment is expected to increase an average of 1.38 percent annually, compared with 1.05 percent for employment in New Jersey.

One reason for the low employment growth in the State relative to the nation is the manufacturing sector. Manufacturing employment in New Jersey is forecast to decline an average of 1.2 percent per year through the year 2010, compared with an average annual increase of 0.43 percent for the nation. The expected decline in manufacturing employment in New Jersey is on trend with recent history. The average annual rate of decline for 1978-88 was 1.65 percent.

Looking at the two major groups within the manufacturing sector, durable goods employment is forecast to decline at an average annual rate of 1.81 percent. Employment in the nondurable goods sector is projected to decline an average of 0.78 percent per year.

Forecasted employment growth in the nonmanufacturing sector is also low relative to the nation, though the difference is much less pronounced than in the manufacturing sector. Figure 1.2 compares indices of New Jersey and United States nonmanufacturing employment for 1982-2010. The difference between the two indices, which can be interpreted as the difference in cumulative growth relative to the base year, is less than in Figure 1.1. National nonmanufacturing employment growth averages 1.57 percent annually, compared with 1.44 percent for New Jersey.

An examination of the components of nonmanufacturing employment indicates that total private service producing employment in New Jersey is expected to grow at an annual rate of 1.61 percent, compared with 3.86 percent during 1978-88. The highest average rate of growth within the nonmanufacturing sector is in services, where the average annual growth is forecast to be 2.47 percent. Employment in services is forecast to increase 642,400 during 1989-2010, accounting for two-thirds of the total forecasted increase in nonagricultural employment.

Among the remaining industries within the nonmanufacturing sector, construction and finance, insurance and real estate show relatively strong annual growth rates of 1.45 and 1.49 percent, respectively. The slow growth areas include wholesale and retail trade employment, with an average annual rate of growth of 0.78 percent, and public sector employment with average growth of 0.65 percent annually.

The forecasted growth in nonagricultural employment in the State is modest when compared with its growth in the previous decade, and with the forecasted national growth. However, an examination of the demographic elements of the forecast suggests that even an average annual growth rate of 1.0 percent for nonagricultural employment will place a strain on the labor re-

Table 1.5

DEMOGRAPHICS

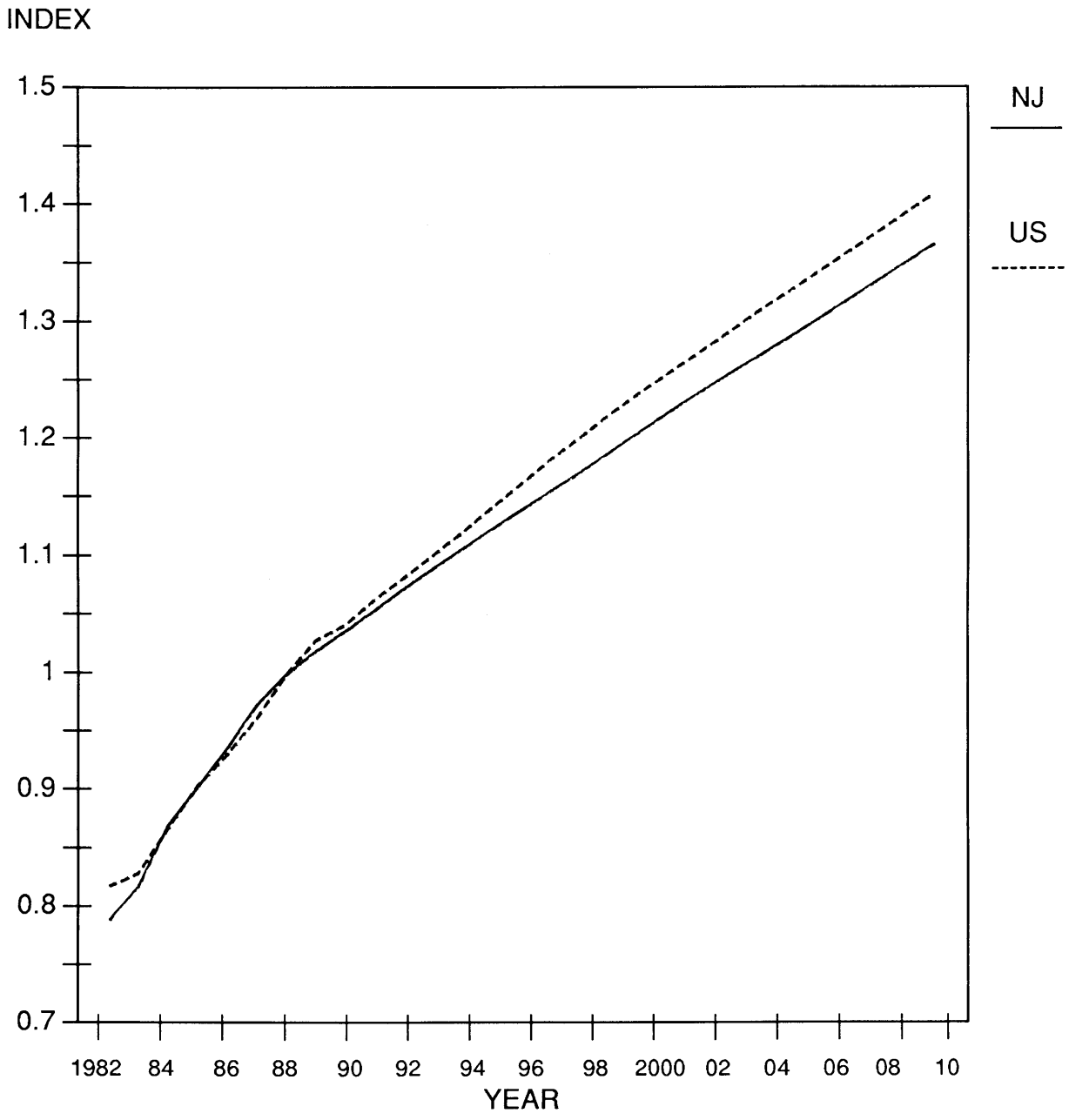
Demographics	1988	1990	1995	2000	2005	2010
Labor Force	3978.0	4082.1	4251.3	4412.9	4621.1	4828.6
Net Migration (cumulative)	13.3	52.8	153.0	284.5	461.0	639.3
Population	7721.0	7816.1	8050.9	8258.8	8469.1	8647.8
Unemployment	151.0	142.6	130.7	81.2	80.3	68.8
Unemployment Rate	3.80	3.49	3.07	1.84	1.74	1.42
Resident Employment	3827.0	939.5	4120.7	4331.7	4540.8	4759.9

Average Annual Rates of Growth

	1990/1985	1995/1990	2000/1995	2005/2000	2010/2005
Labor Force	1.24	0.82	0.75	0.93	0.88
Population	0.65	0.59	0.51	0.50	0.42
Unemployment	-8.08	-1.73	-9.1	-0.22	-3.04
Resident Employment	1.70	0.90	1.0	0.95	0.95

Figure 1.2

NONMANUFACTURING EMPLOYMENT
US & NJ, 1982-2010
(Index 1988 = 1.0)



sources of the State's economy.

Table 1.5 contains the demographic forecasts through the year 2010. Total population is expected to increase by 927,000 between 1988 and 2010, for an average annual rate of growth of 0.52 percent. The national population growth rate is expected to be 0.67 percent per year. Figure 1.3 portrays indices of the United States and New Jersey population for 1982-2010.

The population forecast for the State is based on a forecast of net population migration and the New Jersey Department of Labor projection of the 1987 state population assuming zero migration during 1988-2010. The zero migration population projection averages 0.19 percent annual growth, with population growing from 7.675 million in 1987 to 8.023 million in 2010. Given this low natural increase in population, it is evident that the New Jersey economy will have to rely quite heavily on migration for its labor supply.

The cumulative net population migration forecast for 1989-2010 is 626,000. This represents an average annual migration of 30,000 persons. The migration forecast is high compared to the average annual migration of 10,000 persons during the 1980-88 period. However, even with the relatively high migration forecast, the tight labor market conditions that New Jersey is presently experiencing are expected to worsen.

The labor force is forecast to increase an average of 0.88 percent per year during the 1989-2010 period. Resident employment is expected to grow an average of 1.00 percent per year. Consequently, unemployment will decline, with the unemployment rate dropping from 3.8 percent in 1988 to 1.4 percent in 2010.

This unemployment rate is extremely low by historic standards. Various reasons why the actual unemployment rate might be higher than the forecast include, a greater level of migration, higher labor force participation rates and a lower demand for labor. While these reasons offer an

Table 1.6

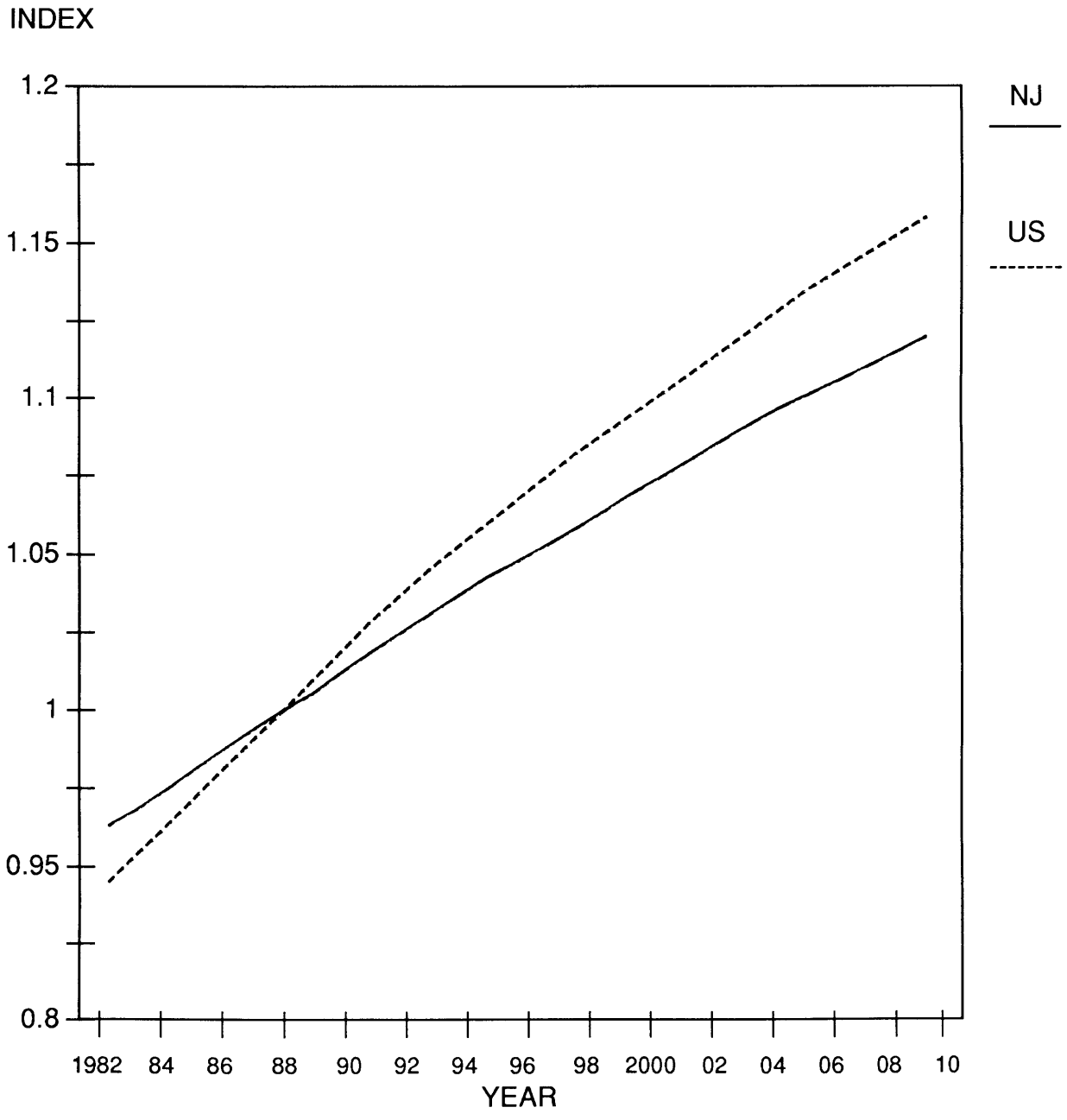
PERSONAL INCOME FORECAST

PERSONAL INCOME & COMPONENTS	1988	1990	1995	2000	2005	2010
Nominal Personal Income	169.1	196.5	273.8	392.7	572.2	851.6
Real Personal Income	135.8	143.3	160.9	181.3	209.4	246.5
Real Wagebill, Total	76.6	80.9	95.5	110.4	125.2	140.6
Manufacturing	16.4	16.2	15.9	16.0	16.0	16.0
Services	44.0	48.1	61.0	72.7	84.1	95.6
Construction & Mining	4.5	4.7	5.7	7.7	9.8	12.0
State & Local Government	8.9	9.2	10.2	11.4	12.8	14.5
Federal Government	2.4	2.4	2.3	2.2	2.2	2.1
Agricultural	0.3	0.3	0.3	0.4	0.4	0.4
Other Labor Income (82 $)	6.8	7.0	7.8	8.8	10.0	11.1
Proprietors' Income (82 $)	8.5	8.9	9.7	10.6	11.8	13.1
Social Security Contributions (82 $)	6.3	6.7	7.9	9.1	10.3	11.6
Transfer Payments (82 $)	14.7	15.2	16.1	16.9	18.7	20.6
Dividends & Interest (82 $)	24.0	26.0	26.7	29.8	38.5	55.3
Resident Adjustment (82 $)	11.6	12.2	12.9	14.0	15.6	17.4

Average Annual Rates of Growth	1990/1985	1995/1990	2000/1995	2005/2000	2010/2005
Nominal Personal Income	8.05	6.86	7.48	7.82	8.28
Personal Income (82 $)	3.70	2.34	2.42	2.92	3.32
Total Wagebill (82 $)	4.36	3.37	2.94	2.55	2.35
Other Labor Income (82 $)	2.13	2.19	2.44	2.59	2.11
Proprietors' Income (82 $)	4.62	1.74	1.79	2.17	2.11
Social Security Income (82 $)	5.61	3.35	2.87	2.51	2.41
Transfer Payment (82 $)	1.80	1.16	0.97	2.04	1.95
Dividend & Interest (82 $)	3.78	0.53	2.22	5.25	7.51
Resident Adjustment (82 $)	3.24	1.12	1.65	2.19	2.21

Figure 1.3

POPULATION
US & NJ, 1982-2010
(Index 1988 = 1.0)



explanation for a higher unemployment rate, they would signify a considerable change from the past.

Table 1.6 contains the forecast of nominal personal income, constant dollar personal income, and the components of constant dollar personal income. Nominal personal income is expected to grow at an average annual rate of 7.63 percent for 1988-2010 compared with an average rate of 9.53 percent during 1978-88. Some of the difference in growth rates is due to lower inflation during the forecast period. The average annual rate of growth of real personal income was 3.63 percent for 1978-88, compared to 2.75 percent for 1988-2010. The remainder of the difference is due to changes in real factors, including employment growth and real average wagebill per employee.

Table 1.7

NET IMPACT OF HOUSING PRICE INCREASE

(Alternative Minus Control, thousands)

	1995	2000	2005	2010
Cumulative Net Migration	-0.32	-7.39	-17.27	-30.23
Labor Force	-0.10	-3.59	-8.95	-16.18
Resident Employment	0	-0.70	-5.18	-10.31

Figure 1.4 shows indices of New Jersey and U.S. nominal personal income for 1982-2010. Personal income for the nation is expected to grow an average of 7.11 percent per year, compared with 7.63 percent for the State. New Jersey's nominal personal income is expected to grow faster than the nation even though employment growth in the nation is higher. This is due, in part, to the low unemployment rate in the State during the forecast period. The low unemployment rate puts upward pressure on the average wagebill per employee. The real average wagebill per employee in nonmanufacturing is expected to increase 1.73 percent annually in New Jersey and 1.68 percent in the nation. Total real wagebill is expected to increase 2.80 percent per year in New Jersey vs. 2.58 percent in the nation.

The nonwage components of real personal income are also growing faster in New Jersey than the nation. The average annual rate of growth for the nonwage components is expected to be 2.68 percent for New Jersey and 1.73 percent for the nation. During 1978-88, the real nonwage components increased an average of 3.90 percent per year in New Jersey and 3.0 percent in the nation.

III. Analyzing the Relative Price of Housing

This section contains an analysis of the effect of an increase in the relative price of housing on the New Jersey economy. We use this particular example for two purposes. First, to show how the model can estimate the effect of a change in economic conditions on all of the model's components. Second, to illustrate the important role that house prices play in the State's economy and the implications for land use policies.

The impact of a housing price change is realized through its impact on net population migration. In the model, net migration is determined by two variables — the sales price of existing homes in New Jersey relative to the nation, and the ratio of the New Jersey and U.S. unemployment rates. The relative sales price of existing homes is exogenous (determined outside of the model).[6] By changing the relative price of housing, it is possible to determine the effect on net population migration, and the other variables in the model as well. These can then be compared to forecasts based on alternative relative house price conditions.

Figure 1.5 illustrates two scenarios for relative housing prices. The "control" forecast, used in determining the results presented in the previous section, increases from 1.63 in 1988 to 2.0 in the year 2010. The "alternative" scenario first diverges from the control forecast beginning in 1995, and continues to increase faster than the control forecast until it exceeds it by 10 percent in the year 2010.

The results of resimulating the model are summarized in Figures 1.6 through 1.9 and Table 1.7. The immediate impact of an increase in the relative price of housing is a reduction in net population migration. Figure 1.6 shows cumulative net migration during 1994-2010 for both the control and alternative scenarios. By the year 2010, cumulative migration for the alternative scenario is

6. For 1989-1997, the relative sales price of existing homes was derived from the Wharton Econometric Forecasting Associates Real Estate and Construction Forecast, the WEFA Group, Bala Cynwyd, PA, Winter 1988. For 1998-2010, the series was trended so that it gradually approaches 2.0 in the year 2010.

Figure 1.4

NOMINAL PERSONAL INCOME
US & NJ, 1982-2010
(Index 1988 = 1.0)

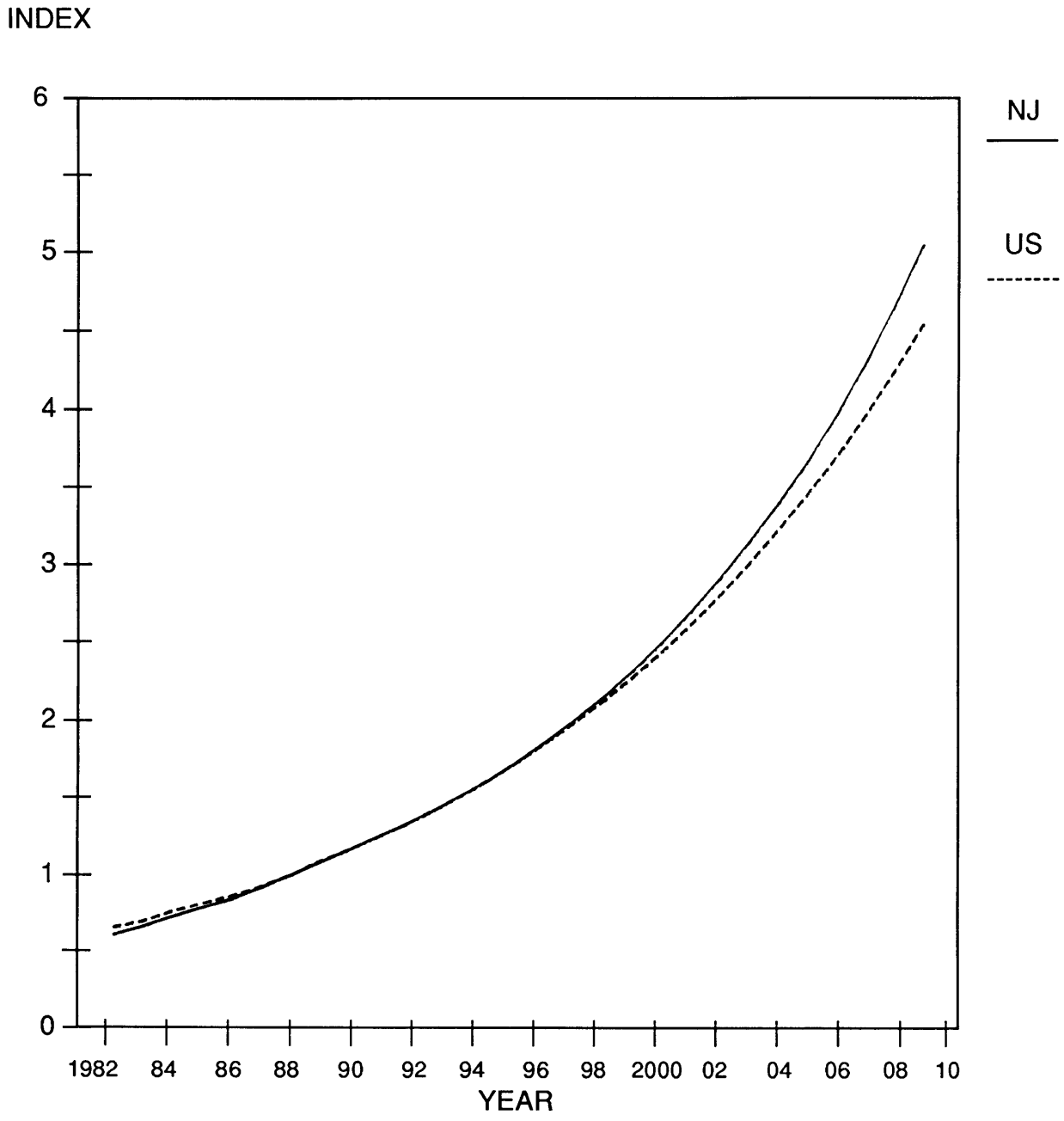


Figure 1.5

HOUSING PRICE SIMULATION
RELATIVE SALES PRICE OF EXISTING HOMES
US and NJ

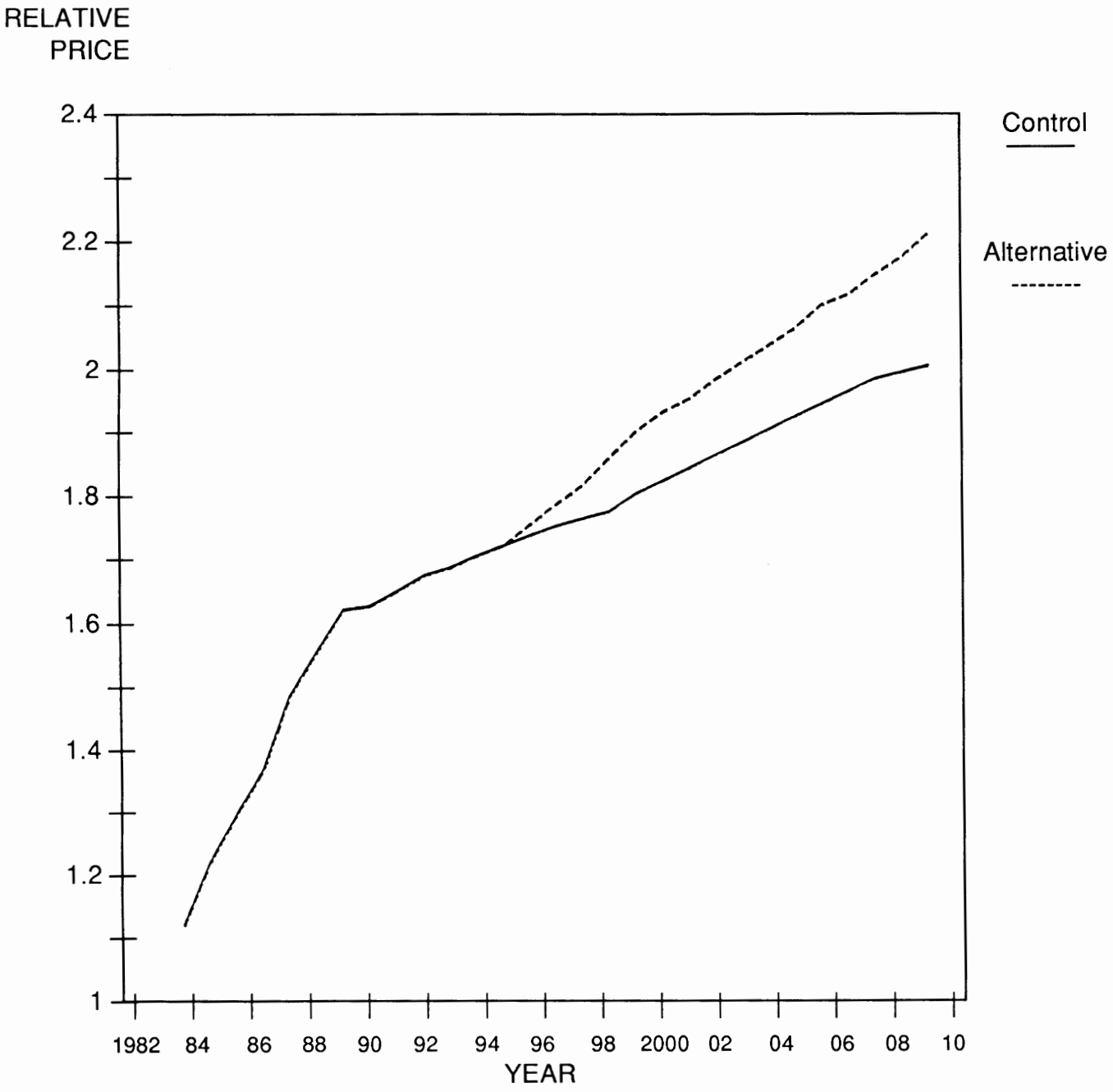


Figure 1.6

HOUSING PRICE SIMULATION
EFFECT ON NET MIGRATION

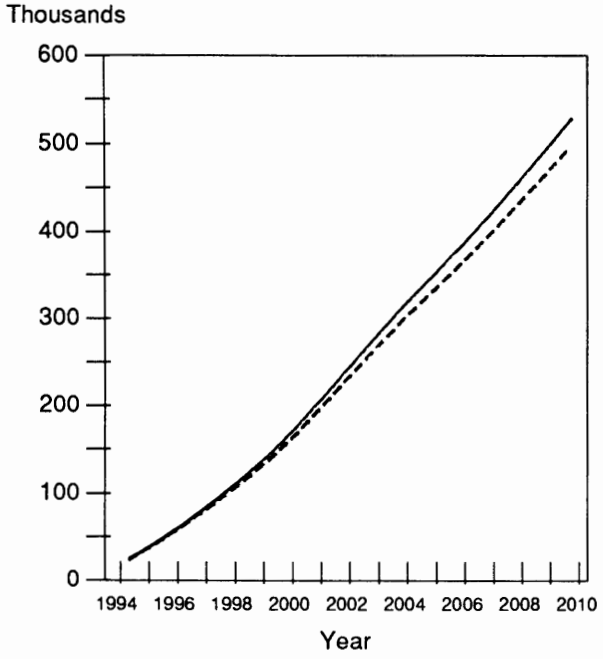
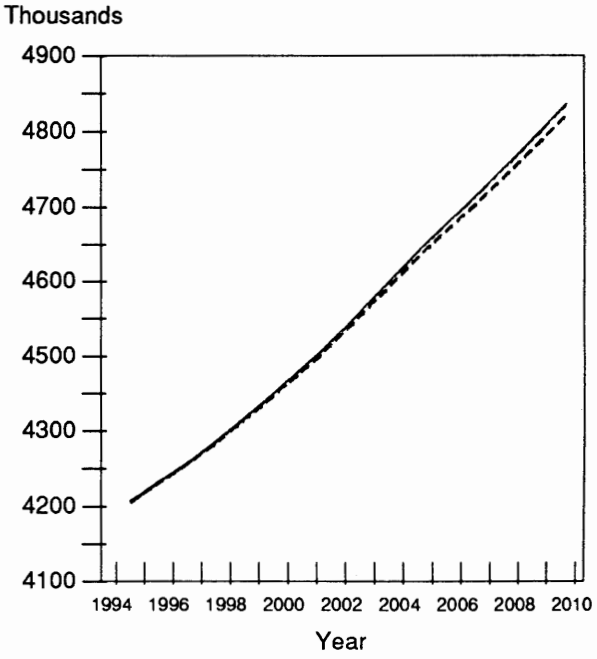


Figure 1.7

HOUSING PRICE SIMULATION
EFFECT ON LABOR MIGRATION



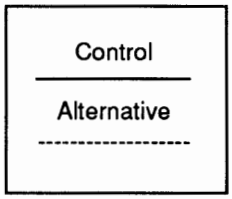


Figure 1.8

HOUSING PRICE SIMULATION
EFFECT ON RESIDENT EMPLOYMENT

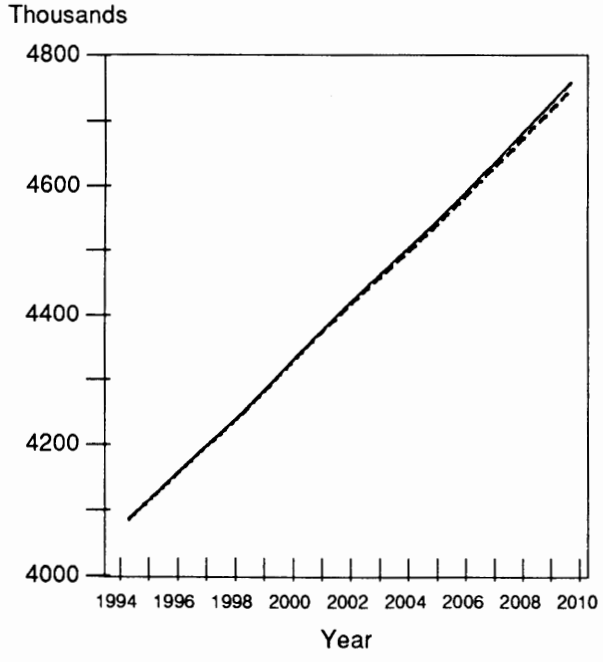
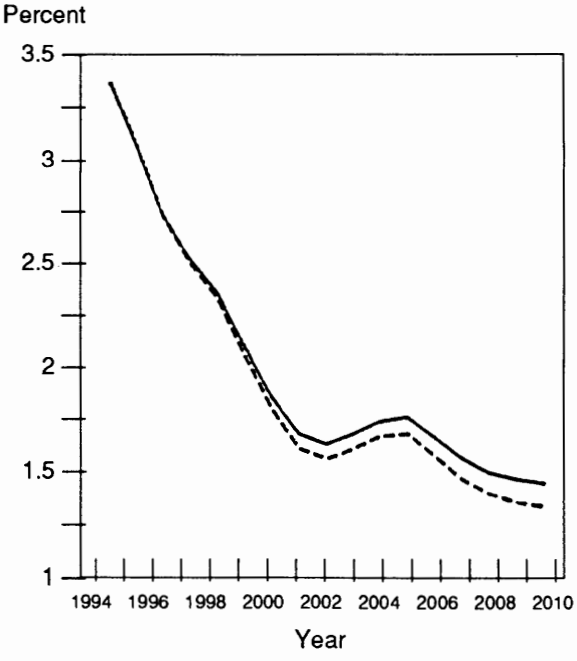


Figure 1.9

HOUSING PRICE SIMULATION
EFFECT ON UNEMPLOYMENT RATE



4.8 percent less than the control scenario. This is a cumulative decrease of 30,000 persons (see Table 1.7). While a decline of 30,000 in net migration for the entire sixteen year period is not very large, the effect is to tighten the labor supply.

The effect of the resimulation on the labor force forecast is illustrated in Figure 1.7. By the year 2010, the alternative forecast labor force is 16,200 lower than the control forecast. Figure 1.8 shows the resident employment forecast for the two scenarios. The alternative forecast is 9,000 lower than the control forecast in 2010. The employment decline is the result of an increase in wages caused by a tighter labor market. That is, lower migration causes additional tightness in the labor market, which puts additional upward pressure on wages, which causes the demand for labor to decline. The labor force declines more than employment, resulting in a decrease in the unemployment rate. Figure 1.9 shows the unemployment rate for the control and alternative scenarios. The distance between the unemployment rate in the two scenarios increases over time.

Table 1.8

COMPARISON OF GROWTH RATES, NATIONAL FORECASTS

Moderate Growth Scenario vs. Cyclical Scenario
(Average Annual Growth Rates, 2010/1988)

	Moderate Growth (1)	Cyclical (2)
Gross National Product (constant dollar)	2.53	2.26
Nonagricultural Employment	1.38	1.19
Manufacturing Employment	0.43	0
Housing Starts	-0.04	-0.96
Industrial Production Index, Mfg. Durables	3.39	2.96
Industrial Production Index, Mfg. Non-Durables	3.06	2.68
Wagebill	7.45	7.25
Other Labor Income	6.67	6.43

IV. An Alternative Forecast Scenario

This section contains an analysis of the role of the national forecast in the New Jersey model. National variables are inputs into a number of equations in the state model. They play a particularly important role in the manufacturing sector, and in the nonwage components of personal income. Accordingly, the purpose of this section is to show how the model's forecasts for the State's economy are affected by different national economic conditions.

The national forecast which was used to generate the state forecast discussed in section II uses a moderate and steady growth trend scenario. That is, the national forecast has no cyclicality. The average annual rates of growth for key components of this forecast are contained in the first column of Table 1.8. During the 1988-2010 period, real gross national product is forecast to grow at an average annual rate of 2.53 percent, compared with 2.87 percent during 1980-1988. Nonagricultural employment for the nation is forecast to grow 1.38 percent, compared with 2.0 percent during 1980-1988.

Column 2 of Table 1.8 contains growth rates for a cyclical scenario, which is essentially the moderate growth scenario with two recessions imposed on it. The recessions occur in 1994 and 2005. In each recession, real gross national product declines one percent.

The average national growth rates for the cyclical scenario are lower than the trend scenario. The most notable differences are in housing starts, and dividends and interest payments. The various indicators for the manufacturing sector also show significant differences in growth; e.g., U.S. manufacturing employment, which grows at an annual rate of 0.43 percent in the trend scenario, shows no growth in the cyclical scenario.

The results of simulating the New Jersey model under these two national scenarios are compared in Table 1.9. As expected, the results reflect the fact that the average growth rates of the national variables are lower in the cyclical scenario than the trend scenario. In addition, the cyclicality in the national forecast introduces some cyclicality into the forecasts of the State variables.

Nonagricultural employment is essentially the same for the two scenarios for the first twelve years of the forecast, with the cyclical scenario being slightly higher in 1995 and 2000. After 2000, the trend scenario grows faster. The final outcome is a modest difference in overall growth, with the trend scenario growing at an average annual rate of 1.03 percent and the cyclical scenario growing at an annual rate of 0.98 percent.

Manufacturing employment is lower in the

Table 1.9

FORECAST COMPARISON, NEW JERSEY
Trend and Cyclical Scenarios

	1990	1995	2000	2005	2010	Average Annual Growth 2010/1990
Nonagricultural Emp. (thousands)						
Trend	3735.2	3921.7	4141.6	4359.7	4588.0	1.03%
Cycle	3735.2	3925.1	4143.0	4333.6	4538.8	0.98
Manufacturing Emp. (thousands)						
Trend	636.1	565.6	538.7	519.0	506.9	-1.13
Cycle	636.1	561.3	533.9	495.9	497.5	-1.22
Population (thousands)						
Trend	7816.1	8050.9	8258.8	8469.1	8647.8	0.51
Cycle	7816.1	8064.4	8283.7	8472.6	8613.2	0.49
Labor Force (thousands)						
Trend	4082.1	4251.3	4412.9	4621.1	4828.6	0.84
Cycle	4082.1	4258.4	4426.2	4623.0	4809.3	0.82
Unemployment Rate						
Trend	3.49	3.07	1.84	1.74	1.42	
Cycle	3.49	3.16	2.11	2.32	2.01	
Personl Income (billion $)						
Trend	196.5	273.8	392.7	572.2	851.6	7.61
Cycle	96.5	275.3	386.5	545.2	787.2	7.19

cyclical scenario than in the trend scenario for the 1995-2010 period. The two scenarios have similar average rates of decline for the entire period, though they differ significantly over smaller time intervals. During 2000-2005, the average rate of decline is -1.47 percent for the cyclical scenario and -0.74 percent for the trend scenario.

The personal income forecasts follow a pattern similar to that of nonagricultural employment. The average annual growth rates for the trend and cyclical scenarios are 7.61 percent and 7.19 percent, respectively.

In the demographic sector, labor force and population follow the same pattern. The trend scenario is lower than the cyclical scenario for 1995-2005, and increases faster than the cyclical scenario during 2005-2010. The average annual growth rates are close in the two scenarios for both labor force and population.

The unemployment rate is higher in the cyclical scenario, throughout the 1995-2010 period. In addition, it shows evidence of cyclicality, in comparison to the trend scenario which decreases monotanically.

Summary

Given the basic trend scenario for the national economy, our State model forecasts an employment increase of 940,000 jobs for New Jersey between 1988 and 2010. This represents an average annual rate of growth of 1.0 percent. Over two-thirds of the new jobs will be in the service sector, which will constitute 33.7 percent of total nonagricultural employment by 2010 (compared to 24.7 percent in 1988).

The expected low natural rate of increase in the State population (births minus deaths) will result in the need for a significant amount of migration in order to meet labor force requirements. Even with net migration as high as 30,000 annually, the unemployment rate will remain extremely low. The low unemployment rate will put upward pressure on wages, raising labor costs in the State

relative to the nation. The long-term effect of the labor supply tightness will be to reduce growth in the economy as new firms elect not to locate in the State due to difficulties finding skilled workers.

The simulation exercise in Section III quantifies the effect of an increase in the relative price of housing. While the impact is not particularly large, it does lower migration and, consequently, decreases the labor force. Public policies which limit land development can be expected to place upward pressure on housing prices. The problems of an economy simultaneously experiencing labor supply tightness will be compounded by such a policy.

The simulation exercise in Section IV analyzed the effect of a change in the national forecast. Imposing cyclicality on the national forecast caused a slight decrease in the forecasted average growth of the state economy.

This Chapter has attempted to demonstrate the details of the econometric model of New Jersey developed by the Office of Economic Policy. The model, which will be extended and refined, can be used for a number of purposes. We have provided several examples of these uses.

REFERENCES

Bolton, Roger, "Regional Econometric Models, Journal of Regional Science, Vol. 25, No. 4, 1985.

Friedlaender, Ann, George Tray and Richard Tresch, "A Quarterly Econometric Model of Massachusetts and its Fiscal Structure." Report to the Senate Ways and Means Committee, State of Massachusetts, 1975.

Glickman, Norman, Econometric Analysis of Regional Systems, New York: Academic Press, 1977.

New Jersey Department of Labor, Population and Labor Force Projections for New Jersey: 1990 to 2030, Vol. I, February 1989.

Shapiro, Harold and George Falton, A Regional Econometric Forecasting System, Ann Arbor: University of Michigan Press, 1985.

Wharton Econometrics Forecasting Associates, United States Long-term Economic Outlook, 1988-97, third quarter 1988. The WEFA Group, Bala Cynwyd, PA.

Chapter II

ECONOMIC GROWTH VERSUS ENVIRONMENTAL PROTECTION: A FURTHER ANALYSIS OF THE TRADEOFF

Introduction

Recently the issue of a trade-off between economic growth and conservation has received increasing attention as the statewide planning process moved into its cross-acceptance stage. In a previous study, we attempted to demonstrate the existence of a trade-off between growth promotion and growth restriction, and the feasibility of arriving at an optimum combination of growth and conservation by the method of dynamic optimization.[1] Nevertheless, advocates on both sides of the issue tend to approach the problem with an "either-or" attitude. Little attention has been paid to finding an optimum compromise between the desire to promote economic growth and the need to mitigate its adverse effects. Clouding the issue is the ambiguous wording of the State Planning Act of 1985, which charges the State Planning Commission to promote "beneficial growth," words which obviously can mean different things to different people.

Our previous analysis demonstrated that an optimum combination of growth and conservation is not only feasible, but is dependent on the preference of the policymakers, reflecting the wishes of their constituents. In our previous analysis, we did not place any restrictions on the State's ability to promote growth and, consequently, the optimum paths of employment growth exhibited large jumps in either direction during the first planning period, followed by equally large reversals in the next planning period.

In this study, we analyze the same tradeoff problem but recognize the fact that economic growth in any given year must be restricted within the limits of realistic rates. The principal method of introducing such a limit is to incorporate into the analyses the penalties for large deviations of growth rates from certain predetermined rates. In other words, by considering deviations of growth rates from the target rates as a component of costs of growth, we will be able to derive optimum growth rates that fall within realistic bounds, while at the same time minimizing the overall cost of the tradeoff.

This analytical method permits us to find optimum compromises under different scenarios. In this paper, three different scenarios (pro-growth, anti-growth, and moderate growth) are evaluated under two different weighting schemes. In addition to these three scenarios, we analyze the consequences of three other alternatives; accommodation of the population growth projected by the State Department of Labor, zero population growth, and a condition where the State's employment growth annually outpaces the United States' by one percentage point.

The results of these exercises demonstrate that setting proper target values is the most important element in the optimum planning strategy. Secondly, when targets for different indicators (e.g., income growth vs. population growth) conflict, an optimum compromise can be determined only if all the indicators are evaluated simultaneously. For example, many programs may be judged acceptable when they are evaluated individually, but, when viewed together, they may have an aggregate economic impact exceeding acceptable limits.

---

*Prepared by Jong Keun You, Research Economist, Office of Economic Policy.

1. See Jong Keun You, "Growth Promotion vs. Growth Management: An Analysis of the Tradeoff," 20th Annual Report, Economic Policy Council and Office of Economic Policy, pp. 44-66.

Numerous agencies in the State are responsible for overseeing their individual programs. Not surprisingly, these agencies tend to promote their programs in isolation from any overall consideration of their interrelated aspects and effects. It seems appropriate that the State Planning Commission should take an aggregate view of these programs. An economic impact study and an ongoing process of monitoring are essential for this task.

I. The Model

The model is based on three highly simplified assumptions. The first assumption is that the rate of population growth in the State is a proxy measure for the cost of growth. This implies that the costs of growth in terms of environmental damage, infrastructure needs, congestion, etc., are proportional to population growth. In reality, these costs depend not only on the rate of population growth, but also on where the growth occurs, how new residents are housed, commuting patterns, etc. Thus, the assumption that the cost of economic growth is proportional to the rate of population growth must be viewed as a crude approximation. Indeed, it is clearly possible, with differing policies, to have different environmental costs from the same rate of population growth.

The benefits of economic growth are measured by the ratio of the State's per capita personal income to the national average. Again, this measure does not fully represent all the benefits of economic growth, and it too should be regarded as a simplified assumption to facilitate the analysis.

It is further assumed that the State is able to control the rate of economic growth (represented by employment growth in this model) using various regulations, taxes, subsidies, tax concessions, etc. Although this assumption is not completely realistic, economic planning postulates an ability to control, to a varying extent, the outcomes of certain economic variables. This assumption of an ability to control outcomes is adopted here not as a realistic portrayal of how the economy actually works, but as a means of analyzing the results of policy choices which attempt to control economic outcomes.

The relationship between economic growth on the one hand, and the benefits and the costs of growth on the other, is defined by the following equations:

$$y_{1t} = a_1 + a_2 x_t + a_3 y_{1t-1} + u_{1t}$$
$$y_{2t} = b_1 + b_2 x_t + b_3 y_{2t-1} + u_{2t}$$

where y_1 stands for the difference between New Jersey's per capita personal income and the national average expressed as a percent of the national average (i.e., the benefits of growth), y_2 measures the State's population growth rate minus the national growth rate (our proxy for the costs of economic growth), "x" is the difference between New Jersey's nonagricultural employment growth rate and its national counterpart, u_1 and u_2 are random errors, and subscript "t" denotes time (year). The new estimation results for this model using annual data for 1960-87 are shown in the box.

(1) $y_{1t} = 2.63430 + 1.02433x_t + 2.27958B_{83} + 0.87338y_{1t-1}$
(2.477) (4.736) (3.783) (14.92)

$\bar{R}^2 = 0.9684$ SER = 0.809 h = -0.632
B_{83} = 1 for 1983 and after.

(2) $y_{2t} = 0.070335x_t - 0.619517B_{73} + 0.894334y_{2t-1}$
(2.277) (-4.703) (23.33)

$\bar{R}^2 = 0.9523$ SER = 0.128 h = 0.348
B_{73} = 1 for 1973 only.

The figures in parentheses are t-statistics and "h" stands for Durbin's h-statistic, B_{83} for a binary variable accounting for a shift in the relationship between the relative per capita personal income and the relative employment growth as a result of structural shifts in the State's economy during the 1980s, and B_{73} is a binary variable representing a temporary and unexplained deviation in the relative population growth rate from the long term trend.

As in our previous study, the estimation

results imply that the State's per capita income rises (falls) relative to the national average as the state's employment grows faster (slower) than the national employment growth.[2] Equation (1) also indicates that, if the State's employment growth rate remained equal to the national rate every year, the State's per capita income would have remained 20.8 percent above the national per capita income for the period up to 1982, and 38.8 percent above the national average after 1982.

According to Equation (2), the faster the employment growth in the State, the faster is its population growth. If the State's employment grew at the same rate as the nation's, year after year, New Jersey's population growth rate would eventually converge to the national population growth rate.

Equation (1) represents benefits of economic growth in the State, while equation (2) represents the costs of economic growth. According to equation (1), employment growth in New Jersey in excess of the U.S. employment growth would result in an increase in relative per capita personal income of the State. Conversely, equation (1) also implies that even those who have already secured employment in the State would not entirely escape the negative consequence of relatively slow growth, since economic well being is determined not only by the absolute level of income, but also by its relative level. This is an important point which runs counter to a popularly held view that for those who are employed in the State, no cost is incurred by growth restrictions.

II. An Application of the Model

We take as an obvious objective in the model that the State should steer the economy so that the variables y_1 and y_2 follow desired paths. Unfortunately, however, this cannot be done fully, because we have in this model only one instrument (x) and two target variables. In this situation, an optimum compromise must be made by weighing the cost of failure to achieve each target. In our previous study this task was done by using a cost function which penalizes the deviations of y_1 and y_2 from target paths. Mathematically, the cost function is represented by:

$$J_t = k_1(y_{1t} - d_{1t})^2 + k_2(y_{2t} - d_{2t})^2$$

where k_1 and k_2 are the weights given to the costs, and d_1 and d_2 are the target values of y_1 and y_2. This cost function implies that the cost of failure to meet the target for either y_1 or y_2 is proportional to the square of the deviation. Here, variables y_1 and y_2 are referred to as the target variables. However, because of the absence of any restrictions on the control variable (x), the resulting optimum mean paths exhibited unrealistic ups-and-downs. Although the variable x (employment growth difference) is not considered as a target variable, but, rather, acts as a variable that drives the target variables y_1 and y_2, the control variable can, nevertheless, be included in the cost function in the following manner:

$$J_t = k_1(y_{1t} - d_{1t})^2 + k_2(y_{2t} - d_{2t})^2 + k_3(x_t - d_{3t})^2$$

This cost function implies that not only do we penalize the failure to meet the targets for y_1 and y_2, but also we assign additional costs to the failure to guide the employment growth rate (x) along a predetermined path d_{3t}. In the application of this cost function, d_{3t} will be set to be zero, because it would be undesirable to have negative values (i.e., slower employment growth in the State than in the nation) or positive values (i.e., faster employment growth in the State than in the nation) which would be difficult to obtain.

Finding an optimum compromise between the benefit of growth and the cost of growth means minimizing the total cost over the entire planning horizon. In other words, we minimize:

$$J = J_1 + J_2 + ... + J_T = \sum_{t=1}^{T} J_t$$

subject to the model represented by equations (1) and (2). As explained in our previous study, the cost function contains random errors, which implies that total cost is a probabilistic variable. The task of minimizing the expected value of the total cost, i.e., minimizing on the average, yields the following solution.[3]

---

2. It is possible that a faster than average employment growth may not necessarily bring about a faster than average income growth (increase in the per capita income ratio), if it is accompanied by a structural shift in employment from high wage to low wage sectors. But that has not happened in New Jersey and is unlikely to happen in the future.
3. For further explanation of the model and the solution, see Jong Keun You, op cit.

$$(3)\quad x_t = g_{1t}y_{1t-1} + g_{2t}y_{2t-1} + g_{3t}x_{t-1} + h_t$$

This solution implies that the optimum value of x (i.e., New Jersey's employment growth rate over and above the national growth rate) consists of two parts: a predetermined part (h_t) and a part determined in reaction to the condition of the state economy in the previous year (y_{1t-1}, y_{2t-1}, and x_{t-1}). This implies that the optimum trajectories are not entirely predetermined. Instead, they obey a "feedback" policy rule which strives to compensate for unexpected developments inherent in the model due to random elements. If, however, one disregards the random error term in equations (1) and (2) and solves the optimization problem as if the world were deterministic, then the solution provides the expected (mean) values of y_{1t}, y_{2t}, and x_t. Such a solution is referred to as a "certainty equivalent" solution and the actual paths for y_{1t}, y_{2t}, and x_t will most likely hover around the certainty equivalent solution paths.

Table 2.1

SCENARIOS AND THEIR VARIANTS

Scenario	Description	Variant	Weights
Case 1	d_{1t} increases by 1 from 31 in 1988 to 50 in 2006 and remains at 50 until 2010. d_{2t} decreases by 0.1 from -0.4 in 1988 to -0.8 in 1992 and remains unchanged until 2010. $d_{3t} = 0$ for all t.	A	$k_1 = k_2 = k_3 = 1$
		B	$k_2 = 10$, $k_1 = k_3 = 1$
Case 2	d_{1t} increases by 0.5 from 31 in 1988 to 39 in 2004 and remains at 39 until 2010. d_{2t} and d_{3t} are the same as in Case 1.	A	$k_1 = k_2 = k_3 = 1$
		B	$k_2 = 10$, $k_1 = k_3 = 1$
Case 3	d_{1t} remains at 31 throughout the planning period (1988-2010); d_{2t} and d_{3t} are the same as above.	A	$k_1 = k_2 = k_3 = 0$
		B	$k_2 = 10$, $k_1 = k_3 = 0$

The model is applied to three possible scenarios. The first scenario is to set the target for y_1 (percent difference in per capita income) such that its value will increase by one percentage point each year starting from the 1987 actual value (30.8), reach the value of 50 by the year 2006, and remain at 50 until the year 2010.[4]

The population growth target for this scenario is to lower the population growth rate by one-tenth of a percentage point each year. This will result in the value of y_2 (which was -0.33 in 1987) reaching -0.8 by 1992 and remaining at that level until the year 2010. It is assumed that the U.S. population growth rate will average 0.8 percent per year. Therefore, the value of -0.8 for y_2 (N.J. population growth rate minus the U.S. rate) implies zero population growth for New Jersey from 1992 until the year 2010.

Scenario 2 attempts to increase y_1 by 0.5 percentage point each year to a more moderate level of 39 by 2006. Since the long run value of y_1, when x remains at 0 year after year, would eventually reach 38.8, this scenario assumes that there would be no deliberate effort to raise the relative per capita income level of New Jersey above this long run value. The population growth target under scenario 2 remains the same as scenario 1, i.e., no population growth from 1992 on.

In the third scenario, the target value for y_1 is fixed at 31, or only 0.2 percentage point above the 1987 actual value. The population target again remains the same as under the two previous scenarios.

The first scenario represents a pro-economic growth approach in which a conscious

4. Assuming a 1.5 percent annual growth in per capita personal income (in constant dollars), the U.S. would reach a level of $21,605 by the year 2010. If New Jersey's per capita income relative to the U.S. remains at the current ratio of 1.31, in 2010 its level would be $28,303. However, if the ratio reaches 1.50 as implied in this scenario, New Jersey's per capita income will reach $32,408.

effort is made to promote a higher rate of growth and higher standard of living. This effort must be balanced by the desire to keep population growth in check. The second scenario is an attempt to keep the population growth under control, while permitting the relative standard of living to increase to a more moderate level (39 percent above the United States' average).

The third scenario represents an attempt to restrict economic growth so that population growth is more controlled. Each of these three scenarios are applied to two variants in the cost function. The first variant gives each variable in the cost function equal weight. The second variant gives a weight of 10 to y_2 while y_1 and x are given the weights of 1 each. The second variant represents a pro-conservation tilt which tends to regard the objective of attaining the population target as more important than the economic growth target. The six possible combinations of the three scenarios and two variants are summarized in Table 2.1.

Analyzing different cases in Table 2.1, we obtain the optimum mean paths for y_1, y_2, and x. The results for these six cases are summarized in Table 2.2 and are also shown in Figures 2.1, 2.2, and 2.3.[5] Table 2.3 presents New Jersey's real per capita income, population, and nonagricultural employment, under the assumption that their U.S. counterparts grow at average annual rates of 1.5 percent, 0.8 percent, and 1.6 percent, respectively.[6] Figures 2.1 to 2.3 demonstrate that, as expected, variant B in each scenario exhibits lower growth rates and lower relative income than variant A, but the two variants in each scenario are not significantly different from each other. On the other hand, the three scenarios show significantly different paths from each other. This implies that the weights in the cost function do not make much difference in the optimum paths, and the target paths are the more important elements in determining the optimum paths.

Table 2.2

SUMMARY OF THE OPTIMUM MEAN PATHS

	1987*	1988	1989	1990	1995	2000	2005	2010
	Percent Difference in Per Capita Income (Y_1)							
Case 1A	30.81	31.98	33.02	34.02	38.92	43.83	48.59	49.02
Case 1B	30.81	31.85	32.79	33.70	38.31	43.03	47.64	48.14
Case 2A	30.81	31.17	31.62	32.09	34.52	36.97	38.87	38.93
Case 2B	30.81	31.10	31.47	31.88	34.l4	36.52	38.37	38.49
Case 3A	30.81	31.01	31.07	31.09	31.09	31.10	31.10	31.59
Case 3B	30.81	30.96	30.98	30.95	30.90	30.94	30.97	31.47
	Difference in Population Growth Rate (y_2)							
Case 1A	-0.33	-0.29	-0.24	-0.20	0.07	0.39	0.74	0.80
Case1B	-0.33	-0.30	-0.26	-0.22	0.02	0.33	0.67	0.73
Case 2A	-0.33	-0.34	-0.34	-0.34	-0.26	-0.12	0.00	0.01
Case 2B	-0.33	-0.35	-0.35	-0.35	-0.28	-0.16	-0.04	-0.03
Case 3A	-0.33	-0.35	-0.38	-0.41	-0.50	-0.56	-0.59	-0.58
Case 3B	-0.33	-0.36	-0.39	-0.42	-0.52	-0.57	-0.60	-0.59
	Difference in Employment Growth Rate (x)							
Case 1A	0.03	0.l5	0.17	0.26	0.85	1.46	1.97	0.89
Case 1B	0.03	0.03	0.06	0.14	0.74	1.33	1.83	0.83
Case 2A	0.03	-0.64	-0.51	-0.43	-0.11	0.19	0.12	0.01
Case 2B	0.03	-0.71	-0.59	-0.51	-0.17	0.12	0.05	-0.02
Case 3A	0.03	-0.80	-0.90	-0.94	-0.95	-0.95	-0.95	-0.62
Case 3B	0.03	-0.85	-0.95	-0.99	-0.97	-0.97	-0.96	-0.63

*Actual Value.

For example, Case 1 sets out to raise the relative personal income of New Jersey to a level 50 percent above the U.S. average, while gradually lowering the State's population growth rate to zero (or -0.8 in y_2). In order to raise the State's per capita personal income to a level 50 percent above the national average, it would be necessary to maintain relatively high economic growth in the State. As a result, the relative employment growth rate (x) rises gradually (Figure

5. Complete tables are found in the Appendix.

6. These figures are based on Wharton Econometric Forecasting Associates' latest long-term forecasts.

Figure 2.1

COMPARISON OF THE OPTIMUM MEAN PATHS
y1 (Percent Difference in Per Capita Income)

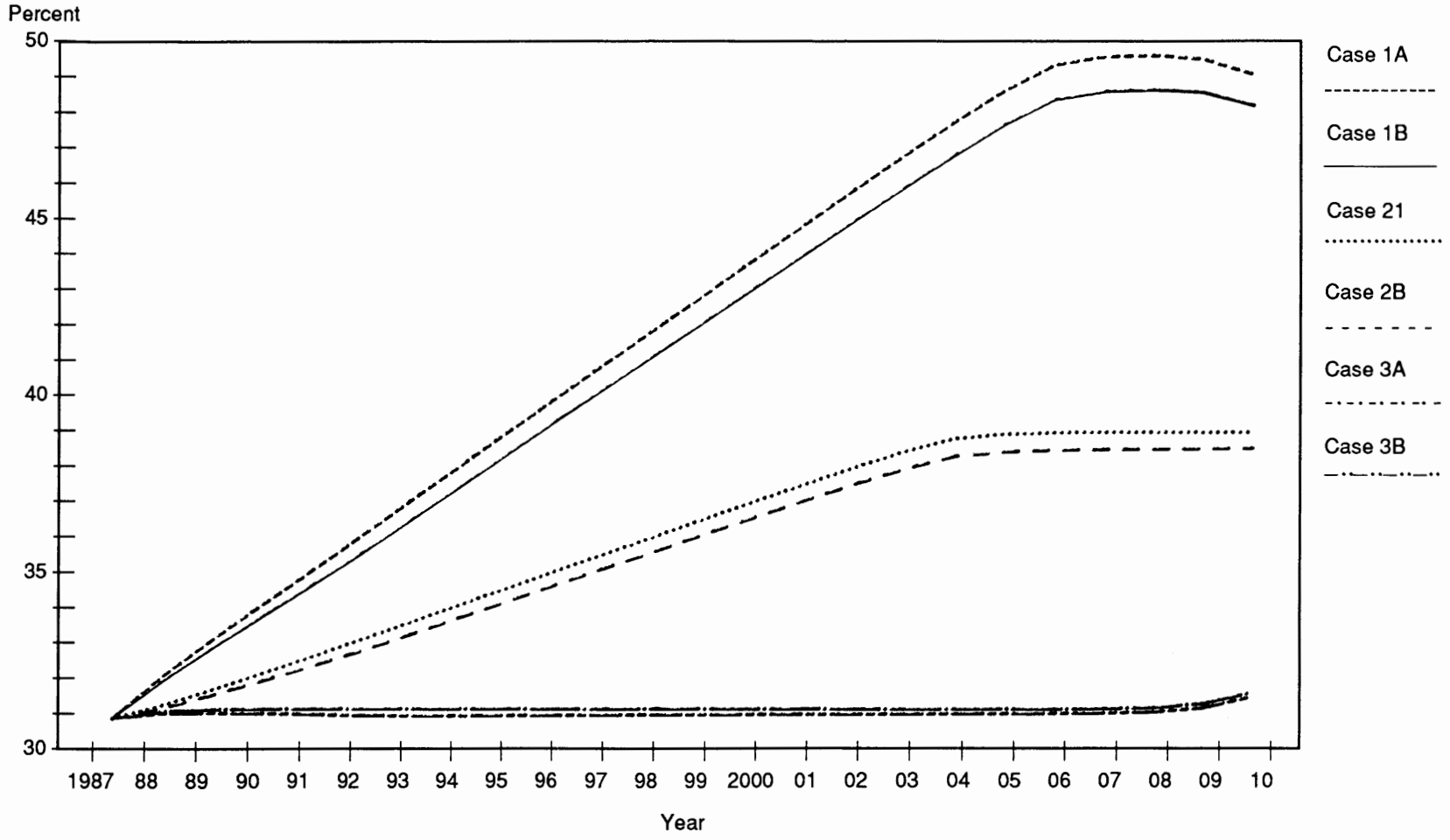


Figure 2.2

COMPARISON OF THE OPTIMUM MEAN PATHS
y2 (Population Growth Rate Difference)

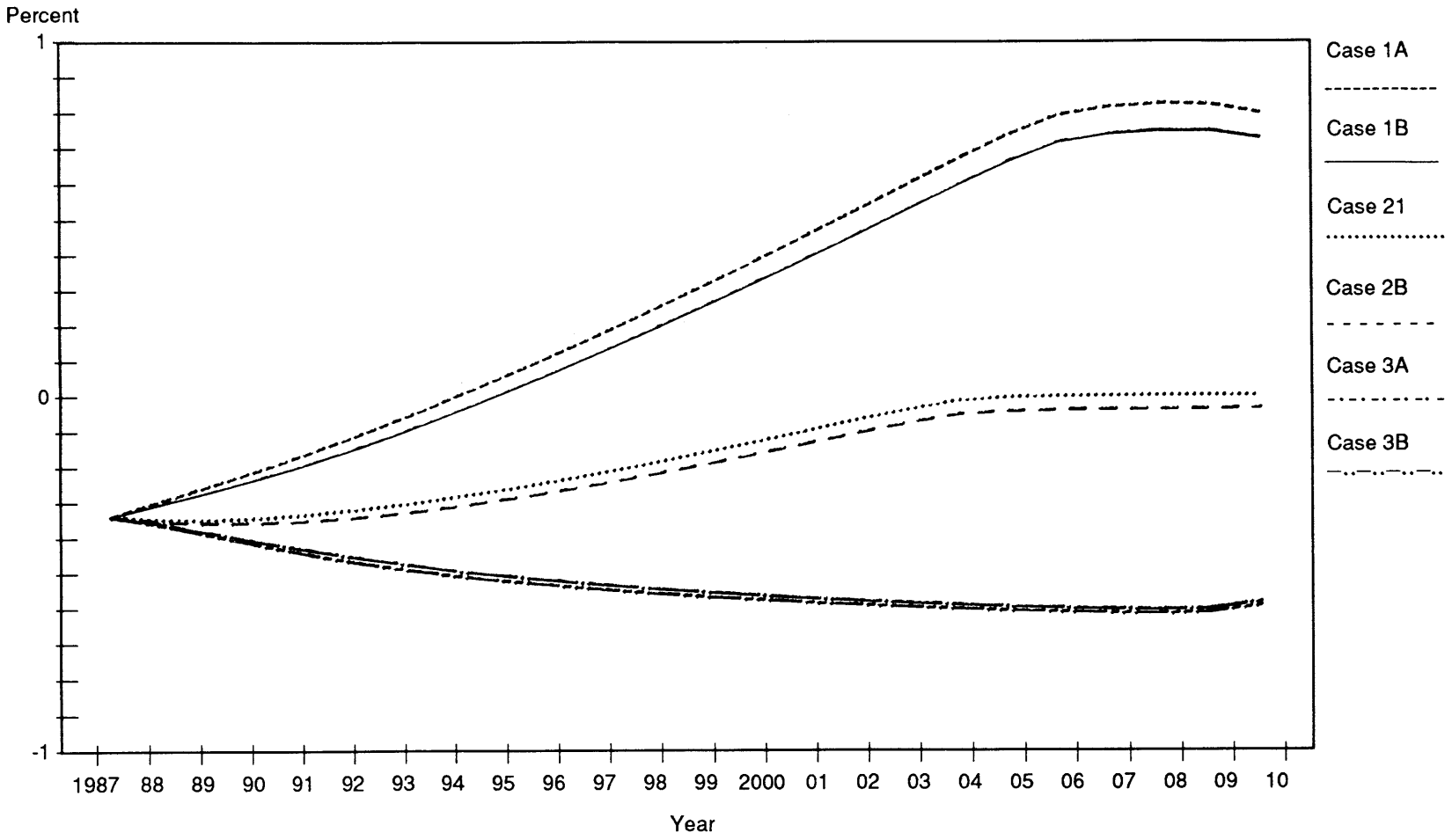
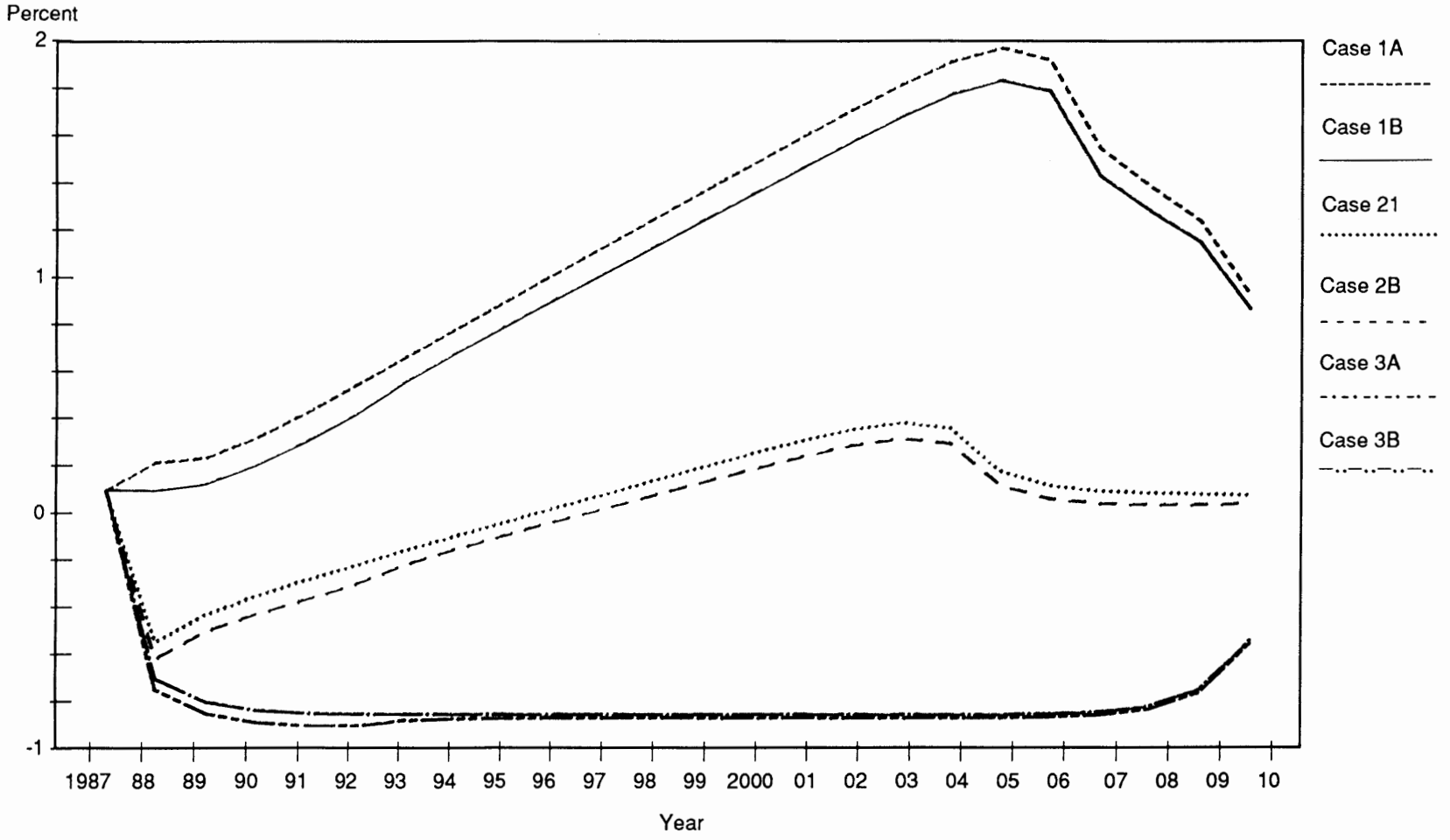


Figure 2.3

COMPARISON OF THE OPTIMUM MEAN PATHS
x (Employment Growth Rate Difference)



2.3) and, consequently, the relative population growth rate (y_2) also rises gradually, reaching a plateau of about 0.8 (i.e., 1.6 percent growth per annum). The year 2010 values implied by the optimum paths for case 1A in Table 2.2 are close to $32,200 (in 1987 prices) for the State's per capita income, nearly 10 million residents, and over 6.6 million jobs. Needless to say, such rapid employment and population increases are unrealistic.

Scenario 2 attempts to raise the relative per capita personal income to a long-run equilibrium level, 39 percent above the national average (for perspective, the actual number for 1988, the latest year of data, is 31%), while lowering the State's population growth rate to zero. In this scenario, the optimum mean path for the State's employment growth rate exhibits a sharp decrease in the first planning year to a rate about 0.6 to 0.7 percentage point below the national employment growth rate, followed by a gradual increase over time. The sharp decrease in the first planning year is an attempt to lower the population growth rate in the State. The optimum paths for y_1, y_2, and x under scenario 2 are more realistic. The implicit per capita income level in this scenario is about $30,000 in the year 2010, a population of over 8.8 million, and employment over five million.

The third scenario attempts to lower the population growth rate of New Jersey to zero, and maintain the relative per capita personal income of the State near its present level of 31 percent above the national average. Since this scenario does not attempt to raise the relative per capita personal income, the resulting optimum path shows the population growth rate more closely tracking the target path. However, this result is accomplished by maintaining a consistently low employment growth rate in the State. As shown in Figure 2.3, the relative employment growth rate in the State under scenario 3 shows a sharp decline in the first planning year and remains near a level close to one percentage point below the national growth for almost the entire planning period. The implicit optimum values for the year 2010 in this scenario are about $28,400 for per capita income, a population of 8.2 million and close to 4.2 million jobs.

Table 2.3

IMPLICIT OPTIMUM MEAN PATHS*

	1988	1989	1990	1995	2000	2005	2010
	New Jersey's Per Capita Income (in 1987 dollars)						
Case 1A	20,549	21,022	21,498	24,006	26,775	29,800	32,196
Case 1B	20,529	20,986	21,447	23,900	26,626	29,609	32,006
Case 2A	20,423	20,801	21,189	23,245	25,498	27,850	30,016
Case 2B	20,412	20,778	21,155	23,179	25,415	27,750	29,921
Case 3A	20,398	20,714	21,028	22,652	24,406	26,292	28,430
Case 3B	20,390	20,700	21,006	22,620	24,376	26,266	28,404
	New Jersey's Population (thousands)						
Case 1A	7,711	7,754	7,801	8,100	8,538	8,152	9,916
Case 1B	7,710	7,752	7,797	8,080	8,494	9,075	9,795
Case 2A	7,707	7,743	7,778	7,976	8,228	8,546	8,898
Case 2B	7,706	7,741	7,776	7,965	8,202	8,503	8,835
Case 3A	7,706	7,739	7,769	7,899	8,002	8,091	8,174
Case 3B	7,706	7,737	7,767	7,890	7,989	8,073	8,152
	New Jersey's Nonagricultural Employment (thousands)						
Case 1A	3,652	3,716	3,786	4,223	4,851	5,732	6,638
Case 1B	3,648	3,708	3,773	4,184	4,779	5,609	6,463
Case 2A	3,623	3,663	3,706	3,966	4,308	4,724	5,121
Case 2B	3,621	3,658	3,697	3,943	4,270	4,666	5,045
Case 3A	3,618	3,643	3,667	3,788	3,913	4,041	4,195
Case 3B	3,616	3,639	3,662	3,775	3,895	4,021	4,171

*Based on the assumption that the annual average growth rates for the U.S. real per capita income, population, and nonagricultural employment will be, respectively, 1.5%, 0.8%, and 1.6%.

The above results show that, while setting different target paths would result in significantly different optimum mean paths, varying the weights given to different variables results in only small differences in the optimum paths. This implies that setting proper target paths is critically important in the determination of the optimum policy. In other words, it would be crucial to accurately assess the preferences of constituents so that policymakers would be able to set proper target paths.

Figure 2.4

ALTERNATIVE MEAN PATHS FOR
y1 (Percent Difference in Income)

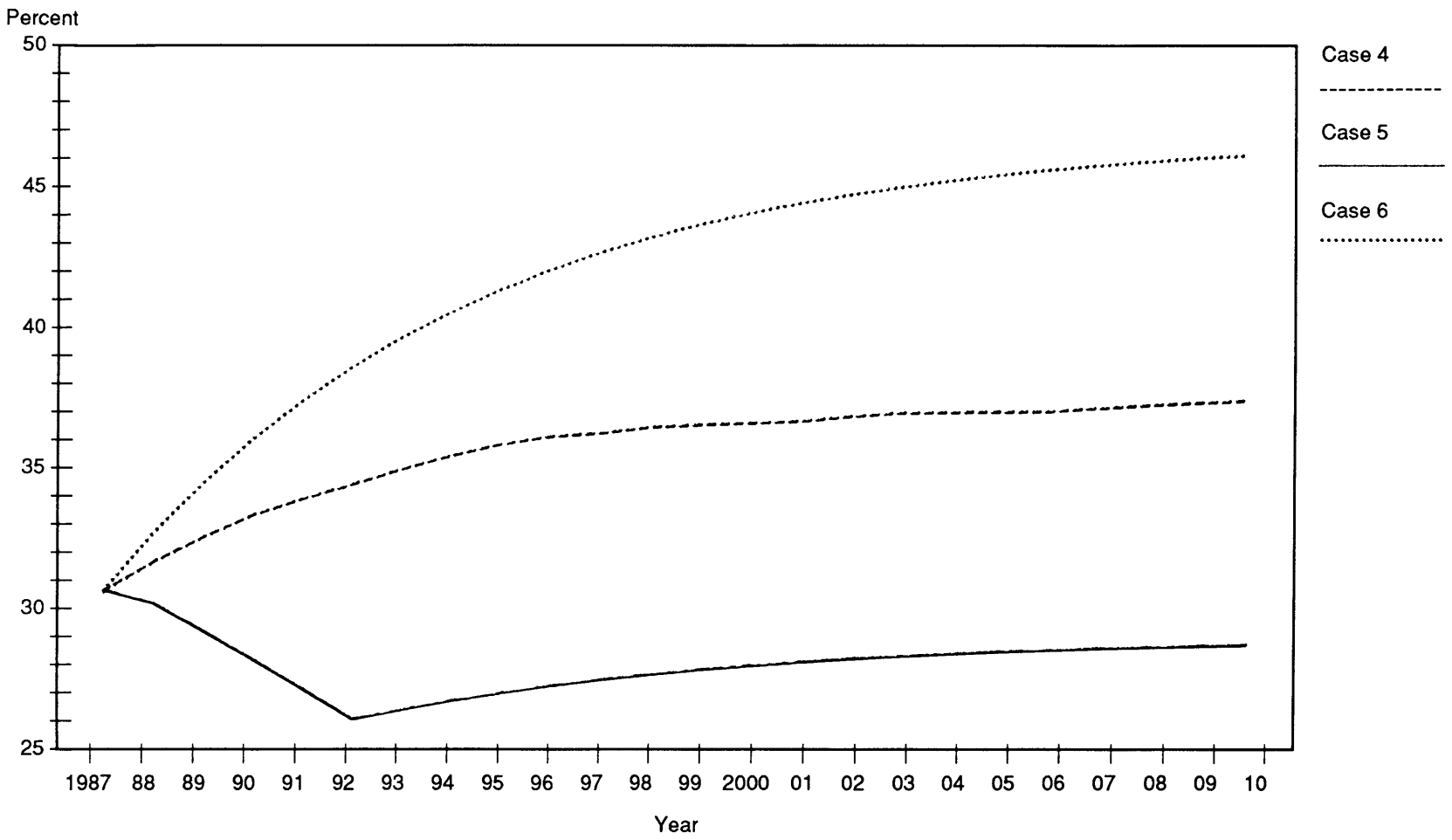


Figure 2.5

ALTERNATIVE MEAN PATHS FOR
y2 (Population Growth Rate Difference)

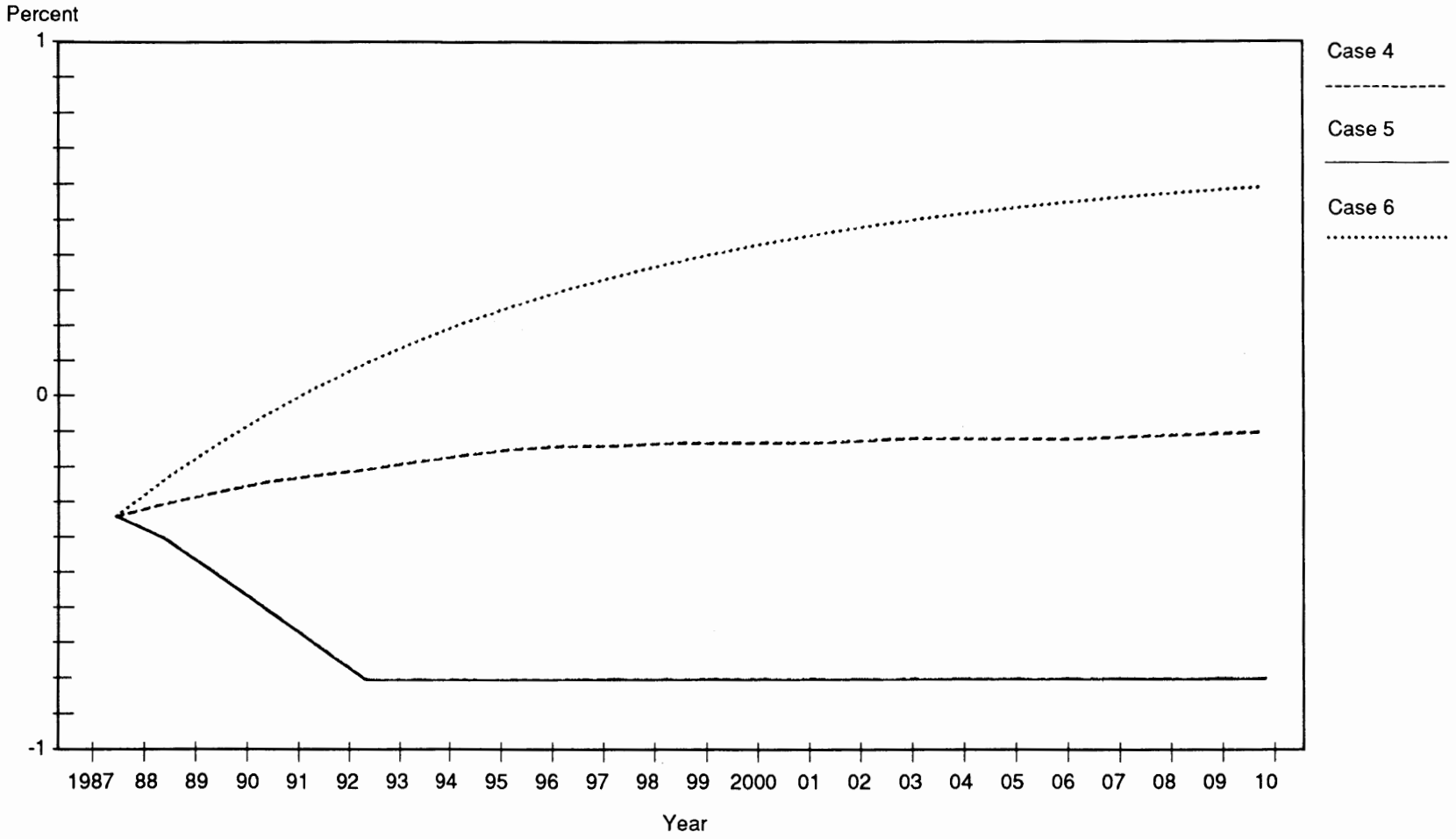
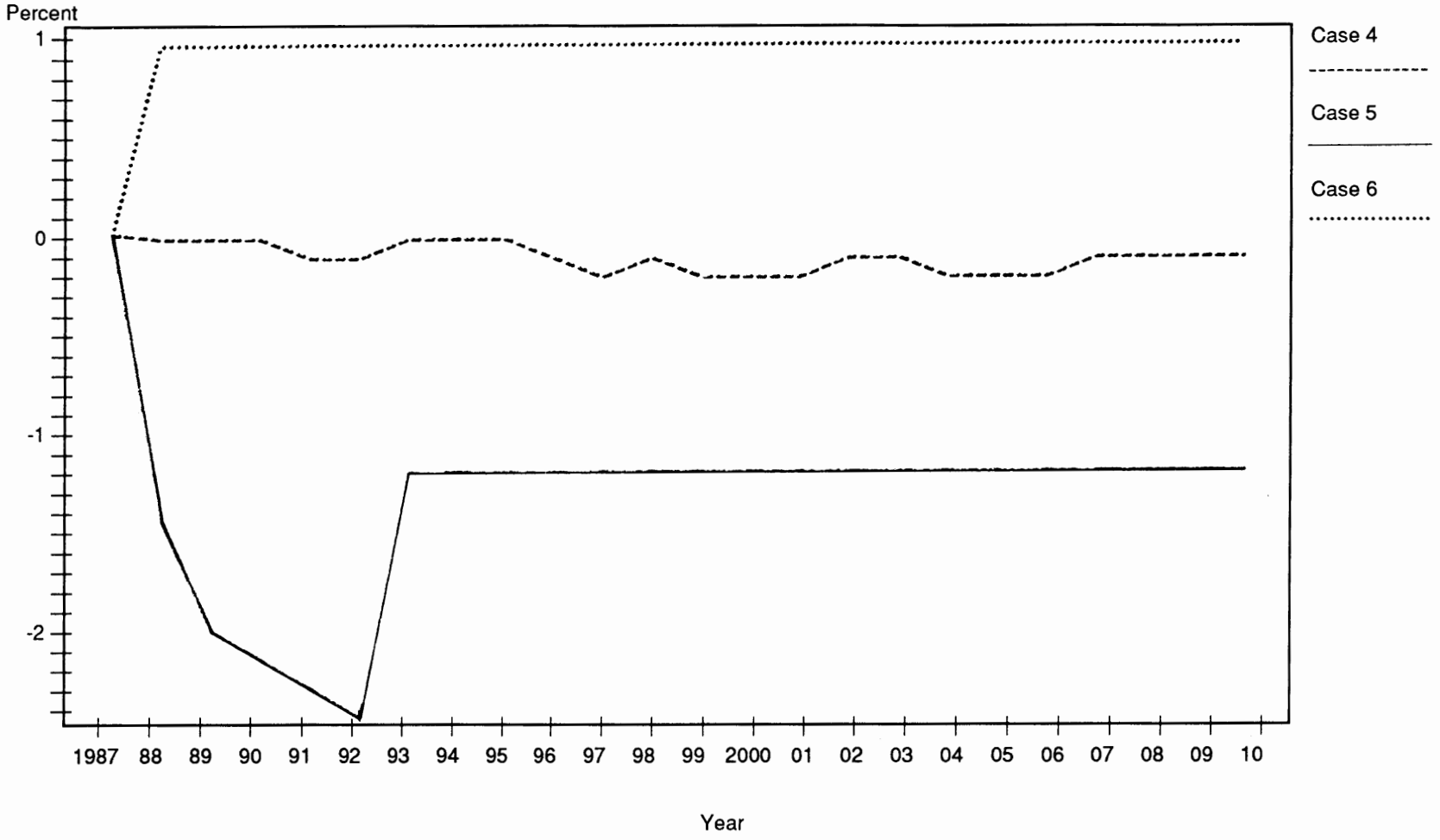


Figure 2.6

ALTERNATE MEAN PATHS FOR
x (Employment Growth Rate Difference)



III. Alternative Paths

Since it has been shown that the target paths are more important in the determination of the optimum paths than the weighting factors in the cost function, it would be useful to consider other alternative target paths. For example, according to the preliminary version of the *State Development and Redevelopment Plan*.[7] New Jersey's population is projected to grow to 895,900 by the year 2010.[8] This implies an annual population growth rate of 0.65 percent, which is slightly higher than the 1987 growth rate of 0.62 percent. However, since the national population growth rate is expected to decrease slightly over the period 1985-2010, New Jersey's population growth rate of 0.65 percent per annum represents a fairly healthy growth rate, and almost matches the projected growth rate of 0.8 percent in the United States.

In order to reach a population of 8,895,900 by 2010, starting from 7,672,000 in 1987 and making a smooth transition in the growth rate, we make an assumption that y_2 will gradually rise from -0.3 in 1988 to -0.1 in 2010. This scenario is identified as Case 4 in Figures 2.4-2.6. We calculate the relative employment growth rate (x) which will ensure the population growth assumed in this case (Figure 2.6), and using these values, we obtain the relative per capita personal income consistent with these growth rates (Figure 2.4).

We also consider two other alternative scenarios. The first is an attempt to lower the State's population growth rate to zero regardless of its economic consequences (Case 5). It is assumed under this scenario that y_2 will decrease from -0.3 in 1987 by 0.1 each year until it reaches -0.8 in 1992 and will remain at this rate throughout the rest of the planning period (Figure 2.5). We calculate the relative employment growth rate which will ensure these population growth rates and, using these relative employment growth rates, we obtain the relative per capita personal income (Figure 2.6 and Figure 2.4, respectively). Finally, in order to assess the consequence of promoting economic growth at any cost, we assume that the State somehow manages to induce an employment growth rate which annually exceeds the national employment growth rate by one full percentage point, i.e., x = 1 (Case 6). The relative per capita income and the relative population growth rate as a result of such employment growth are presented in Figures 2.4 and 2.5, respectively and are also summarized in Table 2.4.[9]

In Case 4, New Jersey's population is expected to increase at a slightly slower rate than the national growth rate. In order for such a result to occur, the State's employment growth rate must be maintained near the national employment growth rate for the first eight years of the planning period, and at 0.1 to 0.2 percentage points lower than the national growth rate for the rest of the planning period.

In contrast, Cases 5 and 6 show more extreme results. Case 5, which attempts to lower the State's population growth rate to zero regardless of its consequences, requires significant reductions in the State's employment growth rate (more than 2 percentage points below the national employment growth rate initially and 1.2 percentage points below the national rate from 1993). As a result, the relative per capita personal income of New Jersey decreases from about 31 percent higher than the United States' in 1987 to about 27 percent higher in 1994, followed by a moderate increase to 28.8 percent in 2010, although its absolute level rises from $20,067 in 1987 to $21,601 in 1994, and to $27,834 in 2010. Compared to Case 4, this represents a nearly 9 percentage point decrease in the relative per capita income of the State.

Case 6 represents an extreme pro-growth and unrealistic scenario. If it were possible for the State to maintain its employment growth rate a full one percentage point above the national growth rate, relative per capita income would increase to 46.2 percent (or by 8.7 percentage points more than in Case 4) by 2010, while the State's population growth rate would surpass the national rate by almost 0.6 percentage point (i.e., 1.4 percent growth in the State's population per annum). This would result in the State's population reaching almost ten million by the year 2010.

Both Case 5 and Case 6 are unacceptable; Case 5 because of the high cost in terms of the loss in the relative per capita income (almost $2,000

---

7. The New Jersey State Planning Commission, *Communities of Place*, Vol. I, November 1988.
8. Actually, this figure is a New Jersey Department of Labor projection. It is not clear what role this figure plays in the State Plan.
9. For complete results for these alternatives, see the Appendix.

Table 2.4

ALTERNATIVE MEAN PATHS AND THEIR IMPLICIT VALUES

	1988	1989	1990	1995	2000	2005	2010
	Percent Difference in Per Capita Income (Y_1)						
Case 4	31.80	32.71	33.48	35.97	36.71	37.09	37.48
Case 5	30.34	29.34	28.31	27.16	28.10	28.59	28.83
Case 6	32.85	34.63	36.18	41.45	44.13	45.49	46.18
	Difference in Population Growth Rate (Y_2)						
Case 4	-0.30	-0.27	-0.24	-0.15	-0.13	-0.12	-0.10
Case 5	-0.40	-0.50	-0.60	-0.80	-0.80	-0.80	-0.80
Case 6	-0.23	-0.13	-0.05	0.26	0.43	0.53	0.59
	Difference in Employment Growth Rate (x)						
Case 4	0.00	0.00	0.00	0.00	-0.20	-0.20	-0.10
Case 5	-1.45	-2.02	-2.17	-1.20	-1.20	-1.20	-1.20
Case 6	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	New Jersey's Per Capita Income (1987 dollars)						
Case 4	20,521	20,973	21,412	23,496	25,450	27,493	29,703
Case 5	20,294	20,441	20,582	21,973	23,847	25,789	27,834
Case 6	20,685	21,277	21,845	24,443	26,831	29,178	31,582
	New Jersey's Population (thousands)						
Case 4	7,710	7,751	7,795	8,039	8,310	8,595	8,895
Case 5	7,703	7,726	7,741	7,749	7,749	7,749	7,749
Case 6	7,716	7,767	7,826	8,204	8,694	9,273	9,926
	New Jersey's Nonagricultural Employment (thousands)						
Case 4	3,646	3,705	3,764	4,067	4,368	4,692	5,050
Case 5	3,594	3,579	3,559	3,545	3,616	3,689	3,763
Case 6	3,682	3,778	3,876	4,407	5,011	5,697	6,477

compared to Case 4), and Case 6 because of the high cost of a rapid increase in the State's population (by more than 2.2 million from 1987 to 2010, or twice as much as the increase in Case 4). On the other hand, if the State were able to guide the economy fairly close to the scenario represented by Case 4, then there would be a moderate increase in the relative per capita income.

It has been suggested by some proponents of growth management that the State would be able to absorb the projected population growth without discouraging economic growth by more efficiently allocating population and employment within New Jersey. It is unrealistic to assume that any measures altering market forces so as to limit population growth in high-growth areas and to redirect such growth to other areas would have absolutely no net effect. If, however, the State Planning Commission can indeed minimize any negative economic consequences of its growth controls and maintain economic growth paths reasonably close to those represented by Case 4, then the results are likely to be much more acceptable to proponents of both growth management and economic growth. Whether the Plan can have minimum negative effects on economic growth will be affected by the specifics of the policies, incentives and disincentives it uses. This important issue needs to be examined by an economic impact assessment.

IV. Conclusions

The exercises in this paper demonstrate that setting a proper target path is the most important element in determining the planning strategy. Therefore, State agencies should examine the economic impact of the programs they promote. Moreover, the State Planning Commission should review the total economic impact of these programs since each program, considered in terms of its own benefits and costs, may be judged acceptable. However, the effects of all programs in totality may have an aggregate economic impact which is undesirable.

For example, when viewed independently, zero population growth may be an appealing proposition, particularly to the existing residents of the most densely populated state in the country. However, such a result cannot be achieved with-

out the loss of some economic growth. Thus, when its consequences on income and employment are taken together, zero population growth may prove considerably less attractive. Similarly, relative high income and employment growth are certainly desirable if they could be achieved without attracting a burdensome amount of net in-migration. But, it is not possible to keep the State's borders closed when there is a strong labor demand. A set of optimum values for income, employment, and population growth, therefore, can be found by balancing the benefits and costs associated with conflicting objectives.

At present, there is no mechanism for balancing the benefits and costs of various programs of the State and local governments. When each agency is allowed (as indeed it should) to promote its own programs, there is a natural tendency for the agency to be biased in favor of the development and expansion of programs in its area, and, consequently, not give close scrutiny to the economic impact of these programs. For example, there are numerous programs dealing with environmental questions and land use in addition to the State Development and Redevelopment Plan. These programs include the Water Supply Management Act, Water Quality Planning Act, Water Pollution Control Act, Solid Waste Management Act, Flood Hazard Area Control Act, Fresh Water Wetlands Protection Act, Fair Housing Act, Agriculture Retention and Development Act, Pinelands Protection Act, Coastal Area Facilities Review Act, Hackensack Meadowlands Reclamation and Development Act, etc. The agencies which promote these programs may not give serious consideration to their overall economic impact.

Therefore, it would be most desirable for the State to conduct an economic impact study of these programs in terms of the totality of their effect and make recommendations for adjustments, if necessary. Furthermore, since the State's economic and environmental conditions continue to change over time, such a study should be ongoing, so that programs can be adjusted to changing circumstances.

APPENDIX

Table A1

Optimum Mean Paths (Case 1A)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	32	31.98	-0.4	-0.29	0.15
1989	33	33.02	-0.5	-0.24	0.17
1990	34	34.02	-0.6	-0.20	0.26
1991	35	35.00	-0.7	-0.15	0.37
1992	36	35.98	-0.8	-0.10	0.49
1993	37	36.96	-0.8	-0.05	0.61
1994	38	37.94	-0.8	0.01	0.73
1995	39	38.92	-0.8	0.07	0.85
1996	40	39.91	-0.8	0.13	0.97
1997	41	40.89	-0.8	0.19	1.09
1998	42	41.87	-0.8	0.26	1.21
1999	43	42.85	-0.8	0.32	1.34
2000	44	43.83	-0.8	0.39	1.46
2001	45	44.81	-0.8	0.46	1.58
2002	46	45.78	-0.8	0.53	1.70
2003	47	46.75	-0.8	0.60	1.81
2004	48	47.70	-0.8	0.67	1.91
2005	49	48.59	-0.8	0.74	1.97
2006	50	49.32	-0.8	0.80	1.91
2007	50	49.55	-0.8	0.82	1.53
2008	50	49.59	-0.8	0.83	1.36
2009	50	49.46	-0.8	0.83	1.21
2010	50	49.02	-0.8	0.80	0.89

Table A2

Optimum Mean Paths (Case 1B)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	32	31.85	-0.4	-0.30	0.03
1989	33	32.79	-0.5	-0.26	0.06
1990	34	33.70	-0.6	-0.22	0.14
1991	35	34.59	-0.7	-0.18	0.24
1992	36	35.50	-0.8	-0.14	0.36
1993	37	36.43	-0.8	-0.09	0.50
1994	38	37.37	-0.8	-0.03	0.62
1995	39	38.31	-0.8	0.02	0.74
1996	40	39.26	-0.8	0.08	0.86
1997	41	40.20	-0.8	0.14	0.98
1998	42	41.14	-0.8	0.20	1.09
1999	43	42.09	-0.8	0.27	1.21
2000	44	43.03	-0.8	0.33	1.33
2001	45	43.97	-0.8	0.40	1.44
2002	46	44.92	-0.8	0.46	1.56
2003	47	45.85	-0.8	0.53	1.67
2004	48	46.77	-0.8	0.60	1.77
2005	49	47.64	-0.8	0.67	1.83
2006	50	48.34	-0.8	0.72	1.78
2007	50	48.58	-0.8	0.74	1.41
2008	50	48.62	-0.8	0.75	1.25
2009	50	48.53	-0.8	0.75	1.12
2010	50	48.14	-0.8	0.73	0.83

Table A3

Optimum Mean Paths (Case 2A)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	31	31.17	-0.4	-0.34	-0.64
1989	31.5	31.62	-0.5	-0.34	-0.51
1990	32	32.09	-0.6	-0.34	-0.43
1991	32.5	32.57	-0.7	-0.33	-0.36
1992	33	33.05	-0.8	-0.31	-0.30
1993	33.5	33.54	-0.8	-0.30	-0.23
1994	34	34.03	-0.8	-0.28	-0.17
1995	34.5	34.52	-0.8	-0.26	-0.11
1996	35	35.01	-0.8	-0.23	-0.05
1997	35.5	35.50	-0.8	-0.21	0.01
1998	36	35.99	-0.8	-0.18	0.07
1999	36.5	36.48	-0.8	-0.15	0.13
2000	37	36.97	-0.8	-0.12	0.19
2001	37.5	37.46	-0.8	-0.09	0.25
2002	38	37.93	-0.8	-0.06	0.30
2003	38.5	38.38	-0.8	-0.03	0.33
2004	39	38.74	-0.8	-0.01	0.30
2005	39	38.87	-0.8	0.00	0.12
2006	39	38.92	-0.8	0.01	0.05
2007	39	38.93	-0.8	0.01	0.03
2008	39	38.94	-0.8	0.01	0.02
2009	39	38.94	-0.8	0.01	0.02
2010	39	38.93	-0.8	0.01	0.01

Table A4

Optimum Mean Paths (Case 2B)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	31	31.10	-0.4	-0.35	-0.71
1989	31.5	31.47	-0.5	-0.35	-0.59
1990	32	31.88	-0.6	-0.35	-0.51
1991	32.5	32.30	-0.7	-0.35	-0.45
1992	33	32.73	-0.8	-0.34	-0.38
1993	33.5	33.19	-0.8	-0.32	-0.30
1994	34	33.67	-0.8	-0.30	-0.23
1995	34.5	34.14	-0.8	-0.28	-0.17
1996	35	34.62	-0.8	-0.26	-0.11
1997	35.5	35.10	-0.8	-0.24	-0.05
1998	36	35.57	-0.8	-0.21	0.01
1999	36.5	36.05	-0.8	-0.19	0.06
2000	37	36.52	-0.8	-0.16	0.12
2001	37.5	36.99	-0.8	-0.13	0.18
2002	38	37.46	-0.8	-0.10	0.23
2003	38.5	37.89	-0.8	-0.07	0.26
2004	39	38.25	-0.8	-0.05	0.23
2005	39	38.37	-0.8	-0.04	0.05
2006	39	38.42	-0.8	-0.03	-0.01
2007	39	38.44	-0.8	-0.03	-0.03
2008	39	38.46	-0.8	-0.03	-0.03
2009	39	38.47	-0.8	-0.03	-0.03
2010	39	38.49	-0.8	-0.03	-0.02

Table A5

Optimum Mean Paths (Case 3A)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	31	31.01	-0.4	-0.35	-0.80
1989	31	31.07	-0.5	-0.38	-0.90
1990	31	31.09	-0.6	-0.41	-0.94
1991	31	31.09	-0.7	-0.43	-0.95
1992	31	31.09	-0.8	-0.45	-0.95
1993	31	31.09	-0.8	-0.47	-0.95
1994	31	31.09	-0.8	-0.49	-0.95
1995	31	31.09	-0.8	-0.50	-0.95
1996	31	31.10	-0.8	-0.52	-0.95
1997	31	31.10	-0.8	-0.53	-0.95
1998	31	31.10	-0.8	-0.54	-0.95
1999	31	31.10	-0.8	-0.55	-0.95
2000	31	31.10	-0.8	-0.56	-0.95
2001	31	31.10	-0.8	-0.57	-0.95
2002	31	31.10	-0.8	-0.57	-0.95
2003	31	31.10	-0.8	-0.58	-0.95
2004	31	31.10	-0.8	-0.59	-0.95
2005	31	31.10	-0.8	-0.59	-0.95
2006	31	31.11	-0.8	-0.60	-0.95
2007	31	31.12	-0.8	-0.60	-0.94
2008	31	31.16	-0.8	-0.60	-0.91
2009	31	31.27	-0.8	-0.59	-0.84
2010	31	31.59	-0.8	-0.58	-0.62

Table A6

Optimum Mean Paths (Case 3B)

	Y_1		Y_2		
Year	Target	Optimum	Target	Optimum	X
1988	31	30.96	-0.4	-0.36	-0.85
1989	31	30.98	-0.5	-0.39	-0.95
1990	31	30.95	-0.6	-0.42	-0.99
1991	31	30.92	-0.7	-0.44	-1.01
1992	31	30.89	-0.8	-0.47	-1.01
1993	31	30.88	-0.8	-0.49	-0.98
1994	31	30.89	-0.8	-0.50	-0.97
1995	31	30.90	-0.8	-0.52	-0.97
1996	31	30.91	-0.8	-0.53	-0.97
1997	31	30.92	-0.8	-0.54	-0.97
1998	31	30.93	-0.8	-0.55	-0.97
1999	31	30.94	-0.8	-0.56	-0.97
2000	31	30.94	-0.8	-0.57	-0.97
2001	31	30.95	-0.8	-0.58	-0.97
2002	31	30.96	-0.8	-0.59	-0.97
2003	31	30.96	-0.8	-0.59	-0.97
2004	31	30.97	-0.8	-0.60	-0.96
2005	31	30.97	-0.8	-0.60	-0.96
2006	31	30.98	-0.8	-0.61	-0.96
2007	31	31.00	-0.8	-0.61	-0.95
2008	31	31.04	-0.8	-0.61	-0.93
2009	31	31.15	-0.8	-0.60	-0.85
2010	31	31.47	-0.8	-0.59	-0.63

Table A7

Alternative Mean Paths

	Case 4			Case 5			Case 6 (x = 1)	
	Y_1	Y_2	X	Y_1	Y_2	X	Y_1	Y_2
1988	31.8	-0.30	0	30.34	-0.4	-1.45	32.85	-0.23
1989	32.71	-0.27	0	29.34	-0.5	-2.02	34.63	-0.13
1990	33.48	-0.24	0	28.31	-0.6	-2.17	36.18	-0.05
1991	34.05	-0.22	-0.1	27.26	-0.7	-2.32	37.54	0.03
1992	34.55	-0.20	-0.1	26.19	-0.8	-2.47	38.72	0.09
1993	35.09	-0.18	0	26.56	-0.8	-1.20	39.76	0.15
1994	35.56	-0.16	0	26.88	-0.8	-1.20	40.66	0.21
1995	35.97	-0.15	0	27.16	-0.8	-1.20	41.45	0.26
1996	36.23	-0.14	-0.1	27.40	-0.8	-1.20	42.14	0.30
1997	36.35	-0.14	-0.2	27.61	-0.8	-1.20	42.74	0.34
1998	36.56	-0.13	-0.1	27.80	-0.8	-1.20	43.27	0.37
1999	36.64	-0.13	-0.2	27.96	-0.8	-1.20	43.73	0.40
2000	36.71	-0.13	-0.2	28.10	-0.8	-1.20	44.13	0.43
2001	36.77	-0.13	-0.2	28.23	-0.8	-1.20	44.48	0.46
2002	36.93	-0.12	-0.1	28.34	-0.8	-1.20	44.79	0.48
2003	37.06	-0.12	-0.1	28.43	-0.8	-1.20	45.05	0.50
2004	37.08	-0.12	-0.2	28.51	-0.8	-1.20	45.29	0.52
2005	37.09	-0.12	-0.2	28.59	-0.8	-1.20	45.49	0.53
2006	37.10	-0.12	-0.2	28.65	-0.8	-1.20	45.67	0.55
2007	37.22	-0.12	-0.1	28.71	-0.8	-1.20	45.83	0.56
2008	37.32	-0.11	-0.1	28.75	-0.8	-1.20	45.96	0.57
2009	37.40	-0.11	-0.1	28.80	-0.8	-1.20	46.08	0.58
2010	37.48	-0.10	-0.1	28.83	-0.8	-1.20	46.18	0.59

Chapter III

EVIDENCE OF HOUSE PRICE CHANGES IN NEW JERSEY — 1984 TO 1987*

Introduction

The New Jersey economy, which began the decade in recession, has emerged at its end as an economic success story. Despite the fact that the State's economic growth has slowed considerably in the last two years, the economic performance of New Jersey in the 1980s has been nothing less than remarkable.

Since 1982, employment in New Jersey increased by over 500,000. The State's unemployment rate fell from above nine percent in 1982 to less than four percent in the first half of 1989. Between 1982 and 1988, total personal income rose by 63 percent, and real disposable income per capita increased by 27 percent. The State's population, which had risen by only two percent during the entire 1970s, grew by over four percent between 1980 and 1988, as net migration turned positive after years of a net outflow. The State's budget expanded by 84 percent from 1982 to 1988 as a result of high rates of growth in income, employment, and retail sales, and the subsequent expansion of the tax base. The visible signs of economic prosperity—new commercial and residential construction and infrastructure improvements—are everywhere.

At the same time, this unprecedented economic prosperity has led to growing problems of congestion, pollution, loss of open space, and shortages of labor and affordable housing. The State has responded with a number of initiatives aimed at protecting the quality of life in New Jersey and maintaining economic prosperity. These initiatives include the State Planning Act, the Fair Housing Act, several open space bond issues, wetlands and coastal protection, mandatory recycling, and additional authority for state and county governments and regional agencies to regulate economic development. The concerns which have led to these initiatives are certain to remain a major focus for public policy in the 1990s.

The linkages between housing affordability, labor supply, land use management, and economic growth have become increasingly apparent. For example, there is concern that a shortage of affordable housing will constrain the growth of the State's labor force and adversely affect New Jersey businesses. In fact, in order to attract and retain employees, private employers increasingly have been devising innovative housing assistance programs. Second, land use controls are widely supported as necessary to protect environmental quality and open space. However, limitations on the location and intensity of development may cause undesirable increases in land and housing costs in certain areas of the State. Third, location decisions by firms and individuals may be significantly influenced by quality of life concerns, economic and employment opportunities, and housing costs. These, and other, complex interrelationships among economic development, land use controls, housing costs and quality of life need to be understood better in order to improve the effectiveness of public policies.

The problems associated with rapid growth are so recent that evidence of their nature and severity is more often anecdotal than systematic. In order to evaluate the State policies now being implemented to address these emerging concerns, it is essential to understand the quantitative dimensions of the problems. In this chapter we present some evidence on one important outcome of the economic development process that New Jersey experienced in the 1980s — the differential behavior of house prices across the State and the implications of these changes for housing affordability.

The Chapter is organized according to the following outline. Section I discusses

---

*Prepared by Joseph J. Seneca, Chairman of the Economic Policy Council and Jeffrey I. Rubin, Associate Professor of Economics at Rutgers University.We acknowledge the support of the New Jersey Department of Community Affairs.We thank Ruchira Banerjee and Paul Schwabe for statistical assistance and Lawrence Dolan, John Payne, Ernest Reock and George Sternlieb for comments. The views expressed in this chapter are solely those of the authors.

the general characteristics of housing markets and the role of supply and demand factors in determining house prices. Section II provides an overview of housing activity in New Jersey in the 1980's. Section III presents recent evidence of housing price changes in New Jersey. The distribution of house price changes across the State and the issue of housing affordability are examined. Section IV concludes the chapter with a discussion of future research plans to identify the determinants of house prices in New Jersey.

I. Housing Prices and Housing Markets

Any study of the behavior of house prices requires an understanding of housing markets. As with any good or service in the economy, such a study must begin with understanding the demand and supply factors which underlie the market.

Demand and Supply of Housing

The demand for housing in a given area is affected by the price of housing, borrowing costs, the income (both current and future) of the buyer, household characteristics, the quality and cost of local public services and amenities, access to employment, transportation conditions, household formation growth, and a myriad of other factors.

The supply of housing has an important time dimension. Because of construction lags, the housing stock is reasonably fixed in the short-run, and any increases in housing demand will result in an increase in the price of existing dwelling units. In time, higher prices (or the anticipation of higher prices) induce builders and landowners to increase the supply of housing. Construction and land costs also influence the long-run supply of housing. Land use controls, zoning ordinances, building codes, and environmental standards and regulations may also affect housing costs and, hence, housing supply.

Assessing the specific effects of these demand and supply factors on housing prices is complicated by a number of special features of housing markets. Unlike many other goods and services, housing combines three special characteristics—durability, spatial fixity and quality differences. Each of these factors carries implications for empirical studies of house prices. The durable nature of housing means that annual increases in housing represent only a very small amount of the existing stock, and housing models must be analyzed in a stock-flow context. The spatial fixity of housing means that housing services and accessibility are inseparable in the purchase decision of a house. It also implies the concomitant choice of a number of other characteristics — the level and type of local government services, the quality of education, local taxes, environmental conditions, etc. The third characteristic of housing — the diversity of housing types — also creates significant problems for empirical analysis. For example, the observed variation in house prices across communities at a point in time reflects, in part, differences in housing quality and size. Similarly, over time, house prices may change differently across communities if new units differ markedly in type and size from existing units. Disentangling the separate effects of all these factors which influence house prices becomes an imposing task.

Research on Housing Markets

There has been extensive research on housing markets and housing prices, and an extremely large theoretical and empirical literature exists (see, Smith, *et al.* for a recent comprehensive review organized around the housing chracteristics outlined above). Among the variables of particular empirical interest are the effects on housing markets of price, consumer income and land use controls. Empirical estimates of the price elasticity of demand for housing have generally found it to be inelastic. For example, one study (Polinsky and Ellwood, 1979) estimated a price elasticity of -0.7. This means that a one percent increase in the price of housing causes a 0.7 percent decline in the demand for housing. Estimates of the income elasticity of housing have reached less of a consensus, and vary widely with the market and time period studied. One recent review (Harmon, 1988) found an income elasticity of 0.7 in the short-run, rising to 1.0 in the long-run. This suggests, that over time, a given percentage increase in household income leads to a proportional rise in spending on housing.

Other studies have attempted to focus on the specific effects on housing prices of such variables as school performance (see, e.g., Jud and Watts, 1981), environmental quality (Mark, 1980), and public amenities and neighborhood characteris-

tics (Li and Brown, 1980). The general consensus of these, and similar, studies is that all of these factors have a detectable and significant effect on house prices.

A more recent focus of housing market studies has been to quantify the effects of land use and growth controls on housing markets. This interest has arisen out of the increasing use by local, and in certain cases, regional authorities and even states, of policies to restrict development. The very visible effects of additional development on current residents—congestion, pollution, loss of open space and amenities—have become the targets of land use controls. In addition, the fiscal effects of differences in the amount and type of development spill over local government boundaries and create complicated interjurisdictional dependencies. These are difficult to address under traditional divisions of state versus local government authority.

One study of growth controls in San Francisco found that house prices were 17 to 38 percent higher in communities which had imposed growth restrictions compared to communities which had not (Katz and Rosen, 1987). Another study examined the effects of the land use restrictions of the California Coastal Commission on housing prices in four communities (Frech and Lafferty, 1984). The authors found that controls had raised housing prices between $990 to $5,043 (in 1975 dollars). Although other studies have examined the effects of local zoning restrictions on property values and house prices, no consensus has emerged (see, e.g., Oates and Mills, 1975; Jud, 1980; Stull, 1975; Maser, et al., 1977; Zorn, et al., 1986). In general, the research on the effect of growth controls implies that land use restrictions on additional housing development may adversely affect housing affordability by increasing prices and thereby raising the relative share of household income needed to purchase housing. The issue, however, is extremely complex and must be evaluated according to the specifics of each policy in each housing market.

Data Issues in Housing Market Analysis

A number of data and estimation problems are present in all studies of house prices and housing markets. The demand for housing in any given area is partially dependent on the proximity (in distance and time) to employment opportunities. Thus, it is certainly possible that much of the differences in house prices across areas can be attributed to differences in access to employment and transportation. These variables may not be easily measured across or even within given areas. Differences in the amount and the speed of adjustment of the flow of new housing supply will also differ across areas because of institutional factors — some zoning boards may consent more readily and more rapidly to new development than others.

Macroeconomic factors—changes in employment demand, interest rates, and federal tax policy—also affect housing markets, often in complicated ways. While these effects are likely to influence the behavior of house prices over time to a great degree, they are less likely to affect differences in house prices across communities at a given point in time.

Finally, there is the choice of the level of aggregation at which to analyze house prices. Some studies use data from individual house transactions as the unit of measurement and attempt to explain differences in sales prices. Other studies use aggregate data at the community or larger level. The definition of the relevant housing market becomes an important issue in such studies. In our discussion of the recent behavior of house prices in New Jersey, we examine data at the municipal level. This has both advantages and disadvantages. First, the large number of communities in New Jersey (567) implies that there will be considerable variation in the average value of a house. This will increase the ability of any empirical analysis to identify the determinants of house prices. Second, much of housing policy at the State level is based on regulations and programs which apply to municipalities. However, similar housing types, public services, and tax rates exist in many communities, and households have a substantial choice among communities. Thus, a single municipality is unlikely to represent a housing market. Accordingly, in the next sections, we describe and analyze the patterns in the level and changes in house prices in New Jersey by municipality, county, and housing region during the mid-1980s.

II. New Jersey Housing Markets, An Overview

Residential construction activity in New Jersey during the 1980s has been volatile. This volatility reflects the construction sector's general sensitivity to changing financial and economic conditions. Table 3.1 lists the annual total of authorized dwelling units for the State since 1980. As the decade began, the national economy was in

a severe recession and mortgage rates, at one point in the early 1980s, were over eighteen percent. As a consequence, authorized dwelling units in New Jersey were at historically low levels. With the start of the economic recovery in 1983, construction activity increased sharply, and continued to rise through 1986 when annual authorized dwelling unit permits peaked at over 57,000. Although activity slowed in the following two years, the level of authorized permits remained high. During the entire period from 1980 through 1988, the State's housing stock increased by over 348,000 units.[1] After accounting for replacement, the net increase was approximately 300,000 units, or an increase of 12 percent to the base housing stock of about two and one-half million dwelling units in 1980.

Table 3.1

AUTHORIZED DWELLING UNITS 1980 TO 1988*

Year	Number	Percent Change
1980	22,257	-36.2
1981	21,293	-4.3
1982	21,404	0.5
1983	36,791	71.9
1984	43,925	19.4
1985	55,015	25.2
1986	57,074	3.7
1987	50,325	-11.8
1988	40,268	-20.0
Total	348,352	

*Permits for all types of units—single and multiple family, public and private.
Source: New Jersey Department of Labor

However, this increase in the supply of housing units was not evenly distributed across New Jersey. The State has been divided into six housing regions which have served as the basis for some aspects of housing and planning policy.[2] The geographical definition of a housing region is based on observed commuting patterns, derived from 1980 Census data, between place of employment and place of residence. Each housing region defines the boundaries of an area which is relatively self-contained with respect to employment and residence patterns. Figure 3.1 shows the six housing regions of the State and lists their component counties.

Table 3.2 provides data on dwelling units, employment, and households for each housing region. The data reveal significant differences in activity across the State. It is difficult to predict the effects of these differences on house prices because of the uncertain time lags inherent in the housing construction process, and the initial conditions of the housing market in the various regions. Nevertheless, the data indicate that there have been major, and uneven, changes in housing activity.

Column (1) lists the increase in authorized dwelling units for each region between 1980 to 1987. Of the over 308,000 new units, more than 65 percent were located in the central and mid-coastal regions of the State (regions 3, 4 and 5). The urbanized regions (1 and 2) had much less new housing construction, reflecting a high existing density of development and relatively high land and housing costs. The lower growth in region 6 reflects the different economic and land use patterns existing in the extreme southern part of the State.

The gains in employment by housing region for the 1982-1987 period are given in column (2).[3] During this time, the total change in employment was over 470,000. This unprecedented job growth was accompanied by significant gains in personal income, a sharp expansion of the State's tax base, and a decline in the unemployment rate from over nine percent in 1982 to less than four percent in 1988. About 40 percent of the employment in-

1. Because of lags in the construction process, the number of units completed in any calendar year is unlikely to match the number of permits granted in that year.
2. The concept and the specific boundaries of these housing regions were developed by the Center for Urban Policy Research at Rutgers University as part of the analysis of the affordable housing needs for New Jersey.
3. Consistently measured county employment data are available for these Census of Business years, 1982 and 1987. The data are covered employment, i.e., jobs covered by unemployment insurance. The employment is located in the county and, therefore, the data reflect changes in jobs within the county as opposed to changes in the number of county residents who are employed anywhere. From 1980 to 1982, employment in New Jersey increased only slightly (about 30,000 jobs) due, in part, to the national recession.

Figure 3.1

THE SIX HOUSING REGIONS OF NEW JERSEY

REGION 1
NORTHEAST
BERGEN
HUDSON
PASSAIC

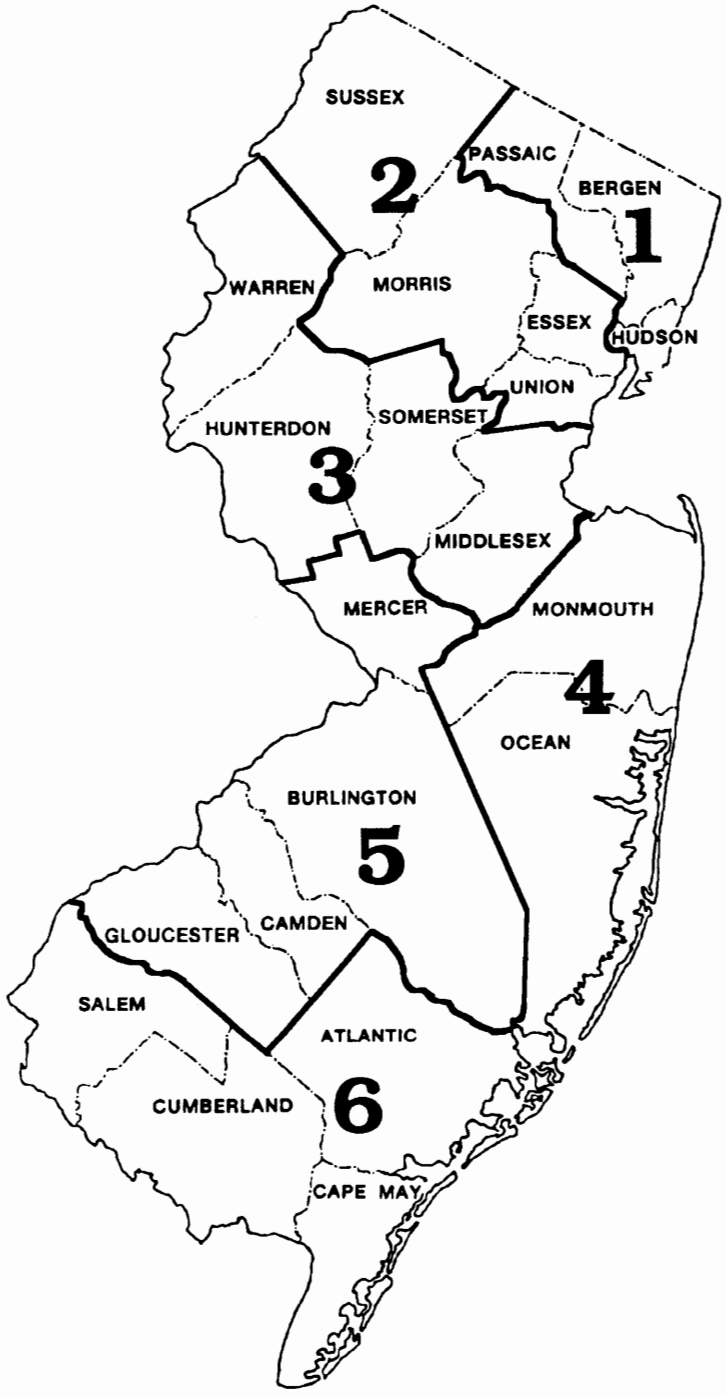
REGION 2
NORTHWEST
ESSEX
MORRIS
SUSSEX
UNION

REGION 3
WEST CENTRAL
HUNTERDON
MIDDLESEX
SOMERSET
WARREN

REGION 4
EAST CENTRAL
MONMOUTH
OCEAN

REGION 5
SOUTHWEST
BURLINGTON
CAMDEN
GLOUCESTER
MERCER

REGION 6
SOUTH-SOUTHWEST
ATLANTIC
CAPE MAY
CUMBERLAND
SALEM



Source: RUTGERS UNIVERSITY CENTER FOR URBAN POLICY RESEARCH

Table 3.2

OVERVIEW OF HOUSING ACTIVITY IN NEW JERSEY

Region	(1) Dwelling Units Authorized (1980-1987)*		(2) Change in Employment (1982-1987)		(3) Change in Households (1980-1987)**		(4) Change in Population (1980-1987)		(5) Col.(3) -Col.(4)	(6) Col.(2) /Col.(3)
1	35,485	(11.5)	103,191	(21.8)	39,843	(13.7)	-8,500	(-2.9)	48,343	2.59
2	36,789	(11.9)	86,457	(18.3)	45,630	(15.7)	11,600	(4.0	34,030	1.89
3	72,419	(23.5)	94,288	(19.9)	50,639	(17.5)	82,700	(28.6)	-32,061	1.86
4	71,961	(23.4)	66,297	(14.0)	61,881	(21.3)	107,400	(37.1)	-45,519	1.07
5	56,724	(18.4)	90,793	(19.2)	65,880	(22.7)	64,600	(22.3)	1,280	1.38
6	34,647	(11.2)	32,202	(6.8)	26,006	(8.9)	31,700	(10.9)	-5,694	1.24
Totals	308,025	(100%)	473,228	(100%)	289,879	(100%)	289,500	(100%)	379	1.63

* All types of units (single-family, multiple-family, and public.)Source: New Jersey Department of Labor.
**Source: Housing Accommodation by the State Development and Redevelopment Plan, New Jersey Office of State Planning, and County and City Data Book, United States Department of Commerce.
NOTE: Numbers in parentheses are percentages of column totals.

crease occurred in the northeast part of the State (housing regions 1 and 2). During the economic recovery, New Jersey's labor force participation rate increased significantly, as tightening labor markets drew many individuals back into the labor force. Thus, not all of the increase in employment in column (2) translates into additional housing demand. Instead, a large part of the employment growth in some regions occurred when individuals in existing households, who were formerly not actively seeking work, joined the labor force to take advantage of improved economic opportunities.

However, the State also experienced an estimated net in-migration of over 57,000 people during this time. Many of these individuals were attracted by New Jersey's strong labor markets and available (though increasingly more costly) housing. Although the relation between housing demand and employment change is imperfect (and varies by region), the sustained economic recovery of the 1982-1987 period certainly led to increased housing demand.

Column (3) provides estimates of the change in households from 1980 to 1987. The total nearly matches the number of new dwelling units authorized, and the distribution again shows the strong increase in households in the central and mid-coastal housing regions (regions 3, 4 and 5 account for over 60 percent of the total).[4]

Column (4) gives the increase in population by housing region. Population actually declined in region 1 and rose only slightly in region 2, but rose sharply in regions 3, 4 and 5 (together these three regions accounted for 88 percent of the total increase). A comparison between household growth and population growth is revealing, and the absolute difference between the two is listed in column (5). It is noteworthy that although regions 1 and 2 had essentially no population growth, they did have a substantial increase in the number of households (over 85,000) reflecting trends in household formation rates and household size. Thus, in these regions, population change is a poor predictor of housing demand. In regions 3, 4 and 6, however, the opposite relation is observed. Here, population growth was larger than the increase in households, probably reflecting relatively larger household sizes and the in-migration of new households. In region 5, the increases in population and households were nearly equal.

Finally, column (6) lists the ratio of the change in employment over the change in households for each region. The ratio is about 2 for the

4. It is important to note that the dwelling unit data are not adjusted for the obsolence rate of the existing housing stock. Thus, some of the new dwelling units in column 1 represent replacement, and the net increase in the number of dwelling units is accordingly less.

first three regions—indicating the relatively larger increase in employment compared to the increase in households in these regions. In the coastal (region 4), south central (region 5), and southern areas of the State (region 6), the ratio is much lower.

The overall conclusion from Table 3.2 is that areas within New Jersey have experienced widely differing patterns of population, housing and employment growth in the 1980s. These changes are related, partly, to economic conditions, and, in turn also affect economic activity in complicated ways. The relative availability of land in some regions during the period meant that housing supply could be increased at relatively lower costs. The sharp overall employment increases and the diffusion of economic activity out of the existing urbanized centers to suburban and rural locations, led to changing employment and household distributions. These differences in the location of new housing vis-à-vis employment have also led to new commuting patterns. The 1990 Census is likely to reveal significant changes in commuting distances and places of residence and employment. If the same criteria for defining housing regions are applied to the 1990 data, the boundaries of some regions will likely change.

Population growth accelerated in some areas, and the State attracted a substantial inmigration of people leading to new housing demand. At the same time, although population fell, or grew only very slowly, in northeastern counties, household formation in those areas was still substantial. In the next section, we examine how these disparate changes affected housing prices across New Jersey.

III. House Price Changes—The Evidence

Table 3.3 gives the distribution of the percentage change in average residential value by municipality from 1984 to 1987 for the entire State.[5] More than 64 percent (356) of the State's municipalities experienced an increase of more than 70 percent in average residential value over the period. The modal increase (for almost 22 percent of the State's communities) was between 80 to 90 percent, and over ten percent of the municipalities had increases exceeding 100 percent. Table 3.3 clearly indicates that the gain in house prices during this period was substantial and included most communities in the State. However, the increases in residential value were not uniformly distributed.

Table 3.3

DISTRIBUTION OF PERCENTAGE CHANGE IN AVERAGE RESIDENTIAL VALUES NEW JERSEY, 1984-1987*

Percent Change	Frequency	Percentage
< = 0.0	4	0.72
0.1 - 10.0	4	0.72
10.1 - 20.0	19	3.42
20.1 - 30.0	53	9.55
30.1 - 40.0	44	7.93
40.1 - 50.0	23	4.14
50.1 - 60.0	18	3.24
60.1 - 70.0	34	6.13
70.1 - 80.0	83	14.95
80.1 - 90.0	122	21.98
90.1 - 100.0	92	16.58
100.1 - 110.0	38	6.85
> 110.0	21	3.78
Total	555	100.00%

*Data Source: Legislative District Data Book, annual, Bureau of Government Research, Rutgers University, New Brunswick, N.J.

Table 3.4 provides the distribution of changes in average residential value for each of the State's six housing regions. Municipalities in the northeast and central parts of the State (housing re-

5. The average residential value for each municipality is estimated annually by the Bureau of Government Research at Rutgers University using data from the sales ratio analysis of the New Jersey Division of Taxation. The sales price (based on current sales) to assessment ratio of residential housing is used to derive the market value of all assessed residential property. This is then divided by the number of residential units to arrive at the average residential value for each municipality. Data for 10 municipalities were not available for the full period of our analysis. Data for two other municipalities were omitted from the study for technical reasons. As a result, our data cover 555 of the State's 567 municipalities. We believe these data are the single most accurate source of house-price information at the municipal level of aggregation. Nevertheless, it is important to note that the data reflect any change in the mix of type of housing as well as changes in house prices. For example, if a community consists primarily of single family homes on large lots, but this community then adds a large number of townhouses over the period of study, the average residential value may decline. This will occur even though there is no actual depreciation in the price of the single family, large lot homes. Rather, the new mix of housing simply brings the average down. A list of the average residential value and per capita income for all 555 communities in the study is available upon request from the Office of Economic Policy.

Table 3.4

DISTRIBUTION OF THE PERCENTAGE CHANGE IN AVERAGE RESIDENTIAL VALUE, 1984-1987, BY HOUSING REGION

	Housing Region											
	1		2		3		4		5		6	
% Change	#	%	#	%	#	%	#	%	#	%	#	%
< = 0.0	0	0	0	0	1	1.06	0	0	1	0.93	2	2.94
0.1 - 10	0	0	0	0	0	0	0	0	0	0	4	5.88
10.1 - 20	0	0	0	0	0	0	0	0	3	2.80	16	23.53
20.1 - 30	0	0	0	0	0	0	0	0	28	26.17	25	36.76
30.1 - 40	0	0	0	0	0	0	0	0	32	29.91	12	17.65
40.1 - 50	1	1.03	0	0	1	1.06	1	1.18	18	16.82	2	2.94
50.1 - 60	1	1.03	1	0.96	3	3.19	3	3.53	8	7.48	2	2.94
60.1 - 70	2	2.06	7	6.73	7	7.45	5	5.88	9	8.41	4	5.88
70.1 - 80	7	7.22	27	25.96	25	26.60	19	22.35	5	4.67	0	0
80.1 - 90	17	17.53	39	37.50	40	42.55	25	29.41	1	0.93	0	0
90.1 - 100	36	37.11	21	20.19	13	13.83	21	24.71	1	0.93	0	0
100.1 - 110	21	21.65	7	6.73	1	1.06	8	9.41	0	0	1	1.47
>110	12	12.37	2	1.92	3	3.19	3	3.53	1	0.93	0	0
Totals	97	100%	104	100%	94	100%	85	100%	107	100%	68	100%

gions 1 through 4) experienced the highest rates of increase in average residential value. The modal percentage increase for region 1 was 90 to 100 percent, and this gain occurred in over 37 percent of the region's communities. An additional 33 municipalities (or 34% of the region's total) had even higher gains—over 100 percent! The modal increase in regions 2, 3 and 4 was 80 percent to 90 percent, and over 75 percent of the communities in these three regions had increases between 70 to 100 percent. Gains in average residential value were noticeably lower in the two southern housing regions (regions 5 and 6), where the modal percentage increase was 30 to 40 percent in region 5, and 20 to 30 percent in region 6.[6]

Table 3.5 provides information on the level of house prices, and lists the average residential value in each year for each region. The averages are weighted by the population of each community and therefore reflect the change in house prices adjusted for the size of the municipality.[7]

Several interesting patterns emerge from the data in Table 3.5. First, the absolute size of the average residential values indicates that for large areas of the State (everywhere except regions 5 and 6) average house prices were in the range of $150,000 to nearly $200,000 by 1987. The last column of Table 3.5 indicates that the change in house prices has been greatest in region 1 (93%). Housing regions 2, 3 and 4 all had increases in the mid-80 percent range, while the gains in regions 5 and 6 were significantly less.

Second, the differences in average house prices across housing regions widened over time. The last row of Table 3.5 lists the percentage difference from the highest average price region to the lowest in each year. For example, in 1984 housing region 2 had the highest weighted average price at $97,659. This was 69 percent higher than the average house price ($57,673) in the lowest house price region (6) that year. This gap widened steadily over the four years, and by 1987, the difference between the highest priced region (1) and the lowest (6) exceeded 150 percent. The relationship between prices in regions 2 through 4 remained essentially constant as a consequence of their similar rates of growth. In 1984, average prices in region 2 were 24 percent greater than in

6. The rates of change in average residential value are not adjusted for inflation. Average annual rates of change in residential value can be calculated from the data, but it is important to note again that the rates discussed here are for the entire period from 1984 through 1987.

7. The 1985 population of each municipality is the weight used for these calculations.

region 4. By 1987, this difference had been reduced slightly to 21 percent, although the decline was not uniform in the intervening years.

The issue of housing affordability has emerged as a major concern of public policy in New Jersey. A lengthy history of litigation over exclusionary zoning practices led, in 1985, to the passage of the Fair Housing Act. The Act established a procedure by which each of the State's municipalities could address its affordable housing obligation. The Act is concerned with increasing the supply of housing available to low and moderate income families.[8] However, the economic prosperity of the State during the mid-1980s has placed such significant demand pressures on house prices that many middle and upper middle income households are also constrained in their housing choices. Further pressures on house prices due to housing supply constraints (state land use regulations, building codes, local zoning changes to restrict development, etc.) are likely to continue. It is useful, therefore, to attempt to measure the change in housing affordability that has occurred in New Jersey in the recent past.

Table 3.6 gives the distribution of one measure of affordability — the ratio of average residential value in a municipality to the per capita income of that municipality — for the 555 communities in our sample. This distribution is calculated for house prices in two years—1984 and 1986.[9] The change in this distribution over time indicates what has been happening to housing affordability. Although anecdotal evidence has indicated that affordability has declined markedly (and the data of the previous tables certainly suggest that this is likely), the evidence in Table 3.6 is the first systematic measure of this issue at the municipal level for the entire State.

Table 3.5

WEIGHTED MEAN AVERAGE RESIDENTAL VALUE ($), 1984-1987

Housing Region	1984	1985	1986	1987	% Change 1984 to 1987
1	96,133	114,494	144,041	185,533	93.0
2	97,659	113,367	139,807	178,453	82.7
3	86,984	99,630	123,984	159,093	82.9
4	78,539	87,903	109,220	146,692	86.8
5	60,231	64,807	72,508	86,817	44.1
6	57,673	61,255	67,011	73,726	27.8
% Difference (Highest to Lowest Region)	69%	87%	115%	152%	

In 1984, approximately 58 percent of the State's municipalities had house price to per capita income ratios between 5.6 to 8.0, and an additional 26 percent of the municipalities had ratios above 8.0. The increase in house prices between 1984 and 1986 sharply exceeded the rate of growth in income, and, as a result, the entire distribution shifted to higher ratio values. By 1986, only 34 percent of the municipalities had ratios between 5.6 and 8.0, but 52 percent now had ratios above 8.0 (in contrast to only 26 percent in 1984).

When the distributions for each housing region are examined, it is apparent that the large house-price gains in regions 1 through 4 are largely responsible for this shift.

Table 3.7 presents the distribution of the ratio of the percentage change in average residential value to the percentage change in income over the two year period. If house prices and per capita income grew at the same rate in every municipality, all the ratios in Table 3.7 would equal one. Ratios greater than one indicate that the growth rate in average residential value exceeded the growth rate in income. Ratios less than one indicate the opposite. The distribution of these ratios is given for the State as a whole (all 555 municipalities and for each housing region).

8. Eligibility for affordable housing units is defined in terms of family income relative to the county median income (50% or less of the median qualifies a household as low-income, and 51% to 80% qualifies the household as moderate-income). The county median income figures are adjusted for family size.

9. There is a one year difference between the numerator and the denominator in these ratios. That is, prices are measured for a given year while the per capita income is for the previous year. This was done because the Bureau of the Census estimates municipal income only every two years, and the years 1983 and 1985 were the latest available at the time of this study. Since the relative differences in income across municipalities are unlikely to change significantly in so short a time, we believe that the ratios accurately reflect the variation in house prices to income levels across communities.

Of the 555 municipalities, 44 percent had ratio values between 2.1 and 4.0, indicating that, over this time, house prices grew between two and four times faster than income. An examination of the individual housing regions shows that in the first two regions, 70 percent of the municipalities had ratios between two and four, while 60 percent of the communities in region 3 also fell within this range. Region 4 had more modest relative growth rates; only 41 percent of its municipalities had ratios between two and four. In region 5, 38 percent of the municipalities had ratios less than or equal to one, and almost all of the other municipalities in this region had ratios between 1.1 and 2.0. This pattern towards balanced rates of increase in house prices and income is even more pronounced in region 6. In that region, 43 of the 68 municipalities (63%) had ratio values less than or equal to one, indicating that income gains outpaced house price advances in these communities. This was the only region in the State where such a large share of the municipal ratios fell into this range.

Table 3.6
DISTRIBUTION OF RATIO OF AVERAGE RESIDENTIAL VALUE TO PER CAPITA INCOME
All Municipalities

Ratio	p84/in83	Pctage	p86/in85	Pctage
<= 3.0	1	0.18	1	0.18
3.1 - 3.5	5	0.90	2	0.36
3.6 - 4.0	2	0.36	5	0.90
4.1 - 4.5	11	1.98	14	2.52
4.6 - 5.0	22	3.96	16	2.88
5.1 - 5.5	47	8.47	39	7.03
5.6 - 6.0	62	11.17	45	8.11
6.1 - 6.5	70	12.61	35	6.31
6.6 - 7.0	69	12.43	28	5.05
7.1 - 7.5	58	10.45	33	5.95
7.6 - 8.0	64	11.53	47	8.47
8.1 - 8.5	41	7.39	42	7.57
8.6 - 9.0	31	5.59	39	7.03
9.1 - 9.5	19	3.42	42	7.57
9.6 - 10.0	18	3.24	49	8.83
10.1 - 10.5	9	1.62	27	4.86
10.6 - 11.0	10	1.80	24	4.32
11.1 - 11.5	6	1.08	18	3.24
11.6 - 12.0	1	0.18	12	2.16
> 12.0	9	1.62	37	6.67
Total	555	100.00%	555	100.00%

Variable Definitions:
p84 = average residential value, 1984
in83 = per capita income, 1983
p86 = average residential value, 1986
in85 = per capita income, 1985

Source of income data is the U.S. Bureau of the Census.

The basic conclusion to be drawn from Tables 3.6 and 3.7 is that housing affordability declined dramatically over large areas of the State in a relatively short period of time. The economic prosperity of the State in the mid-1980s, and the concomitant increases in the demand for housing, led to large absolute increases in house prices, and large increases relative to income gains. Despite record levels of housing construction, housing supply lagged behind demand increases, and house prices accelerated over most of the housing regions in the State during this period.

Conclusions

This chapter has examined the behavior of house prices at the municipal level for the entire State. It offers a comprehensive picture of the differential behavior of house prices across New Jersey during the mid-1980s. However, these results do not imply that past patterns of price levels and price changes will continue in the future. The data examined here cover a period of rapid economic growth for New Jersey. House prices are certain to behave differently in periods of slower growth in income and employment, conditions which have recently characterized the State's economy. The sharp cyclical behavior of the housing market implies that rates of increase in house prices can slow dramatically, and even, as we have recently seen in some areas, actually decline.

Accordingly, our data on average residential value require further analysis. In particular, it is important to identify the specific factors which are responsible for the differences in house price levels and rates of change across municipalities. Simply put, based on this chapter, we now know

Table 3.7

DISTRIBUTION OF THE RATIO OF THE PERCENTAGE CHANGE IN AVERAGE RESIDENTIAL VALUE (1984 TO 1986) TO THE PERCENTAGE CHANGE IN PER CAPITA INCOME (1983 TO 1985), BY STATE AND HOUSING REGION

		Housing Region					
Ratio	New Jersey	#1	#2	#3	#4	#5	#6
< = 0.0	6	1	0	1	0	0	4
0.1 - 1.0	88	1	1	2	4	41	39
1.1 - 1.5	89	3	3	11	21	41	10
1.6 - 2.0	106	12	24	21	24	15	10
2.1 - 2.5	119	25	37	31	21	5	0
2.6 - 3.0	72	19	23	18	9	1	2
3.1 - 4.0	53	24	13	7	5	3	1
4.1 - 5.0	14	8	3	2	1	0	0
5.1 - 6.0	6	3	0	1	0	1	1
> 6.0	2	1	0	0	0	0	1
	555	97	104	94	85	107	68

what has happened to house prices in New Jersey on a systematic basis, but we do not know exactly why.

There are a number of relevant questions to address. Why did such wide variation occur? What are the determinants of this variation? What are their quantitative effects? What are the implications for housing supply and demand, housing affordability, land use, and economic development policies? The next step in this process is to construct a model of house prices for New Jersey along the lines of the models discussed in Section I. The objective is to identify the variables which affect the level and rate of change in municipal house prices. Some of the factors likely to influence house prices include employment opportunities, property taxes, school system quality and performance, income, crime and safety conditions, available public services and public amenities, land availability, and land use controls. Once these are integrated into a model, their separate influences on housing prices can be statistically identified and their quantitative effects measured.

A model which effectively explains the variation in house prices can improve the assessment of housing policy in the State. If the major determinants of house-price changes can be identified, then the location and extent of differential changes in price can be anticipated. State policy can be correspondingly adjusted (e.g., affordable housing subsidies can be more precisely targeted to areas of special need; or land use control strategies can be altered in areas where such controls have resulted in sharp increases in land costs). Finally, research on house price determinants can be integrated into broader areas of state and local policy such as the level and structure of taxes, growth management plans, and economic development strategy.

REFERENCES

Frech, H.W. and Lafferty, R.N., "The Effect of the California Coastal Commission on Housing Prices," Journal of Urban Economics, Vol. 16, July 1984, pp. 105-123.

Harmon, O., "The Income Elasticity of Demand for Single-Family Owner Occupied Housing: An Empirical Reconciliation," Journal of Urban Economics, Vol. 23, September 1988, pp. 173-185.

Jud, G.D., "The Effects of Zoning on Single-Family Residential Property Values: Charlotte, North Carolina," Land Economics, Vol. 56, May 1980, pp. 142-154.

Jud, G.D. and Watts, J.M., "Schools and House Values," Land Economics, Vol. 57, August 1981 , pp. 459-470.

Katz, L. and Rosen, K.T., "The Interjurisdictional Effects of Growth Controls on Housing Prices," Journal of Law and Economics, Vol. XXX, April 1987, pp. 149-160.

Li, M.M. and Brown, H.J., "Micro-Neighborhood Externalities and Hedonic Housing Prices," Land Economics, Vol. 56, May 1980, pp. 125-141.

Mark, J.H., "A Preference Approach to Measuring the Impact of Environmental Externalities," Land Economics, Vol. 56, February 1980, pp. 103-116.

Maser, S.M., et al., "The Effects of Zoning and Externalities on the Price of Land: An Empirical Analysis of Monroe County, New York," Journal of Law and Economics, Vol. XX, April 1977, pp. 111-132.

Mills, E.S. and Oates, W.E., editors, Fiscal Zoning and Land Use Controls, Lexington, Lexington Books, 1975.

Polinsky, A.M. and Ellwood, D.T., "An Empirical Reconciliation of Micro and Grouped Estimates of the Demand for Housing," Review of Economics and Statistics, Vol. LXI, May 1979, pp. 199-205.

Smith, L.B., Rosen, K.T. and Fallis, G., "Recent Developments in Economic Models of Housing Markets," Journal of Economic Literature, Vol. XXVI, March 1988, pp. 29-64.

Stull, W.J., "Community Environment, Zoning and the Market Value of Single Family Homes, Journal of Law and Economics, Vol. XVIII, October 1975, pp. 535-558.

Zorn, P.M., Hansen, D.E., and Schwartz, S.I., "Mitigating the Price Effects of Growth Control: A Case Study of Davis, California," Land Economics, Vol. 62, February 1986, pp. 46-57.

CHAPTER IV

EDUCATION EXPENDITURES AND STUDENT ACHIEVEMENT IN NEW JERSEY*

"The search for equity usually generates a response that increases the total costs of school operations without ensuring any increases in the performance of students or the efficiency of schools."

Eric A. Hanushek

Introduction

The inadequacies and failures of our national education system are generally recognized as a threat to our standard of living and place among leading nations in the world. Governor Kean's administration has devoted enormous attention to reforming the elementary and secondary public school system in New Jersey. The cornerstones of this reform are the implementation of a new system of teacher certification, the increase in entry level teacher salaries, and the new, more rigorous High School Proficiency Test (HSPT) at the 9th grade level. Significant increases in expenditures per pupil and especially state aid for local school districts have also occurred. Between fiscal years 1981 to 1988, overall state aid for local school districts increased by 95 percent, while total enrollment declined from 1.205 million to 1.081 million pupils. Thus, expenditure per pupil increased by 117 percent or by 11.7 percent per year. The obvious question is whether the increased expenditures were effectively spent. Even more pertinent from a public policy perspective, is whether, and to what extent, additional outlays contribute to better student performance.

The methodological approach taken in this study follows the traditional 'production function' method used in the economics of education literature. We are cognizant that applying a production function methodology to education is especially difficult because of the problems in measuring both the outcomes of the education "production process" and its inputs.

Standardized test scores are most often used as proxies for school outputs, although student attitudes, school attendance rates, college continuation and dropout rates have also been examined.

The following statement by an expert[1] on the economics of education reflects the opinion of many educators, school administrators and researchers:[2]

---

*Prepared by Adam Broner, Director, Office of Economic Policy. A considerable contribution to this subject was made by Dr. Laurence H. Falk before his retirement from this Office. Also, Carol Maslowski, the Office's Administrative Assistant, contributed to the research on this subject.

The New Jersey Department of Education has provided us with most of the data utilized in this study. We thank Howard Bookin for his assistance.

1. Eric A. Hanushek, "Conceptual and Empirical Issues in the Estimation of Educational Production Functions." The Journal of Human Resources, Vol. XIV.3, Summer 1979, p. 355.

2. In a comprehensive review of the literature on this subject, Hanushek stated: "The measures used, however, are generally proxies (with varying degrees of validation) for more fundamental outcomes. Some people, including many school practitioners, simply reject this line of research entirely because they believe that educational outcomes are not or cannot be adequately quantified.", Eric A. Hanushek, "The Economics of Schooling: Production and Efficiency in Public Schools. Journal of Economic Literature, Vol. XXIV (Sept. 1986), p. 1150.

"While standard production theory concentrates upon varying quantities of a homogeneous output, this is not easily translated into an educational equivalent. Education is a service which transforms fixed quantities of inputs (i.e., individuals) into individuals with different quality attributes. Educational studies rightfully concentrate upon "quality" differences. However, simply because individuals can be ordinally ranked in terms of cognitive test scores, does not imply that such a measure is necessarily appropriate."

Despite the shortcomings of measures of educational outcomes, test scores are frequently used to evaluate educational programs. Improved test results, despite their imperfections, are valued by educators, parents and policymakers.

Production function equations use a variety of inputs. In general, they measure the characteristics of students' families, peers, schools and teachers. Family inputs are measured by social and demographic variables such as parents' education, income, and family size. Peers' inputs are measured by demographic and social characteristics of the other students in the school. School inputs measure teachers' education, experience, qualifications, gender, etc. Finally, other characteristics of schools such as class sizes, quality of facilities and overall expenditures are also used as input measures. Numerous detailed studies of student performance and inputs have been conducted, although their results convey a mixed picture. One of the most comprehensive studies was the controversial "Coleman Report" of 1966 which concluded that differences in students' performance were related to family background and the characteristics of students rather than differences in schools.[3] Extensive critical analyses of this report led, over the years, to many investigations applying refined econometric methods.

In an extensive review, Hanushek summarized the findings of numerous studies of the efficiency of schooling.[4] We summarize here his review of that large literature:

–Differences in family socioeconomic background lead to significant achievement differences. Socioeconomic characteristics are proxies for the home learning environment.

–There is conclusive evidence that schools are economically inefficient; that is, they do not employ the best mixes of inputs, given input prices and their apparent effectiveness.

–There is an almost universal finding that additional education of teachers has no impact on achievement. This can be interpreted as indicating that teacher training institutions do not, on average, add significantly to the skills of teachers acquired in their basic college education.

–Findings also indicate that class size does not affect achievement. This may arise from complicated and unobserved interactions with the teaching process. Therefore, while it is possible that smaller classes could be beneficial in specific circumstances, it is also true that, in the context of typical school and teacher operations, there is no apparent gain.

–A majority of studies find no consistent or significant relationship between student achievement and expenditures per pupil (either instructional or total expenditures) and between achievement and specific purchased inputs such as teacher experience, teacher education levels, class size and administrative supervisory expenditures.

–Teacher experience is effective in improving educational outcome, but has less productivity at the margin than its cost based upon typical salary schedules.

In undertaking this current study, we were motivated by the awareness that public education in New Jersey absorbs enormous resources and, accordingly, merits

---

3. James S. Coleman, et al., "Equality of Educational Opportunity,"Washington, D.C., U.S.G.P.O., 1966.
4. Eric A. Hanushek, "Conceptual and Empirical Issues..., "*op cit*. and the "Economics of Schooling.., *op cit*.

careful evaluation. However, even beyond the narrow issue of efficiency, there is the more important concern about whether the output of our education system is able to meet the needs of contemporary society. An inadequate preparation of our human resources places at risk the State's ability to maintain and improve its standard of living.

The global economic competition that now confronts the United States has led to an increased willingness of our society to do whatever is necessary, including additional education expenditures, to improve student preparation, learning and skills. The questions are whether additional expenditures will significantly affect the educational outcome, and how best to structure any increase in spending.

This study is the first of its kind undertaken by the Office of Economic Policy on the subject of education efficiency, but it follows the methodology of a large number of other educational production function analyses. Section I reviews the sample of schools selected for the study. Section II presents results of our attempts to separate the effects of different types of education expenditures upon high school test scores. Section III summarizes our findings.

I. Sample Characteristics

This study of the relationship between expenditures on education and student performance concentrates on a sample of school districts in New Jersey which have at least one high school. The academic achievement of students is measured by the High School Proficiency Test, which was introduced for the first time in 1984. These are proficiency tests at the 9th grade level for reading, writing and mathematics skills. Our use of the HSPTs as a measure of education outcome limited the total number of school districts to 217. A variety of technical reasons (availability of other data), led to a final sample of 171 school districts. These 171 districts include about 80 percent of the total number of school districts with high schools, and we consider them as an adequate representation of the entire population of high schools in New Jersey.[5]

The New Jersey Department of Education categorizes each school district according to socio-economic characteristics. These "district factor groups" include such variables as education of parents, occupational status, number of persons per household, urbanization, income, unemployment and poverty. These indicators are combined using the method of principal components in order to obtain a single measure of socioeconomic status for each distrct. All districts are ranked according to that measure and they are divided into ten equally-sized groups. The lowest socioeconomic districts are numbered "1" and the highest, "10". In our sample, we utilize these ten "district factor groups" (DFG) and aggregate them into five groups, each consisting of two DFG classes. Thus, the first group in our sample consists of 39 school districts and combines all the DFG 1 and DFG 2 districts in our sample; the second group has 26 districts, and includes DFG 3 and DFG 4, and so on.

Tables 4.1 and 4.2 characterize the sample school districts in terms of their population and income, student enrollment, pupil-teacher ratio and characteristics of the faculty. These and the other data in this section describe the characteristics of the sample. It is more revealing to subdivide the entire sample of 171 districts into the five distinct classes, in order to describe the diversity of the school districts.

The lowest DFG (groups 1 and 2) consist of 39 districts with a total population of 1.836 million. The other groups are in areas with much lower population. The percentage of white population is larger in the higher DFG communities, which reflects the relative concentration of the minority population in urban centers. In terms of population density, the sample groups do not differ that much.[6] The per capita income data also indicate that a much larger percentage of low income households are concentrated in the first and second DFG's. (See Table 4.1 on next page).

Table 4.2 shows that total enrollment in the selected school districts was 677,329 students in the 1985-86 school year. This total measures all students in the 171 districts in elementary, junior,

5. Regional School districts were excluded because they serve several communities and socio-economic variables for the regions were not readily available.

6. However, even in this case, the tests for differences betwen the mean values are statistically significant.

Table 4.1

POPULATION AND INCOME IN SAMPLE SCHOOL DISTRICTS

Sample of School Districts	Number of Districts	Population in 1985	Percent of White Population (1980)	Population per Square Mile (1983)	Per Capita Money Income (1985)
Total	171	4,718,751	0.78%	2,161	$12,112
DFG 1-2	39	1,835,918	0.57	2,369	8,644
DFG 3-4	26	649,473	0.88	2,297	11,569
DFG 5-6	39	945,108	0.89	2,248	13,006
DFG 7-8	37	757,120	0.94	1,937	14,733
DFG 9-10	30	531,132	0.93	1,678	19,434

and high schools. The average number of students per district indicates the average size of a school district, but not necessarily the average size of a single school. Although average enrollment declined between the 1982 and 1986 school years, the decline was less pronounced in the first two district factor groups, reflecting their different demographic experience compared to the other district factor groups.

The average pupil/teacher ratio in the lower DFG districts is somewhat higher than in other groups. A more pronounced difference exists in the indicator for teachers' experience. The first group has the lowest experience level, meaning that, on the average, relatively less experienced teachers are employed in urban school districts (see footnote to Table 4.2).

Table 4.3 shows that the educational level of teachers increases with higher socioeconomic characteristics of the school districts. Thus, in DFG 1-2, the percentage of teachers with only a baccalaureate is 70 percent, while the overall average for the 171 districts is 63 percent, and in the highest DFG's, it is 47 percent.

The percentage of teachers with MA degrees, on the other hand, increases with the DFG groups, reaching 52 percent in the highest. A different relationship exists for teachers with Ph.D. degrees. The percentage of faculty with a Ph.D. is highest at the two extreme DFG's; lowest in the middle DFGs, although the percentages in all cases are very small in absolute size.

Table 4.4 gives the percentage increases in overall spending between school years 1982-83 and 1985-86.

During the 1983-1986 period, total expendi-

Table 4.2

AVERAGE ENROLLMENT (1985/86), PUPIL/TEACHER RATIO AND TEACHER EXPERIENCE

	Average Enrollment 1985-86	Average Enrollment Per District	Change in Enrollment 1986/1982	Pupil/ Teacher Ratio	Teacher Experience (years)
Total	677,329	3,961	-0.05	15.10	14.39
DFG 1-2	288,493	7,397	-0.02	15.47	13.17
DFG 3-4	85,989	3,307	-0.05	14.69	14.46*
DFG 5-6	120,567	3,091	-0.06	15.20	14.79*
DFG 7-8	102,536	2,771	-0.09	14.60	15.71
DFG 9-10	79,744	2,658	-0.09	14.82	16.23

*The means of teachers' experience in DFG 3-4 and DFG 5-6 are not statistically different from each other. The difference between the first and second group is statistically significant.

Table 4.3

EDUCATIONAL LEVEL OF TEACHERS

	BS/BA	MA	Ph.D.	Total Number of Teachers	Percent in Total Teaching Faculty of: BS-BA	MA	Ph.D.
Total	28,912	16,399	329	45,640	63	36	0.72
DFG 1-2	13,202	5,390	146	18,738	70	29	0.78
DFG 3-4	3,827	2,020	35	5,882	65	34	0.60
DFG 5-6	5,129	2,987	35	8,151	63	37	0.43
DFG 7-8	4,127	3,117	45	7,289	57	43	0.62
DFG 9-10	2,627	2,885	68	5,580	47	52	1.22

tures in the sample school districts increased by 28 percent, from $2.449 billion to $3.140 billion.[7] The increase from local school taxes was, in our sample, 17 percent and in the entire State — 18 percent. The remaining sources of school expenditures increased in the sample by 42 percent, and in the State by 41 percent. Local contribution to school expenditure increases was lowest (13%) in the DFG 1-2 districts and highest in DFG 7-8 and DFG 9-10 (about 20%). Conversely, revenue from other sources, mainly state aid, increased, as expected, most in the DFG 1-2 districts. This follows from the design of the school aid formula that purposefully favors poorer districts.

Together, local, state, and other sources of expenditures led to an overall expenditure increase of 36 percent in the DFG 1-2 districts compared with a 28 percent increase for all 171 school districts, and only a 22 percent increase in the DFG 9-10 districts. This should be considered a significant achievement in the quest for equalizing school expenditures across school districts and for creating equal education opportunities for children irrespective of the economic circumstances of their communities.

Table 4.4 shows the percentage increase in expenditures for education regardless of the number of students enrolled. Table 4.5 takes into account changes in enrollment and reports expenditures per pupil.

Table 4.4

PERCENTAGE GROWTH OF SCHOOL EXPENDITURES BY SOURCE, 1986/1983

	From Local Revenues	From All Other Sources*	Total
Total	17%	42%	28%
DFG 1-2	13	45	36
DFG 3-4	16	34	24
DFG 5-6	16	42	25
DFG 7-8	20	31	23
DFG 9-10	19	37	22

*Most of these sources are state aid, federal aid and tuition.

Per pupil expenditures on education increased from $3,427 to $4,636 (35%) between the 1982/83 - 1985/86 school years.[8] The disparity between the lowest and highest DFG groups was 19 percent in 1983. This gap was reduced to 15 percent in 1986. Even though the overall per student expenditures do not differ much between district groups, the local and state contributions to those totals reflect the disparity of the socioeconomic characteristics of these groups. In the school year 1982/83 local taxes per enrolled student were $964 in the poorest districts, and $3,054 in the most affluent, for a ratio of 3.2 to 1.0.

7. The percentage increase in all districts in the State during this time was 28 percent from $4.148 billion to $5.317. Thus, our sample is very typical of the overall expenditure patterns.
8. The total expenditure growth statewide for the same period was 34.4 percent (from $3,572 to $4,800), very close to the sample's growth of 35.0 percent.

Table 4.5

EXPENDITURES PER PUPIL, BY SOURCE

School District Groups	1982-83 Total Expenditures Per Pupil	1982-83 From Local Taxes	1982-83 From All Other Sources	1985-86 Total Expenditures Per Pupil	1985-86 From Local Taxes	1985-86 From All Other Sources	1986/1983 Percent Change Total	1986/1983 Percent Change Local	1986/1983 Percent Change Other
Total	$3427	$1841	$1586	$4636	$2266	$2370	+35	+23	+49
DFG 1-2	3214	964	2250	4459	1113	3346	+39	+15	+49
DFG 3-4	3367	1943	1425	4394	2379	2016	+30	+22	+41
DFG 5-6	3456	2217	1239	4611	2738	1873	+33	+24	+51
DFG 7-8	3688	2689	999	4986	3546	1440	+35	+32	+44
DFG 9-10	3833	3053	779	5125	3959	1166	+34	+30	+50

By 1985/86 the local tax contributions per student had increased to $1,113 and $3,959, respectively, for a ratio of 3.6 to 1.0. Thus, the educational expenditure effort of local taxpayers increased over time in the higher DFGs more than in the lower DFGs. However, despite this widening in the contribution of local taxes, the overall gap between expenditures per student in the two extreme DFGs was reduced by the increase in school aid from the State. (In 1982-83, the highest DFG, groups 9 and 10, had a total expenditure per pupil that was 19% higher than the lowest group; by 1985-86, this difference was reduced to 15%).

The obverse of these relationships can be found in the educational expenditures attributed to all other sources. In 1982-83 such expenditures were $2,250 and $779 in the two extreme DFG groups, while in 1985-86 they had increased to $3,346 and $1,166 respectively. The initial ratio was 2.9 to 1.0 in favor of the lower DFG's ($2,250/$779), and it remained essentially the same in 1985-86.

It is also important to analyze how expenditures are divided among the various items of the school budget. In particular, we examine teachers' salaries versus all other expenditures, since teachers' emuneration and the corresponding incentives it creates can possibly make a difference in the quality of education. Table 4.6 provides data on the growth in teachers' salaries per pupil, and in other expenditures per pupil over the period.

Table 4.6

PERCENTAGE GROWTH OF TEACHERS' SALARIES AND OTHER EXPENDITURES PER PUPIL (1985-86/1982-83)

District Factor Group	Total Expenditures	Teachers' Salaries	Other Expenditures
Total	35%	17%	48%
DFG 1-2	39	13	54
DFG 3-4	30	17	40
DFG 5-6	33	18	45
DFG 7-8	35	22	46
DFG 9-10	34	21	44

We expected that teachers' salaries would have increased at least at the same pace as overall expenditures. However, the percentage increase in teachers' salaries lagged behind the increase in other expenditures in all school districts (17% vs. 48%). But even within that general phenomenon, teachers' salaries in the poorest school districts increased the least (13%), and a clear progression is apparent with higher rates of increase in higher socioeconomic district groups. However, the difference in the average increase in teachers' salaries between DFGs are not statistically significant.

The reader should be aware, however, that

Table 4.7

Selected Expenditure Categories

1985 - 1986 Level of Expenditures Per Pupil

DFG	Adminis. Salaries	Other Instruct. Salaries	Transpt. Salaries	Transpt. Contracted Services	Operations Salaries	Operations Contracted Services	Utilities	Insurance and Judgements	Student Body Activities (salaries)	Student Body Activities (other exp.)	Total Selected Expend. 1985-86	Total Selected Expend. 1982-83
Total	$119	$204	$39	$117	$200	$14	$107	$281	$35	$22	$1,139	$835
DFG 1-2	113	174	35	92	186	17	99	263	17	16	1,014	724
DFG 3-4	113	201	50	98	185	8	96	259	36	20	1,067	803
DFG 5-6	120	207	35	147	219	20	109	293	46	30	1,218	891
DFG 7-8	121	244	47	154	216	5	129	313	49	26	1,294	964
DFG 9-10	138	263	39	134	239	13	125	310	61	32	1,346	997

Table 4.7 (continued)

PERCENTAGE GROWTH OF VARIOUS EXPENDITURES (1986/1983 SCHOOL YEARS)

DFG	Growth of Total Selected Expenditures, School Years 1986/1983	Adminis-trative Salaries	Other Instruct. Salaries	Transpt. Salaries	Transpt. Contract Services	Operations Operation Salaries	Contracted Services	Utilities	Ins. & Judgements	Student Body Activities (salaries)	Student Body Activities (other exp.)
Total	36%	17	36	32	55	19	58	25	48	43	39
DFG 1-2	40	24	79	63	48	14	106	24	44	53	37
DFG 3-4	33	29	44	-2	48	22	-40	21	42	36	15
DFG 5-6	37	12	14	26	73	28	423	17	53	41	47
DFG 7-8	34	4	19	42	53	21	-66	39	53	39	53
DFG 9-10	35	10	20	18	59	18	86	31	54	54	40

Table 4.8

High School Proficiency Test Scores, 1984-1988 for Selected School Districts and State Total

School Districts	Average Test Scores						Index of Change 1988/1984*		
	Reading 1984	Math 1984	Writing 1985	Reading 1988	Math 1988	Writing 1988	Reading	Math	Writing
a) Total	75.28	60.29	78.92	89.58	75.52	85.30	1.19	1.25	1.08
b) DFG 1-2	65.70	49.54	73.85	84.27	66.92	81.62	1.28	1.35	1.11
c) DFG 3-4	76.01	59.26	78.49	90.17	75.26	85.43	1.19	1.27	1.09
d) DFG 5-6	79.57	64.34	81.21	92.28	78.76	87.10	1.16	1.22	1.07
e) DFG 7-8	82.34	68.82	82.78	93.41	83.01	88.04	1.13	1.21	1.06
f) DFG 9-10	85.85	74.42	85.19	94.92	85.41	89.28	1.11	1.15	1.05
g) Mean Scores for All State Tested Students	77.3	62.6	80.0	90.6	77.0	85.9	1.17	1.23	1.07
56 Urban Districts	68.3	52.2	75.2	85.7	68.8	82.7	1.25	1.32	1.10

*For Writing 1988/1985.

these rates are not strictly teachers' salaries since they are calculated per student enrollment. Since enrollment declined by 2 and 9 percent, respectively, in the two extreme DFGs, actual teachers' salaries grew somewhat faster.

Table 4.7 reveals that the lowest DFG's spent less than the more affluent school districts on most of the expenditure items. This occurred despite the overall higher rate of growth of expenditures in DFGs 1 and 2 during the period. It seems that those school districts have been catching-up in areas where they formerly lagged. We could not find, in this admittedly cursory review, levels of educational expenditures that were clearly higher in the poorer districts.

Table 4.8 presents the High School Proficiency Test (HSPT) score results for reading, mathematics and writing over the 1984-1988 school years. These results are averages obtained for the indicated school districts. The last three columns of row (a) indicate that the largest improvement in our sample of 171 districts took place in mathematics scores (+25%), followed by reading (+19%) and writing (+8%). These results are similar to those obtained by all students (row g) where the mean score increases were 23%, 17% and 7%.[9]

The differentiation by district factor groups indicates the positive association of higher test scores with higher socioeconomic characteristics of the school districts. Without exception, the lower DFG districts had lower test scores in every subject in both 1984-85 and 1988. However, the lowest DFG's achieved the highest percentage increase in scores over time (35% in math, 28% in reading, and 11% in writing).

A juxtaposition of the test score results with the expenditure increases suggests a positive association between the percentage increase of test scores and the percentage increase in expenditures. Whether increased expenditures lead to higher student test performances will be investigated in the next section.

II. Do Increased Expenditures Lead to Higher Student Test Performances?

A cursory review of possible relationships between student performance and per pupil expenditures based on the data presented in Section I suggests that students in districts where per pupil expenditures were higher achieved better test scores both in 1984 and in 1988. Does this

9. Our sample shows a one to two percentage point higher increase in the average test scores. This can be accounted for by the omission in the sample of vocational schools, where the results were, in general, somewhat lower.

observation mean that increased expenditures lead to better student performance, or is better performance more associated with the socioeconomic characteristics of the school districts? To answer this question, we use the multiple regression analysis to separate the influence of socioeconomic variables on test scores from the effect of expenditures and other variables.

As mentioned earlier, the investigation involves 171 school districts with at least one high school. The educational input variables considered for each school district are:

1. Per capita money income in 1985.
2. Percent of single parent families with children under 18 years old.
3. Population density (people per square mile) in 1983.
4. Teachers' salaries per pupil (1985/86).
5. Other school district expenditures per pupil (1985/1986).
6. Pupil/teacher ratios (1985/86)
7. Teacher experience (number of years in teaching positions).
8. Average number of students per school.

The measure of educational performance for each district was: Average 1988 test score (HSPT) for reading, mathematics, and writing.

The division of total expenditures into teachers' salaries and other expenditures was prompted by initial indications that even though total expenditures did not seem to be a significant factor in determining test results, higher teachers' salaries might better reflect the effects of the education reform measures recently adopted in New Jersey. Higher teachers' salaries indicate, other things equal, a more experienced, better educated faculty that should result, in time, in better student performance.

The relationships between the independent variables and the test scores can be interpreted to indicate, for example, whether higher per pupil expenditures are associated with higher test scores across school districts in a given year, holding the other variables constant. Although we present in this section the results from linear regressions, we also estimated non-linear equations. Since the improvement from estimating non-linear relations was minimal, we concentrate here on presenting only the results of the linear equations.

In addition to regression equations for the entire sample, computations were made for five subsamples according to the DFG classifications. Since each subsample is more homogenous in terms of its socioeconomic characteristics, this exercise may better indicate whether variables other than socioeconomic variables influence test scores achieved by students within each group.

Consistent with previous literature, we test a number of hypotheses with the New Jersey data. First, households with higher income are expected to create more favorable learning conditions at home and provide closer attention to the academic performance of their children. Therefore, higher income should be directly associated with higher test scores. There is concern, however, that higher per capita income also leads to higher expenditures per pupil and, therefore, that the relationship is simultaneous and, hence, may lead to biased results.

Population density is a proxy for urbanization. It is hypothesized that the learning conditions in schools of larger urban centers reflect educational disadvantages relative to schools in suburban or rural areas. Hence, higher population densities are expected to be associated with lower test scores. The percent of single parent families with children under 18 years old should also have a negative effect on student performance.

Increased expenditures per pupil are assumed to be positively associated with academic performance. A similar positive association is expected between teachers' experience (number of years in teaching positions) and test scores. The pupil/teacher ratio is expected to be negatively associated with students' proficiency, since smaller classes create more favorable learning conditions, and permit greater attention to individual students. Similarly, larger schools may be more difficult to manage, and academic performance is hypothesized to be negatively associated with the size of schools (number of students enrolled per school).

Regression Results

First, we present the results of the relationship between the level of test scores and per pupil expenditures, holding socioeconomic variables constant. We eliminated all those variables that were not statistically significant with respect to test performance. Among those eliminated were the pupil/teacher ratio, the size of schools, and teachers' experience. The insignificant results for these variables do not mean that they do not influence student performance. It only indicates that in the school districts examined in this study, the variation in these variables was not associated

Table 4.9

REGRESSION RESULTS 1

	Const.	Per Capita Income	Population Density	Single Parent Houshold	Total Per Pupil Expenditures	Adjusted R^2	F stat (4,166)
Reading	93.6	0.000303	-0.00015	-40.19	-0.00049	0.68	93
	(72.55)	(5.57)	(-5.71)	(-8.98)	(-1.77)		
Math	75.09	0.000781	-0.00017	-50.92	-0.00048	0.63	73
	(30.19)	(7.45)	(-3.26)	(-5.90)	(-0.90)		
Writing	85.69	0.000296	-0.00007	-24.18	-0.00019	0.56	56
	(72.22)	(5.92)	(-2.88)	(-5.88)	(-0.76)		

*Figures in parentheses are t-statistics. Given our sample size (171), a value close to 2.0 and higher indicates that the relationship between this variable and the test scores is statistically significant.

in a statistically significant way with test performance (at least at a 95 percent probability level).[10]

Table 4.9 presents the results for those variables that were statistically significant. In some cases, in order to illustrate a particular point, results that were not statistically significant are also presented.

First, we review the regression results for the equations using total per pupil expenditures.

—The per capita income variable is positive and statistically significant. It confirms the results of the previous studies, and the hypothesis that students in relatively higher income districts achieve better test results.

—Students in higher population density communities performed less well on the HSPTs, other things equal. We have suggested that this may result from disadvantaged learning conditions in high schools located in larger cities. This result is invariant to the racial composition of the student body. We experimented with a variable measuring the racial composition of the population in each district, and found that population density remains negative and statistically significant even in the presence of a racial composition variable.

—Family structure, measured as the share of single parent families with children under 18 years old also had a negative effect on test scores.

—In this first set of equations, per pupil expenditures were not significantly associated with higher test scores. In fact, the relationship was negative, although statistically insignificant. This puzzling result contradicts the view that in order to improve student performance, education expenditures must increase, especially in poorer districts.

The remaining part of this study is devoted to clarifying the issue of whether additional expenditures improve educational results.

The first experiment was to divide total expenditures into two components: teachers' salaries and all other remaining educational expenditures. The regression results for the entire sample are presented in Table 4.10.

This separation leads to a significant clarification of the effect of educational expenditures. One part of expenditures — teachers' salaries — is positively and significantly associated with test scores while the remaining part of expenditures is negatively associated with student performance. Thus, it seems that we can interpret these results as suggesting that not all expenditures contribute to improved test results. In our sample, increased expenditures on teachers had a positive effect on test scores. (Recall that the variable of teachers' salaries per pupil used here measures not only the direct payment to teachers, but is also affected by the pupil/teacher ratio in each school district. When we tested the effect of pupil/teacher ratio separately, it did not have a statistically significant effect on test scores.)

Teachers' salaries also reflect teaching expe-

10. It is possible, for example, that some of these indicators do not vary much between school districts or that their variation is not systematic. In the latter case, additional observations may better help to specify the equation and indicate a more systematic relationship between student performance.

Table 4.10

REGRESSION RESULTS 2

	Const.	Per Capita Income	Population Density	Single Parent Household	Teachers' Salaries	Other Expend.	Adjusted R^2	F stat (5,165)
Reading	92.51	0.000202	-0.00016	-33.58	0.00244	-0.00158	0.73	93
	(76.5)	(3.78)	(-6.52)	(-7.8)	(4.09)	(-4.83)		
Math	73.37	0.000622	-0.00018	-40.59	0.00413	-0.0022	0.66	68
	(30.6)	(5.85)	(-3.69)	(-4.75)	(3.49)	(-3.38)		
Writing	85.00	0.000236	-0.00007	-20.32	0.00155	-0.0824	0.59	50
	(72.7)	(4.54)	(-3.17)	(-4.88)	(2.69	(-2.6)		

rience (number of years in teaching positions) as well as academic qualifications. Neither of these variables by themselves, however, were significantly associated with students' performance. Only as the effect of these variables is captured in salaries, do they significantly influence our sample results.

From a policy perspective, it is important to evaluate the sensitivity (or elasticity) of the explanatory variables with respect to the test score variables. Elasticity is a measure of the percent change in the dependent variable (in our case, test scores) in response to a given percent change in any of the explanatory variables. Table 4.11 provides the elasticity estimates for each of our explanatory variables.

An increase in per capita money income by 10 percent is associated with an increase of 0.6 percent in reading test scores. By adding or subtracting the confidence interval, we determine the range within which the true elasticities will be contained 95 percent of the time. In the case of reading, the range is between 0.38 and 0.82 percent. A 10 percent increase in per capita money income is associated with an increase of 1.34 to 2.28 percent in mathematics test scores. For writing test scores, the results are 0.42 to 0.86 percent. Thus, the largest increase can be achieved in mathematics, while the effects on reading and writing are similar and small.

A reduction in population density by 10 percent is associated with an increase from 0.05 to 0.13 percent in reading test scores; from 0.04 to 0.20 percent in mathematics, and from 0.0 to 0.08 percent in writing test scores. A reduction in the share of single parent families by 10 percent is associated with an increase in reading by 0.06 to 0.26 percent; in mathematics between -0.09 to

Table 4.11

REGRESSION RESULT 3: ELASTICITIES*

Test Scores (Dependent Variables)	EXPLANATORY VARIABLES				
	Per Capita Income (E)___(CI)	Population Density (E)___(CI)	Single Parent Families (E)___(CI)	Teachers' Salaries (E)___(CI)	Other Expenditures (E)___(CI)
Reading	0.060 ± 0.022	-0.009 ± 0.004	-0.016 ± 0.010	0.053 ± 0.025	-0.062 ± 0.024
Math	0.181 ± 0.047	-0.012 ± 0.008	-0.011 ± 0.020	0.089 ± 0.057	-0.106 ± 0.051
Writing	0.064 ± 0.022	-0.004 ± 0.004	-0.009 ± 0.008	0.025 ± 0.024	-0.034 ± 0.022

*The elasticities are calculated from equations expressed in logarithms. In addition to the elasticities (E), the 95% confidence intervals (CI) are also shown. They were used to calculate ranges for the percentage responses.

Table 4.12

REGRESSION RESULTS 4*

	Constant	Per Capita Income	Population Density	Single Parent Household	Teachers' Salaries	Other Expen-ditures	Adjusted R^2	F Statistics
DFG 1-2	92.00	0.000125	-0.000173	-28.03	0.004116	-0.002324	0.63	14.21
	(18.64)	(0.3)	(-3.97)	(-3.25)	(2.37)	(-3.42)	N = 39	
DFG 3-4	93.55	0.000712	-0.000204	-78.18	-0.001011	-0.000877	0.37	3.95
	(9.9)	(0.99)	(-2.07)	(-3.12)	(-0.54)	(-0.79)	N = 26	
DFG 5-6	101.47	-0.000364	-0.000134	-26.67	-0.000718	-0.000233	0.18	2.72
	(30.52)	(-1.17)	(-1.92)	(-1.51)	(-0.37)	(-0.25)	N = 39	
DFG 7-8	92.86	0.000123	-0.000019	-10.06	0.000596	-0.000680	-0.09	0.39
	(37.58)	(0.79)	(-0.26)	(-0.69)	(0.56)	(-1.13)	N = 37	
DFG 9-10	92.70	0.000110	-0.000021	-9.00	0.001150	-0.000584	0.33	3.84
	(41.88)	(2.73)	(-0.24)	(-0.73)	(1.57)	(-1.37)	N = 30	

*The dependent variable is reading test scores.

0.31 percent, and in writing from 0.01 to 0.017 percent.

From a public policy perspective, the most interesting is the effect of per pupil expenditures. A 10 percent increase in teachers' salaries per pupil is associated with an increase in reading test scores of 0.28 to 0.78percent. Since this indicator is calculated per pupil, we have to multiply this result by the average pupil/teacher ratio (approximately 15) in order to arrive at the increase in teachers' salaries that can bring about the indicated 0.28 to 0.78 percent increase in reading scores. Average per pupil teachers' salaries were $1,769 in 1985/86. Multiplying this average by 15 (the average pupil/teacher ratio) gives an approximate annual salary per teacher of $26,535 in our sample. The elasticity indicates that an increase of ten percent (or $2,635), will bring about an increase in reading test scores of between 0.28 to 0.78 percent. Assuming an equal effect of such an increase in all school districts, it means that the public sector would have to increase total expenditures on teachers salaries by $111 million ($1,113 billion x 10%) annually to achieve approximately a half a percentage point increase in reading scores.

Since we are dealing here with a joint product, the same amount of teachers' salaries increase could simultaneously bring about a 0.32 percent to 1.46 percent increase in mathematics scores and from 0.1 percent to 0.49 percent increase in writing test scores.

It is also interesting to note that the relationship between the remaining school expenditures and test scores are negative. This may indicate that financial resources can be better spent, for example, by shifting some expenditures to teachers' salaries.

However, we are not sure that such an interpretation is valid. It is not clear whether the negative association between 'other expenditures' and test scores means that those expenditures are not only wasted but even cause negative academic results. It is more likely that this negative association follows from specific conditions requiring more spending on administration, maintenance of structures, utilities, insurance, transportation, etc., all of which have nothing to do directly with students' performance. Or, it could be that school districts with lower student achievements require some of those additional expenditures, for example, on safety, administration, etc. Since the regression method does not indicate the line of causation, no clear answer can be given.

Subsample Results

As noted previously, the 171 school districts are grouped according to socio-economic characteristics as determined by the New Jersey Department of Education. Each district factor group represents school districts of similar socio-eco-

nomic features. If socio-economic factors are important in determining students' scholastic achievements, it would follow that within more homogenous groups of districts, we should find less of a relationship between per capita personal income, density and family characteristics and student test scores.

In order to test this contention, we set out to estimate the same multivariate regression equations for five subsamples. The number of observations in each subsample is the sum of the districts in the two factor groups in each subsample. Table 4.12 presents the results for the reading test scores in 1988.[11]

Except for DFG 1-2, the regression equations are not statistically significant (the F statistics are very low). As expected, most of the demographic variables in the other equations are statistically insignificant. The reasons for such poor results are mainly due to very little variation within those groups. However, in the DFG 1-2 group, which comprises 39 district schools, the regression coefficients confirm the results obtained for all selected school districts, namely, that population density and single parent households are negatively associated with test scores and teachers' salaries are a positive factor, while other educational expenditures per pupil are negative and statistically significant. The only exception in this equation is the per capita money income, which shows no relationship to test scores. It is reasonable to assume that income variation within this group is much smaller than for the total number of school districts. This is confirmed by the much lower coefficient of variation of income (0.147) in the DFG 1-2 subsample than in all school districts (0.306). [12]

Conclusions

This study follows in the steps of many investigations which examine the efficiency of the educational process. The enormous importance of an education for the well-being of our nation and the preparation of its labor force for the challenges of a global economy has attracted the attention of researchers and policymakers.

The particular focus of this study is the relationship between expenditures on education and educational outcomes in New Jersey, as measured by test scores of students taking the High School Proficiency Test at the 9th grade level. Our sample includes 171 school districts in New Jersey — representing a large majority of all the school districts in the State that have at least one high school. In addition to district mean test scores for reading, mathematics and writing, the socioeconomic characteristics of communities and households, as well as school expenditures were analyzed. The study also utilizes the New Jersey Department of Education's "district factor groups" — a complex socioeconomic index — in our attempt to identify the relationships between scholastic achievement, socioeconomic status, educational expenditures and other variables. In order to separate the influence of socioeconomic variables from expenditures, this study employs the method of multivariate regression. What follows is a brief summary of the major findings of this study.

—In the 1985/86 school year the average per pupil expenditure in all 171 school districts included in this study was $4,636. In the lowest socioeconomic districts, it was $4,459 and in the highest, $5,125.

—The increase in per pupil expenditures between the 1982-83 and 1985-86 school years was 35 percent. The largest increase took place in the low District Factor Group (39%), with 15 percent of this increase due to local taxes, and 49 percent from the State and other sources.

—During the same three year interval, teachers' salaries per pupil in all 171 school districts grew by 17 percent, while other educational expenditures increased by 48 percent. In the lowest DFG, teachers' salaries increased only by 13 percent, and the remaining expenditures — by 54 percent. Despite the faster growth of expenditures for other than teachers' salaries in DFG 1-2, the level of those expenditures remained lower than the sample average, and the averages of all other DFG subsamples.

—Average test scores increased significantly between 1984 and 1988 in all DFG's. The improvement in test scores was largest in the lowest DFG. Nevertheless, the level of scores in 1988 remained lower in DFG 1-2 than in all other DFG's.

---

11. Similar results were obtained for the writing and mathematics tests.
12. See Appendix 2 where the mean values, standard deviations and coefficients of variation for the five subsamples are displayed.

—Multivariate regression analysis of the data revealed a positive association between per capita income of the communities and the test scores of students. This relationship is highly significant (99 percent probability that the results are not obtained by chance).[13]

—In more densely populated districts, the test scores are, by and large, lower. This negative relationship remains even after eliminating the effect of racial composition.

—Similar negative associations with test performance exist between scores and the share of single parent families in the total number of households.

—The size of classrooms (pupil/teacher ratio), teachers' education or experience, and number of students per school did not show any systematic effect on the average test scores of students.

—Total expenditures per pupil and test scores are not significantly associated with each other after accounting for the effects of per capita income, population density, and family characteristics.

—Unlike most other econometric studies on this subject, our results clearly indicate a positive and statistically significant relationship between per pupil teachers' salaries and test scores.

—Other educational expenditures (the difference between total expenditures and teachers' salaries) are negatively and significantly associated with test scores.

—Assuming the line of causation flows from higher teacher salaries to higher student achievement, this result suggests that increasing teachers' salaries are one means of improving educational performance. Our calculations show that a 10 percent increase in teachers' salaries may result in increased reading test scores by 0.28 to 0.78 percent, mathematics scores by 0.32 to 1.46 percent, and writing scores by 0.1 to 0.49 percent. Such an increase would require approximately $111 million for the school districts included in our study.

—The negative association between 'other expenditures' and test scores is both puzzling and difficult to interpret. Does it really mean that some expenditures are not only wasted but are even causing negative academic results? Or is this negative association indicative of the necessity of spending more on administration and other non-instructional activities because conditions require them, for example, expenditures on maintenance of the structures, utilities, insurance, transportation, etc. The analysis does not indicate the line of causation. If we could broaden our knowledge and determine what is cause and effect, it might be possible to interpret whether a shift of expenditures from other than teachers' salaries could be an effective policy.

—Although a direct change in expenditures on education is the most obvious public policy, state and local government can also have an indirect and long-term effect on other variables considered in this analysis, such as a reduction in single parent families, and most important, improving the economic health of the State's poorest communities. Given the elasticity of test scores with respect to per capita income, a significant increase in the economic well-being of the lowest socioeconomic districts may make a sizeable contribution to the academic achievement of students.

---

13. Similar results were obtained by Herbert J.Walberg and William J. Fowler in "Expenditure and Size Efficiencies of Public School Districts". A Heartland Policy Study. The Heartland Institute, #22, September 1988. Also, Anita A. Summers and Barbara Wolfe: "Which School Resources Help Learning? Efficiency and Equity in Philadephia Public Schools." Federal Reserve Bank of Philadelphia Review, February 1975.

APPENDIX 1

School Districts Included in the Study by District Factor Groups:

District Factor Group 1-2

#	District	County	DFG
1	Asbury Park	Monmouth	1
2	Atlantic City	Atlantic	1
3	Bridgeton	Cumberland	1
4	Camden	Camden	1
5	East Orange	Essex	1
6	Elizabeth	Union	1
7	Gloucester City	Camden	1
8	Hoboken	Hudson	1
9	Jersey City	Hudson	1
10	Keansburg	Monmouth	1
11	Middle Township	Cape May	1
12	Neptune Township	Monmouth	1
13	Newark	Essex	1
14	Paterson	Passaic	1
15	Paulsboro	Gloucester	1
16	Perth Amboy	Middlesex	1
17	Pleasantville	Atlantic	1
18	Salem City	Salem	1
19	Trenton	Mercer	1
20	Union City	Hudson	1
21	West New York	Hudson	1
22	Wildwood	Cape May	1
23	Egg Harbor Twp.	Atlantic	2
24	Garfield City	Bergen	2
25	Hammonton	Atlantic	2
26	Harrison	Hudson	2
27	Irvington	Essex	2
28	Keyport	Monmouth	2
29	Lacey Township	Ocean	2
30	Long Branch	Monmouth	2
31	Manchester	Ocean	2
32	Millville	Cumberland	2
33	Monroe Township	Gloucester	2
34	New Brunswick	Middlesex	2
35	Orange City	Essex	2
36	Pemberton Twp.	Burlington	2
37	Phillipsburg	Warren	2
38	Pittsgrove Twp.	Salem	2
39	39Vineland	Cumberland	2

District Factor Group 3-4

#	District	County	DFG
40	Bayonne	Hudson	3
41	Carteret	Middlesex	3
42	Deptford	Gloucester	3
43	Jackson Twp.	Ocean	3
44	Kearny	Hudson	3
45	Lakewood Twp.	Ocean	3
46	Linden	Union	3
47	Lodi	Bergen	3
48	Newton	Sussex	3
49	North Bergen	Hudson	3
50	Pennsville	Salem	3
51	Plainfield	Union	3
52	Riverside Twp.	Burlington	3
53	South Amboy	Middlesex	3
54	Weehawken	Hudson	3
55	Belleville	Essex	4
56	Brick Twp.	Ocean	4
57	Dover Town	Morris	4
58	Florence Twp.	Burlington	4
59	Hillside Twp.	Union	4
60	Manville	Somerset	4
61	Palmyra	Burlington	4
62	Pennsauken Twp.	Camden	4
63	Point Pleasant Bor.	Ocean	4
64	South River	Middlesex	4
65	Woodbury	Gloucester	4

District Factor Group 5-6

#	District	County	DFG
66	Boonton Town	Morris	5
67	Dunellen	Middlesex	5
68	Elmwood Park	Bergen	5
69	Hackensack	Bergen	5
70	Hackettstown	Warren	5
71	Manasquan	Monmouth	5
72	Maple Shade Twp.	Burlington	5
73	North Arlington	Bergen	5
74	Oaklyn	Camden	5
75	Point Pleasant Beach	Ocean	5
76	Rahway	Union	5
77	Spotswood	Middlesex	5
78	Vernon Township	Sussex	5
79	Wallington	Bergen	5
80	West Deptford	Gloucester	5
81	West Milford Twp	Passaic	5
82	Bloomfield	Essex	6
83	Bound Brook	Somerset	6
84	Cliffside Park	Bergen	6
85	Clifton	Passaic	6
86	Collingswood	Camden	6
87	Englewood City	Bergen	6
88	Haddon Twp.	Camden	6
89	Hamilton Twp.	Mercer	6
90	Jefferson Twp.	Morris	6
91	Middlesex Borough	Middlesex	6
92	Ocean City	Cape May	6
93	Palisades Park	Bergen	6
94	Passaic City	Passaic	6
95	Ridgefield Bor.	Bergen	6
96	Roselle	Union	6
97	Roselle Park	Union	6
98	Sayreville	Middlesex	6
99	Secaucus	Hudson	6
100	Union Twp.	Union	6
101	Wall Township	Monmouth	6
102	Willingboro	Burlington	6
103	Wood Ridge	Bergen	6
104	Woodbridge	Middlesex	6

District Factor Group 7-8

#	District	County	DFG
105	Bergenfield	Bergen	7
106	Bogota Borough	Bergen	7
107	Butler	Morris	7
108	Delran Twp.	Burlington	7
109	Dumont	Bergen	7
110	Edison	Middlesex	7
111	Franklin Twp.	Somerset	7
112	Haddon Heights	Camden	7
113	Hopatcong	Sussex	7
114	Monroe Township	Middlesex	7
115	New Milford	Bergen	7
116	North Plainfield	Somerset	7
117	Nutley	Essex	7
118	Pitman	Gloucester	7
119	Pompton Lakes	Passaic	7
120	Ridgefield Park	Bergen	7
121	Rutherford	Bergen	7
122	Saddle Brook	Bergen	7
123	Somerville	Somerset	7
124	South Plainfield	Middlesex	7
125	Cinnaminson Twp.	Burlington	7
12	East Brunswick	Middlesex	8
127	Fair Lawn	Bergen	8
128	Fort Lee	Bergen	8
129	Green Brook	Somerset	8
130	Highland Park	Middlesex	8
131	Metuchen	Middlesex	8
132	Midland Park	Bergen	8
133	Mount Olive	Morris	8
134	North Brunswick	Middlesex	8
135	Ocean Township	Monmouth	8
136	Paramus	Bergen	8
137	Parsippany-Troy Hills	Morris	8
138	Pequannock Twp.	Morris	8
139	Roxbury	Morris	8
140	South Brunswick	Middlesex	8
141	Waldwick	Bergen	8

District Factor Group 9-10

#	District	County	DFG
142	Cedar Grove Twp.	Essex	9
143	Caldwell-West Caldwell	Essex	9
144	Cherry Hill Twp.	Camden	9
145	Cranford	Union	9
146	Cresskill	Bergen	9
147	Emerson	Bergen	9
148	Hillsborough	Somerset	9
149	Lawrence Twp.	Mercer	9
150	Leonia	Bergen	9
151	Madison Borough	Morris	9
152	Montclair	Essex	9
153	Park Ridge Borough	Bergen	9
154	Ramsey	Bergen	9
155	Wayne Township	Passaic	9
156	Bernardsville	Somerset	10
157	Chatham Borough	Morris	10
158	Chatham Township	Morris	10
159	Glen Ridge	Essex	10
160	Glen Rock	Bergen	10
161	Haddonfield Borough	Camden	10
162	Holmdel	Monmouth	10
163	Kinnelon	Morris	10
164	Livingston	Essex	10
165	Millburn	Essex	10
166	Montgomery	Somerset	10
167	Mountain Lakes	Morris	10
168	New Providence	Union	10
169	Ridgewood	Bergen	10
170	Summit City	Union	10
171	Westfield	Union	10

APPENDIX 2

Mean Values

	Total	DFG 1-2	DFG 3-4	DFG 5-6	DFG 7-8	DFG 9-10
Reading, 1988	91.51	86.96	90.68	92.29	93.19	95.08
Mathematics, 1988	78.69	70.85	76.17	79.48	82.20	85.71
Writing, 1988	86.59	83.44	85.62	87.17	87.58	89.55
Per Capita Income	13700	9401	11661	13261	14795	20278
Population Density	5733	9235	5630	5704	4358	3004
Single Parent Household	0.076	0.128	0.075	0.063	0.057	0.048
Teachers' Salaries Per Pupil	1769	1402	1678	1734	1971	2125
Other Expenditures Per Pupil	2916	2921	2780	2852	2945	3076

Standard Deviations

	Total	DFG 1-2	DFG 3-4	DFG 5-6	DFG 7-8	DFG 9-10
Reading, 1988	3.72	4.08	2.47	1.94	1.21	0.99
Mathematics, 1988	6.61	6.16	3.95	3.48	3.31	2.81
Writing, 1988	2.91	2.72	2.18	1.57	1.92	1.78
Per Capita Income	4196	1386	613	1540	1697	4309
Population Density	6315	10739	4210	4303	3253	1831
Single Parent Household	0.045	0.061	0.017	0.024	0.018	0.014
Teachers' Salaries Per Pupil	345	257	215	213	271	215
Other Expenditures Per Pupil	485	617	364	473	480	373

Coefficients of Variation

	Total	DFG 1-2	DFG 3-4	DFG 5-6	DFG 7-8	DFG 9-10
Reading, 1988	0.041	0.047	0.027	0.021	0.013	0.010
Mathematics, 1988	0.084	0.087	0.052	0.044	0.040	0.033
Writing, 1988	0.034	0.033	0.025	0.018	0.022	0.020
Per Capita Income	0.306	0.147	0.053	0.116	0.115	0.212
Population Density	1.101	1.163	0.748	0.754	0.747	0.610
Single Parent Household	0.588	0.475	0.222	0.380	0.318	0.300
Teachers' Salaries Per Pupil	0.195	0.183	0.128	0.123	0.137	0.101
Other Expenditures Per Pupil	0.166	0.211	0.131	0.166	0.163	0.121

Chapter V

ECONOMIC DEVELOPMENT IN SOUTHERN NEW JERSEY

Introduction

Historically, southern New Jersey has been the part of the State that did not fully participate in the industrial leaps of the 20th century. Although some industries, notably glass and food manufacturing were highly developed, the region lacked the broad spectrum of industries which had spread over the northern part of the State. The region's natural endowment predisposed it to develop and retain agriculture and related pursuits as predominant activities and to serve as the resort hinterland for the neighboring agglomerations of New York, Philadelphia and the relatively densely populated northern areas of New Jersey.

For a variety of reasons, chiefly soil quality and market conditions, the southern part of New Jersey did not become a major grain producing area, but concentrated instead on cultivating fruits and vegetables.

This historical development has, to a large extent, determined the relatively less dense network of settlement, and the lower level of household income. Periodically, opinions have been expressed that the southern region of New Jersey has not been treated fairly. At times, increasingly loud demands were heard that the state government does not adequately represent the interests of the South.

The Office of Economic Policy has, from time to time, analyzed the economic development of the State's southern counties in order to ascertain the degree of progress in that region. This Chapter undertakes a complete economic review, in as far as data permit. In particular, it addresses the question of how well southern New Jersey has done during the 1980s, a time when the State's economy experienced a major resurgence of activity. This subject is of considerable importance to the economic and quality of life interests of the region and to the emerging growth objectives espoused in the currently formulated State Development and Redevelopment Plan.

I. The Economy of Southern New Jersey

Population

New Jersey is the most densely populated state in the nation with an average of more than 1,000 persons per square mile. However, the density of population in New Jersey has a specific regional pattern and the population density in the southern region of the State is substantially below the New Jersey average.[1] While the territory of the eight southern counties is only slightly smaller than that of the remaining thirteen northern counties (3.7 thousand square miles vs. 3.8 thousand), the population residing in the South in 1987 was only 35 percent of that in the North. As a result, southern New Jersey's population density was 544 persons per square mile, while the North's was 1,489 persons per square mile (Table 5.1).

Relatively more open space and lower land prices in the South led, in the 1970s, to higher rates of population growth. In the decade 1970-80, the population in the South increased by 277,000, while the North lost over 83,000 people (Table 5.2).

This represents an annual rate of change in the 1970s of 1.63 percent growth in the South versus a -0.15 percent annual decline in the North. In the period 1980-87, the annual rate of popula-

---

*Prepared by Jerzy Zachariasz, Research Economist, Office of Economic Policy.

1. We are cognizant of the fact that the thirteen counties of the northern part of New Jersey are not homogenous. In fact, the north-western part of the State resembles the South more than the highly-developed, densely-populated counties of the Northeast. Since our intention here is not to review all different regions of the State but rather concentrate attention on the South, we choose this two-part division as a preferred way of presenting the material. The eight Southern New Jersey counties are: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean, Salem. For the purposes of this report, the remaining 13 counties constitute Northern New Jersey.

tion growth in the South slowed to 1.13%, while the respective growth rate for the North increased from a negative -0.15 percent to 0.40 percent. During 1980-87, the absolute size of the population increase in the two regions was approximately the same — 152,000 in the South and155,000 in the North.

It is worth noting that within the southern part of New Jersey, Ocean County achieved the highest annual rate of population growth — 5.07 percent in the 1970s and 2.10 percent in the 1980-87 period. Since Ocean County is one of the largest counties in southern New Jersey, the absolute size of its population increase is one-half of the total increase in the South during the 1970's, and one-third in the 1980-87 period. The population of Ocean County almost doubled in the seventeen years, from 208,000 in 1970 to 403,000 in 1987.

There are significant differences in age characteristics of the population between the northern and southern part of New Jersey. In comparison to northern New Jersey, the southern region had fewer individuals in the prime working age group of 18-64 years. This group constituted 60.1 percent of the total population in the South vs. 64.2 percent in the North (Table 5.3). The population 65 or over constituted 14.4 percent in the South and 12.4 percent in the North. The respective figures for population of age 17 years or less were 25.5 percent vs. 23.3 percent.

Table 5.1

NEW JERSEY POPULATION PER SQUARE MILE*

	1980	1987	Change (#)
South New Jersey	503	544	41
Atlantic	342	368	26
Burlington	443	475	32
Camden	2,124	2,235	111
Cape May	312	358	46
Cumberland	265	274	9
Gloucester	609	649	40
Ocean	543	633	90
Salem	187	189	2
North New Jersey	1,448	1,489	41
Total New Jersey	983	1,024	41

*New Jersey Economic Indicators, November 1988 and New Jersey Department of Community Affairs, Division of Local Government.

Table 5.2

NEW JERSEY POPULATION, 1970-1987*

				Number Change		Percent Change		Average Annual Rate of Change	
	1970	1980	1987	1970-80	1980-87	70-80	80-87	70-80	80-87
State Total	7,171,112	7,365,011	7,672,000	193,899	307,089	2.71	4.17	0.26	0.56
North N.J.	5,594,221	5,510,937	5,666,100	-83,284	155,163	-1.49	2.82	-0.15	0.40
South N.J.	1,576,891	1,854,074	2,006,000	277,183	151,926	17.58	8.19	1.63	1.13
Atlantic	175,043	194,119	208,500	19,076	14,381	10.90	7.43	1.04	0.99
Burlington	323,132	362,542	388,000	39,410	25,458	12.20	7.02	1.15	0.94
Camden	456,291	471,650	496,300	15,559	24,650	3.37	5.23	0.33	0.70
Cape May	59,554	82,266	94,200	22,712	11,934	38.14	14.46	3.23	1.86
Cumberland	121,374	132,866	137,600	11,492	4,734	9.47	3.54	0.90	0.48
Gloucester	172,681	199,917	213,000	27,236	13,083	15.77	6.57	1.46	0.88
Ocean	208,470	346,038	403,000	237,568	56,962	65.99	16.46	5.07	2.10
Salem	60,346	64,676	65,400	4,330	724	7.18	1.08	0.69	0.15

*New Jersey Economic Indicators, November 1988.

Employment

The State's southern region outperformed the North in terms of employment growth. In the years 1982-87, covered employment[2] in the South grew at an annual rate of 4.4 percent compared with 3.4 percent for the North (Table 5.4).

Within the southern region, the highest annual growth rates were recorded in Ocean (6.6%) and Burlington (6.5%) counties.

In terms of the total number of jobs generated, four southern counties (Atlantic, Burlington, Camden and Ocean) accounted for nearly 115,000, or over 90 percent of the total employment growth in the region. Their employment growth during 1982-1987 was nearly 30 percent compared to to the North's 18 percent.

The South has a relatively smaller manufacturing sector compared with the North as measured by the share of manufacturing employment in total employment (Table 5.5). However, during the period 1982-87, this gap narrowed. In 1982, the share of manufacturing in the North's total employment was 30.1 percent, but declined to 23.4 percent by 1987. The respective figures for the South were 20.3 percent and 16.5 percent. While manufacturing employment in the North declined substantially (-8.1%), the South had a small increase of 1.2 percent during the period. Manufacturing employment increased mainly in Burlington County (12.5%), Ocean (25.2%) and Camden (3.4%) counties. Other southern counties had a decline or an insignificant growth of manufacturing employment.

Construction employment, reflecting the statewide boom, grew significantly in both the North and the South. However, the increase in the South was considerably higher than in the North (63.8% vs. 50.5%). Three counties in the South (Atlantic, Burlington and Ocean) had over a one hundred percent increase of construction employment during the

Table 5.3

SOUTH NEW JERSEY POPULATION BY AGE (PERCENT OF TOTAL)*

1987

	Less Than 17	Age 18-64	Age 65+
South New Jersey	25.5	60.1	14.4
Atlantic	23.6	61.3	15.1
Burlington	25.6	64.6	9.8
Camden	26.9	61.2	11.8
Cape May	21.7	58.5	19.9
Cumberland	27.8	59.2	12.9
Gloucester	28.0	61.4	10.6
Ocean	22.9	54.1	22.9
Salem	27.6	58.8	13.6
North New Jersey	23.3	64.2	12.4
Total New Jersey	23.9	63.2	12.9

*New Jersey Economic Indicators, November 1988

Table 5.4

COVERED EMPLOYMENT IN NEW JERSEY, 1982-1987

	1982	1987	Change #	Change %	Average Annual Rate
South New Jersey	525,517	653,016	127,499	24.3	4.4
Atlantic	89,278	116,720	27,442	30.7	5.5
Burlington	85,259	117,064	31,805	37.3	6.5
Camden	141,539	171,957	30,418	21.5	4.0
Cape May	32,344	35,131	2,787	8.6	1.7
Cumberland	42,407	46,225	3,818	9.0	1.7
Gloucester	46,276	54,115	7,839	16.9	3.2
Ocean	67,292	92,573	25,281	37.6	6.6
Salem	21,122	19,231	-1,831	-8.9	-1.9
North New Jersey	1,987,284	2,336,640	349,356	17.6	3.3
North New Jersey Including Undistributed	2,038,383	2,410,240	371,857	18.2	3.4
New Jersey Total	2,563,900	3,063,256	499,356	19.5	3.6

2. Covered employment is obtained from reports filed by employers covered by the New Jersey Unemployment Compensation Law.

period. Salem County experienced a dramatic decline in construction employment due to the completion of the nuclear power plant.

On the other hand, growth of service employment was substantially lower in the South (24.7% vs. 32.4%). However, it should be noted that the share of service employment in 1987 was much higher in the South than in the North (31.6% vs. 25.7%). The growth of service employment was highest in Burlington County (32.8%) and the lowest in Salem County (6.0%) (Table 5.6).

In terms of employment growth, the wholesale sector in the South outperformed the northern region. Employment in this sector increased in the South by 32.1 percent and in the North by 23.0 percent. Still, the importance of the wholesale sector remains relatively less in the South than in the North. In 1987, the employment share of this sector was 9.5 percent of the total in the North, and 5.9 percent in the South. Retail trade employment grew at approximately the same pace in both regions of New Jersey.

Income

Personal income includes wage and salary

Table 5.5

NEW JERSEY COVERED EMPLOYMENT BY SECTORS, 1982-1987

	Manufacturing	Construction	Wholesale Trade	Retail Trade	Services	Other	Total
SOUTH							
1982	106,762	28,024	29,028	136,435	155,075	70,193	525,517
1987	107,990	45,900	38,349	165,841	206,035	88,901	653,016
Change 82-87							
#	1,228	17,876	9,321	29,406	50,960	18,708	127,499
%	1.2	63.8	32.1	21.6	24.7	26.5	24.3
Composition							
1982	20.3	5.3	5.5	26.0	29.5	13.4	100.0
1987	16.5	7.0	5.9	25.4	31.6	13.6	100.0
NORTH*							
Percent Change,							
1982-87	-8.1	50.5	23.0	21.8	32.4	32.5	18.2
Composition							
1982	30.1	4.1	9.2	17.7	22.9	16.0	100.0
1987	23.4	5.3	9.5	18.2	25.7	17.9	100.0
NEW JERSEY							
Percent Change,							
1982-87	-6.7	53.8	24.2	21.7	32.5	31.6	19.5
Composition							
1982	28.1	4.4	8.4	19.4	24.3	15.4	100.0
1987	21.9	5.6	8.7	19.8	26.9	17.0	100.0

*Includes employment not distributed by counties.

Table 5.6

EMPLOYMENT BY SECTOR IN SOUTHERN NEW JERSEY COUNTIES IN 1987 AND CHANGE OVER 1982-1987 (%)

	Mfg.	Constr.	Wholesale Trade	Retail Trade	Services	Other	Total
Atlantic	7,546	7,447	3,155	22,746	62,972	12,854	116,720
Change	1.0	104.2	12.8	24.7	28.2	7.7	30.7
Composition	6.47	6.38	2.70	19.49	53.95	11.01	100.00
Burlington	23,685	8,184	8,466	29,592	29,523	17,614	117,064
Change	12.5	105.3	45.8	32.8	30.5	51.7	37.3
Composition	20.23	6.99	7.23	25.28	25.22	15.05	100.00
Camden	34,068	11,258	16,199	38,420	49,101	22,911	171,957
Change	3.4	95.2	29.6	15.6	21.4	23.7	21.5
Composition	19.81	6.55	9.42	22.34	28.55	13.32	100.00
Cape May	865	2,599	757	16,555	10,604	3,751	35,131
Change	-18.2	66.7	8.7	4.0	7.0	15.5	8.6
Composition	2.46	7.40	2.15	47.12	30.18	10.68	100.00
Cumberland	16,098	2,203	2,348	8,406	9,218	7,952	46,225
Change	-4.5	38.5	18.0	19.6	20.8	4.1	9.0
Composition	34.83	4.77	5.08	18.18	19.94	17.20	100.00
Gloucester	12,418	4,167	4,285	14,678	11,172	7,395	54,115
Change	-14.5	92.3	36.8	26.3	25.7	13.1	16.9
Composition	22.95	7.70	7.92	27.12	20.64	13.67	100.00
Ocean	7,343	8,825	2,672	31,883	29,795	12,055	92,573
Change	25.2	115.5	53.8	26.0	26.6	43.3	37.6
Composition	7.93	9.53	2.89	34.44	32.19	13.02	100.00
Salem	5,967	1,217	467	3,561	3,650	4,369	19,231
Change	-14.6	-76.6	27.2	25.6	6.0	90.8	-8.9
Composition	31.03	6.33	2.43	18.52	18.98	22.72	100.00
SOUTH TOTAL	107,990	45,900	38,349	165,841	206,035	88,901	653,016
Change	1.6	63.8	32.1	21.5	24.7	26.6	24.3
Composition	16.54	7.03	5.87	25.40	31.55	13.61	100.00

earnings, dividends, interest, rent and transfer payments. Personal income is, therefore, the most comprehensive measure of residents' income. In 1986,[3] New Jersey's personal income reached over $143 billion. For the southern part of the State, total personal income was $32 billion, or 22.5 percent of the State's total, which is less than the South's share of the State's population (26.1%).

A more meaningful analysis can be made by comparing the per capita personal income of the two regions. In 1986, per capita personal income in the southern region of the State was $16,187, 18.3% below that of the North (in 1982 dollars).

Table 5.7 indicates that per capita personal income in each southern county was below the North's average. Only Atlantic County's per capita personal income ($19,229) came close to the North's average. A significant contributing factor to the

3. The latest available data for counties.

Table 5.7

PER CAPITA PERSONAL INCOME AND WEEKLY WAGES

	Personal Income				Weekly Wage		
	1978	1982	1986	1986/1978	1982	1987	1987/1982
South New Jersey	$7,147	$11,267	$16,187	126.5	$296.6	$382.0	28.8
Atlantic	7,369	12,247	19,229	160.9	306.3	393.8	28.6
Burlington	6,811	11,586	17,021	149.9	296.2	389.9	31.6
Camden	7,673	11,285	15,606	103.4	315.2	401.0	27.2
Cape May	7,296	11,650	17,073	134.0	212.0	320.6	51.2
Cumberland	6,952	9,658	12,732	83.1	278.6	344.8	23.8
Gloucester	6,775	10,639	14,452	113.3	302.7	372.0	22.9
Ocean	7,006	11,448	16,755	139.2	244.1	346.7	42.0
Salem	6,844	10,139	14,276	108.6	432.5	466.5	7.9
North New Jersey	9,262	13,728	19,823	114.0	347.6	457.8	31.7
Total New Jersey	8,775	13,095	18,877	115.1	337.8	441.1	30.6
South/North (%)	77.2%	82.1%	81.7%		85.3%	83.4%	

Source: New Jersey Department of Labor.

Table 5.8

RESIDENTIAL UNITS ON MUNICIPAL TAX ROLLS, 1980-1986

	Residential Units Per 1,000 Pop.	Residential Units				Pop. Change	Additional Housing Per 1,000 Population	Residential Units Per 1,000 Population
				Change				
	1980	1980	1986	(#)	(%)	(#)	Increase	1986
South New Jersey	302	559,616	625,903	66,287	11.85	126,669	523	316
Atlantic	302	58,636	70,144	11,508	19.63	12,199	943	340
Burlington	242	87,835	97,004	9,169	10.44	19,920	460	254
Camden	263	124,133	133,134	9,001	7.25	21,903	411	270
Cape May	592	48,692	57,929	9,237	18.97	9,912	932	628
Cumberland	250	33,183	33,891	708	2.13	3,587	197	248
Gloucester	257	51,371	56,045	4,674	9.10	10,802	433	266
Ocean	401	138,953	160,571	21,618	15.56	47,566	454	408
Salem	260	16,813	17,185	372	2.21	780	477	263
North New Jersey	216	1,189,838	1,281,548	91,710	7.71	128,838	712	227
Total New Jersey	238	1,749,454	1,907,451	157,997	9.03	255,507	618	250

Source: Statements of Financial Conditions of Counties and Municipalities. Report of the Division of Local Government Services, Department of Community Affairs, various editions.

lower per capita income is the prevalence of two sectors, namely, agriculture and tourism that generate lower incomes per capita.

One component of personal income — wages — has a special economic and social significance. The average weekly wage in the South was $382 in 1987, while the respective figure for the North was $458. Thus, average wages were 16.6 percent lower in the South than in the North. Since these are average wages for the whole economy, they are affected by the differences in the sectoral mix of industry. However, the magnitude of the difference suggests that the South may have lower wages in some comparable industries. The lower level of wages in the South, made possible by a lower cost of living and lower prices for housing services, may be one of the key factors that have contributed to faster employment growth.

Table 5.9

DWELLING UNITS AUTHORIZED 1981-1987

	Number of Units	Population Increase	Authorized Dwellings Per 1,000 of Additional Population
South New Jersey	110,069	151,926	724
Atlantic	16,634	14,381	1,157
Burlington	17,822	25,458	700
Camden	13,990	24,650	567
Cape May	11,417	11,934	957
Cumberland	2,178	4,734	460
Gloucester	8,846	13,083	676
Ocean	38,011	56,962	667
Salem	1,171	724	1,617
North New Jersey	175,639	155,163	1,132
Total New Jersey	285,701	307,089	930

Source: New Jersey Economic Indicators, June 1988.

Housing

The fast growth of population and employment since the beginning of the 1980s exerted strong pressure on the New Jersey housing market. Construction of new houses accelerated during that period.[4] In order to highlight the relationship between population and housing growth, we employ two available indicators: taxable residential units and total building permits.

Data from annual reports of the New Jersey Department of Community Affairs indicate that the southern part of New Jersey had 559,616 residential units in 1980, and by 1986 that number increased to 625,903 — a net increase of 66,287 units, or 11.8 percent (Table 5.8). The respective figure for the North is 7.7 percent.

When the growth of population is taken into consideration, the picture is different. For that purpose, we introduce an indicator that reflects the number of additional residential units per 1000 of additional population (see Table 5.8). The results indicate that the South added less residential units per 1000 additional population then the North (523 vs. 712). However, the number of units per 1,000 population was higher in the South both in 1980 and in 1986, and the improvements were just about equal (11 to 12 units per 1,000).

During the period 1981-1987, the South authorized 724 dwelling units per 1000 of additional population (Table 5.9). The North authorized 1,132 dwelling units per 1000 of additional population.

Although housing construction in New Jersey increased dramatically, the prices of residential units increased even more. Price increases show a distinct geographical pattern.

Chapter III of this Report provides information about housing price increases in New Jersey over the years 1984-1987. Table 5.10 shows those price increases for the relevant counties and regions of New Jersey. Prices increased dramatically during the 1984-1987 period. Average housing prices for the entire State grew by 21.4 percent annually; in the North the increase was even higher (23.2), while the South experienced smaller price increases (12.9%). However, even this was three times higher than the overall infla-

4. See Chapter III of this Report for a detailed analysis of recent house price changes in New Jersey.

tion rate during this time (about 4% annually).

In addition, Sternlieb provides information about prices of residential units for the years 1980-1986.[5] According to his results, prices of residential units in the South increased during that period by over 61 percent, while the increase in the North was 92 percent (Table 5.11).

The gap between relatively low prices in the South and higher prices in the North increased during 1980-1986. In 1980, the average price of a house in the South was $46,383, while in the North it was $68,017. By 1986, the average price in the South reached $74,751, but in the North the average increased to $130,585. As a result, the average price in the South in 1986 was 57.2 percent of that in the North compared to 68 percent in 1980. Within the South, Ocean County had the highest price increase (79.1%). Ocean County also had the highest population growth in the 1980-87 period (16.5%). The second highest price increase occurred in Cape May County (59.3%), where population growth was the second highest in the South (14.46%).

Table 5.10

AVERAGE RESIDENTIAL VALUE, 1984-1987

	1984	1987	Percent Change	Average Annual Change
South New Jersey	$58,585	$84,241	43.8	12.9
Atlantic	65,149	85,333	31.0	9.4
Burlington	63,547	91,684	44.3	13.0
Camden	51,695	67,024	29.7	9.1
Cape May	77,500	95,050	22.6	7.0
Cumberland	39,470	50,494	27.9	8.5
Gloucester	54,381	68,607	26.2	8.1
Ocean	65,906	121,073	83.7	22.5
Salem	44,264	55,647	25.7	7.9
North New Jersey	90,188	168,559	86.9	23.2
Total New Jersey	$82,037	$146,812	79.0	21.4

*Based on data provided in Chapter III of this Report weighted by 1985 population.

These various methods of calculating housing price increases show that residential price inflation was much lower in the South than in the North. They also indicate that the average annual price increases during the 1984-1987 years were higher than during the six years between 1980 and 1986. We believe that lower initial prices for housing and smaller price increases were important factors attracting economic development to southern New Jersey in the 1980's.

In 1980, the number of households in the eight southern counties was 641,601. The New Jersey Department of Labor estimation of households for 1990 is 809,200 — an increase of 26 percent. The data for the 13 northern counties are 1,906,993 in 1980 and 2,193,400 in 1990[6] — an increase of only 15 percent. Thus, both from population and household growth differentials, it would follow that housing demand should have been stronger in the South.

The supply of housing, either per capita or per household increase, was less in southern than northern counties. Nevertheless, price increases were lower in the South. The relatively plentiful supply of vacant land and lower land prices allowed the South to retain a comparative price advantage.

The number of ratable units recorded by municipal tax authorities approximates the total acreage of vacant land. Although taxable units (parcels) are not of the same size, when aggregate numbers for many counties are considered, average size differences may be less pronounced. In any event, this information is valuable. It will be compared with information developed by the Office of State Planning. It should also be noted that an increase in vacant land units mostly results from subdivisions of farmland or forests made available for development. On the other hand, when actual development takes place, the number of vacant units is reduced. Municipal records also show residential units (single and multi-family units and condominiums, excluding apartment buildings) and commercial and indus-

5. George Sternlieb, "From Caboose to Locomotive," The Council on New Jersey Affairs, Princeton Urban and Regional Research Center, Woodrow Wilson School, Princeton University, July 1988.
6. Alfred Toizer, Household Projections for New Jersey and Counties: 1990, 1995 and 2000, New Jersey Economic Indicators, January 1988, New Jersey Department of Labor, Trenton, New Jersey.

trial units. According to these data (Table 5.12), the number of vacant land units was much higher in the South than in the North.

It is reasonable to assume that this more plentiful supply of vacant land, at least in those cases where it could be used without restriction for development[7] was a significant contributing factor to keeping investment costs in the South relatively lower. This comparative advantage is reflected in the larger percentage of increase of residential units in the South and also of commercial and industrial units.

Table 5.13 provides additional information on the growth of various units of property recorded in the southern and northern counties over the 1980-1986 period.

Table 5.11

RESIDENTIAL SALES PRICES*

	1980	1986	Percent Change	Average Annual Change (%)	Population Change (%) 1980-86
South New Jersey	46,383	74,751	67.2**	7.6	8.19
Atlantic	54,144	80,055	47.8	6.7	7.43
Burlington	48,199	74,419	54.4	7.5	7.02
Camden	41,518	61,848	49.0	6.9	5.23
Cape May	62,491	98,319	57.3	7.8	14.46
Cumberland	30,038	42,037	39.9	5.8	3.54
Gloucester	43,029	61,862	43.7	6.2	6.57
Ocean	46,496	83,288	79.1	10.2	16.46
Salem	34,581	50,303	45.5	6.4	1.08
North New Jersey	68,017	130,585	92.0	11.5	2.82
Total New Jersey	60,912	112,562	84.8	10.8	4.17

**This is a weighted average of the counties' price increases. The weights are the numbers of cases in each county as provided in the above article. Note that without Ocean County the price increases in the South would have been much lower.

Source: George Sternlieb, "From Caboose to Locomotive," op cit.

Except for vacant land units and farms, changes in the South were more favorable than in the North. That is, commercial and industrial units grew faster, while farms grew slower and vacant land units declined. The decline of apartment property units in the South was less than in the North (-6.6% compared to -7.8%). Further evidence of the role of vacant developable land is provided by preliminary estimates of various categories of land carried out by the Office of State Planning (Table 5.14).

Total land area in the South and North is almost equal (2,357,587 acres vs. 2,434,298 acres). The amount of already developed land in the South as a ratio of the amount of already developed land in the North is 24.6 percent. The South/North ratio of developable land is favorable to the South (47.7% of developable land, while the South/North population ratio is only 35%). This confirms our previous finding that developable land was more plentiful in the South, and contributed significantly to the South's economic growth in the 1980's.

However, in the future this advantage may diminish. Of the total 470,849 acres considered developable in the eight southern counties, 367,687, or 78 percent has been preliminarily classified to be in tiers 5-7 where the State Development and Redevelopment Plan proposes a variety of development restrictions.[8]

Concerns expressed by farmers and the business community in the South are, to a large extent, related to the issue of possible future land use restrictions. A vivid illustration of that concern is demonstrated in Table 5.15, where developable land classified in tiers 5-7 with relatively more development restrictions than in tiers 1-4, is added to the category of undevelopable land.

Certainly not all of the land in tiers 5-7 will be restricted. But the policies now in the process

7. Significant restrictions on the use of vacant land are imposed in the Pinelands and in the coastal areas.
8. For a brief description of those land use regulations, write to: Office of Economic Policy, N.J. Department of Commerce, CN 830, Trenton, NJ 08625.

Table 5.12

TAXABLE UNITS IN MUNICIPALITIES OF SOUTHERN AND NORTHERN COUNTIES, 1980-1986*

	Vacant Land		Residential		Farmland		Commercial		Industrial		Apartments	
	1980	1986	1980	1986	1980	1986	1980	1986	1980	1986	1980	1986
South N.J.	217,980	203,332	559,616	625,903	25,389	26,343	30,466	31,849	2,111	2,386	3,565	3,331
Atlantic	42,276	42,533	58,636	70,144	2,518	2,463	5,083	5,460	168	143	640	511
Burlington	22,221	21,492	87,835	97,004	5,196	5,432	3,934	4,299	526	562	309	354
Camden	20,296	18,081	124,133	133,134	1,302	1,300	7,176	7,111	655	698	613	592
Cape May	17,916	17,870	48,692	57,929	819	852	3,083	3,338	49	47	1,094	1,012
Cumberland	18,102	18,491	33,183	33,891	4,458	4,600	2,512	2,546	346	340	137	150
Gloucester	15,523	13,670	51,371	56,045	5,063	5,268	2,870	2,905	171	330	176	163
Ocean	74,770	64,676	138,953	160,571	851	935	4,660	5,079	245	219	550	497
Salem	6,876	6,519	16,813	17,185	5,182	5,493	1,148	1,111	51	47	46	52
North N.J.	146,355	155,045	1,189,838	1,281,548	30,527	32,975	78,438	79,950	15,652	15,958	15,692	14,475
Total N.J.	364,335	358,377	1,749,454	1,907,451	55,916	59,318	108,904	111,799	17,763	18,344	19,257	17,806

*Although these units may not always be the same, it is plausible to assume that in large aggregates (total of Southern and Northern counties), the differences in physical size and characteristics of individual units are, to a large extent, evened out.Source: New Jersey Department of Community Affairs, Div. of Local Government Services, Annual Reports (various years).

Table 5.13

PROPERTY UNITS BY COUNTIES
CHANGE OVER 1980-1986 (%)

	Vacant Land	Residential Units	Farmland	Commercial	Industrial	Apartments
South Jersey	-6.7	11.8	+3.8	+4.5	+13.0	-6.6
Atlantic	+0.6	19.6	-2.2	+7.4	-14.9	-20.2
Burlington	-3.3	10.4	+4.5	+9.3	+6.8	+14.6
Camden	-10.9	7.3	-0.2	-0.9	+6.5	-3.4
Cape May	-0.3	19.0	+0.4	+8.3	-4.1	-7.5
Cumberland	+2.1	2.1	+3.2	+1.4	-1.7	+9.5
Gloucester	-11.9	9.1	+4.0	+1.2	+93.0	-7.4
Ocean	-13.5	15.6	+9.9	+9.0	+51.0	-9.6
Salem	-4.2	2.2	+6.0	-3.2	-7.8	+13.0
North Jersey	+5.9	7.7	+8.0	+1.9	+2.0	-7.8
Total N.J.	-1.6	9.0	+6.1	+2.7	+3.3	-7.5

Source: New Jersey Department of Community Affairs, Division of Local Government Services, Annual Reports (various years).

Table 5.14

ESTIMATES OF DEVELOPED, DEVELOPABLE AND UNDEVELOPABLE LAND IN ACRES

	Total Land	Developed	Developable	Undevelopable	Undevelopable Plus Non-tier* Land
South N.J.	2,357,587	158,668	470,849	170,102	1,728,070
Atlantic	362,861	557	4,426	262	357,878
Burlington	523,290	37,489	72,210	64,941	413,591
Camden	142,086	55,053	23,543	9,827	63,490
Cape May	168,557	824	1,722	686	166,011
Cumberland	321,107	18,493	98,177	25,250	204,437
Gloucester	210,150	30,069	113,721	30,644	66,360
Ocean	407,738	7,937	30,200	7,947	369,601
Salem	221,798	8,246	126,850	30,545	86,702
North N.J.	2,434,298	644,409	986,102	NA	803,787
Total N.J.	4,791,885	803,077	1,456,951	NA	2,531,857
South/North (%)	96.8	24.6	47.7	NA	215.0

*Includes land classified as undevelopable within the tiers and non-tier land such as parks, recreation areas and military installations greater than one square mile as well as the Pinelands, Hackensack Meadowlands District and the Coastal Area (CAFRA).Source: Office of State Planning (preliminary estimates).

Table 5.15

DISTRIBUTION OF LAND BY CATEGORIES (%)

	Developed	Developable	Undevelopable*	Total
New Jersey Total	16.8	30.4	52.8	100.0
North New Jersey	26.5	40.5	33.1	100.0
South New Jersey	6.7	20.0	73.3	100.0
South N.J. With Tiers 5-7 Included in Undevelopable	6.7	4.4	88.9	100.0

*See footnote to Table 5.14.Source: Office of State Planning (preliminary estimates).

of being formulated for these tiers may be less conducive to development because of changes in state infrastructure investment.

The percentage of undevelopable land in the South may be somewhere between 73.3 and 88.9, much higher than in the North.

Summary

The 1980s were years of rapid growth in southern New Jersey. Population, employment and housing construction grew faster than the thirteen northern counties. Especially pronounced was the increase in population during the 1980s when the eight southern counties had an almost equal absolute increase of population (155,000 in the North and 152,000 in the South). This fast-growing population base will continue to contribute to future employment and income growth.

Personal income per capita also grew faster in the South, especially in Atlantic and Burlington counties where the rate of overall growth was the fastest among all the southern counties. Ocean and Cape May counties also exhibited faster per capita income growth than the average for the entire southern region. Falling behind were Cumberland, Camden and Salem counties,where income growth did not reach the much slower statewide growth rate.

Overall, however, the South remains less developed than the North. Its industrial base is relatively small. In 1986 there were only 2,386 industrial units in the South compared with 15,958 in the North. The South/North ratio of industrial units in 1986 was 0.15, while the population ratio was 0.35. This affects the relationship of the value of all real assets as determined by the equalized property values. In 1986, the South's property values were only 30 percent of the North's, while its population was 35 percent.

The concerns of the residents and public and private sector leaders of the southern counties are concentrated around the issue of continued economic growth and environmental protection. The southern region contains the large area of the Pinelands, which is shielded in many parts from development. Significant restrictions are also placed on the shore area development by the Coastal Area Facilities Review Act (CAFRA). Much of New Jersey's agricultural land is also located in South Jersey and is subject to a variety of preservation measures already in existence or suggested in the State Development and Redevelopment Plan—which is now in its cross-acceptance stage. All these specific circumstances create both concerns and opportunities for future development in the southern part of New Jersey.

Chapter VI

STATISTICAL TABLES

Table 1

POPULATION AND EMPLOYMENT, NEW JERSEY, 1960 - 1988

Year	Resident Population (000)	Work/ Labor Force (000)	Total Employment (000)	Unemployment		Insured Unemployment Rate (%)
				Number (000)	Rate (%)	
*1960	6,066	2,507	2,337	168	6.7	5.7
1965	6,720	2,724	2,582	140	5.1	3.9
*1970	7,171	2,996	2,859	138	4.6	4.4
1971	7,281	3,012	2,840	172	5.7	5.4
1972	7,335	3,117	2,935	182	5.8	5.1
1973	7,333	3,190	3,011	180	5.6	4.7
1974	7,332	3,226	3,023	204	6.3	5.7
1975	7,338	3,264	2,929	334	10.2	7.8
1976	7,340	3,318	3,973	346	10.4	6.4
1977	7,337	3,383	3,065	317	9.4	5.6
1978	7,351	3,457	3,209	248	7.2	5.1
1979	7,367	3,570	3,323	247	6.9	4.7
*1980	7,365	3,594	3,334	260	7.2	4.7
1981	7,406	3,593	3,330	263	7.3	4.3
1982	7,428	3,632	3,306	326	9.0	4.7
1983	7,464	3,673	3,385	288	7.8	3.8
1984	7,511	3,825	3,589	236	6.2	3.1
1985	7,561	3,839(r)	3,621	217	5.7	3.0
1986	7,625 (r)	3,908	3,712	197	5.0	2.6
1987	7,672 (p)	3,967(r)	3,806	160	4.0	2.2
1988	7,721 (p)	3,978	3,827	151	3.8	2.1

*Population figures for 1960, 1970 and 1980 are April 1 census counts. Estimates for intercensal years are as of July 1, and those estimates from 1981 to 1988 are subject to revision.

NOTES: The rate of insured unemployment is based on weekly averages of insured unemployment (State UI Program) expresed as a percent of the average total number of jobs covered by the State Unemployment Compensation Program.

- Work/laborforce,employment and unemployment estimates are adjusted to latest benchmarks.
- Labor force estimates for 1970 to 1988 are published data obtained directly from the Current Population Survey conducted for the United States Department of Labor.

(r) - revised (p) - provisional

Source: New Jersey Department of Labor, Division of Labor Market and Demographic Research.

Table 2

WAGE AND SALARY WORKERS IN NONAGRICULTURAL ESTABLISHMENTS, MAJOR INDUSTRY DIVISIONS,

New Jersey, 1960-1988 (in thousands)

Year	Total Non-Agricultural Payroll Employment	Manu-facturing	Mining	Contract Construction	Trans-portation Comm. & Utilities	Wholesale & Retail Trade	Finance, Insurance & Real Estate	Services & Miscell-aneous	Govern-ment
1960	2,017.1	808.8	3.5	98.7	149.5	274.5	88.0	252.0	242.1
1965	2,259.0	837.5	3.5	110.6	157.0	438.5	98.6	315.6	295.5
1966	2,359.1	879.3	3.0	111.2	162.2	459.6	101.0	330.8	312.0
1967	3,421.5	882.8	2.8	112.2	166.3	472.0	104.7	351.6	329.2
1968	2,485.2	885.3	3.1	115.6	166.3	489.5	108.4	372.6	344.4
1969	2,569.6	892.5	3.3	118.1	176.2	514.9	111.3	393.2	360.1
1970	2,606.2	860.7	3.2	120.4	182.2	538.0	116.5	410.4	374.8
1971	2,607.6	818.3	3.0	117.6	181.1	558.3	120.4	421.0	338.0
1972	2,674.4	823.3	3.2	121.6	181.2	577.3	124.6	437.9	405.3
1973	2,760.8	842.6	3.3	126.8	186.4	596.9	131.0	456.8	417.1
1974	2,783.4	825.9	3.2	118.7	185.8	603.5	136.5	469.9	439.9
1975	2,699.9	747.9	2.8	99.2	174.3	599.3	135.2	471.1	470.2
1976	2,753.7	756.2	2.7	93.9	176.0	618.5	138.0	488.0	480.5
1977	2,836.9	767.3	2.9	94.5	178.2	637.3	142.9	509.8	504.0
1978	2,961.9	786.8	2.6	105.3	188.5	665.9	147.7	542.2	523.0
1979	3,027.2	799.1	2.6	113.7	190.4	678.6	153.9	571.0	517.8
1980	3,060.4	781.0	2.4	111.2	194.5	680.3	158.1	603.1	529.7
1981	3,098.9	771.1	2.3	108.7	196.5	690.6	161.8	638.9	529.0
1982	3,092.7	729.6	2.1	107.3	197.1	701.2	167.1	663.3	524.7
1983	3,165.1	715.1	2.0	112.1	203.0	735.3	172.7	703.7	521.2
1984	3,329.3	726.8	2.2	131.3	219.4	787.3	183.0	757.3	522.1
1985	3,414.1	712.9	2.1	141.0	226.1	813.3	194.9	792.8	531.1
1986	3,489.9(r)	690.5	2.2(r)	153.4	231.2	834.9	210.8	832.1	535.6
1987	3,581.6(r)	675.4(r)	2.3	164.4(r)	237.6(r)	862.0(r)	226.8(r)	871.4(r)	541.8(r)
1988	3,648.3	666.1	2.3	173.3	243.3	874.1	235.6	902.0	551.5

Series have been adjusted to March 1988 benchmarks.

(r) - revised

SOURCE; New Jersey Department of labor, Division of Labor Market & Demographic Research.

Table 3

WAGE AND SALARY WORKERS IN MANUFACTURING, DURABLE GOODS

New Jersey, 1960-1988 (in thousands)

Year	Total Durable Goods	Lumber & Wood Products	Furniture & Fixtures	Stone, Clay & Glass Products	Primary Metal Industries	Ordnance & Fabricated Metals	Machinery Except Electrical	Electrical Machinery	Trans-portation Equipment	Instru-ments & Related Products	Miscellaneous Manufacturing Industries
1960	436.8	5.7	9.8	33.7	42.6	54.8	61.0	122.3	48.5	31.7	26.8
1965	438.7	5.6	9.4	36.9	39.8	60.8	65.4	118.4	36.8	32.7	32.9
1966	463.4	5.2	10.5	39.3	40.4	64.7	70.8	129.9	36.4	34.3	31.9
1967	464.6	5.0	11.0	39.1	38.6	66.2	75.0	131.1	32.0	36.5	30.0
1968	460.9	5.3	10.2	38.8	38.5	67.5	75.8	127.6	31.7	35.8	29.7
1969	463.3	5.2	11.0	40.9	39.4	69.8	76.2	124.5	31.4	34.7	30.2
1970	434.3	4.9	10.5	39.6	37.2	67.0	72.8	115.2	26.3	33.2	27.5
1971	404.6	4.5	10.6	39.0	33.3	62.9	66.3	104.6	25.3	32.4	25.6
1972	405.9	5.1	10.8	39.9	31.8	63.5	65.8	102.9	25.7	35.1	25.2
1973	420.5	5.3	10.6	40.8	32.0	66.2	72.1	108.1	25.3	34.4	25.9
1974	413.2	5.0	10.3	40.5	31.2	64.4	76.1	105.1	21.1	33.9	25.6
1975	363.1	4.6	8.9	36.0	26.1	58.1	68.4	88.1	19.3	31.2	22.4
1976	363.0	5.3	8.7	36.1	23.9	59.4	67.5	86.8	19.8	31.3	24.0
1977	370.0	5.8	8.9	35.1	23.0	61.1	71.0	87.9	20.7	32.0	24.5
1978	382.8	6.0	10.0	35.2	24.5	64.1	74.2	89.8	20.9	32.3	25.7
1979	395.9	6.7	10.3	35.3	25.5	64.5	76.4	92.9	21.6	35.6	27.2
1980	384.3	5.9	9.7	33.1	25.7	60.8	75.1	92.2	18.5	37.2	26.1
1981	374.7	6.1	9.6	30.9	25.4	58.8	72.5	91.6	17.5	37.1	25.3
1982	350.1	5.5	9.9	27.1	21.8	54.3	66.5	90.9	14.7	35.7	23.6
1983	341.6	5.9	10.5	26.8	20.7	50.9	60.9	93.1	15.1	34.2	23.5
1984	346.2	6.4	12.6	26.2	21.6	51.1	59.9	95.0	16.1	33.5	23.9
1985	337.4	6.7	12.9	25.2	20.9	50.2	59.1	93.5	14.6	33.5	20.7
1986	322.6	6.9	12.6	24.4	20.0	48.4(r)	55.8(r)	89.4	12.3	32.8	20.1
1987	312.1(r)	7.1	11.3(r)	24.1(r)	18.7(r)	45.1(r)	53.8(r)	84.9(r)	14.8(r)	32.0(r)	20.4(r)
1988	306.4	6.7	10.3	23.7	18.6	44.5	53.2	81.6	14.5	32.5	20.9

Series have been adjusted to March 1988 benchmarks.

(r) - revised

SOURCE: New Jersey Department of Labor, Division of Labor Market & Demographic Research.

Table 4

WAGE AND SALARY WORKERS IN MANUFACTURING, NONDURABLE GOODS, New Jersey, 1960-1988 (in thousands)

Year	Total Non-durable Goods	Food & Kindred Products	Tobacco Manu-factures	Textile Mill Products	Apparel & Related Products	Paper Allied Products	Printing, Publishing & Allied Industries	Chemicals & Allied Products	Petroleum Refining & Related Industries	Rubber & Miscell. Plastic Products	Leather & Leather Products
1960	372.0	62.9	1.7	31.4	77.7	28.0	32.3	86.4	11.5	29.2	11.0
1965	398.8	66.4	1.4	28.5	77.3	31.3	37.5	98.9	9.8	36.0	11.5
1966	415.9	67.2	0.8	29.6	80.3	33.0	39.6	105.5	10.5	37.2	12.2
1967	418.1	65.3	0.6	29.1	78.5	33.7	41.5	110.9	9.6	37.7	11.3
1968	424.5	64.5	0.3	30.5	78.7	34.5	42.2	113.1	9.7	39.9	11.5
1969	429.2	63.2	0.3	30.8	77.2	35.0	43.3	117.4	10.0	41.4	10.6
1970	426.4	63.5	0.3	29.6	72.3	35.3	44.8	120.9	10.1	40.0	9.6
1971	413.7	61.7	0.3	29.4	68.9	35.9	43.8	117.5	10.1	36.8	9.4
1972	417.4	59.8	0.3	30.5	68.9	35.9	46.0	119.3	10.6	37.2	8.9
1973	422.1	68.7	0.2	31.3	68.7	36.8	46.9	124.1	10.9	35.5	9.0
1974	412.7	56.7	0.2	28.8	63.1	35.4	47.8	126.6	11.8	34.0	8.4
1975	384.9	53.6	0.2	24.5	57.9	32.1	46.4	121.0	12.1	29.3	7.9
1976	393.2	52.7	0.2	23.9	61.1	33.2	47.4	122.4	11.9	32.0	8.3
1977	397.3	50.2	0.3	22.8	59.7	33.4	49.7	127.2	11.9	34.2	7.9
1978	404.0	49.9	0.5	22.4	59.3	33.7	51.7	130.0	11.9	37.3	7.3
1979	403.3	49.5	0.4	21.5	56.5	33.9	54.3	129.6	11.9	38.8	6.9
1980	396.8	49.3	0.4	20.2	55.7	32.3	55.4	128.2	12.0	37.4	5.9
1981	396.4	48.1	0.3	19.0	56.1	31.3	57.7	128.9	11.8	37.3	5.9
1982	379.6	47.2	0.3	16.6	50.4	30.6	57.7	124.5	11.2	36.1	5.1
1983	373.5	47.7	0.3	15.4	50.6	31.2	58.0	119.1	10.3	36.2	4.7
1984	380.5	47.7	0.4	15.1	50.2	31.9	62.7	119.9	10.0	38.4	4.3
1985	375.5	47.9	0.3	14.1	46.8	30.1	65.6	120.2	9.3	37.1	4.0
1986	367.9	48.4	0.2	13.4	45.4	28.8	66.4	117.4	8.6	35.9	3.4
1987	363.3(r)	48.9(r)	0.3	13.2(r)	42.7(r)	28.3(r)	67.3(r)	116.0(r)	8.3(r)	35.3(r)	3.0
1988	359.7	47.7	0.3	13.0	39.2	27.8	68.0	118.4	8.2	34.5	2.7

Series have been adjusted to March 1988 benchmarks.

(r) - revised

SOURCE: New Jersey Department of Labor, Division of Planning and Research.

Table 5

EMPLOYMENT, HOURS, AND EARNINGS OF PRODUCTION WORKERS ON MANUFACTURING PAYROLLS

New Jersey, 1950-1988

Year	Employment (thousands)	Average Weekly Hours	Average Weekly Earnings (dollars)	Average Hourly Earnings (dollars)
1950	n.a.	40.8	$6l.65	$1.51
1955	n.a.	40.7	79.16	1.94
1960	580.8	39.6	93.93	2.37
1965	587.1	41.0	112.34	2.74
1966	616.5	41.3	117.29	2.84
1967	616.7	40.6	118.96	2.93
1968	616.9	40.7	125.76	3.09
1969	621.3	40.8	132.60	3.25
1970	592.6	40.3	139.44	3.46
1971	564.4	40.4	150.29	3.72
1972	561.1	40.9	163.35	3.99
1973	582.3	41.4	176.41	4.26
1974	559.8	40.7	186.11	4.57
1975	500.9	39.9	199.68	4.99
1976	509.7	40.4	215.33	5.33
1977	517.2	41.1	239.20	5.82
1978	528.5	40.8	256.22	6.28
1979	530.7	41.2	276.45	6.71
1980	509.9	40.7	297.16	7.31
1981	503.1	40.6	327.16	8.06
1982	467.7	39.9	345.53	8.66
1983	457.1	40.6	369.87	9.11
1984	457.9	41.1	390.45	9.50
1985	440.7	40.8	402.29	9.86
1986	429.2	41.2	416.94	10.12
1987	425.3(r)	41.2	428.48(r)	10.40(r)
1988	419.6	41.0	446.08	10.88

(r) - revised

Data have been adjusted to a 1988 benchmark.

Source: New Jersey Department of Labor, Division of Labor Market and Demographic Research.

Table 6

CONSUMER PRICE INDEXES* FOR URBAN WAGE EARNERS AND CLERICAL WORKERS 1955-1988

Year	United States	New York SCA**	Philadelphia SMSA***
1955	26.9	27.5	27.7
1960	29.8	30.1	29.9
1965	31.7	33.1	32.6
1966	32.6	34.2	33.5
1967	33.6	35.1	34.4
1968	35.0	36.6	36.1
1969	36.9	38.9	38.0
1970	39.0	41.8	40.6
1971	40.7	44.2	42.5
1972	42.1	46.1	43.7
1973	44.7	49.1	46.6
1974	49.6	54.4	52.2
1975	54.1	58.5	56.5
1976	57.2	61.9	59.4
1977	60.9	65.2	63.2
1978	65.6	68.6	67.1
1979	73.1	74.7	73.9
1980	82.9	83.2	83.5
1981	91.4	91.3	91.9
1982	96.9	96.3	95.8
1983	99.8	100.1	99.7
1984	103.3	103.6	104.5
1985	106.9	107.9	109.2
1986	108.6	111.0	111.5
1987	112.5	116.6	116.7
1988	117.0	121.8	122.2

*Annual averages.

**Standard Consolidated Area: New York-Northeastern New Jersey including Bergen, Essex, Hudson, Middlesex, Morris, Passaic, Somerset and Union counties.

***Standard Metropolitan Statistical Area, including Camden,Burlington and Gloucester counties.

Source: United States Department of Labor, Bureau of Labor Statistics.

Table 7

PERSONAL INCOME, NEW JERSEY AND UNITED STATES
1955-1988

Year	Total Personal Income (millions of current dollars)		Per Capita Personal Income (current dollars)		Per Capita Personal Income (1982-84 dollars)	
	New Jersey	United States	New Jersey	United States	New Jersey	United States
1955	$12,434	$307,601	$2,260	$1,872	$8,188	$6,959
1960	16,502	298,843	2,704	2,216	8,851	7,436
1965	22,472	536,152	3,321	2,772	10,110	8,744
1966	24,320	582,630	3,550	2,980	10,487	9,141
1967	26,183	623,757	3,779	3,161	10,875	9,408
1968	28,740	683.561	4,103	3,430	11,287	9,800
1969	31,890	766,522	4,495	3,808	11,691	10,320
1970	34,549	825,534	4,805	4,051	11,663	10,387
1971	37,161	888,536	5,103	4,296	11,772	10,555
1972	40,290	976,181	5,492	4,665	12,232	11,081
1973	44,012	1,095,289	6,000	5,182	12,539	11,593
1974	47,908	1,204,899	6,531	5,648	12,253	11,387
1975	51,328	1,308,482	6,991	6,073	12,158	11,226
1976	56,070	1,447,002	7,635	6,651	12,589	11,628
1977	61,290	1,602,863	8,348	7,294	13,003	11,977
1978	68,047	1,806,968	9,250	8,136	13,633	12,402
1979	75,741 (r)	2,928,510	10,273 (r)	9,033	13,826	12,357
1980	85,367 (r)	2,254,076	11,573 (r)	9,919	13,885	11,965
1981	95,954 (r)	2,514,231	12,955 (r)	10,949	14,143	11,979
1982	103,773	2,663,432	13,966 (r)	11,481	14,540	11,848
1983	112,510	2,834,385	15,064 (r)	12,098	15,079	12,122
1984	123,602	3,101,163	16,440 (r)	13,114 (r)	15,800	12,695
1985	133,333 (r)	3,317,545 (r)	17,617 (r)	13,896 (r)	16,229	12,999
1986	143,517 (r)	3,522,203 (r)	18,819 (r)	14,608 (r)	16,916	13,451
1987	155,909 (r)	3,768,696 (r)	20,313 (r)	15,482 (r)	17,414	13,762
1988	168,923 (p)	4,042,110 (p)	21,882 (p)	16,444 (p)	17,936	14,055

Personal Income data revised as of August 1988.

a. The average of the Consumer Price Indexes (Urban Wage earners and Clerical workers) for the New York Standard Consolidated Area and the Philadelphia SMSA was used to express New Jersey per capita personal income in constant 1982-84 dollars.

b. The Consumer Price Index (Urban Wage earners and Clerical Workers) for the United States was used to express United States per capita personal income in constant 1967 dollars; from 1984 to 1987, the figures are expressed in 1984 dollars.

(r) - revised (p) - provisional

SOURCE: United States Department of Commerce, Bureau of Economic Analysis.

Table 8

PRODUCTION AND TRADE, NEW JERSEY, 1965-1988

Year	Total	Electric Power Sales Commercial Users (kilowatt hours in thousands)		Value of New Dwelling Units Authorized ($000)	Construction Contracts Awarded ($000)	Retail Store Sales* ($000,000)	Passenger Cars (number)	Commercial Vehicles (number)
		Large Industrial	Small Industrial					
1965	25,964,004	11,712,402	6,433,961	727,586	1,555,689	10,396	378,768	30,980
1966	28,512,856	12,814,406	7,043,455	588,874	1,651,494	10,711	352,573	31,072
1967	30,146,448	13,147,596	7,620,829	572,646	1,906,577	10,947	302,680	27,471
1968	32,616,153	13,863,329	8,394,581	597,980	2,380,846	12,030	356,762	30,724
1969	35,637,643	15,042,515	9,214,088	562,616	2,205,705	12,582	374,936	34,616
1970	38,256,144	15,396,352	10,185,005	599,034	2,740,746	14,274	336,564	36,027
1971	39,919,508	15,564,483	11,056,580	876,144	2,409,797	15,359	398,194	35,255
1972	42,318,122	16,192,817	12,143,135	1,062,430	2,946,729 (r)	16,399	414,232	50,545
1973	45,540,943	17,018,962	13,233,603	1,030,506	2,517,119 (r)	17,874	440,099	53,735
1974	43,995,014	16,390,080	12,904,974	588,291	2,368,896 (r)	18,024	344,110	51,663
1975	43,477,908	14,927,694	13,509,510	574,101	1,960,858 (r)	19,636	308,346	31,493
1976	45,605,202	15,759,346	14,289,144	832,433	2,087,648 (r)	21,833	359,833	45,731
1977	46,398,759	15,659,679	14,744,406	998,931	4,796,517 (r)	24,076	432,918	61,578
1978	48,113,001	16,386,752	15,474,339	1,262,831	4,143,900 (r)	27,746	415,948	65,772
1979	48,783,424	16,593,515	15,782,667	1,274,353	3,602,425 (r)	30,622	375,302	63,867
1980	49,851,000	16,345,000	16,446,000	1,010,084	3,562,769 (r)	32,747	365,370	56,390
1981	49,635,000	16,311,000	16,741,000	1,022,130	3,546,176 (r)	34,250	319,977	39,093
1982	48,752,000	15,233,000	17,263,000	1,003,694	3,705,996 (r)	35,815	324,221	38,649
1983	50,924,000	15,380,000	18,176,000	1,837,655	5,621,537 (r)	38,929 (r)	350,053	48,068
1984	52,611,000	15,708,000	19,315,000	2,274,406	6,389,701 (r)	42,478 (r)	433,244	66,017
1985	53,764,000	15,640,000	25,750,000	3,139,186	8,053,654 (r)	45,927 (r)	454,614	n.a.
1986	55,877,000	11,759,000	21,774,000	3,618,204	8,958,288 (r)	50,255 (r)	551,472 (r)	n.a.
1987	58,629,000	15,607,000	23,266,000	3,549,963	8,862,486 (r)	54,236 (r)	495,797	n.a.
1988	62,089,000	15,840,000	25,111,500	2,960,757	8,428,583 (p)	59,161 (p)	462,651	n.a.

*Years 1965-68 compiled by the New Jersey Division of Motor Vehicles, Years 1969-88 are from R. L. Polk & Company.
(p) - provisional (r) - revised (n.a.) - not available

SOURCES: Electric Power sales: Edison Electric Institute, and U.S. Department of Energy.
New Dwelling Units Authorized: New Jersey Department of Labor in cooperation with the U.S. Department of Commerce.
Construction Contracts Awarded: F.W. Dodge Corporation.
Retail Sales: United States Department of Commerce.
Registration of New Vehicles: New Jersey Division of Motor Vehicles and R. L. Polk & Company.
Prepared by: New Jersey Department of labor, Division of Labor Market & Demographic Research.

Table 9

BUSINESS ACTIVITY, NEW JERSEY, 1955-1988

Year	Business Failures (Number)	Liabilities Business Failures ($000)	New Incorporations (Number)	New Jersey Turnpike	
				Toll Revenue ($000)	Number of Vehicles (000)
1955	456	$29,753	8,386	$21,123	25,888
1960	714	49,071	10,172	35,584	49,083
1965	512	96,334	10,439	46,122	64,958
1966	442	61,191	9,656	48,610	69,850
1967	414	64,215	10,220	51,230	73,529
1968	423	42,692	13,168	55,340	78,205
1969	343	53,141	12,038	57,637	80,618
1970	463	142,196	13,958	63,934	89,655
1971	428	102,738	15,563	70,124	98,534
1972	453	173,428	16,462	75,940	107,933
1973	491	201,463	16,312	78,997	110,422
1974	643	110,441	15,410	75,243	106,628
1975	768	213,209	16,022	84,385	105,633
1976	660	174,457	18,270	91,082	109,234
1977	535	194,995	19,366	95,112	113,664
1978	415	198,834	20,381	100,838	120,623
1979	421	194,188	21,172	100,885	121,031
1980	430	182,709	21,484	118,614	122,588
1981	521	372,568	24,113	126,188	127,212
1982	512	346,598	22,401	129,922	132,932
1983	689	315,383	26,215	139,895	143,855
1984	1,005	947,890	27,646	151,913	156,029
1985	990	1,342,823	30,458	162,449	167,179
1986	912	n.a.	33,130	173,547	178,839
1987	747	n.a.	31,829 (r)	178,970	183,166
1988	860 (p)	n.a.	32,659 (p)	185,931	190,740

n.a. - not available (p) - provisional

SOURCES: Number and Liabilities of Business Failures and New Incorporations: Dun & Bradstreet, Inc. New Jersey Turnpike — Toll Revenue and Number of Vehicles: New Jersey Turnpike Authority.

Prepared by: New Jersey Department of Labor, Division of Labor Market and Demographic Research.

Table 10

RESIDENT POPULATION FOR NEW JERSEY COUNTIES
1970, 1980, 1988

County	Census		Provisional Estimates*
	April 1, 1970	April 1, 1980	July 1, 1988
Atlantic	194,119	194,119	213,200
Bergen	897,148	845,385	829,500
Burlington	323,132	362,542	397,600
Camden	456,291	471,650	502,200
Cape May	59,554	82,266	96,000
Cumberland	121,374	132,866	138,400
Essex	932,526	851,304	838,900
Gloucester	172,681	199,917	219,100
Hudson	607,839	556,972	542,200
Hunterdon	69,718	87,361	100,300
Mercer	304,116	307,863	331,000
Middlesex	583,813	595,893	651,700
Monmouth	461,849	503,173	558,800
Morris	383,454	407,630	420,700
Ocean	208,470	346,038	410,700
Passaic	460,782	447,585	462,800
Salem	60,346	64,676	66,400
Somerset	198,372	203,129	226,300
Sussex	77,528	116,119	126,700
Union	543,116	504,094	499,900
Warren	73,960	84,429	88,700
STATE TOTAL	7,190,188	7,365,011	7,721,000

*The State estimate is rounded to the nearest thousand and county estimates are rounded to the nearest hundred.

Prepared by: New Jersey Department of Labor, Division of Labor Market and Demographic Research.

State of New Jersey
Office of Economic Policy
20 W. State Street, CN 830
Trenton, NJ 08625-0830