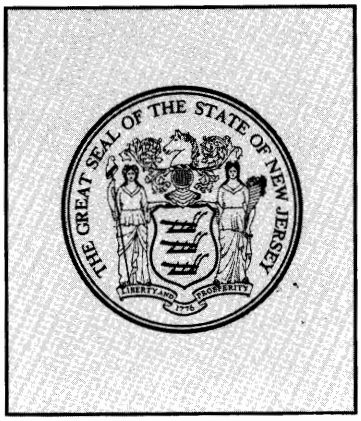

13th Annual Report

Economic Policy Council and Office of Economic Policy

Department of the Treasury
State of New Jersey
1980

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STATE OF NEW JERSEY
OFFICE OF THE GOVERNOR
TRENTON
08625

BRENDAN T. BYRNE
GOVERNOR

July 28, 1980

The Honorable Joseph P. Merlino
President
New Jersey Senate

The Honorable Christopher J. Jackman
Speaker
New Jersey Assembly

I am pleased to transmit the *13th Annual Report* of the Economic Policy Council and Office of Economic Policy.

Preserving the vitality and stability of the New Jersey economy will be one of the great challenges of the 1980's.

Recent surveys have found that a vast majority of New Jerseyans are proud of their State as a place to live and work. Perhaps this measure of optimism reflects the fact that we have faced and solved many of the problems that stood in the way of our progress. We successfully recovered from the recessions of the 1970's. The State income tax stabilized local property taxes and has redirected the burden of financing public education. We have considerably improved the environment with the cooperation of the public and private sectors. We have started rebuilding our cities; the renaissance of Atlantic City is well underway. Although the energy problem is not yet behind us, conservation is widespread and there is evidence that we can still accommodate economic growth.

In this *Report* the Economic Policy Council emphasizes the need for capital formation and increased productivity as an important determinant of continuing economic development in the coming years.

I hope and trust that we will continue to face our problems in the 1980's with the vision, boldness and inventiveness that always have been the trademark of New Jersey.

Respectfully,

Brendan Byrne

Governor.

ECONOMIC POLICY COUNCIL

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

DR. WILLIAM C. FREUND, *Member*
Senior Vice President and Chief Economist, New York Stock Exchange

DR. DWIGHT M. JAFFEE, *Member*
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State of New Jersey
ECONOMIC POLICY COUNCIL
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DR. JOSEPH J. SENECA
CHAIRMAN

DR. WILLIAM C. FREUND
DR. DWIGHT M. JAFFEE
MEMBERS

July 23, 1980

The Honorable Brendan T. Byrne
Governor
The State House
Trenton, N. J. 08625

Dear Governor Byrne:

The Economic Policy Council is pleased to transmit its *Thirteenth Annual Report* in accordance with Chapter 129 of New Jersey Public Law 1966.

Both New Jersey and the nation reached the peak of the current business cycle in the first quarter of 1980 and have subsequently entered a period of significant economic recession. Although the Economic Policy Council expects that the State will not fare any worse than the nation, substantial economic difficulties loom for New Jersey in the coming fiscal year.

Among the problems ahead are:

—Rising energy costs and their effect on industrial development and affordability to various segments of the population.

—Employment creation and protection during a time of national recession.

—The need for creative assistance to urban areas to reach their difficult but critical goal of full revitalization.

—Increased capital formation; the foundation of continued economic strength, job creation, productivity improvements and support for social programs.

—Accommodation of the aspirations of the rapidly developing parts of the State with proper safeguards for environmental and other concerns.

The Economic Policy Council remains ready to assist you and the Legislature in these and other issues that will give shape to the State's future in the 1980's.

In this *Report,* we focus on some of the above issues and also attempt to extend our understanding of the New Jersey economy in several new directions.

We examine the State's recent energy use patterns and estimate the conservation response induced by higher energy prices (Chapter VI). This Chapter also details the significant reductions in energy use already achieved by New Jersey.

Whether or not the State can place increasing reliance on the service sector for its employment growth is the question posed by Chapter VII. Unfortunately, we conclude that a growing manufacturing base is necessary for the long-term expansion of employment in service activities and note that State policy must encourage manufacturing activity in order to ensure sustained and balanced economic development.

We examine the historical record of labor productivity in New Jersey (Chapter VIII) and find that New Jersey has retained its advantages in productivity over the last several decades. We note with alarm, however, the decline in capital formation and stress the need for State incentives in this area in order for New Jersey to retain its high productivity accomplishments.

We also examine the role of business taxation in deterring capital formation and economic growth (Chapter IX).

Finally, we extend our efforts of last year to examine the *intra-regional* aspects of New Jersey's economy (Chapter X). We trace the employment changes that have occurred in four subregions of the State over the past two decades. This Chapter also isolates the role of rising property taxes and urban distress in contributing to the dispersal of employment away from the State's major cities and urban counties.

Our work this year was generously assisted by a number of individuals and departments. We wish to express our appreciation for assistance to Dr. Arthur O'Neal, Vivien Shapiro, Bette Benedict, Shirley Goetz, Anita Townsend, Wally Falk, and Anna Kiley of the Department of Labor and Industry. Eugene Taylor of the Department of Agriculture, Beverly Railsback and the staff of the State Library, all for assistance in locating reference materials. Eileen Lawton of the New Jersey Council on the Arts for assistance with the preparation of our socio-economic profile of New Jersey and Barbara Weaver of the State Library for comments on the *Report*.

We also appreciate the interest and comments of Commissioner Joel Jacobson on our work on energy. Also, John Weyland and Gene Owen from the New Jersey Department of Energy, and Martha Savage from the Public Service Electric and Gas Company for their help in providing material for the Chapter on energy. Raymond Pettersen of New Jersey Bell Telephone Company for his presentation to the *Economic Policy and Development Conference*.

We also wish to thank the State Treasurer, Clifford Goldman, Edward Hofgesang, John Flynn and John Polios for their support of the work of our Office. We particularly wish to thank John Cooney of Rutgers University for assistance in organizing our Conference on Economic Policy and Development at Rutgers University. To all participants of that *Conference*, we express our appreciation for their valuable contributions. Finally, our secretary, Carol Maslowski, deserves special thanks for the skillful preparation of this *Report*.

The Council and its staff greatly appreciate your interest in our work and we look forward to continuing to assist you in improving the economy of New Jersey.

Respectfully submitted,

Joseph J. Seneca

CONTENTS

Appendix: STATISTICAL TABLES

CHAPTER I

ACTIVITIES OF THE ECONOMIC POLICY COUNCIL*

The national recession that has been unfolding since earlier this year makes economic policy an especially critical concern for New Jersey. The difficult task before New Jersey, in this time of constrained fiscal resources and a slowing economy, is to insure that the State does not suffer disproportionately in the current national downturn, as it did during the 1971 and 1974 recessions. In those two recessions New Jersey experienced both a more prolonged and more severe economic slump than did the nation as a whole. The top priority for the State is to avoid a repetition of this distressing relationship.

Accordingly, in this Chapter we review the activities of the Council and its staff in the past year and provide an overview of some of the specific economic problems and issues currently facing State economic policy makers. The Chapter also presents a summary of the economic studies contained in this *Report* and the Council's research agenda for the coming year.

I. Review of Activities

The highlights of the Council's work in the preceding year are listed below:

—The Council met several times with the Governor and his Cabinet. At these meetings a wide range of topics was discussed including the economic outlook for 1980, an export expansion and foreign direct investment policy, the New Jersey business climate, and recent energy consumption patterns in the State.

—In addition, the Council and Office responded to ongoing requests for advice and opinion on various economic issues. These requests came from the Chief Counsel to the Governor, the Treasurer, the Capital Budgeting and Planning Commission, Department of Labor and Industry, Department of Environmental Protection, and the Department of Community Affairs.

—Our work with the Legislature this past year included testimony before the Assembly Taxation Subcommittee and extensive participation in the Emergency Task Force on the Impact of the 1980 Recession. Our advice was also solicited and given on several specific legislative bills.

—The Council's Chairman, Joseph J. Seneca, served on the Governor's Hazardous Waste Advisory Commission, and the Chancellor of Higher Education's Task Force on Principles for Financing Higher Education.

—Over the past year we significantly expanded our participation with various business, civic and academic groups. This activity focused on general reviews of the State's economy as well as specific economic policy concerns. Groups that we met with for dis-

* Prepared by Joseph J. Seneca, Chairman, Economic Policy Council.

cussions or presentations included: Association of Government Accountants, Trenton Chapter; Coalition of Small Business Associations; World Trade Council; Sealand Corporation; New Jersey Roundtable of the New Jersey Business & Industry Association, and International Management Council, Hunterdon County.

—We were also active in a series of conferences including our sponsorship of the New Jersey Economic Policy and Development Conference at Rutgers University. This Conference, attended by 50 experts, focused on the practical issues of local economic development and the research needs required to better understand and solve these problems. The Office also presented four papers at the State Economic Conference at Rutgers University (revised and expanded versions of these papers appear as several study chapters in this *Report*). In addition, we assisted in the organization of a conference on The Role of Technical Innovation scheduled for this fall at Stevens Institute of Technology.

—Part of the public law charge to the Council is to provide the public with information on developments in the New Jersey economy. To this end, the Council and Office had significant media and public contact in the past year. This included our quarterly press releases monitoring the New Jersey economy, television statements and special issue shows, numerous radio interviews, two panel discussions of the New Jersey economy on the Rutgers University Radio Forum, frequent responses to inquiries by press correspondents on current economic topics and an article on business tax reform in *New Jersey Business.*

—The Council also released two publications in its Economic Policy Papers Series. The first, "Business Climate: Meanings, Measures and Myths," attempted to define the nebulous term "business climate," assess New Jersey's recent efforts to improve business conditions, and critique a widely released study of state business climates done for the National Association of Manufacturers. The second paper, "Issues in Energy Policy," examined energy consumption patterns in New Jersey in response to price increases and changes in the State's economic structure.

II. Review of Studies

Whether New Jersey can continue to expect significant future economic development has been the focus of considerable concern and debate. A troubled manufacturing sector, the continued movement of jobs and people away from urban areas, the economic squeeze of rising energy costs and the impact of taxes on economic activity represent some of the more important concerns confronting State economic policy. Accordingly, in the study chapters of this *Report* we examine several of these potential obstacles to economic growth and evaluate the policy implications in each area. A brief summary of these chapters appears below.

Chapter VI. "Patterns of New Jersey Energy Use and Conservation"

The economic effects of rising energy prices represent a potentially serious threat to New Jersey's economy. Decreases in employment, changes in industry mix, pressures on profit margins and investment are some of the significant ramifications of energy price increases. This Chapter examines the effect of energy prices and other economic variables on energy consumption patterns in four sectors of the New Jersey economy (transportation, residential, commercial, and manufacturing). A time series analysis is conducted for each sector for the period 1960 to 1976. The results show a significant deterrent effect of increases in the real price of energy on energy consumption in all four sectors. Transportation was the sector most responsive to energy price increases with residential, industrial and the commercial sector next in order of conservation response.

The sharp drop in energy use, expressed in terms of the State's economic production, is also noted. This decline, from 46,000 BTU's for each dollar of value added output produced in New Jersey in the 1960s to 38,000 BTU's by 1977 is significantly greater than the comparable change experienced nationally.

In addition, the Chapter goes on to examine the role of energy in manufacturing activity in more detail. A cross-section analysis of manufacturing industry in the 48 contiguous states (in 1972) indicates a strong energy conservation response to rising real energy prices (an estimated state energy price elasticity of −1.2).

One important policy conclusion of the Chapter is that any future national energy conservation strategy, when implemented on a state basis via specific quotas or reduction targets, must account for the major decreases in energy use already achieved by New Jersey. The State begins the 1980s with a relatively lower energy use level than most other states, and New Jersey has reduced energy consumption proportionately more than other states as well. Requiring the State to reduce energy consumption further from this already significant achievement could lead to considerable negative effects on New Jersey's economy.

Chapter VII. "Specialization in Services as State Development Policy"

In a maturing economy, the shift in employment shares from the manufacturing to the services sector is an expected part of economic development. One implication of this trend is the attractive posibility that, over time, a state could specialize in service sector employment, and as a result continue to experience significant economic growth even in the face of a declining manufacturing base. This hypothesis is the subject of this Chapter which analyzes the determinents of the employment changes observed over time in 48 states in ten service areas (transportation; communication and public utilities; wholesale and retail trade; financing and insurance; real estate; health; education; business services; personal services; and amusements, recreation and lodging).

The general conclusion of the analysis, however, casts doubt on the hypotheses that employment growth can be dichotomized into manufacturing and services, and that one sector can thrive while the other slumps. In most of the service employment areas examined, service sector gains were directly related to gains in the manufacturing sector, population growth and overall measures of economic growth.

The implication is that close ties exist between service and manufacturing activity, and the development of the manufacturing sector is a necessary prerequisite for long-term employment expansion in most service areas. The policy conclusion is that manufacturing activity must be encouraged and promoted as an important part of an overall State strategy to ensure sustained and balanced economic development.

Chapter VIII. "Labor Productivity in New Jersey Manufacturing"

The critical issue of manufacturing productivity is examined in this Chapter. In particular, comparisons of productivity levels in New Jersey manufacturing industries (at both the two and four digit level) are made with a group of neighboring and Sunbelt states. Interestingly, the results indicate that over time (from 1958 to 1977) New Jersey has managed to retain many of its historic advantages in productivity. This evidence is presented along with several hypotheses explaining why this has occurred.

However, the relatively high levels of productivity currently enjoyed by New Jersey manufacturing cannot, unfortunately, be expected to continue indefinitely. The infusion of new capital formation—an area where the State has lagged for some time—is necessary in order for New Jersey to retain its productivity advantages. The Chapter exposes this problem and points to the need for State policy to provide effective incentives for new capital investment.

Chapter IX. "Business Taxes and Regional Economic Growth"

The importance of investment and capital accumulation in economic growth has been widely established, both theoretically and empirically. It has also been observed that regions experience differing economic growth patterns over time as the influence of natural market forces and public policies combine to redistribute economic activity. This Chapter is a pioneering attempt to quantify the influence of state tax policy on economic growth. The hypothesis is that differences in business taxes (e.g., corporate income tax rates) will cause investment expenditures to vary across states and this, in turn, will result in observable variations in economic performance.

A cross-section analysis of changes in personal income (1970 to 1977) in the 48 contiguous states reveals that relatively higher state corporate income tax rates result in lower growth rates of income, even after accounting for the effects of changes in the labor force, labor costs, manufacturing share and property tax rates. (The findings also show a significant, negative effect of property tax rates on income growth.)

The conclusion is that investment expenditure and hence economic growth is affected by state corporate income tax policy. Accordingly, from a policy perspective, decisions to attempt to increase revenues from this source of taxation should be carefully balanced by considerations of the adverse impact such tax increases will have on state economic growth and ultimately on the tax base itself.

Chapter X. "Intrastate Shifts in New Jersey Economic Activities"

This Chapter extends work presented in last year's *Report* concerning the changes in regional economic growth patterns that have occurred *within* New Jersey. Our State, popularly (and accurately) characterized as the most densely populated in the country has in the last two decades witnessed a dispersal of its people and employment away from the industrialized urban northeastern counties to its suburban central, and rural southern and western areas. Indeed, New Jersey has re-enacted in miniature the national movement of industry and population away from the Northeast to the Sunbelt.

This Chapter is an ambitious and unique attempt to reveal and examine employment changes in four subregions of the State—major cities, urban counties, suburban counties and rural counties. The movement of employment over the past two decades in each of these areas is decomposed into a *national* trend, an *interstate* factor and an *intrastate* component. The results indicate that the major changes in the 1960s were characterized by an absolute decrease in employment in New Jersey's major cities while the rest of the State experienced employment growth comparable to that of the nation. However, in the 1970s, the slowdown in employment growth did not remain confined to the major cities but spread to the urban counties as well. Only suburban and rural counties were able to hold their own in the 1970s vis à vis national employment growth trends.

While the urban employment decrease and its spread from cities to their counties was a painful process, it did bring some longer term benefits to the State. The elimination of many marginal manufacturing firms, which characterized this process in the 1970s, brought New Jersey's share of manufacturing employment (26.6%) very close to the national share (23.7%). This adjustment provides some protection against the tendency, because of New Jersey's previous relatively heavy reliance on manufacturing employment, of the State's economy to experience both longer and deeper economic downturns when national recessions occur.

A final section of the Chapter attempts to identify the causes of the observed intrastate shift of jobs away from the State's major cities and their urban counties. Preliminary results of this analysis point to the negative effects of rela-

tively high property tax rates and concerns about safety conditions as accounting for some of this employment dispersal.

The policy implications confirm the need to reduce the addictive and self-defeating reliance of urban areas on property tax increases to meet revenue requirements as well as the necessity to develop innovative programs to improve the amenity and safety dimensions of urban environments.

III. Research Agenda

During the next year we intend to further develop our understanding of the inner workings of the State economy. An input-output table will be used as an aid to our analyses of the effects of changes in economic conditions within the State. It will be especially useful for examining problems of energy supply and for determining the effects of energy shortages on the various industrial sectors and, consequently, upon employment.

A number of economists throughout the State are engaged in building a State econometric model. We are cooperating in this endeavor, and, independently, are developing forecasting models which utilize leading indicators. These efforts, to be continued during the forthcoming year, have evolved from our work during the past few years on comparative economic indicators.

We also intend to study the economy of southern New Jersey. This will be a natural extension of this *Report's* study (Chapter X) of intrastate shifts in economic activities. Because it represents a special case, the economy of Atlantc City will be treated separately.

Additionally, we plan to investigate some economic aspects of higher education in New Jersey. We expect to estimate the demand for higher education, both public and private, in the State. We shall also identify and quantify the economic contributions of higher education to the people of New Jersey.

It is also our intention to analyze capital spending patterns of New Jersey municipalities. We shall describe past trends and attempt to determine the existing demand for new capital outlays. We shall also consider the question of when capital outlays should be made in order to maximize their countercyclical impact.

Finally, we plan to study the losses of manufacturing plants in the six largest New Jersey cities. The types and amounts of industry lost will be determined and related to the experience of the State as a whole. Among the questions to be answered are: which industries moved to the suburbs and which left the State, and what portion of the State's total manufacturing losses can be accounted for by the losses of the six cities?

II

NATIONAL ECONOMIC OUTLOOK FOR FISCAL YEAR 1981*

A Widely Heralded Recession

The widely heralded recession arrived somewhat later than many economists had predicted and turned out to be among the more severe declines of recent years.

The recession began with overextended consumer spending. Partly because of mounting inflation and expectations of further sharp price increases, consumers contracted an uncommon amount of debt in 1978 and 1979. The rate of personal savings fell to a low of 3.5 percent of disposal income in the fourth quarter of 1979—or less than half the rate considered "normal" in the early 1970's.

As inflation fears fed on themselves, the Federal Reserve System acted to restrain the pace of expansion. Monetary policy was made more restrictive in October of 1979 and, when that policy did not seem to work fast enough, was tightened still further in March of 1980.

The upshot of economic forces and more restrictive monetary measures was to curb consumer spending with a jolt. Escalating interest rates choked off the housing market which soon found itself not in a recession but a depression. Consumer spending responded to new credit curbs. Unemployment rates rose. Industrial capacity utilization plunged as the deepening recession caused contractions in many industries, particularly in manufacturing. From automobiles to chemicals, from steel to textiles, the process of recession spread.

One obvious benefit of the contraction process was the improvement in price inflation. The consumer price index had become inflated by high interest rates and by pressures of demand and cost push. In the first quarter of 1980, the consumer price index rose by 18.2 percent per annum. By mid-year, with demand pressures off and interest rates sharply lower, consumer prices were rising between 11 percent and 12 percent per annum. Indeed, the base rate of inflation, apart from temporary factors, seemed to settle into the 9-10% range.

The questions now are how deep will the recession be, how long will it last, and then, how vigorous will be the recovery once it starts?

None of these questions can be answered with much assurance. The record of economic forecasters in predicting turning points and in seeing beyond turning points is not good. Yet many policy decisions require some expectation about the future. With a deep sense of humility, therefore, and with full recognition of the fallibility of all economic forecasts, we offer our view of prospects for the next fiscal year.

The Fiscal Year Ahead

At summer 1980, the recession has some way to go. Following a real decline in GNP of 9.1

* Prepared by Dr. William C. Freund, Senior Vice President and Chief Economist, The New York Stock Exchange. Member of the Economic Policy Council.

percent during the April-June quarter, we expect another 4-5 percent drop in the July-September quarter. The final three months of the year should see a leveling in economic output as the forces of decline run out of steam. We are, therefore, optimistic that a turn in aggregate business activity will be reached by the end of the calendar year. But we envisage a rather serious recession, one which differs relatively little from the magnitude of the 1975 recession —which was the deepest downturn since the great depression of the 1930's.

Unemployment nationally is likely to settle in at 9 percent of the labor force. Interest rates will reflect the base rate of inflation of around 9 percent so that a prime rate in the neighborhood of 10 percent is expected.

A number of forces are likely to turn the economy around, making for a real growth rate of 3 percent per annum as 1981 begins:

- Consumers will have had an opportunity to rebuild some financial liquidity through the postponement of purchases during the previous year and a rise in the savings rate.
- Consumer spending will be stimulated by easier credit, that is by a greater availability of funds at lower interest rates.
- A tax cut of about $30 billion is expected to become effective at the beginning of the year offsetting rising social security taxes and the rise in taxes attributable to inflation. Business will also benefit from this tax reduction.
- Real family incomes are expected to rise for the first time in many months.
- The housing market will revive for a number of reasons. First, mortgage credit will be more abundant, at lower rates, say, around 12 percent for fixed-term mortgages, and 11 percent for long-term mortgages with rates adjustable every few years. Second, the basic demand for housing will be very strong because of a surge in new households formed by those aged 25-40 years old. We expect housing activity to rise nationally from a monthly low point of 900,000 units at annual rates in 1980 to a rate in excess of 1.5 million units in peak months of 1981.
- Inventories will have been brought into a comfortable relationship with sales by early 1981.
- Business capital spending, always a lagging series in the economy, will begin to level out. Indeed, with some of the anticipated tax cut going for faster depreciation and other tax encouragements to capital formation, the sector should begin to do better.
- Government defense spending will be rising.

All-in-all, the momentum of the decline will end by the time 1980 is over. Although many economists share that view, there is considerable controversy regarding the vigor of the recovery thereafter.

Much will depend on the degree of monetary ease or tightness and the extent of budgetary stimulation in the months ahead. If, for example, the Federal Reserve were to become concerned about a too-rapid rate of recovery and adopt a more restrictive posture, the recovery would, in time, slow down. We are assuming this will not happen. Nor are we assuming any new and unpredictable calamity in international relations.

Given these assumptions, we look for a 3 percent per annum real GNP growth during the first half of 1981. Such a growth rate will do little to improve the unemployment rate because of the natural growth in the labor force and, therefore, an increase in the number of people looking for work. Our best estimate is that nationally, unemployment will still be at 8.5 percent in the middle of calendar year 1981. At that time, the inflation rate is likely to remain around 9 percent. Experience has been that productivity gains rise in the early stages of recovery as output grows faster than labor input. Because of gains in output per person, inflation should not accelerate in the first half of calendar year 1981.

III

NEW JERSEY ECONOMIC REVIEW AND OUTLOOK FOR FISCAL YEAR 1981*

This Chapter presents a review of New Jersey's economy over the past year and the economic outlook for Fiscal Year 1981. This last year witnessed the peak of the current business cycle for both New Jersey and the nation. The beginning months of 1980 represented a high-water mark for employment in the State. The number of New Jerseyans employed in non-agriculture industries reached an all-time high of 3.08 million in February 1980, marking a full recovery from the national recession of 1974/75. The increase in jobs from the bottom of that recession (May 1975) to February 1980 totaled 342 thousand. Service sector employment growth represented 53 percent of this increase, manufacturing—20 percent, construction—11 percent, and government—16 percent. While total employment surpassed its previous peak, it should be noted that manufacturing employment even at its highest level in this period (805.7 thousand in February 1980) fell short of its pre-1974/75 recession levels of 834.5 thousand in May 1974.

The State unemployment rate fell from 11 percent at the worst of the 1974-75 downturn to near 6½ percent in early 1980. This improvement meant that, at times, the State's unemployment rate was lower than the national rate, a position New Jersey had not enjoyed since 1971.

Nevertheless, New Jersey and the nation have now entered another recession that appears to be approaching the severity of the last one. We turn now to documenting, in more detail, the State's recent economic performance and to present the Economic Policy Council's forecast for the upcoming fiscal year.

I. The New Jersey Economy: A Review

Several positive developments were apparent in the State's economic indicators between FY 1979 and FY 1980.[1] Total employment expanded by 55 thousand, a 1.7 percent increase. This amount of job creation absorbed the new entrants to the State's labor force, which grew by 45 thousand (or 1.3 percent). The net result was a decline in the monthly average of unemployed from 248 to 238 thousand.

Since total employment includes New Jersey residents who work out of State, a different measure of economic progress is the increase in new non-agricultural jobs within the State. Non-agricultural wage and salary employment rose by 46.4 thousand, or by 1.5 percent. Table III.1 details this employment increase. More than one-half of the gain (23.6 thousand jobs)

* Prepared by Dr. Joseph J. Seneca, Chairman, Economic Policy Council.

1 At the time of preparation for publication, complete data were available for only nine months of FY 1980, i.e., July 1979 through March 1980. All references to annual changes in this review reflect the change from this nine month period compared to a similar nine month period one year earlier (i.e., July 1978 to March 1979).

TABLE III.1

EMPLOYMENT CHANGE: FISCAL YEAR 1980

	Employment (000)	Percent of Total	Percent Growth Rate from FY 1979
Services	+23.6	50.9	1.5
• wholesale-retail trade	+ 6.3	...	+ .9
• finance, real estate	+ 4.3	...	+ 2.9
• medical and health services	+ 7.5	...	+ 4.9
• educational services	— 5.8	...	—12.7
• all other services	+11.4	...	+ 2.1
Construction	+16.7	36.0	15.0
Manufacturing	+ 3.5	7.5	.5
Government	+ 2.6	5.6	.5
• Federal	— 1.0	...	— 1.4
• State	+ 2.8	...	+ 2.3
• Local	+ 1.5	...	+ 0.4
TOTAL	+46.4	100.0	

SOURCE: Calculated from *New Jersey Economic Indicators* (New Jersey Department of Labor and Industry).

can be attributed to the broadly defined services sector which includes wholesale-retail, transportation, finance and services.

Within this sector, employment growth was particularly strong in the medical and health services industry and in wholesale-retail trade. One particular aspect of this rapid growth in services is the resulting continuing shift in the State's employment profile away from slower-growing manufacturing industries to service sector jobs. It is important to note that changes in service employment have been less sensitive to cyclical downturns in the economy.

Currently, 26 percent of the State's non-agricultural employment is in manufacturing compared to 23 percent nationally. For some perspective, the comparable figures ten years ago were 32 percent in New Jersey and 27 percent in the United States. Thus. New Jersey, which is now much less dependent than previously on goods-producing industries, should not see its unemployment rate rise much higher than the national average during the current recession.

The largest percentage gain in non-service employment occurred in the construction sector (16.7 thousand jobs). Although residential construction slowed significantly as interest rates skyrocketed in early 1980, employment losses were reduced by expanding Atlantic City casino construction and other non-residential construction projects.

Manufacturing employment grew by only 3.5 thousand jobs (.5 percent annual growth). However, it should be noted that these statistics do not include the closing and layoffs in automotive and other durable goods industries that occurred this summer. Manufacturers who believed a recession was imminent during 1979, maintained conservative inventory levels which fell below desired levels as consumer spending depleted producer's stocks. Efforts to rebuild stocks and restore inventory-sales ratios most likely account for the modest manufacturing employment gains in the data reflected through March 1980.

Government employment also increased by .5 percent with the majority of new jobs concentrated at the State level.

Total personal income in the State expanded by nine percent during this past year. However,

local prices (as measured by a weighted average of New York and Philadelphia metropolitan area price indexes) rose by 11 percent which left New Jerseyans with a decrease in purchasing power over last year (see Table III.2). Since there are more workers on New Jersey payrolls than last year, this implies that some individuals experienced even larger "real" declines in income. There is some solace, however, in noting that the New Jersey price index increase was 1.8 percentage points less than the national average.

Sales of retail stores approached the $30 billion level, a six percent increase over last year's sales. In inflation-adjusted terms, however, the actual quantity of goods and services purchased *declined* by more than four percent. There was a brief surge in retail sales during the 1979 holiday season, but this should not detract attention from the longer trend of declining real sales.

Another sign of weakness appeared in the residential construction where contract awards fell by 45 percent between FY '79 and FY '80. Similarly, building permits, which reflect intentions to build, declined by 24 percent as mortgage interest rates for the purchase of new homes rose from less than 10 percent in FY '79 to almost 13 percent by the Spring of 1980.

Non-residential construction reflects a completely different picture as contracts awarded, bolstered by Atlantic City casino building, were up 43 percent.

II. New Jersey and the Business Cycle

Since the economy has reached another turning point this past year, it is informative to summarize measures of recent growth in the State in relation to long-run trends.

Between 1962 and 1978, personal income growth in New Jersey averaged 7.9 percent per year. During the recovery period from the last recession, 1975 through 1979, incomes rose at the rate of 10 percent per annum. After accounting for the influence of rising prices, total State personal income rose at the annual rate of 3.1 percent during the recovery as compared to the long-run trend of 2.7 percent.

Changes in State population growth, however, significantly alter the growth in *per capita* income. Since the bottom of the last business cycle, increases in per capita income averaged 3.0 percent, whereas the long-run trend was only 1.9 percent per annum. Although the growth in total State income has often lagged behind the national average, these statistics suggest that it is slower population growth which accounts for most of the difference.

TABLE III.2

PERSONAL INCOME CHANGE: FY 1980

	Personal Income	Prices	Real Personal Income
New Jersey	+ 9.1%	11.1%*	—1.8%**
United States	+11.3%	12.9%	—1.2%

SOURCE: Calculated from *New Jersey Economic Indicators* and *Consumer Price Index* (U.S. Dept. of Labor).

* New Jersey price index change is based on a weighted average of the New York and Philadelphia area Consumer Price Indices.

** The formula for real personal income change is:

$$\left(\frac{109.1}{111.1} \times 100\right) - 100 = -1.8\%$$

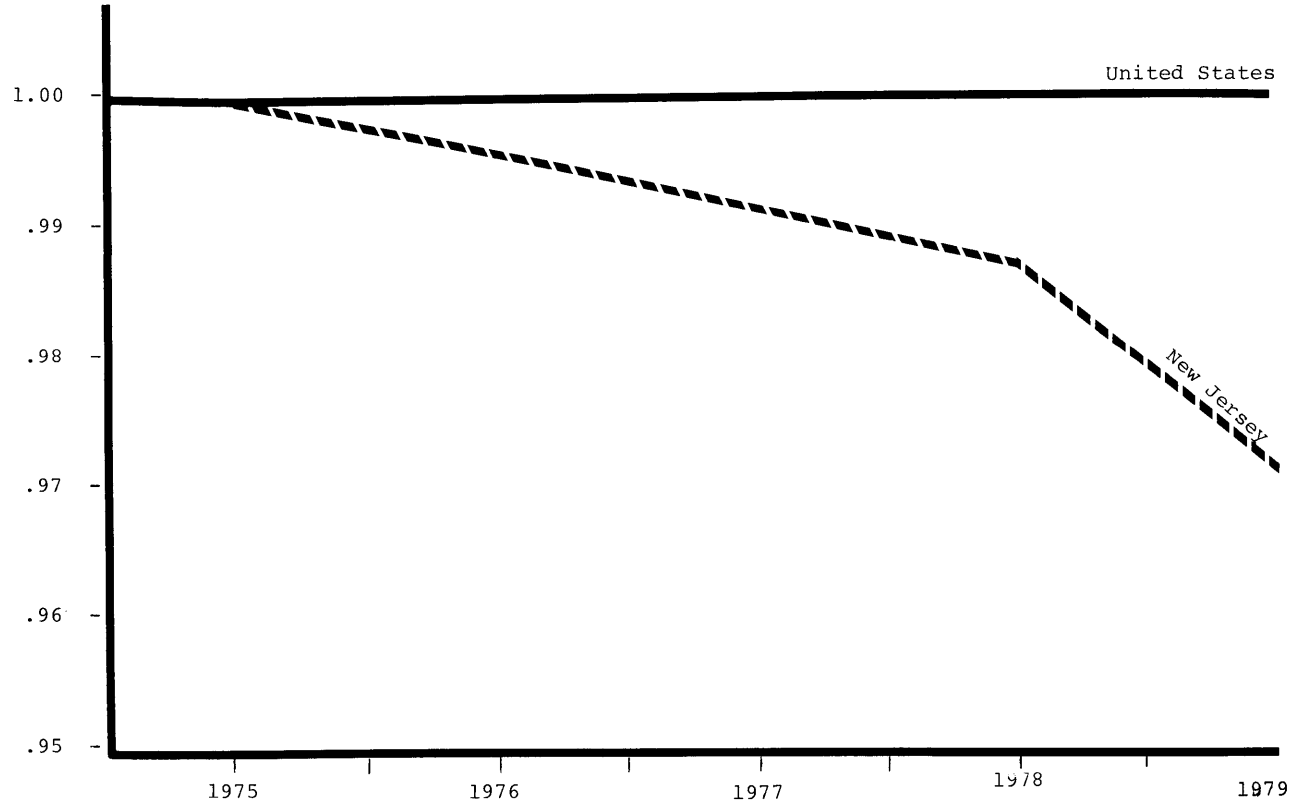
The question of how State personal income will be affected by the 1980 recession now arises. As we have previously noted, New Jersey, as part of the northern industrial complex, tended in the past to be relatively more recession prone because of the size and cyclical sensitivity of manufacturing activity. However, expansion of the New Jersey service sector, which is less sensitive to the business cycle, will tend to soften the income decline.

Some states can rely upon countercyclical government spending to offset declining payrolls, but New Jersey has not yet adopted such policies. The State has not accumulated any significant surpluses that could be spent during a recession. In addition, a federal commitment to fiscal restraint will yield grudgingly to efforts to increase spending, thus limiting the size of the federal countercyclical resources. Thus, neither State nor federal countercyclical measures will significantly affect personal income in New Jersey during the 1980 recession.

Despite slower population growth in New Jersey, employment growth during the 1975-80 recovery period exceeded long-run trends. On the average, non-agricultural employment grew by 51 thousand per year between 1962 and 1978, whereas the gain in jobs during the recent business cycle recovery reached a peak of 125 thousand jobs in 1978 and averaged 83 thousand jobs during the recovery period.

During the 1960's manufacturing employment in the State expanded by almost 15 thousand jobs annually. A structural change in the New Jersey economy during the 1970's

FIGURE III. 1
COMPARATIVE ECONOMIC INDEX—ANNUAL



reversed earlier growth patterns and manufacturing industries lost about 9 thousand jobs each year (even after adjusting for temporary job losses during the 1971 and 1974 recessions). During the 1975-80 recovery phase, manufacturing jobs have grown by more than 11 thousand per annum.

Overall, it is clear that economic recovery since the 1974-75 recession has exceeded long-run trends; most significant and encouraging has been the reversal, albeit perhaps temporary, in the decline of manufacturing jobs in the State.

III. New Jersey's Comparative Economic Performance

A different view of economic performance can be seen by comparing State and national rates of growth. Over the past several years, the Economic Policy Council has monitored relative State economic performance by using a measure we call the Comparative Economic Index (CEI). This index summarizes the growth in three broad measures of economic performance—total employment, personal income, and retail sales—for both the State and the nation. Since changes in the New Jersey indicators are compared with their national counterparts, an index value of greater than one means that the State has outperformed the United States. Conversely, an index less than one implies that the State is lagging behind the nation. The annual CEI in current dollars (Figure III.1) shows State economic growth lagging behind the national average for the 1975-79 period.

However, since two of the three CEI components (personal income and retail sales) are valued in dollar terms, these statistics are sensitive to change in the price levels. Up to the last recovery which began in 1975, there was little

FIGURE III. 2
COMPARATIVE ECONOMIC INDEX—ANNUAL
(in constant $)

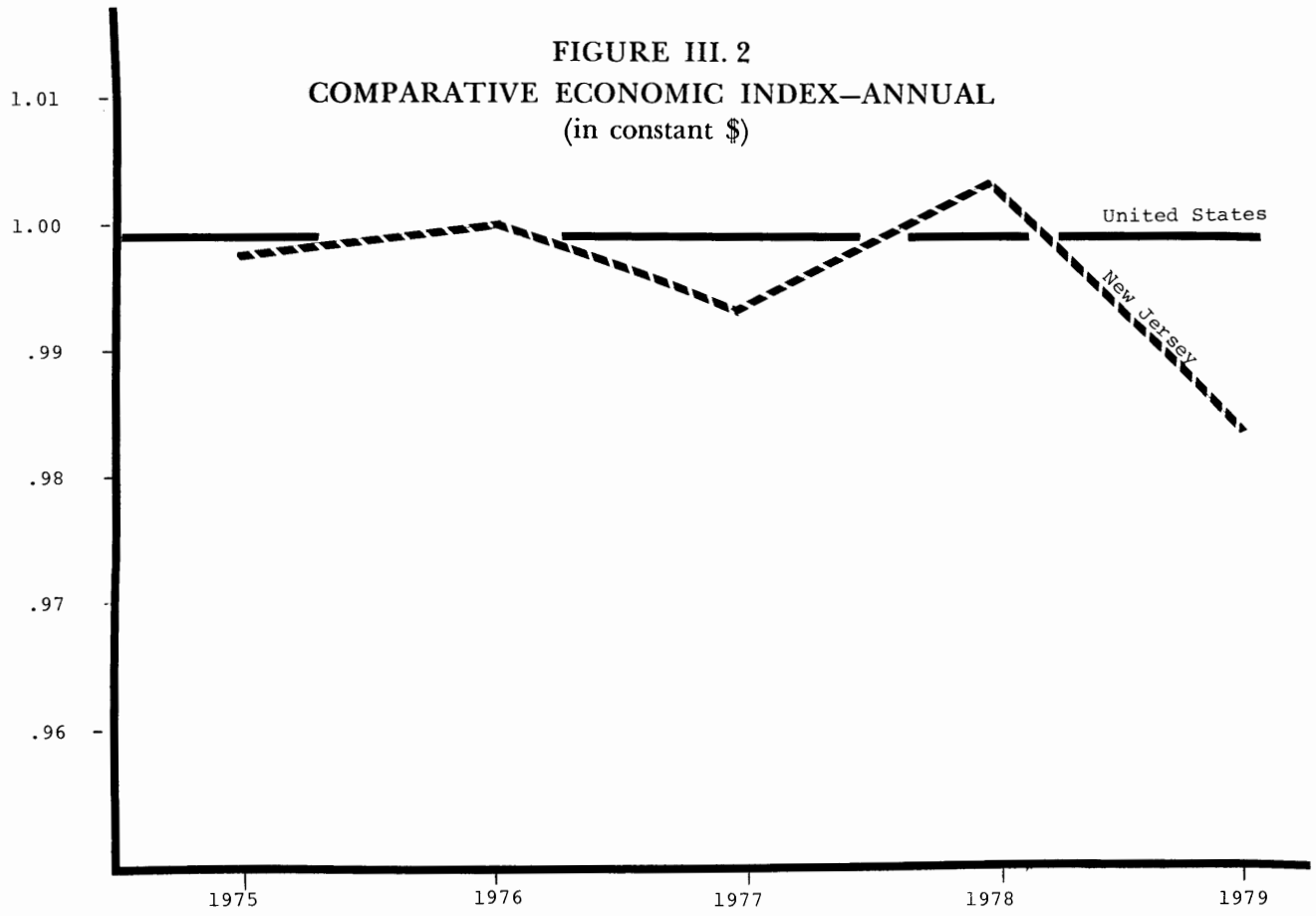
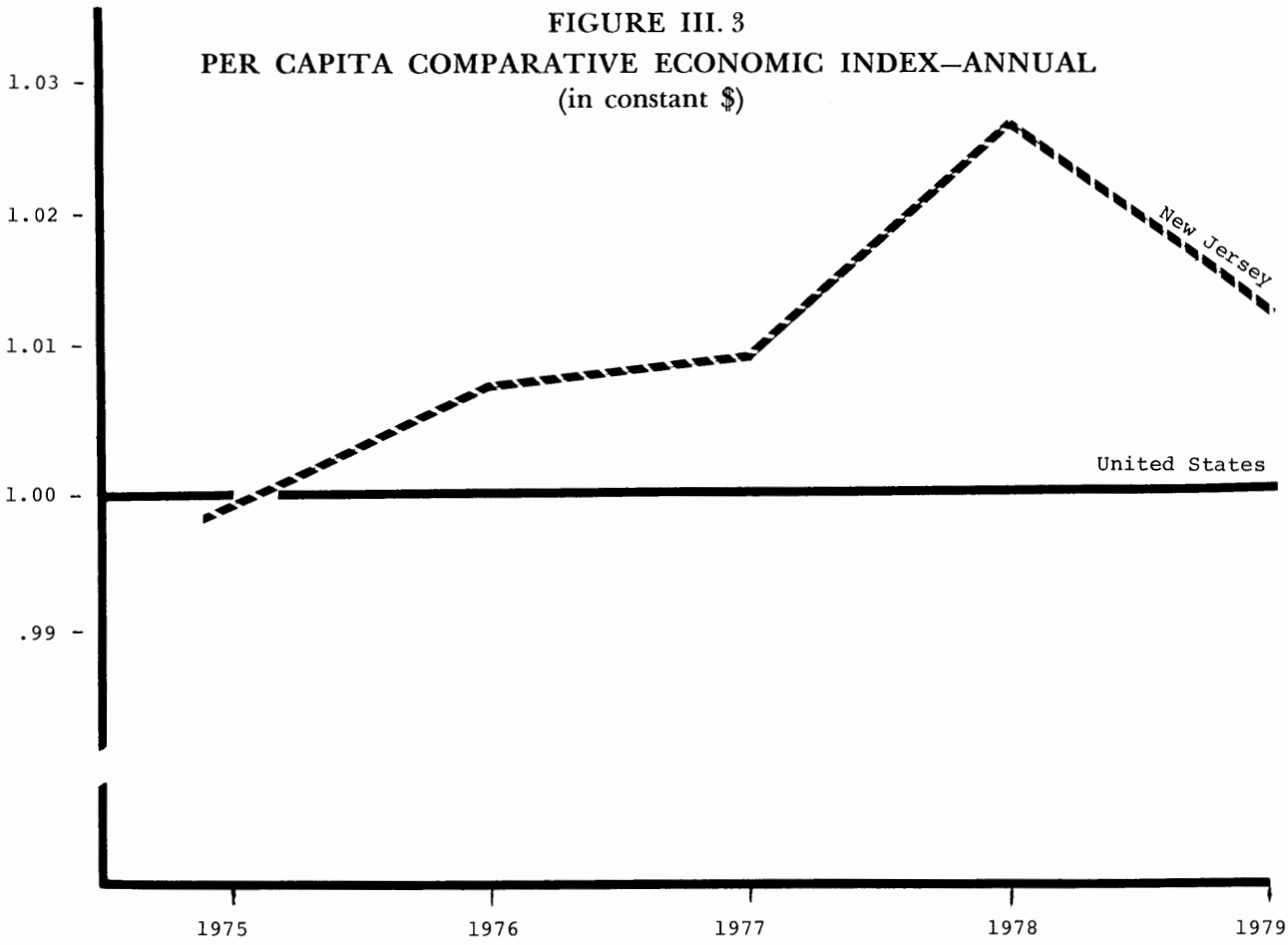


FIGURE III. 3

PER CAPITA COMPARATIVE ECONOMIC INDEX—ANNUAL

(in constant $)



difference between New Jersey and U.S. price changes. Current data, however, have shown up to a two percentage point difference in the respective Consumer Price Indexes (see Table III.2). After making this price level adjustment to the CEI, New Jersey appears to have largely followed "real" national rates of growth (Figure III.2).

It should also be noted that the CEI measures of Figures III.1 and III.2 reflect changes in *aggregate* economic activity. However, the absolute size or growth rate of the economy by itself is not entirely indicative of the economic well-being of the State's residents. Growth in the *totals* of income, sales and employment is, in part, simply due to population increases. Therefore, a meaningful adjustment to the index is to account for differing rates of population growth. Accordingly, a *per capita* CEI (also in real terms) is shown in Figure III.3.

Since New Jersey's population has grown more slowly than the nation's during the 1975-79 period, the per capita CEI improves the State's relative standing, and the index remains above 1.0 throughout the 1975-79 recovery period.

The conclusion to be drawn from this analysis is that the New Jersey economy grew faster than the State's long-run trend during the five years of the last business cycle recovery. In addition, on a per capita measure, New Jersey residents appeared to outperform the United States average. Adjustments in price levels also improved the State's economic standing. However, a slow or declining population indicates underlying weaknesses that may portend some longer-term economic problems for the State.

IV. Outlook for Fiscal Year 1981

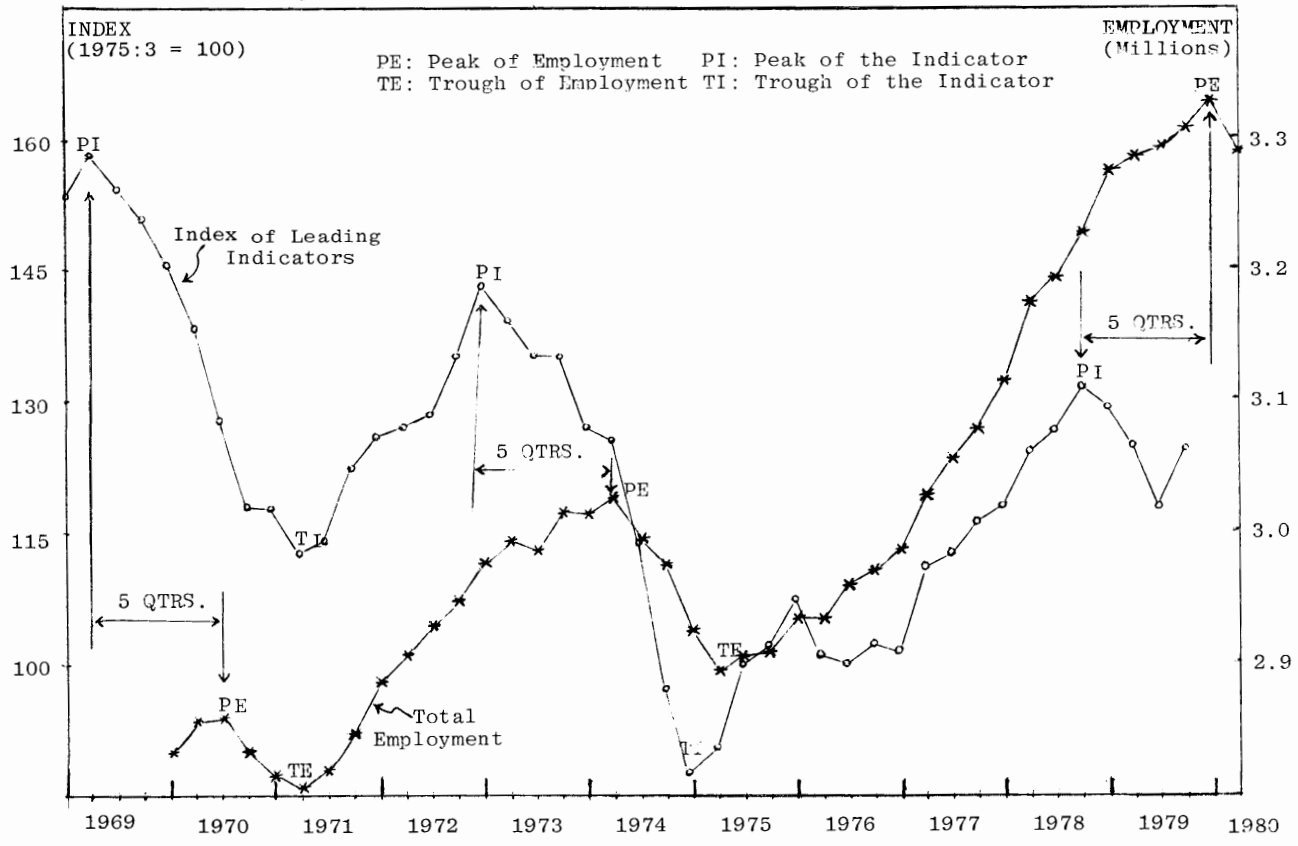
New Jersey cannot expect to be immune from the effects of the national recession which began earlier this year. In the last two recessions, New Jersey's economy went down deeper and stayed depressed longer than the nation's. This past performance raises two important questions. First, will this pattern of a longer and deeper New Jersey recession be repeated? Second, what are the expected dimensions of the duration and severity of the recession for the State?

Recently, the Office of Economic Policy has developed a leading indicator forecasting tool for the State. With this index of leading indicators and a judgment about their future behavior, we are able to forecast several key performance measures of State economic activity —employment, income and the unemployment rate. The index has four components—new job openings, manufacturing work-week hours, initial unemployment claims and the quit-rate in manufacturing. These data, available monthly for New Jersey, are each indexed to base (1975 = 100), aggregated to obtain a quarterly measure and then all four components are averaged to obtain a composite index of employment conditions for the State. An examination of the behavior of the index in the past relative to actual employment levels reveals that this index has led total employment by five calendar quarters (see Figure III.4). This means that approximately 15 months after the index has reached a peak (PI in Figure III.4) total employment peaks (PE) and subsequently declines. This pattern has held for both of the recessions in the 1970's, and the index accurately predicted the latest downturn in the New Jersey economy which began in 1980-I (five quarters after the leading indicator peaked in 1978-III).

It should also be noted that the index appears to *lead* the recovery of employment by one

FIGURE III. 4

NEW JERSEY LEADING INDICATORS AND EMPLOYMENT



quarter (i.e., one quarter after the index reaches its trough, actual employment begins to increase). The index, therefore, appears to be a reliable indicator of the turning points in the State's economy.

In order to forecast total employment for this current recession, a projection of the behavior of the leading index was made. This projection was based on the historic trend of the index over past business cycles and an adjustment for changes in the industry mix in New Jersey since 1974 and the development of casino-related economic activity in Atlantic City. We have also realistically assumed that the 1980 recession will closely approach the magnitude of the 1974-75 downturn.

A consensus forecast is then estimated for total employment in New Jersey[2], and in combination with a separate forecasting equation for the State's labor force, a forecast can also be made for the unemployment rate.[3] Finally, another equation is used to forecast income in the State.[4]

The results of these forecasts appear in Table III.3. Total employment is projected to drop by over 100,000 jobs from its peak of 3.331 million in 1980-I to 3.229 million at the bottom of the recession in 1981-II. As of the time of preparation of this *Report*, actual employment 1980-II was 3.289 million or a decrease of 44,000 jobs from the 1980-I peak.

The State's unemployment rate is projected to approach 10 percent by the Spring of 1981, an increase of over three points from its 1980-I low of 6.6 percent. Real income[5] is expected to decline by $1.6 billion or 2.8 percent.

It is informative to compare the peak to trough projected changes for the 1980 recession with those actually experienced during the 1974-75 recession (see the last line of Table III.3). In each case—employment, income and the unemployment rate—the forecasted change for the 1980 recession is less severe than what New Jersey experienced in the last recession. Thus, even though we expect the extent of the current national downturn to approach that of 1974-75, New Jersey should not fare as badly this time around.

The two major reasons for this are, as mentioned previously, the change in the State's industry mix since 1974 and the economic ramifications of the new casino industry in Atlantic City.

Since 1974, the share of manufacturing employment in New Jersey has declined from 30 percent of total non-agricultural employment to 26 percent. Moreover, within the manufacturing sector there has also been a shift in employment towards non-durable manufacturing and away from the more recession-sensitive durable goods production. We estimate that both of these shifts will reduce the employment loss of the current recession by nearly 20,000 jobs.

In addition, the new casino industry in Atlantic City has, to date, created approximately 15,000 jobs. Together, these two factors represent the difference between the decline in employment of 131,000 experienced in 1974-75 and our projected loss of 100,000 jobs during the current recession (even though the earlier downturn and this current one are, on a national level, expected to be of nearly equal intensity).

Our conclusion that New Jersey will not suffer disproportionately in the current national recession is not meant to dismiss its effects lightly. The expected loss of 100,000 jobs, the large decline in income, and all the social and personal problems that follow, represent a severe blow to the State. Moreover, it is possible that unforeseeable international events will make the national recession worse and increase the hardships on New Jersey.

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2 An alternative forecast using State and national industry profiles is also made.

3 The labor force forecast is based on the employment forecast and a trend factor.

4 The income forecast also relies on the employment forecast and a trend factor.

5 The income measure used in this forecasting is Labor and Proprietors' Income (LPI), which is cyclically less sensitive than the GNP. The GNP includes rents and royalties, profits, indirect business taxes, in addition to the Labor and Proprietors' Income. Declines in real GNP during the recession are usually sharper than those of real LPI.

TABLE III.3

ECONOMIC FORECAST FOR NEW JERSEY

Period	Employment (000)	Labor Force	Unemployment Rate	Real Income	
1980-I	3331 (actual)	3567 (actual)	6.6%	$30359 million in 1972 dollars	(+2.6% annual rate)
II	3319	3558	7.0	30192	(—2.2)
III	3299	3572	7.6	30018	(—2.3)
IV	3263	3568	8.5	29700	(—4.2)
1981-I	3231	3567	9.4	29455	(—3.3)
II	3229	3579	9.8	29503	(+0.7)
Forecasted Peak to Trough Change 1980-I to 1981-II	—102 (—3.1%)		+3.2 points	$1.6 billion in 1980 dollars	(—2.8%)
Peak to Trough Change of 1974-75 Recession	—131 (—4.3%)		+4.5 points	$2.4 billion in 1974 dollars	(—7.1%)

SOURCE: Office of Economic Policy.

The severity of this recession in combination with the likelihood that the 1980's will witness repetitions of economic downturns points clearly to the need for State action to mitigate these economic hardships. Although the ability of any single state (particularly a relatively older industrial one like New Jersey) to protect itself significantly from a national recession is limited, there are several policy possibilities that could make the inevitable future turnings of the national business cycle less damaging. We offer these suggestions not as an immediate countercyclical program, but for longer run consideration and debate for the 1980's.

V. Conclusion

It is difficult to be precise about the specifics of any long-range economic strategy for the 1980's. However, one basic premise of any program, regardless of its operational details, should be that the State must make it clear that New Jersey is interested in attracting new industries and providing a business climate in which its existing businesses can be profitable and expand. Even if we recognize that, because of our high population and industrial density, there may be little room to sustain large increases in economic activity, it is vitally necessary for the State to have (and execute) an effective economic development strategy. This is true because, as part of the larger Northeast region, New Jersey is in the economic ebb tide of the flow of people, jobs and investment out of our region to other areas of the country. This long-run trend is likely to continue for some time even though there are hopeful signs that its force is declining. If we add, on top of this, the certainty of recurring national recessions in the next decade, a clear challenge for innovative State efforts to promote economic development is apparent. In the absence of such a program, New Jersey, faced by the long-run secular decline of the Northeast and a recession-vulnerable economy could experience significant economic problems in the coming years. Moreover, legitimate concerns for the protection of environmental amenities can be accommodated under this pro-economic growth philosophy by stressing the development of the high technology industries—electronics, machinery, pharmaceuticals—where we now enjoy an advantage and which constitute little threat to basic environmental conditions.

The first major component of an economic development strategy for the 1980's must address the need to stimulate capital formation. This may include many elements, but several specific suggestions come immediately to mind. The delays and difficulties of obtaining State and local land-use and building permits for business and commercial development must be further minimized. Such problems are simply an added cost (and often an expensive and very frustrating one) of investment and are important negative influence on business capital decisions.

Second, there is a clear need to continue the tax reform in the 1980's. One particular starting point, as the Council has long advocated, is to phase out the business net worth tax. This tax is a regressive levy on investment that deters capital formation in the State. The time has long come to eliminate it. In addition, most states provide a loss-carryover provision to business against their corporate income tax liabilities. New Jersey should enact such a provision. It is particularly important for small businesses to protect themselves against bankruptcy since they often experience lethal cash flow problems in their initial years of operation, and during times of national recession.

Another component of an economic strategy for the 1980's would be to make more timely use of the State's capital expenditure program. In particular, capital spending is perhaps one of the most effective and least costly ways by which a state can provide a countercyclical stimulus to its economy. Any project that does not require an immediate start-up should be inventoried and then begun when a national downturn occurs. Moreover, at this particular time of employment decline, we should also seek out opportunities for speeding up capital projects.

In addition, the idea of a stabilization fund that accumulates revenues in surplus years to be used for capital spending and employment crea-

tion activities during recession years is a concept that merits serious consideration. Michigan has such a fund in operation, and it has provided significant aid to that hard-hit state during the current recession.

Also, a recent proposal to combine a federal countercyclical program with state and local stabilization funds deserves serious consideration. The proposal calls for a $3 billion annual contribution by the Federal Government to be matched by state and local funds. This could be a serious cushion against[6] frequent business downturns.

Finally, any economic strategy for the 1980's must include innovative programs to continue the process of urban revitalization. An effective urban policy has to contain many elements and we have previously (see our *11th Annual Report*) detailed our ideas in this area. Investment and employment tax credits for urban small businesses, improvements in urban safety and amenities, and urban location incentives for businesses are several of the areas which deserve attention. In addition, the promising success already achieved of private-public coalitions stressing a joint commitment to urban development in several of the State's cities must be built upon and extended as the single most effective urban revitalization policy. In addition, the self-defeating addiction of our cities to property taxes as revenue sources must be cured if urban areas are ever to recover fully their economic vitality and attractiveness. Some new tax equalizing mechanism for the raising and distribution of property taxes is a worthy, albeit difficult, objective for the 1980's.

The 1980's promise to be an important decade for the economy of the State. The challenge for policy-makers is to anticipate and act in advance of events in order to insure the continued attractiveness of our State as a desirable place to live and work.

[6] See, Roger J. Vaughan, "An Anti-Recession Step", New York Times, July 9, 1980.

IV

ECONOMIC LEGISLATION: A REVIEW OF ACCOMPLISHMENTS AND PROPOSALS*

The number of bills we can classify as economic legislation appears to be an inverse indicator of the health of the State's economy. This past fiscal year (FY 1980) provides an example of one in which a healthy state economy diverted lawmakers' attention away from countercyclical measures. In retrospect, the legislature passed few new laws designed to have immediate economic consequences. However, with a deepening recession, interest and debate on significant economy-related legislation has increased.

This review points out "new" economic legislation as well as selected bills containing significant economic consequences and briefly highlights their intentions and impacts. The Chapter is divided into three parts: Part One deals primarily with regulatory legislation; Part Two with issues affecting economic growth; and Part Three with fiscal and other matters.

I. *Free To Choose* is the title of a recent television series which promotes reliance on the price system to provide greater consumer choice and competition in the market place and which criticizes government regulation for distorting economic decisions. In no small way, the New Jersey Legislature has considered a number of measures that relate to this theme.

An example of a step in the direction toward freer consumer choice is the administrative rule change by the New Jersey Attorney General to deregulate State liquor prices. Increased competition in the liquor business is expected to lead to lower prices and expanded selection for consumers. In the near future, the Legislature will have to consider A-1529 which realigns the State's liquor tax laws to this new system.

Another step toward deregulation is proposed by S-1067 which exempts newly constructed apartment buildings from municipal rent control for a period of ten years. Local rent control has prevented owners from increasing rents along with rising costs or changing market conditions. Also, rent control ordinances have hastened the conversion of apartments to the condominium form of ownership as investors seek to recoup their money for more profitable investment opportunities. It is argued that by overriding rent control ordinances, apartments will again be a profitable investment and should attract investors and lead to the construction of more rental units.

Contrary to public opinion, government regulation does not always assure the consumer of the lowest price or the widest choice. Instead, a regulated price is often set *above* the free market

* Prepared by George R. Nagle, Office of Economic Policy, with the assistance of Mark Melio.

price in order, supposedly, to preserve competition (even if participating firms are woefully inefficient). This line of reasoning was used to defend State retail milk price controls imposed in the 1930's. Recent studies have shown that deregulation would lower the price of milk to consumers as proposed in A-391.

Last year's legislature passed a bill limiting the New Jersey Economic Development Authority to assisting only contractors who pay (at least) prevailing wages. Assembly-848 proposes to repeal this measure, arguing that this stipulation limits choice of contractors and may inflate the cost of EDA assistance to the point where the savings on EDA bonds could be offset by higher labor costs. Since prevailing wages are interpreted to mean union wages, non-union contractors (including many minority contractors) are effectively blocked from bidding on public-assisted development projects.

A legislative bill that critically weakens employer choice is known as the "Employment Relocation Assistance Act" (A-1054). This measure requires an employer with more than 100 employees to file one year in advance notice of intention to shut down or move to another location. Pre-notification demands extensive confidential information about the firm and specifies fines for non-compliance. Since any private household would find it an invasion of their right to choose if they were required to report a move in residence one year in advance, so does the employer. The profit system forces producers to respond to changing markets and business conditions; restrictions imposed here would only serve to lessen the profitability and viability of local employers. In addition, competition among local areas will draw new investors away from New Jersey to regions where the public sector does not interfere with business location. The concept of pre-notification would possibly benefit the State only if it were part of a plan that treated all states equally.

A bill to further limit choice is A-1540 which seeks to prohibit the ownership of agricultural land by non-United States citizens. In some cases there is a legitimate argument against foreign ownership when sophisticated technology could be easily transferred out of the country. The fixed nature of land resources voids this argument altogether leaving little justification for the bill. In addition, restrictions on ownership could discourage foreign investment in New Jersey, an important factor in recent State economic development.

A further step in the direction of deregulation is suggested by S-1167 which raises the legal interest rate ceiling for second mortgages from 18 to 24 percent and A-1377 which also raises the usury ceiling for installment credit issued by State-regulated financial institutions. These bills were introduced to increase the amount of available credit to New Jersey borrowers when market interest rates exceed the legal ceiling. It should be noted that the actual interest rate paid by borrowers is determined by market conditions facing both the lender and borrower. The role of the usury ceiling, however, is to prevent unaware borrowers from agreeing to an interest rate that far exceeds the risk conditions of the loan.

Under certain circumstances, a freely competitive market may be dominated by a single or few firms resulting in non-competitive pricing and restrictive business practices. Assembly Concurrent Resolution-42 seeks to create a bipartisan commission to investigate non-competitive practices and their impact on increases in consumer prices, and to suggest corrective action. Although it is not specifically mentioned in the resolution, there is a growing awareness by lawmakers of the "cost" of regulating business. On the federal level, airline deregulation has been a success with consumers benefitting from lower prices and air carriers benefitting from increased profit. A similar deregulation model is being applied to the trucking industry. On the State level, liquor deregulation is encouraging competition and consumer prices are falling. Without a specific state agency to monitor the effects of regulation, the proposed commission could serve a useful public purpose by identifying other overregulated sectors of the economy and reviewing the

cost of regulation in terms of entry, competitiveness, and pricing.

Senate-876 recognizes the unequal burden State administrative and regulatory rules impose on business and industry. The bill allows for the exemption of many small businesses from State regulation.

Free choice extends beyond the relationship between consumers and producers and applies equally to intergovernmental relations. Fiscal difficulties are often created when the State mandates a new program to counties and municipalities without providing an explicit source of funding. Too often this forces a tax increase on local residents. Assembly Concurrent Resolution-114, if passed by the Legislature, would offer a constitutional amendment at the next general election to require the State to finance programs that are to be performed or administered at the local level.

II. *Supply-side Legislation*—is broadly defined as having some impact on the use of the State's productive resources. Nationally, interest in supply side economics has soared in response to lagging productivity, investment, and reduced savings rates. Typical supply side recommendations encourage capital formation at the expense of current consumption. At the State level, there are a number of legislative proposals designed to stimulate investment, encourage new business formation, and assist selected industries.

A bill which could provide the stepping-stone for further supply side legislation is S-874 which would establish a State Department of Commerce and Economic Development. Throughout the 1970's New Jersey established a number of agencies dealing with economic development or industry problems which were scattered among departments dealing with various issues and constituencies. The proposed Department would consolidate existing agencies and become an advocate of the business community. Specifically, the Department would organize information programs, conduct industry research, and develop economic policies conducive to a growing economy.

Specialized assistance to small businesses is proposed in S-878, the "State Small Business Development Act of 1980." Research findings emphasize the importance of small businesses in economic and employment growth. Since small businesses often lack technical information and managerial expertise, they experience exceedingly high mortality rates. The proposed small business center would not offer financial assistance but rather technical advice supplied by consulting centers located at leading universities and colleges around the State.

In 1978 Trenton lawmakers established a unique public agency to promote the production of new products and processes (P.L. 1977, C-429). The original role of the Office for Promoting Technical Innovation was to provide technical and advisory assistance to inventors and innovators in manufacturing and marketing. Assembly-482 diverges sharply from the original legislation by allowing the Office to become a joint owner in the new business. The Agency will share the risk involved in producing and merchandising new technology by accepting royalities, stocks, bonds, or other financial claims in return for financial assistance. The bill raises serious questions as to whether State government should become a business partner. The atmosphere for conflict is obvious since the private business sector is guided by the profit motive and the public by political goals. In fact, much can be learned from the lack of success of other attempts at government-run business enterprises.

Investment and employment growth undoubtedly fluctuate with the ups and downs of the business cycle. Senate-877 proposes to help stabilize the economy during downturns by: (1) financing revenue shortfalls in the State budget, and (2) supplying financial aid for employment opportunities to stimulate private investment. The "Countercyclical Budget and Stabilization Fund" would be capitalized with State budget surpluses during prosperous years

and held in abeyance until needed during a recession or downturns of the economy. The effectiveness of the stabilization fund is dependent, however, on the speed with which the fund can be dispersed as the business cycle turns down. The recent experience in Michigan for a similar "rainy-day fund" suggests positive results from such legislation.

In contrast to this list of supply side legislation was the increase in the State's Corporate Income Tax rate from 7½ percent to 9 percent (P.L. 1979, C-280). This increase brings New Jersey's corporate tax rate in line with surrounding states but leaves it among the top five states in terms of corporate income taxes. Aside from the short term revenue increase of the new law, research suggests that an increase in the corporate income tax will discourage future investment. Since New Jersey has experienced lagging investment for many years, this measure seems to sacrifice long term growth for short term budget balancing. Assembly-737, if approved, rolls back the recent increase to 7½%. One compromise measure suggested by the Economic Policy Council would maintain the current income tax rate but would phase out the business net-worth tax. The net-worth tax is a regressive tax which discourages capital formation and also fails most other economic tests of equity and efficiency.

Another measure falling into the tax reform category is Assembly-533 which would amend the Corporation Business Tax to provide for a carryover of both capital and operating losses as a deduction from the taxpayers income. One important dimension of business tax reform is fiscal stability; that is, the tax structure should not exaggerate the pronounced cyclical fluctuations in business income and profits. This bill will help smooth the effects of business cycles, as income losses in past years will be deducted from profits during recovery years. Small businesses who often sustain loses in the initial start-up years are expected to be the prime beneficiaries of the proposal. The bill, in effect, would extend to the State's tax law the carryover benefit allowed most businesses under federal law.

Aside from the above measures aimed at reforming existing business taxes, several bills would offer incentives for corporate capital investment and employment creation. Since the cost of industrial incentives often exceeds budgetary constraints, each measure is targeted toward localities under economic stress or with above average unemployment rates.

Senate bills 714 and 715, if passed by the Legislature, would allow business an investment tax credit of three percent against the State's Corporation Taxes. The credit covers the cost for capital construction and acquisition of equipment. The bill also limits the credit to investment in communities receiving state urban aid or in municipalities with above average unemployment rates. A similar bill introduced in the Assembly (A-1341) calls for a two percent investment credit limited to manufacturing or research and development facilities within the State. One additional condition limits tax credit eligibility only to firms hiring at least twenty full-time employees. Senate-716 proposes corporate income tax credits for those businesses which create at least five new jobs through capital improvements.

Occasionally a New Jersey manufacturer realizes the potential for larger profits in another region and relocates leaving behind a myriad of social and personal costs borne by its former employees and community. Competition between states for industrial development often means the facility will be closed indefinitely. One approach to the problem has been the establishment of a stock ownership plan by the employees who continue to operate the plant under the direction of a management acting on behalf of the employee owners. Assembly-1021 recognizes the success of worker-owned corporations and proposes a comprehensive study by the State as to the best means to encourage and assist the formation of employee ownership. Worker ownership could relieve the public sector of lingering unemployment insurance benefits and other welfare-related expenses associated with a plant closing.

Another urban oriented economic development measure creates a separate industrial assistance fund, financed by a $50 million bond issue (Senate-719). The expressed purpose of the bill is to involve directly the New Jersey Economic Development Authority in offering direct low interest loans for capital construction in the State's urban municipalities. A public agency can offer lower cost financing as the interest on industrial development bonds is tax exempt, and this reduces the "real" cost of raising money. Although industrial development loan programs are commonplace among states, an initial $50 million capitalization creates a relatively small pie to be divided among projects in all the State's urban municipalities.

Assembly-1207 suggests tax exemptions for businesses manufacturing alternative energy equipment. More specifically, complete corporate tax forgiveness is proposed for firms manufacturing and selling solar or wind-powered machinery or devices. The purchasers of solar heating or cooling systems are also offered a 25 percent credit on the corporation business tax as outlined in Assembly-702. These bills raise the question as to why the public sector intends to assist a growing and prosperous industry. Consumer demand for energy-saving devices is growing rapidly in the face of rising energy prices, and it is clearly in the best interest of private business to supply the products consumers wish to buy. Such tax reductions would most likely go to out-of-state firms, while New Jersey consumers are not likely to benefit from lower retail prices.

III. *Fiscal and Other Related Legislation* account for the remainder of this session's economy-related bills.

One long-standing issue involving the distribution of Public Utility tax receipts was resolved early in 1980. In 1940, the State agreed to standardize the assessment of, and collect a tax on, utility property which passes through all the State's municipalities. Although all municipalities receive some of these tax monies, large amounts of utility property became concentrated in few localities. At the same time, State economic growth and rapidly escalating utility rates inflated tax revenues which are based on utility sales.

Rural communities with nuclear power plants found themselves in a situation where the revenue spigots were wide open, but spending opportunities were few. Budget surpluses were typical. From the State's point of view, a type of fiscal drag was developing as utility taxes increased but not all the money was being returned to the economy as some type of expenditure. Chapters 10 and 11, P.L. 1980, amend the original utility tax law by limiting the distribution of utility tax monies to municipalities to $700 per person. The $700 ceiling is expected to generate a fund surplus of $15 million which, according to law, will be deposited into the "Municipal Purpose Tax Assistance Fund."

The newly created municipal assistance fund provides a funding mechanism to replace federal countercyclical grants which lapsed in 1978. Determined by a need-based formula, the fund will distribute monies to more than 300 municipalities with above-average property tax rates and below-average property assessments. Although this package of laws does not alter the size or burden of the utility tax, it does shift the distribution of tax receipts away from municipalities with low propensities to spend to fiscally troubled communities with higher propensities to spend.

Winding its way through the legislative process is a measure (S-1171) which directs the New Jersey Sports Authority to rebuild and operate the fire-destroyed Garden State Racetrack in Cherry Hill. The ultimate fate of the measure will be based on an estimate of break-even and profitability. The financial success of the project at this point is questionable as the State has been unable to locate a private investor to undertake the project.

A number of bills proposing capital spending on natural resources (A-1818, $145 million), energy conservation (S-749, $50 million), and

quality of life is improving due to efforts by both business and government to improve the environment.

This is not to say that the road has been, or will be, trouble-free. New Jersey has many unresolved problems. Their solution can best be reached through the conscious efforts and participation of its citizens.

The Economic Policy Council realizes that such broad participation can become a reality only if there is wide-spread knowledge about the State's economic and social problems and developments. In order to contribute to this educational process, the Economic Policy Council and Office of Economic Policy undertook the task of compiling and publishing *The New Jersey Socio-Economic Profile.*

Using a combination of plain language and easily understood graphs, the book attempts to profile the State in a way that is both interesting and informative to a wide range of people yet easily understandable to those neither familiar with New Jersey nor interested in highly technical literature. *New Jersey Profile* is not meant to be an exhaustive description of any one topic; rather it examines some of the basic economic and demographic dimensions of the State in order to give an overall picture of New Jersey—where it stands, how it has changed in recent years, and how it compares with the nation. Chapters are extensively referenced to allow individual readers to pursue topics they find of particular interest.

New Jersey Profile consists of an overview of the State and ten chapters, each of which deals with a particular subject. The purpose of this discussion in the *Annual Report* is to highlight the general issues and information which can be found in each chapter.

I. Overview

New Jersey offers its residents a wide variety of opportunities, ranging from its manufacturing strength to its formidable agricultural sector and extensive forestland and seacoast. The overview takes a panoramic view of this diverse state, covering topics from Gross State Product to cultural offerings to research and development. This section gives the reader a chance to become more familiar with New Jersey as a whole before exploring the more specific topics of later chapters.

II. Population

There is, of course, nothing more important in the State of New Jersey than its people. In 1979, 7,332,000 people lived in the State, making New Jersey the ninth most populous state in the nation. With over 970 residents per square mile, New Jersey is also the most densely populated state. The population is not evenly concentrated throughout the State, however, as population densities range from lows of under two hundred in Hunterdon and Salem counties to over ten thousand residents per square mile in Hudson County. While in the 1950's and 1960's New Jersey's population increased rapidly in contrast to that of most surrounding states, population growth slowed considerably in the 1970's.

The population chapter details the many changes in the State's demographics in the past thirty years, in terms of population levels and characteristics, and also compares these changes to national trends. County and area population growth trends are also presented.

III. Employment

A question of vital concern to all New Jerseyans is employment. In 1979, 3.1 million people made their living in New Jersey, an increase of almost 50 percent from the total of 2.1 million in 1960. New Jerseyans today are not as dependent on manufacturing industries for jobs as they were in the past; in 1950, 45.6 percent of New Jersey's non-agricultural employment was in the manufacturing sector; by 1979, this number had fallen to 26.3 percent.

This Chapter examines the growth of New Jersey employment and the composition of jobs by sector, and compares these trends with national developments. Other key issues include

the performance of New Jersey employment (and unemployment) in past recessions.

IV. Income

New Jerseyans enjoyed a per capita income of $9,702 in 1979, the sixth highest in the nation. While the State's per capita income is still well above the national average of $8,706, the difference between the two has been narrowing for some time in keeping with a national trend toward equalization of income between states.

The income chapter examines the extent of this equalization trend among states and also looks at income distribution within the State, both geographically and demographically.

V. Natural Resource Industries

New Jersey's diversity of natural resources accommodates various "resource industries" which produce vital goods and services. Nicknamed "The Garden State" for its rich agricultural heritage, New Jersey had 990,000 acres of farmland in 1979, and the State is famous for its production of blueberries, cranberries, corn, tomatoes, and dairy products.

Millions of vacationers take advantage of the many beaches and resorts along New Jersey's 130 mile Atlantic Ocean coastline, and the State's water resources support a thriving fishing industry which caught over 80,000 tons of fish in 1977.

Despite New Jersey's emphasis on industry, 40 percent of the State's land remains forested, and many State parks and forests allow residents to take advantage of this recreational resource.

New Jersey agriculture has experienced difficulties much like other farming activities across the nation, and this section highlights some of these problems. Other important topics such as forestland preservation are also explored in this brief profile of the State's natural resource industries.

VI. Manufacturing

New Jersey has long been a major manufacturing state. With $23.2 million of value added in 1977, the State's manufacturing sector ranked seventh in the nation and provided jobs for over 800,000 workers. The New Jersey manufacturing sector has, however, faced increasingly strong competition from developing areas, especially in the South and West, and has also faced numerous difficulties in recent national recessions. Leading industries in the State include the chemicals industry, food, and electric and electronic equipment.

This chapter points out New Jersey's traditionally high labor productivity. Another important topic examined is the effects of the past recessions and the extent of recovery of New Jersey's manufacturing industries.

VII. Construction

New Jersey's construction sector employed 115,100 workers in 1979 and has been growing steadily since the recession of 1974-75. After enormous activity in the early 1960's attributable to the State's rapid population growth, the industry, especially the residential construction sector, slowed in the late 1960's and through the 1969-70 recession. After a brief recovery in 1971 and 1972, construction activity plunged again in 1974-75. Since then growth has been fairly steady overall despite national downturns. A large part of this strength has been due to non-residential construction, bolstered by large-scale construction in Atlantic City in 1978. This section examines general construction activity and compares New Jersey's industry with the nation.

VIII. Transportation, Communications and Public Utilities

The transportation, communications and public utilities industries provide key services in a modern society. Besides directly employing almost 200,000 workers, this sector is important to businesses and residents alike in daily life.

New Jersey's transportation network allows businesses and industries to take advantage of the State's geographical location to reach major markets for their goods. Over 33,000 miles of roadway facilitate shipping by truck as well as

easing every day travel for residents. The State also has 1,381 miles of railroad track, with more track per square mile of land area than any other state. Rapid transit lines, bus lines, some of the world's finest seaports, and airports are also vital parts of New Jersey's transportation system.

The transmission of information is also a crucial element in today's world. This section also deals with New Jersey's newspapers, television stations, radio stations, and telephone usage and gives a brief synopsis of the State's modes of communications.

The State's public utilities provide goods and services vital to the everyday operation of businesses and homes. New Jerseyans consumed 6331 kWh of electricity per capita in 1977, far below the national average of 9019 kWh per capita. In 1978, the State used 264 trillion BTU's of natural gas, or 36,000 BTU's per capita. Once again, this was well below the national average of 67,606 BTU's per capita. This section points out several possible reasons for these differences and also deals with other aspects of public utility operation in the State.

IX. Finance, Insurance, Real Estate, Trade and Services

Whereas in the past the production of goods was the major task for an economy, today's society—from consumers to businesses to government—demands increasing amounts of services.

A strong financial base is necessary for economic growth and stability, and New Jersey's banks, savings and loan associations, and insured commercial banks held combined assets of over $48 billion in 1977. Insurance companies are also important financial units, and New Jersey's life insurance companies held policies valued at $111.6 billion in 1978.

The distribution of goods is itself a vital service, and New Jersey's retail and wholesale trade industries fill this need. The State's retail trade establishments had sales totaling $30 billion in 1977, the ninth highest total in the nation. New Jersey's prime market location and efficient transportation system provide the demand for a strong wholesale sector, and, as a result, wholesale trade has grown enormously in the past ten years, with the State's sales of $55 billion in 1977 ranking among the highest in the nation.

The service sector, which includes such industries as hotels, personal services, business services, auto repair, amusements, professional services, and health services, has also expanded rapidly. This section looks at growth in New Jersey's service industries and other related topics.

X. Education

Education is one of the few "resources" which can be increased in quality and quantity, and it is increasingly important in modern society.

The first section of this chapter examines the educational attainment of the population and compares it to national levels. For example, New Jersey's illiteracy rate has fallen from 2.9 percent in 1950 to 1.1 percent in 1970, much in keeping with the national trend.

New Jersey public elementary and secondary school enrollment totaled 1.4 million in 1978 and has been declining over the past six years due to slowing population growth and declining birth rates. New Jersey public school districts spent an average of $2,333 per student in average daily attendance in 1978, far higher than the national average of $1,739. Money expenditures, of course, do not translate directly into effective education. Moreover, different parts of the country have different costs of living, and this chapter points out several other factors in evaluating education. Local district spending variations within the State are also discussed.

Higher education trends are also profiled in this section, with special attention given to the relatively recent emergence of a county college system.

XI. Government

It takes money to finance government operations and provide services to the population. In 1977, New Jerseyans paid $931 per capita in State and local taxes, compared to the national average of $831. This difference is due to New Jersey's higher per capita income—state and local taxes amounted to 12.6 percent of personal income for New Jersey and 12.8 percent for the nation. This chapter explores the sources and disbursement of government revenues.

Employment in New Jersey's government sector has increased over the past decades. Government employment increased at an average annual rate of 4.2 percent from 1960 to 1978. Many "government" workers, however, are school personnel. Excluding these educational service employees, government employment in New Jersey increased at an average annual rate of 3.8 percent over this period, compared to average annual increases of 2.2 percent for all non-agricultural employment.

Conclusion

The Economic Policy Council is confident that New Jerseyans as well as out-of-state readers will find the *New Jersey Socio-Economic Profile* both interesting and informative. We hope that knowing more about New Jersey will help motivate residents to take pride in their State's positive points as well as taking a more active role in solving its problems.

VI

PATTERNS OF NEW JERSEY ENERGY USE AND CONSERVATION*

Much of the concern over State energy policy has been whether there will be enough gasoline to meet our summer driving requirements and enough heating oil in the winter to avoid hardship. However, long term issues, such as prospects for the State's manufacturing sector and economic growth in general are often overlooked. The following review assesses the State's energy profile and estimates both the short and long-run responses to changes in State energy prices. The findings show that "energy" demand is somewhat responsive to relative price change (in the short run) and that differential rates of State economic growth and industrial relocation are responsible for a considerably stronger price effect in the long run. Recommendations based on these findings argue for continued energy price decontrol to: 1) promote conservation, and 2) to narrow the artificial comparative advantage currently offered by low energy cost states and thus reduce interstate competition for manufacuring investment.

ENERGY USE IN NEW JERSEY

Our economy is dependent on energy, and the consumption of energy in turn depends closely on the level of economic activity. The recession following OPEC price increases in 1973-74 vividly illustrates this point. The decline in business activity was so severe by 1975 that the energy shortage had vanished. In general, our energy requirements depend on two variables: 1) the rate of economic growth, and 2) the relationship between economic growth and energy consumption.

Since energy is treated as a homogeneous factor in this study, every effort is made to avoid a discussion of alternative energy sources and substitution among fuels (fossil, nuclear, hydro, *etc.*). Energy sources, measured in dissimilar physical units, were converted to a common measure of heat, the British Thermal Unit (BTU).[1]

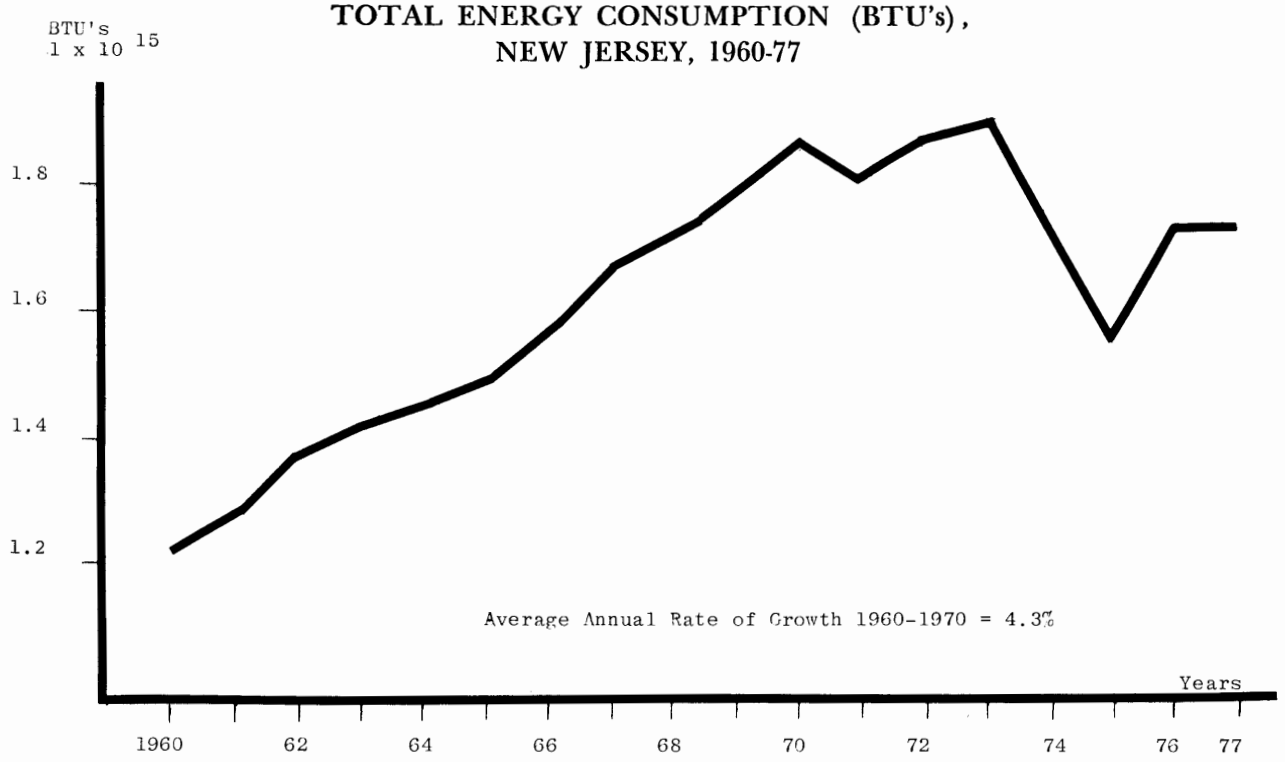
The pattern of gross energy use in New Jersey closely follows the ups and downs of the business cycle (Figure VI. 1). During the 1960-70 expansion, the average annual growth in energy consumption was 4.3%. The 1970-71 and the 1974-75 recessions curtailed economic growth, and manufacturing activity in particular. This resulted in unprecedented energy reductions of 3 percent and 19 percent, respectively. By 1977 the New Jersey economy had recovered from the 1974-75 recession. However, the growth in energy use lagged and by the end of 1977 energy consumption had recovered only about one-half of its recession-related losses.

* Prepared by George R. Nagle, Office of Economic Policy.

[1] A BTU is the quantity of heat required to raise the temperature of one pound of water one degree Farenheit. Implicit in any comparison of fuels based on their heat content is the assumption that fuels are perfect substitutes.

FIGURE VI. 1

TOTAL ENERGY CONSUMPTION (BTU's), NEW JERSEY, 1960-77



SOURCE: Federal Energy Data Systems (FIDS), U.S. Department of Energy, 1979.

This suggests a significant change in the relationship between economic growth and energy consumption.[2] The trend in energy use per dollar of real New Jersey Gross State Product supports this observation (Figure VI. 2). Between 1960 and 1970 New Jersey energy demand averaged about .046 million BTU's per dollar of output with little year to year variation. After 1970, the BTU output ratio declined steadily, falling to .038 million BTU's per dollar of GSP in 1977 the latest year for which complete State energy data are available.

Not only has relative energy demand subsided, but the State has compared favorably with the United States average throughout the 1960-77 time period. New Jersey's BTU/Gross Product ratio was 75% of the U.S. average in 1960 and only 66% by 1977 (Figure VI. 2). On a per capita basis, New Jersey residents consumed 240 million BTU's in 1977, as compared to 355.2 million BTU's nationwide. Another important factor in energy consumption is the level of personal income which is often associated with higher levels of energy demand.[3] Despite higher incomes in New Jersey, energy demand in 1977 per dollar of personal income was only 70 percent of the national average. This pattern of absolute energy conservation should not, however, overshadow the current downtrend in the energy-output ratio.

The Demand for Energy—A Short-Run Approach

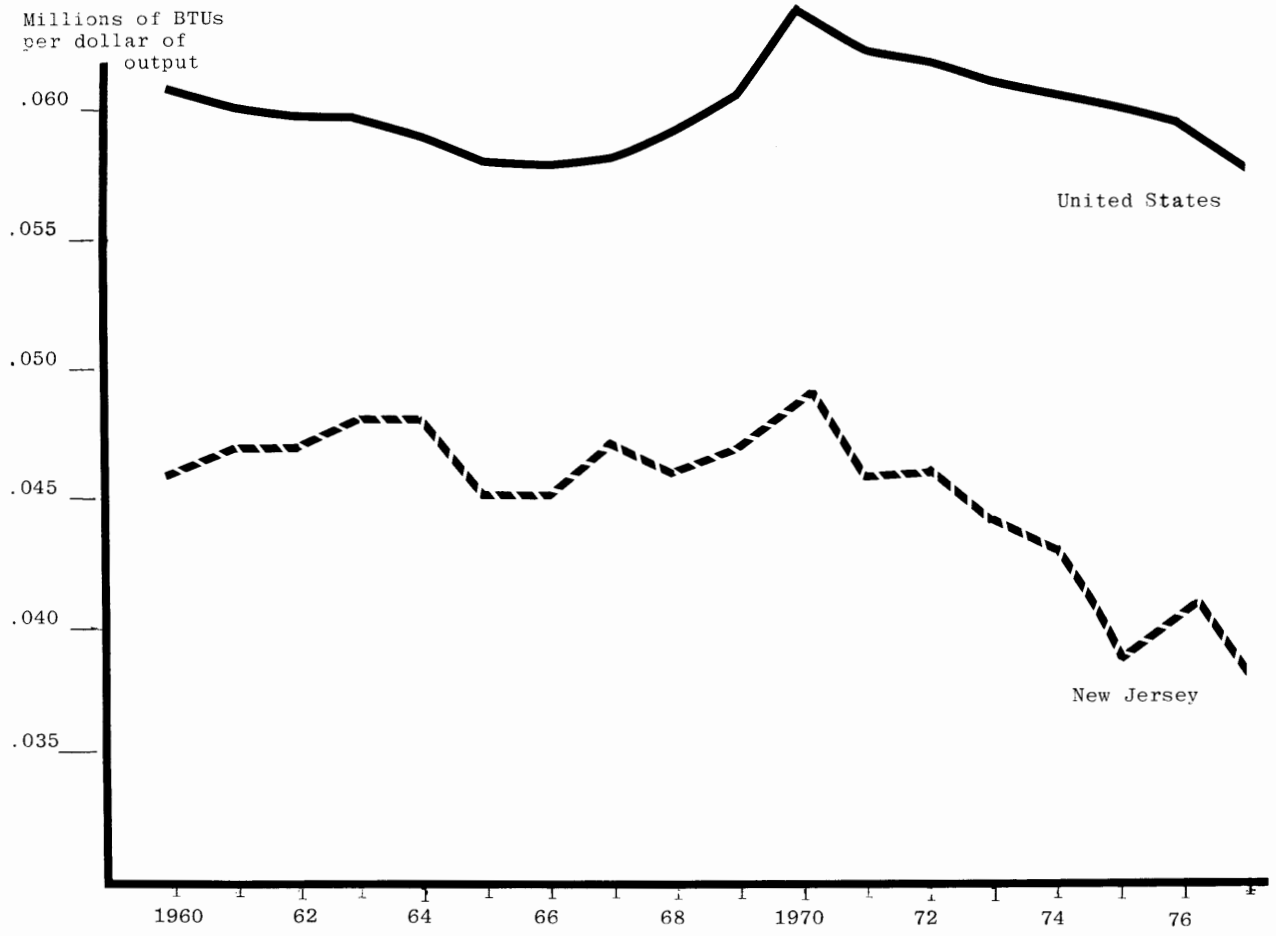
Although numerous factors interact with energy demand, one cannot overlook the role of

[2] A ratio between energy use and Gross Product represents the thermal content of energy consumed per dollar of real output of the economy. The most important characteristics of the BTU/GP ratio is that it is not based on a fixed set of output or final demand weights so that the ratio reflects both changes in the mix of output (demand) and changes in the energy intensity in the production of goods and services.

[3] For example, see Halvorsen, *Econometric Models of Energy Demand,* Lexington, 1978, pp. 142-148.

FIGURE VI. 2

ENERGY DEMAND PER DOLLAR OF OUTPUT (in 1972 dollars)



price. By estimating the price elasticity of demand for energy, it is possible to estimate the degree of conservation resulting from energy price decontrol and world market price increases.

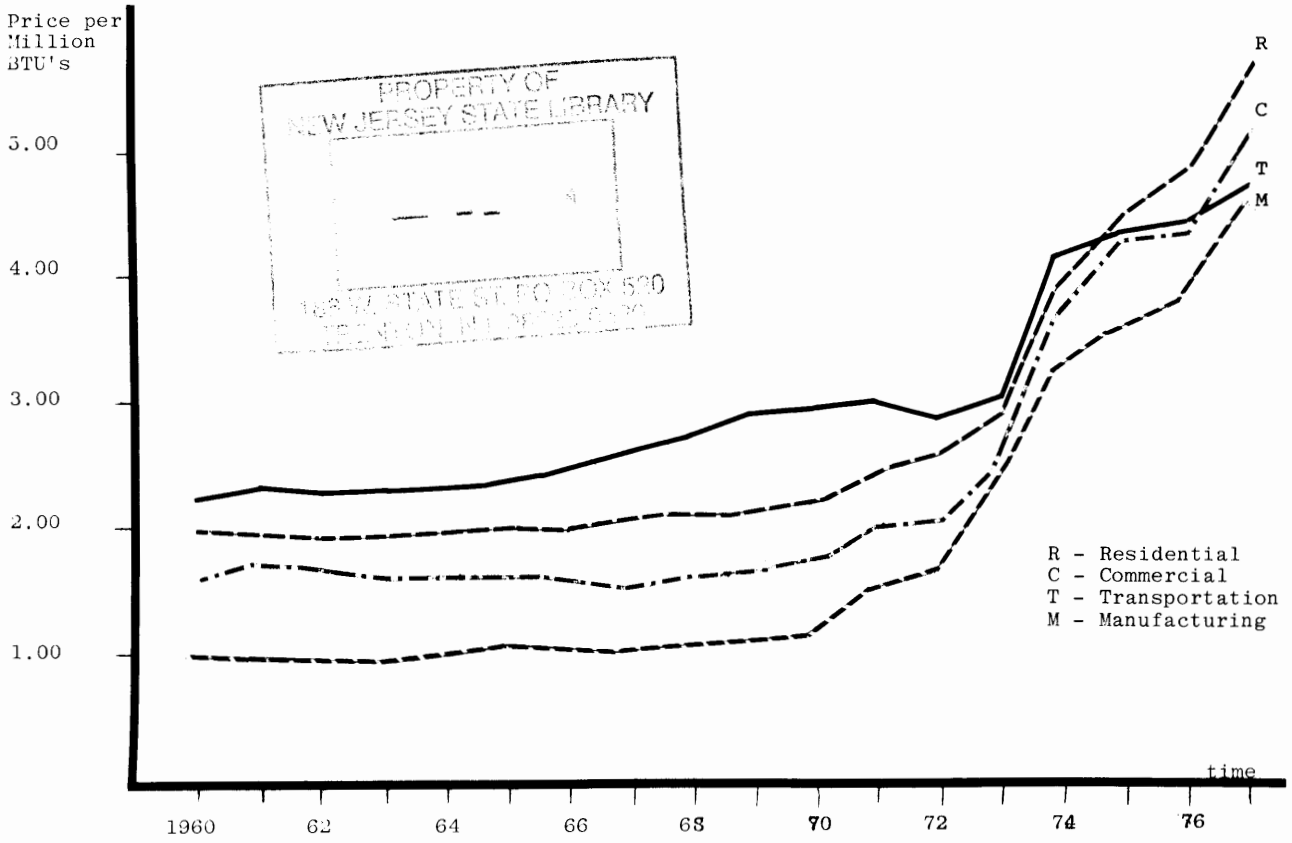
Since energy is a heterogeneous product derived from the heat content of various fuels, it was necessary to estimate a "New Jersey" energy price weighted by the actual mix of fuels consumed in any one year.[4] Further inquiry revealed considerable differences in estimated energy prices among sectors of the New Jersey economy (Figure VI. 3). The principal causes attributed to differential energy prices is unequal government price control among fuels and the ease of substitution of relatively low priced fuels within sectors.

In 1960, prices in the gasoline dominated transportation sector were the most costly to State residents ($2.27 per million BTU's); however, by 1977, increases in the relative price of heating oil thrust the residential sector into the most costly category ($5.62 per million BTU's). The cost of energy to the State's manufacturers was in 1960 ($1.02 per million BTU's), and still is, relatively cheaper than prices in other sectors ($4.58 per million BTU's). Over the 1960 to 1977 time period, fuel substitution in the industrial sector largely accounted for

[4] See, *Energy Fuel Prices by Major Economic Sectors from 1960 Through 1977*, U. S. Department of Energy, July 1979 for the source of data used in compiling State energy prices.

FIGURE VI. 3

NEW JERSEY ENERGY PRICES ESTIMATED PER MILLION BTU's
WEIGHTED BY MIX OF FUELS, 1960-77



lower prices as consumption of residual and distillate fuels was sharply reduced and replaced with relatively cheaper natural gas and electricity.

The observance of a change in the order of energy prices by using sector emphasizes the need to review not only total energy demand but also to disaggregate the data by these major sectors of the economy.[5]

The aggregate demand for energy is partly dependent on price. However, to view energy prices in isolation neglects overall price changes for *all* goods and services. The change in relative energy prices is determined by dividing the derived energy price by the GNP implicit price deflator.

The demand for energy (in trillions of BTU's) during the 1960-77 period is assumed to be a function of "real" energy price and "real" output. The estimated demand equation appears in Table VI. 1. By holding economic growth constant, the price of energy is seen to have a negative and significant relationship to total energy consumption. Overall, the New Jersey economy has been responsive to changes in relative energy prices (elasticity = −.401) even in the short-run. Although previous studies of regional energy demand have found higher energy price elasticities for particular sources of energy, they are often attributed to the existence of alternative energy choices. By treating energy as a homogeneous commodity, consumer response was effectively reduced.

[5] The electric utility sector is excluded from this analysis, because of difficulty in separating that sector's dual role as a consumer of energy and as a producer of energy.

TABLE VI. 1
NEW JERSEY ENERGY DEMAND

Variable(s)†		*Coefficient*	*t*
X_1: real energy price	=	−.401	−9.27**
X_2: real GSP	=	.920	23.83**
Intercept	+	4.482	17.08**
$R^2 = .97$			
$F_{(2, 15)} = 285.4$			
D.W. = 2.32			
Dependent Variable = Annual Gross Energy Consumption in Trillions of BTU's (1960-77)			

† Etimated in natural logarithms. In all the following tables, * denotes statistical significance at the 10% confidence level; and ** denotes statistical significance at the 5% confidence level.

The energy-output elasticity (+.920) is significantly less than one at a 5 percent confidence level[6] which means that one percent of economic growth (GSP or Gross State Product) can be accommodated by *less* than a one percent increase in energy demand.

By disaggregating the energy data, it becomes clearer which sector of the New Jersey economy has been the most, and which sector the least, sensitive to changes in energy prices. Sectors are presented in order of their contribution to overall energy demand.

Transportation

The transportation sector accounts for approximately 35 percent of total State energy demand. In order to account for the "size" of this sector, energy consumption was divided by population. Total transportation energy use per capita was estimated to be a function of the inflation-adjusted price and per capita income (Table VI. 2).

TABLE VI. 2
NEW JERSEY ENERGY DEMAND: TRANSPORTATION

Variable(s)	*Coefficient*	*t*
X_1: real transportation energy price	−.471	−4.152**
X_2: real personal income per capita	1.100	18.046**
Intercept	.549	.783
$R^2 = .97$		
$F_{(2, 15)} = 229.7$		
D.W. = 1.69		
Dependent Variable = Annual Gross Transportation Consumption (in Trillions of BTU's (1960-77) per capita)		

Although the transportation price elasticity is less than one, it shows a stronger consumer response than the price elasticity for the economy as a whole even though gasoline prices, which weigh heavily in this sector, have shown less change (up to 1977) per million BTU's than prices in other sectors. There are several possible explanations. Even though it is argued that personal driving habits cannot be changed and that workers must travel to and from their jobs, there are alternatives that become attractive as the relative price of gasoline rises. Typical responses are carpooling, switching to more fuel-efficient automobiles, or abandoning the private auto in favor of mass transit. There is also the possibility that suburban economic development during the 1960-77 time period has resulted in relatively more jobs being created in the suburbs and thus reducing the suburban resident's long commute to the central city.

The estimated price elasticity of transportation energy demand suggests that for every one

[6] In other words:

$$t = \frac{1 - \text{coefficient}}{\text{Std. error}} = \frac{1 - .920}{.0386} = 2.07$$

(where $t_{.05} = 1.75$)

percent increase in real gasoline prices there was a .47 percent decline in energy consumption. In order to arrive at this figure, it was necessary to hold real per capita personal income constant. Higher incomes, of course, offset the budget constraints of rising energy prices while population growth supplies additional drivers to the State's roads irrespective of gasoline prices. Overall, a one percent increase in real income per person is estimated to increase the demand for gasoline by 1.1 percent.

Residential

There are several factors that influence residential energy demand. These include the number and size of households, the percentage of the population living in urban or multi-family dwellings, climate, and the composition and use of home appliances. However, they are not very important in revealing the price and income elasticities of energy demand, which are the main concern of this report. The variables appearing in the demand equation are real energy price and real income per household (Table VI. 3). Again, to account for the absolute size of the residential sector, residential BTU's were divided by the number of households.

TABLE VI. 3
NEW JERSEY ENERGY DEMAND: RESIDENTIAL

Variable(s)	*Coefficient*	*t*
X_1: real residential energy price	−.376	−9.07**
X_2: real per household income	.427	5.75**
Intercept	.075	.309
$R^2 = .90$		
$F_{(2, 15)} = 65.3$		
D.W. = 1.79		
Dependent Variable = Annual Gross Energy Consumption (in Trillions of BTU's (1960-77) per household)		

Residential energy elasticity (−.376) is not significantly different from total New Jersey energy elasticity (−.401). Since the estimated elasticity is significantly less than one, it might reflect the lack of energy alternatives to homeowners and renters as well. In any event, the estimation of a significant and negative price elasticity indicates that price rationing could be an effective conservation policy in the short run. The existence of a positive income elasticity (.426) indicates that residential energy is a normal, but income inelastic, economic good, at least in the short-run.

Commercial

New Jersey commercial establishments consumed 350 trillion BTU's of energy in 1977 accounting for approximately 22 percent of the total. Energy prices in this sector were ranked third in importance in 1960, but reliance on residual and distillate fuels now ranks it second behind the residential sector. Commercial energy demand is assumed to be inversely related to price and positively related to output, measured by real retail sales (Table IV. 4).

The commercial sector's response to energy price change is low. The price elasticity (−.116)

TABLE VI. 4
NEW JERSEY ENERGY DEMAND: COMMERCIAL

Variable(s)	*Coefficient*	*t*
X_1: real commercial energy price	−.116	−1.34*
X_2: real retail sales	2.136	8.74**
Intercept	.039	.061
$R^2 = .87$		
$F_{(2, 15)} = 39.31$		
D.W. = 1.65		
Dependent Variable = Annual Gross Energy Consumption in Trillions of BTU's (1960-77)		

is negative and statistically significant. The quantity of energy demanded, however, is found to be highly sensitive to the level of retail sales ($X_2 = 2.14$). A possible explanation for the low price elasticity is that entrepreneurs in this sector, more than others, have the ability to pass along higher energy prices to consumers. If this is so, we should see some downward influence on retail sales (as a result of higher prices) which is not readily apparent because of interactions with other economic variables. Moreover, the commercial sector includes significant numbers of renters and lessors who have little control over energy use. Another factor may be the wide scale development of climate controlled indoor shopping malls which appear to consume relatively large quantities of energy relative to retail sales. However, the attraction of agglomerated markets may appeal to the consumer and result in transportation energy economies as store-to-store driving is curtailed. Thus, energy conservation may be underestimated in the commercial sector and possibly overstated in the transportation sector.

TABLE VI. 5
NEW JERSEY ENERGY DEMAND: INDUSTRIAL

Variable(s)	*Coefficient*	*t*
X_1: real manufacturing energy price	−.238	−4.760**
X_2: real wages per production worker	−1.439	−6.365**
Intercept	2.685	5.449**
$R^2 = .82$		
$F_{(2, 15)} = 33.86$		
D.W. = 1.31***		
Dependent Variable = Annual Gross Industrial Energy Consumption (in Trillions of BTU's (1960-77) per dollar of real value-added)		

*** The Durbin Watson statistic indicates some degree of auto correlation, however, an adjustment procedure did not significantly alter the magnitude of the coefficients.

Manufacturing

The manufacturing sector consumes about 20 percent of total BTU's in the State. Since the size of the manufacturing sector has changed over the 18 year sample period, total energy demand is divided by output (value added). Industrial energy demand per dollar of value added is hypothesized to be negatively related to price, and positively or negatively related to real wages per production worker (Table VI. 5). Technological progress over time leads to a more efficient use of energy as well as higher labor productivity and higher real wages. This trend effect will show a negative correlation between real wages and energy use per dollar of value added. If labor and energy are complements, the negative trend effect will be reinforcd by the complementary effect. On the other hand, if labor and energy are substitutes[7], real wages will be positively correlated with energy demand, offsetting the negative trend effect. The net effect will be positive or negative depending on which effect is stronger.

The estimate of manufacturing energy price elasticity suggests that for a ten percent increase in price, consumption of energy falls by 2.4 percent. The measured price elasticity (−.24) is quite low due to the fact that manufacturing energy prices in this period (1960 to 1977) have exhibited less increase and variation than that observed in the State's other major energy consuming sectors. Also, manufacturers often possess the technology to switch fuels as prices change thus restraining the increase in their energy bills. Moreover, there have been changes in the industrial mix in New Jersey during the 1960-77 study period which have altered the demand for energy in relation to the composition of manufactured goods.

Table VI. 6 summarizes the short-run energy price elasticities by sector and ranks them in

[7] A recent study by Dale Jorgensen finds that employment may now be a substitute for energy when all sectors of the economy are aggregated. In particular, labor-for-energy substitution appears to cushion the harmful effects of rising energy prices in the long run. See, *New York Times*, March 21, 1980.

descending order of importance to overall New Jersey energy demand.

TABLE VI. 6
NEW JERSEY ENERGY DEMAND: SUMMARY

Sector	*Price Elasticity*
Transportation	—.471
Residential	—.376
Manufacturing	—.238
Commercial	—.116
New Jersey	—.401

A Look at Energy Demand Within the Manufacturing Sector

Since the manufacturing sector is vital to the economic health of the State's economy, it is worthwhile to review the behavior of energy demand over time by major two-digit industries. In order to compare energy consumption between two points in time, it is necessary to separate differing rates of real output (as measured by manufacturing value added) for each two-digit industry from energy demand by industry. The two points in time, 1963 and 1976, were selected in order to allow sufficient time for the energy-output ratio to adjust to changes in energy prices.

In 1963 New Jersey's manufacturing firms consumed 24.5 million BTU's per dollar of real value added, and in 1976, the manufacturing sector consumed 97% of that amount, or 24.0 million BTU's. However, there were considerable differences in energy demand among manufacturing industries. Figure VI. 4 illustrates a ratio between 1976 and 1963 energy use (per dollar of value added) for all two-digit manufacturing industries.

Apparel, Stone-Clay-Glass, Printing, Fabricated Metals, and Food all consumed relatively *more* energy per dollar of output than in 1963. In the case of Apparel, it is suspected that a significant increase in output per worker was the result of substitution of capital for labor. Increased capital intensity thus increases the demand for energy.

The majority of output and employment growth is concentrated in those industries with declining energy-value added ratios. With the price of energy increasing faster than the price of other inputs, it stands to reason that those industries with relatively large energy demands would seek energy saving technology or initiate energy conservation programs. It should be noted that most industries with higher than average energy demand (with the exception of Stone-Clay-Glass) have reduced their energy requirements (per dollar of value added) over the 1963-76 time period. This list includes Chemicals, Primary Metals, and Paper industries.

It is suspected that those industries responding to rising energy prices by reducing their energy-value added ratios are more often than not faster-growing industries. A simple correlation between changes in the energy-value added ratio and changes in real output is negative (—.44) and significant at the ten percent level of significance ($t = 1.72$). This statistic suggests that energy conservation is related to manufacturing growth (in New Jersey).

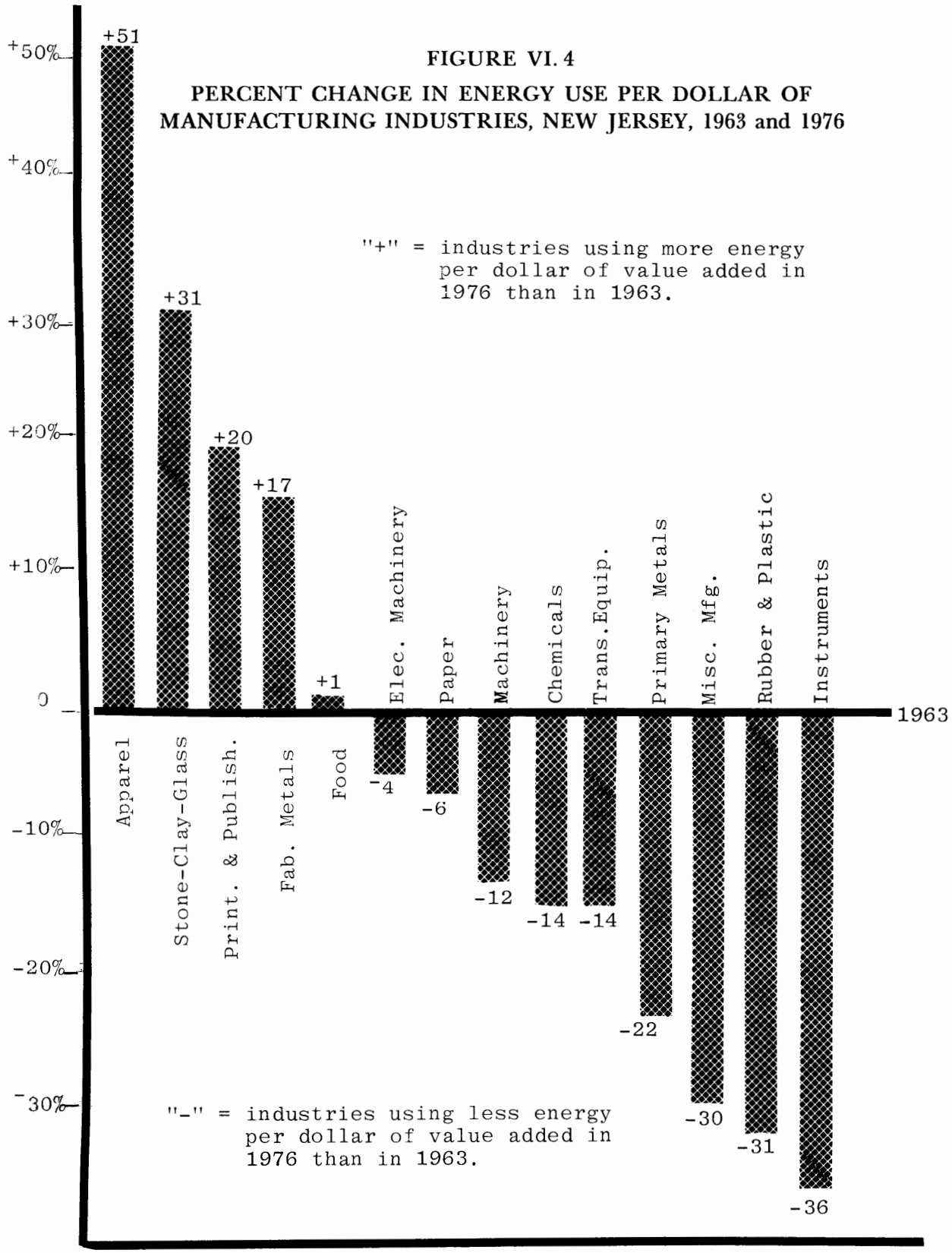
Long Run Energy Demand

Historically, energy prices have been low relative to those of other inputs. Consequently, cheap energy has played a central part in the industrialization and urbanization of the United States. Since energy was abundant and cheap, major population and industrial complexes developed in the Northeast and Mid-Atlantic states, far removed from basic energy sources. Some industry was attracted to sources of cheap energy, but by and large industry located in response to market demand factors or other supply factors.

Now, however, the higher price of energy is found to differ substantially from state to state and the higher level and geographic differences will have an effect on future industrial development. As of 1976, the price per million BTU's in the manufacturing sector ranged from a high of $4.75 in Massachusetts to $1.01 in New Mexico. The price in New Jersey was $3.85, well

FIGURE VI. 4

PERCENT CHANGE IN ENERGY USE PER DOLLAR OF MANUFACTURING INDUSTRIES, NEW JERSEY, 1963 and 1976



* Value added has been adjusted for inflation by appropriate Producer Price Indexes.

above the national average energy price of $2.18 per million BTU's. There are a number of reasons accounting for the variation in state energy prices including the mix and cost of fuels consumed, sources of fuels, price controls on interstate sales of natural gas,[8] and state taxes levied on interstate energy sales.

A cross-section (state by state) energy demand analysis for 1976 is provided in order to measure long-run adjustments to differences in interstate energy prices. One example of a long-run adjustment might be the relocation of a manufacturing firm to a state with comparative cost advantages. Assuming that the long-run demand for energy will increase more rapidly than supply in the foreseeable future, energy prices will rise. As energy prices rise (relative to the price of other inputs) energy will become a more important location determinant than it has been.

Although many non-price variables influence energy demand, there is an observable inverse relation between energy price and demand. Energy consumption per dollar of (non-petroleum) manufacturing value added[9] ranged from 9 million BTU's in Massachusetts (where energy prices were ranked No. 1 in the nation) to 129 million BTU's in Louisiana (where the price of energy was ranked No. 46).

Certainly the industrial mix, the energy intensity of manufactured products, climate, and other factors influence this ratio; however, in estimating the cross-section elasticity of demand, these factors can be held constant.

The quantity of energy used by the industrial sector is assumed to be a function of output, the price of substitute and complementary resources, and climate. An adjustment has to be made in that the level of manufacturing output is not independent of the price of energy because energy price also affects the location decisions of firms. Manufacturing output (value added) is, therefore, estimated from both supply and demand variables.[10] Value added will be negatively affected by the prices of inputs and positively related to market-oriented variables. The specification for the energy and value added equation is given below:

Quantity of Energy Purchased

1. $\text{LnQ} = A_0 + A_1\text{LnP} + A_2\text{LnV} + A_3\text{LnM} + A_4\text{LnW} + A_5\text{LnH} + A_6\,\text{LnJ}$

Value Added

2. $\text{LnV} = B_0 + B_1\text{LnP} + B_2\text{LnW} + B_3\text{LnK} + B_4\text{LnE} + B_5\text{LnL} + B_6\text{LnD} + B_7\text{LnY}$

where:

- Q = total industrial energy consumption (in trillions of BTU's)
- P = Price of Energy (weighted by mix of fuels)
- V = Manufacturing Value Added
- M = Value of Mineral Production
- W = Average hourly wages of Production Workers
- H = Heating degree days
- J = Average July temperature
- K = Capital Stock (book value of manufacturing investment in millions)
- E = Energy Productivity (output per BTU)
- L = Labor Productivity (output per manhour)
- D = Population Density (persons per square mile)
- Y = Per Capita Personal Income (in thousands)
- Ln = Natural logarithm
- A_i = Estimated coefficients
- B_i = Estimated coefficients

[8] Natural gas price controls which have recently been lifted were in effect during the time period studied.

[9] Note that statistical sources include energy consumed in minerals production with a broader category of industrial consumption, thus all measures of manufacturing value added also includes the value of mineral production.

[10] The idea for this specification was developed by Halverson, *op. cit.*

It is expected that manufacturers at the state level will be more responsive to long-run increases in energy prices because, in addition to energy conservation some firms will leave high price energy states and relocate in states where costs are less. Therefore, an estimate of the state price elasticity of demand must not only incorporate the effects of price on energy use but also the influence of energy price on the location of manufacturing output among states.[11]

The estimated coefficients are given below:

1. Quantity of Energy Equation

	Variable	*Coefficient*	*t*
A_0	Intercept	−6.17	−.97
A_1	Energy Price (P)	−.92	−4.16**
A_2	Value Added (V)	.72	11.17**
A_3	Mineral Value (M)	.18	3.53**
A_4	Wages (W)	.63	1.34*
A_5	Heating degree days (H)	−.09	−.63
A_6	July Temperature (J)	.97	.72

$R^2 = .90$ **Significant at 5%

$N = 48$ states *Significant at 10%

$F_{(6, 41)} = 63.83$

The estimated long-run nationwide industrial energy price elasticity, −.92 is considerably larger than any of the short-run elasticities (see Table VI. 6). This suggests that manufacturing firms, if allotted sufficient time, do adjust to differences in relative energy prices. The estimated energy price elasticity (−.92) is not found to be significantly different from unity which means that a ten percent increase in national energy prices induces an approximately ten percent decline in energy demand (holding the effect of other variables constant).

The output variables, value added and mineral value are positive and significant at the five percent level. A measure of manufacturing energy conservation can be observed from the energy output elasticity (A_2) whereby a ten percent increase in value added can be achieved with an increase in energy consumption of only 7.2 percent. The coefficient for labor cost is positive ($A_4 = .63$) indicating that over a longer period of time, labor may be a substitute for energy as discovered by Jorgensen (see footnote 7). The variables representing climate were insignificant.

Estimates of the parameters of the value added equation are given below:

2. Value Added Equation

	Variable	*Coefficient*	*t*
B_0	Intercept	−4.55	−1.85**
B_1	Energy Price (P)	−.36	−2.99**
B_2	Wages (W)	−.19	−.74
B_3	Capital Stock (K)	.96	33.14**
B_4	Energy Productivity (E)	.36	7.32**
B_5	Labor Productivity (L)	.10	.55
B_6	Density (D)	−.01	−.35
B_7	Per Capita Income (Y)	.49	1.56*

$R^2 = .98$ **Significant at 5%.

$F_{(7, 40)} = 455.73$ *Significant at 10%.

In general, value added is positively related to income, capital stock, and productivity, and negatively related to the prices of inputs. Energy price in particular is observed as having a negative influence on the level of manufacturing output ($B_1 = -.36$). This can be interpreted to mean a 10 percent increase in energy price lowers value added by 3.6 percent.

The coefficient for labor costs was insignificant. This may reflect a lack of sufficient variation across states. Increases in energy and labor productivity were positively associated with increased manufacturing output, but the coefficients were less than unity. The coefficient for the capital stock was positive ($B_3 = .96$) as expected. Per capita personal income was positively related to value added (.49) while the coefficient for density was negative but insignificant.

[11] A change in the price of energy in a given state will affect demand for energy directly (A_1), and through its effect on the location decisions of firms (A_2B_1). The state price elasticity of demand will therefore be equal to $A_1 + A_2B_1$. The location effect is composed of the effect of energy price on value added (B_1), representing the changes in output due to industrial relocation induced by energy price changes, and the effect of value added (production level) on energy demand (A_2). Note that this estimate is *not* an appropriate measure of the response of demand to a nationwide price change, because a change affecting all states equally would not induce the location effect. The proper nationwide price elasticity is therefore A_1.

The long-run state energy price elasticity in manufacturing is −1.17. This exceeds the national energy price elasticity because it includes the effect of price on the level of manufacturing output. This result indicates that energy is price elastic in the long-run once the differential effects of industrial development are incorporated in the model.

The Employment Cost of High Energy Prices

It has been shown that manufacturing energy demand is responsive to differences in energy prices across states. A state with higher than average or rising energy prices, other things equal, is likely to be discriminated against in the location of manufacturing industries—especially high energy intensive industries. By using the value added equation developed in the previous section, we can estimate the shortfall in value added and employment stemming from higher than average energy prices.

In 1976, New Jersey's weighted energy price was $3.85 per million BTU's as compared to the national average of $2.18 per million BTU's. As stated earlier, there are several economic reasons for price differences among states which includes the mix and source of consumed fuels and transportation costs to the point of consumption. In addition, there are a number of legislated factors which serve to widen the interstate energy price differential. Among these are price regulations and taxes levied on interstate energy sales.

Since New Jersey's energy price is well above the average price, we estimate that manufacturing output and employment are less than if New Jersey energy was priced at the U.S. average. We calculate that there would have been about 170 thousand additional manufacturing jobs in New Jersey in 1976 if energy prices had been at the national average. From a public policy point of view we argue for a reduction in regulations, taxes, and guidelines that serve to increase the energy price differential among states.

Summary and Conclusion

This analysis of New Jersey's energy profile measured the importance of energy to state economic growth and estimated the influence of changes on energy price on current and long term energy demand.

By several different measures, New Jersey is found to be relatively energy efficient. New Jersey ranks ninth in population and seventh in manufacturing output, but falls to twelfth place in gross energy demand. On a per capita basis State energy consumption is only 68 percent of the national average.

On the national level, some advocates suggest forsaking economic growth in order to conserve scarce energy resources. However, a statistical review of New Jersey data during the 1960-77 period revealed a reduction in the amount of energy required to produce a dollar of output. Throughout the 1960's a dollar of output required about 46 thousand BTU's. By 1977 the so called "energy-output ratio" fell to 38 thousand BTU's/$. Other evidence of relative energy efficiency is drawn from the estimated short-run energy-output elasticity which was significantly less than unity. In other words, available evidence indicates that it is possible for New Jersey to accommodate economic growth (in the short run) with a less than proportionate increase in energy demand.

The relative decline in state energy demand was not a random occurrence but was related to increases in the price of energy and changes in other key economic variables. From time series data it was found that in the short-run for each 10 percent increase in relative energy price, quantity purchased was reduced by about four percent (price elasticity $= -0.4$). The negative impact of rising prices suggests that price serves as an effective mechanism to reduce energy demand and encourage conservation.

Despite the conclusion that price is an effective way to promote conservation, the energy savings

attributed to a rising price may fall short of national energy conservation priorities. If this is the case, a strong argument could be made for additional or non-price incentives to promote energy conservation.

An analysis by principal energy consuming sectors found the transportation sector to respond the strongest to changes in energy price (—.47), followed by residential (—.37), manufacturing (—.24), and commercial (—.12).

A review of energy use by the State's industrial sector found that most energy intensive manufacturers had reduced their energy inputs per dollar of output between 1963 and 1976. Also, a relationship was found between growth in manufacturing output and reductions in relative energy use.

Cross-section energy data were analyzed to provide estimates of the long-run response to changes in energy price. The estimated national energy price elasticity (—.92) exceeded the short-run measure (—.4) because sufficient time was allotted for technological and locational changes. After correcting for differences in interstate development and allowing for possible relocation of manufacturing firms from high to low energy cost areas, the average state price elasticity was found to be —1.17. In other words a ten percent increase in industrial energy price leads to almost a twelve percent decline in manufacturing energy demand. The analysis concludes that if the price of energy continues to rise faster than the price of other inputs, energy will become a more important factor in the location of industrial facilities.

From a policy standpoint, the State should work for continued deregulation of interstate energy prices and critically review taxation of interstate energy sales. Widening differences in energy prices among states will have continuing deleterious effects on Northeast industrial development. Only by integration of interstate energy prices will the artificial comparative advantage now afforded to selected energy producing states be abolished.

VII

SPECIALIZATION IN SERVICES AS STATE DEVELOPMENT POLICY*

The objective of this Chapter is to call into question the often-voiced notion that New Jersey can begin specializing in service production. This opinion holds that New Jersey need not be concerned about job losses in the manufacturing sector since they can be replaced by gains in the service sector.

It is said to be both natural and desirable that the State move away from the recession-prone, pollution-troubled, goods-producing economy toward a more economically stable and clean service economy. It follows that New Jersey development policy should concentrate on service industries. More of the State's necessarily limited economic development efforts, funds and incentives should be directed toward service firms; less toward manufacturers.

Some of the recent economic literature seems to support this notion or at least makes it seem plausible. Daniel Bell, for example, holds that consumption in the national economy is moving away from manufactured goods in favor of services—non-goods such as education, health care, and entertainment.[1] Implicit in his viewpoint is the tenet that the basic economic problem, scarcity of goods, is, or will be, solved.

But by no means do all economists agree with this thesis. There does seem to be general agreement that service employment will rise to a major proportion of total employment as an economy matures. However, it is often pointed out that this does not imply that the desire for goods will be sated or that consumption will shift to services. In fact, according to one observer, Jonathan Gershuny, the trend of consumption in one advanced economy, Great Britain, is now turning in the other direction. He states that except for medicine and education, "the consumption of services in Britain has actually decreased as a proportion of total consumption over the last twenty years."[2]

There is close correspondence between the debate in the literature and the dialogue in New Jersey. The "concentrate-on-services" stance must essentially hold that service production can expand unconstrained by any stagnation or decline in goods production. If the economy is experiencing a shift of consumption from goods to services, then a state *can* specialize in services. But if material wants cannot be satisfied, and if there are interrelations in the production of goods and the consumption of services, making them to a large degree inseparable, then a policy promoting specialization can only meet with frustration. This Chapter presents evidence for this latter view.

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* Prepared by Dr. Laurence H. Falk, Office of Economic Policy.

1 Daniel Bell, *The Coming of Post-Industrial Society*, New York: Basic Books, Inc., 1973, pp. 127-29.

2 Jonathan Gershuny, *After Industrial Society?*, Atlantic Highlands, NJ: Humanities Press, 1978, pp. 138-40.

TABLE VII.1

NON-AGRICULTURAL AND SERVICE EMPLOYMENT
(thousands)

Employment Category	United States 1970	United States 1977	Annual Change %	New Jersey 1970	New Jersey 1977	Annual Change %
Labor Force	85,900	99,500	2.12	2,982.0	3,353.0	1.69
Total Non-Agricultural Employment	70,880	82,256	2.15	2,606.2	2,836.1	1.21
Services (private sector)						
Wholesale & Retail Trade	15,040	18,492	3.00	538.0	637.8	2.46
Services	11,548	15,249	4.05	410.4	509.6	3.14
Transportation, Communication and Public Utilities	4,515	4,696	0.56	182.2	178.2	—0.32
Finance, Insurance and Real Estate	3,645	4,452	2.90	116.5	142.9	2.96
Total Services (excluding government)	34,748	42,889	3.05	1,247.1	1,468.5	2.36
Total Services as a percent of non-agricultural employment	49.02	52.14	....	47.85	51.78	....

SOURCES: U.S. Bureau of the Census, *Statistical Abstract of the United States,* 1979; U.S. Bureau of Labor Statistics, *Employment and Earnings, 1939-78,* November 1979, New Jersey Department of Labor and Industry, *New Jersey Economic Indicators,* June 27, 1980.

Growth of Service Employment

For many years, in New Jersey and the United States, employment in services has been growing both in absolute numbers and as a proportion of total employment. Since the empirical sections of this study deal with the recent period 1970-77, it is instructive to examine employment over that period.

Table VII.1 compares non-agricultural employment and employment in non-governmental services in New Jersey and the United States in 1970 and 1977. Both non-agricultural employment and service employment show substantial gains over the seven year period. The average annual growth rate for non-agricultural employment in the United States was 2.15 percent; New Jersey employment grew 1.21 percent per year. Services grew more rapidly: 3.05 percent per annum in the United States; 2.36 percent in New Jersey.

The United States non-agricultural employment growth rate closely followed the 2.12 percent growth rate of the national labor force. New Jersey's labor force average growth of 1.69 percent exceeded somewhat its non-agricultural employment growth, but both in the United States and New Jersey service employment grew significantly faster than labor force and non-agricultural employment. In the United States and in New Jersey, non-governmental service employment overtook other non-agricultural employment. In the 1970-77 period, these services grew from 49.02 percent of total U.S. non-agricultural employment to 52.14 percent; the New Jersey proportion increased from 47.85 percent to 51.78 percent.

There are several historical facts that can help us explain the general trend of increasing service employment share. They are related to income growth, technical progress and ever-

growing productivity differentials between the goods-producing sector and service-producing sectors.

First, it is generally accepted that productivity gains in the manufacturing sector have far outpaced those in the service sector, and will continue to do so, since manufacturing processes are more susceptible to technological advances. Thus, even if growth in demand for services were no greater than growth in demand for goods, the proportion of total employment in services would necessarily rise. For example, if demand for both goods and services were each to double during a given time period, employment would not likely double in either sector; but the addition to service employment would need to be greater than the addition to goods employment because productivity gains achieved in services during the period would not match those realized in manufacturing. Indeed, service demand could even be growing more slowly than the demand for goods, yet the need for extra service jobs could still surpass the need for new manufacturing jobs. All that is required is the existing disparity in productivity gains.

Second, there are some increases in service jobs that are more apparent than real. Part of the growth in services is a shift of work once performed in the home to specialized service industries outside. Examples are cleaning and food preparation. Rising incomes have allowed for the use of these services by an ever-increasing part of the population.

Third, a number of business services such as transportation, accounting, and many managerial functions were previously carried out within goods-producing industries but are now often spun off to the service industries. This specialization has become possible largely through technical innovations.

It is possible that in both cases of spinoff—from the home and from the factory—total labor expended actually declined because of the new specialization. But, in the case of the home at least, published employment figures would show otherwise.[3]

Fourth, wholesale and retail services represent the final phase of the production process. Here employment growth is closely related to the growth of manufactured output. But since productivity is apparently growing faster in manufacturing than in trade establishments, it is understandable that trade employment represents an increasing share of total employment.

The group of outputs called "services" is far from homogeneous, however, and the general statement that these services are rising as a proportion of total employment does not apply to each individually. The classification "Transportation, Communication and Utilities" includes industries that have achieved great technological advance. As a result, the employment share for this classification has long been declining. In the recent years 1970-77, the U. S. share declined from 6.37 percent to 5.71 percent of total non-agricultural employment; the New Jersey share for the classification fell from 6.99 percent to 6.28 percent.

Employment in Individual Categories

Ten service industry categories are studied in this Chapter. They include all service classifications except government and several small industry groups—auto repair, services and garages; miscellaneous repair services; motion pictures; legal services; and miscellaneous—that we did not consider amenable to our study approach.[4] Recent growth history for the ten industries that are the subject of this report is summarized in the following table.

[3] It is also possible that, in the future, a reverse spinoff process will yield the opposite result: a reduction of jobs. Cable Television offers an example. Increased use of cable television in the home can lead to less employment in the entertainment services industry. Gershuny, *op. cit.* refers to this reverse process in the subtitle of his book: "The Emerging Self-Service Economy."

[4] Moreover, since the data source for this study is the U.S. Department of Commerce, *County Business Patterns* (various years), employment figures for the ten categories represent only employees covered by F.I.C.A. Excluded are government employees, railroad employees, self employed persons, farm workers, domestic service workers and persons employed on airborne vessels.

TABLE VII.2
SERVICE INDUSTRY EMPLOYMENT GROWTH
1970 - 1977

Industry Group	Employment (thousands)				1970-1977 Average Annual Growth Rate (%)	
	United States		New Jersey			
	1970	1977	1970	1977	U.S.	N.J.
Transportation	2,082	2,114	94.7	96.3	0.22	0.24
Wholesale & Retail Trade	15,107	17,946	540.2	625.6	2.49	2.12
Communication & Utilities	1,712	1,805	61.0	59.7	0.76	—0.31
Finance	2,930	3,595	92.6	113.4	2.97	2.94
Real Estate	727	891	24.2	25.9	2.95	0.97
Amusements, Recreation & Lodging	1,218	1,500	27.4	34.2	3.02	3.22
Business Services	1,632	2,307	67.9	96.7	5 07	5 18
Personal Services	1,002	901	35.3	28.6	—1.51	—2.96
Health Services	2,902	4,339	94.8	140.3	5.91	5.76
Educational Services	890	992	27.0	31.9	1.56	2.41

SOURCE: U.S. Department of Commerce, Bureau of the Census, *County Business Patterns,* (various volumes).
Rates of growth differ from those in Table VII.1 because of differences in data as explained in the text.

In the United States, except for transportation, communication and utilities and personal services, the service categories under investigation grew significantly faster than the labor force. Growth in New Jersey also exceeded labor force growth except for these three categories plus real estate. Health services had the highest average annual growth rate, both in the United States and in New Jersey, followed by business services. New Jersey's growth was greater than that in the United States in five of the ten categories, including the rapidly growing business services industries.

Given the recent sizable gains in service employment, it is indeed tempting to suggest that the State confine its developmental efforts to the service industries. But this implies that service employment gains can be achieved through a process of specialization in services to the neglect of manufacturing.

The Specialization Process

To be able to specialize in services jobs a state must be able to export service products to other states. With some exceptions, such exporting is very difficult or impossible or not economically feasible.

Transportation, communication and public utility companies must serve people where they live. Wholesale trade must be located in population centers. While mail-order retail trade exists, it accounts for only one percent of the retail trade employment in the United States. Professional services must, for the most part, be located at the point of demand, as is the case with personal services. The major exceptions to the nonexportable rule probably lie in finance—New York is a major financial center for the nation—and some business services. However, many business services must be located near the firms that purchase their outputs.

Thus, it is clear that at least some services cannot be exported. If this is true for the products of most service industries, then any policy neglecting manufacturing development in favor of service industry development will be futile.

The empirical sections that follow investigate the hypothesis that growth of employment in the service sector must be associated with broader economic development.

Study Approach

Ten service industry divisions were selected for study. Some services have been excluded because, for the most part, there is little opportunity for exporting them to other states. Included in the industries omitted are: automobile and other repair services, motion pictures, legal services and nonprofit membership organizations. Although the motion picture producing industry offers significant export possibilities, the data combine production employment with local motion picture distribution and retailing figures. Moreover, most states are not involved in production to any large degree; this fact makes it difficult to carry out cross-sectional statistical studies in this industry.

For obvious reasons, governmental services have been omitted from this study. Moreover, the data we have used do not include railroad employment or other employment not covered by F.I.C.A. (Social Security). With one exception, the results should show little or no change if all excluded employment were added to our data. The exception is educational services where a large proportion of total employment is by local and state governments. This study is concerned with *private* educational industry services which differ in many ways from the educational services provided by governments.

Least squares regression analysis was used to link variation in employment in each of the ten service categories with variations in a group of economic and demographic variables. Regressions were cross-sectional—across the "lower 48" states. The dependent service employment variables are: 1) CTRAN—change in transportation employment; 2) CCUT—change in communication and utility employment; 3) CTR—change in wholesale and retail trade employment; 4) CFI—change in finance employment; 5) CREL—change in real estate employment; 6) CHEL—change in health services employment; 7) CPER—change in personal services employment; 8) CED—change in educational services employment; 9) CBS—change in miscellaneous business services employment; and 10) CARL—change in amusement, recreation and lodging employment.

Each dependent variable (S) was formulated as a relative growth (or decline) measure:

$$\frac{S_{ij}^{1977} - S_{ij}^{1970}}{S_{ij}^{1970}}$$

where S_{ij}^{year} is employment in the ith service industry in the jth state during the given year.

Independent variables used are: 1) CINC—change in per capita income; 2) CDEM—change in the percentage of the population either under 21 or over 64 years of age; 3) CPOP—change in population; 4) CYUTH—change in the percentage of the population under 21 years old; 5) CSENR—change in the percentage of the population over 64 years of age; 6) LDENS—the natural logarithm of population per square mile; 7) CEDUC—change in the number of persons 25 and over with four years college or more; 8) CMAN—change in manufacturing employment per capita; 9) CRMA—change in the ratio of value added in manufactures to total farm income; and 10) DPORT—a dummy variable for states having major deep water ports.

With the exception of LDENS, CEDUC, and DPORT, each independent variable was also defined as relative growth:

$$\frac{V_{kj}^{1977} - V_{kj}^{1970}}{V_{kj}^{1970}}$$

where V_{kj}^{year} is the value of the kth development or demographic statistic in the jth state for the given year.

TABLE VII. 3

REGRESSION RESULTS

Service Employment Variable	Constant	Explanatory Variables					$\bar{R}^2$
1. Transportation (CTRAN)	= 0.356	+0.693 CPOP	−0.491 LDENS	+0.493 CMAN			0.644
	(2.351)	(2.391)	(−2.427)	(2.621)			
2. Communication and Utilities (CUT)	= −0.509	+1.518 CPOP	+0.583 CINC				0.625
	(−3.756)	(7.228)	(3.592)				
3. Wholesale and Retail Trade (CTR)	= 0.171	+1.395 CPOP	−1.503 CDEM	−0.018 LDENS	+0.145 CMAN		0.889
	(1.983)	(9.914)	(−2.587)	(−2.189)	(2.947)		
4. Finance (CFI)	= 0.189	+0.952 CPOP	+0.165 CMAN				0.575
	(11.512)	(6.289)	(2.725)				
5. Real Estate (CREL)	= −0.018	+2.173 CPOP	−5.174 CDEM	−1.419 CSENR	+0.457 CMAN		0.574
	(−0.010)	(5.434)	(−2.300)	(−2.817)	(3.137)		
6. Health (CHEL)	= 0.153	+1.050 CPOP	+1.550 CSENR	+0.388 CEDUC			0.597
	(1.725)	(5.216)	(5.818)	(1.887)			
7. Personal Services (CPER)	= 0.075	+1.382 CPOP	−0.575 CINC	−0.464 CDEM	−0.184 CRMA	+0.514 CMAN	0.539
	(0.621)	(6.870)	(−3.695)	(−4.475)	(−2.940)	(3.650)	
8. Educational Services (CED)	= 1.636	−1.194 CINC	+5.141 CYUTH	+1.313 CMAN			0.371
	(4.218)	(−3.043)	(2.169)	(4.196)			
9. Business Services (CBS)	= 0.565	+2.433 CPOP	−0.120 LDENS	+0.283 DPORT	−7.477 CDEM		0.366
	(1.088)	(2.627)	(−2.137)	(2.231)	(−1.970)		
10. Amusements, Recreation and Lodging (CARL)	= −0.145	+1.938 CPOP	−4.170 CDEM				0.367
	(−1.098)	(5.317)	(−2.150)				

Numbers in parentheses are t-statistics.

$\bar{R}^2$ is R^2 corrected for degrees of freedom.

in three regressions. LDENS carries a negative sign in all three of its appearances: in the transportation, trade and business services regressions. The CINC coefficient is positive in the communication and utilities regression and negative in the regressions for personal services and educational services.

It is probable that the densely populated states have smaller changes in transportation, other things equal, because they have older, better established transportation systems; less dense but developing states are expanding their systems.

Wholesale and retail trade may be demonstrating a version of the shopping center phenomenon. While the preference for shopping in the suburbs may not often cause firms to move across state lines from downtown city locations, it may be that density has a negative effect on the desire to shop. Perhaps more important, wholesale facilities may be moving at least short distances away from population centers, and, at times, across state lines.

The negative density coefficient for business services is difficult to interpret. However, since business services are often exportable, it is possible that industry managers are displaying workplace preference for less-dense regions. Still the positive DPORT coefficient appears to signify some usefulness in locating business service facilities near deep port facilities—perhaps because the service firms' customers are often located near deep ports.

The positive CINC coefficient for communication and utilities was expected. Its negative signs in the personal services and educational services were not expected, however, but they are at least partly explainable. The personal services data, which exclude services of household workers, include such items as coin-operated laundries and cleaning. Rising incomes very likely cause decreasing demands for services of these industries, and related industries, because more of the work tends to be done by automatic appliances in the home. Private educational services employment can also respond negatively to income changes. Rising incomes in developing regions can prompt the newly well-to-do to send sons and daughters out of state—to old, established and respected educational institutions.

CYUTH appears in the equations once, as a positive determinant of increases in educational services. This is, of course, as expected; an increase in the percent of young people in the population should lead to increased demand for educational services.

CSENR appears twice, as a positive determinant of health services and a negative factor in real estate employment changes. The former situation is to be expected; an increase in the aged in the population should increase demand for medical services. In the latter case, CSENR acts like the dependency ratio. An increase in the aged in the population leads to a lowered demand for and ability to pay for real estate.

CRMA is the only variable that has not yet been discussed. It is seen only once, in the personal services regression. The sign is negative, and the explanation is uncertain, though it may be similar to that for the negative per capita income-personal services relationship. A change in a state's economic composition away from agriculture and toward manufacturing may lead toward an improvement in the demand for home appliances and thus to a fall in demand for laundry, cleaning and other personal services.

Summary and Conclusions

This paper hypothesizes that growth of services is dependent on growth of the manufacturing sector. It is recognized that service sector employment is growing more rapidly than other employment, and it is expected that the relatively faster service employment growth will continue in the future. Nevertheless, we believe that the level of growth in the service sector depends on other economic development, and any neglect of manufacturing will adversely affect service employment gains.

The results of our study give firm support to the hypothesis. Most of the services investigated show a positive connection with manufacturing employment change and display a positive influence from another developmental variable—population change. Some of the services (representing less than one-fourth of total employment in the categories studied) do not seem to respond to manufacturing development. However, except for business services, these industries hold little prospect for exporting.

Little possibility for specializing exists. Some business services are exportable, but most service industries are dependent either on manufacturing or upon geographic or demographic factors that cannot be changed. In general, then, we conclude that a broad based and effective economic development policy must necessarily pay close attention to the manufacturing sector in order to sustain balanced economic growth over the long-run.

VIII

LABOR PRODUCTIVITY IN NEW JERSEY MANUFACTURING*

Introduction

Labor productivity is one of the most important factors of economic growth, prosperity and price stability. It also contributes to a state's competitive position vis à vis other states or regions. Higher productivity usually leads to lower unit labor costs and a comparative advantage in the marketplace.

This Chapter is devoted to a systematic study of labor productivity in New Jersey's manufacturing industries. It compares New Jersey's level of productivity with other states. A previous study established that New Jersey's labor productivity is among the highest in the nation.[1] It is not clear whether this comparative advantage has been maintained. Therefore, the present study reviews relative productivity levels in 1958, 1967 *and* 1977. These Census of Manufactures years were chosen in order to cover a sufficiently long period of time.

The study consists of four sections. Section I defines the productivity measures applied throughout this Chapter. Section II reviews the results of comparisons of labor productivity between New Jersey, the United States, and two groups of selected states. Section III discusses some of the factors affecting labor productivity in various states. Finally, Section IV is devoted to a regression analysis.

I. Definitions

The art of measuring productivity is far from perfect. It is not that much of a problem to define what productivity should measure. The difficulties are in obtaining appropriate statistical data that comply with the theoretical requirements. It should, therefore, be realized from the start, that the results presented in this paper are, at best, a close approximation to the true productivity levels and their changes over time.

In the broadest sense, productivity is a relationship of output of goods and services to inputs utilized in their production. The question is whether the researcher is interested in measuring the productivity of *specific inputs* or of *all resources* involved in the production process? If one is interested in all inputs, the question then arises—how to express such various inputs as labor, capital, raw materials, energy, *etc.* in one unit of measurement. This subject is not discussed extensively here since there exists a broad literature on it.[2] Instead, the definition of productivity used in this study is limited to just one input—namely labor.

* Prepared by Dr. Adam Broner, Director, Office of Economic Policy. The advice and assistance from Dr. Jong K. You (Office of Economic Policy), Lawrence Leibowitz (Princeton University), and Philip Maniscalco (Rutgers University) are greatly appreciated.

1 See, "New Jersey Manufacturing Industries: A Long-Run Overview," *8th Annual Report,* 1975, pp. 38-60.

2 See, for example, Solomon Fabricant, *"A Primer on Productivity"* (New York, Random House, 1969).

On the output side, there are also known difficulties related to the proper reflection of the quantity and quality of goods and services expressed in value terms. A related concern is the avoidance of comparing productivity in the production of "apples" *and* "oranges" and also of properly expressing the different qualities of *either* apples *or* oranges. A further problem is the requirement to measure output at a limited, both in space and time, production unit. In most market economies, including the United States, this is resolved by measuring only "value-added" in each establishment over a given period of time. Total shipment of goods and services data, also available, contain an unspecified amount of double counting that can significantly distort the true productivity level.

In this paper, three measures of productivity were adopted. They differ only by the way labor input is calculated: one measure of productivity is the amount of output per employee year. The second is the amount of output per production worker year; and, finally, the third is the amount of output per production worker man-hour. The difference between the first and second measure reveals the impact of the proportion of production workers and "white collar" or overhead workers. The distinction between the second and third measures eliminates the impact of different amounts of time spent by production workers during the year.

It is often claimed that different levels of labor productivity, as defined above, really do not reflect *only* the efficiency of labor input, since the latter will also depend on the amount and quality of equipment and machine tools put at the disposal of labor in the production process. An addition to fixed capital will not be shown explicitly, while it will be reflected in higher labor productivity. The question then is whether *labor productivity* is properly measured after all? One way of rectifying such problems would be to include fixed capital among the inputs. But an indirect way of measuring the impact of various levels of capital-labor ratios would be to account for its impact among the factors determining the level of labor productivity. An attempt to capture this influence together with some other factors is made in a subsequent section of this report.

II. Results of Comparisons

The following table presents comparisons of labor productivity in the manufacturing sector measured at the level of two-digit industries in New Jersey and a selected group of states in the South-West (SW), the North-East (NE), and the

TABLE VIII.1

LABOR PRODUCTIVITY IN MANUFACTURING–
NEW JERSEY AND OTHER STATES*

All Manufacturing Industries (19 two-digit industries)	1958			1967			1977		
	NJ/US	NJ/SW	NJ/NE	NJ/US	NJ/SW	NJ/NE	NJ/US	NJ/SW	NJ/NE
Value Added/ Employee	1.05	1.07	1.03	1.07	1.12	1.02	1.02	1.07	1.01
Value Added/ Worker	1.09	1.07	1.03	1.11	1.14	1.04	1.07	1.06	1.02
Value Added/ Man-Hour	1.08	1.08	1.02	1.10	1.14	1.03	1.05	1.05	1.00

* In all tables of this section, the numbers are ratios, i.e., the New Jersey indicator divided by the same indicator in the nation and other states. A ratio greater than 1.0 means that productivity in New Jersey is higher, and a ratio less than 1.0 that it is lower, than in the states selected for comparisons.

SOURCE: Census of Manufactures 1958, 1967 and 1977 and Office of Economic Policy.

entire United States (US). All comparisons are made on a standardized basis, thus eliminating to a large extent the influence of different industry compositions.[3]

In 1958, the first year of this investigation, New Jersey's manufacturing industries achieved higher labor productivity in comparison with the average U.S. as well as the selected states from the Southwest and Northeast.[4] The advantage over the Southwest states was 7-8% and over the Northeast states, 2-3%, depending on the productivity measure. New Jersey had even a greater advantage in labor productivity in 1967, especially over the Southwestern states (1.12 to 1.14).

Many changes took place in New Jersey's industrial development from 1958 to 1977. A significant decline of New Jersey's manufacturing sector was observed both in terms of its position in the national and the state economy. Accompanying this relative decline was the presumed diminished leadership position in new technological developments, as New Jersey was challenged by such states as California, Massachusetts, Texas, and even some of the overseas countries. How did the State fare in terms of productivity over this period? As the calculations indicate, surprisingly, New Jersey lost little ground.

In 1977, the State's productivity level was still 2-7 percent higher than in the United States; 5-7 percent higher than in the Southwest, and above or equal to the other Northeastern states. The loss in New Jersey's comparative productivity level was only 1-3 percentage points, which is negligible for a twenty-year period characterized by such profound structural changes.

Global productivity comparisons for all manufacturing establishments are sometimes made without regard to differences in the industry composition. In order to ascertain the validity of such global comparisons of productivity, a comparison of the relative levels of productivity is made for the entire manufacturing sector on both a standardized and nonstandardized basis. The difference between these two sets of indicators shows whether industry composition had a positive or negative impact on the relative productivity levels for the entire manufacturing sector. As is apparent from Table VIII.2, the non-standardized relative levels of productivity in New Jersey were higher in every comparison. In comparisons with the U.S., for example, the non-standardized ratio in 1958 was 1.08 while the standardized only 1.05. Thus, the industry mix positively affected New Jersey's aggregate productivity in comparison with the United States and the selected groups of states.

TABLE VIII.2

LABOR PRODUCTIVITY COMPARISONS, NEW JERSEY, UNITED STATES AND SELECTED STATES

Productivity Measure	1958			1977		
	NJ/US	NJ/SW	NJ/NE	NJ/US	NJ/SW	NJ/NE
Value Added/ Employee Total Manufacturing						
a) standardized	1.05	1.07	1.03	1.02	1.07	1.01
b) non-standardized	1.08	1.13	1.06	1.06	1.11	1.03

SOURCE: Census of Manufactures, 1958 and 1977, and Office of Economic Policy.

[3] Standardization is a procedure in which a unique industry composition is applied to all states included in the comparisons. In the present study, the U. S. industry mix was applied by using employment (or output) weights for 1958, 1967 and 1977. Individual industry relationships are weighted by the U. S. shares of either employment or output. The overall results of comparisons are then free of the influence of different industry compositions in each state.

[4] The selected South and West states are: California, Georgia, North Carolina, South Carolina, Tennessee, Texas, Virginia and Washington. The selected Northeastern states are: Connecticut, Illinois, Indiana, Massachusetts, Michigan, New York, Ohio and Pennsylvania.

TABLE VIII.3

LABOR PRODUCTIVITY COMPARISONS, SELECTED (4 DIGIT) INDUSTRIES, 1958 AND 1977

Productivity Measure (54 four-digit industries)	1958			1977		
	NJ/US	NJ/SW	NJ/NE	NJ/US	NJ/SW	NJ/NE
Output/Employee	0.90	1.03	0.99	1.00	1.03	0.97
Output/Production Worker	0.94	1.03	0.99	1.11	1.02	0.99
Output/Man-Hour	0.93	1.04	0.99	1.13	1.04	1.00

SOURCE: Census of Manufactures, 1958 and 1977, and Office of Economic Policy.

Even though the differences between standardized and non-standardized levels of productivity do not seem to be very large, they indicate that the State's higher productivity is partially due to its industry mix. Thus, a global comparison of labor productivity in New Jersey and other states somewhat exaggerates our comparative advantage (by 3-6 percentage points in 1958 and 2-4 percentage points in 1977).

Further evidence that New Jersey's higher aggregate productivity is due mainly to changes in industry mix is derived from comparisons of 54 four-digit manufacturing industries. The selection of these 54 industries was based on their high degree of homogeneity and on their importance in New Jersey's manufacturing sector. The results are presented in Table VIII.3.

These comparisons are standardized so that the industry composition does not affect the results, hence one can interpret the results as reflecting genuine productivity levels. The comparison between New Jersey and the Southwestern states shows no change in relative productivity between 1958 and 1977. The comparisons between New Jersey and the Northeast and, especially New Jersey and the total United States, indicate gains in the State's comparative productivity advantage (e.g., from .90 in 1958 to 1.00 by 1977 in comparisons with the U.S.).

Before some hypotheses are formulated and tested, several factors that are generally assumed to determine labor productivity are reviewed below.

III. Factors Affecting Productivity

1. The Investment-Output and Investment-Labor Ratios

Fixed capital values are published only occasionally and are usually expressed as book values, reflecting mixed capital prices for the years when particular capital items were constructed or installed. No reasonable comparisons can be made on the basis of book value of capital.[5] In the present study, only new capital expenditures for a particular Census year are compared. However, since investment-output and investment-labor ratios in New Jersey were consistently lower for many years, it can be assumed that the capital-output and capital-labor ratios are also lower in New Jersey than in the other states used in this study.

Lower capital investments per dollar of value added in New Jersey[6] (see Table VIII.4, Rows 1 and 3) can mean, essentially, two things; either investments in New Jersey are more efficient,

[5] In a previously referenced study published in the *8th Annual Report* an attempt was made to re-evaluate the fixed capital stock in 1972 replacement prices and to compare capital-output and capital-labor ratios for New Jersey and the United States. See, "New Jersey Manufacturing Industries: A Long-Run Overview," *op. cit.*

[6] A comparison of capital expenditures per unit of output for each year between 1947 and 1972 show a consistent pattern of lower investments per dollar of output in New Jersey compared with the United States. See *8th Annual Report, op. cit.*, p. 44.

TABLE VIII.4

CAPITAL EXPENDITURE PER DOLLAR OF OUTPUT AND EMPLOYEE

Indicator	1958			1977		
	NJ/US	NJ/SW	NJ/NE	NJ/US	NJ/SW	NJ/NE
Two-digit Industries						
1. Capital Expenditures/ Output	0.84	0.77	0.92	0.76	0.75	0.92
2. Capital Expenditures/Employees	0.83	0.82	0.93	0.70	0.83	0.86
Four-digit Industries						
3. Capital Expenditures/Output	0.76	0.81	1.04	1.13	0.92	1.11
4. Capital Expenditures/Employees	0.77	0.82	1.01	0.94	0.93	1.04

SOURCE: Census of Manufactures, 1958 and 1977, and Office of Economic Policy.

i.e., for each investment dollar New Jersey industries realize a larger increase in output, or that New Jersey's manufacturing industry is underinvested. The latter is possible in a situation of a shrinking manufacturing sector where output from existing facilities is continued without new investments.

Eventually, output from the old facilities will cease while new plants will not be erected, thereby reducing the State's total production. Under such conditions, investments can be reduced much earlier than output. Therefore, at each particular year, one will observe a lower investment/output ratio.

The supposition that New Jersey has a monopoly for efficient investment is hardly defensible. However, if New Jersey invests a larger share of total capital expenditures on modernization of existing facilities, it can have a lower investment-output ratio. Modernization of old facilities requires relatively less investment per unit of output than the erection of new facilities. However, such a policy can be successful only in a limited period of time, since the opportunities for modernization of existing facilities are exhaustible and become ever more expensive, if continued indefinitely. Sooner or later it will become impossible (or extremely expensive) to continue production at such old and, most likely, obsolete facilities. New facilities, however, will not be available to replace those withdrawn from the production process and the end result will be a shrinking manufacturing sector. There is evidence that this is what actually is taking place in New Jersey.

Capital expenditures per employee (see Table VIII.4, Row 2) are also lower in New Jersey. In 1977, the amount of capital expenditures on new machine tools and equipment put at the disposal of the average New Jersey worker was 30% lower than in the United States (1.00 – 0.70 = 0.30; see Table 4, Row 2 for NJ/US in 1977); 17% lower than in the Southwestern states; and 14% lower than in the Northeastern states included in this study.[7]

These ratios are influenced by the industry mix *within* the two-digit industries. A comparison of the selected four-digit industries is relatively free from the influence of the industry composition. It shows (see Table VIII.4, Row 4), nevertheless, lower ratios in comparisons with the average United States and the Southwest. Only in comparison with the Northeastern states does New Jersey exhibit an advantage in the capital expenditure-labor ratio. It also

[7] Capital-output and capital-labor ratios based on an estimate of the 1972 capital stock in 1972 replacement prices, were approximately 8% lower in New Jersey than in the United States manufacturing sector.

reveals an improvement in these ratios between 1958 and 1977 in all comparisons for the four-digit industries (e.g., 0.77 vs. 0.94 for the NJ/US comparison).

It is generally recognized that higher capital-labor ratios lead to higher labor productivity. Such a relationship has been established in many studies. Larger investments over a long period of time allow the introduction of more recent and efficient technologies and, thereby, considerably raise labor productivity. In New Jersey a prolonged period of lower capital expenditures per employee has been observed. It is, therefore, logical to expect a declining level of productivity in comparison with states that invest much more than New Jersey does.

However, one can see that in New Jersey lower investment ratios have not led to substantially lower productivity levels. It seems, therefore, that the results of relative productivity and investments are in a basic conflict. Before an attempt is made to reconcile these indicators, there is need to introduce some additional results obtained in this study.

2. Size of Establishments

Two measures of the average size of an establishment have been considered: value added per establishment and the number of employees per establishment. Both measures are complementary, and are designed to reveal the impact of economies of scale on the productivity level. It is implicitly assumed that larger establishments are capable of using less overhead and more powerful production equipment and apply more modern management techniques, thereby reducing the amount of total labor per unit of output, i.e., increase productivity. The results of these comparisons are shown in Table VIII.5.

One can observe that rather significant declines in the relative size of New Jersey establishments took place (e.g., from 1.86 in 1958 to 1.45 in 1977; see Table VIII.5, Row 1 for NJ/US). Even though the average size of an establishment in New Jersey remains somewhat larger than in the United States, and possibly in the Southwest, the reductions over time were substantial indeed. One is tempted to say that in New Jersey small establishments are replacing the large ones. From the viewpoint of relative productivity levels, such events are troublesome. However, again, one does not observe commensurate lower relative levels of productivity.

3. Average Annual Earnings and Unit Labor Costs

The analysis of average earnings can serve two purposes. It can be used to show the interrelationship between wages, labor skills, and productivity, and it can indicate to what extent higher wages are compensated by higher productivity, thus allowing unit labor costs to remain competitive. The latter have significant repercussions for economic growth of particular states and regions.

TABLE VIII.5

RELATIVE SIZE OF ESTABLISHMENTS

Industries and Measure	1958 NJ/US	1958 NJ/SW	1958 NJ/NE	1977 NJ/US	1977 NJ/SW	1977 NJ/NE
All Two-digit Industries						
a) Output/Establishment	1.86	1.23	0.98	1.45	0.91	0.79
b) Employment/Establishment	1.49	1.14	0.92	1.04	0.85	0.77
Selected Four-Digit Industries						
a) Output/Establishment	2.35	1.90	1.08	2.57	1.35	0.95
b) Employment/Establishment	1.96	1.49	1.04	1.55	1.11	0.90

SOURCE: Census of Manufactures, 1958 and 1977, and Office of Economic Policy.

TABLE VIII.6

AVERAGE EARNINGS AND UNIT LABOR COSTS

Industry and Indicator	1958 NJ/US	1958 NJ/SW	1958 NJ/NE	1977 NJ/US	1977 NJ/SW	1977 NJ/NE
Total Manufacturing						
a) Average earnings	1.04	1.08	1.01	1.02	1.08	0.99
b) Productivity	1.05	1.07	1.03	1.02	1.07	1.01
c) Unit labor costs	0.99	1.01	0.98	1.00	1.01	0.98
54 Selected Industries						
a) Average earnings	0.93	1.05	0.99	1.05	1.08	1.00
b) Productivity	0.90	1.03	0.99	1.00	1.03	0.97
c) Unit labor costs	1.03	1.02	1.00	1.05	1.05	1.03

SOURCE: Census of Manufactures, 1958 and 1977, and Office of Economic Policy.

The indicators for the manufacturing sector in New Jersey and other states are shown in Table VIII.6.

Average earnings in New Jersey seem to be somewhat higher in comparison with the United States and particularly with the Southwestern states. Over the 1958-77 period, only small improvements took place, although not with the Southwest. In comparisons with total U.S., the selected four-digit industries show considerably different relationships—relatively lower earnings in 1958, but rising in 1977. Since the difference between the two-digit and four-digit industries is mainly due to the impact of industry composition, one can infer that the comparisons of the four-digit industries better reflect the true earning differences.

This is fairly consistent with the findings for relative productivity levels and suggests that there is indeed a close relationship between the levels of wages and labor productivity. It is plausible to assume that in order to achieve higher productivity, industry must employ better skilled workers who demand relatively higher wages. A different explanation would suggest that higher wages determine higher levels of value added and productivity by enabling the production of high quality commodities which is reflected in the marketplace by relatively better prices. For example, high technology items, especially new products, are being sold at premium prices, thus allowing the realization of both higher wages and higher profit margins. But in order to sustain such conditions, industry must maintain a highly skilled labor force. Hence, the close relationship between wages and productivity and the underlying skills of the labor force. These relationships are tested in the regression analyses that are presented in the next section.

Table VIII.6 also contains comparisons of unit labor costs. On the two-digit level, unit labor costs in New Jersey seem to be competitive even when compared with the Southwestern states (see Table 6, Row c for total manufacturing). For the selected industries, however, unit labor costs in New Jersey are higher by 3-5% in 1977, as compared to 2-3% in 1958. These comparisons also suggest that New Jersey obtains somewhat better results due to the impact of high quality industries. This inference follows from comparisons of total manufacturing and the selected industries. With the reduction of the share of such quality industries, the ability to sustain a competitive manufacturing sector will become increasingly difficult. Parenthetically, one can infer that a viable strategy for economic development in New Jersey should include the priority to maintain a highly skilled labor force and the emphasis on technological innovation and the production of new high quality goods.

IV. Regression Analyses

1. The Regression Equations

Several multiple regression equations are estimated in this study incorporating a set of independent variables (X) and the three productivity measures as dependent variables (Y). All variables are formulated as ratios between New Jersey and a group of other states—namely the eight South and Western states and the eight North and Eastern states. The variables considered in this study are:

Dependent Variables

Y_1—value added per employee.
Y_2—value added per production worker.
Y_3—value added per one man-hour of production workers.

Independent Variables

X_1—new capital expenditures per output.
X_2—new capital expenditures per employee.
X_3—the amount of output per establishment.
X_4—the number of employees per establishment.
X_5—the average annual earning per employee.
X_6—the proportion of production workers in total employment.
X_8—output growth during the 1958-77 period.
X_9—investment growth during the 1958-77 period.

The mathematical relationships are assumed to be linear and the estimated equations are of the following form:

$$Y_i = A + b_1x_1 + b_2x_2 + \ldots + b_9x_9$$

where

Y_i are the dependent variables (Y_1, Y_2, Y_3)
X_j are the independent variables ($j = 1, \ldots 9$)
A is an estimated constant, and
b_j are the estimated regression coefficients.

A high correlation can be assumed to exist between capital expenditures per unit of output (X_1) and per unit of labor (X_2). Similarly, considerable collinearity can be expected between the two variables that measure the average size of establishments (X_3 and X_4) and between the output and investment growth (X_8 and X_9). Therefore, only one of each of these pairs of correlated variables is included in any one of the regression equations. Nevertheless, some collinearity may still remain between the included variables.

The estimation of the multiple regression equations provide a test of the following hypotheses:[8]

1. A higher investment/output ratio in New Jersey should be associated with a higher labor productivity ratio. Therefore, the regression coefficient (b_1) for the variable X_1 should be positive. It is postulated here that higher capital expenditures allow the introduction of new technologies and improved equipment, leading to higher productivity.
2. New capital expenditure usually leads to a higher degree of mechanization and automation and, therefore, to labor saving. It results in a higher capital/labor ratio and also higher labor productivity. Therefore, it is hypothesized that whenever New Jersey's industry exhibits a higher investment/labor ratio, it should also have higher productivity. This positive relationship should lead to a positive sign of the regression coefficient (b_2) for the variable X_2. It should be understood that this hypothesis also holds for the reverse case, namely, a lower investment/labor ratio should result in lower labor productivity.
3. Larger establishments measured by the value of output (value added) are usually more productive for reasons of economies of scale. In a larger plant more powerful equipment can be installed, the produc-

[8] A hypothesis is valid when the sign of the estimated regression coefficient is as predicted (positive or negative depending on the underlying theoretical reasoning), and is statistically significant at a given probability level (usually at least 0.95). The interested reader may find further explanation of the statistical method employed here in any textbook on the subject. See, for example, Jan Kmenta, *"Elements of Econometrics"* (New York, Macmillan Publishing Co., Inc., 1971).

tion process can be more specialized and overhead more economical. Hence, the larger the average size of an establishment, the higher should be labor productivity. We expect the regression coefficient (b_3) for variable X_3 to be positive.

4. Variable X_4 measures the size of establishment by the number of employees. The regression coefficient (b_4) should also have a positive sign for the same reasons as outlined above. Since in highly automated plants the number of employees can be small even though output is very high, this measure may, in many instances, less accurately reflect the size of operation.

5. It is supposed that higher average earnings reflect a better skilled labor force and, therefore, higher labor productivity. It is also assumed that prices of goods manufactured in various states are determined in the national market.

   Under this condition, it would not be possible for higher wage rates to impact the prices and value of output and hence also measured productivity. To the extent that this is a reasonable assumption when higher earnings are matched by higher productivity, it probably reflects the quality of management and labor force. Therefore, one should expect a positive relationship between earnings and labor productivity, and, hence, the regression coefficient (b_5) for variable X_5 should have a positive sign.

6. A larger proportion of production workers in total employment may in some cases reflect a more economic overhead (fewer white collar workers).[9] On the other hand, if research and development activities and proper management are neglected, it can also result in a higher proportion of production workers. In this case, productivity of production workers and of all employees may suffer. Hence, we would expect a negative sign of the (b_6) regression coefficient.

7. A growing industry is usually able to introduce, more frequently, new methods of production that lead to higher productivity. Therefore, it is expected that those industries that are growing faster in New Jersey will exhibit higher labor productivity. Relative growth of industries is measured by growth of output (X_8) or growth of investments (X_9) over the years 1958 to 1977. Both regression coefficients (b_8 and b_9) are predicted to have positive signs.

2. *Results and Interpretations*

In this limited space, only the most general results of the regression computations can be reported.

Table VIII.7 presents the signs and statistical significance of the partial regression coefficients obtained in the estimation of different regression equations.[10]

The review of Table VIII.7 concentrates on the results for the sample of four-digit industries because these industries are more homogeneous and, therefore, less distorted by the intra-industry variations.

Variable X_1. In all instances, the relationship between the investment-output ratio and labor productivity was negative and statistically significant in most equations. Since such outcome contradicts the prediction, it requires a detailed explanation.

The negative relationship means that by and large industries that invested a larger amount per dollar of output *did not* have relatively higher productivity and vice versa. Let us recall that, on the average, New Jersey industries invested significantly less than the other states, but nevertheless maintained an equal or even higher

[9] It is assumed that the smaller proportion of white collar workers made possible in larger establishments and leading to overall higher productivity will be reflected in variables X_3 and X_4.

[10] A sample of regression equations is presented in the Appendix to this Chapter.

TABLE VIII.7

REGRESSION COEFFICIENTS: SIGN AND SIGNIFICANCE TEST

Two Digit Industries		X_1	X_2	X_3	X_4	X_5	X_6	X_8	X_9
NJ/NE	(1977)	—Sign.	+Ins.	±Ins.	—Sign.	+Ins.	+Sign.[1]	—Sign.	—Sign.
NJ/NE	(1967)	—Sign.[3]	—Ins.	+Ins.	±Ins.	+Sign.	—Sign.[2]	NC	NC
NJ/NE	(1958)	—Sign.	—Sign.	+Sign.	+Sign.[3]	+Sign.[3]	±Ins.	NC	NC
NJ/SW	(1977)	—Ins.	+Sign.[3]	+Sign.	+Ins.	+Sign.	+Sign.[1]	—Ins.	—Ins.
NJ/SW	(1967)	—Ins.	+Ins.	+Sign.[3]	—Ins.[4]	+Sign.	±Ins.	NC	NC
NJ/SW	(1958)	—Sign.[3]	±Ins.	+Ins.	—Ins.	+Sign.	±Ins.	NC	NC
Four Digit Industries									
NJ/NE	(1977)	—Sign.	+Ins.	+Ins.	—Sign.	+Sign.	—Sign.[2]	—Sign.	—Sign.
NJ/NE	(1967)	—Ins.	+Ins.	+Sign.	+Ins.	+Ins.	±Sign.[5]	NC	NC
NJ/NE	(1958)	—Sign.[3]	+Ins.	+Sign.	+Ins.	+Sign.[3]	—Sign.[2]	NC	NC
NJ/SW	(1977)	—Sign.	+Ins.	+Ins.	—Ins.	+Sign.	—Sign.[2]	—Ins.	—Ins.[4]
NJ/SW	(1967)	—Sign.[3]	+Ins.[4]	+Sign.	+Sign.	+Sign.[3]	—Sign.[2]	NC	NC
NJ/SW	(1958)	—Ins.	+Sign.	+Sign.	+Ins.	+Sign.	—Sign.[2]	NC	NC

NOTES: Sign.—means significant at the .95 or higher level.
Ins.—means insignificant.

NC —Not Calculated.

1) Significant only in regressions with productivity of all workers (Y_1) otherwise inconsistent.
2) Significant only in regressions with productivity of production workers (Y_2,Y_3).
3) Insignificant in some equations.
4) In some equations significant.
5) Positive significant in regressions with Y_1; negative significant in regression with Y_2 and Y_3.

productivity level. This was the first indication that a negative relationship between these variables may exist. The question is how can New Jersey achieve higher productivity with much lower investments?

It is unrealistic to assume that New Jersey manufacturers possess the exclusive knowhow to achieve such results. It is also hard to believe that lower investment-output ratios in New Jersey reflect a tendency to apply relatively more labor-intensive technologies. This is not likely because the price of labor is relatively higher than the price of capital in this region. Needless to say, labor intensive technologies can hardly lead to higher labor productivity. Hence, low investment-output ratios and high productivity cannot be explained this way.

On the other hand, higher investment-output ratios coupled with lower productivity cannot be easily explained either. For if it means a substitution of capital for labor (which is in agreement with the relative prices of these two production factors), it should lead to higher, not lower, labor productivity via increased capital-labor ratios. Otherwise, there is no economic reason for increased capital expenditures per unit of output.[11]

A possible explanation can be construed by distinguishing two different types of industries, each with a specific investment behavior.

In old industries, which did not expand in New Jersey relative to other states, the prevailing investments were modernization of existing plants. Modernization investments usually require less capital expenditures per unit of output since they utilize existing plants and replace only part of machinery and equipment. In a previous study of the New Jersey manufacturing industry,[12] it has been suggested that a low investment-output ratio in New Jersey can be explained by the declining share of manufacturing in New Jersey vis à vis the United States. Declining industries cease making significant investments much earlier than they reduce, or eliminate entirely, output. A decline in investment spearheads a decline in output. At any point in time one will observe relatively low investment-output ratios in such industries. Naturally, they will also have a higher attrition rate. If one further assumes that the plants that are being permanently closed have relatively low productivity, it follows that, as a result of these closings, the average level of productivity will automatically increase. Hence, lower investment-output ratios and higher productivity can coincide.

Let us now consider a different type of industry, which is growing in New Jersey and maybe even faster than in the compared states. Since these are fast-growing industries, one would expect that a large part of investments are in entirely new plants. It is logical to assume that these investments are capital intensive, i.e., they tend to substitute capital for labor. Capital-labor ratios are not observed in this study directly. One can, however, infer that these industries, if they continue for many years to invest more per unit of labor, the resulting capital-labor ratio will be higher. Even in such a case, it *does not* follow that higher investment-output ratios in New Jersey must necessarily lead to higher labor productivity as well. For if the investment-output ratio is higher than the investment-labor ratio, relative productivity can still be lower. This follows from the identity describing these three variables:

$$\frac{\text{Output}}{\text{Labor}} = \frac{\text{Investment}}{\text{Labor}} \div \frac{\text{Investment}}{\text{Output}}$$

Conversely, when the investment-output ratio is lower than the investment-labor ratio, productivity will be relatively higher. Thus, a higher investment-output ratio is compatible with both a lower and higher labor productivity ratio, depending on the intervening investment-labor ratio. It should, therefore, be possible to find a negative relationship between investment-out-

[11] Some other non-economic factors, or the cost of other production factors must justify such increased investments. We discuss these possibilities briefly at the end of this section.

[12] New Jersey Manufacturing Industries, *8th Annual Report, op. cit.*

put and productivity ratios even though the investment-labor and productivity relationship is positive. As can be seen from Table VIII.7, this is exactly what the regression coefficients for X_2 are.[13] Before concluding this argument, the results for variable X_2 and also X_8 and X_9 are presented for reasons that will become clear in the following analysis.

Variable X_2. In most cases the b_2 regression coefficient was positive and statistically insignificant. In some comparison on the two-digit level, the signs were even negative. This suggests that the relationship for individual industries are not uniformly positive or negative. In other words, these results at least do not contradict the contention that there are two types of industries—one, where lower investment-labor ratios are matched by higher productivity, and others where the relationship between these variables are positive.

Variables X_8 *and* X_9. The hypothesis advanced for the explanation of the inverse relationship between investment-output and productivity ratios can be tested directly by regressing the growth ratios (expressed either by output growth (X_8) or investment growth (X_9) over the 1958-77 period) with productivity. For the verification of the contention that declining industries achieve higher productivity by removing the least productive plants, it must be shown that the regression coefficients b_8 and b_9 are negative. As it turned out, this is actually the case. The signs for variable X_8 and X_9 were always negative, although not always significant.

It is likely that in the faster growing industries, especially when this is measured by investment growth ratios, relatively more was spent on energy-saving and pollution equipment. This is justified by relatively higher energy costs in the Northeastern region and by more effort needed to reach a given pollution standard in a highly industrialized and densely populated state. Anti-pollution and energy-saving investments do not increase output, but tend to raise the investment-output ratio without simultaneously increasing labor productivity. Thus, the negative regression coefficients for variables X_8 and X_9 support the interpretation of the negative relationships between investment-output and productivity ratios.

Variables X_3 *and* X_4. The size of establishments measured by output (X_3) shows a positive and often statistically significant contribution in explaining the productivity ratios, especially for the detailed four-digit industries. However, their significance diminished in 1977 due to the fact that New Jersey industries have lost much of their previous size advantage. Variable X_4 which measures establishment size by the number of employees is a poorer indicator of economies of scale due to the interference of automation that reduces the number of employees while usually raising output. This is why the signs of X_4 change from positive to negative and are often insignificant. It is also plausible that the inconsistency reflects the same phenomenon as described earlier, namely that relatively larger plants were closed which simultaneously increased the average productivity level in New Jersey and reduced the relative size of establishments. Hence, one observes negative coefficients in 1977, especially in comparisons with the Northeast.

Variable X_5. In all equations, the regression coefficient b_5 was positive and with minor exceptions highly significant. These results seem to confirm the widely held view that New Jersey has an advantage, especially over the southwest, in the quality of the labor force. Higher average earnings could have some minimal impact on the price level of goods whose price is determined in the local market. To the extent that this is a factor, measured productivity could be influenced by higher wages. It is unlikely that this could have seriously distorted the regression results.

Variable X_6. The relationship between the share of production workers and their productivity is invariably negative. The meaning of this result is that a disproportionate increase of

[13] The reader should be reminded that the regression coefficients for X_2 were estimated in equations that *did not* include the X_1 variable, due to their collinearity.

production workers leading to a higher share of blue collar workers, lowers their productivity. It indicates that deviating from the proper proportions of white and blue collar workers is not contributing to higher productivity. However, the decline of productivity of production workers resulting from an increase in their share can be compensated by an even larger change in the opposite direction, i.e., by an improvement in productivity of all employees. In such a case, one should observe a positive association between X_6 and Y_1. Only in a few equations have positive results been obtained (on the two-digit level in 1977 and in 1967 only for the Northeast comparison). Hence, the results are inconclusive.

Summary and Conclusions

1. Labor productivity comparisons were made between manufacturing industries (19 two-digit and 54 four-digit industries) in New Jersey and a sample of industrialized states from the Southwest and the Northeast. The comparisons were made for 1958, 1967, and 1977 and based on statistics obtained through the comprehensive *Census of Manufactures.*

2. In 1977, the level of labor productivity in New Jersey manufacturing industries was found to be somewhat higher (5-7%) than in the Southwest and equal with the Northeast. The results did not differ significantly between 1958 and 1977, especially in comparisons with the Southwest.

3. The level of capital expenditures per dollar of output or per employee was consistently lower in New Jersey in most comparisons and for a long period of time. Lower levels of reinvestment must, necessarily, lower the opportunities for introducing new technologies and products and must lead, ultimately, to a relative decline in productivity.

4. The average size of establishments is still higher in New Jersey than in the United States and possibly also in the Southwest, although that advantage has been reduced significantly over the analyzed period. New Jersey did not have such an advantage in comparison with the Northeast states.

5. A high correlation was found between higher average earnings per employee in New Jersey and Southwest states and their relative productivity levels. Higher earnings (5-8%) are generally compensated by higher productivity (5-7%) thus leading to almost identical unit labor costs. An inference is also drawn that the quality of New Jersey's labor force is superior to that in the Southwest. No such advantage is generally observed in comparisons with the Northeast.

6. The study has revealed a basic conflict between several factors that usually have a positive impact on productivity (the amount of capital per unit of output or the average size of an establishment, and the relative productivity levels). In most cases, these relationships do not hold for New Jersey; they are negative and opposite to the normally expected.

7. The explanation for this is found in the method of preserving New Jersey's relatively higher productivity. Instead of relying equally on building new plants with the highest available technologies and removing the old and obsolete facilities, New Jersey seems to rely more heavily on permanently closing old, least-efficient plants without sufficiently expanding new facilities. In the short-run this may lead to improving the average productivity level at the cost of a continuing decline of manufacturing industries. If not stemmed, this process will ultimately undermine New Jersey's position as a well-developed industrial state.

The most general recommendations that follow from these findings is that *capital formation must be encouraged in New Jersey* by all means. Improving the business climate, removing unnecessary impediments to investments; a more encouraging attitude to business development; easing the permit requirements and shortening the time for their granting; financial incentives, whenever necessary and in the most effective form, are some suggestions that deserve serious consideration.

APPENDIX

PARAMETERS FOR SELECTED REGRESSION EQUATIONS OF PRODUCTIVITY IN 1958 AND 1977

Type of Comparison	Dependent Variable	INDEPENDENT VARIABLES*								R^2
		X_1	X_2	X_3	X_4	X_5	X_6	X_8	X_9	
Two-digit Industries										
NJ/SW 1958	Y_1	−.31		.08		1.31	1.49			.69
		(−2.43)		(1.39)		(4.54)	(2.11)			
	Y_2	−.32		.08		1.33	.67			.71
		(−2.38)		(1.21)		(4.41)	(.91)			
NJ/SW 1977	Y_1		.18		.03	1.30	.92			.72
			(1.33)		(.24)	(2.94)	(1.42)			
NJ/SW 1977	Y_1		.33			1.04		−1.38		.70
			(3.49)			(2.48)		(−1.11)		
NJ/SW 1977	Y_1	−.13				1.63	1.67		−.21	.70
		(−.82)				(4.17)	(3.30)		(−.26)	
NJ/NE 1977	Y_1	−.18			−.15		1.38		−5.83	.78
		(−2.42)			(−1.37)		(2.70)		(−2.64)	
	Y_2	−.23			−.13		.10		−5.93	.75
		(−3.18)			(−1.21)		(.20)		(−2.73)	
Four-digit Industries										
NJ/SW 1958	Y_1	.002		.03		1.06	.67			.55
		(−.03)		(2.71)		(6.03)	(1.78)			
NJ/SW 1958	Y_1		.13		.008	1.13	.81			.54
			(2.11)		(.56)	(6.79)	(2.15)			
	Y_2		.13		.005	1.09	−.27			.59
			(2.12)		(.34)	(6.82)	(−.75)			
NJ/SW 1977	Y_1	−.19				1.07	−.01		−.42	.41
		(−3.00)				(4.66)	(−.05)		(−2.04)	
	Y_2	−.20				1.06	−1.07		−.42	.51
		(−3.13)				(4.66)	(−3.53)		(−2.07)	
NJ/NE 1977	Y_1	−.18			−.14	.52			−1.40	.39
		(−3.29)			(−2.84)	(2.58)			(−2.87)	

* For explanation of variables, see p. 60.
NOTE: Numbers in parentheses are the t-statistics.

IX

BUSINESS TAXES AND REGIONAL ECONOMIC GROWTH*

The effects of state business taxes on regional economic growth have been the subject of considerable interest both within and outside the State. In particular, the Northeastern states' relative decline during the decade of the 1970s appears to have persuaded many people of the desirability of improving the business climate in this area.

However, studies attempting to account for the quantitative effects of business tax structure on regional economic growth have been fragmentary. There have been studies on the implications of business taxes on business location using a comparison of tax burdens, but the total effect of business taxation on regional economic growth has not yet been quantitatively documented.[1]

In this paper, an aggregate model of interregional factor migration and economic growth is developed and tested. Section I discusses the role of capital accumulation on economic growth, and Section II deals with the theoretical issues involving business taxes and interregional factor mobility and develops an aggregate model for econometric analysis. Section III presents the statistical estimation results of the model, and Section IV applies the results of Section III to the examples relevant to New Jersey's economy. Section V summarizes the findings of the study.

I. Capital Accumulation and Economic Growth

There exist many theories explaining differences in regional growth rates. In the earlier stage of United States economic development, initial endowments of natural resources and locational advantages were considered to be the dominant factors in regional economic growth.

However, as transportation-communication technology improved and the industrial structure became more sophisticated, those initial advantages became less important, and increased factor mobility enabled the relatively less developed regions to reduce the gap between their per capita income levels and the national average. This process, known as the equalization of per capita income, does not fully account for the differences in regional growth rates.[2]

Although the equalization process is an important factor in explaining regional growth rate differences, there exist other reasons for interregional factor movements; e.g., climate, congestion, and cultural amenities influence migration of labor force, while taxes, labor

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[1] For studies relating taxes and business location see, for example, NJMA (1974), Nagle (1976) and Singer (1979).

[2] This conclusion is made on the basis of earlier studies of the equalization process cited in this paper and the empirical evidence presented in this study.

union strength and business regulations affect the region's capital investment.

While the above factors are well recognized as potentially important determinants of regional economic growth, empirical studies attempting to measure their quantitative impact have been scarce. Some of the studies of regional growth appearing in economic literature are those by Borts and Stein (1964), Smith (1974, 1975), and Ghali, Akiyama and Fujiwara (1978). These studies, however, fail to introduce taxes and other exogenous factors to explain factor mobility and, instead, limit their analysis to the role that wages and rates of return to capital play in the equalization process.

In order to account for the contribution of each factor to the growth of output of a given region, let us first assume that regional output is determined by the amount of capital and labor in the form of the following equation:[3]

$$Y_i^* = a_0 + a_1 L_i^* + a_2 K_i^* \qquad (1)$$

where an asterisk denotes the rate of change in the variable; Y, L, and K stand for output, labor, and capital, respectively, and the subscript i refers to region i. The intercept a_0 then measures the growth of output due to technological progress, and the parameters a_1 and a_2 are elasticities of output with respect to labor and capital, respectively.[4]

In the United States, the technical progress component accounted for about two percent growth per annum during the post-war period. This component, however, has been slowing since the early seventies. Growth of capital stock accounts for about one percentage point of GNP growth, and the increase in man-hours accounts for another percentage point growth or slightly less. Thus, the total effect had been about four percent growth per year on the average during the sixties, but it fell to 3.5 percent by the mid-seventies.

Therefore, capital accumulation accounted for at least one-fourth to one-third of the GNP growth rate. If new technologies are embodied in new capital goods as suggested by Solow (1962), and, therefore, the rate of technical progress is influenced by the rate of growth of capital stock, then the accumulation of capital may account for more than one-third of the total growth rate; perhaps as much as three-quarters. The empirical evidence on the embodiment hypothesis is, however, not very strong.[5]

Since increases in employment are not likely to be an important source of economic growth for New Jersey in the 1980's due to its relatively slower growing population, the key to the State's economic growth lies in capital investment, and this is especially so if the embodiment hypothesis holds true.

II. Business Taxes and Capital Theory

Given the importance of capital accumulation to New Jersey's economic growth, what is the effect of the corporate income tax on capital investment? The analysis can be based on the theory of optimal capital accumulation developed by Jorgenson (1963).

According to Jorgenson's theory of optimal capital accumulation, capital investment is affected by the *user cost of capital*, which is composed of *depreciation*, *interest*, and *corporate income tax* adjusted for the investment tax credit and accelerated depreciation for tax purposes. Thus, if everything else remains constant, an increase in the corporate income tax rate will increase the user cost of capital, which will, in turn, bring about a decrease in capital investment.

Although there is virtually unanimous agreement on the theoretical relationship between the corporate income tax rate and the demand for

[3] This is the same approach employed by Ghali, *et. al.* Growth accounting with the use of an aggregate production function has been fruitfully applied to United States data; e.g., Solow (1959) and You (1979). A non-econometric growth accounting method pioneered by Denison (1962) also implicitly uses the concept of an aggregate production function.

[4] To be more precise, the constant term (a_o) represents the effects of all factors other than capital and labor inputs. Undoubtedly, technical progress is an important part of a_o, but it may include many other important factors. For this reason, some economists call a_o a measure of our ignorance.

[5] For econometric studies on the embodiment hypothesis, see Solow (1962), Wickens (1973), Smallwood (1970), and You (1976).

capital goods (and thus investment) represented by the negative sign of the elasticity, its empirical significance has been subject to a heated debate. While Jorgenson and other neoclassical economists believe the user cost of capital has a significant effect on capital investment, Keynesian economists, headed by Eisner, argue that the effect is insignificant.

The debate can be best understood by the use of the following equation:

$$K_d = AQ\,(c/p)^{-s} \qquad (2)$$

where K_d is the desired capital stock, A a constant, Q the level of demand (expected demand) for output, c the user cost of capital, p the price of output, and s the elasticity of substitution between capital and labor inputs.[6]

The empirical estimates of s are subject to considerable variation depending on the specification, estimation technique, and data.[7] If s is equal to zero, demand for capital investment will be proportional to the *change* in demand for output, while changes in the user cost of capital have no effect on capital investment.

The argument by the Keynesians that corporate income tax changes have an insignificant effect on capital investment seems to have caught the attention of some legislators and other policy makers. Notice, however, that the debate concerns a national parameter. While the user cost of capital may or may not be important at the national level depending on the degree to which factors of production can be substituted in response to changes in the relative cost of inputs, there is little doubt that regional variations in the user cost of capital can have a significant effect on regional capital accumulation, since they involve, in addition to technical substitution of inputs, substitution of one location for another.

It has been pointed out earlier that the user cost of capital depends on many parameters including tax rates. For the purpose of an interregional comparison of capital accumulation, those parameters nationally determined and, hence, common to all regions can be treated as constants. In other words, interregional differences in the user cost of capital are determined by interregional differences in corporate income tax rates, investment tax credits, property tax rates, *etc.* Therefore, growth rates of the regional capital stock can be assumed to be determined by the following equation:

$$K_i^* = f\,(T, X) \qquad (3)$$

where T is a vector of regional tax variables and X a vector of non-tax variables relevant to regional capital accumulation.

Since capital stock data at the regional level are not available, equation (3) cannot be directly tested. However, an indirect test can be performed by substituting equation (3) into (1) and thus estimating a semi-reduced form equation. Similarly, an equation explaining the growth of employment could be introduced. However, since the purpose of this study is to investigate the effects of business taxes on New Jersey's economic growth, and since data for the change in employment (L^*) are available, such an equation is not necessary. Furthermore, estimation of a semi-reduced form equation can facilitate comparisons of the estimated coefficient of L^* with previous estimates by other studies.

III. Data and Estimation Results

For the precise specification of equation (3), all tax *rates* determined at the state and local level are initially considered. However, because of substantial variations in rates within regions depending on the levels of net income and also variations in the treatment of investment tax credit, loss carry over, *etc.*, a single measure of *effective tax rate on corporate net income* and a single measure of *effective property tax rate* are used in this study.

[6] The elasticity of substitution is a measure of technical flexibility in substituting capital for labor (or labor for capital) in response to changes in user cost of capital or wage rate. Zero elasticity of substitution means it is technically not feasible to substitute one input for the other no matter what the relative cost of inputs.

[7] For empirical studies of investment demand, see Jorgenson (1963), Hall and Jorgenson (1967), Eisner and Nadiri (1968), Bischoff (1969), and Eisner (1978).

The effective corporate income tax (CIT) rate is measured by the ratio of total CIT revenue of a state to the state's total labor and proprietors' income by place of work. Ideally, the denominator should be the state's total corporate income, but the lack of suitable data forced the use of this proxy.

As for the effective property tax (PT) rate, the available data cannot be separated between the business property taxes and others. Also, the unreliability of assessed values made the conventional definition of property tax rate inappropriate for this study. Hence, a surrogate measure, defined as the ratio of total PT revenues of state and local governments to the state's total personal income, is used.

In addition to the above tax variables, two other variables are introduced to equation (3). They are relative wage rates defined as the ratio of average hourly earnings of production workers in a state's manufacturing industries to the national average, and the share of manufacturing, defined as the ratio of employment in the state's manufacturing industries to the state's total nonagricultural employment.

The qualitative effect of increases in the relative wage rate cannot be determined *a priori*. The substitution effect increases the use of capital to replace relatively expensive labor, while the output effect and locational effect reduce the investment. However, if the elasticity of substitution is close to zero, the output and locational effects will dominate the substitution effect, and a higher relative wage rate will lower the growth rate of capital.

The reason for adding the share of manufacturing to the equation is that the growth of manufacturing industries has been, on the average, substantially slower than that of other industries. Since the manufacturing sector still remains a very important sector of the economy in terms of its share of total employment, states with a greater concentration of manufacturing industries would tend to suffer more than proportionally from the declining national trend and, as a result, there would be less reinvestment and expansion in those areas.

Assume a linear function for equation (3):

$$K_i^* = b_0 - b_1 CIT_i - b_2 PT_i - b_3 W_i - b_4 M_i \qquad (3')$$

where W and M are, respectively, relative wage rate and share of manufacturing employment. Substitution of (3′) into (1) yields the semi-reduced form equation:

$$Y_i^* = (a_0 + a_2 b_0) + a_1 L_i^* - a_2 b_1 CIT_i - a_2 b_2 PT_i - a_2 b_3 W_i - a_2 b_4 M_i \qquad (4)$$

The dependent variable is defined as the total growth of state's personal income over the 1970-77 period. Similarly, the L* term is defined as the total growth over the same period, i.e.,

$$Y^* = (Y_{77} - Y_{70})/Y_{70}$$
$$L^* = (L_{77} - L_{70})/L_{70}$$

where Y is the personal income in real terms and L the total employment. Ideally, Y* should be defined as the growth of gross state product (GSP), but the unavailability of reliable GSP data forced the use of personal income instead. Although personal income includes such received incomes as transfer payments and incomes earned outside the region by residents of the region, if the proportion of those incomes in total personal income remains fairly constant, the growth rates of personal income will be a good approximation of the growth rates of gross state product. All data are obtained from the *Statistical Abstract of the United States* (Bureau of the Census, various issues.)

Estimation results for the semi-reduced form equation using data for 48 states of the continental U.S. are given below:

$$Y^* - 0.5360 + 0.6307L^* - 6.0608CIT - 2.8260PT - 0.0838W - 0.3566M \qquad (5)$$
$$(5.597) \quad (6.220) \quad (2.189) \quad (3.646) \quad (1.035) \quad (2.830)$$
$$R^2 = 0.75 \qquad F_{(5,42)} = 25.86$$

where CIT and PT are corporate income tax rate and property tax rate as defined above and averaged over the period of 1970-77, W the rela-

tive wage rate in 1970, M the share of manufacturing in 1970. The figures in parentheses are t-statistics.

Equation (5) shows an impressive explanatory power ($R^2 = .75$) compared to earlier studies by Smith and Ghali, *et al.*[8] All the estimated coefficients have the expected sign and are statistically significant (at .05) except for the wage rate term.

IV. Interpretations and Applications of the Results

Equation (5) yields 0.63 for the estimate of the elasticity of output with respect to labor, which is close to the consensus range of 0.65 to 0.75. This implies that the other terms in the equation, namely, relative wage rate, manufacturing share, corporate income tax rate, and property tax rate, reliably account for the effects of capital accumulation, as hypothesized by equation (3).

If we assume constant returns to scale, a_1 and a_2 of equation (1) must add up to unity; i.e., $a_2 = 1 - a_1 = 0.3693$. Then the implicit estimation of equation (3′) can be derived from equation (5) and is given by the following:[9]

$$K^* = \text{constant} - 0.2269W - 0.9656M - 16.411CIT - 7.6523PT \quad (6)$$

Since returns to scale may not be constant, and since the estimate of output elasticity with respect to labor is likely to contain some sampling errors, equation (6) is much less reliable for measuring the quantitative effects of the tax variables on capital accumulation than is equation (5) for measuring the ultimate effects of those same variables on income growth. Nevertheless, equation (6) clearly demonstrates the negative effects of corporate income tax and property tax on the accumulation of capital.[10]

Whatever the quantitative effects of CIT and PT on the growth of capital, their ultimate effects on the growth of regional income are represented by their coefficients given in equation (5). Specifically, an increase of CIT by one percentage point would reduce the growth rate of regional income by slightly over six percentage points over a seven year period, or about 0.9 percentage point per annum. Note, however, that CIT is defined as the ratio of total corporate income tax revenue to the region's total labor and proprietors' income, not the legal definition of tax rate. Similarly, an increase by one percentage point in PT (percent of total personal income paid for property tax) would eventually reduce the growth rate of region's personal income by slightly less than three percentage points over a seven year period, or about fourtenths of a percentage point per annum.

These estimates can be applied to a recent proposal to substitute an *ad valorem* tax on gasoline for a reduction of the State's corporate income tax. Specifically, the proposal is to change the current excise tax on gasoline sales to an *ad valorem* tax (or sales tax) and, in exchange for the anticipated increase in tax revenue from that change, to reduce the corporate income tax rate from the current 9 percent to 7.5 percent.

The proposed corporate income tax reduction, when compared to the available tax revenue data, is expected to result in a decrease in the ratio of corporate income tax revenue to the State's total labor and proprietors' income by about 0.2 percentage point. Since a point decrease in CIT increases the *annual* growth rate of the State's personal income by 0.9 point, the proposed reduction in CIT is expected to increase New Jersey's average annual growth rate in real personal income by about 0.15 of a percentage point. Furthermore, as a result of in-

[8] The coefficient of determination (R^2) of equation (5) cannot be directly compared to those obtained by Smith and Ghali *et. al.* because of the difference in data (Ghali *et. al.*) and in the dependent variable (Smith). Nevertheless, the R^2 of equation (5) is substantially higher than 0.486 (Ghali *et. al.*) or (Smith) 0.17 to 0.67.

[9] The constant term cannot be derived implicitly. Other coefficients are derived by dividing the coefficients of equation (5) by a_2 (0.3693) since they are products of a_2 and b's. See equation (4).

[10] Equation (6) implies that, for example, a reduction in CIT rate (as defined in this study) by one percentage point will increase growth of regional capital by 16.4 percentage points over a seven year period.

creased growth in the State's real personal income, the State's tax revenue will increase over time faster than it would have without the proposed tax reform.

The proposed change in gasoline tax from the excise tax to an *ad valorem* tax will encourage gasoline conservation,[11] while the compensating rollback of the corporate income tax rate will improve New Jersey's business conditions. The proposal for a tax structure reform, therefore, is an idea that deserves serious consideration. Another alternative is to *eliminate the net-worth tax,* which is similar in nature to the corporate income tax but regressive and discourages capital investment in the State.

Net-worth tax revenues have been fairly stable over the past decades, reflecting the fact that no significant net capital investment has been made in the State over that period. As demonstrated by the study described in the preceding section, insufficient investment in the State is partly a result of our business-tax structure, of which the net-worth tax is a significant component.

Abolition of the net-worth tax would reduce revenues by approximately $75 million per year. On the other hand, a 10 percent sales tax on gasoline will more than compensate for the lost revenues, since the increase in gasoline-tax receipts is expected to exceed $100 million per year and, unlike the net-worth tax, will grow over time.

The next alternative is to return the corporate income tax rate to 7.5%. This would reduce revenues by about $80 to $90 million per year (but the initial year's loss would be about $130 to $140 million because of the reduction in prepayment in the first year). Since the initial year's loss in revenues may not be fully compensated by the extra revenues from the gasoline tax, a two-step reduction (to 8% in the first year and to 7.5% in the second year) of the corporate income tax rate would prevent revenue losses arising from such change.

The third preference is to change the flat corporate income tax rate to a progressive system, not by raising the rate for large amounts of profits, but by reducing the rate for small amounts. This change would certainly improve the State's business climate, but not by as much as the abolition of the net-worth tax or the uniform reduction of the corporate income tax rate.

IV. Summary and Conclusions

In this paper a model of interregional factor mobility is developed and applied in order to estimate the effects of tax differentials at the State level on income growth. The study confirms the hypothesis that tax differentials are a significant factor in determining the rate of growth of capital and thus the rate of growth of income.

Among the variables that affect capital accumulation at the State level, the corporate income tax rate appears to be most significant in terms of its quantitative impacts on income growth. Property tax rate, relative wage rate and manufacturing share also have negative effects on income growth, but the effect of relative wage rates is not statistically significant. In any case, recent developments in the New Jersey economy, i.e., decline in the relative wage rate (from 103 percent of U.S. average in 1970 to 100.5 percent in 1978) and in manufacturing share (from 33.1 percent of total non-agricultural employment in 1970 to 26.3 percent in 1979) should be beneficial to the State's economy. On the other hand, the recent increase in corporate income tax rate will have an adverse effect.

The results of this study show that the proposed rollback of the corporate income tax rate in return for a compensating increase in the gasoline tax will increase the average annual growth rate of New Jersey's real personal income by about 0.15 percentage point. Since the proposed change in the gasoline tax from the current excise tax to an *ad valorem*

[11] For empirical evidence on this effect, see Chapter VI of this *Report*.

tax will also encourage gasoline conservation, the proposal is an important positive step toward improving New Jersey's business conditions. However, an elimination of the net-worth tax is considered to be a better alternative, but, if neither of the two alternatives is feasible, changing the flat corporate income tax rate to a progressive system by reducing the rate for small amounts of profits ought to be considered as a third alternative.

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X

INTRASTATE SHIFTS IN NEW JERSEY ECONOMIC ACTIVITIES*

While there have been many studies on *interstate* differences in economic activity, few have investigated *intrastate* economic shifts. This paper extends the analytical methods of an earlier study.[1]

The plan of this paper is as follows:

—Part I presents the shift-share analysis of the employment growth of subregions of the State. Section 1 discusses the method of shift-share analysis, and Section 2 applies the method to the State's data.

—Part II presents an econometric study of the determinants of intrastate shifts in employment.

I. Shift-Share Analysis of Changes in Covered Employment

1. The Shift-Share Model

Shift-share analysis is a method of decomposing regional employment changes for the purpose of identifying the changes specific to the region, as well as those attributable to industry-specific national trends. The model relies on the following identity:

$$E^1_{ir} = E^0_{ir}\left[(E^1/E^0) + (E^1_i/E^0_i - E^1/E^0) + (E^1_{ir}/E^0_{ir} - E^1_i/E^0_i)\right] \quad (1)$$

Where E_{ir} stands for the employment of i-th industry in r-th region, superscripts 0 and 1 represent, respectively, the base year and the given year, absence of subscript i implies all industries and the absence of subscript r implies all regions, i.e., nationwide figures. The three components of equation (1) can be identified as national share (NS), industrial structure or industry specific (IS), and regional shift (RS).

$$E^1_{ir} = NS_{ir} + IS_{ir} + RS_{ir} \quad (2)$$

National share is that part of the industry's regional employment which would have resulted if the region's industry kept pace with the nation's *aggregate* employment growth. Industry specific employment is the additional employment which results from the region keeping pace with the *industry's national trend.* This may represent a faster or a slower rate of growth than that of aggregate national employment. Regional shift represents extra employment (plus or minus) due to the difference between the rate of growth of employment in the region's industry compared to the industry's national

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[1] See You (1979).

trend. Thus, a positive regional shift can be considered as evidence of the region's comparative advantage for that industry and *vice versa.*

Equation (2) is often presented in "difference" form, i.e.,

$$E^{1}_{ir} - NS_{ir} = IS_{ir} + RS_{ir} \qquad (3)$$

which is an attempt to identify the components of the difference in employment from the trend of national aggregates.

Ever since its first appearance in Perloff, *et al.* (1960), shift-share analysis has been criticized for the lack of theoretical underpinnings, and its alleged poor forecasting ability.[2] However, the criticisms appear to have ben overplayed. While it is true that the model is an identity, and as such, it cannot *explain* the interregional differences in employment growth, the method is nevertheless a useful tool to identify the sources of employment growth differentials among various regions, and can be a valuable first step toward a more refined analysis. In other words, further specification of the components of the shift-share model as behavioral equations will not only facilitate the explanation of the causes of the regional differences in employment growth, but it will also improve the forecasting ability of the model.

For the purpose of applying the shift-share model to the subregions of New Jersey, the State is divided into four subregions; namely, major cities, urban counties, suburban counties, and rural counties. Major cities consist of the State's six largest cities, i.e., Camden, Elizabeth, Jersey City, Newark, Paterson and Trenton. Urban counties are the six counties which contain major cities (Camden, Essex, Hudson, Mercer, Passaic, and Union), and suburban counties are those which share the border with an urban county (Bergen, Burlington, Gloucester, Middlesex, Monmouth, Morris, and Somerset). Rural counties are those which are neither classified as an urban county nor as a suburban county.

In applying the shift-share model to the New Jersey economy, an important data problem had to be overcome. The available employment data for counties and cities of New Jersey are "covered employment" data, which include only full and part-time employees *covered* by New Jersey Unemployment Compensation Law. Since covered employment cannot be directly comparable to total employment, some adjustment for the discrepancy had to be made. This is done by choosing the period over which no significant changes in coverage criteria were introduced, and by netting out the differences by introducing an extra term into the identity.[3] The modified shift-share equation is then given by:

$$C^{1}_{ir} = C^{0}_{ir}\left[(E^{1}/E^{0}) + (E^{1}_{i}/E^{0}_{i} - E^{1}/E^{0}) + (E^{1}_{is}/E^{0}_{is} - E^{1}_{i}/E^{0}_{i}) + (C^{1}_{is}/C^{0}_{is} - E^{1}_{is}/E^{0}_{is}) + (C^{1}_{ir}/C^{0}_{ir} - C^{1}_{is}/C^{0}_{is})\right] \qquad (4)$$

where C_{ir} stands for the covered employment of the i-th sector in r-th subregion and subscript s represents statewide employment (covered or otherwise).

Equation (4) identifies the components of covered employment, from left to right, national share (NS), industrial structure (IS), interstate shift (TER), coverage shift (CS), and intrastate shift (TRA). In order to highlight the gains or losses of covered employment, compared to the trend of the national aggregates, equation (4) may be rearranged into difference form as follows:

$$C^{1}_{ir} - NS_{ir} = IS_{ir} + TER_{ir} + CS_{ir} + TRA_{ir} \qquad (5)$$

where IS is the industry specific shift as defined in equation (2), interstate shift (TER) is the

[2] For a detailed discussion of the model as a forecasting tool, see Stevens and Moore (1978).

[3] Covered employment in New Jersey accounts for more than 90 percent of total employment.

shift due to the difference in the growth rate of the State's i-th sector from that of the same sector in the national economy, coverage shift (CS) the shift in employment due to the difference between the growth rate of the sector's covered employment in the State and the growth of the sector's total employment in the State, and intrastate shift (TRA) measures the employment shifts within the State due to regional differences in the growth rates of the sector's covered employment.

An implicit assumption in equation (5) is that the coverage shifts among subregions of the State are proportionately distributed.[4] This restrictive assumption is necessary because of lack of total employment data. To the extent that the coverage shifts are not proportionately distributed, the estimates of intrastate shifts will contain errors. However, since the difference between the covered employment and total employment is small relative to total employment, the errors are not expected to be of significant magnitudes. Furthermore, positive and negative errors at the county level will to some extent cancel out when total shifts for subregions are considered.

2. Estimation of Covered Employment Shifts

In order to minimize the errors due to differences between the growth rates of covered employment and those of total employment, two sub-periods, 1960-68 and 1972-78 are chosen. It is likely that the growth of covered employment in those periods is largely due to the growth of total employment. The break in the period between 1968 and 1972 was necessitated by statutory changes to coverage in January 1969 and in January 1972.

Covered employment data are obtained from *Covered Employment Trends* published by the Department of Labor and Industry, State of New Jersey; the State's total employment by sector from *New Jersey Economic Indicators,* a monthly publication by the State's Department of Labor and Industry; and the national employment data from *Statistical Abstract of the United States,* published annually by the Bureau of the Census, U.S. Department of Commerce.[5]

The components of the estimated employment shifts at the county level,[6] using equation (5) are summed to obtain the shifts for the subregions of the State and presented in Table X.1. Table X.1 shows that throughout both subperiods, none of the sectors in New Jersey experienced positive structural shifts and interstate shifts at the same time. Furthermore, interstate shifts, which were positive for some of the sectors in the sixties, were all negative in the 1972-78 period. As a result, the extent of job losses due to interstate shifts in the seventies was much greater than in the sixties.

On the other hand, the extent of job losses in the State due to industrial structure became much smaller over the two periods. This improvement in the industrial structure is due to a great extent to the decline in the State's manufacturing sector. For example, in 1960, New Jersey's manufacturing sector accounted for 40 percent of total non-agricultural employment, as compared to 31 percent for its counterpart in the national economy. The continuous decline in manufacturing in the State reduced its share to 26.6 percent of total non-agricultural employment (as compared to 24 percent share by the sector in the national economy) by 1978. In other words, the State's industrial structure in the late seventies bore more resemblance to national structure, while previously, New Jersey was proportionally more dependent on nationally declining manufacturing industries.

The estimates of intrastate shifts are all negative for major cities in both sub-periods. During the period of 1960-68, only the service sector in rural counties and the construction sector in suburban counties showed negative intrastate

[4] This means that the percentage increases in coverage (but not necessarily in employment) are assumed to be the same in all subregions of the State.

[5] Because of the problem of data compatability, non-agricultural private employment (excluding mining) is used in the study.

[6] Estimates of shifts at the county level for each of the sectors will be made available upon request.

TABLE X.1
ALLOCATIONS OF JOB GAINS BY SECTOR AND REGION

Sector	Region	1960-1968				1972-1978			
		Structure	Interstate Shift	Intrastate Shift	Total	Structure	Interstate Shift	Intrastate Shift	Total
Mfg.	Major Cities	—17787	—25161	—58212	—101160	16050	—16209	—27771	—60030
	Urban	—21415	—30294	9265	—42444	—30439	—30741	—10111	—71291
	Suburban	—18814	—26614	45081	—347	—33051	—33379	37431	—28999
	Rural	—4952	—7005	3867	—8090	—7364	—7437	451	—14350
	Total	—62968	—89073	0	—152041	—86904	—87766	0	—174670
Trade	Major Cities	—7386	12130	—45848	—41104	4939	—7336	—33131	—35528
	Urban	—6682	10974	17501	21793	10627	—15782	—2637	—7792
	Suburban	—7629	12529	26544	31444	13635	—20250	28718	22103
	Rural	—2417	3970	1803	3356	3925	—5829	7049	5145
	Total	—24114	39603	0	15489	33126	—49197	0	—16072
T. C. U.	Major Cities	—8151	1351	—2020	—8820	—5328	—2319	—10197	—17844
	Urban	—5724	948	1286	—3490	—5350	—2329	—8223	—15902
	Suburban	—5531	917	676	—3938	—5106	—2223	18464	11135
	Rural	—1620	268	57	—1295	—1416	—617	—43	—2076
	Total	—21026	3484	0	—17543	—17200	—7488	0	—24687
Services	Major Cities	11715	—5887	—8833	—3005	8709	—3132	—24823	—19246
	Urban	11297	—5677	1580	7200	14478	—5207	3815	13086
	Suburban	11612	—5835	12170	17947	16472	—5924	14385	24933
	Rural	5166	—2596	—4917	—2347	5084	—1828	6623	9879
	Total	39790	—19995	0	19795	44743	—16091	0	28652
F. I. R. E.*	Major Cities	2044	—3938	—6682	—8576	495	—276	—21181	—20962
	Urban	954	—1837	2737	1854	461	—257	5029	5233
	Suburban	648	—1248	3599	2999	374	—208	15258	15424
	Rural	310	—597	346	59	142	—79	894	957
	Total	3956	—7620	0	—3664	1472	—820	0	652
Construction	Major Cities	—1810	54	—3150	—4906	269	—4775	—4672	—9178
	Urban	—2660	79	3576	995	664	—11764	571	—10529
	Suburban	—3624	108	—1976	—5492	884	—15662	922	—13856
	Rural	—900	27	1550	677	325	—5761	3179	—2257
	Total	—8994	268	0	—8726	2142	—37962	0	—35820
All Sectors	Major Cities	—21375	—21451	—124745	—167571	—6966	—34047	—121775	—162788
	Urban	—24230	—25807	35945	—14092	—9559	—66080	—11556	—87195
	Suburban	—23338	—20143	86094	42613	—6792	—77646	115178	30740
	Rural	—4413	—5933	2706	—7640	696	—21551	18153	—2702
	Total	—73356	—73333	0	—146689	—22621	—199324	0	—221945

* Finance, Insurance, and Real Estate.

TABLE X.2

ALLOCATIONS OF JOB GAINS: MAJOR CITIES VS. REST OF THE STATE[1]

Region	Sector	1960-1968				1972-1978			
		Structure	Interstate Shift	Intrastate Shift	Total	Structure	Interstate Shift	Intrastate Shift	Total
Major Cities	Manufacturing	—17787	—25161	—58212	—101160	—16050	—16209	—27771	—60030
		(—9.2)	(—13.0)	(—30.0)	(—52.1)	(—13.4)	(—13.5)	(—23.2)	(—50.2)
	Trade	—7386	12130	—45848	—41104	4939	—7336	—33131	—35528
		(—8.4)	(13.9)	(—52.4)	(—47.0)	(7.6)	(—11.2)	(—50.8)	(—54.4)
	T.C.U.	—8151	1351	—2020	—8820	—5328	—2319	—10197	—17844
		(—14.0)	(2.3)	(—3.5)	(—15.2)	(—11.6)	(5.0)	(22.2)	(38.8)
	Services	11715	—5887	—8833	—3005	8709	—3132	—24823	—19246
		(23.1)	(—11.6)	(—17.4)	(—5.9)	(12.0)	(—4.3)	(—34.1)	(—26.4)
	F.I.R.E.	2044	—3938	—6682	—8576	495	—276	—21181	—20962
		(5.8)	(—11.1)	(18.9)	(—24.2)	(1.7)	(—1.0)	(—73.8)	(—73.0)
	Construction	—1810	54	—3150	—4906	269	—4775	—4672	—9178
		(—10.5)	(0.3)	(—18.3)	(—28.5)	(3.0)	(—53.1)	(—51.9)	(—102.0)
	Total	—21375	—21451	—124745	—167571	—6966	—34047	—121775	—162788
		(—4.8)	(—4.8)	(—28.2)	(—37.8)	(—2 0)	(—10.0)	(—35.7)	(—47.7)
Rest of the State	Manufacturing	—45181	—63912	58212	—50881	—70854	—71557	27771	—114640
		(—6.5)	(—9.1)	(8.3)	(—7.3)	(—10.4)	(—10.5)	(4.1)	(—16.9)
	Trade	—16728	27473	45848	56593	28187	—41861	33131	19456
		(—4.8)	(7.9)	(13.2)	(16.3)	(4.7)	(—7.0)	(5.6)	(3.3)
	T.C.U.	—12875	2133	2020	—8723	—11872	—5169	10197	—6844
		(13.3)	(2.2)	(2.1)	(—9.0)	(—8.8)	(—3.8)	(7.5)	(—5.1)
	Services	28075	—14108	8833	22800	36034	—12959	24823	47898
		(18.5)	(—9.3)	(5.8)	(15.0)	(8.4)	(—3.0)	(5.8)	(11.2)
	F.I.R.E.	1912	—3682	6682	4912	977	—544	21181	21614
		(4.2)	(—8.0)	(14.5)	(10.7)	(0.8)	(—0.5)	(17.7)	(18.1)
	Construction	—7184	214	3150	—3820	1873	—33187	4672	—26642
		(—8.6)	(0.3)	(3.8)	(—4.6)	(1.9)	(—33.3)	(4.7)	(—26.7)
	Total	—51981	—51182	124745	20882	—15655	—165277	121775	—59157
		(—3.6)	(—3.6)	(8.7)	(1.5)	(0.8)	(—8.0)	(5.9)	(—2.9)

[1] Figures in the parentheses represent gains as percents of end-of-the-period covered employment.

TABLE X.3

ALLOCATIONS OF JOB GAINS: URBAN VS. REST OF THE STATE[1]

Region	Sector	1960-1968				1972-1978			
		Structure	Interstate Shift	Intrastate Shift	Total	Structure	Interstate Shift	Intrastate Shift	Total
Urban Counties Including Major Cities	Manufacturing	—39202	—55455	—48947	—143604	—46489	—46950	—37882	—131321
		(—7.7)	(—10.9)	(—9.6)	(—28.3)	(—11.9)	(—12.1)	(—9.7)	(—33.7)
	Trade	—14068	23104	—28347	—19311	15566	—23118	—35768	—43320
		(—6.2)	(10.2)	(—12.6)	(—8.6)	(5.7)	(—8.4)	(—13.0)	(—15.8)
	T.C.U.	—13875	2299	—734	—12310	—10678	—4648	—18420	—33746
		(—13.7)	(2.3)	(—0.7)	(—12.1)	(—11.3)	(—4.9)	(—19.6)	(—35.8)
	Services	23012	—11564	—7253	4195	23187	—8339	—21008	—6160
		(21.0)	(—10.5)	(—6.6)	(3.8)	(9.7)	(—3.5)	(—8.8)	(—2.6)
	F.I.R.E.	2998	—5775	—3945	—6722	956	—533	—16152	—15729
		(5.2)	(—10.0)	(—6.8)	(—11.6)	(1.2)	(—0.7)	(—20.1)	(—19.6)
	Construction	—4470	133	426	—3911	933	—16539	—4101	—19707
		(—8.8)	(0.3)	(0.8)	(—7.7)	(2.2)	(—38.2)	(—9.5)	(—45.6)
	Total	—45605	—47258	—88800	—181663	—16525	—100127	—133331	—249983
		(—4.3)	(—4.5)	(—8.4)	(—17.3)	(—1.5)	(—8.9)	(—11.9)	(—22.3)
Rest of the State	Manufacturing	—23766	—33619	48947	—8438	—40415	—40816	37882	—43349
		(—6.2)	(—8.7)	(12.6)	(—2.2)	(—9.9)	(—10.0)	(9.3)	(—10.6)
	Trade	—10046	16499	28347	34800	17560	—26079	35768	27248
		(—4.8)	(7.9)	(13.5)	(16.6)	(4.6)	(—6.8)	(9.3)	(7.1)
	T.C.U.	—7151	1185	734	—5233	—6522	—2840	18420	9059
		(—13.4)	(2.2)	(1.4)	(—9.8)	(—7.5)	(—3.3)	(21.1)	(10.4)
	Services	16778	—8431	7253	15600	21556	—7752	21008	34812
		(18.1)	(—9.1)	(7.8)	(16.8)	(8.2)	(—3.0)	(8.0)	(13.2)
	F.I.R.E.	958	—1845	3945	3058	516	—287	16152	16381
		(4.0)	(—7.8)	(16.7)	(12.9)	(0.8)	(—0.4)	(23.7)	(24.0)
	Construction	—4524	135	—426	—4815	1209	—21423	4101	—16113
		(—9.0)	(0.3)	(—0.8)	(—9.6)	(1.8)	(—32.7)	(6.3)	(—24.6)
	Total	—27751	—26076	88800	34973	—6096	—99197	133331	28038
		(—3.4)	(—3.2)	(10.9)	(4.3)	(—0.5)	(—7.8)	(10.4)	(2.2)

[1] Figures in the parentheses represent gains as percents of end-of-the-period covered employment.

shifts.[7] Aside from these, major cities bore the entire burden of State's relative economic decline. During the 1972-78 sub-period, urban counties experienced negative intrastate shifts in Manufacturing, Trade, and Transportation, Communication and Public Utilities (T.C.U.).[8] This is in contrast with the fact that urban counties did not experience negative intrastate shifts in any of the sectors during the 1960-68 sub-period, and indicates that the economic ills of the major cities are spreading to the neighboring areas.

Table X.2 presents job gains and losses by major cities in comparison with the rest of the State. In both sub-periods, major cities lost jobs through all three components. Total losses in major cities during 1960-68 amounted to 37.8 percent of the 1968 level, and during 1972-78 (in a shorter period) they increased to 47.7 percent of the 1978 level. The rest of the State, on the other hand, gained employment through intrastate shifts while losing through structural and interstate shifts. Net results for the rest of the State were a positive shift of 1.5 percent in the 1960-68 period. However, during the 1972-78 period, the rest of the State also experienced a negative net shift (2.9%). In other words, while the employment creation in the State excluding major cities during the 1960-68 period was competitive with the rest of the nation, it was no longer the case in the 1972-78 period.

It has been noted earlier that the accelerating decline of major cities in the seventies seemed to have spread to their neighboring areas. In order to determine whether that spread was responsible for the overall relative decline of the State's economy, total job gains and losses by the urban counties, including major cities, are compared in Table X.3 to those by the suburban and rural counties. Table X.3 shows that while urban counties lost jobs during both sub-periods (17.3% and 22.3%), through all three components, suburban and rural counties gained employment through intrastate shifts, and these were more than sufficient to compensate for the losses caused by structure and interstate shifts

TABLE X.4

JOB GAINS BY SECTOR—STATE TOTAL[1]

Sector	1960-1968			1972-1978		
	Structure	Interstate Shift	Total	Structure	Interstate Shift	Total
Manufacturing	—62968	—89073	—152041	—86904	—87766	—174670
	(—7.0)	(—10.0)	(—17.0)	(—10.9)	(—11.0)	(—21.9)
Trade	—24114	39603	15489	33126	—49197	—16072
	(—5.5)	(9.1)	(3.6)	(5.0)	(—7.5)	(—2.4)
T.C.U.	—21026	3484	—17543	—17200	—7488	—24687
	(—13.6)	(2.2)	(—11.3)	(—9.5)	(—4.1)	(—13.6)
Services	39790	—19995	19795	44743	—16091	28652
	(19.7)	(—9.9)	(9.8)	(8.9)	(—3.2)	(5.7)
F.I.R.E.	3956	—7620	—3664	1472	—820	652
	(4.9)	(—9.4)	(—4.5)	(1.0)	(—0.6)	(0.4)
Construction	—8994	268	—8726	2142	—37962	—35820
	(—8.9)	(0.3)	(—8.6)	(2.0)	(—34.9)	(—33.0)
Total	—73356	—73333	—146689	—22621	—199324	—221945
	(—3.9)	(—3.9)	(—7.8)	(—0.9)	(—8.3)	(—9.3)

[1] Figures in the parentheses represent gains as percents of end-of-the-period covered employment.

[7] Since the location of a construction company and that of construction activities are not necessarily in the same county, the negative intrastate shift in the suburban counties may not reflect a relative decline in construction activities in those counties.

[8] Rural counties did experience a negative shift in transportation, communications, and public utilities, but the figure is insignificant.

(4.3% and 2.2%). As a result, suburban and rural counties of the State were able to do more than hold their ground against the national economy.

The results shown in Table X.2 and Table X.3 indicate that the spread of urban ills accelerated the relative decline of the State's economy. For the State as a whole, the acceleration of relative decline can be seen from Table X.4. While the total losses of covered employment in the State during the sixties were 7.8 percent of the 1968 level, they were over 9 percent of the 1978 level in the 1972-78 period. However, the structural component of Statewide losses was reduced from 4 percent in the 1960-68 period to one percent in the 1972-78 period. On the other hand, losses due to interstate shifts increased from 4 percent in 1960-68 to over 8 percent in 1972-78. This acceleration of interstate shifts is responsible for the acceleration of total losses.

The fact that the acceleration of interstate shifts in the 1972-78 period overwhelmed the deceleration of structural losses may seem to be a pessimistic sign for the State's economic strength. However, some bright signs can be identified. As shown in Table X.5, during the 1960-68 period only one county (Atlantic) had experienced a positive structural component and only one county (Ocean) showed a positive (but

TABLE X.5

ALLOCATION OF JOB GAINS

Sector: Total Private Industries*
Period: 1960-68

Region	Structural	Interstate Shift	Intrastate Shift	Total
Camden	—3508.	—3919.	—25564.	—32988.
Elizabeth	—2221.	—1667.	905.	—2983.
Jersey City	—3477.	—2629.	—12388.	—18494.
Newark	—7074.	—8265.	—55965.	—71303.
Paterson	—2767.	—2774.	—9438.	—14979.
Trenton	—2330.	—2199.	—22295.	—26824.
Atlantic	1076.	—1148.	—6437.	—6509.
Bergen	—8886.	—6550.	27968.	12534.
Burlington	—1721.	—1588.	5896.	2588.
Camden	—872.	—720.	18296.	16705.
Cape May	—165.	—22.	240.	53.
Cumberland	—2035.	—2054.	1232.	—2856.
Essex	—4498.	—4994.	—4755.	—14249.
Gloucester	—1354.	—819.	1055.	—1117.
Hudson	—9308.	—8268.	—13301.	—30878.
Hunterdon	—524.	—289.	1183.	370.
Mercer	—1019.	—1232.	15474.	13223.
Middlesex	—7604.	—5787.	20766.	7375.
Monmouth	—1521.	—944.	12288.	9824.
Morris	—693.	—2641.	12523.	9189.
Ocean	—342.	28.	5300.	4987.
Passaic	—4420.	—4253.	7515.	—1158.
Salem	—1104.	—1119.	—867.	—3090.
Somerset	—1560.	—1813.	5601.	2227.
Sussex	—255.	—282.	321.	—216.
Union	—4113.	—6339.	12715.	2263.
Warren	—1064.	—1048.	1734.	—378.

* Not including Mining, Agriculture and others.

TABLE X.6

ALLOCATION OF JOB GAINS

Sector: Total Private Industries*
Period: 1972-78

Region	Structural	Interstate Shift	Intrastate Shift	Total
Camden	—791.	—3189.	—8941.	—12921.
Elizabeth	—1343.	—4202.	—7624.	—13169.
Jersey City	—1084.	—5541.	—18210.	—24835.
Newark	—2522.	—13167.	—56882.	—72572.
Paterson	—1232.	—4590.	—12784.	—18607.
Trenton	7.	—3357.	—17325.	—20674.
Atlantic	1564.	—4615.	—3263.	—6314.
Bergen	—2343.	—27108.	19757.	—9694.
Burlington	18.	—6435.	2528.	—3889.
Camden	1303.	—8023.	9685.	2966.
Cape May	856.	—1744.	3687.	2799.
Cumberland	—1506.	—3952.	—1204.	—6663.
Essex	819.	—13645.	—8641.	—21467.
Gloucester	—484.	—3250.	8174.	4441.
Hudson	—6685.	—12351.	—20915.	—39952.
Hunterdon	—131.	—1323.	2619.	1164.
Mercer	—225.	—5402.	13608.	7981.
Middlesex	—4550.	—17707.	31333.	9076.
Monmouth	2046.	—8610.	11852.	5289.
Morris	—343.	—8842.	27366.	18182.
Ocean	1309.	—4122.	12597.	9784.
Passaic	—2141.	—10457.	148.	—12450.
Salem	—814.	—2313.	1382.	—1744.
Somerset	—1137.	—5695.	14168.	7336.
Sussex	205.	—1253.	514.	—534.
Union	—2629.	—16202.	—5448.	—24279.
Warren	—787.	—2229.	1821.	—1194.

* Not including Mining, Agriculture and others.

very small) interstate shift. On the other hand, Table X.6 indicates that many counties had experienced structural gains during the 1972-78 period, although none had gained through interstate shifts. This improvement of industrial structure during the seventies had to be accomplished by eliminating inefficient plants or firms. This is reflected in interstate shifts. In other words, the acceleration of negative interstate shifts which had been necessary for the structural readjustment would not be needed in the 1980s. Furthermore, according to a recent study, New Jersey's productivity levels have remained competitive with those in other regions of the nation over the past two decades.[9] Thus, if other conditions do not worsen, some relative improvement in interstate shifts can be expected in the 1980s.

Another important part of the negative interstate shifts in the seventies can be seen in the construction industry. To a large extent, the relative decline of the State's construction industries is due to a slowdown in population growth in that period, in conjunction with the relative decline in the State's economic activities. Hence, the long-run outlook of the State's construction industries depends on the State's population trend.

[9] See Broner (1980).

TABLE X.7

POPULATION CHANGES AND UNEMPLOYMENT RATES

Year	Unemployment Rate (%)			Population Growth Rate (%)		
	N.J.	U.S.	Difference	N.J.	U.S.	Difference
70	4.6	4.9	—0.3	1.22	1.09	0.13
71	5.7	5.9	—0.2	1.43	0.98	0.45
72	5.8	5.6	0.2	0.62	0.78	—0.16
73	5.6	4.9	0.7	0.04	0.71	—0.67
74	6.3	5.6	0.7	0.01	0.73	—0.72
75	10.2	8.5	1.7	0.11	0.80	—0.69
76	10.4	7.7	2.7	0.11	0.75	—0.64
77	9.4	7.0	2.4	0.01	0.80	—0.79
78	7.2	6.0	1.2	—0.14	0.77	—0.91

SOURCES: *Statistical Abstract of the United States,* op. cit.
12th Annual Report of the Economic Policy Council, and Office of Economic Policy, Trenton, 1979, Statistical Appendix.

The downward drift in the State's population growth rate can be explained in part by the rising State unemployment rate relative to the nation's. As shown in Table X.7 the difference between the State's population growth rate and its national counterpart displays a *negative correlation* with the difference between the State's unemployment rate and the national unemployment rate.[10]

Fortunately, the difference between the State and national unemployment rate, which peaked at 2.7 percentage points in 1976 (the year following the trough of 1974-75 recession), has been gradually declining (see Table X.8). Preliminary statistics indicate a rough parity between the State and national unemployment rate during April-June 1980. Although the current recession will once again increase the unemployment rate of the State, as well as that of the nation, the improvement in industrial structure and eliminaion of inefficient firms or plants during the course of the past two recessions are likely to prevent a repetition of the nearly three percentage point difference between the State's and the national unemployment rates that occurred in 1976. If this turns out to be the case, New Jersey's population trend would, if not reverse itself, at least not worsen and, therefore, the worst for the construction industry may be behind us.[11]

In summary, the relative decline of the State's employment trend in the sixties accelerated in the 1972-78 period, due to the acceleration of negative interstate shifts which overwhelmed the relative improvement (i.e., less negative) in the structural component. Within the State, negative intrastate shifts were observed in the major cities in both periods and also in the urban counties during the 1970-78 period. The spreading of negative intrastate shifts from major cities to urban counties indicates that the urban policies of federal, state and local governments have not yet been able to stem the powerful economic trend. Whether the trend can be reversed in the 1980s remains to be seen.

Despite the acceleration of the relative decline of the State's employment trend in the seventies, there have been some positive developments.

II. Determinants of Intrastate Shift

In Part I, several components of employment shifts have been estimated and their behavior analyzed by the use of shift-share analysis. While

[10] Correlation coefficient is — 0.73. which is significant at the five percent level.

[11] According to a study by Jaffee (1979) prospects for the State's housing industry for the 1980s are also encouraging. His pessimistic forecast is the continuation of the trends in the 1970s and his optimistic forecast is a tripling of the average level of the 1970s.

TABLE X.8

RECENT TRENDS IN UNEMPLOYMENT RATES, N.J. VS. U.S.

Year/Month	Unemployment Rate		
	N.J.	U.S.	Difference
1979: 1	7.1	5.8	1.3
2	7.0	5.7	1.3
3	7.1	5.7	1.4
4	7.0	5.8	1.2
5	6.9	5.8	1.1
6	6.8	5.7	1.1
7	7.0	5.7	1.3
8	7.0	5.9	1.1
9	6.9	5.8	1.1
10	6.9	5.9	1.0
11	6.7	5.8	0.9
12	6.6	5.9	0.7
1980: 1	6.6	6.2	0.4
2	6.5	6.0	0.5
3	6.7	6.2	0.5
4	6.7	7.0	−0.3

SOURCES: *Economic Indicators*, June, 1980, Council of Economic Advisors, Washington, 1980. *New Jersey Economic Indicators*, June, 1980, Department of Labor and Industry, State of New Jersey, Trenton, 1980.

the examination of the patterns and trends of employment shifts facilitated the understanding of the State's economy, more insight can be gained by investigating the determinants of the components of shifts. For the present, the investigation of the determinants of shifts will be restricted to intrastate shifts only.

Intrastate shifts in employment can occur when changes in locational advantages take place. Locational advantages of a given region may be influenced by tax policies of local governments within the region, access to input and output markets, and any external costs of doing business in the region, such as crime. Based on these factors, the following simple model of intrastate shift is hypothesized:

$$(TRA_{ir}/C^{o}_{ir}) = f(TXRT, CRM, GPOP, DEN, DNY, DPH) \quad (6)$$

where the dependent variable is the intrastate shift in percents, TXRT the property tax rate, CRM the crime rate, GPOP the growth rate of region's population, DEN the population density of the region, DNY the distance from New York City, and DPH the distance from Philadelphia. The sample for this study consists of twenty-seven observations covering the six major cities and twenty-one counties of the State.

Ideally, property tax rates should be disaggregated by the types of real property. However, data unavailability forced the use of a single measure of property tax rate for all types of real properties.[12] Effective rates for the sub-regions of the State are computed by dividing the total net property tax revenues by total equalized value.[13]

For the crime-rate variable, both violent crime rate and non-violent crime rate as well as total crime rate are used. Since violent crime rate seems to be a more significant variable, results using violent crime rates only are reported in this paper.

[12] The New Jersey Department of the Treasury is in the process of compiling disaggregated property tax rates for 1970-79.

[13] Data for property tax revenues and equalized values are obtained from *New Jersey State Department of the Treasury Report*—1972.

Population growth rate is included in the model as a measure of growth in output demand and in labor supply. Population density is a proxy for the availability of land as well as the price of land. For the industries relying on horizontal production processes, availability of land would be an important factor of locational decision. Distances from New York City and from Philadelphia are used as a measure of market proximity. However, experiments show that these variables are of little statistical importance in New Jersey sub-regions, presumably because all sub-regions have fairly good access to those cities. Consequently, these distance variables are dropped from the equation.

Other variables, such as the rate of increase in the crime rate and rate of change in property tax rate were tried with no success.[14]

Another problem encountered was that of multicollinearity. TXRT, LVIO (logarithm of violent-crime rate), GPOP and LDEN (logarithm of density) are highly intercorrelated.[15] Because of this, it was difficult to separate the effect of each variable and was not possible to include all variables at the same time. The results for the 1972-78 period presented in Table 9 are equations using the best combinations of variables as judged by $\bar{R}^2$ and significance of the estimates.

The regression equations (Table X.9) show that, with the exception of Transportation, Communication and Public Utilities, intrastate shifts of all other sectors are significantly and negatively associated with property-tax rate and/or violent-crime rate, or population density. For the T.C.U. sector, it was not possible to estimate a meaningful equation. The reason for failure seems to be the idiosyncrasy of the sector in location decision. Transportation, unlike other sectors, cannot abandon cities; and at least in some of the cases, locations of public utilities are decided not by the consideration of minimizing costs but by that of public safety.

For manufacturing, wholesale and retail industries, property tax rate and violent crime rate are found to be important factors of intrastate shifts. In manufacturing industries, safety concerns for the second and third shift workers may be the reason for aversion from high-crime areas. Similar reasoning applies to the trade sector (at least in retail trade).

For small services and amusements, most services cannot be exported to other regions. Hence, the growth of population as a measure of output demand is found to be an important determinant of intrastate shifts. Surprisingly, however, the effect of population growth rate on construction industries' intrastate shifts is negative after accounting for the effects of property-tax rate and population density. This may be due to multicollinearity. Or, more likely, location of construction jobs and construction activities are separated, and, hence, the negative coefficient for the population-growth rate does not necessarily imply a negative effect of this variable on construction *activities*. Another possibility is that the perverse sign may be the effect of public construction programs designed to improve urban economies.

Population density is highly significant in explaining intrastate shifts in construction industries. Since low density areas enjoy greater availability of land, and, consequently, a lower price of land than in high density areas, a negative coefficient of the density variable is expected. The estimation results are consistent with the expectation.

Overall, with the exception of T.C.U. sector and perhaps the F.I.R.E. sector, the influence of the property-tax rate is consistently and negatively associated with intrastate shifts, and

[14] Because 1972 crime data are not disaggregated for violent and non-violent crime, 1973 data are used instead. Also, in order to avoid the problem of simultaneous-equations bias, 1972 tax rate, 1972 density, and 1973 violent-crime rate are used instead of averages for the 1972-78 period.

[15] The correlation coefficients between the explanatory variables range from 0.6 (TXRT and GPOP) to 0.8 (TXRT and LVIO).

TABLE X.9

REGRESSION EQUATIONS[1]

Sector	Constant	TXRT	LVIO	GPOP	LDEN	$\bar{R}^2$	F (d.f.)	Change In Annual Rate[2]
Manufacturing	0.8410 (4.366)**	—6.2156 (2.281)*	—0.0734 (2.177)*			0.6477	24.90** (2,24)	1.09
Trade	1.4080 (5.810)**	—7.6734 (2.239)*	—0.1402 (3.307)**			0.7436	38.69** (2,24)	1.17
T. C. U.	2.2355 (1.699)		—0.2626 (1.597)			0.0562	2.55 (1,25)	N.A.
Services	—0.6666 (1.252)	—8.5893 (2.169)*		1.0225 (2.500)*		0.4960	13.80** (2,24)	1.22
F. I. R. E.	1.2493 (4.777)**	—28.563 (4.567)**				0.4331	20.86** (1,25)	4.63
	3.1580 (5.552)**		—0.3848 (5.411)**			0.5210	29.28** (1,25)	N.A.
Construction	2.0986 (3.501)**	—10.6828 (2.479)*		—1.3326 (2.751)*	—0.1108 (2.965)**	0.5158	10.23** (3,23)	2.08

[1] Figures in the parentheses are the absolute values of t-statistics.

[2] Change in annual rate of growth of employment associated with one percentage point reduction in property tax rate.

* Significant at the 5 percent level.

** Significant at the 1 percent level.

its effects are statistically significant.[16] Violent crime rate also appears to be an important negative factor in intrastate shifts. In addition, to the extent that high property-tax rates and high crime rates in urban areas are the result of socio-economic conditions, more fundamental determinants of intrastate shifts may also be at least partially represented by the property-tax rate and violent crime rate. Nevertheless, the evidence on adverse impacts of high property-tax rate and high crime rate cannot be dismissed.

Since property-tax rate appears to be an important factor of intrastate shifts, its effects on covered employment growth rates are presented in the last column of Table X.9. The figures are changes in the annual rate of growth of employment associated with one percentage point reduction in property-tax rate. Needless to say, the estimates holding the effects of other variables constant are preferred. However, this could not be done for the F.I.R.E. sector, and an estimate using the simple regression coefficient is presented as the upper bound. The estimates of changes in annual rate of growth of employment are slightly over one percentage point for the manufacturing, trade, and service sectors and a little over two percentage points for the construction sector. The fact that the construction sector is twice as sensitive to the property-tax rate as the manufacturing, trade, and service sectors is not surprising and needs no explanation. The upper-bound estimate for F.I.R.E. sector is a 4.63 percentage point increase in employment growth per annum. This is substantially higher than the upper-bound estimates for other sectors and may indicate that the F.I.R.E. sector is more sensitive to property-tax rate than other sectors.[17]

The above estimates apply to the case where one sub-region reduces the property-tax rate. When all sub-regions reduce it while preserving the intrastate differences, the effects will be neutralized and no change in intrastate shifts will take place. Note, however, that a uniform reduction in property-tax rate *does* have a positive effect on the employment growth of all sub-regions through interstate shifts.[18]

Summary and Conclusions

This paper examines the components of employment shifts in sub-regions of the State and the determinants of intrastate shifts. Intrastate shifts, which were negative almost entirely in major cities in the sixties, became negative in the urban counties as well as in major cities during the 1972-78 period. This may be an indication that urban economic problems are spreading from major cities to their neighboring areas.

While these findings reveal some discouraging aspects of the New Jersey economy, an investigation of other components of employment shifts reveals some positive developments as well. These are: (1) an improvement in the industrial structure which resulted in structural employment gains during the 1972-78 period for many counties of New Jersey, (2) the narrowing of the unemployment-rate gap between New Jersey and the United States, partly as a result of structural improvement and partly due to a stagnant population trend, and (3) a favorable outlook for the State's construction industry as a result of the narrowing of the unemployment gap which in turn is expected to check the downward drift in the State's population trend.

These positive developments by themselves may not be enough for the restoration of the State's economic strength in the 1980s. They can be augmented however, by appropriate policy measures initiated by the State.

Estimation of equations explaining the intrastate shift component shows that the property-tax rate is almost consistently and negatively associated with intrastate shifts. In addition, violent crime rate, population growth rate, and/

[16] This finding is consistent with the results of a study of interstate differences in personal income growth by the author. See, You (1980).

[17] The upper-bound estimates for other sectors range from 1.97 for manufacturing to 2.71 for construction.

[18] See You (1980).

or population density are found to explain some of the intrastate shifts. However, because of a simultaneous-equation problem involving intrastate shifts on the one hand and population growth on the other, further refinements of the estimation are warranted.

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XI

APPENDIX

STATISTICAL TABLES

TABLE 1

POPULATION AND EMPLOYMENT, NEW JERSEY, 1956-1979

Year	Resident Population	Work/Labor Force**	Total Employment	Unemployment		Insured Unemployment Rate (Percent)
	In Thousands			Number (000)	Rate (Percent)	
1956 ...	5,516,100	2,406.6	2,263.2	138.6	5.8	4.6
1957 ...	5,631,700	2,448.1	2,290.0	156.8	6.4	5.3
1958 ...	5,739,800	2,472.6	2,248.1	222.5	9.0	7.6
1959 ...	5,960,000	2,483.1	2,303.2	175.5	7.1	5.5
1960 ...	6,070,780	2,507.4	2,337.2	168.5	6.7	5.7
1961 ...	6,222,160	2,543.5	2,355.9	185.5	7.3	6.0
1962 ...	6,370,650	2,575.1	2,415.0	159.0	6.2	5.2
1963 ...	6,503,190	2,618.4	2,447.9	168.8	6.4	5.4
1964 ...	6,614,560	2,655.5	2,489.6	162.1	6.1	4.8
1965 ...	6,720,300	2,724.5	2,582.2	140.0	5.1	3.9
1966 ...	6,821,050	2,790.3	2,665.3	122.6	4.4	3.2
1967 ...	6,917,450	2,803.0	2,701.0	102.0	3.6	3.4
1968 ...	7,012,750	2,829.0	2,730.0	99.0	3.5	3.3
1969 ...	7,103,310	2,898.0	2,805.0	93.0	3.2	3.3
1970 ...	7,189,000(R)	2,983.0	2,846.0	137.0	4.6	4.4
1971 ...	7,273,000(R)	2,991.0	2,819.0	171.0	5.7	5.4
1972 ...	7,322,000(R)	3,103.0	2,923.0	179.0	5.8	5.1
1973 ...	7,316,000(R)	3,171.0	2,994.0	177.0	5.6	4.7
1974 ...	7,312,000(R)	3,204.0	3,002.0	202.0	6.3	5.7
1975 ...	7,313,000(R)	3,240.0	2,908.0	332.0	10.2	7.8
1976 ...	7,312,000(R)	3,292.0	2,949.0	344.0	10.4	6.4
1977 ...	7,306,000(R)	3,353.0	3,038.0	315.0	9.4	5.6
1978 ...	7,316,000(R)	3,425.0	3,179.0	246.0	7.2	5.1
1979 ...	7,332,000(P)	3,537.0	3,293.0	245.0	6.9	4.7

** For data prior to 1970, persons involved in labor-management disputes are included in total workforce and excluded from employment and unemployment. After 1969, persons involved in labor-management disputes are included in employment.

NOTES:

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

Work/labor force, employment, and unemployment estimates are adjusted to latest benchmarks.

Labor force estimates for 1970 to 1979 are obtained directly from the Current Population Survey conducted for the U.S. Department of Labor.

All population data as of July 1; population estimates are not strictly comparable over time because of changes in estimating methodology.

Annual averages may not add due to rounding.

(R) —Revised.

(P)—Provisional.

Source: N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 2

WAGE AND SALARY WORKERS IN NONAGRICULTURAL ESTABLISHMENTS, MAJOR INDUSTRY DIVISIONS, NEW JERSEY, 1947-1979

(In thousands)

Year	Total Non-Agricultural Payroll Employment	Manufacturing	Mining	Contract Construction	Transportation and Public Utilities	Wholesale and Retail Trade	Finance, Insurance and Real Estates	Services and Miscellaneous	Government
1947	1,622.6	782.6	4.0	65.4	142.2	249.7	63.1	158.8	156.8
1948	1,657.1	786.3	4.1	74.6	141.0	260.5	67.0	163.7	159.9
1949	1,595.6	721.8	4.0	72.5	134.0	264.5	66.5	166.2	166.1
1950	1,657.1	756.4	4.3	81.2	135.4	273.7	68.3	166.8	171.0
1951	1,768.1	821.2	4.5	95.4	143.9	285.8	69.8	169.8	177.7
1952	1,804.0	832.9	4.6	91.9	146.7	295.6	70.7	174.0	187.6
1953	1,850.2	856.2	4.7	90.3	147.8	303.4	73.6	180.6	193.6
1954	1,820.8	802.1	4.3	93.6	146.1	312.4	76.1	186.0	200.2
1955	1,865.3	811.1	4.0	98.7	148.4	322.5	78.8	195.4	206.4
1956	1,933.5	834.8	4.3	100.7	153.8	336.6	81.8	208.4	213.1
1957	1,968.3	835.0	4.4	96.4	154.3	349.1	85.2	222.7	221.2
1958	1,911.8	776.0	3.7	88.9	148.2	351.0	86.4	230.5	227.0
1959	1,970.9	801.9	3.6	96.3	147.0	360.3	86.7	241.6	233.5
1960	2,017.1	808.8	3.5	98.7	149.5	374.5	88.0	252.0	242.1
1961	2,033.6	791.5	3.4	100.0	150.1	380.1	90.6	264.2	253.6
1962	2,095.8	812.8	3.4	101.3	150.8	393.1	92.8	279.9	262.8
1963	2,129.4	809.4	3.5	101.2	151.9	405.3	94.5	291.5	272.1
1964	2,168.7	806.7	3.6	106.8	153.4	420.0	96.6	301.6	280.0
1965	2,259.0	837.5	3.5	110.6	157.0	438.5	98.6	315.6	295.4
1966	2,359.1	879.3	3.0	111.2	162.2	459.6	101.0	330.8	312.0
1967	2,421.5	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	388.0
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	2,699.8	747.9	2.8	99.2	174.3	599.3	135.2	471.1	470.0
1976	2,753.1	756.2	2.7	93.9	176.0	618.5	138.0	480.7	479.8
1977	2,835.7	767.3	2.9	94.5	178.2	637.3	142.9	509.8	502.9
1978	2,961.3	786.8	2.6	105.3	188.5	666.4	147.7	542.7	521.4
1979	3,031.9	799.8	2.7	115.1	188.7	680.4	152.3	572.1	520.8

Series have been adjusted to March 1979 benchmarks.
SOURCE: N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 3
WAGE AND SALARY WORKERS IN MANUFACTURING, DURABLE GOODS, NEW JERSEY, 1947-1979
(In thousands)

Year	Total Durable Goods	Lumber and Wood Products	Furniture and Fixtures	Stone, Clay and Glass Products	Primary Metal Industries	Ordnance and Fabricated Metals	Machinery, Except Electrical	Electrical Machinery	Trans-portation Equipment	Instruments and Related Products	Miscellaneous Manu-facturing Industries
1947	403.0	6.9	7.7	31.0	45.8	45.7	56.0	108.9	47.4	18.2	35.5
1948	397.2	7.0	8.2	31.4	44.2	44.3	53.8	106.7	45.9	18.8	36.9
1949	346.1	6.5	7.6	29.0	37.6	40.7	48.8	87.3	37.5	17.9	33.2
1950	372.3	6.8	8.9	31.7	40.5	44.2	49.9	97.2	40.1	17.8	35.3
1951	427.9	7.1	9.1	35.3	46.5	48.3	60.0	115.1	47.5	22.4	36.6
1952	446.6	6.4	8.5	33.4	45.3	50.5	61.7	121.7	60.2	24.7	34.3
1953	470.4	6.3	8.6	33.8	46.2	57.2	64.0	132.5	62.7	26.5	32.6
1954	431.3	6.4	8.2	32.5	42.6	54.6	60.6	116.7	56.5	24.9	28.3
1955	435.5	6.4	8.5	34.1	43.9	55.7	59.1	117.5	57.1	25.3	27.8
1956	455.9	6.4	9.1	34.3	47.3	55.5	65.8	124.3	57.4	27.9	27.9
1957	457.3	6.3	9.2	33.9	46.9	56.7	65.5	125.6	55.9	29.4	27.9
1958	412.5	5.6	8.7	31.9	40.9	51.5	57.0	115.0	48.7	27.4	25.8
1959	431.1	5.9	9.2	33.1	41.7	54.3	57.8	121.4	50.5	30.2	27.0
1960	436.8	5.7	9.8	33.7	42.6	54.8	61.0	122.3	48.5	31.7	26.8
1961	421.9	5.6	9.0	34.4	40.7	54.2	57.3	119.5	41.7	31.9	27.6
1962	436.3	5.8	9.7	34.6	40.1	56.1	60.3	125.2	42.5	32.4	29.9
1963	426.0	5.7	8.9	34.9	38.6	55.7	60.1	121.7	39.0	32.9	28.7
1964	419.1	5.6	9.0	35.6	37.9	57.2	61.4	115.1	35.6	31.0	30.7
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	363.0	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	396.3	6.8	10.3	35.4	25.6	65.0	76.3	92.9	21.3	35.4	27.3

Series have been adjusted to March 1979 benchmarks.
SOURCE: N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 4

WAGE AND SALARY WORKERS IN MANUFACTURING, NONDURABLE GOODS, NEW JERSEY, 1947-1979

(In thousands)

Year	Total Nondurable Goods	Food and Kindred Products	Tobacco Manufactures	Textile Mill Products	Apparel and Related Products	Paper Allied Products	Printing, Publishing and Allied Industries	Chemicals and Allied Products	Petroleum Refining and Related Industries	Rubber and Miscellaneous Plastic Products	Leather and Leather Products
1947	379.6	56.9	5.5	61.1	78.9	21.7	18.6	80.1	15.6	29.5	11.7
1948	389.1	57.1	5.1	64.7	85.6	22.2	19.9	77.6	16.2	28.4	12.3
1949	375.7	55.9	4.9	57.8	88.9	21.8	21.4	71.9	16.3	24.7	12.1
1950	384.1	56.5	4.6	58.2	89.0	23.5	22.8	73.7	16.5	26.4	12.9
1951	393.3	59.8	4.4	53.7	89.8	24.8	23.4	79.1	17.3	28.4	12.6
1952	386.3	61.3	4.4	50.1	88.7	24.2	23.5	78.5	16.3	27.3	12.1
1953	385.8	60.9	4.3	48.3	85.0	26.5	24.8	79.2	16.4	28.4	12.0
1954	370.8	62.2	4.0	41.9	79.7	26.0	25.9	78.0	15.2	26.7	11.2
1955	375.6	61.7	3.4	42.7	79.6	26.3	27.1	80.8	14.5	27.5	11.9
1956	378.9	63.5	2.6	41.6	79.7	27.2	28.1	81.8	14.3	28.3	11.8
1957	377.7	62.9	2.0	38.6	79.2	28.3	30.5	83.3	13.8	27.7	11.4
1958	363.6	62.9	1.9	33.0	76.7	28.0	30.3	80.8	12.2	26.6	11.1
1959	370.8	62.3	1.8	33.2	79.2	28.3	31.5	82.4	11.8	29.3	11.1
1960	372.0	62.9	1.7	31.4	77.7	28.0	32.3	86.4	11.5	29.2	11.0
1961	369.6	63.9	1.6	29.1	76.4	28.1	32.6	87.0	11.1	29.2	10.8
1962	376.5	64.2	1.5	28.6	75.8	29.7	33.0	91.0	10.7	30.7	11.5
1963	383.4	64.9	1.4	27.9	74.5	31.4	34.6	94.8	10.5	31.7	11.7
1964	387.6	65.0	1.5	27.8	74.6	31.5	35.8	96.4	9.7	34.2	11.2
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	.8	29.6	80.3	33.0	39.6	105.5	10.5	37.2	12.2
1967	418.1	65.3	.6	29.1	78.5	33.7	41.5	110.9	9.6	37.7	11.3
1968	424.5	64.5	.3	30.5	78.7	34.5	42.2	113.1	9.7	39.9	11.5
1969	429.2	63.2	.3	30.8	77.2	35.0	43.3	117.4	10.0	41.4	10.6
1970	426.4	63.5	.3	29.6	72.3	35.3	44.8	120.9	10.1	40.0	9.6
1971	413.7	61.7	.3	29.4	68.9	35.9	43.8	117.5	10.1	36.8	9.4
1972	417.4	59.8	.3	30.5	68.9	35.9	46.0	119.3	10.6	37.2	8.9
1973	422.1	68.7	.2	31.3	68.7	36.8	46.9	124.1	10.9	35.5	9.0
1974	412.7	56.7	.2	28.8	63.1	35.4	47.8	126.6	11.8	34.0	8.4
1975	384.9	53.6	.2	24.5	57.9	32.1	46.4	121.0	12.1	29.3	7.9
1976	393.2	52.7	.3	23.9	61.1	33.3	47.4	122.4	11.9	32.0	8.4
1977	397.3	50.2	.3	22.8	59.7	33.4	49.7	127.2	11.9	34.2	7.9
1978	404.0	49.9	.5	22.4	59.3	33.7	51.7	130.0	11.9	37.3	7.3
1979	403.5	49.2	.5	21.7	57.3	33.6	53.9	129.9	12.0	38.7	6.9

Series have been adjusted to March 1979 benchmarks.

SOURCE: N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 5

EMPLOYMENT, HOURS, AND EARNINGS OF PRODUCTION WORKERS ON MANUFACTURING PAYROLLS, NEW JERSEY, 1947-1979

Year	*Employment (thousands)*	*Average Weekly Hours*	*Average Weekly Earnings (dollars)*	*Average Hourly Earnings (dollars)*
1947	n.a.	40.7	52.26	1.28
1948	n.a.	40.5	56.37	1.39
1949	n.a.	39.4	56.97	1.45
1950	n.a.	40.8	61.65	1.51
1951	n.a.	41.1	67.28	1.65
1952	n.a.	41.1	71.02	1.73
1953	n.a.	40.9	74.32	1.82
1954	n.a.	39.8	74.43	1.87
1955	n.a.	40.7	79.16	1.94
1956	n.a.	40.5	82.98	2.05
1957	n.a.	39.9	85.23	2.14
1958	563.7	39.4	86.80	2.20
1959	583.8	40.3	92.45	2.29
1960	580.8	39.6	93.93	2.37
1961	563.1	40.0	97.60	2.44
1962	576.0	40.5	101.66	2.51
1963	567.5	40.5	104.90	2.59
1964	564.4	40.6	108.40	2.67
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	494.8	39.9	199.68	4.99
1976	501.0	40.4	215.71	5.33
1977	513.0	41.3	239.79	5.80
1978	511.2	41.2	255.44	6.20
1979	524.6	41.7	277.72	6.66

FOOTNOTE
n.a.—not available.

Series have been adjusted to March 1978 benchmarks.

SOURCE: N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 6

CONSUMER PRICE INDEXES* FOR URBAN WAGE EARNERS AND CLERICAL WORKERS

(1967 = 100.0)

Year	United States	New York SCA[a]	Philadelphia SMSA[b]
1947	66.9	67.0	66.4
1948	72.1	71.5	71.7
1949	71.4	70.7	70.9
1950	72.1	71.2	71.3
1951	77.8	76.5	77.9
1952	79.5	77.7	79.5
1953	80.1	78.2	79.8
1954	80.5	78.7	80.7
1955	80.2	78.2	80.6
1956	81.4	79.4	81.6
1957	84.3	82.0	84.2
1958	86.6	84.5	85.8
1959	87.3	85.6	86.8
1960	88.7	87.3	88.4
1961	89.6	88.1	89.4
1962	90.6	89.4	90.1
1963	91.7	91.3	91.8
1964	92.9	92.8	93.2
1965	94.5	94.3	94.7
1966	97.2	97.5	97.3
1967	100.0	100.0	100.0
1968	104.2	104.3	104.8
1969	109.8	110.8	110.4
1970	116.3	119.0	117.8
1971	121.3	125.9	123.5
1972	125.3	131.4	127.0
1973	133.1	139.7	135.5
1974	147.7	154.8	151.6
1975	161.2	166.6	164.2
1976	170.5	176.3	172.4
1977	181.5	185.5	183.5
1978	195.3	195.4	194.8
1979	217.7	212.8	214.6

FOOTNOTES

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

[b] Standard Metropolitan Statistical Area, including Camden, Burlington, and Gloucester counties.

* Annual averages.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 7

PERSONAL INCOME, NEW JERSEY AND UNITED STATES, 1948-1979

Year	Total Personal Income		Per Capita Personal Income			
	New Jersey	*United States*	*New Jersey*	*United States*	*New Jersey*[a]	*United States*[b]
	(millions of current dollars)		*(current dollars)*		*(1967 dollars)*	
1948	8,063	208,876	1,689	1,430	2,359	1,983
1949	8,131	205,793	1,663	1,384	2,349	1,938
1950	8,541	226,197	1,753	1,496	2,460	2,075
1951	10,151	253,232	2,028	1,652	2,627	2,123
1952	10,934	269,769	2,134	1,733	2,715	2,180
1953	11,750	285,456	2,247	1,804	2,844	2,252
1954	11,957	287,607	2,231	1,785	2,799	2,217
1955	12,688	308,266	2,306	1,876	2,904	2,339
1956	13,719	330,479	2,443	1,975	3,035	2,426
1957	14,550	348,460	2,536	2,045	3,052	2,426
1958	14,553	356,956	2,471	2,050	2,902	2,367
1959	15,655	380,033	2,603	2,146	3,020	2,458
1960	16,477	396,036	2,700	2,201	3,073	2,481
1961	17,250	411,301	2,753	2,248	3,102	2,509
1962	18,502	436,894	2,902	2,353	3,233	2,597
1963	19,415	459,075	2,973	2,436	3,247	2,656
1964	20,782	491,341	3,120	2,572	3,355	2,769
1965	22,400	532,022	3,310	2,750	3,503	2,910
1966	24,269	579,158	3,542	2,963	3,637	3,048
1967	26,107	620,020	3,768	3,142	3,768	3,142
1968	28,536	677,786	4,074	3,401	3,897	3,264
1969	30,930	738,233	4,359	3,667	3,941	3,340
1970	33,680	793,485	4,684	3,893	3,956	3,347
1971	36,181	851,952	4,967	4,132	3,983	3,406
1972 (R).	39,029	935,463	5,326	4,493	4,122	3,586
1973 (R).	42,532	1,045,303	5,807	4,981	4,220	3,742
1974 (R).	46,225	1,147,257	6,313	5,428	4,121	3,675
1975 (R).	49,762	1,248,631	6,786	5,861	4,103	3,636
1976 (R).	53,623	1,374,189	7,288	6,401	4,179	3,754
1977 (R).	58,112	1,522,706	7,920	7,038	4,293	3,878
1978 (R).	64,297	1,709,616	8,775	7,840	4,495	4,012
1979 (R).	71,135	1,915,999	9,702	8,706	4,546	4,005

FOOTNOTES

[a] The average of the Consumer Price Indexes for the New York Standard Consolidated Area and the Philadelphia SMSA was used to express New Jersey per capita personal income in constant 1967 dollars.

[b] The Consumer Price Index for the United States was used to express United States per capita personal income in constant 1967 dollars.

(R) Revised estimates. Estimates of state total and per capita personal income for 1958-79 have been revised following the 1976 benchmark revision of the national income and product accounts. Estimates prior to 1958 have not been revised and are not directly comparable to those for 1958 to 1979.

(P) Preliminary estimates.

SOURCES: U.S. Department of Commerce; U.S. Department of Labor, Bureau of Labor Statistics. Prepared by N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 8
PRODUCTION AND TRADE, NEW JERSEY, 1948-1979

Year	Electric Power Sales			Value of New Dwelling Units Authorized	Construction Contracts Awarded	Retail Store Sales*	Registration of New Vehicles	
	Total	Large Industrial and Commercial Users	Small Industrial and Commercial Users				Passenger Cars	Commercial Vehicles
	(kilowatt hours in thousands)			($000)	($000)	($000,000)	(number)	(number)
1948	6,887,131	3,736,931	1,359,854	n.a.	406,476	n.a.	116,847	25,504
1949	7,026,664	3,578,396	1,483,196	n.a.	408,007	n.a.	165,179	23,544
1950	8,023,122	4,161,454	1,630,075	n.a.	747,771	n.a.	210,436	27,229
1951	8,944,201	4,648,835	1,806,808	n.a.	676,458	n.a.	178,862	25,002
1952	9,578,722	4,837,880	1,969,215	n.a.	690,770	n.a.	149,168	19,335
1953	10,435,872	5,191,330	2,180,598	n.a.	793,889	n.a.	208,313	23,048
1954	10,931,039	5,214,694	2,348,391	n.a.	886,947	n.a.	207,242	20,601
1955	12,184,077	5,874,199	2,584,701	n.a.	1,010,459	n.a.	258,079	22,262
1956	13,224,653	6,323,544	2,807,035	n.a.	1,106,452	n.a.	219,297	21,903
1957	14,196,487	6,642,234	3,097,755	n.a.	1,048,449	n.a.	219,865	20,320
1958	14,949,906	6,829,115	3,322,774	n.a.	1,143,484	n.a.	183,770	17,616
1959	16,632,611	7,683,942	3,719,151	n.a.	1,303,736	n.a.	219,305	20,374
1960	17,569,054	8,125,141	3,967,306	497,534	1,256,532	n.a.	266,299	22,532
1961	19,248,349	8,730,727	4,471,379	553,029	1,307,832	n.a.	250,432	24,606
1962	20,630,556	9,506,486	4,848,024	549,825	1,392,618	n.a.	285,955	24,713
1963	22,077,818	10,108,217	5,309,982	608,660	1,534,448	8,992	318,127	26,804
1964	23,848,214	10,773,759	5,872,988	704,809	1,622,048	9,768	325,293	28,417
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	356,583	34,616
1970	38,156,144	15,394,352	10,185,005	599,034	2,740,746	14,274	348,304	36,027
1971	39,919,508	15,564,483	11,056,580	876,144	2,409,797	15,359	370,004	35,255†
1972	42,318,122	16,192,817	12,143,135	1,062,430	2,948,735	16,399	443,628	50,545
1973	45,540,943	17,018,962	13,233,603	1,030,506	2,513,229	17,874	453,334	53,735
1974	43,995,014	16,390,080	12,904,974	588,291	2,353,822	18,024	351,103	51,663
1975	43,477,908	14,927,694	13,509,510	574,101	1,950,095	19,636	298,926	31,493
1976	45,605,101	15,759,346	14,289,144	832,433	2,063,615	21,833	384,407	45,731
1977	46,398,759	15,659,679	14,774,406	998,931	4,805,407(R)	24,076	448,669	61,578
1978	48,113,001	16,386,752	15,474,339	1,262,831	4,096,430(R)	27,333(R)	436,849	65,772
1979	48,783,424	16,593,515	15,782,667	1,274,353	3,585,145(P)	29,739	402,484	63,867

FOOTNOTES

* Data prior to 1976 are based on different sample design and are not strictly comparable with later retail sales figures.

† Years 1948-70 compiled by N.J. Auto List. Years 1972-79 are from the N.J. Division of Motor Vehicles.

(P) —Preliminary estimates. (R) —Revised. n.a.—not available.

SOURCES: Electric Power Sales: Edison Electric Institute. New Dwelling Units Authorized: N.J. Department of Labor and Industry in Cooperation with U.S. Department of Commerce. Construction Contracts Awarded: F.W. Dodge Corporation. Retail Sales: U.S. Dept. of Commerce, Registration of New Vehicles: New Jersey Auto Lists, Inc.; N. J. Division of Motor Vehicles.

Prepared by N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 9
BUSINESS ACTIVITY, NEW JERSEY, 1948-1979

Year	Business Telephones Net Gains	Business Failures (number)	Liabilities of Business Failures ($000)	New Incorporations (number)	New Jersey Turnpike	
					Toll Revenue ($000)	Number of Vehicles (000)
1948	19,106	219	15,286	5,510	n.a.	n.a.
1949	10,014	366	16,246	5,411	n.a.	n.a.
1950	20,134	346	10,926	6,009	n.a.	n.a.
1951	29,806	307	11,961	5,581	n.a.	n.a.
1952	29,044	319	18,627	6,146	16,241	17,948
1953	26,613	360	25,856	6,651	19,193	22,005
1954	24,664	385	20,086	7,276	20,756	24,555
1955	31,659	456	29,753	8,386	21,123	25,888
1956	37,452	582	33,919	8,839	24,513(R)	31,588
1957	29,856	565	39,604	8,097	29,023(R)	39,270
1958	21,892	778	43,475	8,757	30,159(R)	41,615
1959	35,051	639	27,619	10,436	33,318(R)	46,199
1960	38,543	714	49,071	10,172	35,584(R)	49,083
1961	28,825	717	53,282	9,650	37,193(R)	51,738
1962	39,383	591	58,468	9,984	39,240(R)	54,901
1963	29,716	509	256,075	9,716	40,779(R)	56,677
1964	36,771	442	49,261	10,023	44,149(R)	60,708
1965	47,251	512	96,334	10,439	46,122(R)	64,958
1966	54,650	442	61,191	9,656	48,610(R)	69,850
1967	48,620	414	64,215	10,220	51,230(R)	73,529
1968	53,293	423	42,692	12,038	55,340(R)	78,205
1969	73,211	343	53,141	13,168	57,637(R)	80,618
1970	58,787	463	142,196	13,958	63,934(R)	89,655
1971	45,401	428	102,738	15,563	70,124(R)	98,553
1972	66,989	453	173,428	16,462	75,940(R)	107,933
1973	87,064	491	201,463	16,312	78,997(R)	110,422
1974	55,327	643	110,411	15,410	75,243(R)	106,628
1975	31,164	768	243,209	16,022	84,385(R)	105,633
1976	53,040	660	174,457	18,270	91,082(R)	109,234
1977	76,351	535	194,995	19,366	95,112	113,664
1978	73,114	415	198,834	20,381	100,838	120,623
1979	67,957	421	194,188	21,172	100,885	121,031

FOOTNOTES
n.a.—not available. (R)—Revised.

SOURCES: Business Telephone Net Gains: N.J. Bell Telephone Company. Number and Liabiliteis of Business Failures and New Incorporations: Dun and Bradstreet, Inc. Apparent Consumption of Distilled Spirits: Distilled Spirits Institute. New Jersey Turnpike-Toll Revenue and Number of Vehicles: New Jersey Turnpike Authority.

Prepared by N.J. Department of Labor and Industry, Division of Planning and Research.

TABLE 10

AGRICULTURE, NEW JERSEY, 1950-1979

Year	Number of Workers on Farms (thousands)	Cash Receipts from Farm Marketings (thousands of dollars)		
		Total	From Livestock and Products	From Crops
1950	66	292,430	188,694	103,736
1951	65	348,831	229,976	118,855
1952	61	342,447	215,156	127,291
1953	58	346,187	223,750	122,437
1954	59	314,259	194,605	119,654
1955	58	307,674	200,178	107,496
1956	53	330,372	202,117	128,255
1957	51	314,627	193,991	120,636
1958	51	304,569	191,946	112,623
1959	45	288,814	170,273	118,541
1960	44	296,510	166,126	130,384
1961	42	285,007	154,547	130,460
1962	41	276,598	143,854	132,744
1963	39	267,965	134,962	133,003
1964	37	259,477	124,079	135,398
1965	33	268,493	118,031	150,462
1966	27	269,839	120,262	149,577
1967	23	250,927	102,337	148,590
1968	23	252,599	100,797	151,802
1969	21	248,982	103,694	145,288
1970	20	246,631	98,962	147,669
1971	19	244,045	90,679	153,366
1972	20	240,784	90,910	149,874
1973	19	302,035	111,204	190,831
1974	20	339,876	113,269	226,607
1975	21	325,998	102,915	223,083
1976 (R)	22	335,534	109,599	225,935
1977 (R)	23	348,793	98,237	250,556
1978 (R)	23	372,439	104,402	268,037
1979 (P)	20	401,900	109,100	292,800

FOOTNOTE

(P) —Preliminary estimates. (R) —Revised.

SOURCES: U.S. Department of Agriculture; N.J. Department of Agriculture.

Prepared by N.J. Department of Agriculture.

TABLE 11

RESIDENT POPULATION ESTIMATES FOR NEW JERSEY COUNTIES[1]

July 1, 1979

County	*Census* *April 1, 1970*	*Estimates*[2] *July 1, 1978(R)*	*July 1, 1979(P)*
Atlantic	175,043	189,400	191,500
Bergen	897,148	863,800	861,800
Burlington	323,132	363,400	368,200
Camden	456,291	471,500	475,400
Cape May	59,554	76,500	78,400
Cumberland	121,374	130,600	128,100
Essex	932,526	829,000	819,000
Gloucester	172,681	199,600	204,000
Hudson	607,839	554,100	543,300
Hunterdon	69,718	84,500	86,700
Mercer	304,116	316,200	314,500
Middlesex	583,813	590,100	594,200
Monmouth	461,849	497,900	500,500
Morris	383,454	402,800	405,700
Ocean	208,470	331,100	341,000
Passaic	460,782	444,700	445,100
Salem	60,346	62,400	61,800
Somerset	198,372	207,100	210,200
Sussex	77,528	109,300	112,700
Union	543,116	507,900	506,100
Warren	73,960	83,500	83,700
State Total	7,171,112	7,316,000	7,332,000

(R) Revised (P) Provisional

[1] These estimates were produced before the tabulation of the 1980 Census was complete. They have not been adjusted to reflect the 1980 counts.

[2] State estimates are shown to nearest thousand. County estimates to nearest hundred.

Prepared by New Jersey Department of Labor and Industry, Division of Planning and Research.