RULS - AD - 1976 - 240

11/4/1976

- EMPLOYMENT GROWTH PROJECTIONS FOR SIX COUNTIES SURROUNDING BERNARDS TOWNSHIP

PGS - 35

EMPLOYMENT GROWTH PROJECTIONS FOR SIX COUNTIES SURROUNDING BERNARDS TOWNSHIP, NEW JERSEY

PJO-1-1d
1-4-76
87

James C. Ohls and Peter Bearse*
Mathematica Policy Research, Inc.
Princeton, New Jersey
November 4, 1976

This paper has been prepared under a contract with McCarter and English. Under the terms of the contract, it is not to be released by MPR to anyone other than McCarter and English until certain litigation in which McCarter and English is involved is completed. Do not, therefore, distribute this report outside of MPR without first consulting McCarter and English or James C. Ohls.

---

*We would like to thank James Hughes and Connie Michaelson of the Center for Urban Policy Research at Rutgers University for making available to us some of the data on which this study is based. We are also indebted to Matthew Pavuk for exceptional programming assistance.

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY AND INTRODUCTION

This paper reports the results of research undertaken by MPR under contract with McCarter and English to make estimates of future employment growth in Essex, Hunterdon, Middlesex, Morris, Somerset, and Union counties in New Jersey. Since several alternative techniques for making such projections are available in the economics literature and since no single technique is generally recognized as being clearly the most accurate, two different methodologies have been employed in the present research and two different sets of projections have been made. These two sets of estimates are summarized in Table 1 below. Under one methodology, 1976-1982 county employment growth rates are expected to range from between 20.7 percent of 1976 employment for Middlesex County to 0.4 percent for Essex County. The range for the second estimation approach is 21.2 percent to -10.1 percent.

The development of methodologies for making estimates of population growth was beyond the scope of the present research. It may, however, be useful in interpreting the projections in Table 1 to show the implications of these projections with regard to Allen's (1976) estimates of future population growth in Bernards Township. This is done in Table 2. When the Allen methodology is used in conjunction with the MPR employment growth projections shown in Table 1, the estimated increase in population in Bernards Townships is between 3,739 and 5,144 people. The corresponding figure in Allen (1976) is 4,588 people. Hence, the two sets of employment projections shown in Table 1, when taken together with the Allen methodology for translating employment growth into population growth, suggest a range of population growth between 81 percent and 112 percent of that estimated by Allen.

TABLE 1

ESTIMATED COUNTY EMPLOYMENT GROWTH RATES, 1976-1982,

AS A PERCENTAGE OF 1976 EMPLOYMENT

County	Methodology I	Methodology II
Essex	0.4%	-10.1%
Hunterdon	20.4	21.2
Middlesex	20.7	19.3
Morris	19.0	15.6
Somerset	17.9	14.6
Union	8.9	3.4

TABLE 2

POPULATION GROWTH ESTIMATES

	Allen Population Estimation Methodology and Allen Estimated Employment Growth Rates	Allen Population Estimation Methodology and Employment Growth Estimates from MPR Methodology I	Allen Population Estimation Methodology and Employment Growth Estimates from MPR Methodology II
Estimated Increase in Bernards Township Population, 1976-1982	4,588	5,144	3,739
Percent of Allen Estimates	100	112	81

Section II below presents details concerning the way in which our employment forecasts have been derived. Section III then discusses in greater detail the implications of these employment forecasts with regard to the Bernards Township population projections.

II. EMPLOYMENT GROWTH PROJECTIONS

Three very powerful forces can be expected to influence employment growth in New Jersey during the coming years. One of these forces is an overall slowdown in the rate of growth of employment in the United States. The 1960s and early 1970s witnessed a very rapid growth in the labor force and in employment in the United States, largely as a result of demographic factors. This was the period when people born during the post World War II baby boom completed school and entered the work force, and these new labor force entrants caused a rapid expansion of overall employment. However, according to predictions made by the U.S. Office of Business and Economic Research on the basis of Census population data, this rapid growth can be expected to slow notably during the coming years. The average annual U.S. employment growth of the 1960s, for instance, was approximately 1.7 percent; that for the 1970s is estimated to be 1.9 percent. The comparable figure for the first half of the 1980s, however, is predicted to be only 1.0 percent (U.S. Water Resources Council, 1972).

A second important factor which must be considered in making employment forecasts for New Jersey is the recent acceleration in the movement of both population and employment out of the Northeast. During much of the post World War II period, certain areas of the country such as the West and Southwest have experienced more rapid growth rates than the Northeast, and it appears that this trend has accelerated significantly during the 1970s. A recent study by the U.S. Department of Commerce, for instance, reported that earlier Commerce predictions of employment by state which were based largely on 1960s data appear to have substantially overestimated the growth of Northeastern states including New Jersey (U.S.

Department of Commerce, 1976). Similarly, a recent collection of papers edited by George Sternlieb and James Hughes and published by the Center for Urban Policy Research of Rutgers University presented evidence that, in the words of Sternlieb and Hughes, "Net out-migration of population is occurring in the Northeast. . . .Economic forecasts indicate these trends will accelerate." (Sternlieb and Hughes, 1975)

The two trends identified above have similar impacts on future employment growth in all New Jersey counties. The effects of a third important factor vary more widely from one county in the state to another. This third trend is the continued movement of jobs and people away from New Jersey's older urban areas and into the suburban and more rural sections of the state. This movement away from the older central cities is not new (see, for instance, Mills, 1972). It continues to be an important factor determining employment patterns, however, as more and more firms find that the suburbs offer relatively easy access to plants, coupled with working environments which many of their employees find relatively more attractive than those of center city areas. With regard to the six New Jersey counties which are the subject of the current research, this third factor influencing employment trends can be expected to lead to quite disparate county growth rates, since the region in question ranges from Essex county, which includes the center of Newark, to predominantly rural Hunterdon county.

This chapter documents the techniques which we have used in order to predict the county employment growth patterns which will result from the complex forces discussed above. Section A below briefly sets the stage for the remainder of the analysis by discussing previous attempts to forecast

New Jersey county employment growth. Sections B and C then present details of two alternative methodologies for predicting job growth. The technique described in Section B essentially involves making extrapolations of past county trends in jobs by industry, using multiple regression statistical techniques in order to correct for possible biases resulting from short term fluctuations in the unemployment rate. The technique of Section C involves extrapolating past county trends in county shares of state employment and then applying these share estimates to independently-developed state predictions. We have presented results based on each of these methodologies because each of them has been used in the past literature and neither can be said with certainty to be the better of the two in terms of predictive accuracy.

A. PAST FORECASTS

The two most carefully done recent attempts to predict future employment growth by county in New Jersey are (1) a study entitled New Jersey's Manpower Challenge of the Eighties, which was published by the New Jersey State Department of Labor and Industry (New Jersey, 1975); and (2) a book entitled Modeling State Growth: New Jersey 1980, by Franklin James and James Hughes of the Center for Urban Policy Analysis at Rutgers University (James and Hughes, 1973). These two studies employed two different estimation methodologies, corresponding to the two different techniques which have been used in the current research as described in Sections B and C below. The state analysis is based upon the extrapolation of past trends in employment totals by county,[1/] while the Rutgers analysis

---

[1/] The publication itself does not provide methodological details. The description in the text is based on a phone call with Gary King of the New Jersey Department of Labor and Industry, September 28, 1976.

was based on extrapolations of employment shares which were then applied to statewide total estimates. Each of these studies appears to represent state-of-the-art work in employment forecasting. Nevertheless, in planning the present research, a decision to develop new estimating equations was made for two reasons: first, both the state and the Rutgers studies focus their forecasts on the year 1980; neither study presents direct employment estimates for 1982, the end point of the time interval of direct concern to the present study. Second, both of the previous studies are based on data which are now relatively dated. In particular, the statistical work upon which each of these previous studies is based was done several years ago and was based upon data which did not go beyond 1972. We have performed new statistical work for the present analysis in order to make it possible to use data through 1975, thus increasing our ability to take into account the recent changes in employment trends which were discussed earlier in this chapter.

B. PROJECTION METHODOLOGY I: REGRESSION EQUATION WORK BASED ON COUNTY EMPLOYMENT TOTALS

The basic employment projection approach described in this section is similar to that used by the New Jersey Department of Labor and Industry study cited earlier and involves basing future employment projections on observed past trends in county employment industry. Since long run housing needs, which are the basic concern of the present research, depend on long run employment changes rather than on short-term economic fluctuations, multiple regression techniques were used to control for the effects of the business cycle in order to extract overall long run trends from the temporary effects of short-term economic conditions.

Single stage least squares multiple regression analysis was used to estimate coefficients for the following equation:

$$E_{ijt} = A_{0ij} + A_{1ij}T_t + A_{2ij}U_t \quad (1)$$

where

E_{ijt} = first-quarter employment in county i in industry j in year t,

T_t = a variable which is set equal to 1 for the first year of the data, 2 for the second year, etc.,

U_t = the seasonally-adjusted March U.S. unemployment rate for year t,

A_{kij} = estimated coefficients.

This equation was estimated separately for each of the six counties of concern in this study and for each of the seven different industry groupings: agriculture and mining, contract construction, transportation and public utilities, wholesale and retail trade, finance and insurance, services and government, and manufacturing. Thus, a total of 42 different regression equations was estimated.

The basic data source for the employment statistics used in the statistical work was County Business Patterns, an annual U.S. Department of Commerce publication which presents county estimates of employment based on reports made by employers in connection with the administration of the Social Security system. This data source does not include information on the government and agricultural sectors, and data for these sectors were obtained from the New Jersey State Department of Labor and Industry. County Business Patterns data also exclude self-employed workers. Estimates of such workers were obtained from the Department of Labor and Industry and were allocated among counties and industries on the basis of 1970

Census ratios. We are greatly indebted to James Hughes and Connie Michaelson of the Center for Urban Policy Research at Rutgers University who assembled this data base for another purpose and kindly made it available to us.[1/] Data on the unemployment rate were taken from the U.S. Department of Labor publication, Monthly Labor Review.

The 42 employment regression equations were estimated using data for the years 1966-1975. (County Business Pattern data for 1974 and 1975 have not yet been officially published but were made available by the U.S. Department of Commerce on a preliminary basis.) The choice of this 10-year estimation period represents a compromise between two offsetting factors. On the one hand, statistical precision can be increased by using as long an estimation period as possible. On the other hand, however, as discussed above, there is considerable evidence that the determinants of employment

---

[1/] Two other sources of employment data were considered for the analysis but were eventually rejected as not being as suitable for our purposes as the County Business Patterns data set. One of these sources is the annual publication, Covered Employment Trends in New Jersey, which presents data reported by employers as part of the administration of the unemployment insurance system. We have decided not to use these data largely because of potential biases due to changes in the coverage of unemployment insurance. Second, we considered using data obtained from the Current Employment Statistics and Total Employment Statistics programs of the New Jersey Department of Labor and Industry. This data source, which is based on surveys of employers conducted by the Department of Labor and Industry, was rejected because complete employment series were not available on an individual county basis. While these programs are capable of yielding separate county estimates--indeed, such county estimates formed the basis for the Department of Labor and Industry projections cited in Section A above and for the supplementary information on the government and agricultural sectors which was used in constructing our own data bases--separate county estimates are not routinely made, and complete data series were therefore not available. It should be noted that the County Business Patterns data we have used lead to estimates of total New Jersey employment which are somewhat smaller than those estimated by the New Jersey Department of Labor and Industry. It is not clear whether the Department of Commerce data set we have used or the state data set is more nearly correct in absolute terms. We do not believe that the discrepancy is important for the present analysis, however, since we are estimating rates of change in employment and the two series--while they differ in absolute levels--tend to move parallel to one another over time.

growth have changed considerably during the 1970s, and the inclusion of large numbers of observations from an earlier period might therefore tend to result in coefficient estimates which did not adequately reflect the current situation. In general, the inclusion of fewer years in the estimation work could be expected to lead to lower estimates of growth rates, while the extension of the estimation period back into the early 1960s would tend to raise the estimates. Our judgement is that the period which we have chosen represents a reasonable compromise between these two factors.

Several alternative functional forms were tried during the estimation work, but no significant differences were observed in the way alternative functional forms fit the data. Regression results for Equation (1) are reported in Appendix A.

Once coefficients for the regression equations were obtained as discussed above, the final step in the forecasting process was to make projections for 1976 and for 1982. This was done by setting the T variable to 11 and 17 for these two prediction years, respectively, and by setting the U variable equal to its average value over the estimation period. The unemployment variable was held constant at its average value during the prediction work since our objective was to determine long run trends in employment rather than to analyze short-term fluctuations caused by business cycle conditions.

The results of these calculations are shown in Table 3 below. The estimates in this table show county employment rates which have been obtained by adding up for each county estimated increases within specific industries for that county. As shown in the table, the rate of employment growth can be expected to vary widely among the six counties which are the

TABLE 3

EMPLOYMENT GROWTH RATES AS ESTIMATED BY METHODOLOGY I

County	Estimated 1976 Employment[a]	Estimated 1982 Employment	1976-1982 Change as Percent of 1976 Figure
Essex	417,371	419,283	0.4%
Hunterdon	23,509	28,306	20.4
Middlesex	260,339	314,109	20.7
Morris	147,624	175,595	19.0
Somerset	74,587	87,925	17.9
Union	276,134	300,686	8.9

[a] As explained in footnote 1 on page 10, those estimates of employment which are based on U.S. Department of Commerce data, are somewhat larger than analogous estimates compiled by the New Jersey Department of Labor and Industry. It is not clear which data set is more nearly correct in absolute terms. This discrepancy is not important for the current analysis, however, since we are primarily interested in rates of change in employment, and the two series--while they differ in absolute levels--tend to move parallel to one another over time.

subject of our study. The lowest estimated growth rate is that for Essex County which is 0.4 percent; the highest growth rate, 20.7 percent, is estimated for Middlesex county.

C. PROJECTION METHODOLOGY II: REGRESSION EQUATION WORK BASED ON COUNTY EMPLOYMENT SHARES

The second forecasting methodology which we have used in our analysis is a variant of that used in the projection work by Franklin James and James Hughes cited earlier. This second technique involves estimating equations based on county shares of state employment totals. These equations are then used to project future county shares and these, in turn, are applied to statewide employment projections to make county-level employment forecasts.

More specifically, this second methodology is based upon estimated equations of the following form:

$$S_{ijt} = B_{0ij} + B_{1ij}T_t + B_{2ij}U_t \qquad (2)$$

where S_{ijt} is the share of total state employment in industry j at time t which is found in county i, and the other variables are the same as those defined earlier. The data and estimation techniques used in estimating these equations and the procedures used in projecting shares to 1976 and 1982 are the same as those outlined with regard to the equations discussed in Section A above. Regression results are reported in Appendix B.

In order to make use of the county share projections described above, it is necessary to have estimates of New Jersey statewide employment totals by industry. Such estimates were obtained by estimating a

second set of regression equations in which the fraction for each industry of all U.S. employment located in New Jersey was used as the left-hand-side variable in the equation and the independent variables were time and the unemployment rate. These statewide equations were then used to forecast New Jersey's share of national employment by industry to 1976 and 1982. The predicted state shares were then applied to national industry employment totals for 1976 and 1982, as estimated by the U.S. Department of Commerce, in order to obtain statewide employment estimates. Finally, these state estimates were multiplied by the estimated county shares in order to obtain county employment estimates.

Mathematically, the above methodology can be described as follows. County employment totals by industry were obtained using the equation:

$$E_{ijt} = S_{ijt} \times F_{jt} \times N_{jt}. \qquad (3)$$

N_{jt} are national U.S. Department of Commerce industry employment forecasts for 1976 and 1982 (U.S. Water Resources Council, 1972),[1/] and F_{jt} is the fraction of national employment in industry j at time t which is located in New Jersey. F_{jt} was estimated on the basis of regression equations of the form:

$$F_{jt} = C_{0j} + C_{1j}T_t + C_{2j}U_t \qquad (4)$$

where the F_{jt} and the U_t unemployment variable are both annual averages. These state equations were estimated using the same techniques as those discussed earlier with regard to county equations. Except for the

---

[1/] This publication only gives direct estimates for 1970, 1980, and 1985. In order to calculate the corresponding values for 1976 and 1982, semi-logarithmic interpolations were used. The semi-logarithmic interpolation technique was chosen on the basis of advice given by Department of Commerce officials during telephone conversations.

agricultural sector, state employment data were obtained from U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 1312-10. State data for the agricultural sector were obtained from the county employment data series described in Section A above,[1/] while national agricultural employment figures were obtained from the U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 1865. Because the necessary 1975 BLS data were not available, we ran equations for 1966-1974 only, rather than for the 1966-1975 period used elsewhere in the analysis. Regression results are reported in Appendix C.

Results based on the analysis described by the preceding equations are presented in Table 4 below. Like the first projection method, this second approach results in widely varying estimated county growth rates during the 1976-1982 period. Overall, however, this second approach leads to somewhat lower estimates of job growth than does the first.

D. ACCURACY OF THE ANALYSIS

Before outlining the implications of the above projections with respect to population projections for Bernards Township, it may be appropriate to discuss explicitly a major limitation which must be kept in mind in interpreting the analysis presented above. Specifically, there are several alternative possible approaches to making county employment projections, and these alternative approaches in general lead to different

---

[1/] It would, of course, have been possible to use the county data set described in Section A for all of the industries rather than just agriculture. We decided, however, to use the state BLS data to insure as much comparability as possible between the state and national data bases used for calculating the F_{jt} variable.

TABLE 4

EMPLOYMENT GROWTH RATES AS ESTIMATED BY METHODOLOGY II

County	Estimated 1976 Employment[a/, b/]	Estimated 1982 Employment[b/]	1976-1982 Change as Percent of 1976 Figure
Essex	426,455	382,991	-10.1%
Hunterdon	24,287	29,423	21.2
Middlesex	271,840	324,189	19.3
Morris	154,179	178,178	15.6
Somerset	76,967	88,201	14.6
Union	283,074	292,707	3.4

[a/] As explained in footnote 1 on page 10, those estimates of employment which are based on the U.S. Department of Commerce data, are somewhat larger than analogous estimates compiled by the New Jersey Department of Labor and Industry. It is not clear which data set is more nearly correct in absolute terms. This discrepancy is not important for the current analysis, however, since we are primarily interested in rates of change in employment, and the two series--while they differ in absolute levels--tend to move parallel to one another over time.

[b/] These estimates are not directly comparable to those of Table 3, since the Table 3 estimates apply to first quarter employment while those in this table apply to annual averages.

results. The two general approaches which we have used in making our projections are ones which are frequently used, and we believe that there is a high probability that actual observed growth rates in the coming years will fall within the brackets of the growth estimates which we have made. This is far from certain, however, and it must be recognized that alternative variants of the techniques which we have used might well lead to higher or lower estimates than those which we have reported. Many different steps in the estimation process are subject to judgement, including choice of data bases, choice of functional forms of equations, choice of the time period over which to run the regressions, and choice of variables to include in the equations. While we believe that the judgements which we have made regarding these issues are reasonable ones, there is no way that we--or any other team of economists--can claim that the judgements implicit in a set of projections are the only ones which are possible. What we do claim, however, is that our procedures are reasonable ones, given the current state of the art of economics.

Finally, it should be noted in closing this section that refinements of the techniques described in Sections A and B would be possible if more time and resources were available for the research. It would be possible, for instance, both to undertake further experimentation with additional functional forms for the estimation equations and to work with data which included a greater level of industry disaggregation. It would also be possible to experiment with the inclusion of additional explanatory variables such as personal income in the estimating equations and to develop more fully specified simultaneous models of the county growth process. Indeed, we undertook some preliminary work with a personal

income variable during the current research, although in the end we dropped the variable because of our inability to obtain predictions of personal income for all of the counties in question.[1/]

[1/] If more resources were available it would be possible to explore the possibility of modeling personal income endogenously within the model.

III. IMPLICATIONS OF THE ANALYSIS WITH REGARD TO BERNARDS TOWNSHIP POPULATION PREDICTIONS

The development and formal assessment of alternative methodologies for estimating future increases in the population of Bernards Township was beyond the scope of the present research, and no such work has been undertaken. In order to facilitate the interpretation of our results, however, it may be useful to discuss the implications of our employment growth rate estimates with regard to Bernards Township's existing population growth computation procedure as presented in Allen (1976). Section A below outlines the procedures which we have used to incorporate our employment growth rate estimates into Allen's framework. The results of the calculations are then presented and discussed in Section B.

A. METHODOLOGY FOR INSERTING OUR ESTIMATED GROWTH RATES INTO THE BERNARDS TOWNSHIP CALCULATIONS

The first step of the Bernards Township procedures as discussed in Allen (1976) is to estimate by county 1976-1982 employment growth as a percentage of 1974 employment, using the Covered Employment Trends data base. We have used the procedures described in Section II above to compute analogous percentages using our County Business Patterns data base.

Allen (1976) then multiplies his percentage growth rates by his estimated 1974 Bernards Township JORD county employment totals as shown in Column M, Attachment 5 of the Allen paper. We have performed a similar calculation except that, since we are using a different employment data base, it was necessary to adjust the figures in Allen (Column M, Attachment 5) upwards to make them correspond to the greater inclusiveness

of our data base. For each county, we have made this adjustment by using Allen's ratio of Bernards Township residents holding jobs in the county to total employment in the county[1/] and by multiplying this ratio by our (higher) estimates of total employment in each county.

For each county, the result of the procedure described in the above paragraph is an estimated increase in Bernards Township residents broken down by the county in which these residents will work. (In the Allen paper, this is Column P, Attachment 5.) Allen's final step is then to multiply the total number of new workers residing in Bernards Township, summed over the counties in which they will work, by the 1974 ratio of total population to total employment in New Jersey. (See Note 3, Attachment 5 of the Allen paper.) We have performed the analogous calculation using Allen's New Jersey 1974 population estimate but using the estimate of total New Jersey employment from our own employment data base. This calculation then yields an estimate of Bernards Township population growth.

In implementing the above procedures, Allen makes an adjustment for the recent substantial increase in employment in Bernards Township. Specifically, he estimates employment growth separately for Somerset County minus Bernards Township and then adds in the effects of the extraordinarily high increase in employment which is known to have occurred in Bernards Township (see Column P and Note 2, Attachment 5 of the Allen paper). We have made the same adjustment using the corresponding employment figures from our data base. The only additional assumption necessary

---

[1/] In Allen's paper, this ratio for each county is that county's entry in Column M, Attachment 2, divided by the county entry in Column E, Attachment 1.

for doing this was that the share of Bernards Township in total county employment is the same in our County Business Patterns data base as it is in Allen's Covered Employment Trends data base.

B. RESULTS

The results of the calculations described above are presented in Table 5 which shows that the two MPR employment projection methodologies, when combined with the Bernards Township population prediction procedures, lead to somewhat different estimates of population growth for the Township. The first of our two methodologies leads to population growth estimates which are somewhat in excess of the Bernards Township estimates, while the second of our two methodologies leads to somewhat lower estimates.

The procedures which we have used in obtaining employment growth estimates differ in several ways from those of Allen (1976), and it may be useful to identify a number of factors which, at least in part, are responsible for the differences shown in the table. Of the two MPR methodologies, the first is the more similar to that of Allen, since it is based--like Allen's--on extrapolating past data on county employment totals. We believe that our estimates are higher than Allen's for the following reasons: (1) we have used a longer time period for our estimation work, including years during the 1960s when employment growth was relatively rapid; (2) we have explicitly taken into account changes in the unemployment rate which rose during the period on which the Allen calculations were based; (3) our data base--unlike Allen's--includes the rapidly-growing government sector of the economy; and (4) the Allen employment growth predictions may somewhat underestimate growth because of the way in which these predictions adjusted for changes in the coverage

TABLE 5

POPULATION GROWTH ESTIMATES

	Allen Population Estimation Methodology and Allen Estimated Employment Growth Rates	Allen Population Estimation Methodology and Employment Growth Estimates from MPR Methodology I	Allen Population Estimation Methodology and Employment Growth Estimates from MPR Methodology II
Estimated Increase in Bernards Township Population, 1976-1982	4,588	5,144	3,739
Percent of Allen Estimates	100	112	81

of the Covered Employment Trends data base (see Allen, 1976, pp. 24-25); no such adjustments were necessary in our calculations, since our data base was consistently defined during the period in question.

With regard to reasons why our second methodology leads to lower population growth estimates than those obtained by Allen, we believe that the major cause of the difference is that the second MPR methodology makes it possible to take explicitly into account the slow-down in national employment growth which U.S. Department of Commerce estimates suggest will take place during the coming years. By using independent projections of national employment growth, this second methodology makes it possible to incorporate into the county employment growth estimation process demographic factors which are not yet apparent in the historical employment data on which the Allen methodology and the first MPR methodology are based.

REFERENCES

Allen, William. "Fair Share Housing Analysis for Bernards Township: Low and Moderate Income Housing." Unpublished paper, 1976.

James, Franklin and James Hughes. Modeling State Growth: New Jersey 1980. New Brunswick, New Jersey: Rutgers University Center for Urban Policy Research, 1973.

Mills, Edwin. Urban Economics, Glenview, Illinois: Scott, Foresman, 1972.

New Jersey Department of Labor and Industry. New Jersey's Manpower Challenge of the Eighties, 1975.

Sternlieb, George and James Hughes, eds. Post Industrial America: Metropolitan Decline and Inter-Regional Job Shifts. New Brunswick, New Jersey: Rutgers University Center for Urban Policy Research, 1975.

U.S. Department of Commerce. "Tracking the BEA State Economic Predictions." Survey of Current Business, April 1976.

U.S. Water Resources Council. OBERS Projections: Regional Economic Activity in the United States, 1972.

APPENDIX A

COUNTY EMPLOYMENT REGRESSION RESULTS

County and Industry[a]	Constant	Year Coefficient[b]	Unemployment Coefficient[b]	Adjusted R^2
1,1	1385.0	17.3 (.45)	-50.2 (.95)	.01
1,2	26602.6	-414.4 (6.84)	-723.2 (5.15)	.88
1,3	38062.2	-70.3 (.05)	314.1 (.22)	-.08
1,4	86673.4	-437.9 (.40)	-580.7 (.18)	.20
1,5	39589.8	311.4 (3.32)	-407.5 (1.41)	.25
1,6	109062.6	3326.3 (112.96)	-1282.7 (4.15)	.97
1,7	142308.1	-2413.7 (54.26)	-3317.5 (25.35)	.98
2,1	1060.8	-22.2 (1.20)	62.0 (2.33)	.16
2,2	1466.2	14.4 (.20)	-17.4 (.07)	-.09
2,3	1062.8	52.7 (26.57)	-32.6 (2.51)	.85
2,4	2871.5	239.2 (53.35)	-11.6 (.03)	.95
2,5	568.1	41.8 (84.42)	-24.6 (7.23)	.95
2,6	3723.8	398.1 (130.96)	-161.9 (5.35)	.97
2,7	6178.9	76.3 (1.18)	-268.4 (3.60)	.29

APPENDIX A (continued)

County and Industry[a]	Constant	Year Coefficient[b]	Unemployment Coefficient[b]	Adjusted R^2
3,1	1065.7	-3.5 (.01)	33.1 (.29)	-.04
3,2	I0505.4	214.2 (9.26)	-178.7 (1.60)	.61
3,3	6886.1	1102.2 (24.52)	-27.9 (0.00)	.89
3,4	25868.1	2403.2 (84.71)	511.2 (.95)	.97
3,5	3974.3	314.5 (43.35)	-38.9 (.16)	.93
3,6	36657.5	3595.1 (1175.02)	-364.4 (2.99)	.99
3,7	88359.4	1337.7 (4.59)	-2280.5 (3.30)	.32
4,1	1528.2	5.4 (.01)	-13.8 (.02)	-.12
4,2	6234.9	97.5 (1.20)	-141.0 (.62)	.04
4,3	5241.6	205.3 (14.31)	-48.6 (.20)	.80
4,4	17225.4	933.4 (95.08)	-17.7 (.01)	.97
4,5	1220.0	321.5 (7.94)	240.6 (1.10)	.83
4,6	29476.3	2167.0 (185.17)	43.4 (.02)	.99
4,7	43109.1	935.7 (9.90)	-1624.0 (7.37)	.54

APPENDIX A (continued)

County and Industry[a]	Constant	Year Coefficient[b]	Unemployment Coefficient[b]	Adjusted R^2
5,1	-1042.5	15.0 (.11)	17.8 (.04)	-.02
5,2	4043.3	90.6 (3.46)	-91.2 (.87)	.31
5,3	1640.8	16.2 (.01)	3.3 (.00)	-.12
5,4	9725.8	613.4 (80.60)	72.8 (.28)	.97
5,5	763.9	187.5 (35.73)	61.3 (.95)	.94
5,6	11766.1	861.0 (8.36)	233.8 (.15)	.78
5,7	19657.3	442.2 (1.43)	9.6 (.00)	.29
6,1	764.6	36.6 (1.33)	-25.2 (.16)	.14
6,2	14841.1	-65.7 (.34)	62.1 (.08)	-.06
6,3	15143.0	619.6 (30.36)	-313.4 (1.92)	.88
6,4	52785.3	991.7 (5.21)	-425.1 (.24)	.55
6,5	9215.1	519.8 (66.75)	-304.2 (5.66)	.94
6,6	43238.4	2571.7 (142.26)	-100.0 (.05)	.98
6,7	120080.3	-579.4 (.38)	-3955.5 (4.39)	.70

NOTES TO APPENDIX A

a/ County and industry codes are as follows:

County	Code
Essex County	1
Hunterdon County	2
Middlesex County	3
Morris County	4
Somerset County	5
Union County	6

Industry	Code
Agriculture and Mining	1
Contract Construction	2
Transport and Public Utilities	3
Wholesale and Retail Trade	4
Finance, Insurance and Real Estate	5
Services and Government	6
Manufacturing	7

b/ F statistic corresponding to each coefficient is shown in parentheses.

APPENDIX B

COUNTY EMPLOYMENT SHARE REGRESSION RESULTS

County and Industry[a]	Constant	Year Coefficient[b]	Unemployment Coefficient[b]	Adjusted R^2
1,1	.05967	.00058 (.82)	-.00237 (3.42)	.31
1,2	.16943	-.00466 (19.36)	-.00114 (.29)	.89
1,3	.23043	-.00501 (12.21)	.00335 (1.35)	.71
1,4	.18007	-.00551 (87.17)	-.00028 (.05)	.97
1,5	.35125	-.00875 (49.96)	.00280 (1.26)	.93
1,6	.18585	-.00314 (215.65)	-.00039 (.84)	.99
1,7	.14677	-.00281 (76.54)	.00038 (.34)	.96
2,1	.04711	-.00081 (2.95)	-.00182 (3.70)	.27
2,2	.00896	-.00006 (.09)	.00022 (.28)	-.07
2,3	.00644	.00015 (7.26)	-.00013 (1.32)	.54
2,4	.00638	.00021 (11.74)	-.00002 (.03)	.79
2,5	.00509	.00015 (21.11)	-.00010 (2.43)	.81
2,6	.00655	.00024 (23.67)	-.00019 (3.64)	.81
2,7	.00620	.00009 (2.02)	-.00009 (.52)	.17

APPENDIX B (continued)

County and Industry[a]	Constant	Year Coefficient[b]	Unemployment Coefficient[b]	Adjusted R^2
3,1	.04662	-.00013 (.10)	.00083 (.95)	.08
3,2	.06401	.00027 (.16)	.00130 (.92)	.33
3,3	.04295	.00447 (26.23)	.00065 (.14)	.91
3,4	.05874	.00218 (13.43)	.00079 (.44)	.86
3,5	.03590	.00093 (5.83)	.00060 (.60)	.77
3,6	.06648	.00168 (91.79)	-.00032 (.80)	.97
3,7	.08701	.00154 (5.84)	.00097 (.57)	.76
4,1	.06616	.00020 (.43)	-.00119 (.05)	-.02
4,2	.03830	.00001 (.00)	.00042 (.13)	-.06
4,3	.03191	.00038 (2.25)	.00003 (.00)	.43
4,4	.03767	.00051 (6.88)	-.00007 (.03)	.68
4,5	.01321	.00143 (2.47)	.00243 (1.77)	.72
4,6	.05302	.00041 (5.14)	.00029 (.65)	.75
4,7	.04258	.00108 (12.29)	-.00015 (.06)	.79

APPENDIX B (continued)

County and Industry[a/]	Constant	Year Coefficient[b/]	Unemployment Coefficient[b/]	Adjusted R^2
5,1	.04529	.00048 (.41)	.00038 (.07)	.13
5,2	.02463	.00017 (.24)	.00034 (.24)	.16
5,3	.01012	-.00006 (.00)	-.00001 (.00)	-.12
5,4	.02144	.00041 (20.56)	.00011 (.34)	.90
5,5	.00749	.00089 (18.15)	.00084 (3.97)	.93
5,6	.02148	.00013 (.12)	.00037 (.23)	.10
5,7	.01825	.00048 (1.34)	.00110 (1.71)	.65
6,1	.03302	.00136 (6.17)	-.00120 (1.19)	.49
6,2	.09124	-.00191 (3.93)	.00361 (3.46)	.29
6,3	.09162	.00135 (11.51)	-.00088 (1.21)	.70
6,4	.11154	-.00127 (7.21)	-.00055 (.34)	.78
6,5	.08187	.00107 (7.64)	-.00065 (.69)	.61
6,6	.07660	.00001 (.00)	.00022 (.20)	-.03
6,7	.12311	-.00071 (.68)	-.00082 (.22)	.30

[a/], [b/] See footnotes to Appendix A.

APPENDIX C

STATE SHARE REGRESSION RESULTS

Industry[a/]	Constant	Year Coefficient[b/]	Unemployment Coefficient[b/]	Adjusted R^2
1	.00410	.00001 (.01)	.00006 (.06)	-.10
2	.03627	-.00045 (7.03)	-.00028 (.34)	.80
3	.03736	-.00043 (.89)	.00084 (.41)	.01
4	.03270	.00001 (.06)	.00057 (12.44)	.85
5	.03262	-.00008 (.60)	.00002 (.01)	.08
6	.03104	.00014 (28.45)	.00013 (2.95)	.95
7	.04454	-.00073 (52.84)	.00064 (5.06)	.93

a/, b/ See footnotes to Appendix A.

WOODRUFF J. ENGLISH
NICHOLAS CONOVER ENGLISH
FRANCIS E. P. McCARTER
ARTHUR C. HENSLER, JR.
ARTHUR L. NIMS, III
EUGENE M. HARING
JULIUS B. POPPINGA
GEORGE C. WITTE, JR.
STEVEN B. HOSKINS
ROONEY N. HOUGHTON
THOMAS F. DALY
ALFRED L. FERGUSON
CHARLES R. MERRILL
ANDREW T. BERRY
JOSEPH E. IRENAS
JOHN L. McGOLDRICK
RICHARD C. COOPER
PETER C. ASLANIDES
ARMAND POHAN

JOHN R. DROSDICK
JAMES F. HAMMILL
WILLIAM H. HORTON
FREDERICK B. LEHLBACH
MARY L. PARELL
FRED B. WHITE, III
RICHARD M. EITTREIM
JOHN E. FLAHERTY
STEVEN G. SIEGEL
GEORGE T. HILL
ARTHUR F. DICKER, III
WILLIAM T. REILLY
JAMES A. WOLLER
ROBERT M. BECKER
TERRY V. HAUSER
DAVID M. LINDLEY
ROBERT A. WHITE
HAYDEN [illegible]ITH, JR.
GEORG[illegible]. McCARTER
RICHA[illegible]UAY
STUA[illegible]ERSON
MICH[illegible]SR
STEP[illegible]NELL
GERA[illegible]EY
JOHN[illegible]ER, JR.
TODD[illegible]

McCARTER & ENGLISH
COUNSELLORS AT LAW
550 BROAD STREET
NEWARK, N.J.
07102

JAMES R. E. OZIAS
WARD J. HERBERT
OF COUNSEL

AREA CODE 201
622-4444

CABLE ADDRESS
"McCARTER"

December 27, 1976

Bernards Township ads. Allan-Deane

Benjamin N. Cittadiano, Esq.
Mason, Griffin & Pierson
201 Nassau Street
Princeton, New Jersey 08540

Dear Mr. Cittadiano

Confirming our telephone conversation on December 23, 1976, the deposition of James Ohls are hereby postponed from December 30, 1976 until January 4, 1977. The deposition will be held at your offices in Princeton at 10:00 o'clock in the afternoon.

Very truly yours,

Stuart E. Rickerson

SER:mcl

cc: Mr. James Ohls
Richard J. McManus, Esq.
John F. Richardson, Esq.