

NOT FOR QUOTATION

MAP POLICY APPLICATIONS

Institute of Social, Economic and Government Research  
University of Alaska  
Fairbanks, Alaska

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## INTRODUCTION

The initial set of projections carried out using the MAP models concentrated on analysis of alternative petroleum development scenarios. There are, of course, a variety of other types of policy actions which can be analyzed through use of the MAP models. The projections presented here provide four illustrative examples of policy applications using the MAP models.

The first policy application considers the implication of placing varying proportions of the state petroleum revenues into an investment trust fund for use in the future. The second application projects the impact of using petroleum revenues to eliminate personal income taxes in Alaska. The third application estimates the economic impact of a proposed state lease sale in the Beaufort Sea. This is an example of how the MAP models can be used to evaluate a very specific policy action or project. The fourth and final policy application is also a type of project analysis. It analyzes the economic impacts of the alternative proposed gas pipelines bringing natural gas from the North Slope. The gas pipeline analysis is carried out using the regional economic models rather than the statewide model which was used in the first three policy applications.

## MAP POLICY APPLICATION: ALTERNATIVE FISCAL SAVING POLICIES

It is apparent that the growth of the Alaska economy will be influenced significantly by the fiscal policies of the state government. A key policy decision that must be made concerns the amount of money, if any, that is to be saved out of the massive petroleum revenues accruing to the state. In the projections used to analyze the alternative petroleum development scenarios, it was assumed that the fiscal saving rate was a fixed proportion of petroleum revenues. In particular, it was assumed that 25 percent of recurrent revenues were saved and 50 percent of petroleum bonuses were saved. The saving took the form of deposits into an investment trust fund, the interest from which was then used to finance current expenditures.

The projection presented here will examine the implications of alternative fiscal saving rates. A high saving rate case is considered in which 75 percent of recurrent revenues are saved and 100 percent of bonus are saved; the low (or zero) saving rate case assumes that none of the petroleum revenues are saved; and the medium saving rate case uses the same rate as in the previous projections, namely 25 percent of recurrent revenues and 50 percent of bonuses.

In all, five separate projections are made. All of them assume a well-head price for oil of \$5 a barrel. Three of the projections are based on the accelerated petroleum development scenario used in conjunction with the three alternative fiscal saving rates. The other two projections are extreme cases: the first uses the maximum development scenario in conjunction with the zero fiscal saving rate and the second uses the limited development scenario in conjunction with the high fiscal saving rate.

As would be expected, the high saving rate produces a slower growth in the Alaska economy, and the zero saving produces more rapid growth. Some selected summary measures for the five different projections are shown in the attached table and the population projections are shown in the attached figure. In 1990 under the accelerated development scenario, the high fiscal saving rate produces a projected population which is 64 thousand persons lower than under the medium fiscal saving rate. The zero fiscal saving rate produces a projected population which is 33 thousand persons larger in 1990.

Most measures of aggregate economic activity display very similar patterns of change in response to changes in the fiscal saving policy. Under the accelerated petroleum development scenario, the zero fiscal saving rate produces 1990 increases of 4.6 percent in population, 4.1 percent in employment, 4.0 in personal income, and 3.7 percent in disposable personal income. Since the policy change being studied is centered on the government sector, the impact there is somewhat larger; expenditures of state and local government increase by 7.6 percent in 1990. On the other hand, the increase in real gross state product was relatively modest, only 2.0 percent. This was because the economic expansion induced by the additional state spending tended to be concentrated in those sectors with relatively low labor productivity, namely in trade, finance, services, and state and local government. The induced expansion in total employment in 1990 was 14.7 thousand persons, of this trade, finance, and services accounted for 47 percent and state and local government accounted for another 37 percent.

When one moves from aggregate measures to per capita measures, the impact of the zero fiscal saving appears in a very different light. Real disposable personal income per capita is actually lower with zero fiscal saving than it was with medium fiscal saving. However, public sector expenditures per capita are higher under the zero saving rate. On balance, these two changes very nearly cancel out. As shown in the attached table, real disposable personal income plus real state and local government expenditures per capita are just slightly higher, about 0.7 percent, under the zero fiscal saving than under the medium saving. Thus, for the typical individual living in Alaska, the use of all petroleum revenues for current expenditures produces an insignificant increase in real economic benefits.

A further point which should be stressed is that by the end of the period, the projected rate of growth is actually slower under the assumption of zero fiscal saving than under the medium fiscal saving. This is attributable to the difference in the accumulated general fund balance and in the interest accruing on that balance. As shown in the table, by 1990 the medium fiscal saving produces a general fund balance of \$6.8 billion while the zero fiscal saving case produces a general fund balance of only \$1.1 billion. (The accumulated general fund balance in the zero fiscal saving case is viewed as a general contingency reserve and is accumulated out of non petroleum revenues. This type of fiscal saving is held at the same level in all the cases considered.) Because of the larger general fund balance, the state interest income in 1990 is nearly \$360 million larger under medium fiscal saving than under zero fiscal saving. Furthermore, the difference in interest income is tending to

widen over time. As a result, state government expenditures, though at a lower level, are growing more rapidly in the medium saving case. This, in turn, induces a more rapid growth in general economic activities. Thus, a key impact of fiscal saving is to shift some of Alaska's rapid economic growth from the early years of the period to the later years of the period. Selection of the appropriate set of fiscal saving policies is one way of smoothing out Alaska's petroleum induced "boom-bust" cycle.

The impact of implementing a high fiscal saving policy is roughly the mirror image of the impact of the zero fiscal saving policy. That is, under high fiscal saving the magnitude of the expansion in the Alaska economy is smaller, but in the later years of the period, the growth rate is substantially higher. By 1990, the high fiscal saving policies produce a general fund balance in excess of \$18 billion and an annual interest income for the state of \$1.1 billion.

The two extreme cases included in the projections serve to illustrate the degree to which fiscal policies and petroleum policies are interactive. The impacts of the two types of policies are not additive. For example, under the maximum petroleum development scenario, the zero fiscal saving case produces a 1990 population projection of 957 thousand persons. That is 49 thousand persons more than the comparable projections under the medium fiscal saving case. In contrast, under the accelerated petroleum development scenario, shifting from medium to zero fiscal saving produced an increase in projected population of only 33 thousand persons. The change in fiscal policy has a larger impact under the maximum petroleum development scenario because the change is applied to a larger amount of petroleum revenue. Conversely, a given change in the fiscal saving rate has a smaller impact under the limited petroleum development scenario.

ALTERNATIVE FISCAL SAVING POLICIES

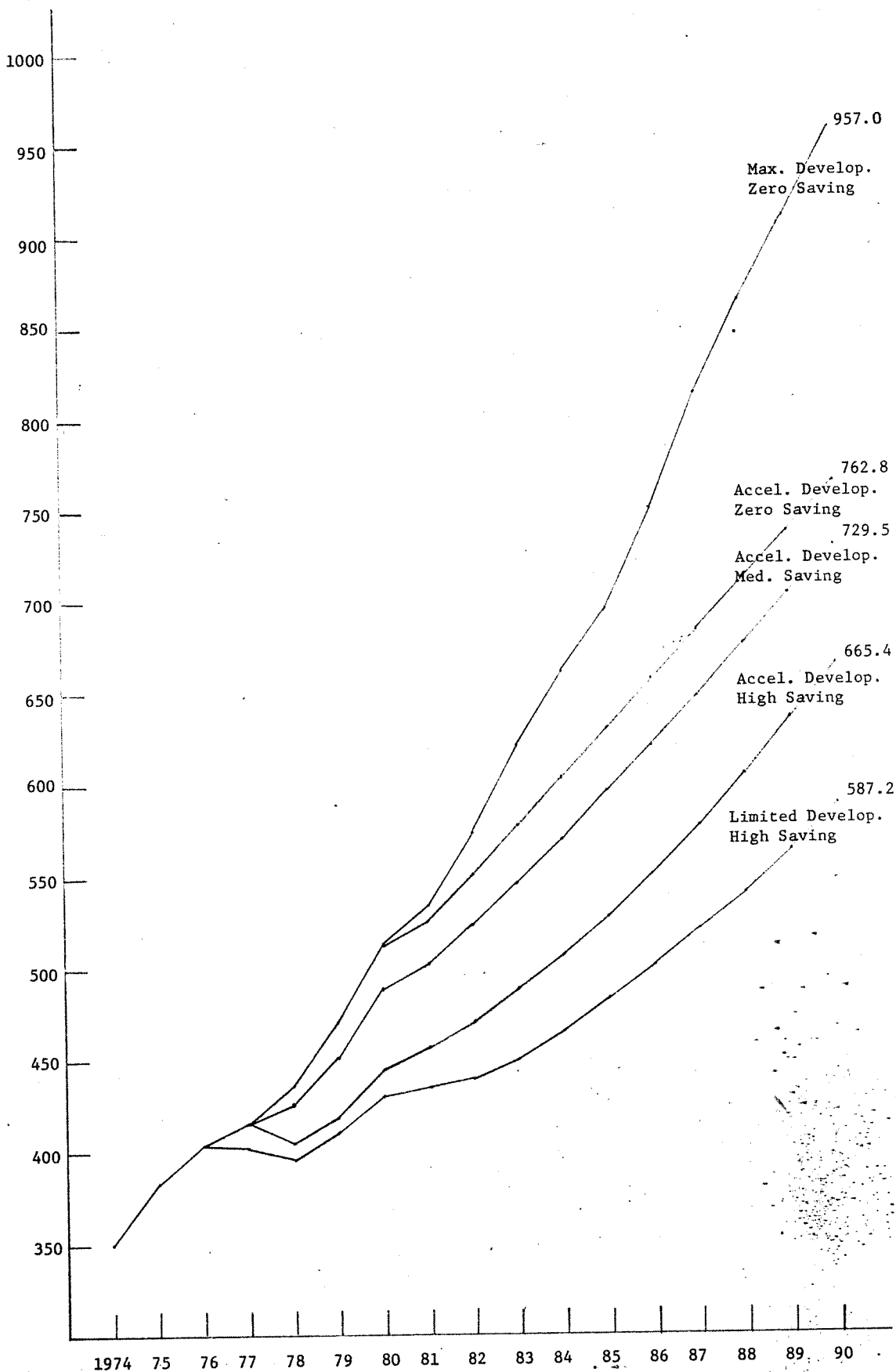
PROJECTED 1990 VALUES FOR SELECTED VARIABLES

		<u>UNITS</u>					
X	Total Output	(Millions of 1958 \$)	Accelerated Development Med. Saving	Accelerated Development High Saving	Accelerated Development Zero Saving	Maximum Development Zero Saving	Limited Development High Saving
E	Total Employment	(Thousands of Persons)	5728.2	5510.8	5843.3	10253.0	4015.2
POP	Total Population	(Thousands of Persons)	356.7	328.7	371.4	490.9	286.7
PI	Personal Income	(Millions of \$)	729.5	665.4	762.8	957.0	587.2
PIPC	Personal Income Per Capita	(\$)	12390.0	11442.4	12887.2	16988.1	9972.4
DIRPA	Real Disposable Personal Income Per Capita	(1967 \$)	16983.3	17195.1	16895.7	17751.0	16983.9
RP9S	State Government Total Petroleum Sector Revenue	(Millions of \$)	3296.1	3355.5	3270.3	3371.5	3345.6
SLGEXP	State-Local Government Expenditures	(Millions of \$)	2339.0	2339.0	2339.0	2940.0	1685.0
GFBAL	State Government General Fund Balance	(Millions of \$)	6190.3	5280.9	6662.0	9074.3	4361.4
SLGEXP/POP	State-Local Government Expenditures Per Capita	(\$)	6807.5	18136.0	1093.3	1093.3	14896.3
DIRPA + SLGEXP/POP - RPI	Real Disposable Personal Income plus Real State-Local Government Expenditures Per Capita	(1967 \$)	8485.7	7936.4	8733.6	9482.0	7427.4
			5603.9	5513.9	5645.5	5950.2	5365.6

ALTERNATIVE FISCAL SAVING POLICIES

PROJECTED POPULATION

(Thousands of Persons)



MAP POLICY APPLICATION: IMPACT OF A REDUCTION IN STATE PERSONAL INCOME TAXES

A reduction in state personal income taxes is frequently suggested as an appropriate use of the petroleum revenues that will be accruing to the state of Alaska. In the projection presented here, it is assumed that state personal income taxes are reduced by 25 percent in 1978, by 50 percent in 1979, and are eliminated completely from 1980 on. It is further assumed that this tax cut is financed through a reduction in state fiscal saving rather than through a reduction in state expenditure. Except for these policy changes, the assumptions are the same as those used in the accelerated petroleum development scenario with the price of oil at \$5 a barrel. The attached figures and table show the differences between that scenario and the projection made after implementing the cut in state personal income taxes.

As shown in Figure 1, the 1990 increase in projected employment is 40.4 thousand and the increase in population is 86.7 thousand persons. As would be expected, the increase in personal income has produced an increase in job opportunities in Alaska and has induced a substantial increase in migration into the state. From 1980 on, net migration into the state is from three to eight thousand persons more per year than was the case in the absence of the tax cut.

It is particularly noteworthy that with an increase in total employment of over 40 thousand in 1990, less than 2,800 of this is in state and local government. Thus, the use of petroleum revenues to cut personal income

taxes serves to focus more of Alaska's growth on the private sector rather than on the public sector. Much of the growth induced by the tax cut is concentrated in the support sector and particularly in the trade, finance, and service industries. The projected gain in employment in those three industries in 1990 is over 29 thousand persons or about 72 percent of the total increase in employment. As before, the increase referred to is relative to the employment projected in the absence of the tax cut.

As shown in the attached table, the general fund balance in 1990 is \$3.7 billion lower with the tax cut. The lower general fund balance reflects the fact that the tax cut is assumed to be financed out of reduced fiscal saving. The lower general fund balance in turn results in a state interest income which is nearly \$220 million lower in 1990. However, because of the induced increase in general economic activity, most other sources of state revenue are higher. This combined with the fact that the cut in personal income taxes is financed through a reduction in fiscal saving means that state expenditures are almost the same as in the absence of a tax cut; state expenditures are less than \$20 million lower in 1990. With state expenditures remaining almost the same and with a general expansion in economic activity, local government revenues, and therefore expenditures, are higher with the tax cut. The net effect is to increase state and local government expenditures by \$240 million in 1990.

The cut in state personal income taxes naturally has the effect of increasing disposable personal income much more than personal income. Thus, in 1990 real personal income increases by 9.6 percent while real dis-

posable personal income increases by 15.4 percent. On a per capita basis, the contrast between the two measures is even sharper. With the tax cut, real personal income per capita is actually lower in 1990 by 2.1 percent, while real disposable personal income per capita is higher by 3.2 percent (see Figure 2.)

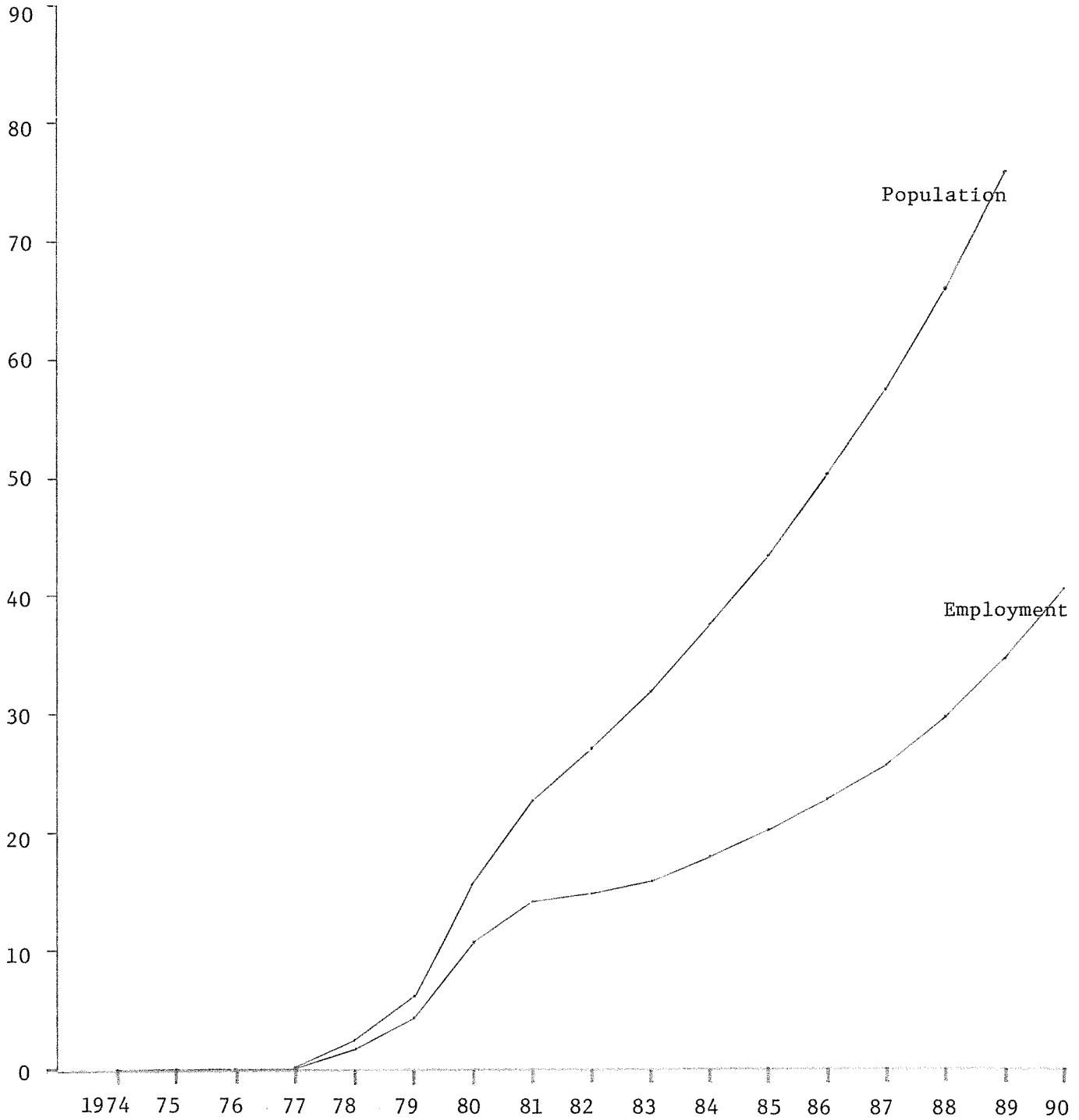
The increase in population induced by the gain in disposable personal income is so large that state and local government expenditures per capita declined substantially; they are over 7 percent lower in 1990. Thus, the increase in population more than offsets the increase in total state and local government spending. Furthermore, real disposable personal income plus real state and local government expenditures per capita are lower by 1.1 percent in 1990. This implies that for the typical individual in Alaska, real personal income plus real public services are, on balance, lower after the tax cut than they were before the tax cut. While the analysis is by no means conclusive at this point, it does raise some questions concerning the efficacy of across-the-board tax cuts as a means of distributing the benefits of Alaska's economic growth.

Figure 1

POPULATION AND EMPLOYMENT IMPACT OF A REDUCTION

IN STATE PERSONAL INCOME TAXES\*

(Thousands  
of Persons)

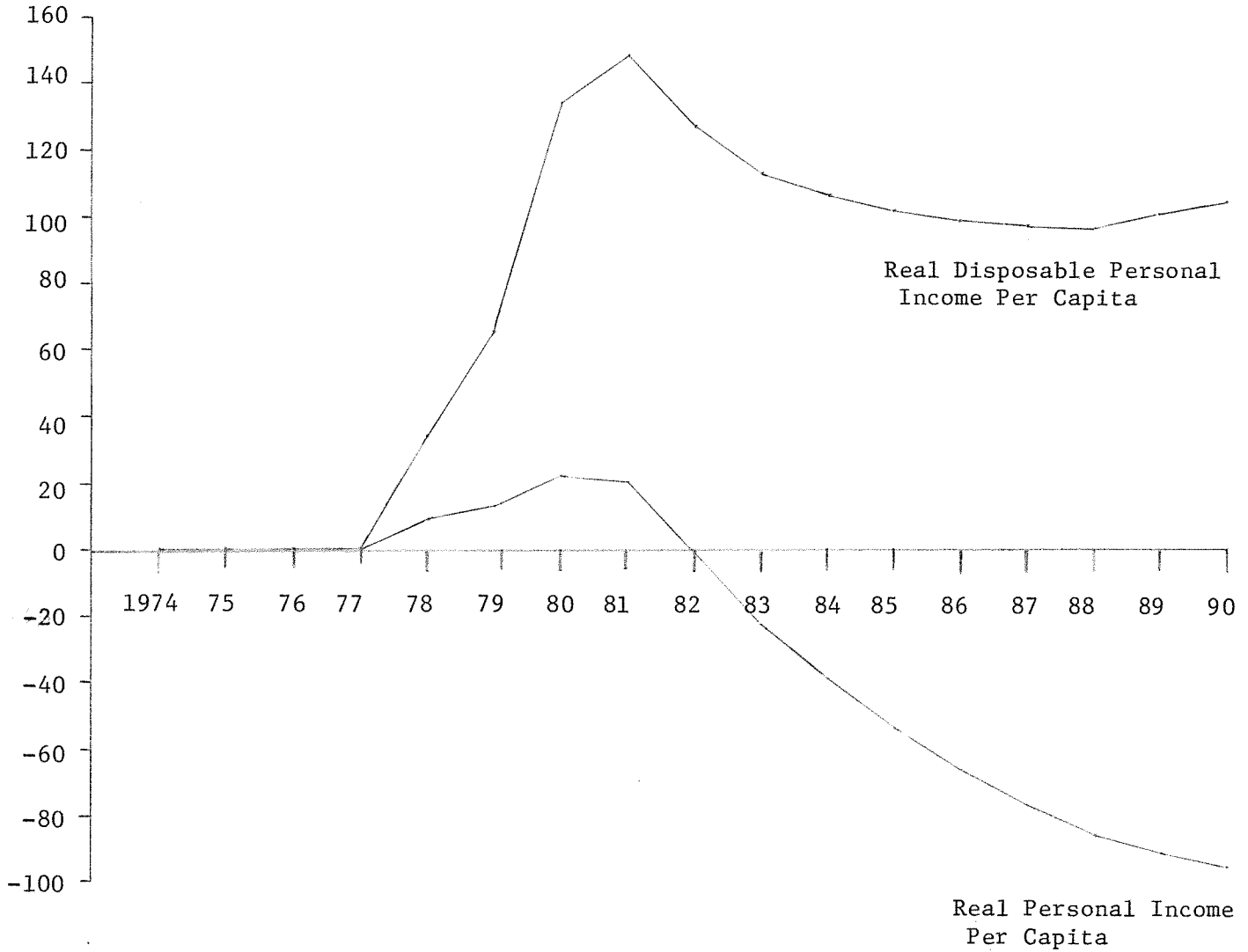


\*The impact is measured as the change from the results obtained in the absence of the tax reduction.

Figure 2

PERSONAL INCOME IMPACT OF A REDUCTION IN  
STATE PERSONAL INCOME TAXES\*

(1967 Dollars)



\*The impact is measured as the change from the results obtained in the absence of the tax reduction.



MAP POLICY APPLICATION: IMPACT OF BEAUFORT SEA LEASE SALE

The state of Alaska has recently proposed making a petroleum lease sale in the Beaufort Sea just north of Prudhoe Bay. Although not required by law to do so, the state has, in preparation for such a sale, prepared a draft environmental assessment of the impacts of the sale. As part of this environmental assessment (EA) the state estimated the economic impact that would be caused by the exploration, development and production in the Beaufort field. In the projection presented here, the MAP models are used to carry out somewhat more comprehensive analysis of the impact of the Beaufort lease sale.

The economic impact of the Beaufort Lease sale can be attributed to three different types of direct effects: (1) the bonus from the lease sale, (2) the recurrent state revenues due to production in the Beaufort field, and (3) the direct employment required to develop and operate the Beaufort field. The method of analysis used here is to make a projection based on a petroleum development scenario which excludes the Beaufort Lease sale. The petroleum development scenario is then expanded to include the Beaufort Lease sale, a second projection is made, and the results of the two projections are compared. Since the only difference in the input data for the two projections is the direct effect of the Beaufort Lease sale, the differences in the results are measures of the total impact of the lease sale.

The base from which the impacts are measured consist of a set of projections derived from the limited petroleum development scenario with two modifications: (1) the Beaufort Lease sale has been excluded from the

scenario and (2) petroleum revenues other than bonuses have been increased by an amount equal to the lease sale. The second modification is designed to reflect the existing situation in Alaska. Until the North Slope oil starts to flow, the state is confronted with a "fiscal gap"; that is state revenues are not sufficient to support current expenditure levels. Since it is unlikely that the state will cut back on spending, additional sources of revenues will have to be found to close the fiscal gap. The Beaufort Lease sale is one possible source of additional revenue. However, if the Beaufort Lease sale is not made, some alternative source of revenue will be necessary. In practice, the recently enacted tax on petroleum reserves is likely to provide the necessary gap-closing revenue. The assumption made here is that if the Beaufort Lease sale is not made, some alternative means of raising an equivalent amount of revenue will be found so that the net revenue impact of the bonus from the lease sale will be negligible.

In adding the Beaufort Lease sale to the petroleum development scenario, two different sets of estimates of employment and revenue impacts are used. The first set is the one that has been included in the MAP scenario and the second set is derived from the state EA. Both sets of estimates are shown in the attached table. In general, the direct impact as estimated by the EA is substantially larger than the direct impact included in the MAP scenario.

The Beaufort Lease sale impacts on employment and population as projected by the MAP model are shown in the attached figures. The figures also show estimates of the total impacts which were included in the EA itself.

The total impact of the Beaufort Lease sale as estimated by the EA is very low despite the fact that the EA includes high estimates of direct employment and revenue. There are two reasons underlying the seemingly contradictory results. First, the analysis in the EA looks only at short-run impacts, it does not take into account the cumulative long-run growth effects of the Beaufort Lease sale. Second, the EA ignores the effects of the revenues generated by production in the Beaufort area. The MAP models do, of course, take into account the long-run growth effects and the effects of the additional revenues.

When the MAP models are used in conjunction with the state's estimates of direct employment and revenue, the Beaufort Lease sale is projected to increase Alaska's 1990 employment by 14 thousand persons and population by 30 thousand persons. In contrast the MAP estimates of direct employment and revenues produce projected impacts of just 8.2 thousand and 16.5 thousand respectively. However, even the lower impacts are several times as large as the total impacts shown in the EA.

BEAUFORT LEASE SALE:

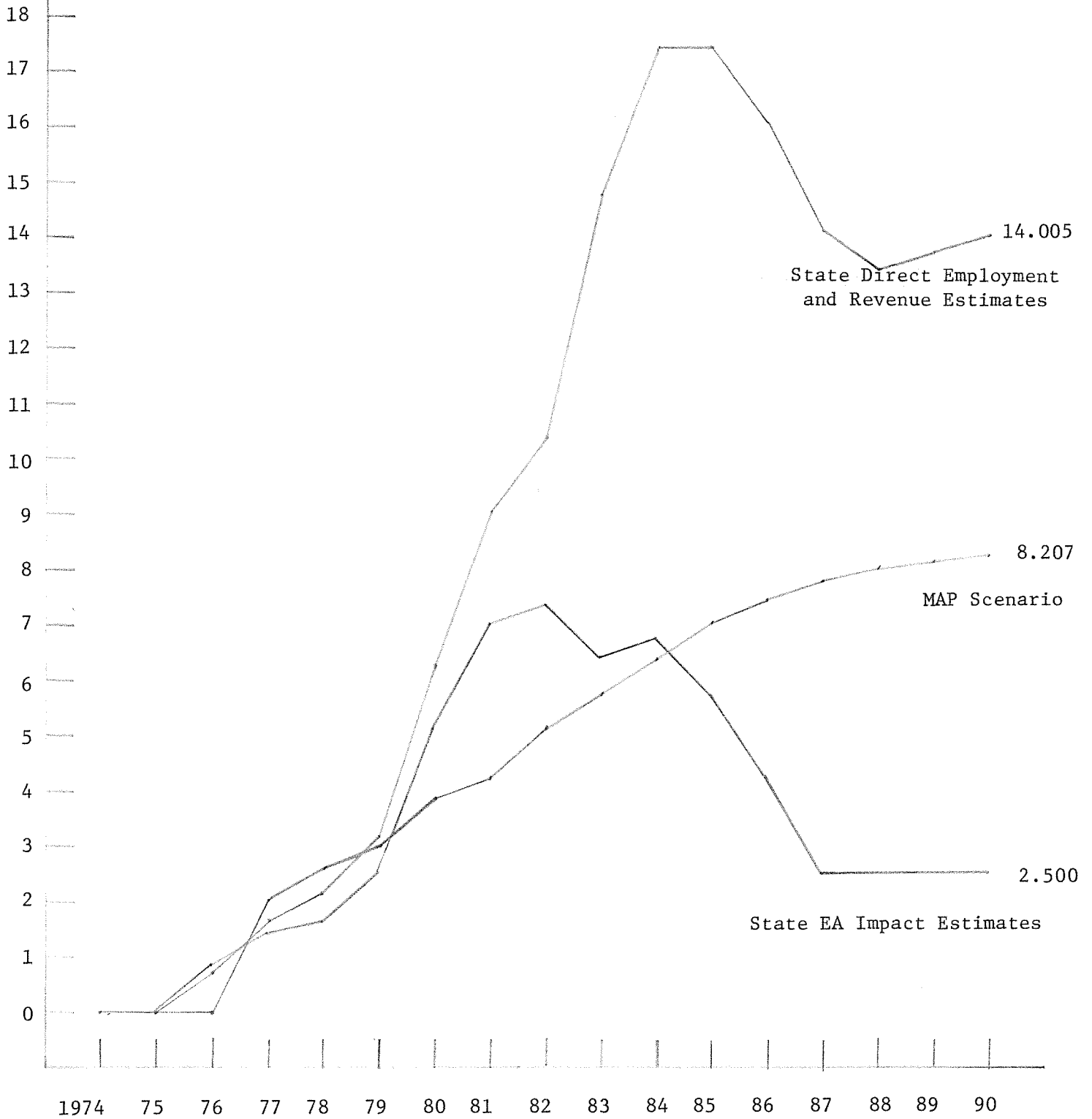
DIRECT EMPLOYMENT AND REVENUE IMPACTS

	<u>Petroleum Construction and Mining Employment</u>		<u>Recurrent Revenues</u>	
	<u>EA</u>	<u>MAP</u>	<u>EA</u>	<u>MAP</u>
1976	0.3	0	----	----
1977	0.6	0.8	----	----
1978	0.7	0.8	----	----
1979	1.0	0.9	----	----
1980	2.1	0.9	1.4	13.0
1981	2.8	0.7	1.6	40.0
1982	3.0	0.6	166.2	77.1
1983	2.6	0.4	175.8	107.9
1984	2.8	0.4	185.0	123.4
1985	2.3	0.4	195.0	138.8
1986	1.7	0.3	205.0	154.2
1987	1.0	0.3	205.0	154.2
1988	1.0	0.3	205.0	154.2
1989	1.0	0.3	205.0	154.2
1990	1.0	0.3	205.0	154.2

IMPACT OF BEAUFORT LEASE SALE

EMPLOYMENT

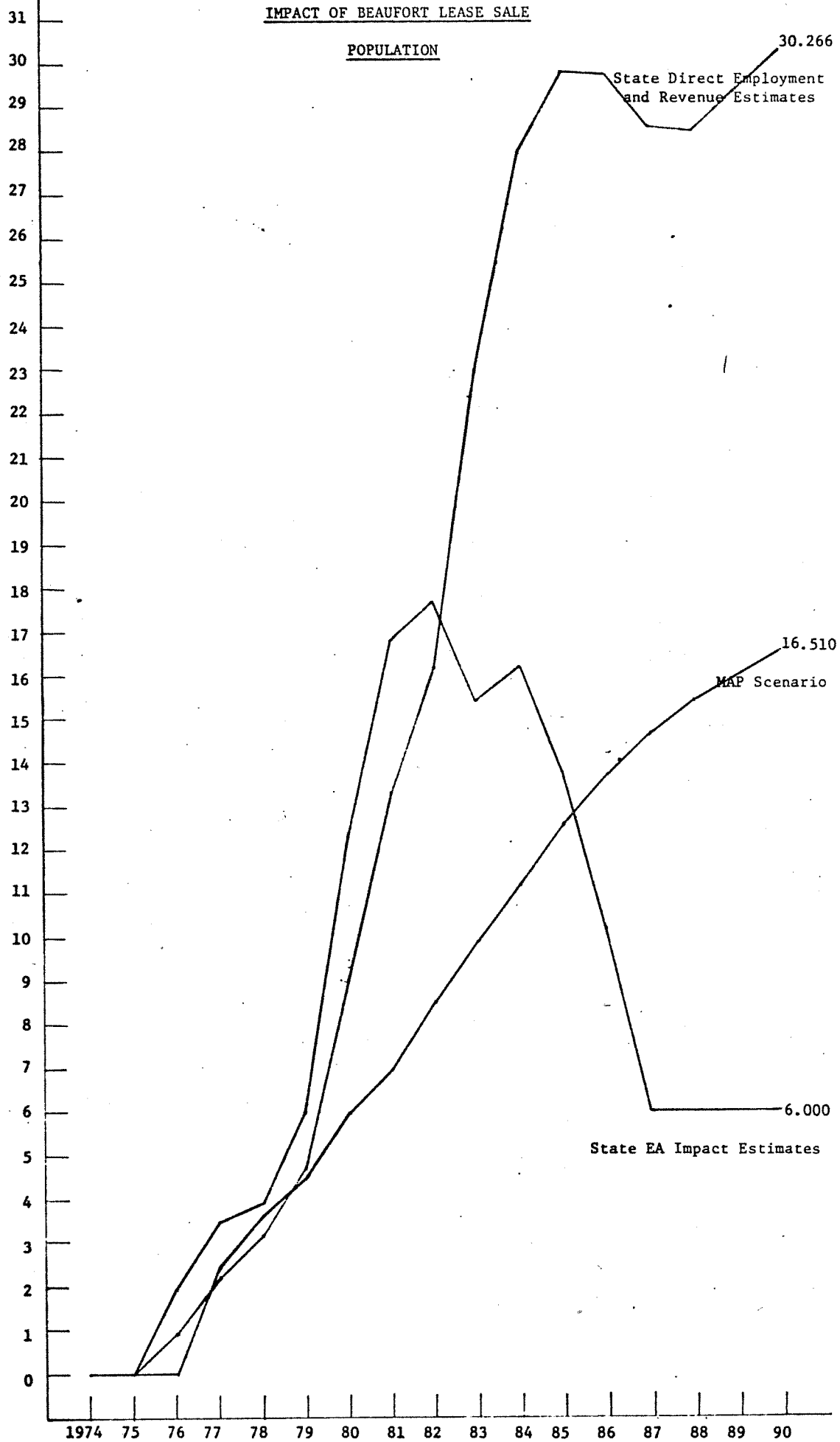
Thousands  
of Persons)



of Persons)

IMPACT OF BEAUFORT LEASE SALE

POPULATION



MAP POLICY APPLICATION: IMPACTS OF ALTERNATIVE GAS PIPELINE ROUTES  
ON THE ALASKAN ECONOMY

There are at present two principal proposed systems for transporting natural gas from Alaska's North Slope to the continental United States. The first system, proposed by the Arctic Gas consortium, would be an all-land pipeline leading from Prudhoe Bay through Canada to the midwestern United States. The second system, proposed by the El Paso Alaska Company, would consist of a trans-Alaska pipeline and then shipment by LNG tanker to the U.S. West Coast.

Clearly, the alternative proposed gas transportation systems would have significantly different impacts on the Alaskan economy. The MAP regional economic-demographic model makes it possible to evaluate the economic impact on Alaska in terms of the induced change in total employment, industrial production, population, wages, personal income, and government revenues for each region and the state as a whole. The estimates of the differing impacts can be made in the context of the overall growth and development of the Alaska economy.

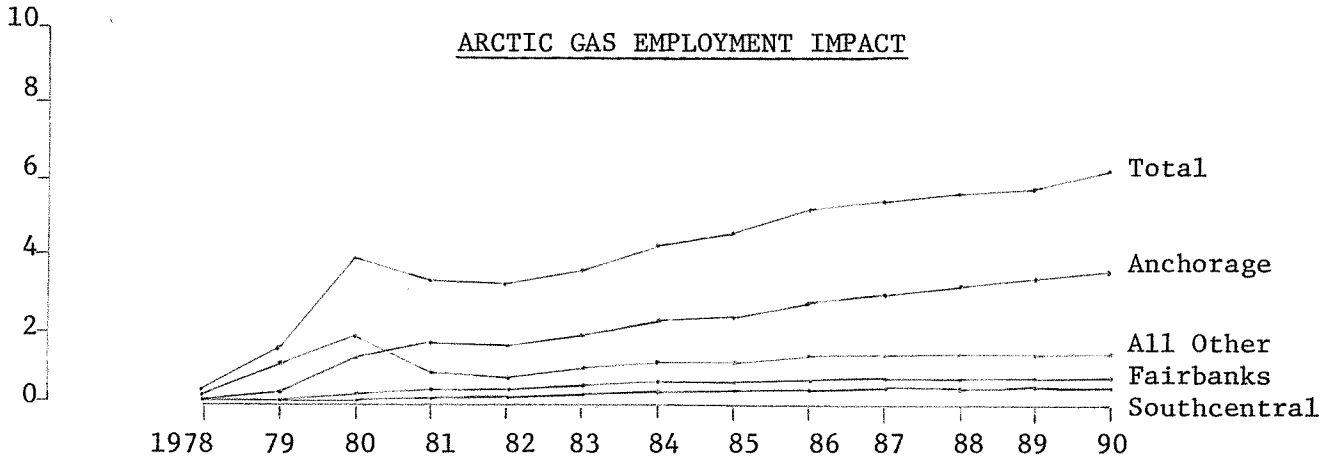
Figures 1 and 2, and Table 1 show the differing regional and state impacts of the El Paso and Arctic pipelines for population, employment, and wages and salaries. Because of its much larger magnitude, the impact of the El Paso project is much greater in all regions than is the impact of the Arctic Gas project. Perhaps the most notable feature of the regional projections is that the bulk of the impact occurs in Anchorage, even though neither project passes through Anchorage itself. This emphasizes just how important Anchorage is as the commercial center of Alaska.

Except during the peak of the El Paso boom, well over half of the total impact is concentrated in the Anchorage region. In terms of population, the El Paso proposal would increase Anchorage's 1990 population by almost 17 thousand persons, and the Arctic Gas proposal would increase the population by 7 thousand persons. As shown in Figure 4-1, the El Paso Anchorage employment impact peaks at 7 thousand persons in 1981, declines to 5 thousand persons in 1984, and then rise gradually as the Alaskan economy grows. Although these changes are not insignificant, they should be measured against projections of Anchorage's early 1980's population of 250,000, and a labor force above 100,000.

Both the absolute and relative magnitudes of the differences between the two gas pipeline proposals are much more significant in the Southcentral region. The construction of the El Paso facilities creates a boom-bust cycle in the Southcentral region, while the Arctic Gas project has almost no effect. During the peak construction year of 1980, the Southcentral employment impact of the El Paso project would be 10 thousand persons. This represents an increase of more than one-third in the regional labor force. This impact fall rapidly to just 1.6 thousand persons by 1983.

The projections and analysis presented here are just a few of the results reported in "Impact on the Alaska Economy of Alternative Gas Pipelines" by ISEGR. They demonstrate the applicability and utility of the MAP regional economic-demographic model.

Figure 1



EL PASO GAS EMPLOYMENT IMPACT

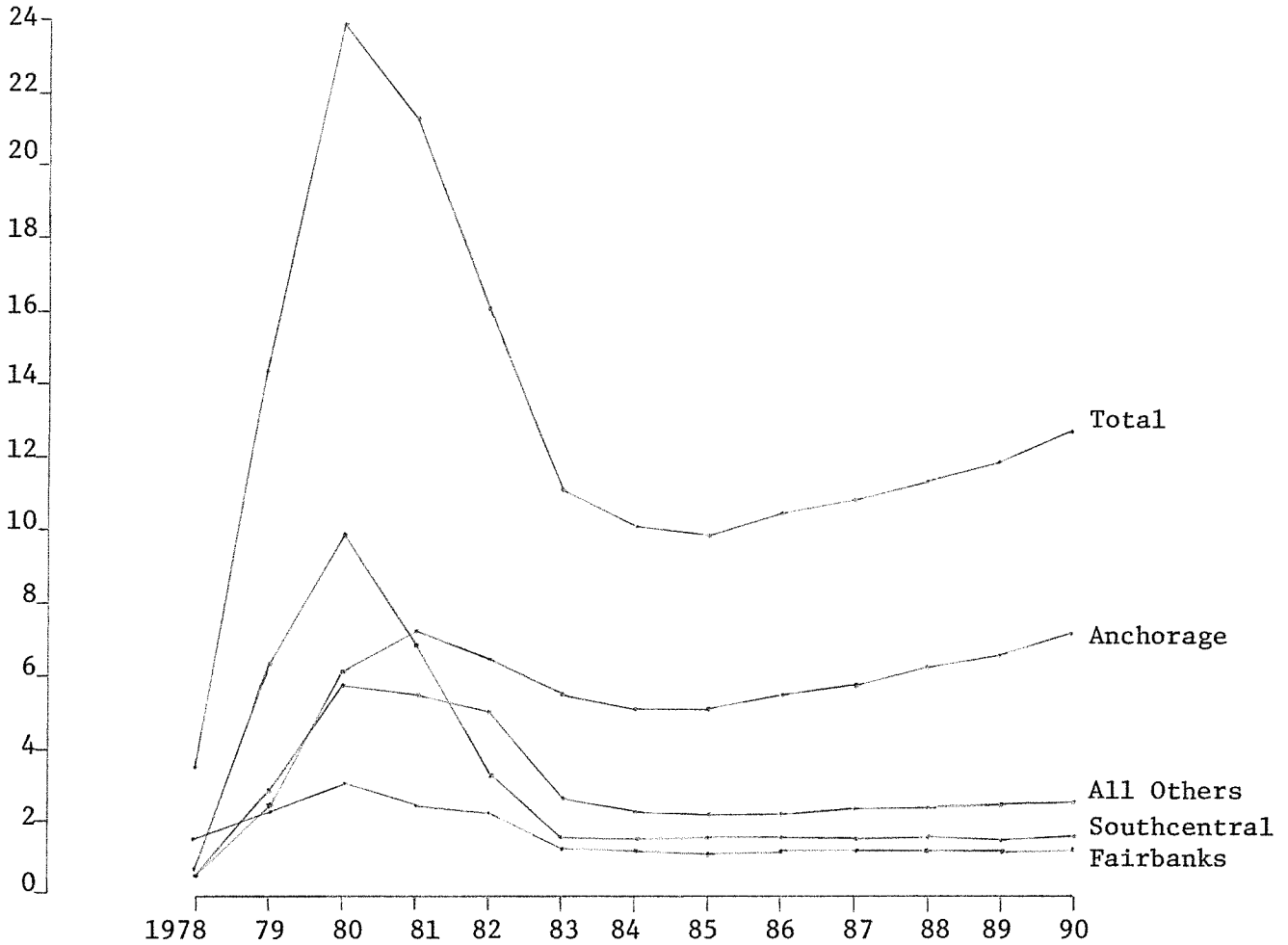
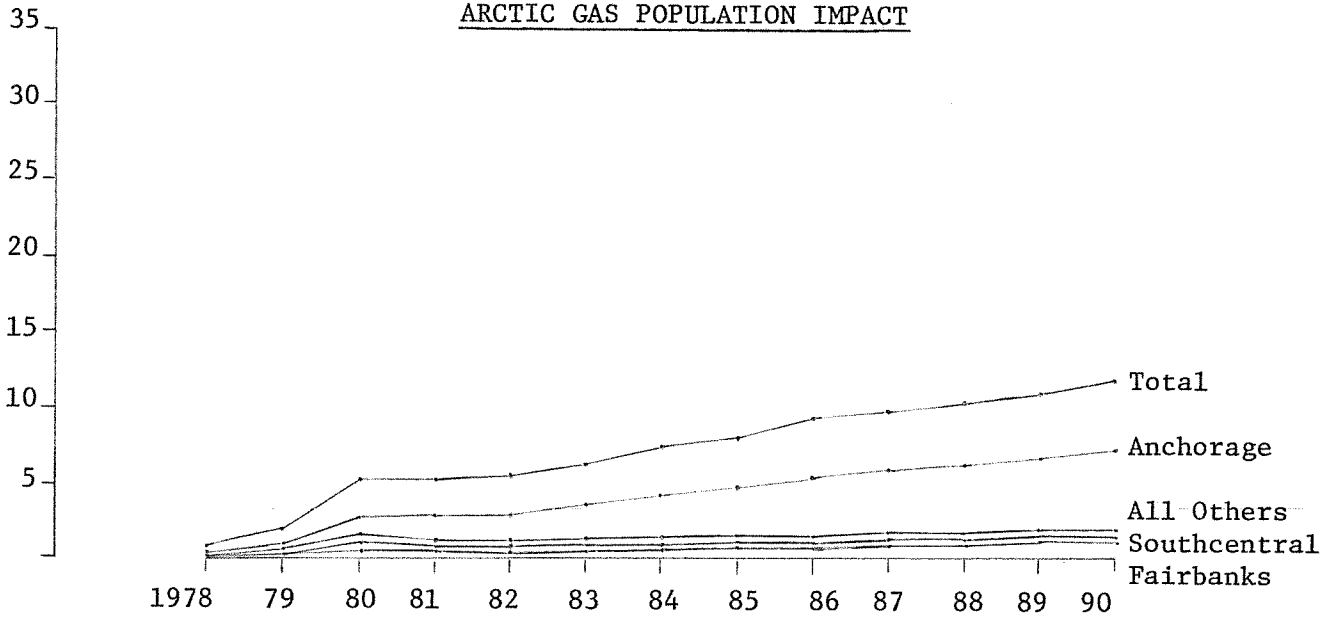


Figure 2

ARCTIC GAS POPULATION IMPACT



EL PASO GAS POPULATION IMPACT

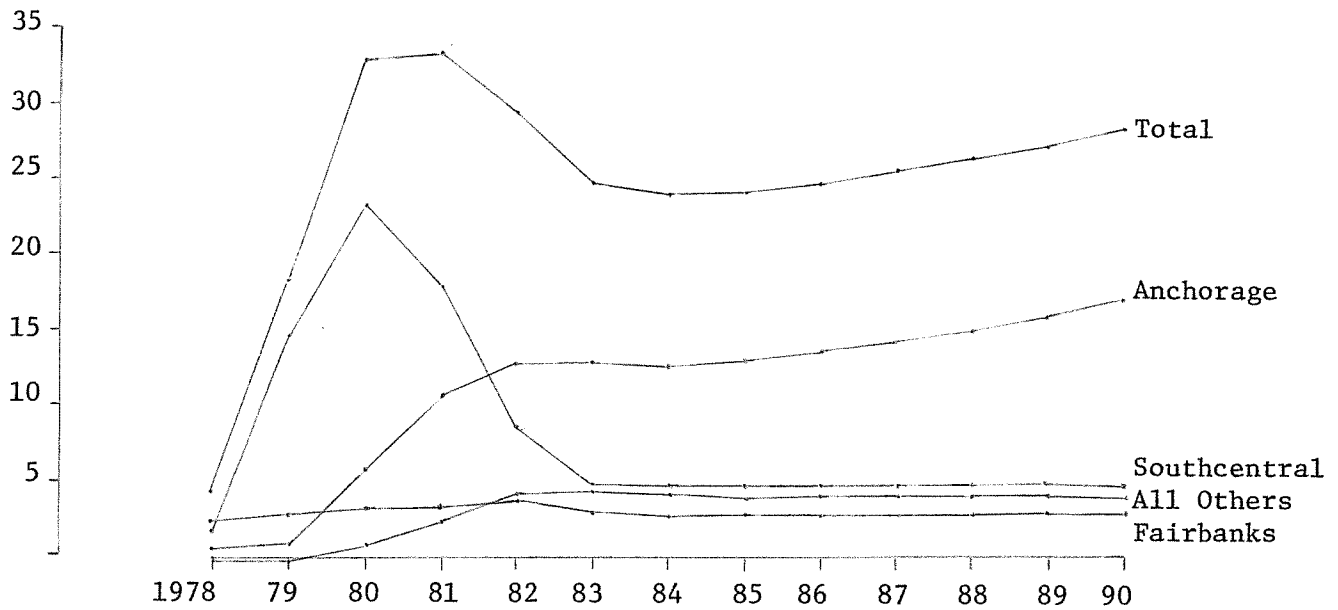


Table 1

REAL WAGES AND SALARIES  
(Millions of 1958 Dollars)

	<u>Total</u>	<u>Anchorage</u>	<u>Southcentral</u>	<u>Fairbanks</u>	<u>All Other</u>
			<u>A R C T I C</u>	<u>G A S</u>	
1978	3.7	0.7	0.1	0.1	2.8
1979	14.2	2.1	0.3	0.3	11.5
1980	32.0	9.6	1.8	2.2	18.4
1981	23.4	11.3	2.4	3.0	6.7
1982	23.1	11.2	2.4	2.9	6.6
1983	26.9	13.4	2.7	3.4	7.4
1984	31.8	16.1	3.2	3.9	8.6
1985	34.3	17.5	3.4	4.2	9.2
1986	32.9	20.6	3.8	4.7	10.1
1987	41.9	22.2	4.0	5.0	10.8
1988	44.2	23.7	4.2	5.2	11.1
1989	46.6	25.4	4.3	5.4	11.5
1990	49.7	27.6	4.5	5.7	11.9
			<u>E L</u>	<u>P A S O</u>	
1978	29.6	4.0	6.5	13.2	5.9
1979	118.5	16.6	53.1	21.0	27.9
1980	194.0	41.7	83.5	26.0	42.8
1981	166.5	51.2	57.9	20.3	37.2
1982	124.2	45.9	26.7	18.8	32.8
1983	83.7	39.7	12.8	11.2	20.0
1984	76.7	36.7	12.1	10.1	17.8
1985	76.7	37.0	12.1	10.1	15.5
1986	82.7	40.9	12.6	10.7	18.5
1987	87.2	43.7	13.0	11.1	19.4
1988	92.1	47.1	13.4	11.5	20.1
1989	98.2	51.1	13.9	12.0	21.2
1990	105.5	56.2	14.4	12.7	22.2