

REGIONAL IMPACTS OF FEDERAL ENERGY
DEVELOPMENTS

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David T. Kresge, Director
Joint Center for Urban Studies
of MIT and Harvard University
53 Church Street
Cambridge, Massachusetts 02138

taken to minimize such adverse impacts and, in any case, the economic benefits are sufficient to more than offset the environmental costs. In recent years, however, certain states, particularly those adjacent to developments on the Outer Continental Shelf (OCS), have argued that the economic effects of federal energy developments are adverse, quite apart from the attendant risk of environmental damage. The purpose of this paper is to assess the likely regional economic impacts of federal energy developments. This will be done by using an economic/demographic model of Alaska to analyze the impacts of specific, though hypothetical, OCS developments in Alaska.

2. A Model of the Alaska Economy

Before examining the impacts of OCS development, it is useful to have an overview of the model which will be used to carry out the analysis. The Alaska model has been developed as part of the Man in the Arctic Program (a long-term NSF-funded research program), hence its designation as the MAP model. The objective of the model is to estimate the regional impacts of resource development and, more specifically, to evaluate the effectiveness of regional policies designed to deal with those impacts. The MAP model consists of three interrelated modules: (1) economic; (2) population and income distribution; and (3) fiscal. To give an overview of the model's structure and to show the linkages among the modules, the basic structure is outlined in Figure 1.

The model divides the regional economy into "export" and "residential" sectors. Production levels in the export sectors

are specified exogenously since output is constrained either by the availability of natural resources or by federal policy decisions. Outputs in the residentiary industries are determined by Alaska incomes, prices, and other local demand conditions. Employment in each industry is calculated from a labor requirements function, or inverse production function. The Alaskan price level is determined jointly by U.S. consumer prices (almost all Alaska consumer goods are imported) and by local demand conditions. Alaska personal income consists chiefly of wages and salaries (sector wage rates are functions of U.S. wages and local conditions). Subtracting federal and state income taxes, as determined by the fiscal model, and deflating by the Alaska price level produces an estimate of real disposable personal income, which is the key variable determining the outputs of the nonexport industries.

In terms of its general structure, the MAP model is similar to other regional models. The population and fiscal submodels, however, go well beyond most regional model specifications. In the population model, for example, the amount of civilian net migration to the state is determined endogenously as a function of Alaska employment growth and income in Alaska relative to the United States as a whole. Thus rapid employment growth attracts substantial numbers of migrants, particularly if the new jobs pay high wages (for example, oil pipeline construction). Migration flows keep Alaskan incomes from diverging excessively from U.S. levels. The demographic model incorporates an age-sex-race distribution of the state's population which, when combined with a set of (exogenous) age-sex-race-specific fertility and mortality

rates and a standard aging process, determines the natural increase of the population. The estimated employment is combined with information giving the occupational mix in each industrial sector to provide estimates of employment levels in each occupational group. Census data are used to construct a matrix of occupational participation rates for each age, race, and sex group. That set of data, together with estimates of occupational employment levels, is used to derive income distributions for each race and sex group and for the state population as a whole.

The Alaska model has a detailed fiscal sector in which each major source of revenue is estimated as a function of the tax structure and the relevant measure of economic activity. Government expenditures are modeled by functional category, each of which has an associated employment intensity. The level of total state government expenditures is a key policy variable which is specified by the policy alternative being analyzed. Local government revenues are also modeled by major source. State revenue sharing, a key component of local revenues, is explicitly incorporated.

3. A Hypothetical OCS Development Scenario

Development of offshore petroleum resources along the nation's Outer Continental Shelf (OCS) poses quite different regional issues from those typically associated with private onshore development.

There are obvious differences in the technologies and logistics involved and these can, at times, be significant. The major change, however, is in the financial implications for state and local government in the regions adjacent to the OCS developments. The OCS areas are owned by the federal government which, therefore, controls the development process. Most importantly, the federal government controls the revenue generated by the leasing, development, and production in OCS areas. Unless an explicit federal policy decision is made to share these revenues, the affected state and local governments receive no funds directly from the petroleum activity.

The OCS developments will, regardless of their effects on local revenues, result in increases in the demands for local services. A variety of onshore facilities are required to support offshore activities - staging areas, material depots, pumping stations, loading docks, etc. Workers in these facilities will add to regional consumption demand which will induce further increases in regional employment and income. As the regional economy expands, the population will also grow and local governments will have to spend more for schools, highways, police and fire protection, and other public services. The population growth induced by onshore facilities will undoubtedly be augmented by the families of at least some onshore workers who will choose to move into the area.

The development scenario used here assumes large-scale development in several of the potential OCS areas indicated on the map shown in Figure 2. The process is assumed to begin in 1981 with the large-scale construction of various transport, storage, and other support facilities. Direct OCS employment rises rapidly to a peak of nearly 12 thousand workers in 1982 and 1983 with most of them, as shown in Figure 3, involved in the construction activity. In subsequent years, there are changes in the mix of construction workers, drilling crews, and transportation workers but the total direct petroleum employment stays in the range of 6 to 8 thousand workers throughout most of the rest of the projection period. The wages paid to petroleum workers, whether they work onshore or offshore, are assumed to be fully taxable by the State of Alaska. Apart from these income taxes, it is assumed that the development of the federal OCS areas produces no other direct revenues for this state. Any induced expansion in business activity is, of course, subject to the usual state and local taxes.

The OCS development does produce a substantial increase in the level of aggregate economic activity in the state, as shown in Figure 4 and by the summary statistics in Table 1. Just as contended by proponents of such developments, there are increases in gross state product, employment, personal income, and state revenues. The problem is that there is also substantial increase in the number of people living in the state. The gains in employment opportunities and incomes have induced

50 to 60 thousand migrants to move into the state. The increase in population will inevitably be accompanied by an increase in the demand for public services and increasing strains will be placed on existing public facilities, such as schools, hospitals, and highways.

A critical question for the state and local governments is whether the expansion in economic activity will produce sufficient additional revenues to finance the needed growth in services and facilities. With onshore developments, there are typically substantial increases in state revenues coming directly from petroleum royalties, severance taxes, and property taxes. If those direct revenues are not available from OCS developments, or are available only in part, state and local governments may have a much more difficult task keeping revenues and expenditures in balance. To the extent that revenues fall short of the needed expansion in state expenditures, the OCS development will impose a net fiscal burden on the state.

4. Fiscal Burden

The analysis carried out using the Alaska Model indicates that the revenues generated by OCS development will in fact fall far short of the amounts needed to prevent the quality or quantity of public services from declining. If the state attempts to maintain service levels by keeping real per capita spending

at previous levels, the fiscal results are as shown in Figure 5. Revenues increase less than half as much as the increase in required spending - even if the interest costs on the additional public debt are excluded. The annual revenue shortfall, that is the current deficit, jumps to \$200 million in the early boom period then after receding somewhat for a few years reaches \$250 million by 1990. To finance the deficit the state would either have to borrow or, in the case of the states like Alaska, reduce the surplus it has accumulated from other revenues. In either case, there will be an additional interest cost (due to debt service if borrowing is required or due to foregoing earnings if the surplus is reduced) that will add further to required expenditures. The estimated increase in total expenditures is shown by the top line in Figure 5.

By 1990, the cumulative fiscal burden for Alaska would be \$2.3 billion, and by the year 2000 would reach \$8.4 billion. If the federal government makes no provision for the sharing of the revenues from the project, these figures are then the estimates of the net fiscal costs of OCS development as viewed by the State of Alaska. In fact, these figures are actually an underestimate because they do not include any allowances for the cost of the additional strain to be placed on the stock of social infrastructure capital. This aspect of the OCS development process will be discussed in more detail in the next section.

If the federal government were to implement revenue sharing, perhaps augmented by impact assistance funds in the early years, it is only the current deficit that would need to be covered. The funds required to cover the current deficit would total \$1.8

billion by 1990, and \$5.1 billion by the year 2000. These figures are lower than the previous estimates because, if the shortfall is made up as it occurs, there is no need to pay the additional interest costs. It should be pointed out that although the total amounts of funds involved are quite substantial, particularly as seen by an individual state, they do not seem excessive relative to the total amount of revenue being generated by the project. For example, if production from the OCS development is assumed to be only 500 thousand barrels per day and if the real wellhead price of oil is assumed to remain constant at \$20 a barrel, the state would need to be provided with less than 5 percent of the wellhead value of the oil in order to fill the fiscal gap. The actual revenue sharing percentage would almost surely be less than 5 percent since production from a development of the size hypothesized here would normally be substantially larger than 500 thousand barrels a day.

5. Resident Income and Wealth

In addition to the fiscal problems caused by OCS development, there are some difficulties involved in estimating the benefits accruing to the private sector of the regional economy. The aggregate growth impacts reported in Table 1 are far from an adequate measure of net benefits and may provide a seriously distorted picture of the benefits accruing to the current residents of the region. Only a portion of the gains in income and employment accrue to current residents since migrants will

be coming into the state to fill a substantial portion of the new jobs. The share of the gains going to residents will be influenced by such things as the elasticity of local labor supply, the speed and magnitude of the migration response to new job opportunities, and the extent to which the job skills of the local labor force match the occupational requirements of the growing industries.

If it is assumed that per capita incomes for in-migrants will be no higher than for existing residents, then 50-60 percent of the gains in real personal income would go to residents in the first few years. By 1985 the proportion would fall to about one-third and would continue to decline in later years. The higher gains in the early years reflect the fact that there is some lag in the migration response. Also, the job skills in the resident labor force are a relatively good match for the occupational requirements of the construction activity which dominates the development process for the first few years. It will, however, be argued in the next section that the actual proportions in the early years are likely to be much lower than the percentages suggested here. In later years, the occupational requirements during the development and production stages are not nearly as well-suited to the local labor force, so more of the new jobs, and particularly the high-paying jobs, are filled by in-migrants.

Even though a major portion of the jobs created by OCS development go to newcomers, the income gains of current residents are, nonetheless, substantial as shown in Table 2. At the peak of construction activity, resident income increases by nearly

\$400 million (in 1967 prices), a per capita increase of nearly \$1,000 or 26 percent. Although the gains taper off in later years, residents continue to show higher incomes throughout the entire period. For the purposes of comparison, the annual fiscal burden caused by the OCS development is also shown in real terms in Table 2. The gains in real personal income, which diminish over time, are accompanied by smaller, but increasing, real financial losses for the state government.

Even though the personal income gains are larger than the fiscal losses, it cannot simply be inferred that the state has necessarily experienced a net increase in welfare. First, there is no reason to think that the real burden of the fiscal loss will be borne by the same individuals who are enjoying the gains in income. This distributional issue is particularly likely to arise if the fiscal gap is closed by cutting back on public services, many of which are directed towards those segments of the population least able to participate in the economic boom. Although, in principle, it should be possible to take funds away from the gainers in order to compensate the losers, in practice it is very difficult to design tax/transfer systems that can do so efficiently. And if borrowing is used to close the fiscal gap, the distributional issue becomes an intergenerational one - the fiscal burden is, in effect, shifted from present to future generations.

In addition to its income effects, including the distributional issues just raised, the OCS development affects the amount of social capital (both physical and financial) available to each resident of the region. At the peak of the boom in 1983, the amount of physical, social infrastructure capital (schools, hospitals, highways, etc.) is estimated to drop by \$363 per capita (1967 prices) or about 10 percent. This reflects the fact that although the aggregate stock of social capital is increasing, it is not growing nearly as rapidly as population. By 1985, the decline in social capital per capita is cut to 5 to 6 percent then holds at about that level through 1990. Because of the continuing strong growth in the economy, the social capital stock cannot "catch up" with population even though the state is increasing the aggregate amount of capital spending.

Together with the decline in physical capital available to its residents, the state will experience a decline in its real financial wealth. This decline reflects the cumulative effects of the annual fiscal burden. In states without other major resource developments, the fiscal drain would have to be met through borrowing. In such cases the decline in state financial wealth would actually be an increase in the public debt outstanding. States like Alaska, which have substantial revenues from non-federal resource developments, would have to draw on these other revenues to meet the burdens imposed by OCS developments. Hence

such states would experience a decline in financial wealth, both in total and on a per capita basis as shown in the fourth column of Table 2. The increase in population induced by OCS development has strained or diluted both the state's physical and financial capital. Although personal income increases as a result of OCS development, the public sector is actually poorer than it was in the absence of such development.

There is no easy way to say whether on balance the gains in income and wealth are sufficient to compensate for the losses. The distributional problems, and the fact that the gains are in the private sector while the losses are in the public sector, makes this an area where simple economic calculus is inappropriate. The analysis presented has, however, identified the nature of the trade-offs involved, and, in the Alaska case, has quantified the various impacts.

6. Boom/Bust Cycle

One of the difficulties commonly associated with resource development is the so-called "boomtown" problem. The first half of the problem arises when a small community is virtually overwhelmed by a sudden influx of workers during a boom period caused by the construction of facilities to extract and/or process local resources. The subsequent "bust" following completion of the construction constitutes the second half of the problem. Clearly these same issues can arise in a larger regional context when the projects in question are sufficiently large relative to the regional economy.

The OCS development, as analyzed thus far, is not well-suited to illustrating the boom/bust problem. Although the development is certainly large enough, the hypothesized scenario does not really contain much of a bust period. There is a modest decline from the peak in 1983, but the scenario generally results in strong growth throughout most of the projection period (see Figure 4). However, the boom/bust problem can be examined by separating one component of the OCS scenario, namely the construction and operation of the necessary transport and storage facilities. This activity is assumed to start up in 1981, reach peak employment levels of 8 to 9 thousand in 1982-83, and then drop to a long-run operating employment level of only about 100 workers by 1983 (see Figure 3). This time pattern of employment, though not necessarily the magnitudes, would also be characteristic of projects involving oil or gas pipelines, highly automated petrochemical plants, and similar capital-intensive energy facilities. As with the overall OCS scenario, it is assumed here that the construction activity generates no direct revenues for the state.

The growth path resulting from the construction activity, as shown in Figure 4, exhibits a marked boom/bust cycle as population first shoots up by 50 thousand between 1980-83, drops 28 thousand by 1985, and then grows very slowly in subsequent years. The growth in population and income after 1985 is actually lower than it was in the Base case.

Although the construction project clearly boosts aggregate economic activity, the resulting boom/bust cycle is essentially asymmetric in its effects on the regional economy. During the boom years, 1981-83, 42 thousand people move into the region in response to the increased job opportunities. Within two years after completion of the construction, over 80 percent of that number have moved back out, but that still leaves a substantial number of migrants in the region competing for jobs which by 1985 are only slightly increased over base levels. This situation would undoubtedly be perceived by many residents as inferior to the conditions which would have existed at that time if the construction had never been undertaken.

The deterioration in regional economic conditions following the short-lived boom is attributable to the nature of the migration process, and its consequent effects on the labor force and employment. During the boom phase, people moving into Alaska are drawn from a huge national pool of potential migrants. These people will not move in, at least for not long enough to count in the statistics, unless the availability of jobs and the rate of pay are superior to what they can obtain in the region where they are currently located. The demographic and occupational characteristics of the typical migrants also influence the way the construction boom affects the regional economy. A disproportionate number of migrants tend to be young

males. Of the 42 thousand individuals who move into Alaska during the boom period, about 30 percent are projected to be males between the ages of 20 and 35. In general, the migrants coming into Alaska tend to be in age/sex groups with high participation rates and relatively few dependents. Taking into account the age/sex characteristics of the migrants, and assuming employment rates no higher than the national average, the migrants would account for a minimum of 75 to 80 percent of the gains in employment and income in the boom period.

During the bust phase, the situation is quite different. Out-migration now has to come from a much smaller pool of potential migrants, namely from the population of the region itself. It seems unlikely that the deteriorating economic conditions will induce the members of the regional population to move out as in great numbers, or as quickly, as migrants were attracted from the national population during the boom phase. At a minimum, one would expect an appreciable lag in migration response just due to inertia and moving costs.

If some migrants remain in the region and continue to look for jobs even when the economy slows down, this will lower employment rates, even though total employment is higher than in the base case. Hence, the boom/bust cycle can leave the economy with more unemployment, or underemployment, and lower per capita incomes than would have occurred in the absence of the construction project. Since the migrants would be competing on an equal basis

with everyone else in the region for the jobs that are still available, the unemployment and reductions in income would be spread throughout the population as a whole. This points out the basic asymmetry in the effects of the boom/bust cycle. During the boom phase, migrants take a disproportionate share of the gains, while during the bust the losses are shared equally.

Using the detailed information provided by the Alaska model concerning the likely demographic and occupational characteristics of the migrants, it is possible to estimate the impacts of the boom/bust cycle on resident incomes. To estimate the impact on wage income, it is assumed that during the boom period the employment rates for in-migrants are the same as the national averages for each specific age/sex group. Non-wage income is assumed to accrue predominantly to the original residents of the region, apart from those non-wage components tied directly to wage payments. During the bust phase, it is assumed that the original residents will experience the same change in average income as shown by the population as a whole. From 1985 on, that change is a loss since per capita incomes are lower following completion of construction than they were projected to be in the base case.

Using the procedures just outlined, the estimated net gains and losses in resident incomes are shown in Table 3. During the boom period, the real income accruing to the original residents is increased by as much as \$149 million but is then reduced by an average of \$25 million in every year after 1985. This means that the typical resident would indeed perceive the

bust as worse than the conditions achievable in the base case. It is likely to be of little comfort to the average resident who is faced with a declining income to be told that aggregate economic activity is higher as a result of the construction activity. The key question is whether the gains that the residents would receive during the boom period are sufficient to more than offset the losses that would be suffered during the bust.

To address that question, the analysis needs to be extended to consider the fiscal impacts as well as the impacts on personal incomes. Assuming that the hypothesized project generates no significant direct revenues, the state will be subjected to a substantial fiscal burden during the boom phase as well as during the subsequent bust, see Table 3. As before, the fiscal burden is estimated by assuming that the state attempts to maintain public service levels by keeping real government expenditures per capita at the same level as in the base case. Because of the massive inflow of people during the boom phase, the cumulative fiscal burden reaches \$367 million by the end of 1983. By 1990 the burden totals nearly \$1.0 billion. The very rapid run up in the fiscal burden during the boom offers compelling evidence of the need for some sort of impact assistance during that period. Over the longer run, as in the previous case, a relatively modest amount of revenue sharing would be sufficient to close the fiscal gap.

In the absence of federal revenue sharing or other assistance, it is difficult to say whether on balance the state is better or worse off as a result of this very substantial

construction project. The gains in resident personal income during the boom are very substantial but are partially offset by losses in later years. The impact on the public sector is unequivocally adverse since the fiscal burden is substantial and persistent. Strains on the stock of social infrastructure capital would impose additional costs on the state during the boom period. As before, the distributional aspects of all of these effects would also need to be taken into account in making any final evaluation of the project's impacts.

7. Trickle Down Effects

One of the commonly advanced arguments for augmenting regional economic growth is that the benefits of expanded economic activity will tend to "trickle down" to the low income or unemployed segments of the population. The Alaska situation offers a unique opportunity to examine this contention more closely. The Alaska Natives (consisting of Eskimos, Indians, and Aleuts) constitute a highly immobile population group whose numbers cannot be augmented through migration. The Natives have historically had low employment rates, and those who are employed tend to be concentrated in the lower-skilled, lower-paying occupations.

The Natives, thus, have some of the key characteristics of "disadvantaged" population groups in other parts of the country. The unusual characteristic is that they are separately identifiable in the existing statistics. Many of the standard data sources (particularly the Census data) report income, employment, and other key statistics separately for this group. Using this information, the MAP model gives explicit and separate treatment to the income and employment of the Natives. The model can therefore be used to see to what extent the benefits of OCS development "trickle down" to Natives.

In terms of employment, the impacts are, as shown in Figure 6, quite modest. Even at the peak of construction activity Native employment increases by less than 10 percent, and after 1985 the employment gains are less than 3 percent. That is in the context of a regional economy in which the total employ-

ment gains are generally 15 percent or more. The Natives gain less than 2 thousand jobs even in 1983, when construction activity is at its peak and total employment in the economy is up by 45 thousand. After 1985, the gain in Native employment is about 500 to 600 jobs while total employment in Alaska is up by more than 30 thousand.

The principal reason for the limited gains in Native employment is that the Native labor force does not possess the job skills required by the industries fueling the expansion in the Alaska economy. Instead of hiring Native workers and then training them, most of the jobs are filled by attracting migrants to the state who already have the appropriate job skills. During the early years of the expansion, when activity is primarily construction, the Natives do obtain a somewhat larger share of the employment gain because their training is better suited to the occupational requirements of the construction industry. Later in the OCS development process, when more of the jobs are in managerial and technical positions, the Native employment gains drop sharply.

As shown in the bottom half of Figure 6, Native income gains during the first few years of OCS development are quite substantial. But they too, begin to taper off once the construction boom ends. In 1982, for example, Native income is up by 37 percent which is reasonably comparable to the gain in total income of 41 percent; but in 1990 Native income increases by only 7 percent while the total income gain is 20 percent.

Because most Natives are currently employed in relatively low paying occupations, the addition of a relatively small number of highly paid Native construction workers is sufficient to raise Native income by a substantial percentage, even though the amount of money involved may not be very large. Again looking at 1982 with total Alaska real personal income up by \$620 million Natives receive just \$45 million, which results in an increase in per capita Native income of \$611 (in 1967 prices). The Natives thus receive only about 7 percent of the total increase in income even though they account for 18 percent of Alaska's population. By 1985 the proportion of income gains going to Natives has fallen to 4 percent and the share continues to decline in later years.

What these results show is that Native income and employment is increased as a result of the OCS development, but the gains are quite modest and short-lived. Because the Natives are not trained in the occupations required by the development process they do not get a very large share of the jobs nor do they receive many of the high-paying jobs. Unless the development process incorporates an effective manpower training program, the Natives, like many other residents of the region, will not be able to compete with new migrants for the more desirable jobs. It seems that the "trickle down" theory is qualitatively correct but in terms of magnitude the effect is indeed no more than a trickle.

8. Conclusions

The most general conclusion to be drawn from the analysis reported here is that federal OCS development is, at best, a mixed blessing for the region involved. The development will stimulate increased economic activity in the region, providing additional jobs and income for local residents. However, most of the jobs, particularly the higher-paying jobs requiring specialized skills, will go to new migrants rather than to current residents. To meet the needs of an expanding population, state and local governments will have to increase their expenditures. Because the OCS developments do not generate any direct revenues for the state, the required increase in expenditures will typically exceed the induced increase in available revenues. Thus, the OCS development will impose a fiscal burden on the state which, as in the case of Alaska, can be quite substantial.

In many states, the fiscal burden would have to be financed either through borrowing or by raising state tax rates. Alaska, and other states with substantial non-federal resource developments, could obtain some or all of the necessary funds by drawing on the surplus being generated by other developments. In Alaska's case, this would amount to using its North Slope revenues to subsidize developments in federal OCS areas. While that outcome might be attractive from a federal viewpoint, it is not likely to generate much support within Alaska. Other states, without a North Slope surplus to draw on, should be

even less enthusiastic about supporting federal petroleum developments in their area. However, the analysis shows that only a modest amount of federal revenue sharing, or impact assistance, is required to provide sufficient funds to eliminate the fiscal burden. That might be a reasonable price to pay to reduce states' resistance to developments that could increase national energy supplies.

In addition to the major problem posed by the fiscal burden, the OCS development process can cause other types of complications:

- Social infrastructure capital will be put under a strain by the growth in population.
- If the process causes a boom/bust cycle, residents are likely to be left worse off in later years, not only relative to the boom years but relative to their situation in the absence of the development.
- Few of the benefits of expanded growth are likely to trickle down to disadvantaged population groups unless the process incorporates effective manpower training programs.
- Distributional issues have to be taken into consideration in all aspects of the process since there is no guarantee that the benefits will accrue to the same groups that bear the costs of development.

Table 1

AGGREGATE IMPACTS OF OCS DEVELOPMENT

	GROSS STATE PRODUCT (Excluding Petroleum) (Millions of 1958 \$)	EMPLOYMENT (Thousands)	REAL PERSONAL INCOME (Millions of 1967 \$)	STATE REVENUES (Millions of \$)
1981	136.3	13.2	189.7	23.2
1982	422.7	38.4	619.9	111.9
1983	485.5	45.9	724.1	219.9
1984	279.3	30.1	408.7	216.0
1985	232.9	26.6	330.2	159.5
1986	223.2	25.0	319.3	156.8
1987	264.8	28.9	378.7	175.7
1988	289.2	32.2	421.4	213.6
1989	281.5	32.8	415.7	239.1
1990	262.3	32.2	392.0	248.3

Table 2

IMPACTS ON INCOME AND WEALTH

RESIDENT REAL INCOME (Millions of 1967 \$)	REAL FISCAL BURDEN	PER CAPITA MEASURES			
		RESIDENT REAL INCOME	STATE REAL FINANCIAL WEALTH (1 9 6 7 \$)	STATE REAL SOCIAL CAPITAL	
1981	114	-21	272	-97	-122
1982	364	-61	862	-334	-321
1983	397	-55	989	-483	-363
1984	189	-29	447	-504	-226
1985	116	-39	274	-618	-203
1990	77	-64	174	-1216	-222

Table 3

IMPACTS FROM CONSTRUCTION BOOM/BUST CYCLE

	REAL RESIDENT INCOME (Millions of 1967 \$)	FISCAL BURDEN (Millions of \$)	REAL FISCAL BURDEN (Millions of 1967 \$)
1981	36	-47	-14
1982	134	-168	-46
1983	149	-151	-39
1984	75	-17	-4
1985	-20	-50	-11
1986	-28	-85	-19
1987	-27	-99	-20
1988	-26	-108	-21
1989	-25	-118	-22
1990	-24	-128	-22

FIGURE 1 Overview of the Basic MAP Model

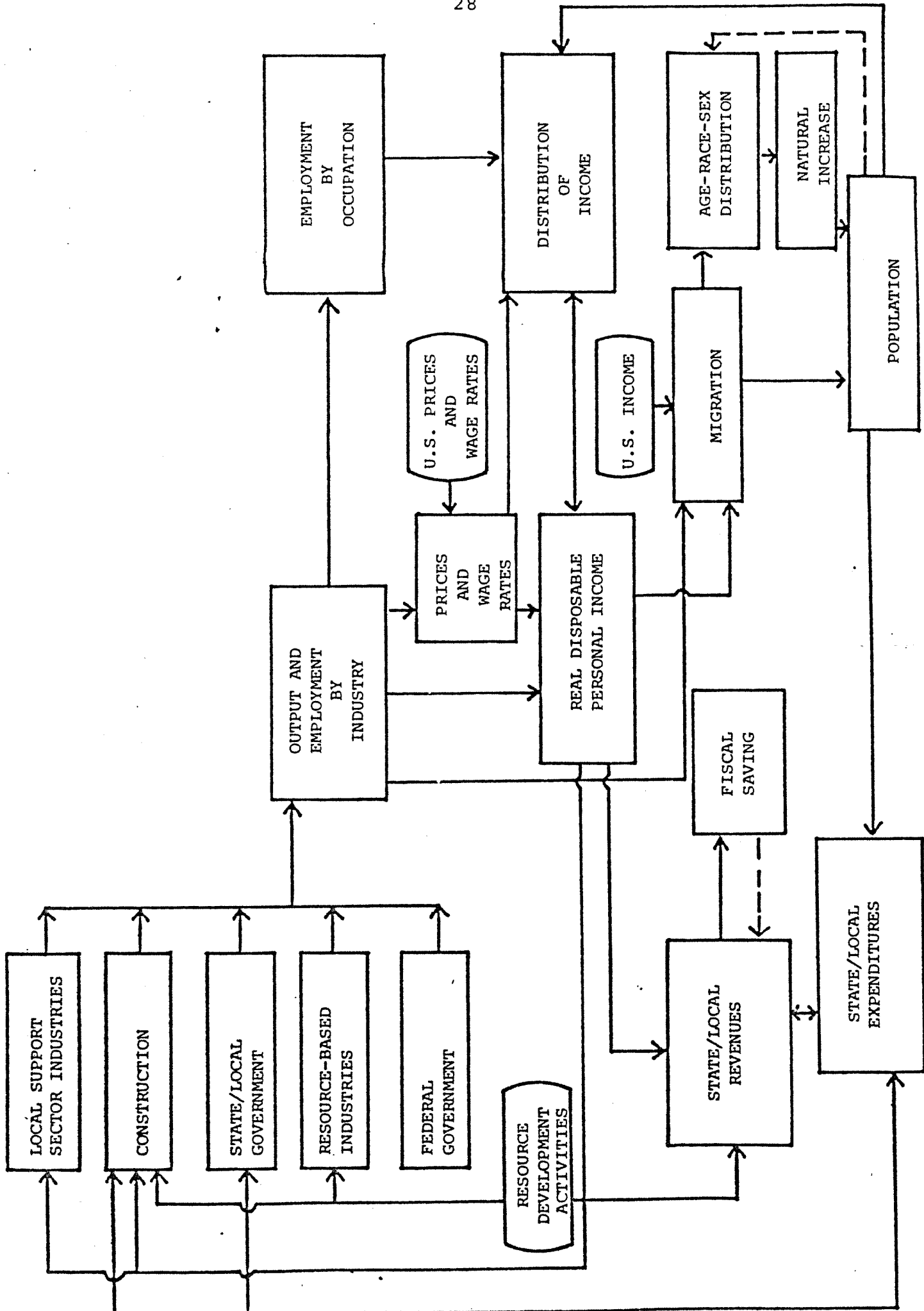


Figure 2

ALASKA OUTER CONTINENTAL SHELF (OCS)
DEVELOPMENT AREAS

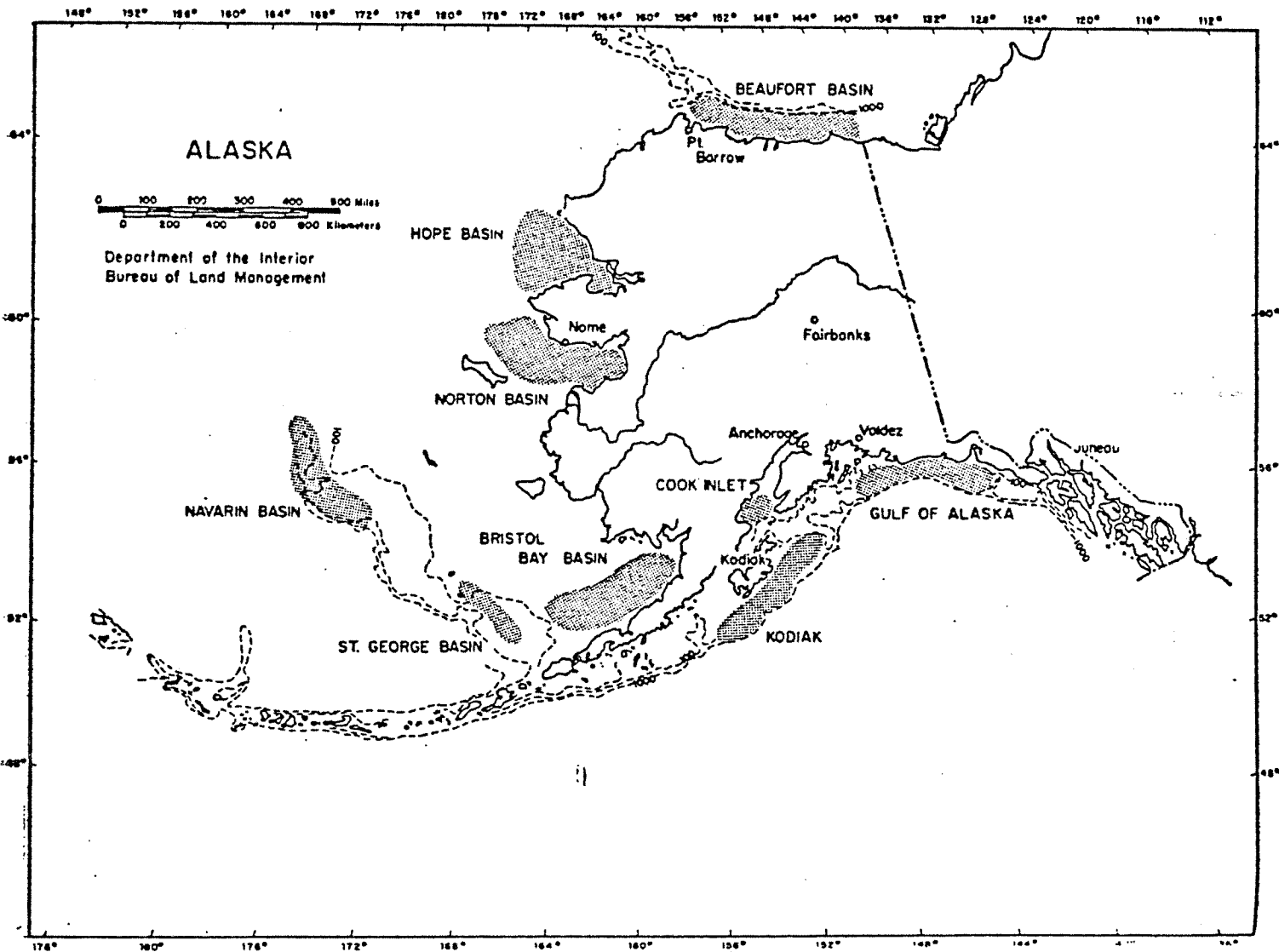


Figure 3
DIRECT EMPLOYMENT IN FEDERAL PETROLEUM DEVELOPMENTS

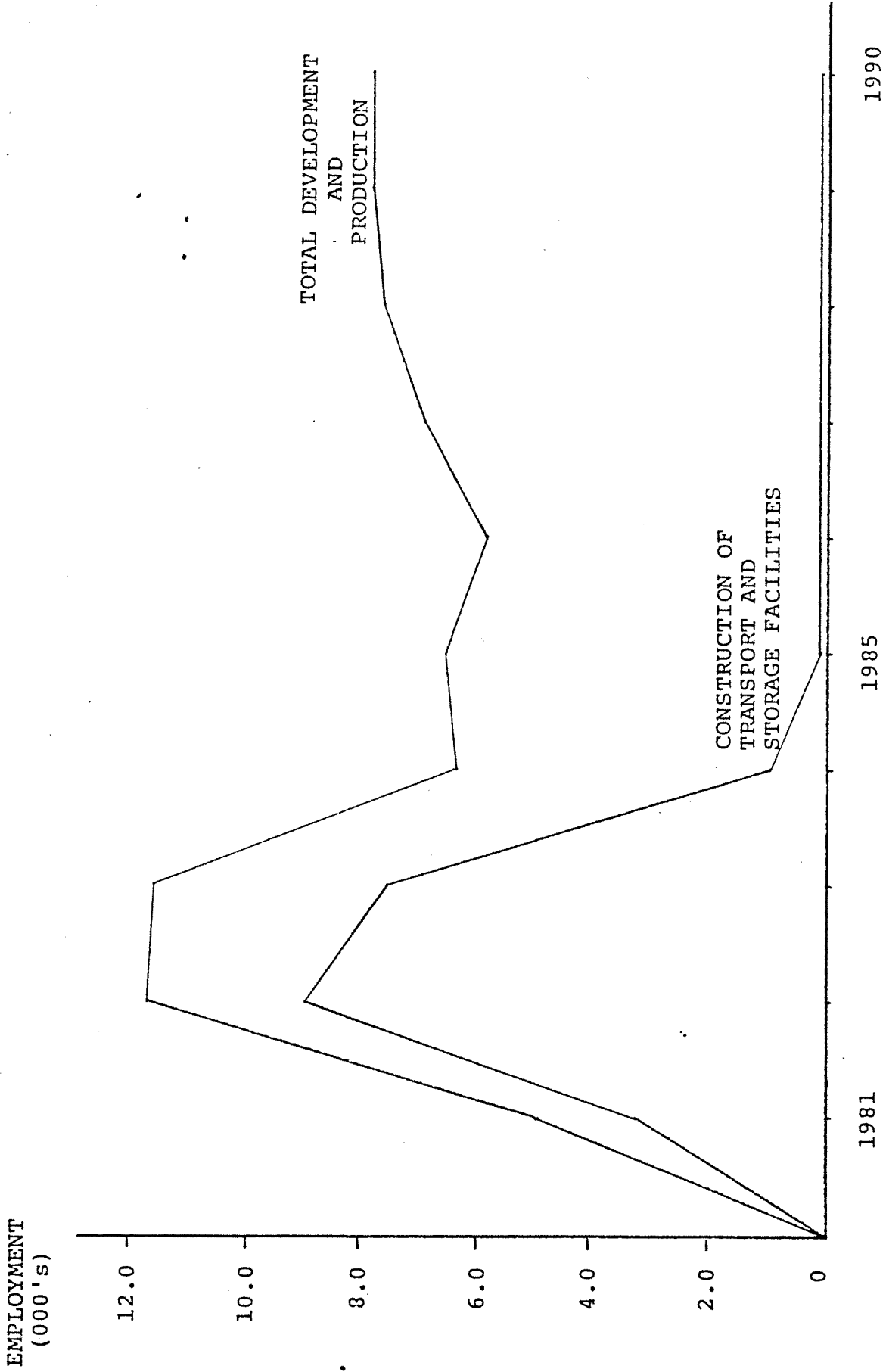
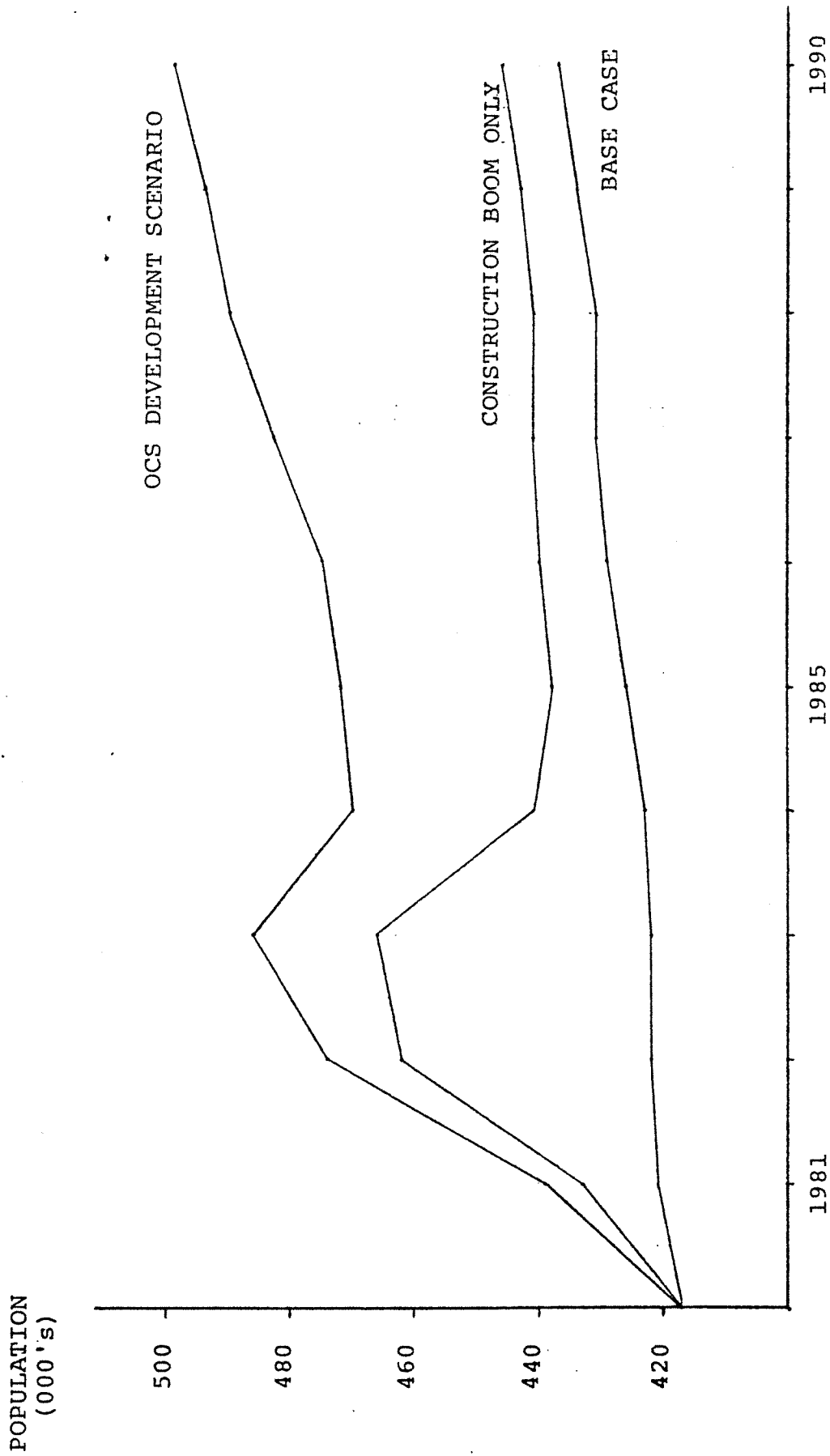


Figure 4

ALASKA POPULATION PROJECTIONS:
ALTERNATIVE FEDERAL PETROLEUM DEVELOPMENTS



STATE FISCAL IMPACTS OF
FEDERAL OCS DEVELOPMENTS

Millions
of \$

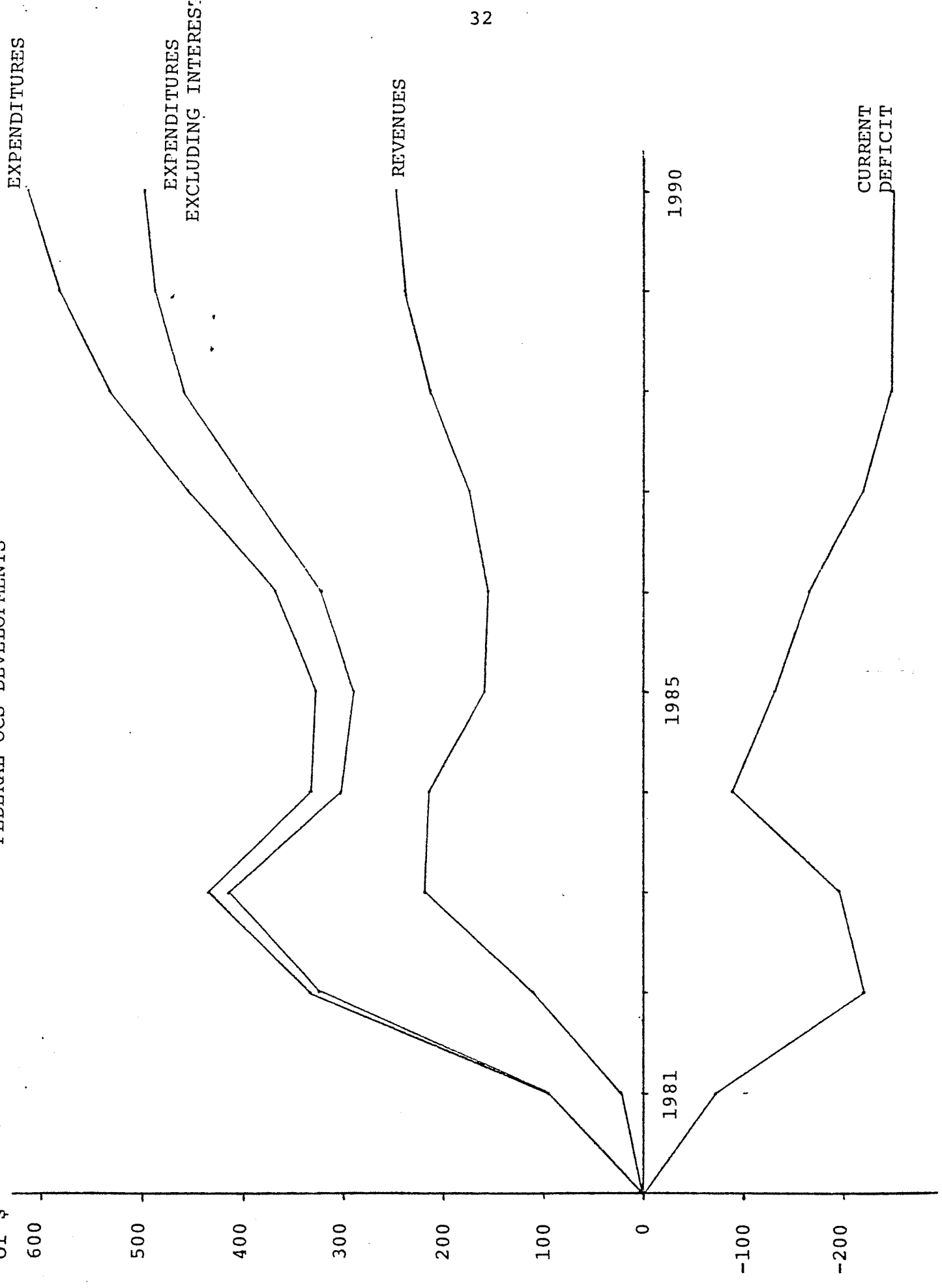


Figure 6

IMPACTS ON ALASKA NATIVE EMPLOYMENT AND INCOME
(Percent Change from Base Case Values)

