ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672
169 SCOMM 9: HOUSE SPEC. COMM. ON PERMANENT FUND 1977-78

THE SUDAN

1- The Industrial Development Bank:

The Industrial Development Bank of Sudan was established in 1961 for providing the necessary finance for industrial projects in the private sector of the Sudan. Its authorized capital is S£ 5.0 million, with a paid-in capital of S£ 3.0 million completely subscribed by Sudan's Central Bank. Its lending operations for the period 1975-1978 are expected, however, to exceed KD 7 million (S£ 8.44 million) of which the foreign exchange is about KD 4.98 million (S£ 5.9 million). In order to meet these requirements the Bank is seeking loans at concessionary terms from both the Kuwait Fund and IDA.

2- Rahad Irrigation Project:

In 1973, the Fund extended a loan of KD 3.3 million to finance the Rahad Irrigation Project, one of the most important agricultural projects in the Sudan.

The project aims at the reclamation of 820,000 feddans and the utilization of the Roseires Dam for their irrigation. Since 1973, the cost estimates have been revised partly as a result of the rise in prices and partly due to certain additions to the works covered by the project. The Fund is currently considering the possibility of participating, jointly with IDA and the Arab Fund for Economic and Social Development, in covering the additional cost.

SOMALIA

Mogadiscio Power Station:

The installed capacity of the existing power station in Mogadiscio, the capital of Somalia, is no longer sufficient to meet the requirements of both industry and household consumption. Demand for electricity is also expected to increase quite rapidly with the increase in population and the planned expansion of industrial production.

The present project aims at increasing the supply of electric power in Mogadiscio by installing 4 diesel generators of 5MW capacity each, and expanding the distribution network.

A Fund mission visited Somalia during November/December,1974 to examine the economic and technical aspects of the project.

LEBANON

Southern Bekaa Irrigation Project:

The Fund is considering a request made by the Lebanese Government to participate in financing a project aiming at the irrigation of an area of 23,000 hectares situated between the Karaoun Reservoir and the Beirut-Damascus highway.

The total cost of the project is estimated at LL 300 million (KD 38 million) of which the World Bank has agreed to contribute KD 14.7 million on condition that other sources of finance would be forthcoming to cover the balance.

EGYPT

The Egyptian Government has submitted to the Fund for consideration, a number of projects, of which the following three have reached an advanced stage of preparation:

- **Abu-Qir Gas Field Project:**

In 1973, a loan of KD 4.5 million was extended by the Fund to the Arab Public Oil Corporation to exploit a natural gas field discovered in 1969 in Egyptian territorial waters near Abu-Qir.

The project included the drilling of nine wells, the construction of an off-shore platform, submarine pipeline linked to the processing plant, as well as a pipeline network for the distribution of gas to the consumption centers in Alexandria, Kafr Al-Dawar and Damanhur. An additional component of the project is the conversion of some plants to substitute gas for fuel oil. Total costs, and in particular the foreign exchange component of the project, have turned out to be higher than originally estimated, because of the substantial rise in world prices since 1973 and the need to engage foreign instead of local contractors in carrying out some parts of the project.

The Fund is considering the possibility of extending an additional loan to meet the rise in costs.

2- Abu-Qir Power Station:

The purpose of this project is to construct two thermal units of 300MW capacity to help meeting the big projected increase in Egypt's demand for electricity.

Total costs are estimated at KD 50 million, of which KD 35 million is in foreign exchange.

A Fund mission visited Egypt during April, 1975 to examine the project, and to reach a preliminary agreement with the Egyptian Government on the terms of its financing.

3- Oil Pipeline Project:

This project aims at lowering the costs of transportation of crude oil to the oil refineries in Suez and Cairo, by substituting oil pipelines for seaborne and land transport.

The project will include the construction of a pipeline extending from the oil fields at Ras-Shukair to Suez and Cairo, with a total capacity of 10 million tons annually.

A preliminary estimate of total costs is put at KD 15 million of which the foreign exchange component is KD 10 million.

MOROCCO

1- Kenitra Power Station:

A Fund mission visited Morocco during June/July 1974, to investigate a project aiming at the construction of a thermal-power station with four units of 75MW each, near the town of Kenitra.

Apart from the construction of the power station and the provision of the necessary equipment and civil works, the project also includes the erection of a pumping station in the Sebou valley as well as the provision of fuel tanks and administrative buildings.

Total costs are estimated at KD 37 million of which KD 23 million is in foreign exchange.

2- The National Bank for Economic Development (BNDE):

Morocco's National Bank for Economic Development was established in 1959 with a capital of DH 20 million and with the aim of promoting productive investment, particularly in industry.

In 1972, its paid-in capital was raised to DH32.4 million, which falls far short of covering its ambitious programme for the period 1975-77, amounting to DH 1.7 billion (KD115 million). The Fund is presently considering its participation in the financing of this programme by extending a loan to the Bank.

3- Lead-Smelting Project:

This project aims at the construction of a lead-ore foundry near the city of Meknes, with a total capacity of 80,000 tons annually of purified lead, using as input, Morocco's own lead ore. The project will be implemented by the "Bureau de Recherches et Participation Minières", a government agency responsible for the development of all Morocco's mineral resources other than phosphate.

The total cost of the project is estimated at KD 12 million.

MAURITANIA

1- Nouakchott-Kiffa Highway:

High priority is assigned by the Government of Mauritania to the construction of a highway linking the capital, Nouakchott, on the Atlantic Ocean, with Nema, in the extreme south-east of the country, and passing through Boutilimit, Aleg, Kiffa and Aioun. One of the most important targets of this project is to connect the inhabitants of the eastern regions, who constitute more than one third of the total population, with the rest of the country, both economically and socially.

The Fund is considering the possibility of participating in financing the section of the road extending from Nouakchott to Kiffa, and for this purpose a Fund mission visited Mauritania during July 1974.

2- Road Rehabilitation and Maintenance:

Highway network in Mauritania is approximately 7000km long, of which no more than 460km are asphalt-paved, the remainder consisting of earth tracks. Apart from the high cost of transportation entailed, some roads become virtually unusable during the rainy season. The present project consists of providing technical assistance to the Authority of Roads and Transportation, the procurement of the necessary equipment for the rehabilitation, improvement and maintenance of the existing road network, as well as the preparation of a detailed study for the construction of a new road, 200km long, between Rosso and Boghe.

The Fund is currently examining the possibility of financing this project jointly with IDA and the Canadian International Development Agency(1).

3- Nouadhibou Port Extension Project:

Situated on the Atlantic Coast in the north-east of the country, Nouadhibou is Mauritania's principal port, but its facilities are insufficiently developed to encourage a large number of ship calls.

The present project consists of the expansion of the port, including the extension of wharf and berth facilities for fishing boats as well as commercial vessels.

NORTHERN YEMEN

1- Industrial Development Bank:

In January 1975, a Fund mission visited Northern Yemen in order to study the possibility of establishing an industrial development bank to promote small and medium industrial projects in both the private and public sectors, by providing them with loans at concessionary terms.

The extension of technical assistance for the study of this project is being considered by the Fund.

2- Ports Development:

The Port of Hodeidha, the principal port of Yemen, is constrained by a number of difficulties related to the narrowness of its entrance and the shallowness of its waters.

The UNDP and the German Federal Republic have both expressed their willingness to participate in financing a study investigating the present conditions of Yemeni ports, and drawing a comprehensive plan for meeting the future requirements of the country. They have agreed to cover the foreign exchange component, and the Fund is currently considering the possibility of providing the necessary finance to cover the local costs.

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(1) A Fund loan of KD 1.15 million (195 million Ouguiya) repayable over 20 years, with 5.25 years grace period, was signed on April 9, 1975, for the financing of this project. The loan carries no interest, except for an administrative charge of 0.5% per annum.

3- Tihama Agricultural Development Project:

Last year, the Fund, jointly with IDA, participated in the financing of a project aiming at the modernisation of the irrigation system in an area of 17,000 hectares in Wadi Zabid. The Fund loan amounted to KD 1.9 million at an interest rate of 0.5% annually.

It was later discovered, however, that actual costs will considerably exceed the original estimates. The Fund is therefore considering an additional loan to cover part of the increase in costs.

4- Hodeidah-Taiz Highway:

The main road network in Northern Yemen consists of three major roads: Sana'a/Hodeidah, Hodeidah/Taiz and Taiz/Sana'a. All three roads are asphalted, except for a short stretch of dirt-track of 64km on the Hodeidah/Taiz road.

A pre-investment study has shown the viability of completing the asphalt-paved road connecting these two cities at an estimated total cost of KD 3.6 million.

SOUTHERN YEMEN

1-Mekala - Seayon Highway:

The Fund is presently considering the extension of a loan to PDRY to finance the construction of 358km road linking Al-Mekala, on the southern coast, with Seayon, in the Hadhramout valley. north of the country. The loan will also cover the expenses of expatriate consultants and the training of nationals abroad as well as the procurement of the necessary spare parts and accessories for road maintenance. Total costs of the project are estimated at KD 9.35 million of which KD 6.15 million is in foreign exchange. The project is expected to be financed jointly by the Fund and IDA.

ASIA

BANGLADESH

1- The Mano River Project:

The aim of this project is to develop an agricultural area of 56,000 feddans located in the province of Sylhet, north east of the country, by increasing the cultivated area and raising the productivity of the land already cultivated.

The project will include the construction of a 37 miles long embankment as a protection against the flood, the erection of a pumping station to drain off excess water, as well as the digging of drainage and irrigation canals.

Total coasts are estimated at KD 7.6 million, of which KD 1.7 million is in foreign exchange. In February 1975, a Fund mission visited Bangladesh to study and evaluate the project.

2- Electrification of Irrigation Works:

The government of Bangladesh has requested the Fund to consider the possibility of financing a project aiming at the replacement of diesel engines by electric motors in running the irrigation pumps used on an area of 160,000 feddans. The project also aims at supplying rural areas with electricity, both for lighting and for industrial uses.

Total costs are estimated at KD 14.5 million , about KD 6.6 million of which is in foreign exchange.

SRI LANKA

The Fund is currently considering the possibility of financing, jointly with the Asian Development Bank, the Governments of Western Germany, India and Iran, the construction of a urea plant, about 11km from the capital, Colombo. The project also includes the construction

of residential and administrative buildings as well as the provision of technical, administrative and training services.

The project is expected to reach its full capacity in 1981, to meet all Sri Lanka's requirements of fertilizers and realize a surplus for export.

Total costs of the project are estimated at KD 42.3 million of which KD 29.6 million is in foreign exchange.

MALAYSIA

Palong Land Settlement Project:

The aim of this project is to clear a forest area of 73,000 feddans, convert it into rubber plantations and resettle about 5,500 families of poor landholders. In order to cover the foreign exchange element of the project, the Government of Malaysia is seeking a loan which would be relent by the Government to the Federal Land Development Authority. Total costs are estimated at KD 39.4 million of which KD 11.3 million is in foreign exchange.

A Fund mission visited Malaysia in March 1975 to study and evaluate the project.

UGANDA

1- Livestock Development:

In its current five-year plan, the government of Uganda is assigning high priority to the diversification of agricultural output and particularly to the expansion of livestock production.

The present project represents the second phase of a programme prepared by the government in order to achieve this target.

The project consists of the establishment of 140 farms for the breeding and fattening of cattle, the average size of the farm being approximately 3000 feddans. The project will also include the provision of water supply, cattle sheds and veterinary services. The total costs of the project are estimated at KD 10.4 million.

2- Development of the Sugar Industry:

The Fund is considering the possibility of extending technical assistance to the government of Uganda to provide consultancy services for the rehabilitation and development of the sugar industry. Uganda's sugar industry has been recently facing a number of difficulties reflected in the decline of sugar output from 144,000 tons annually in 1970 to about 50,000 tons in 1974. As the consumption of sugar has been increasing rapidly, Uganda has turned from a sugar exporting country into a net importer of sugar.

3- Power Development:

Although Uganda is currently realizing a surplus of electric power generation amounting to 35 MW annually, in addition to 31 MW transmitted to Kenya, it is expected that the future growth of demand for electricity will render its existing installed capacity incapable of meeting the country's requirements.

The government of Uganda has therefore requested the Fund to participate in financing a feasibility study of the construction of an electric-power station to be situated at the meeting point of the White Nile and the Juba River.

BURUNDI

1. Bujumbura-Cibitoke Highway:

The project involves the construction of an 80km long highway linking Bujumbura, the capital of Burundi, with the city of Cibitoke, situated near the Rwanda-Burundi borders. The highway will pass through an area of great agricultural potential, particularly for the production of such crops as soya beans, tea and coffee.

The total costs of the project are estimated at about KD 4.5 million.

2. Silo and Flour Mill Project:

This project aims at reducing Burundi's dependence on the imports of flour as well as providing a new source of income for the poor inhabitants of the highlands. It consists of constructing one silo and a number of flour mills with a total capacity of 8000-9000 tons of wheat and about 2000 tons of maize. The total cost is estimated at KD 500,000.

TANZANIA

Mwanza Textile Factory:

In 1973, cotton manufacturing in Tanzania accounted for no more than 15% of the total cotton crop. The aim of the current industrialisation policy is to raise this percentage to reach about 22% by the end of this decade. The present project aims at raising the production capacity of the existing textile factory, situated in the city of Mwanza, from 25 million meters of textile annually to about 45 million, using large and medium-staple cotton varieties currently produced in the Mwanza area.

The total costs of the project is estimated at KD 13.3 million, of which KD 9.0 million is in foreign exchange.

RWANDA

1- Tea Growing and Processing Project:

The government of Rwanda is aiming at increasing the production of tea, which is one of of Rwanda's principal agricultural crops, to reach 14,000 tons in 1982, compared with about 3,520 tons in 1974. The project includes the extension of tea production into an area of 500 hectares in the Karago-Giciye region, as well as the construction of a plant for drying tea leaves with a capacity of 1200 tons annually.

Total costs of the project are estimated at RF 720 million (KD 2.3 million) of which approximately RF 312 million (KD 1.0 million) is in foreign exchange.

MALAGASY

Fenerive-Soanierana/Ivongo Highway:

The government of Malagasy has requested the Fund to participate in financing the construction of a 65km highway linking the two cities of Fenerive and Soanierana-Ivongo. This constitutes a part of a bigger project aiming at connecting Tananarive, the capital, with the city of Tamatave, in the north-eastern part of the island. One important aim of the project is to reduce the cost of transportation and marketing of a number of agricultural crops produced in the province such as coffee, cloves, rice and wood.

MALI

The Fund is presently considering a request made by the government of Mali to participate in financing the technical assistance required for two studies concerning the two following projects:

1- Expansion of Irrigated Area:

This project aims at expanding the irrigated area in the three valleys of Terekole, Colombine and Senegal, allowing an increase in the production of a number of crops, the most important of which are rice and maize.

2. The Construction of a Cement Plant:

Mali possesses only one cement factory, the annual production of which amounting to 49,000 tons in 1974, falls far short of Mali's requirements.

The purpose of the envisaged study is to select the most appropriate method of production, productive capacity as well as the site of the project.

MALI-MAURITANIA-SENEGAL

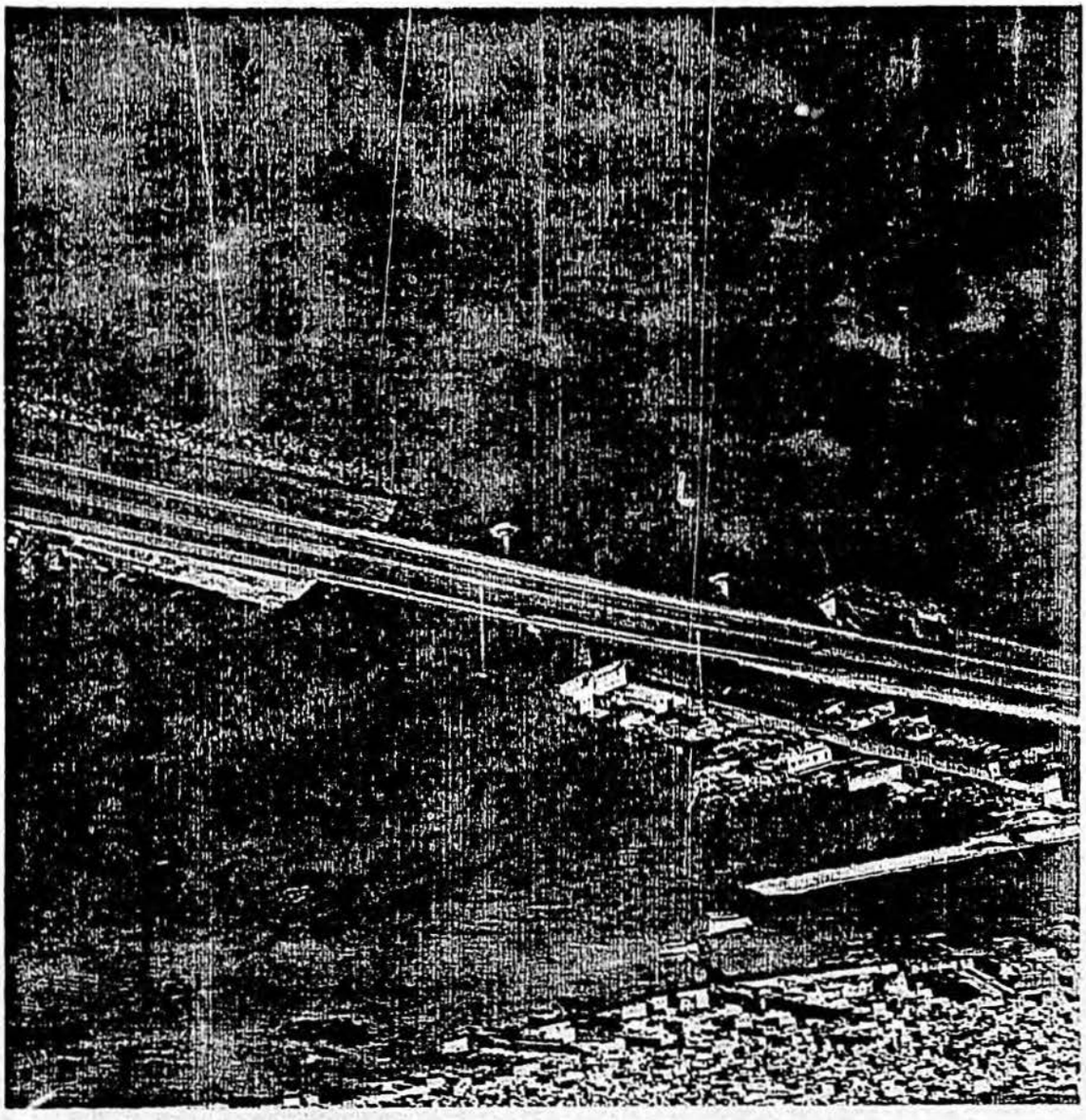
Senegal River Basin Programme:

The three countries of Mali, Mauritania and Senegal are to carry out an ambitious programme for the exploitation of the Senegal River Basin to be implemented over a span of 40 years at the estimated cost of $ 3.4 billion. The project is divided into a number of stages, the first of which is expected to be completed by 1982 and to cost about $ 200 million.

This stage comprises the construction of the Manantali dam as well as a port near the city of Kayes, in Mali, the Diama barrage in the Senegal, as well as nine other ports along the Senegal river, two of which will be situated in Mauritania. Great importance is being attached by the three governments to these projects which are expected to allow a higher degree of exploitation of their agricultural and mineral resources as well as the generation of hydro-electric power for industrialization. The programme will also facilitate navigation along the river for the benefit of the riparian states, particularly of Mali which has no outlet to the sea.

In July, 1974, the Fund was represented at a conference held in Nouakchott and attended by 13 states and 12 international financial institutions to discuss ways of financing the programme.

On November 7, 1974, the Fund's Board approved the allocation of KD 10 million for this programme, but individual projects will have to be submitted to the Fund, for appraisal.



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FINANCIAL POSITION

Loan Accounts:

Withdrawals from loan accounts during the year amounted to KD 7.9 million, thus bringing total cumulative disbursements to KD 91.3 million against KD 83.4 at the end of 1973/74. As total commitments increased at a greater rate than total disbursements, the ratio between total disbursements and total lending decreased from 62% at the end of the previous year, to 57% at the end of the current financial year 1974/1975.

Total cumulative repayments rose from KD 24 million at the end of the previous year to KD 29.3 million at the end of 1974/75. The ratio of total repayments to total disbursements reached 32% compared with 29% at the previous year and 25% in 1972/73.

Income and Expenditure:

Total gross income during the year amounted to KD 16.6 million, to which the Fund's investments portfolio contributed KD 14.4 million (compared with KD 5.7 million in 1973/74) and its loan portfolio KD 2.2 million (compared with KD 2.1 million in the previous year).

Total expenditure during the year reached KD 608,000, amounting to 3.7% of total income. Net income amounted therefore to KD 16.0 million compared with KD 7.1 million during 1973/74.

Balance Sheet:

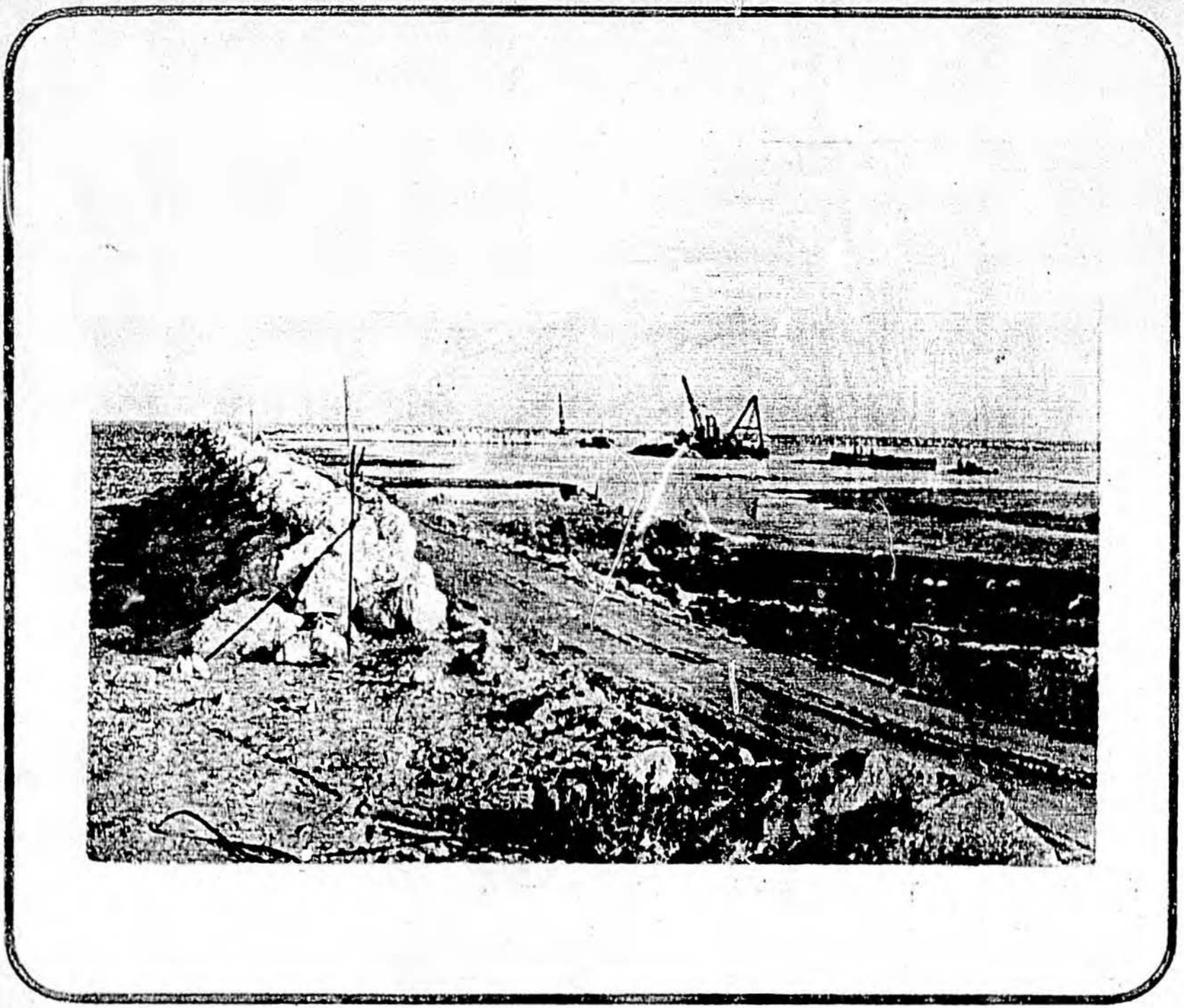
The Fund's paid-in capital increased from KD 113.46 million at the end of the previous year to KD 328.05 million at the end of 1974/75, representing a little less than a three-fold increase.

Accumulated reserves rose from KD 40.0 million in 1973/74 to KD 56.1 million in 1974/75, and total resources from KD 153.5 to KD 384.1 million respectively. On the assets side, deposits increased from KD 8.5 million to KD 174.4 million, investments from KD 66.9 to KD 110.4 million and the contributions of the Kuwait Government, through the Fund, to Arab development institutions, from KD 10.8 million to KD 25.8 million. The percentage distribution of assets on March 31, 1975 stood at 47% for cash and deposits, 29% for investments, 16% for the balance of loan accounts, 7% for the contributions to Arab development institutions and 2% accrued interest and sundry debts.

FINANCIAL RATIOS

	Financial Year	
	1973/74 %	1974/75 %
Net Income/Total Assets(1)	6.6	10.4
Net Income/Paid-in Capital(1)	8.7	14.1
Total Expenditure/Gross Income	6.8	3.7
Administrative Expenses/Gross Income	4.4	3.4

(1) beginning of fiscal year.



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TABLES

Table (A)

NEW LOANS

1974/1975

Country	Project	Date of Agreement	Amount (Million KD)	Interest %	Period (Years)	Grace (Years)
Jordan	Industrial Development Bank	17/ 7/74	1	4	17	5
Tunisia	Modernisation of Phosphate Mines	14/10/74	2	4	15	2.9
Syria	Mehreda Thermal Power Station	25/11/74	9.9	4	19	3.25
Egypt	Talkha Fertilizer Plant II	27/ 6/74	7	4	20	4.7
Morocco	Phosphoric Acid and Mono-ammonium Phosphate Project	25/11/74	2.4	4	14	3.7
Northern Yemen	Saleef Mines-III	29/ 5/74	1.1	2	27	2.1
Southern Yemen	Abyan Delta Project	12/ 5/74	4.2	0.5	49	9.4

Table (B)

TECHNICAL ASSISTANCE GRANTS *

1974/1975

Recipient	Purpose	Amount (KD)
Afghanistan	Sugar Industry Development, and Exploitation of Farah-Rud River	400,000
Somalia	Livestock Development and Expansion of Irrigated Area	200,000
Mauritania	Exploitation of Mineral Resources	175,000
Northern Yemen	Expansion of Cement Production	70,000
Southern Yemen	Modernisation of the Port of Aden and El-Rayan Airport, and the Development of Livestock Production	300,000
Arab Planning Institute	Training Programme	31,000

* As authorised by the Board.

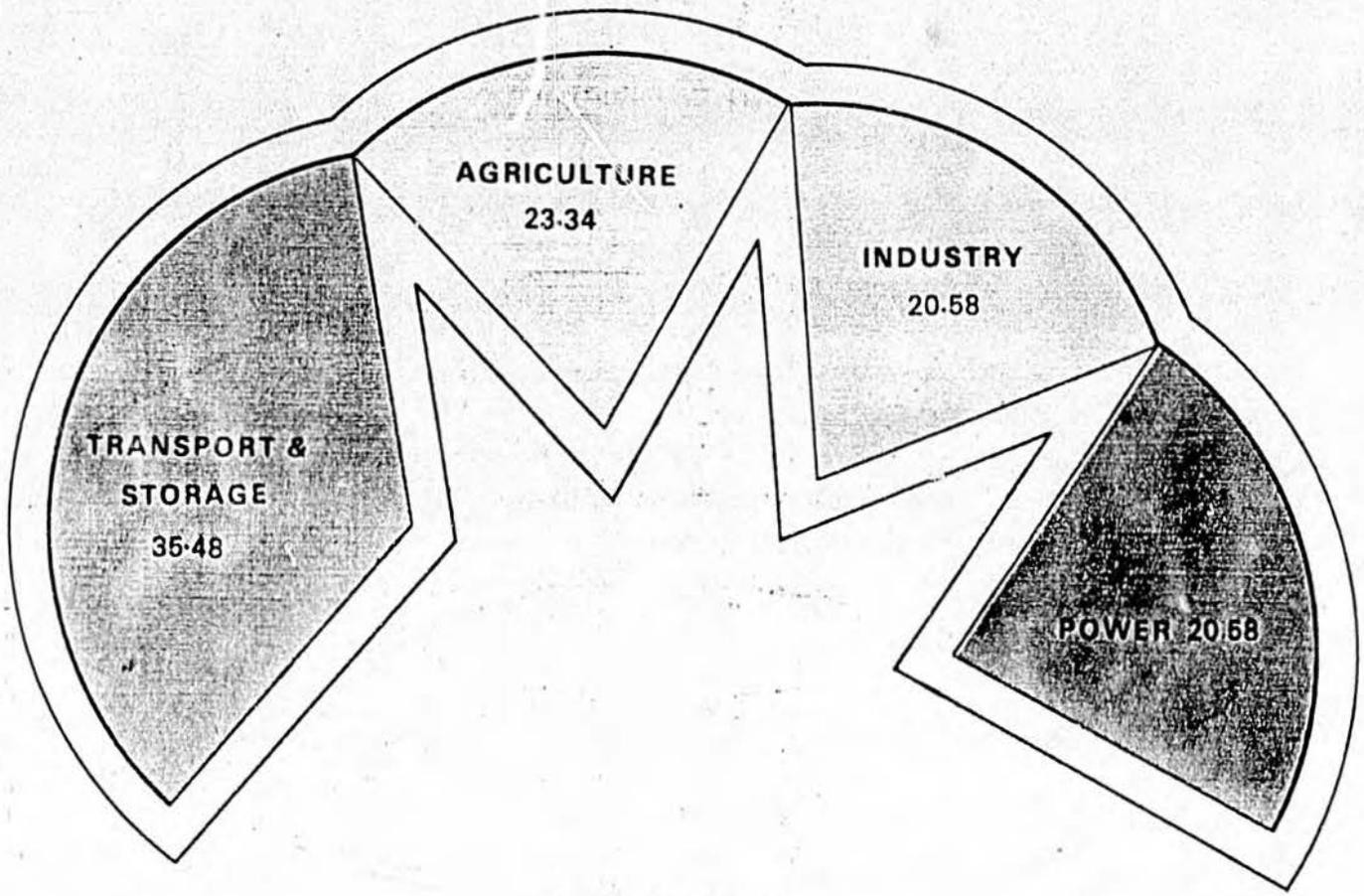
Table (C)

Sectoral and Geographical Distribution of Loans

(Million KD)

Country	Agriculture	Transport & Storage	Electricity	Industry	Total	%(1)
Jordan	6.48	—	3.26	4.48	14.22	8.83
Bahrain	—	0.50	7.35	1.49	9.34	5.80
Tunisia	5.20	3.75	8.35	2.00	19.30	11.98
Algeria	—	10.00	—	—	10.00	6.21
Sudan	9.11	7.00	—	6.17	22.28	13.83
Syria	—	7.00	9.90	2.00	18.90	11.73
Iraq	—	—	2.62	3.76	6.38	3.96
Lebanon	—	0.80	1.66	—	2.46	1.52
Egypt	—	27.80	—	7.00	34.80	21.61
Morocco	10.05	—	—	3.25	13.30	8.26
Southern Yemen	4.53	—	—	—	4.53	2.81
Northern Yemen	2.22	0.28	—	3.00	5.50	3.41
Total	37.59	57.13	33.14	33.15	161.01	100
%(1)	23.34	35.48	20.58	20.58	100	

(1) May not add up to 100 because of rounding.



LOANS

Sectoral Distribution

%

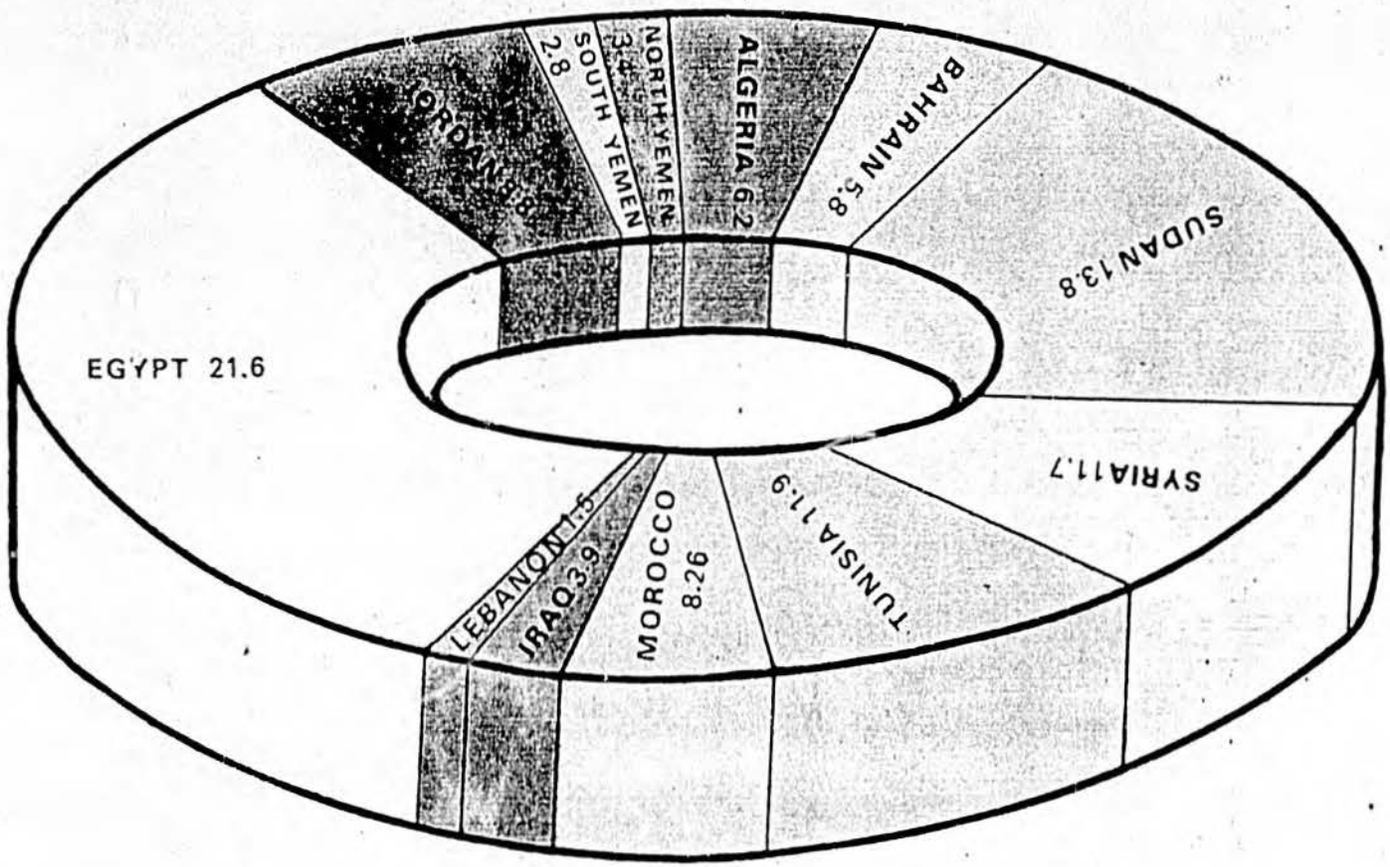
31-3-1975

LOANS

Country Distribution

%

31-3-1975



KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

EXHIBIT A

BALANCE SHEET

	March 31, 1975	March 31, 1974
ASSETS	**KD**	**KD**
Cash	5,181,379	5,067,949
Bank deposits	174,452,883	8,546,246
Securities	110,396,074	66,897,320
Loans	62,009,032	59,473,585
Participations in Arab Development Institutions	25,846,925	10,800,000
Accrued interest and other debit balances	6,871,065	2,832,462
TOTAL ASSETS	384,757,358	153,617,562
LIABILITIES AND CAPITAL		
LIABILITIES:		
Safe custody deposit and other credit balances	653,095	159,979
CAPITAL:		
Authorized capital	1,000,000,000	200,000,000
Paid-in capital	328,046,300	113,457,583
General reserve – Exhibit B	56,057,963	40,000,000
Total capital and general reserve	384,104,263	153,457,583
TOTAL LIABILITIES AND CAPITAL	384,757,358	153,617,562

EXHIBIT B

KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

GENERAL RESERVE ACCOUNT

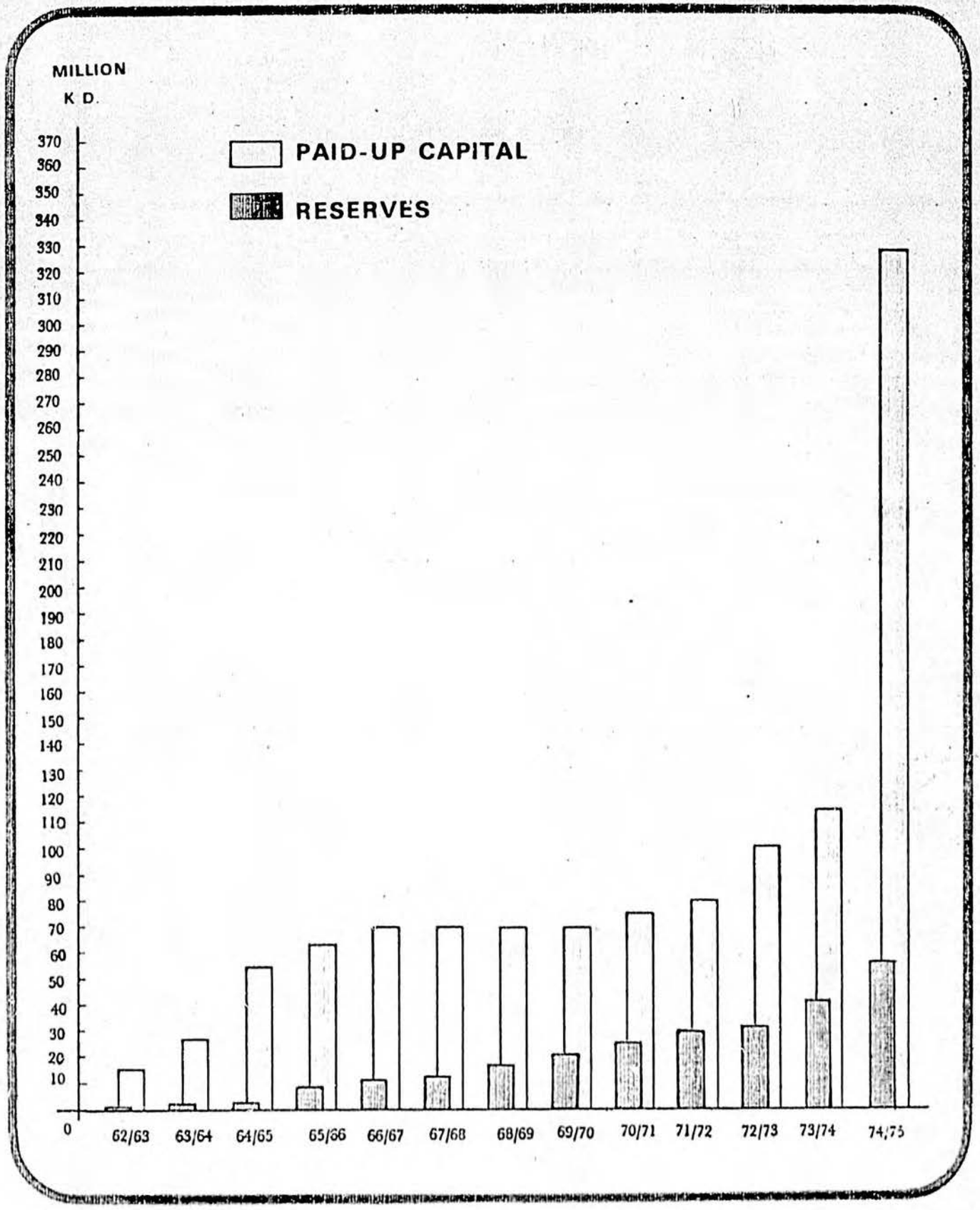
	For the Year Ended March 31,	
	1975	1974
	KD	KD
General reserve at the beginning of the year	40,000,000	31,506,818
General reserve adjustment	(24,329)	(35,353)
Adjusted general reserve	39,975,671	31,471,465
Excess of income over expenditure-Exhibit C	16,008,108	7,127,117
Currency differences	408,350	1,939,464
Total	56,392,129	40,538,046
Securities price differences	(77,942)	(243,064)
Technical assistance grants	(256,224)	(237,399)
General reserve	56,057,963	40,057,583
Transferred to capital	—	(57,583)
General reserve at the end of the year-Exhibit A	56,057,963	40,000,000

EXHIBIT C

KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

INCOME AND EXPENDITURE ACCOUNT

	For the Year Ended March 31,	
	1975	1974
	KD	KD
INCOME:		
Income from investments	14,438,131	5,705,379
Income from loans	2,178,278	2,087,876
Total income	16,616,409	7,793,255
EXPENDITURE:		
Salaries and wages	393,592	275,692
Travelling, accommodation and entertainment expenses	89,927	51,329
Rent	27,327	34,211
Sundry expenses	55,780	46,454
Delegations expenses	2,090	
Depreciation of fixed assets	14,585	21,460
Cost of Fund's building and equipment for the year 1974/1975	25,000	236,992
Total expenditure	608,301	666,138
Excess of Income over Expenditure- Exhibit B	16,008,108	7,127,117


MILLION
K D.
PAID-UP CAPITAL
RESERVES
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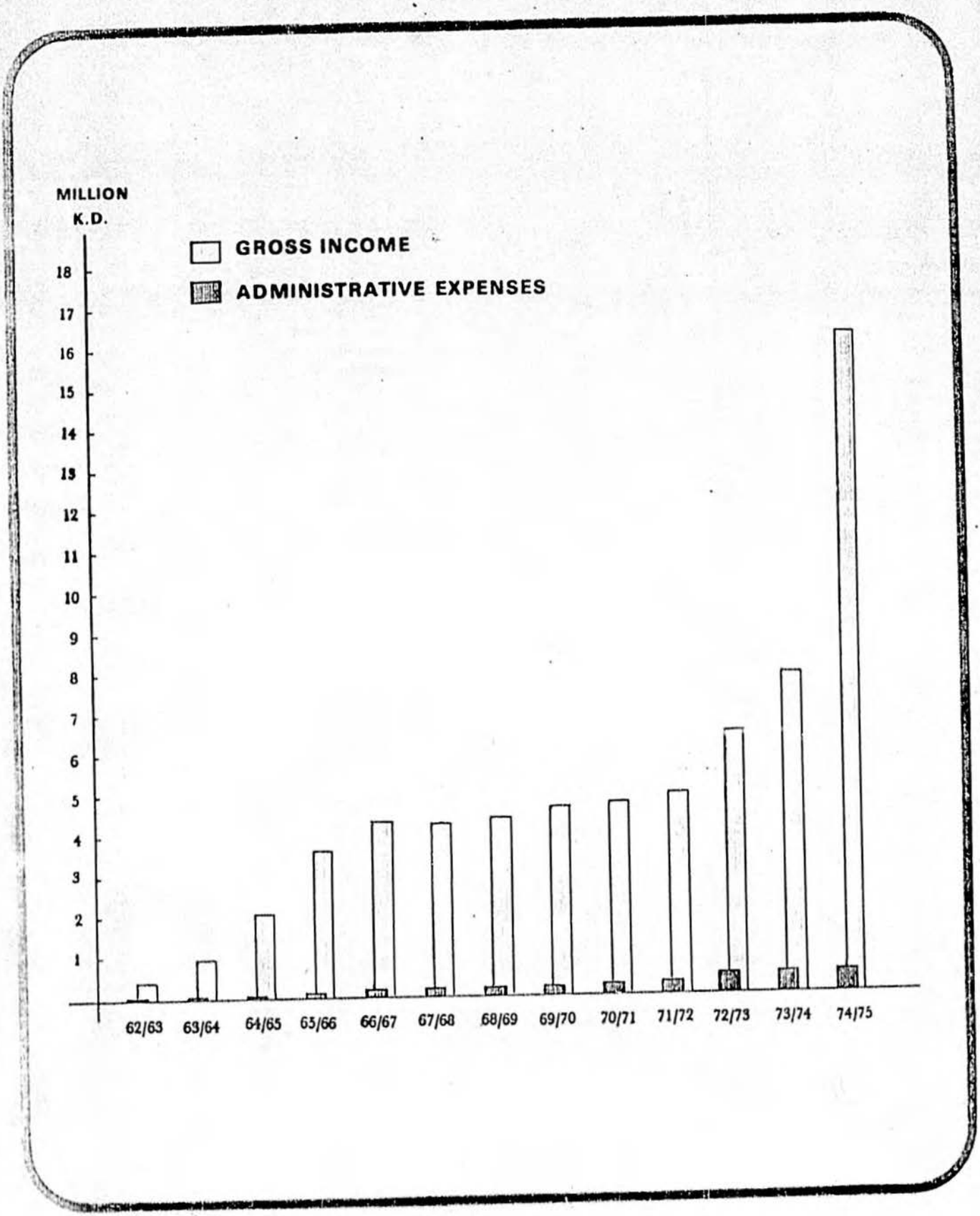
MILLION
K.D.
GROSS INCOME
ADMINISTRATIVE EXPENSES
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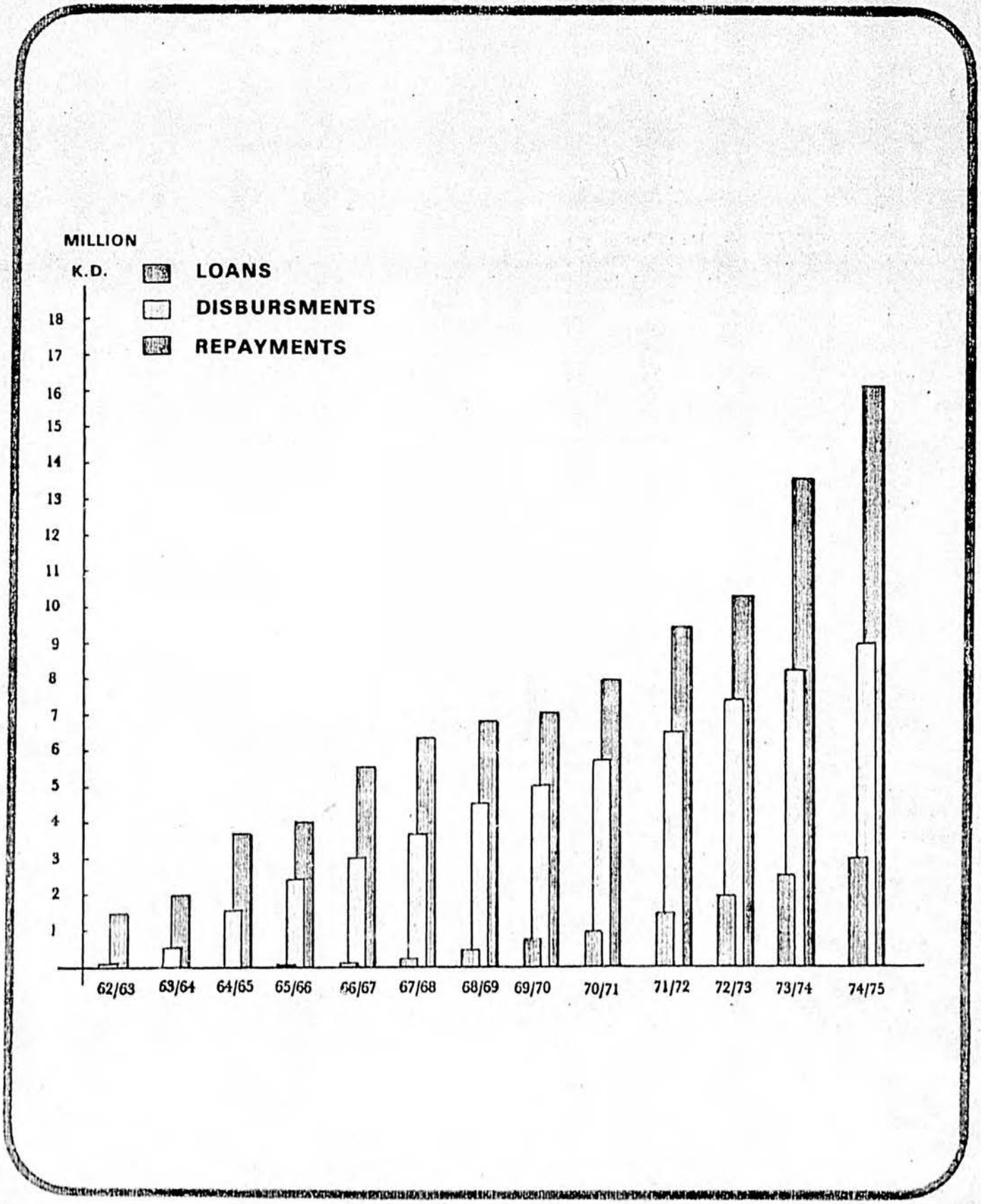
MILLION
K.D.
LOANS
DISBURSMENTS
REPAYMENTS
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The Chairman and Members of the Board of Directors,
Kuwait Fund for Arab Economic Development
Kuwait.

In our opinion, the accompanying Balance Sheet and the related Statements of Income and Expenditure and General Reserve present fairly the financial position of KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT (A Kuwaiti Independent Public Institution) at March 31, 1975, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year. Our examination of these statements was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Kuwait, April 28, 1975.

Talal Abu-Ghazaleh
(Licence No.36)
of TALAL ABU-GHAZALEH & CO.

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KUWAIT

KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

LAW AND CHARTER

LAW AND CHARTER

LAW No.25 (1974) FOR THE REORGANIZATION OF THE KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

We, Jaber Al-Ahmed Al-Jaber Al-Sabah, Deputy Amir and Crown Prince of the State of Kuwait,

Having considered Article 61 and Article 65 of the Constitution;

And Law No.35 (1961) for the Establishment of the Kuwait Fund for Arab Economic Development, as amended by Law No.9 (1963) and Law No.64 (1966);

Hereby assent to and enact the Law passed by the National Assembly and set forth herein below:-

Article 1

The Kuwait Fund for Arab Economic Development, hereinafter called the Fund, shall be a public corporation with an independent legal personality under the supervision of the Prime Minister who shall be the Chairman of its Board of Directors.

Article 2

The purpose of the Fund is to assist Arab States and Developing States in developing their economies and, in particular, to provide such States with loans for the implementation of their development programmes, in accordance with the provisions of a Charter to be made by Order of the Prime Minister.

Article 3

(a) The capital of the Fund shall be one thousand million Kuwaiti Dinars.

(b) An amount of four hundred million Kuwaiti Dinars of the said capital shall be paid out of Government reserves by transfers

made from time to time according to the needs of the Fund.

(c) The remaining part of the Fund's capital amounting to six hundred million Kuwaiti Dinars shall be paid out of the public revenues of the State by the appropriation of a percentage of the said revenues annually.

The Law enacting the State Budget shall determine in each year the percentage of public revenues to be appropriated for payment of the aforesaid part of the capital.

Article 4

The Fund may borrow and issue bonds subject to the limit of twice the amount of its capital and reserves in accordance with such terms and conditions as may be determined by the Prime Minister upon the recommendation of the Board of Directors.

Article 5

The Fund shall be administered by a Board of Directors in accordance with the Charter.

Article 6

The Prime Minister shall lay down the Charter of the Fund, which shall in particular provide for the composition of the Board of Directors and its functions, regulate the technical and administrative work of the Fund and the manner of preparing its budget; and prescribe such other procedures as may be necessary for the proper conduct of the affairs of the Fund.

Article 7

The Prime Minister may delegate all or part of his powers under this law to the Minister of Finance and Oil. *

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* Wherever reference is made to "The Minister of Finance and Oil" in the Fund's Law or Charter, it should read now "the Minister of Finance"

Article 8

Law No.35 (1961) for the Establishment of the Kuwait Fund for Arab Economic Development is hereby repealed. However, all Orders made for its implementation not in conflict with the provisions of this Law shall remain in force until superseded by new orders.

Article 9

The Prime Minister and the Minister of Finance and Oil shall implement this Law which shall take effect from the date of its publication in the Official Gazette.

Deputy Amir of the State of Kuwait
Jaber Al-Ahmed Al-Jaber Al-Sabah

Given at Al-Sif Palace on 27 Jumada Al-Thani 1394 A.H.
corresponding to 17 July, 1974 A.D.

ORDER OF THE PRIME MINISTER FOR THE IMPLEMENTATION OF LAW No.25 (1974) FOR THE REORGANIZATION OF THE KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

The Prime Minister,

Having considered Law No.25 (1975) for the Reorganization of the Kuwait Fund for Arab Economic Development.,
Hereby makes the following Order:-

Article 1

The Kuwait Fund for Arab Economic Development shall operate in accordance with the provisions of the Charter attached hereto.

Article 2

The Order of the Minister of Finance and Oil laying down the Charter for the Kuwait Fund for Arab Economic Development and published in the Official Gazette No.423 dated April 14, 1963 is hereby repealed.

Article 3

The Board of Directors of the Kuwait Fund for Arab Economic Development shall implement this Order which shall take effect from the date of its publication in the Official Gazette.

Prime Minister

Given on 2nd Dhùl Hijjah, 1394 A.H.
corresponding to 22nd December, 1974 A.D.

CHARTER OF THE KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT

CHAPTER ONE

GENERAL PROVISIONS

Article 1

The Kuwait Fund for Arab Economic Development, hereinafter called the Fund, is a Kuwaiti Public Corporation with an independent legal personality as well as financial and administrative autonomy under the supervision of the Prime Minister who shall be the Chairman of its Board of Directors.

Article 2

The purpose of the Fund is to assist Arab and other developing States in developing their economies and, in particular, to provide such States with loans for the implementation of their development programmes, in accordance with the provisions of this Charter.

Article 3

The capital of the Fund is one thousand million Kuwaiti Dinars.

Article 4

The principal office of the Fund shall be located in the City of Kuwait.

CHAPTER TWO
THE ADMINISTRATION OF THE FUND

Article 5

The Fund shall be administered by a Board of Directors composed of the Prime Minister, as Chairman, and eight other Kuwaiti members of recognized competence appointed by the Prime Minister for a term of two years subject to renewal.

In the event that the office of a member shall become vacant, a new member shall be appointed to hold office for the remainder of the term of his predecessor.

The Director-General of the Fund shall attend the meetings of the Board of Directors and participate in its deliberations but shall not be entitled to vote.

The Chairman may designate a member of the Board of Directors to preside over a meeting of the Board of Directors in his absence.

Article 6

The Chairman of the Board of Directors shall have the authority to sign agreements whereby the Fund lends or borrows money, as well as any bonds issued by the Fund. The Chairman may delegate such authority to the Director-General.

Article 7

The Board of Directors shall be the highest authority of the Fund. It shall have the power to determine the general policy of the Fund for the achievement of its objectives and shall, in particular, have the power to:-

(a) consider the recommendations submitted by the Director-General concerning proposed loans and other forms of assistance to Arab and other developing States and make the appropriate decisions;

(b) determine, subject to the provisions of this Charter, the form and terms for the participation of the Fund in the development projects and programmes of Arab and other developing States;

(c) approve the amounts of loans and other types of assistance;

(d) determine the general policy of investments by the Fund and the forms of such investments. The Board of Directors may delegate its powers in this respect to the Director-General;

(e) authorize the borrowings of the Fund and determine the amounts and terms of such borrowings;

(f) lay down administrative and financial regulations for the Fund and supervise their implementation;

(g) approve the proposed administrative budget and the closing account of the Fund;

(h) appoint the Fund auditors and determine their remuneration.

Article 8

The Board of Directors shall hold at least four meetings annually. Meetings shall be held at the invitation of the Chairman or the Director-General. A quorum for any meeting of the Board of Directors shall be a majority of the members. Unless otherwise provided in this Charter, resolutions of the Board of Directors shall be adopted by a simple majority of the votes of members present. In the event of an equal division of votes, the vote of the Chairman shall be deemed a casting vote.

Article 9

The Board of Directors may from time to time appoint sub-committees from among its members to study such matters as may be referred to them and submit their recommendations to the Board. Each sub-committee shall elect a Chairman from among its members.

Article 10

The resolutions of the Board of Directors approving loans and grants, as well as the administrative budget and the closing account shall be subject to confirmation by the Chairman.

Article 11

The Chairman of the Board of Directors shall appoint the Director-General of the Fund and one or more Deputies upon the recommendation of the Board of Directors. The appointment of other staff of the Fund shall be made in accordance with the staff regulations to be laid down by the Board of Directors.

Article 12

The Director-General shall have the direct responsibility for all administrative, financial and technical matters in the Fund. He shall represent the Fund before the Courts of Law and in relation to third parties. His functions shall, in particular, include the following:—

(a) implementation of the resolutions of the Board of Directors;
(b) preparation and submission to the Board of Directors of the proposed administrative budget and the closing account;
(c) authorization of expenditures within the limits of the administrative budget;
(d) submission of an annual report to the Board of Directors on the progress of work in the Fund; such report shall include financial statements certified by auditors and a detailed account of the activities of the Fund during the preceding financial year;
(e) receipt of applications for loans and financial and technical assistance; appraising such applications and submitting appropriate recommendations thereon to the Board of Directors;
(f) implementation of loan and other agreements for the provision of assistance; and
(g) undertaking such other tasks as may be entrusted to him by the Board of Directors in conformity with the provisions of this Charter.

The Director-General shall be assisted by one or more Deputies in carrying out his duties. The senior Deputy present shall act for the Director-General in his absence.

CHAPTER THREE

OPERATIONS OF THE FUND

Article 13

The Fund may assist Arab and other developing States in implementing development projects and programmes by making loans to such states or to corporate entities which are under the control of such states or which are subjects of, or constitute joint ventures among such states, provided that the objectives of such corporate entities are not purely limited to the making of profit. The Fund may also provide assistance by issuing guarantees for the obligations of such states or corporate entities, or through any other means which the Board of Directors may consider appropriate.

Article 14

The Fund may not finance by means of a loan more than 50% of the total costs of any project or programme. Notwithstanding this provision, the Board of Directors may, by a majority of two-thirds of the members present, approve loans in amounts exceeding the aforesaid limit in exceptional cases when the necessary financing for a vital project or programme cannot otherwise be obtained on reasonable terms.

Article 15

The loans made by the Fund shall be for the purpose of financ-

ing, exclusively, all or part of the foreign exchange costs of projects or programmes. However, in exceptional cases where sufficient justification exists, the Fund may, pursuant to a decision of the Board of Directors by a majority of two-thirds of the members present, participate in financing the local component of the cost of such projects or programmes.

Article 16

The Kuwaiti Dinar shall be the unit of account in all operations of the Fund. All loans and other forms of financial assistance made by the Fund shall be paid and repaid, as the case may be, in Kuwaiti Dinars on the basis of the gold parity of the Dinar as specified in the Special Agreement with the International Monetary Fund at the time of signing the agreement for the loan or other type of financial assistance.

Article 17

Each loan agreement shall provide for the payment to the Fund, in addition to the interest charged, if any, of a service charge of one-half of one percent (0.5%) annually on the amounts withdrawn from the loan and outstanding, to cover administrative expenses and other costs incurred in the execution of the loan agreement.

Article 18

All loan agreements between the Fund and the borrowers shall include the following:-

(a) financial clauses specifying the duration allowed and conditions for withdrawal of proceeds of the loan, and the dates and conditions for the repayment of the principal thereof and payment of interest, if any, and other charges on the loan;
(b) an undertaking by the borrower to furnish sufficient information to the Fund on the progress of work on the project financed, starting from the date of signature of the loan agreement until the loan is fully repaid.
(c) an undertaking by the borrower to afford all the necessary facilities to representatives of the Fund to enable them to follow up the progress of the project financed;
(d) provisions setting out arrangements for ensuring that the amounts withdrawn from the loan shall be used exclusively for financing expenditures on the project financed and only as such expenditures are actually incurred;
(e) an undertaking that no other external debt shall have priority over the loan of the Fund or the interest or other charges thereon by way of a lien on the assets of the borrower, except within such limits as the Fund may accept.
(f) an undertaking to exempt all transactions, assets and income of the Fund in the recipient state from all taxes, dues and other impositions;
(g) an undertaking from the monetary or any other competent authority in the recipient state to facilitate all the financial operations of the Fund and, in particular, to lift all foreign exchange restrictions on direct and indirect transfers arising out of the loan agreement;
(h) an undertaking to consider all Fund documents, records, correspondence and similar material, as confidential, and to accord the Fund full immunity from censorship and inspection of printed matters; and
(i) an undertaking to exempt all the assets and income of the Fund from nationalization, confiscation and seizure.

Where the loan is made to an entity other than the recipient state, the undertakings set out in paragraphs (f), (g), (h) and (i) of this Article shall be incorporated in a Guarantee Agreement to be concluded between the Fund and the Government of the State guaranteeing the loan.

Article 19

The Fund may require, depending on the nature of each transaction, additional guarantees other than those provided for in the preceding Article. and may accept guarantees made by third parties including those of national, regional and international financial institutions.

Article 20

In considering loan applications the Fund shall be guided by the recognized principles of development finance including, in particular, the following:

(a) The degree of importance of the project or programme for which the loan is requested and its priority rating in relation to other projects or programmes;
(b) The completeness and accuracy of the cost estimates for the project or programme;
(c) The adequacy of the economic and technical evaluation of the project;
(d) Ascertainment of the availability of the funds necessary, in addition to the financing to be provided by the Fund, for the execution and completion of the project or programme;
(e) The solvency of the applicant and the guarantor, if any.

Article 21

All loan agreements between the Fund and the borrowers shall be made in the Arabic language.

Article 22

The Fund shall not make grants to any beneficiaries except against its accumulated net profits.

Article 23

The Fund may borrow money, issue bonds and give guarantees within the limit of twice the amount of its capital and reserves, in

accordance with such terms and conditions as may be determined by the Prime Minister upon the recommendation of the Board of Directors.

CHAPTER FOUR
FINANCIAL PROVISIONS

Article 24

The financial year of the Fund shall begin on the first day of April and end on the last day of March of the following year.

Article 25

The Fund shall have an administrative budget comprising its income and current expenditures and shall prepare a closing account in respect of such income and expenditures. The Director-General shall submit the draft administrative budget to the Board of Directors not later than two months before the end of each financial year.

Article 26

The Fund shall prepare a Balance Sheet, an Income and Expenditure Statement and a Reserve Account. The said financial statements shall be certified by auditors and submitted to the Board of Directors, together with the Closing Account and the Annual Report on the activities of the Fund, not later than June 30 of each year.

Article 27

The Fund shall keep proper books of accounts to show a true and fair view of the state of affairs of the Fund and explain its transactions. The Auditors' report shall be submitted to the Board of Directors for consideration and approval.

Article 28

Without prejudice to the provisions of Article 22 of this Charter, net profits of the Fund shall be credited to a reserve account until reserves shall become equal to twenty percent (20%) of the capital of the Fund. Thereafter, net profits shall be added to the capital of the Fund provided however, that the reserves shall always remain equal to twenty percent of the capital.

CHAPTER FIVE
MISCELLANEOUS PROVISIONS

Article 29

The Prime Minister may delegate all or part of his powers under this Charter to the Minister of Finance and Oil.

Article 30

This Charter may be amended by a decision of the Prime Minister upon the recommendation of the Board of Directors.

PLEASE NOTE: THE PRECEDING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT.

Institution:	Fondo de Inversiones de Venezuela
Location:	Caracas, Venezuela
Size:	12/31/75
Assets:	BS 22,470,317,537 (1 Bolivar (BS) = U. S. $0.233)
Capital:	BS 20,532,175,000
Purpose:	Fund established by Presidential decree in June 1974 following OPEC's increase in oil prices and consequent increase in Venezuelan government reserves. Stated purposes are fourfold: (1) to create a professionally managed reservoir for public funds that would be kept out of domestic money supply until needed, thereby avoiding inflationary pressures caused by over-rapid money supply growth; (2) to invest in external capital markets funds not immediately needed in Venezuela; (3) to assure a rational and diversified internal investment program designed to reduce Venezuela's dependence on oil revenues; (4) to generate economic growth that creates full employment, redistributes national income and encourages technological independence.
Source of Funds:	Yearly allocation of oil revenues, the size of which is determined at the highest level of government and approved by President. Allocations in 1974 and 1975 aggregated slightly in excess of U. S. $5 billion.
Management Structure:	Fund operations overseen by General Assembly (consisting of State Ministers and high level government officials) which has power to dictate policy. Major policy directives typically originate from high level political sources and the Fund's internal Executive Directorate (2 internal and 2 external) and are ratified by Assembly. President of Fund (State Minister) is crossroads for policy and routine management operations. Major investment decisions made by Executive Directorate and all external investments discussed at senior management level committee meetings.
Management of Funds:	Internal staff divided into 3 groups by function: International Financial Group (investments in external markets); International Financial Cooperation Group (analysis and monitoring of loans to International and non-Venezuelan Gcvernment Agencies); National Investment Group (review and monitoring of debt and equity investments in Venezuelan entities). All groups have specialized sub-groups.

DATE August 24, 1976

MEMORANDUM FOR P.A. Downey

Re: Fondo de Inversiones de Venezuela (FIV)

FIV was established by Presidential decree in June 1974 following the sharp rise in oil prices instigated by OPEC (of which Venezuela is a founding member) and a consequent leap in revenues to the Venezuelan Government. The stated purposes for its creation were fourfold:

1. To create a reservoir for public funds that would be managed professionally and kept out of internal money supply until needed. A major thrust was to avoid the inflationary impact of precipitous increases in money supply.

2. To invest in external capital markets funds which are not immediately needed in Venezuela.

3. To assure a rational and diversified internal investment program designed to move the country away from a captive dependence on oil (28% of GNP and 70% of government revenues in 1973).

4. To generate economic growth that creates full employment, redistributes national income and encourages technological independence.

At present, the government (which is the owner of all hydrocarbon properties in Venezuela) sets a yearly allocation of oil revenues to FIV. It is my understanding that the size of this allocation is determined at the highest levels of government and approved by the President of the Republic as it has clear political overtones. In 1974 and 1975, these allocations aggregated slightly in excess of $5 billion.

The structure of FIV is set out in Appendix A.

The General Assembly is a political body comprised of eight State Ministers, the President of the Central Bank, etc., that routinely affirms the operations of FIV, although it does have the power to dictate policy. In reality, I understand that major policy directives come from the National Executive and the Executive Directorate and are then ratified as appropriate by the General Assembly.

The Executive Directorate is comprised of two internal and two external directors and has substantial influence in the formulation of major policy matters. It does not generally involve itself in day-to-day operations, although major investment decisions, for example, are discussed at this level.

The Presidency is the crossroads of policy and routine operations. The current President, who is a Minister of State, is highly political and involves himself principally in determining policy in conjunction with the Executive Directorate and the National Executive; he does, however, oversee and involve himself to a degree in daily operations.

The management of FIV's resources is carried out by the three financial groups (the International Financial Group,International Financial Cooperation Group and National Investment Group) under the General Manager, although they must have the approval of senior level committees (External Investment Committee, Committee for International Financial Cooperation, Industrial Committee and National Investment Committee) prior to acting. For example, an offer to co-manage a bond issue is studied and processed by the International Financial Group and if attractive to them, recommended for acceptance by the External Investment Committee at its weekly meeting. If the recommendation is accepted, no further authorization is required.

The International Financial Group is responsible for FIV's investment in external markets. To date,investments have been largely in short-term bank deposits with a smattering of intermediate-term bonds. The department itself is broken down into sub-departments (eg. short-term investments and bonds) where primary analysis of investment opportunities begins. The level of financial expertise in this group is pitifully low in general. The result has been to shy away from new investment opportunities.

The International Financial Cooperation Group is responsible for the analysis of and monitoring of loans to international and non-Venezuelan government agencies such as the World Bank, Bank of Jamaica and Central Bank of Peru. Although requests for such loans may occasionally come to FIV on purely commercial terms it is my impression that this area is more of a political treasure chest for the President of the Republic which he taps when some economic/political leverage is needed.

The National Investment Group is responsible for reviewing and monitoring debt and equity investments in Venezuelan entities (to date , exclusively government owned or controlled entities). Again, this is a highly political area and although requests do come directly to FIV for funds, in general political decisions are taken at higher levels in the government as to who is to be financed, how and in what amounts - those results are then communicated to this group for formal processing.

In my view, the structural concept of FIV is a good one. Unfortunately, certain predictable problems have arisen (most of which could be corrected) that have led to inefficiencies, mistakes and a generally mediocre image in the international community. For one, FIV has become highly politicized (it has fought particularly hard to establish itself as a peer with the Ministry of Finance and the Central Bank in the economic decision-making process of the Republic). This has necessarily led to a less independent entity which can often take painfully long to resolve issues with potitical overtones which are of major importance to FIV. For example, the possibility of retaining an advisor a la SAMA was debated for over a year. A proposed merchant banking affiliation/subsidiary in London has now been discussed for at least 14 months. An excessive bureaucratic rigidity has also emerged internally. For example, the necessity to clear every external investment proposal with a senior level committee which meets only once a week has resulted in a lost opportunity syndrome (i.e. a CD offer will not be held firm for five days for the convenience of the committee). This problem results from another major problem area - an inexperienced, financially unsophisticated staff. FIV has refused, again for political reasons, to recruit non-Venezuelan staff or to bring in advisors. As noted, the result has been a reluctance to expand investment into areas of new, often higher yielding investments which are not understood by the staff. This is a vicious circle which has not only disillusioned many financial intermediaries (hence fewer offers) but has created a negative image in Venezuela to such a degree that motivated, imaginative people simply will not join.

To give you a rough idea of the portfolio breakdown at Dec. 31, 1975, approximately $5.2 billion in assets were divided as follow:

	($millions)
Cash	.5
Deposits	4,023
Bonds	79
Loans(1)	907
Trust funds (2)	91
Equity Investments	49.5
Accrued interest	84
Other	.9

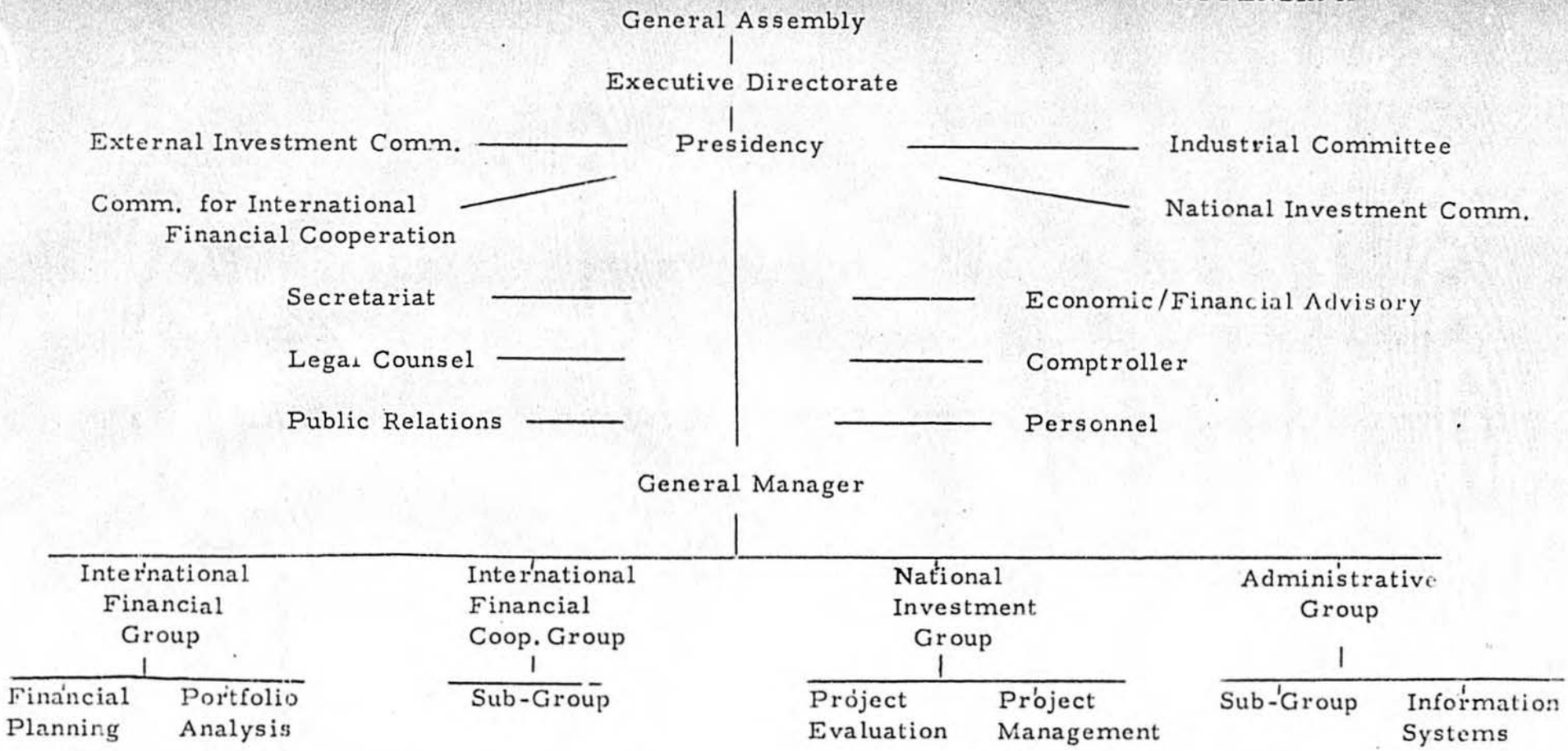
(1) To international and non-Venezuelan Government agencies and to Venezuelan entities.

(2) Administered by the Interamerican Development Bank for development of projects and programs in member countries.

Jeffrey L. Berenson

CC: N. MacEwan
C. Fuhrmann

APPENDIX A


General Assembly
Executive Directorate
External Investment Comm.
Presidency
Industrial Committee
Comm. for International Financial Cooperation
National Investment Comm.
Secretariat
Economic/Financial Advisory
Legal Counsel
Comptroller
Public Relations
Personnel
General Manager
International Financial Group
International Financial Coop. Group
National Investment Group
Administrative Group
Financial Planning
Portfolio Analysis
Sub-Group
Project Evaluation
Project Management
Sub-Group
Information Systems

Publications & Information

Following

SCOMM

#9:55

ALASKA

REVIEW OF

BUSINESS AND ECONOMIC

CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH, Jan. 1976, Vol. XIII, No. 1

ALASKA'S GROWTH TO 1990

ECONOMIC MODELLING AND POLICY ANALYSIS FOR A RAPIDLY CHANGING NORTHERN FRONTIER REGION

THE MAN-IN-THE-ARCTIC PROGRAM

The U.S. North—Alaska—and its adjacent seas are now viewed as the nation's greatest storehouse of the energy resources required to meet national needs and policy goals during the next decade or more. But rapid development of Alaska's oil and gas resources, while critical to national energy policy, potentially conflicts with other national as well as state values and objectives, including environmental preservation, social and economic equity, and local self-determination. This in essence outlines the major events and goals that define the setting, purposes, and significance of the Man-in-the-Arctic Program (MAP). The basic reason for the program is that scientifically grounded policy-oriented research is needed to help guide public and private decision-makers at the state and national levels. MAP is thus designed both as a program of basic research to contribute to the development and testing of social science theories and methods, and as a program of policy research and applications to assist in dealing with current social and economic problems of northern development.

The first phase of the Man-in-the-Arctic Program has been carried out by the University of Alaska's Institute of Social, Economic and Government Research under grant funding from the National Science Foundation, with support from the State of Alaska and other sources. This phase, which is now nearing completion, has consisted of a series of basic economic and demographic studies, which have been used to construct computer models to simulate the behavior of the Alaska economy. The models have been used to make projections of the various growth paths which Alaska might follow as a result of alternative policy choices. The models have been designed specifically to trace out the implications of different policy actions and of changes in outside forces. On the basis of information concerning factors such as (1) location, size, and timing of petroleum leasing, development, and production; (2) petroleum prices; and (3) state fiscal policies, the models project through 1990 such things as the growth in gross state product, personal income, industry output and employment, and population. Projections of economic activity and population are made on both a statewide and regional basis.

A second phase of the Man-in-the-Arctic Program has been designed to build upon and extend the results of the first phase of MAP. The Phase II research will expand the capacity for detailed policy analysis—particularly concerning the *distribution* of the economic and social benefits and costs produced by energy development in Alaska. Further, it will incorporate community studies dealing with prospective patterns of urbanization and human settlement. The community studies will also examine community responses to the actual and/or perceived impacts of Alaska's future development. Phase II will extend the MAP demographic and manpower studies, and they will provide a major link between the more detailed economic models and the community studies.

STRUCTURE OF THE MAP MODELS

Economic Model

The structure of the MAP economic model is illustrated in simplified form in Figure 1. Although

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Victor Fischer—Director of the Institute of Sorial, Economic and Government Research
Institute Editor: Ronald Crowe Author: David T. Kresge

The author would like to acknowledge the valuable help of Thomas A. Morehouse (Deputy Director, Division of Policy Development and Planning, State of Alaska) in the preparation of this article.

separate models have been developed for statewide and regional analysis, the basic structure is the same in both cases. In very general terms, the model proceeds sequentially to estimate industrial output, industry employment, wages and salaries, and finally real disposable personal income. However, the output of certain industries is itself dependent on the level of personal income. Because of these interrelationships, output and income are simultaneously determined in the model.

It should be stressed that the MAP models are specifically designed to analyze the long-run growth path of the Alaska economy. They are not appropriate, without further modification, for studying short-term cyclical fluctuations or for making detailed short-run forecasts. There are many factors such as seasonality, salmon cycles, and supply bottlenecks which are important in the short run but which tend to average out over the long run. Such factors can appropriately be omitted from a growth model even though they may be among the key elements in a short-term forecasting model.

The determination of industrial output is a key element in the model, and determining relationships vary significantly from one industrial sector to another.

The output of the petroleum industry is determined outside the economic model as part of petroleum development scenarios, which are comprehensive sets of assumptions specifying alternative patterns of petroleum

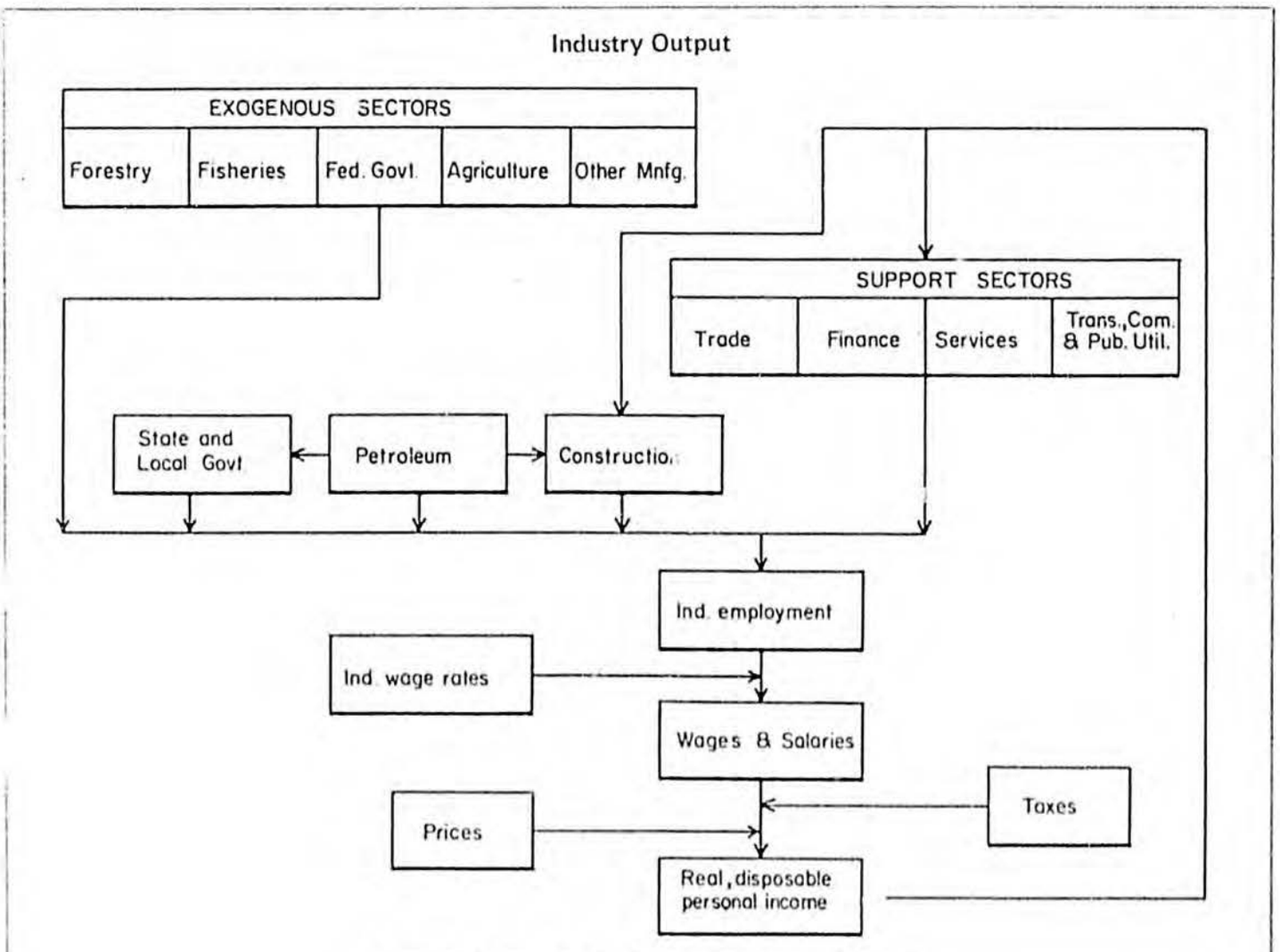


Figure 1. Structure of the MAP Economic Model.

development. In contrast, the output of the support industries (trade, finance, services, transportation, communication, and public utilities) is produced to meet local demands and thus responds to changes in the level of economic activity in Alaska. To reflect this, support sector output is generally made a function of Alaska real disposable personal income.

The output of the construction industry is determined by a combination of internal and external factors. Part of construction activity is designed to supply the needs of the expanding Alaska economy. As in the support sector, this portion of construction output is made a function of real disposable personal income. Over the foreseeable future, there will, in addition, be construction activity involved in building pipelines, terminals, and other facilities required for petroleum production. This portion of construction output is exogenously determined in accordance with the relevant petroleum development scenarios.

Employment and output in the state and local government sector is determined by the level of state and local expenditures, which are, in turn, a function of available revenues. To be precise, expenditures are equal to total revenues minus that portion of petroleum revenues which is assumed to be saved and placed into an investment trust fund. The output of state and local government is thus responsive both to changes in the level of economic activity, which affect general revenues, and to changes in petroleum production, which affect petroleum revenues. The remaining industrial sectors are assumed to have their output determined by exogenous factors. These factors include such things as prices on world markets, demand for export commodities, supplies of natural resources, and policy decisions of the Federal Government.

Once output has been determined in each of the major industrial sectors, the next step in the model is to determine industry employment. In general, a statistical relationship derived from the Alaska data is used to project industry employment as a function of industry output. Industry wage rates are then calculated as a function of projected wage rates in the U.S. and/or relative prices in Alaska. The projections of industry employment and wage rates are then combined to estimate wages and salaries.

Wages and salaries are generally the largest component of personal income, and this is particularly true in Alaska. Sources of income other than wages and salaries are a much smaller component of personal income in Alaska than in the rest of the U.S. Total personal income in Alaska is estimated as a function of total wages and salaries and disposable personal income is estimated as a function of personal income.

Since virtually all consumer goods are imported from the "Lower 48" and wage rates in Alaska are closely related to comparable wages in the U.S., relative prices in Alaska are projected as a function of the U.S. consumer price index. As the Alaska economy expands, there will be a certain amount of import substitution and economies of scale that will tend to lower costs in some industries. As a result, prices in Alaska over the long run are expected to increase somewhat less rapidly than prices in the rest of the U.S. The price and personal income projections are combined to estimate Alaska real disposable personal income in terms of constant 1967 U.S. prices.

As shown by the feedback loop in Figure 1, real disposable personal income is a principal determinant of output in the support sector and in the construction industry. Thus, anything which affects personal income will affect support sector and construction output, and anything which affects support sector and construction output will affect personal income. Industrial output and personal income are thus simultaneously determined in the model.

Although the statewide and regional economic models have similar basic structures, the regional model includes somewhat greater industry detail and does, of course, take into account differences in regional activity patterns. In particular, the behavioral relationships for the Anchorage and Fairbanks regions are quite different from those for the other regions (the model uses seven regions in all, see Figure 2). The statewide model, though less detailed than the regional model, is

Figure 2: Seven Alaska Geographic Regions

nonetheless adequate for certain types of aggregate analysis and has the advantage of being easier to operate.

Demographic Model

Alaska's future population growth will result from two distinct factors: (1) net migration into the state and (2) natural increase, or the excess of births over deaths. The factors determining net migration, births, and deaths are quite different, and therefore, the MAP demographic model treats these events separately. On the other hand, the events are linked through the

age-sex distribution of the state's population, which is strongly influenced by net migration and which in turn influences births and deaths.

The basic structure of the MAP demographic model is illustrated in Figure 3. As shown there, net migration to Alaska is determined by the employment opportunities and by real per capita income in Alaska relative to the U.S. average. In making projections, these factors are among the outputs produced by the economic model. Estimates of births and deaths are derived from information concerning the age-sex distribution of the population, fertility rates, and mortality rates. The estimates of births and deaths are used to calculate natural increase, and this is combined with the estimate of net migration to determine the change in Alaska's civilian population. The level of military personnel and military dependents is assumed to be determined by exogenous factors.

At present, the demographic model uses the estimate of state population to derive estimates of regional populations. The state population is allocated

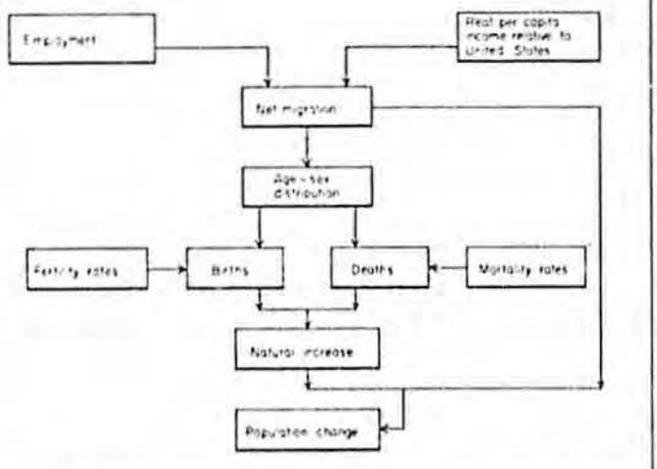


Figure 3. Structure of the MAP Demographic Model.

to each of the seven regions on the basis of the projected employment growth in the region. The regional population model thus requires as inputs the projections of regional employment which are generated by the regional economic model.

PROJECTIONS OF ALASKA'S GROWTH TO 1990

Implementation Procedures

The economic and demographic models are made operational by empirically determining the quantitative relationships involved. In general, the relationships are estimated through statistical analysis of the economic and demographic data for Alaska. As part of the MAP research, a set of economic accounts has been compiled which contains data on gross state product, wages and salaries, employment, prices, population, personal income, and government budgets. The statewide data set covers the period from 1961 to the present and the regional data set goes from 1965 to the present.

In making projections of Alaska's prospective growth, it is assumed in most cases that the behavioral relationships empirically observed in the recent past will continue to apply in the future. There are, however, several areas in which there are strong reasons for expecting future behavior patterns to differ from those in the past. In these instances, the relationships used in making the projections incorporate the anticipated structural changes. A particularly important example of this is in the area of state fiscal policy, which is discussed below.

Once the quantitative relationships in the models have been specified, the major remaining step in preparation for making the projections is to set values for the exogenous variables. Those variables represent the factors influencing Alaska's growth, which are either determined by outside forces or which are the result of policy decisions. In the present Alaskan situation, the most important exogenous factors are the pattern of future petroleum development, state fiscal policies, and potential growth in the resource-based industries. Each of these is discussed separately below; other exogenous factors are assumed to maintain the *status quo* either by remaining constant, as in the case of federal employment in Alaska, or by continuing past trends, as in the case of projected inflation in the U.S. as a whole.

Petroleum Scenarios

Over the foreseeable future, the pace at which Alaska's petroleum resources are developed is likely to be the primary determinant of the state's economic growth. There are, in addition to Prudhoe Bay, a number of promising areas that can be opened up for petroleum exploration and development. Some such developments are almost certain to occur since Alaska plays a central role in national policies to meet U.S. energy needs. There are obviously a very large number of specific actions which might be taken with regard to petroleum leasing, exploration, and development. For purposes of analysis, these individual actions are brought together into so-called "petroleum development scenarios," which are comprehensive, internally consistent sets of actions. The purpose of the scenarios is not to predict the future developments, but to provide a systematic, quantitative basis for generating the relevant ranges for the alternative rates of petroleum development. The projections to 1990 have been carried out using three alternative petroleum scenarios which were designed to reflect sets of policy actions leading to limited, accelerated, or maximum development of Alaska's petroleum resources.

1. Limited Petroleum Development. In this minimum case, present developments would be carried forward, a few additional fields would be opened near

existing areas, and the federal OCS (outer continental shelf) leasing program would be limited to the Gulf of Alaska. Some small amounts of Native corporation oil lands adjacent to the trans-Alaska pipeline would be brought into production. Total oil production, most of it from Prudhoe Bay, would reach 2 million barrels a day by 1980, over 3 million barrels in 1985, and 4 million barrels in 1990. Petroleum-related employment would be 5,000 in 1980 and 7,200 in 1990. Assuming a wellhead price of $5 per barrel, the state would receive petroleum revenues of $1.1 billion in 1980 and $1.7 billion in 1990.

2. Accelerated Petroleum Development. Under accelerated development policies, in addition to the production included in the limited case, new petroleum areas would be opened in the northwest, both onshore and offshore, and a second North Slope oil pipeline would be constructed. This would primarily result from federal leasing of oil-lands in Naval Petroleum Reserve No. 4 in northwest Alaska. As this area comes into production, Alaska's output of oil would rise to 5 million barrels a day in 1985 and to 7.7 million in 1990. Petroleum-related employment would reach nearly 12,000 in 1990 and state revenues would total $2.3 billion.

3. Maximum Petroleum Development. This scenario approximates the maximum rate of petroleum development that might plausibly occur in Alaska. Although there is some question about the technological and logistical feasibility of the scenario, the projected rate of development is comparable to that incorporated in the Federal Government's plan for "Project Independence." In addition to all of the developments in the previous scenarios, it is assumed that the Federal Government would open major new regions by leasing heavily in the Bering and the Chukchi seas. This, in turn, would necessitate construction of oil and gas pipelines running from north to south in western Alaska. Availability of the pipelines and processing facilities would then make additional leasing feasible in the new western areas for Native corporations and the state. With maximum development policies, Alaska's oil production would reach 5.2 million barrels a day in 1985 and nearly 10 million barrels in 1990. Petroleum-related employment would soar to 18,000 in 1985 and to over 23,000 in 1990. State petroleum revenues, on the other hand, would rise only moderately to $3 billion in 1990, since most of the new developments would be in Federal areas.

A critical factor in the construction of the scenarios is the assumed price of oil. The projections made using the MAP models employ three alternative prices of oil: $3, $5 and $7 per barrel at the wellhead. After taking transport costs into account, these wellhead prices correspond to refinery prices of about $7, $9, and $11 a barrel. The revenue figures cited above in presenting the scenarios are all based on a wellhead price of $5 a barrel.

Fiscal Policy

In light of enormous amounts of revenues that will be accruing to the state, and since petroleum is a nonrenewable resource, it seems likely that the state government will set aside at least some portion of petroleum revenues for use in the future. For example, some of the revenue might be placed into an investment trust fund, the interest from which would then be spent for such purposes as the promotion of Alaska's renewable resource industries. In the projections made here, it is assumed that 25 percent of recurrent petroleum revenues are saved and 50 percent of petroleum lease bonuses are saved. These savings rates are applied only after 1978 when the North Slope oil first starts to flow.

The level of total state expenditure is then determined by the revenues available and by the assumed fiscal savings rates. The distribution of the total expenditure among particular expenditure categories is assumed to be determined on the same basis as in the past. At this point in the analysis, no redistributive policy actions have been included.

Resource-Based Industries

Growth in the fisheries industry is expected to be effectively constrained by the availability of marine resources. As a result, real output in Alaska's fishing industry is projected to expand at just 1 percent a year. Likewise, the output of the forest products industry will be determined primarily by the supply of timber, which is a function of the amount of exploitable forest land and the federal policies governing allowable cut in Alaska's national forests. The forest products industry is projected to nearly double its output by 1990, but the industry growth rate declines from 6 percent in the early part of the projection period to 2.5 percent by the end. By 1990, the industry is expected to be approaching the maximum long-run sustainable yield.

Agriculture and nonpetroleum mining are the remaining resource-based industries in Alaska. While specific developments in these industries may be of local importance, their impact on the total state economy is likely to be quite minor. Because of the contraints imposed by the Alaskan climate, the availability of suitable lands and high transport cost, nonpetroleum mining and agriculture are projected to increase only slightly in the future. The growth in mining and agriculture could, of course, be much more substantial if the government should choose to subsidize the development of these industries.

1990 Projections — Statewide Model

The statewide economic model has been used to project the growth of the Alaska economy and population to 1990. This has been done for each of the three alternative petroleum development scenarios and

for each of the three different prices for oil (nine cases in all). The results for five of the cases are summarized in Figures 4 and 5 and the table of selected variables (Table 1). The five cases include the extreme cases (limited development at $3 a barrel and maximum development at $7 a barrel) and the three scenarios at $5 a barrel. Summary excerpts from the computer printout are also shown for the case of accelerated petroleum development at $5 a barrel (Table 2).

By 1990, assuming a wellhead price of $5 a barrel, the projections of Alaska personal income range from $10.5 billion under limited development to $16.1 billion under maximum development; Alaska personal income in 1973 was $2.0 billion. The corresponding projections of Alaska population are 627,000 under limited development and 908,000 under maximum development. If the extreme cases are considered, the projected population ranges from 574,000 to slightly over a million persons in 1990.

While the three scenarios produce wide differences in aggregate growth, the effect on the income of the typical household in Alaska is much less pronounced. As shown in Table 1 (and considering the scenarios at $5 a barrel) total personal income under maximum development exceeds personal income under limited development by more than 50 percent; but the difference in personal income per capita is only 6.6 percent. And when taxes and prices are taken into account, the difference in real disposable personal income per capita is just 3.4 percent. The basic reason for these results is that when income and employment increase in Alaska, migrants are attracted into the state, and the gains are spread over a larger population. Since there are no effective, or constitutional, means of preventing migration into the state, there can be only limited increases in per capita personal income.

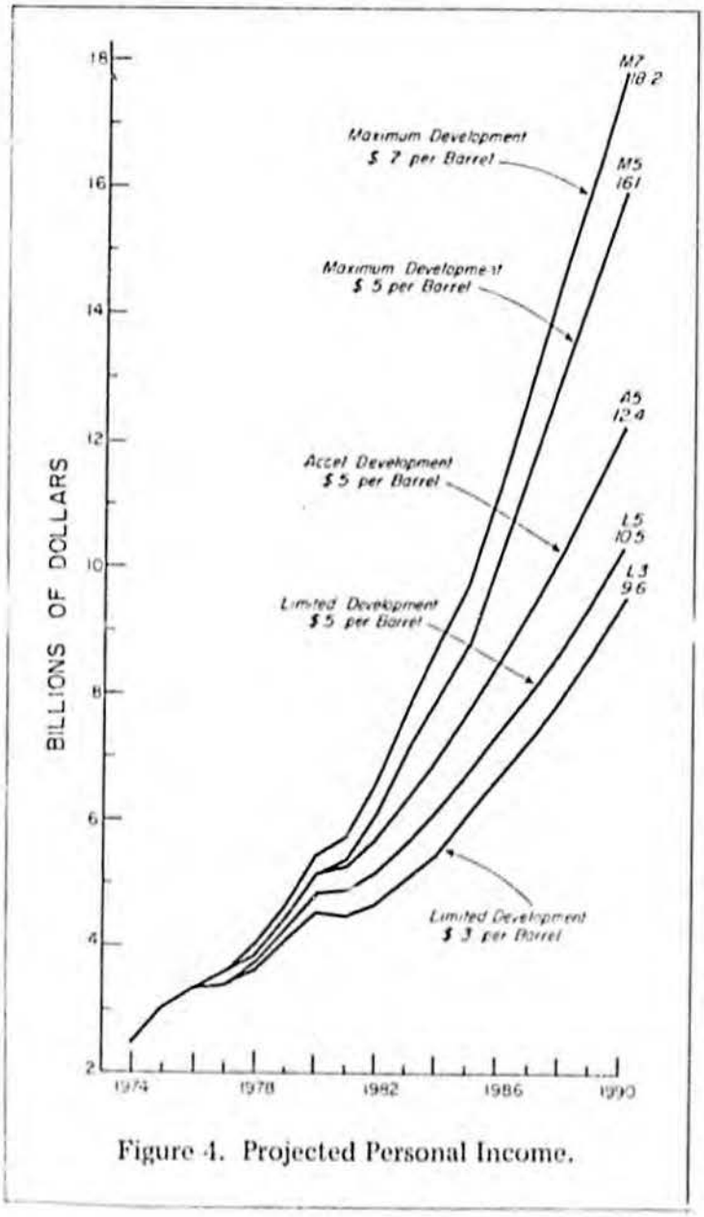


Figure 4. Projected Personal Income.

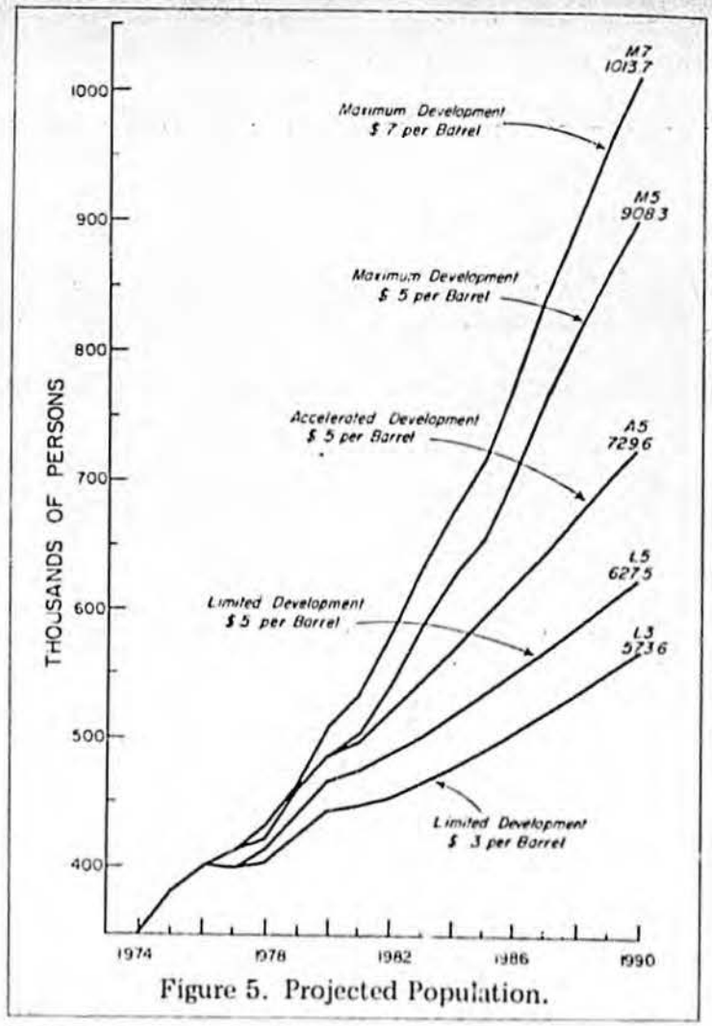


Figure 5. Projected Population.

The differences on an individual level are, however, somewhat larger when one also takes into account differences in state and local government expenditures and the associated differences in the level of public services being provided. As Table 1 shows, state and local government expenditures in 1990 are $8.3 billion under maximum development and $4.9 billion under limited development, a difference of 71 percent. On a per capita basis, the difference is smaller but still significant; it amounts to over $1,400 per person or 18 percent. If state and local government expenditures per capita are added to disposable personal income per

TABLE 1

PROJECTED 1990 VALUES FOR SELECTED VARIABLES

VARIABLES	UNITS	Limited Development		Accelerated Development	Maximum Development	
		$3 per barrel	$5 per barrel	$5 per barrel	$5 per barrel	$7 per barrel
Total Output (X)	(Millions of 1958 $)	3,920.8	4,123.4	5,728.4	10,047.2	10,550.9
Total Employment (E)	(Persons x 1,000)	274.4	301.0	356.7	465.3	528.0
Total Population (POP)	(Persons x 1,000)	573.6	627.5	729.6	908.3	1,013.7
Personal Income (PI)	(Millions of $)	9,553.2	10,461.5	12,391.5	16,136.8	18,216.1
Personal Income Per Capita (PIPC)	($)	16,654.0	16,672.2	16,983.6	17,765.9	17,970.4
Real Disposable Personal Income Per Capita (DIRPA)	(1967 $)	3,290.3	3,273.4	3,296.2	3,386.2	3,396.9
State Government Total Petroleum Sector Revenue (RP9S)	(Millions of $)	1,087.0	1,685.0	2,339.0	2,940.0	3,964.0
State-Local Government Expenditures (SLGEXP)	(Millions of $)	3,949.6	4,852.1	6,190.9	8,305.5	10,169.9
State Government General Fund Balance (GFBAL)	(Millions of $)	4,094.5	5,694.3	6,807.5	7,490.8	9,633.3
State-Local Government Expenditures Per Capita (SLGEXP/POP)	($)	6,885.6	7,732.4	8,485.3	9,144.0	10,032.5
Real Disposable Personal Income plus Real State-Local Government Expenditures Per Capita $\left(\text{DIRPA} + \frac{\text{SLGEXP/POP}}{\text{RPI}}\right)$	(1967 dollars)	5,162.9	5,376.3	5,603.9	5,873.0	6,125.3

KEY TO VARIABLES USED IN TABLES 2 AND 3.

ABBREVIATIONS	DEFINITIONS
AFF	Agriculture, Forestry, Fisheries
DIRPA	Real Disposable Personal Income Per Capita
DPI	Real Disposable Personal Income
E	Employment
E99L	Local Government Total Expenditure
E99S	State Government Total Expenditure
EC	Civilian Employment
EMOT	Employment Other than Wage and Salary Employment
FIR	Finance, Insurance, Real Estate
GFBAL	State Government General Fund Balance
GSL	State and Local Government
PI	Personal Income
PIBAR	Real Personal Income
PIPC	Personal Income Per Capita
PIRPC	Real Personal Income Per Capita
POP	Population — Total
POPC	Population — Civilian
POPM	Population — Military
POPN	Population — Native
R99L	Local Government Total Revenue
R99S	State Government Total Revenue
RINS	State Government Interest Revenue
RPI	Alaska Relative Price Index
RP9S	State Government Total Petroleum Sector Revenue
RSTL	Local Government Revenue from State Government
RTIS	State Individual Income Taxes
SLGEXP	State and Local Government Expenditures
WR	Wage Rate
WS	Wages and Salaries
X	Real Output

TABLE 2

SUMMARY OF ALASKAN STATE ECONOMIC MODEL

(Accelerated Growth with Oil at $5/Barrel)

VARIABLE X MILLIONS OF 1958 DOLLARS

	MINING	CONSTR	MANUFAC	TRAN	COMM	PUB UTIL	TRADE	FIR	SERVICE	FED GOVT	GSL	AFF	TOTAL
74	313.547	98.584	130.200	113.920	95.632	57.390	196.378	129.911	101.126	217.775	91.728	20.000	1566.189
75	313.547	136.910	135.300	132.749	97.827	71.748	235.202	153.951	119.844	217.775	113.239	26.100	1754.190
76	331.363	135.759	140.700	140.055	98.607	77.585	250.545	163.384	127.190	217.775	125.004	32.100	1840.067
77	632.400	101.203	146.100	142.742	98.885	79.767	256.223	166.867	129.902	217.775	138.032	32.500	2142.595
78	1082.890	99.673	152.800	148.416	99.459	84.438	268.277	174.245	135.647	217.775	126.189	32.900	2622.707
79	1141.472	105.583	159.400	165.127	101.046	98.669	304.255	196.153	152.707	217.775	139.396	33.300	2814.882
80	1759.721	112.692	166.300	184.397	102.713	115.919	346.555	221.718	172.616	217.775	160.416	33.700	3594.522
81	1921.317	110.018	171.900	182.186	102.530	113.897	341.661	218.770	170.320	217.775	170.204	34.000	3754.577
82	2010.435	117.499	178.100	189.138	103.101	120.296	357.090	228.055	177.551	217.775	182.540	34.200	3915.780
83	2265.122	122.801	184.400	202.246	104.131	132.658	386.457	245.664	191.264	217.775	191.719	34.600	4279.031
84	2298.600	122.788	191.300	214.439	105.039	144.493	414.081	262.156	204.109	217.775	203.563	35.000	4413.340
85	2488.753	128.045	198.500	227.874	105.990	157.897	444.849	280.450	218.355	217.775	212.820	35.300	4716.598
86	2522.587	133.415	206.400	241.717	106.921	172.092	476.890	299.421	233.130	217.775	222.366	35.400	4868.305
87	2710.086	139.333	214.700	255.958	107.833	187.091	510.201	319.044	248.429	217.775	229.364	36.000	5175.824
88	2934.672	145.836	223.900	271.036	108.753	203.396	545.835	339.994	264.730	217.775	236.077	36.400	5528.391
89	2957.884	152.312	233.300	286.222	109.636	220.244	582.083	361.202	281.248	217.775	243.267	36.800	5681.961
90	2882.564	158.185	243.700	300.137	110.410	236.049	615.604	380.746	296.470	217.775	249.462	37.200	5728.289

VARIABLE E THOUSANDS OF WAGE EARNERS

	MINING	CONSTR	MANUFAC	TRAN	COMM	PUB UTIL	TRADE	FIR	SERVICE	FED GOVT	GSL	EMOT	AFF	TOTAL
74	2.1	12.8	9.9	7.5	2.8	1.2	21.3	4.8	17.9	44.7	24.8	14.7	1.1	165.6
75	2.1	17.9	10.5	8.4	2.8	1.4	25.0	5.7	21.8	44.7	30.8	16.5	1.1	188.8
76	2.3	17.8	11.0	8.7	2.9	1.5	26.5	6.1	23.4	44.7	34.0	17.1	1.1	197.0
77	3.8	13.3	11.5	8.8	2.9	1.5	27.1	6.2	24.0	44.7	37.7	17.3	1.1	199.1
78	6.0	13.1	12.0	9.1	2.9	1.5	28.2	6.5	25.2	44.7	34.4	17.5	1.1	202..
79	6.2	14.0	12.5	9.8	2.9	1.7	31.6	7.4	28.9	44.7	38.1	18.7	1.1	217.7
80	8.9	15.0	13.0	10.6	3.0	1.9	35.6	8.4	33.4	44.7	43.9	20.3	1.1	239.9
81	9.6	14.7	13.6	10.5	3.0	1.9	35.1	8.3	32.9	44.7	46.7	20.5	1.1	242.5
82	9.9	15.7	14.1	10.8	3.0	2.0	36.6	8.7	34.5	44.7	50.2	21.2	1.1	252.4
83	10.9	16.5	14.6	11.4	3.0	2.1	39.3	9.4	37.6	44.7	52.7	22.2	1.2	265.6
84	11.1	16.5	15.1	11.9	3.0	2.2	41.8	10.1	40.6	44.7	56.1	23.1	1.2	277.3
85	11.8	17.3	15.7	12.4	3.1	2.3	44.6	10.8	43.9	44.7	58.7	24.0	1.2	290.6
86	11.9	18.1	16.2	12.9	3.1	2.5	47.5	11.6	47.4	44.7	61.4	24.9	1.2	303.6
87	12.7	18.9	16.8	13.5	3.1	2.6	50.5	12.4	51.0	44.7	63.4	25.9	1.2	316.9
88	13.5	19.9	17.5	14.0	3.2	2.8	53.7	13.3	55.0	44.7	65.3	26.9	1.2	331.0
89	13.6	20.8	18.2	14.6	3.2	2.9	57.0	14.2	59.0	44.7	67.3	27.9	1.2	344.6
90	13.3	21.7	18.9	15.1	3.2	3.0	59.9	15.0	62.7	44.7	69.1	28.7	1.2	356.7

FISCAL SUMMARY MILLIONS OF DOLLARS

	E99S	R99S	RTIS	RP9S	RINS	GFRAL	E99L	R99L	RSTL	SLGEXP
74	578.665	428.665	54.613	48.000	46.011	567.300	320.476	247.478	105.626	793.515
75	797.884	505.884	71.749	62.000	39.711	375.300	416.906	337.306	145.414	1069.375
76	952.367	745.367	93.378	236.000	26.271	243.300	490.738	430.226	170.885	1272.221
77	1167.010	967.010	106.179	416.000	17.031	118.300	551.625	505.804	205.640	1512.994
78	1104.484	1278.234	115.860	695.000	8.281	367.050	558.874	523.031	191.321	1472.037
79	1333.456	1594.206	128.515	943.000	25.693	702.800	630.304	604.564	229.811	1733.949
80	1648.291	1974.541	154.585	1205.000	49.196	1104.050	759.401	744.549	280.514	2127.174
81	1810.825	2110.075	186.904	1197.000	77.283	1478.300	898.709	885.504	305.310	2404.224
82	2127.655	2512.405	194.038	1539.000	103.481	1938.050	971.661	959.589	353.358	2745.958
83	2377.002	2907.752	214.704	1723.000	135.663	2443.799	1183.704	1074.680	389.873	3070.834
84	2661.720	3136.970	246.204	1901.000	171.066	2994.045	1240.974	1234.403	430.735	3471.959
85	2930.067	3442.067	278.694	2048.000	209.583	3581.042	1402.561	1400.166	468.209	3864.416
86	3213.448	3758.948	317.442	2182.000	250.673	4201.539	1592.086	1595.303	507.074	4298.457
87	3465.338	4028.588	359.710	2253.000	294.108	4839.785	1795.682	1805.692	540.899	4720.117
88	3719.355	4293.855	407.533	2298.000	338.785	5489.285	2026.283	2044.831	574.504	5171.133
89	3990.504	4574.004	461.922	2334.000	384.250	6147.785	2290.555	2319.873	609.926	5671.133
90	4255.582	4840.332	520.548	2339.000	430.345	6807.535	2578.754	2620.877	643.919	6140.414

AGGREGATE STATISTICS

	X	E	EC	PI	PIRAR	PIPC	PIRPC	DPI	DPIR	DIMPA	WS	WR	RPI	POP	POPM	POPC	POPN
74	1566.2	165.6	138.1	2472.5	1281.0	7050.9	3653.1	1970.2	1020.8	2911.0	1966.7	13035.	193.0	350.7	27.5	323.2	56.1
75	1754.2	188.8	161.3	3028.4	1487.2	7878.5	3869.1	2379.9	1168.8	3040.6	2446.2	14199.	203.6	384.4	27.5	356.9	57.2
76	1840.1	197.0	169.6	3343.2	1568.2	8298.0	3892.4	2609.6	1224.1	3038.3	2718.5	15109.	213.2	402.9	27.5	375.4	58.4
77	2142.6	199.8	172.4	3575.5	1602.4	8624.3	3865.2	2778.1	1245.1	3003.2	2919.6	15995.	223.1	414.6	27.5	387.1	59.5
78	2622.7	202.2	174.7	3872.5	1670.1	9120.1	3933.3	2992.5	1290.6	3039.5	3133.8	16966.	231.9	424.6	27.5	397.2	60.7
79	2814.9	217.7	190.2	4464.1	1853.0	9400.6	4109.6	3416.3	1418.1	3145.0	3560.7	17892.	240.9	450.9	27.5	423.4	61.9
80	3594.5	239.9	212.5	5166.6	2063.8	10593.7	4231.6	3914.5	1563.6	3206.1	4172.3	18997.	250.3	487.7	27.5	460.2	63.2
81	3754.6	242.5	215.0	5317.7	2044.0	10594.3	4072.1	4021.1	1545.6	3079.2	4471.5	20176.	260.2	501.9	27.5	474.5	64.4
82	3915.8	252.4	224.9	5748.6	2126.2	10998.6	4068.1	4323.8	1594.2	3059.8	4942.1	21379.	270.4	522.7	27.5	495.2	65.7
83	4279.0	265.6	238.2	6387.4	2273.0	11677.9	4155.6	4769.8	1697.3	3103.1	5501.0	22599.	281.0	547.0	27.5	519.5	67.0
84	4413.3	277.3	249.9	7026.9	2407.0	12325.2	4221.9	5213.1	1785.7	3132.1	6061.4	23837.	291.9	570.1	27.5	542.7	68.4
85	4716.6	290.6	263.1	7767.6	2560.3	13044.2	4299.5	5723.2	1886.4	3167.9	6711.5	25180.	303.4	595.5	27.5	568.0	69.8
86	4868.3	303.6	276.1	8552.2	2712.6	13768.3	4367.1	6260.0	1985.6	3196.6	7401.2	26564.	315.3	621.1	27.5	593.7	71.1
87	5175.8	316.9	289.4	9414.7	2873.3	14537.6	4436.7	6846.1	2089.4	3226.3	8160.7	28046.	327.7	647.6	27.5	620.2	72.6
88	5528.4	331.0	303.5	10367.8	3045.2	15348.4	4508.1	7489.6	2199.8	3256.6	9001.4	29602.	340.5	675.5	27.5	648.0	74.0
89	5682.0	344.6	317.1	11366.6	3212.3	16162.6	4567.7	8159.6	2306.0	3279.0	9883.7	31207.	353.8	703.3	27.5	675.8	75.5
90	5728.3	356.7	329.3	12390.2	3369.7	16983.3	4618.8	8842.1	2404.7	3296.1	10789.2	32895.	367.7	729.6	27.5	702.1	77.0

capita, the combined difference in real terms is nearly $500 per person or 9.2 percent. Thus, when public services are taken into account, the differences in individual benefits, though still not overwhelming, are significantly larger than when only personal income is considered.

Although petroleum revenues are the key driving force in the system, less than a third of the increase in the state and local government expenditures are directly financed out of petroleum revenues. Under maximum development, petroleum revenues in 1990 are $1.3 billion higher than under limited development, while state and local government expenditures are $3.5 billion higher. The Alaska economy is projected to grow so much faster under the maximum development scenario that the sources of state revenue other than petroleum are generating much larger funds. In fact, one of the possible policy responses to the accelerated growth would be to reduce revenues by cutting taxes.

1990 Projections – Regional Model

An example is also provided of the computer printout from the regional economic model (Table 3). The projections shown in the printout are for the accelerated development scenario with oil prices at $5 per barrel.

The state totals produced by the regional model are very similar to those produced by the statewide model. For example, projected state employment and population are 365,000 and 731,000, respectively, in the regional model and are 357,000 and 730,000 in the state model. Differences in some of the earlier years are larger but in no case do they exceed about 7 percent. While it is encouraging to have the two models producing similar results, there is no reason to expect them to produce identical projections. The regional model incorporates a wealth of detail not included in the statewide model. Changes in the industrial and regional composition of economic activity are reflected in the regional model projections but not in the statewide projections.

In the sample output which has been included, Anchorage is projected to have a 1990 population of nearly 400,000 people, about 54 percent of the total population in the state. Currently, Anchorage's population is estimated at about 165,000, or 44 percent of the state's total estimated population of 378,000. The regional projections thus show Anchorage continuing and strengthening its role as the commercial and service center for the state. Nearly half of the projected increase in employment between 1974 and 1990 is in the trade, finance, and service industries, and those are the industries which tend to be concentrated most heavily in the Anchorage area. Those three industries account for 62 percent of the projected growth in Anchorage employment. Thus, although almost no petroleum developments are located in the Anchorage area, the economic growth which is caused by those developments tends to be concentrated there.

MAP POLICY APPLICATIONS

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 models. The projections presented here provide four illustrative examples of policy applications using the MAP models.

The first policy application considers the implications 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.

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 savings 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 projections presented here will examine the implications of alternative fiscal saving rates. A high savings rate case is considered in which 75 percent of recurrent revenues are saved and 100 percent of bonuses are saved; the low (or zero) savings rate case assumes that none of the petroleum revenues are saved; and the medium savings 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 wellhead price for oil of $5 a barrel. Three of the projections are based on the accelerated petroleum development scenario used in conjunction

TABLE 3
SUMMARY OF ALASKAN REGIONAL ECONOMIC MODEL
(Accelerated Growth with Oil at $5/Barrel)

AGGREGATE STATISTICS

	XX	EM	EMCV	PI	PIMAR	PIPC	PIRPC	DPI	DPIR	DIRPA	WS	WR	RPI	PDP	PDPM	PIPC	PIPN
74	1494.5	159.9	132.4	2369.7	1227.8	6757.7	3501.5	1893.8	981.3	2798.3	1879.7	12940.	193.0	350.7	27.5	323.2	56.1
75	1661.3	179.9	152.4	2881.8	1415.4	7814.7	3739.9	2272.4	1116.1	2949.1	2321.6	14162.	203.6	374.5	27.5	351.0	57.2
76	1735.6	187.6	160.2	3173.4	1488.7	8047.1	3775.0	2485.9	1166.2	2957.2	2573.3	15047.	213.2	394.3	27.5	366.9	58.4
77	2037.1	192.6	165.1	3409.9	1528.4	8381.3	3756.6	2658.1	1191.4	2928.3	2777.2	15832.	223.1	406.8	27.5	379.4	59.5
78	2496.2	193.8	166.3	3676.4	1585.7	8884.0	3831.8	2851.1	1229.7	2971.6	2966.3	16805.	231.8	413.8	27.5	386.4	60.7
79	2644.6	205.1	177.7	4185.4	1737.5	9657.6	4009.2	3217.2	1335.6	3081.7	3322.1	17767.	240.9	433.4	27.5	405.9	61.9
80	3198.4	224.6	197.2	4827.0	1928.3	10382.5	4147.7	3674.3	1467.8	3157.2	3879.9	18907.	250.3	464.9	27.5	437.5	63.2
81	3349.9	233.6	206.2	5067.7	1948.1	10441.8	4013.9	3844.7	1477.9	3045.2	4264.3	19974.	260.1	485.3	27.5	457.9	64.4
82	3479.5	248.5	221.0	5584.5	2065.8	10928.0	4042.4	4238.7	1556.9	3046.5	4802.9	21131.	270.3	511.0	27.5	483.6	65.7
83	3746.1	262.6	235.1	6227.8	2216.4	11619.1	4135.1	4658.6	1658.1	3093.2	5366.5	22330.	281.0	536.0	27.5	508.5	67.0
84	3852.9	275.0	247.6	6858.8	2349.7	12252.4	4197.4	5096.8	1746.1	3119.1	5919.4	23508.	291.9	559.8	27.5	532.3	68.4
85	4118.2	289.0	261.6	7598.7	2504.9	12970.9	4275.8	5607.2	1848.4	3155.2	6570.3	24815.	303.4	585.8	27.5	558.4	69.8
86	4272.0	303.0	275.5	8388.6	2661.0	13698.5	4345.5	6148.3	1950.4	3185.0	7264.0	26162.	315.2	612.4	27.5	584.9	71.1
87	4516.8	317.4	289.9	9264.8	2827.9	14476.0	4418.4	6744.6	2058.6	3216.5	8036.7	27612.	327.6	640.0	27.5	612.6	72.6
88	4806.1	333.2	305.8	10252.6	3011.7	15303.0	4495.2	7412.1	2177.3	3249.8	8909.3	29135.	340.4	670.0	27.5	642.5	74.0
89	4981.6	349.0	321.5	11303.6	3194.9	16138.1	4561.3	8117.5	2294.3	3275.6	9839.0	30710.	353.8	700.4	27.5	673.0	75.5
90	5097.8	364.7	337.3	12435.3	3382.3	17001.3	4624.2	8872.0	2413.1	3299.2	10839.9	32360.	367.7	731.4	27.5	704.0	77.0

CIVILIAN NON-NATIVE POPULATION THOUSANDS OF PERSONS

		MALE	FEMALE			MALE	FEMALE			MALE	FEMALE
1974	0-1	2.849	2.748	1975	0-1	3.330	3.212	1976	0-1	3.954	3.815
	1-4	10.574	10.333		1-4	11.259	11.072		1-4	11.931	11.719
	5-9	11.630	11.473		5-9	12.301	12.187		5-9	12.789	12.681
	10-14	11.540	11.341		10-14	12.073	11.968		10-14	12.316	12.244
	15-19	12.330	10.981		15-19	14.378	12.088		15-19	14.766	12.464
	20-24	14.319	13.895		20-24	19.438	17.369		20-24	20.555	17.895
	25-29	10.106	12.028		25-29	12.686	14.540		25-29	14.692	15.936
	30-34	8.354	8.885		30-34	9.217	9.895		30-34	10.094	10.966
	35-39	7.571	7.547		35-39	7.947	8.227		35-39	8.272	8.713
	40-44	6.994	6.285		40-44	7.068	6.507		40-44	7.201	6.819
	45-49	6.677	5.777		45-49	6.687	5.847		45-49	6.710	5.946
	50-54	5.646	5.033		50-54	5.779	5.145		50-54	5.885	5.247
	55-59	4.614	3.856		55-59	4.735	4.053		55-59	4.856	4.232
	60-64	3.244	2.590		60-64	3.414	2.793		60-64	3.570	2.990
	65+	3.849	3.290		65+	4.171	3.646		65+	4.499	4.025
1977	0-1	4.169	4.022	1978	0-1	4.260	4.110	1979	0-1	4.180	4.032
	1-4	12.960	12.694		1-4	13.806	13.472		1-4	14.841	14.502
	5-9	13.284	13.161		5-9	13.842	13.676		5-9	14.715	14.539
	10-14	12.517	12.458		10-14	12.640	12.566		10-14	13.160	13.116
	15-19	14.734	12.638		15-19	14.163	12.545		15-19	15.060	13.114
	20-24	20.552	17.679		20-24	19.083	16.472		20-24	21.107	17.912
	25-29	16.208	16.781		25-29	16.952	16.849		25-29	18.305	17.942
	30-34	11.101	12.031		30-34	12.065	12.949		30-34	13.302	13.929
	35-39	8.663	9.241		35-39	9.113	9.764		35-39	9.808	10.618
	40-44	7.372	7.164		40-44	7.586	7.545		40-44	7.845	7.951
	45-49	6.754	6.087		45-49	6.823	6.269		45-49	6.921	6.488
	50-54	5.974	5.349		50-54	6.053	5.457		50-54	6.129	5.579
	55-59	4.973	4.394		55-59	5.081	4.542		55-59	5.182	4.681
	60-64	3.714	3.181		60-64	3.848	3.362		60-64	3.974	3.533
	65+	4.832	4.425		65+	5.167	4.844		65+	5.501	5.279

GROSS PRODUCT - XX MILLIONS OF 1958 DOLLARS

	RGN 1 (NW)	RGN 2 (SW)	RGN 3 (SE)	RGN 4 (SC)	RGN 5 (Anch.)	RGN 6 (Int.)	RGN 7 (Fbnks.)	STATE
74	47.366	79.788	191.881	319.369	606.450	78.382	171.241	1494.476
75	50.500	83.707	207.890	346.391	665.919	112.201	194.735	1661.343
76	55.479	86.797	220.140	352.639	703.243	116.421	200.916	1735.635
77	99.015	89.120	231.831	462.740	753.805	203.409	197.218	2037.138
78	98.295	89.092	366.803	673.313	784.499	287.426	196.797	2496.224
79	99.160	91.548	402.894	701.034	846.284	297.871	205.802	2644.592
80	377.522	104.028	451.904	749.637	940.359	350.906	222.008	3198.364
81	428.111	121.505	534.903	733.154	985.540	314.846	231.807	3349.866
82	461.802	137.936	632.954	658.830	1055.866	287.241	244.855	3479.485
83	491.287	156.235	840.826	602.613	1140.581	258.595	255.937	3746.074
84	417.840	184.064	955.317	564.927	1216.110	247.551	267.095	3852.904
85	375.974	213.163	1109.332	573.979	1305.041	262.234	278.452	4118.172
86	317.327	243.717	1188.178	575.139	1392.299	264.953	290.358	4271.969
87	330.160	284.924	1253.284	570.908	1490.602	284.643	302.306	4516.824
88	353.353	327.947	1333.246	571.034	1601.945	303.351	315.184	4806.055
89	338.102	333.038	1405.105	567.650	1709.549	299.335	328.855	4981.633
90	329.627	317.918	1420.785	576.150	1819.412	290.283	342.965	5097.836

EMPLOYMENT - EM THOUSANDS OF WAGE EARNERS

	RGN 1	RGN 2	RGN 3	RGN 4	RGN 5	RGN 6	RGN 7	STATE
74	4.085	10.655	24.631	17.931	72.483	5.344	24.774	159.903
75	4.480	11.194	27.061	21.524	79.365	8.692	27.576	179.892
76	4.758	11.569	28.632	22.052	83.834	8.403	28.356	187.604
77	5.455	11.993	30.428	20.891	89.548	6.103	28.150	192.567
78	5.299	11.922	31.228	20.735	90.414	6.563	27.606	193.768
79	5.566	12.359	33.323	21.501	96.825	6.989	28.543	205.106
80	8.027	13.125	36.254	22.928	106.284	7.663	30.342	224.624
81	8.803	13.676	38.248	23.869	111.101	6.532	31.385	233.614
82	9.616	14.364	41.030	25.106	118.734	6.748	32.863	248.460
83	10.012	15.007	44.312	25.958	126.690	6.545	34.039	262.564
84	9.445	15.785	46.955	26.757	134.768	6.169	35.166	275.045
85	9.348	16.518	49.566	27.792	143.205	6.373	36.247	289.049
86	9.138	17.285	51.690	28.855	152.143	6.468	37.390	302.968
87	9.406	18.116	53.478	29.802	161.368	6.747	38.465	317.382
88	9.766	18.970	55.402	30.792	171.665	7.046	39.596	333.237
89	9.884	19.488	57.364	31.846	182.476	7.126	40.783	348.967
90	10.039	19.803	58.898	32.999	193.877	7.149	41.964	364.727

TABLE 3
SUMMARY OF ALASKAN REGIONAL ECONOMIC MODEL (Cont.)
(Accelerated Growth with Oil at $5/Barrel)

WAGES & SALARIES - WS MILLIONS OF DOLLARS

	RGN 1	RGN 2	RGN 3	RGN 4	RGN 5	RGN 6	RGN 7	STATE
74	48.1	109.1	290.6	197.9	851.4	92.8	289.9	1879.7
75	56.6	124.0	344.4	265.6	1006.3	168.1	356.6	2321.6
76	64.4	137.2	389.9	286.1	1135.2	168.8	391.6	2573.3
77	83.2	152.3	443.4	276.5	1294.8	117.0	410.1	2777.2
78	85.9	160.0	488.9	291.9	1382.4	132.6	424.5	2966.3
79	94.9	175.9	553.6	317.9	1565.8	148.2	465.6	3322.1
80	168.4	199.2	639.3	358.4	1817.5	169.2	527.9	3879.9
81	199.5	220.7	716.7	394.3	2007.1	145.4	580.5	4264.3
82	232.7	246.4	816.6	437.1	2265.3	158.1	646.6	4802.9
83	255.3	273.5	939.9	475.4	2552.0	159.1	711.3	5366.5
84	244.3	305.8	1056.5	515.4	2864.2	153.4	779.8	5919.4
85	250.4	339.8	1183.7	566.2	3210.4	166.4	853.5	6570.3
86	252.0	377.3	1306.8	621.4	3595.5	176.7	934.3	7264.0
87	274.3	419.6	1430.6	678.3	4019.4	194.4	1020.2	8036.7
88	302.3	465.8	1568.2	740.7	4504.0	214.0	1114.3	8909.3
89	320.8	505.3	1717.6	809.5	5041.1	227.0	1217.7	9839.0
90	342.7	541.3	1863.5	887.2	5637.4	238.7	1329.2	10839.9

REAL WGS - WS/RPI MILLIONS OF DOLLARS

	RGN 1	RGN 2	RGN 3	RGN 4	RGN 5	RGN 6	RGN 7	STATE
74	24.9	56.5	150.6	102.5	441.2	48.1	150.2	974.0
75	27.8	60.9	169.2	130.5	494.2	82.5	175.1	1140.2
76	30.2	64.4	182.9	134.2	532.6	79.2	183.7	1207.2
77	37.3	68.3	198.7	123.9	580.3	52.5	183.8	1244.8
78	37.0	69.0	210.9	125.9	596.2	57.2	183.1	1279.4
79	39.4	73.0	229.8	132.0	650.0	61.5	193.3	1379.1
80	67.3	79.6	255.4	143.2	726.1	67.6	210.9	1550.0
81	76.7	84.8	275.5	151.6	771.6	55.9	223.1	1639.2
82	86.1	91.2	302.1	161.7	838.0	58.5	239.2	1776.6
83	90.8	97.3	334.5	169.2	908.2	56.6	253.1	1909.9
84	83.7	104.8	361.9	176.6	981.2	52.5	267.2	2027.9
85	82.6	112.0	390.2	186.6	1058.3	54.9	281.3	2165.9
86	79.9	119.7	414.5	197.1	1140.6	56.1	296.4	2304.3
87	83.7	128.1	436.7	207.0	1226.8	59.3	311.4	2453.0
88	88.8	136.8	460.7	217.6	1323.0	62.8	327.3	2617.1
89	90.7	142.8	485.5	228.8	1424.8	64.1	344.2	2780.9
90	93.2	147.2	506.8	241.3	1533.3	64.9	361.5	2948.4

POPULATION THOUSANDS OF PERSONS

	RGN 1	RGN 2	RGN 3	RGN 4	RGN 5	RGN 6	RGN 7	STATE
74	13.498	27.561	48.616	45.284	153.120	8.561	54.018	350.659
75	13.752	27.644	51.526	53.661	164.073	9.965	57.830	378.451
76	14.121	28.108	54.092	55.272	173.457	9.903	59.397	394.350
77	14.903	28.620	56.999	52.646	185.350	8.929	59.396	406.844
78	14.943	28.936	58.926	52.951	189.50	9.276	59.294	413.826
79	15.198	29.288	61.919	54.896	201.78	9.474	60.817	433.382
80	17.271	29.887	66.014	58.506	219.765	9.770	63.707	464.920
81	17.977	30.562	69.340	61.401	230.803	9.325	65.919	485.326
82	18.552	31.116	73.250	64.639	245.663	9.439	68.367	511.024
83	18.832	31.627	77.796	66.903	261.161	9.351	70.329	536.000
84	18.486	32.245	81.483	69.081	277.059	9.180	72.255	559.789
85	18.468	32.847	85.176	71.939	293.915	9.309	74.172	585.826
86	18.375	33.465	88.226	74.895	311.823	9.384	76.202	612.369
87	18.639	34.162	90.959	77.674	330.780	9.563	78.236	640.013
88	18.956	34.847	93.830	80.549	351.721	9.744	80.326	669.974
89	19.097	35.290	96.696	83.558	373.510	9.815	82.463	700.429
90	19.258	35.591	98.979	86.813	396.368	9.856	84.566	731.430

STATE REVENUE MILLIONS OF DOLLARS

	RTIS	RTCS	RSGS	RMQS	RINS	RSFS	REDS	RPQS	RQQS
74	54.6	9.6	36.7	53.1	46.0	25.7	155.0	48.0	428.7
75	67.9	12.2	42.6	65.5	39.7	33.7	170.0	62.0	493.6
76	87.6	16.2	50.6	83.7	26.3	46.4	180.0	236.0	726.8
77	99.2	18.6	55.2	94.5	17.0	54.3	190.0	416.0	944.8
78	108.9	20.6	58.8	103.4	8.3	61.1	200.0	695.0	1256.1
79	120.1	23.0	62.8	113.6	25.7	69.0	210.0	943.0	1567.3
80	142.2	27.7	70.5	133.7	49.2	85.3	221.0	1205.0	1934.6
81	171.1	34.1	79.9	159.9	77.3	107.7	232.0	1197.0	2058.9
82	182.3	36.6	83.5	169.9	103.5	116.6	243.0	1539.0	2474.3
83	206.8	42.1	91.0	191.9	135.7	136.6	255.0	1723.0	2782.0
84	238.2	49.3	100.2	220.0	171.1	163.2	268.0	1901.0	3110.9
85	270.1	56.6	109.1	248.3	209.6	191.0	281.0	2048.0	3413.7
86	308.5	65.7	119.5	282.3	250.7	225.7	295.0	2182.0	3729.4
87	350.8	75.8	130.4	319.6	294.1	265.3	310.0	2253.0	3999.0
88	399.1	87.5	142.4	362.0	338.8	311.9	326.0	2298.0	4265.7
89	455.3	101.3	155.7	411.0	384.2	368.0	342.0	2334.0	4551.6
90	516.8	116.7	169.8	464.5	430.3	431.5	359.0	2339.0	4827.6

Table 4

ALTERNATIVE FISCAL SAVING POLICIES

PROJECTED 1990 VALUES FOR SELECTED VARIABLES

VARIABLES	UNITS	Accelerated Development			Maximum Development	Limited Development
		Med. Savings	High Savings	Zero Savings	Zero Savings	High Savings
Total Output (X)	(Millions of 1958 S)	5,728.2	5,510.8	5,843.3	10,253.0	4,015.2
Total Employment (E)	(Persons x 1,000)	356.7	328.7	371.4	490.9	286.7
Total Population (POP)	(Persons x 1,000)	729.5	665.4	762.8	957.0	587.2
Personal Income (PI)	(Millions of S)	12,390.0	11,442.4	12,887.2	16,988.1	9,972.4
Personal Income Per Capita (PIPC)	(S)	16,983.3	17,195.1	16,895.7	17,751.0	16,983.9
Real Disposable Personal Income Per Capita (DIRPA)	(1967 S)	3,296.1	3,355.5	3 270.3	3,371.5	3,345.6
State Government Total Petroleum Sector Revenue (RP9S)	(Millions of S)	2,339.0	2,339.0	2,339.0	2,940.0	1,685.0
State-Local Government Expenditures (SLGEXP)	(Millions of S)	6,190.3	5,280.9	6,662.0	9,074.3	4,361.4
State Government General Fund Balance (GFBAL)	(Millions of S)	6,807.5	18,136.0	1,093.3	1,093.3	14,896.3
State-Local Government Expenditures Per Capita (SLGEXP/POP)	(S)	8,485.7	7,936.4	8,733.6	9,482.0	7,427.4
Real Disposable Personal Income Plus Real State-Local Government Expenditures Per Capita $\left(\text{DIRPA} + \frac{\text{SLGEXP/POP}}{\text{RPI}} \right)$	(1967 S)	5,603.9	5,513.9	5,645.5	5,950.2	5,365.6

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 savings rate produces a slower growth in the Alaska economy, and the zero savings produces more rapid growth. Some selected summary measures for the five different projections are shown in Table 4 and the population projections are shown in Figure 6. In 1990, under the accelerated development scenario, the high fiscal savings rate produces a projected population which is 64,000 persons lower than under the medium fiscal savings rate. The zero fiscal savings rate produces a projected population which is 33,000 persons larger in 1990.

Most measures of aggregate economic activity display very similar patterns of change in response to changes in the fiscal savings policy. Under the accelerated petroleum development scenario, the zero fiscal savings 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. 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 savings than it was with medium fiscal savings. However, public sector expenditures per capita are higher under the zero savings rate. On balance, these two changes very nearly cancel out. As shown in Table 4, 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 savings than under the medium savings. 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

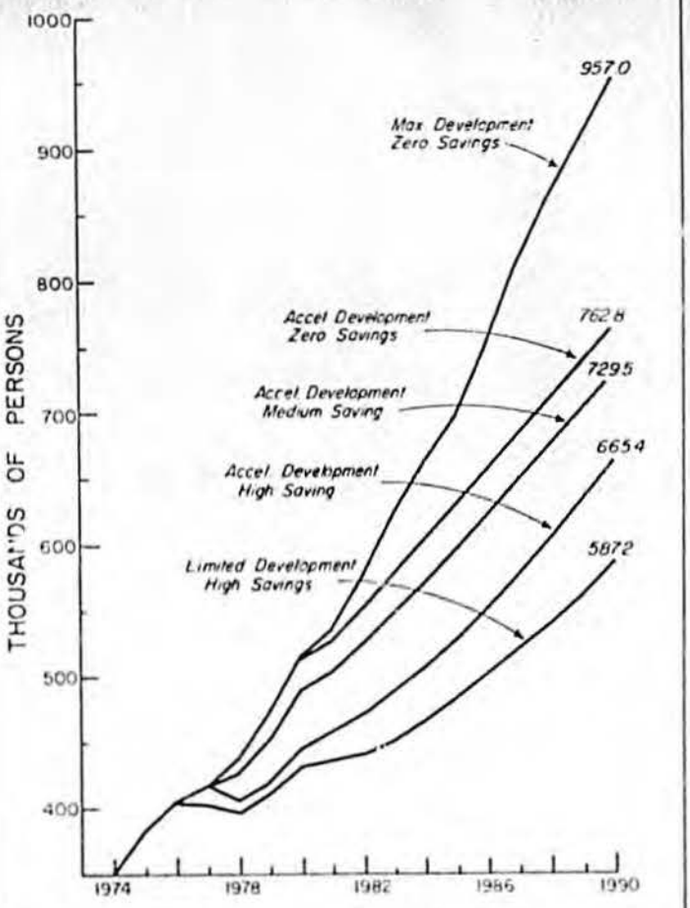


Figure 6. Alternative Fiscal Saving Policies Projected Population.

actually slower under the assumption of zero fiscal savings than under the medium fiscal savings. This is attributable to the difference in the accumulated general fund balance and in the interest accruing on that balance. As Table 4 shows, by 1990 the medium fiscal savings produces a general fund balance of $6.8 billion while the zero fiscal savings case produces a general fund balance of only $1.1 billion. (The accumulated general fund balance in the zero fiscal savings case is viewed as a general contingency reserve and is accumulated out of nonpetroleum revenues. This type of fiscal savings 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 savings than under zero fiscal savings. 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 savings case. This, in turn, induces a more rapid growth in general economic activities. Thus, a key impact of fiscal savings 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 savings policy is roughly the mirror image of the impact of the zero fiscal savings 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 rather than simply additive. For example, under the maximum petroleum development scenario, the zero fiscal saving case produces a 1990 population projection of 957,000 persons. That is 49,000 persons more than the comparable projections under the medium fiscal savings case. In contrast, under the accelerated petroleum development scenario, shifting from medium to zero fiscal savings produced an increase in projected population of only 33,000 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 savings rate has a smaller impact under the limited petroleum development scenario.

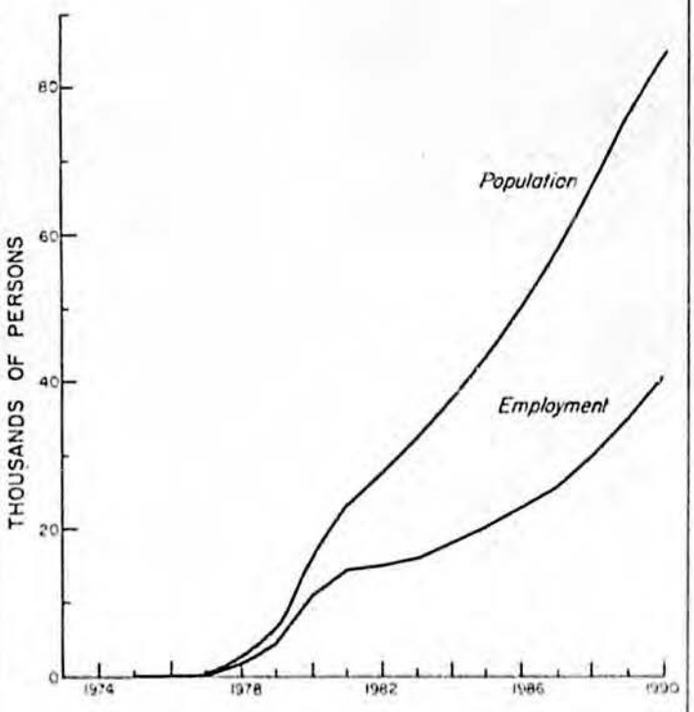
Impact of a Reduction in State Personal Income Taxes

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 savings 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. Figures 7 and 8 show the differences in population, employment, and personal income between that scenario and the projection made after implementing the cut in state personal income taxes.

As shown in Figure 7, 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

Figure 7. Population and Employment Impact of a Reduction in State Personal Income Taxes.*



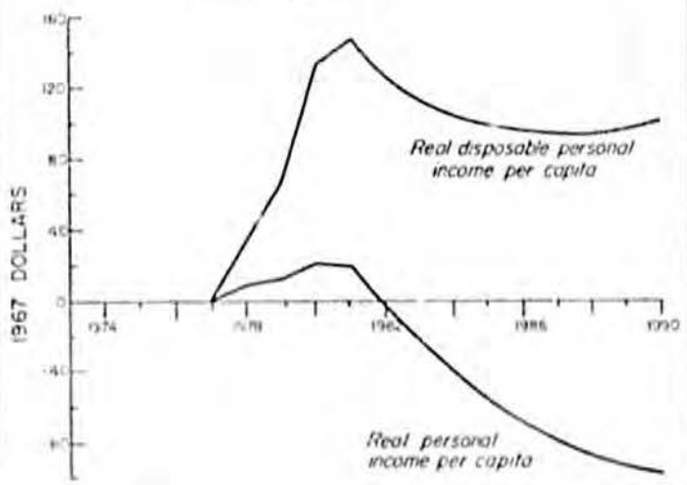
*The impact is measured as the change from the results obtained in the absence of the tax reduction.

total employment of over 40,000 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 29,000 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.

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 disposable 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 8).

The increase in population induced by the gain in disposable personal income is so large that state and local government expenditures per capita decline 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 8. Personal Income Impact of a Reduction in State Personal Income Taxes.*



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

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 makes a projection based on a petroleum development scenario which excludes the Beaufort lease

sale. The petroleum development scenario is then expanded to include the 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 consists 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 revenue 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 Table 5. 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 Figures 9 and 10. 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 14,000 persons and population by 30,000 persons. In contrast, the MAP estimates of direct employment and revenues produce projected impacts of

Table 5

BEAUFORT LEASE SALE:
DIRECT EMPLOYMENT AND REVENUE IMPACTS

	Petroleum Construction and Mining Employment		Recurrent Revenues	
	EA[a]	MAP[b]	EA	MAP
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

a. Environmental Assessment
b. Man in the Arctic Program Model

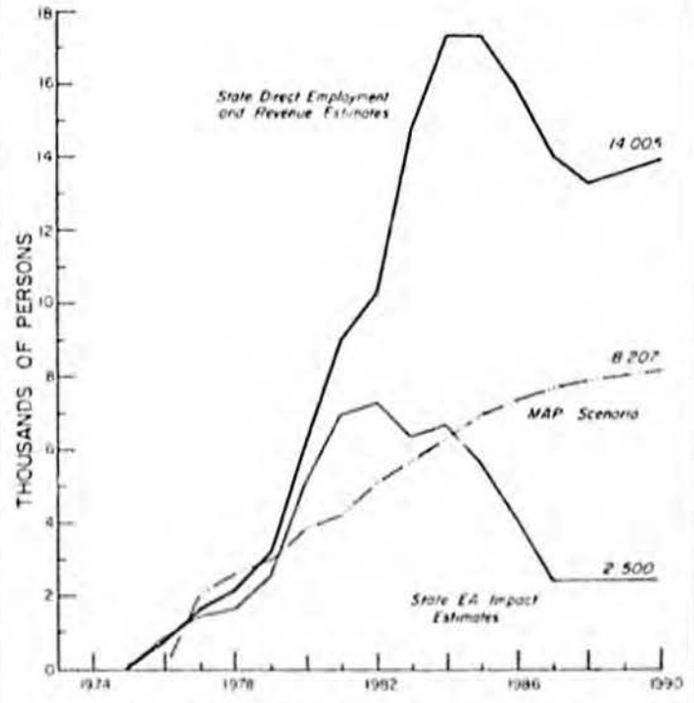


Figure 9. Impact of Beaufort Lease Sale on Employment.

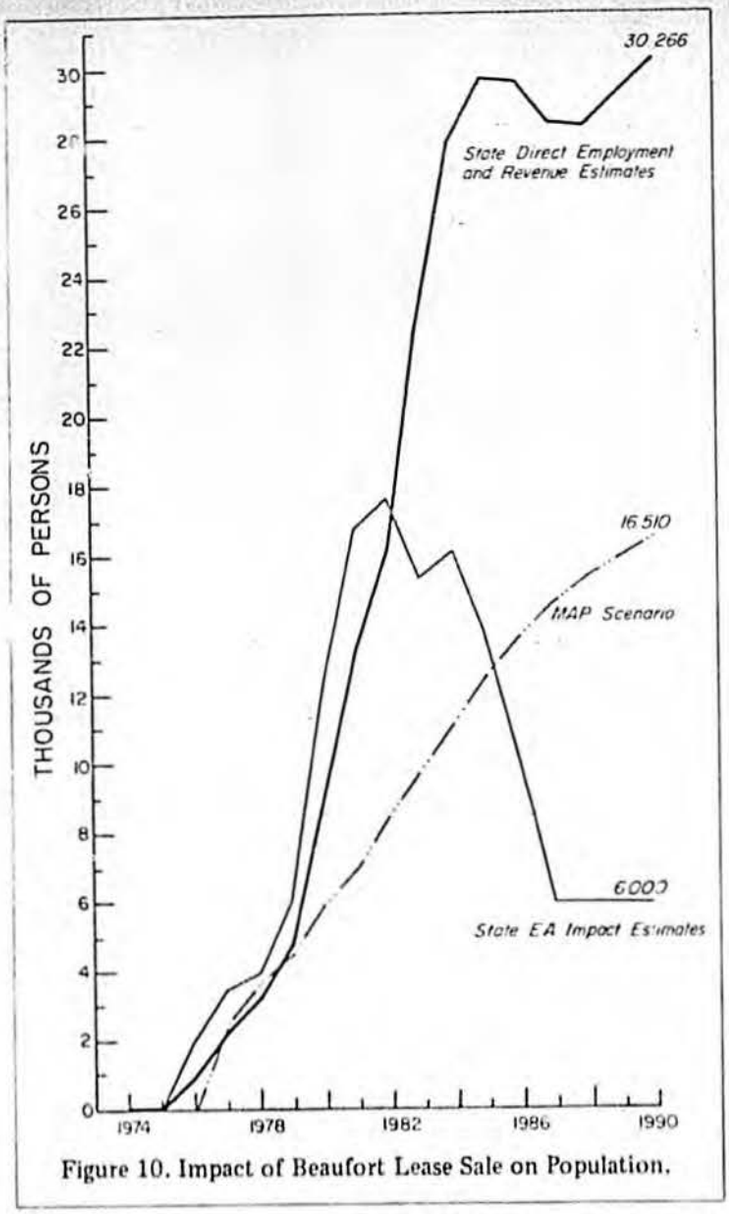


Figure 10. Impact of Beaufort Lease Sale on Population.

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.

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 a liquid natural gas 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 11 and 12 and Table 6 show the differing regional and state impacts of the El Paso and Arctic pipelines for population, employment, 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.

The El Paso proposal would increase Anchorage's 1990 population by almost 17,000 persons, and the

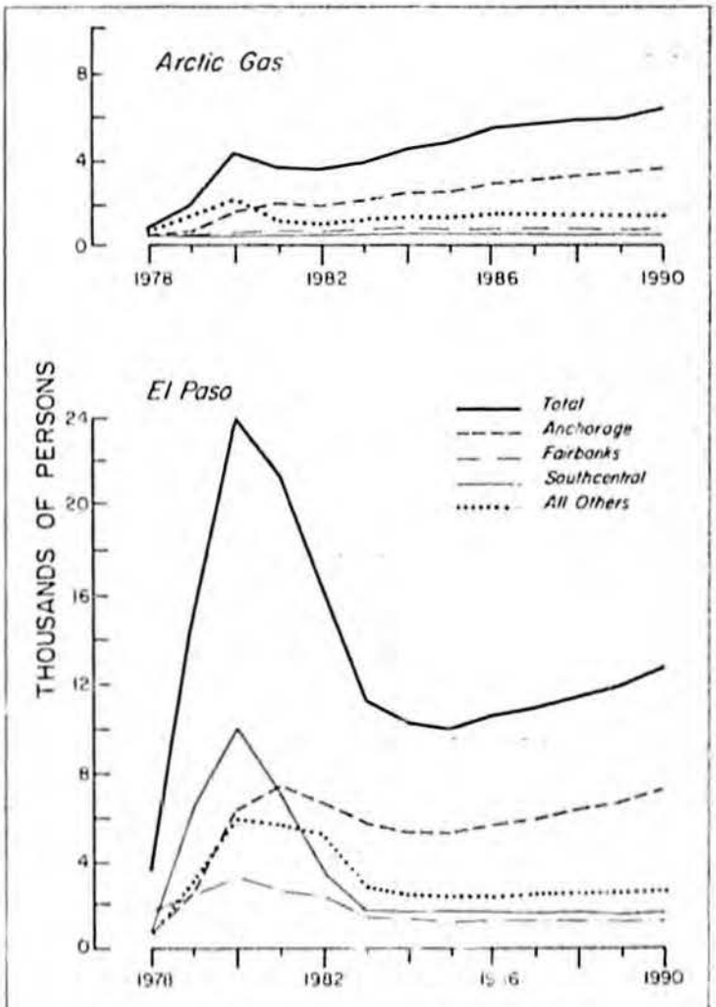


Figure 11. Employment Impacts from Alternative Gas Line Routes.

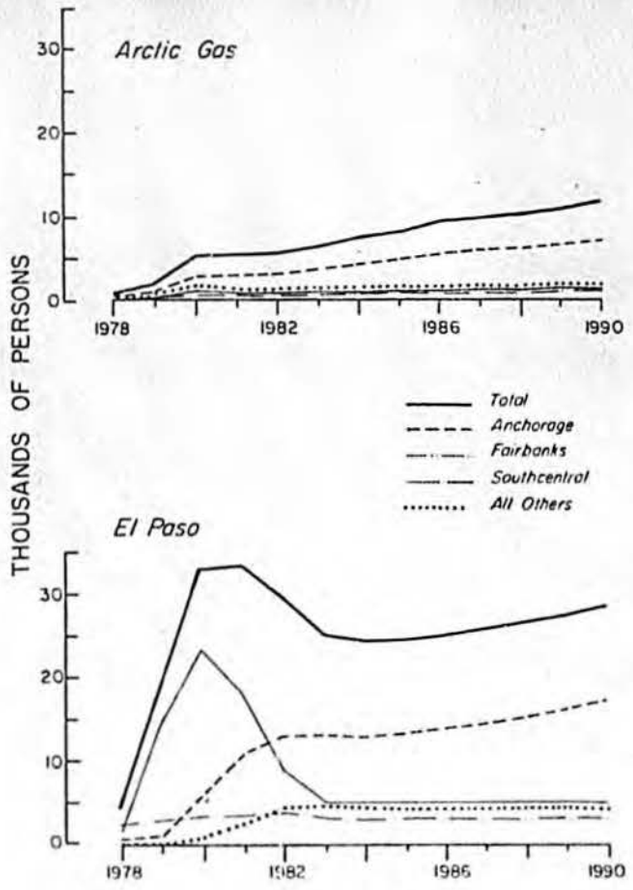


Figure 12. Population Impacts for Alternative Gas Line Routes.

Table 6

REAL WAGES AND SALARIES
(MILLIONS OF 1958 Dollars)

ARCTIC GAS

	Total	Anchorage	Southcentral	Fairbanks	All Other
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

EL PASO

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	116.5	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

Arctic Gas proposal would increase the population by 7,000 persons. As shown in Figure 11, the El Paso Anchorage employment impact peaks at 7,000 persons in 1981, declines to 5,000 persons in 1984, and then rises gradually as the Alaskan economy grows. Although these changes are not insignificant, they should be measured against projections of Anchorage's early 1980s 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 10,000 persons, an increase of more than one-third in the regional labor force. This impact falls rapidly to just 1.6 thousand persons by 1983.

FUTURE MAP RESEARCH

The first phase of MAP research has concentrated on the development of the economic and demographic data bases and models required for policy studies. The analysis and policy applications have generally been at a rather aggregative level, though there has been a significant amount of regional disaggregation. The second phase of MAP research will extend the capacity for detailed analysis of alternative policies and development patterns. There will be three major components in the second phase program: economics, demography and manpower, and community studies. The principal projects, models, and policy applications within the three areas are shown in Figure 13. That figure also illustrates the relationships among the various program elements.

Economics Program

The economic models developed in Phase I of MAP will be refined to focus on the distributional aspects of energy development in Alaska. Studies of earnings in specific industries and occupations will extend the models' capabilities to estimate the impact of economic

growth on the distribution of income among different population groups and regions. In the area of fiscal policy, tax models will be constructed to project the effects of tax changes on income distribution. On the expenditures side, the distribution of costs and benefits of different types of expenditure programs—such as health, education, and resource development—will be examined. Price studies will be aimed at determining the causes of changes in the level of prices and of changes in Alaska prices relative to the rest of the nation. Links with the models being developed within ISEGR's Alaska Transport Systems Development Study (funded by the U.S. Department of Transportation) will be particularly important in the price studies.

Energy studies will update the inventory of Alaska energy resources and will use the more detailed economic models to examine the impacts of alternative energy development scenarios designed to bring Alaska's energy resources into production to meet national needs. An Alaska energy system model will be constructed and links will be made with national energy models. Particular strength will be brought to these studies through the energy research being carried on at the National Bureau of Economic Research's Computer Research Center. The various energy systems models will be used to explore possible Alaska responses to national and local energy demands and to examine the broad economic, environmental, and social trade-offs involved in energy development.

Demography and Manpower Program

This program, a principal link between the economic studies and the community studies, will consist of three components: basic studies of population change and migration, manpower studies, and special studies of Alaska Native mobility and manpower problems.

Population and migration studies are, essentially, important refinements of Phase I work, which will result in disaggregated regional population models. Regional labor force participation rates will be developed and interregional migration as well as patterns of migration to and from Alaska will be examined in detail.

Manpower studies will be necessary to the economic program's study of income distribution as well as to other elements of this and the community studies program. Regional economic growth will be translated into schedules of occupational demands (via the industry/occupation matrix developed in Phase I), and labor supplies will be projected by combining population projections with occupational participation rates. Supply-demand imbalances will be key inputs to manpower planning.

Alaska's Native population responds generally to different factors than does the non-Native population and requires a special study focus. Thus, projections of regional population and labor supply will need to be disaggregated by race. Also, additional information, through survey research to be undertaken as part of the community studies, will be required about Native mobility patterns and related socioeconomic characteristics. These data, combined with projections from the economic and demographic models, will be used to produce projections of Native population movements and indications of their economic and social effects on Native villages, which is one major concern of the community studies program.

Community Studies Program

Economic and demographic change models, and the energy, migration, manpower, and related studies, will provide the broad development context and specific data inputs to the community studies component of MAP. Community studies, in turn, will:

- Provide policy alternatives that can be tested by the models.
- Contribute greater refinement to economic and population (especially migration) analyses.
- Add an important qualifying perspective to projections of an apparently smooth path of economic and population growth.

The community studies program consists of two projects: urbanization and human settlement, and community behavior in response to rapid economic growth.

The urbanization and human settlement project will be closely linked to the demographic program, and analyses will reflect the effects of alternative rates and likely locations of growth projected by the economic models and energy development scenarios. In addition to statewide analyses and development of an urbanization model, studies will focus on:

- The effects of economic and demographic changes in Alaska's metropolitan center (Anchorage).
- Prospective changes in the pattern and character of Native village communities.
- Alternative patterns of resource development communities.

The latter will pay particular attention to special environmental factors related to arctic and subarctic environments.

Community behavior studies will examine:

- The effects of the oil boom on specific communities.
- The oil boom impact on Native villages.
- Post-boom community readjustment.

Particular attention will be given to studying the accuracy of predictions of boom and post-boom problems, Native employment and migration, effects on allocation of resources, and effectiveness of alternative policy responses.

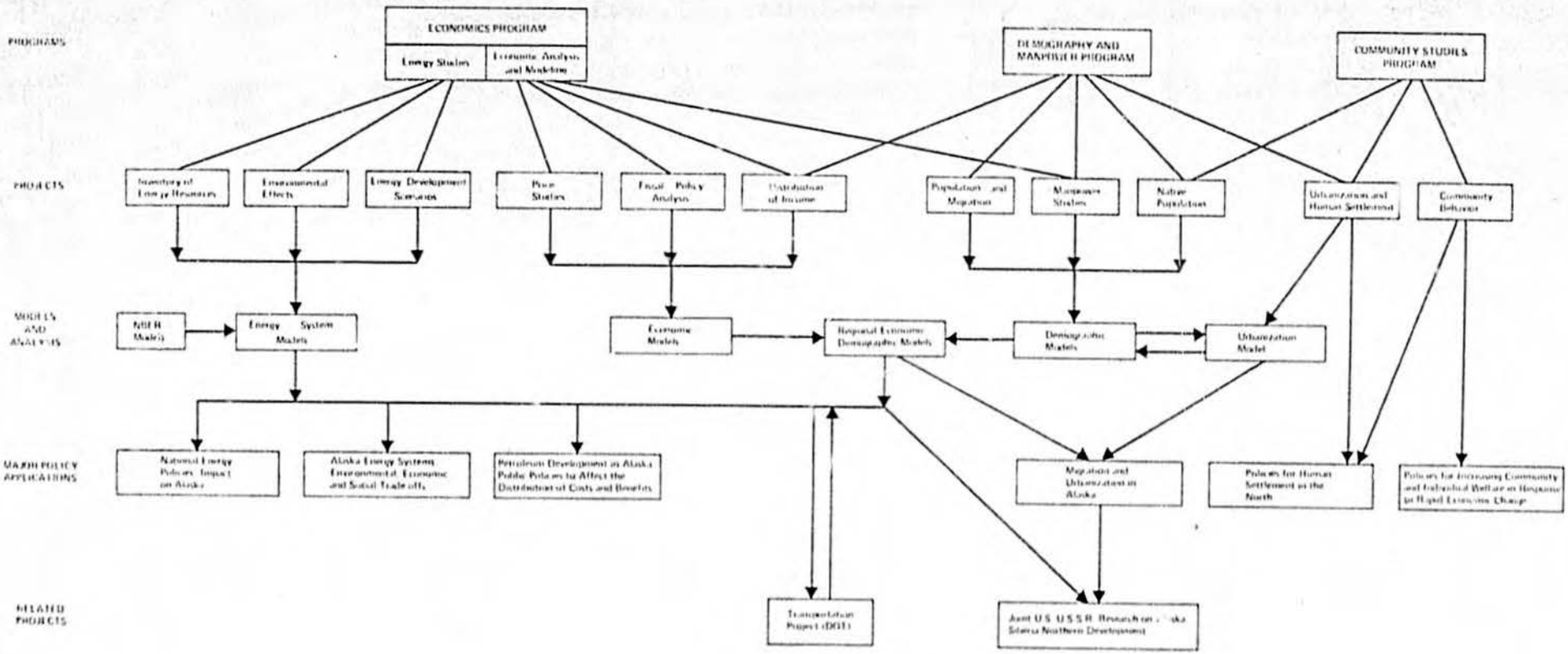


Figure 13. Man in the Arctic Program — Phase II Program Structure.

RECENT INSTITUTE PUBLICATIONS

The Institute of Social, Economic and Government Research was established in 1961 for the purpose of conducting interdisciplinary research in the social sciences and related fields. The institute is part of the University of Alaska and is located on the Fairbanks campus. In addition to the *Alaska Review of Business and Economic Conditions*, the institute publishes ISEGR *Reports*, *Occasional Papers*, *Research Notes*, and other special publications. Recent institute publications are listed below:

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- "Age and Race by Sex Characteristics of Alaska's Village Population," Ron Evans and Peggy Raybeck
- "Estimated Gross State Product for Alaska," David T. Kresge and Monica Thomas
- "Alaska Economic Growth, 1961-1972," David T. Kresge
- "Consumer Prices, Personal Income and Earnings in Alaska," Arlon R. Tussing and Monica Thomas
- "Estimates of Alaska Gross Product By Region, 1965-1973," Monica E. Thomas and Earlene Goodwin
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POSSIBLE PERMANENT FUND CAPITALIZATION OF AN ALTERNATE ENERGY TRANSPORT SYSTEM TO THE INTERIOR OF ALASKA

A CONTEMPORARY QUESTION !

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INTRODUCTION

This paper will seek to evaluate the financial viability, using a variation of the standard Benefit Cost Analysis (P.I.) method of an alternative pipeline for the transport of the State's (1/8) royalty share of Prudhoe Bay natural gas to the interior of Alaska. The view will be that of the State as a potential investor (Permanent Fund Use) in such a venture.

HISTORY

There are now three (3) competing routes for the delivery of natural gas from the North Slope to the lower 48 States:

1. Artic Gas
2. El Paso
3. Northwest Pipeline

Only the latter two (2) proposals would make available energy and feedstock to the State and primarily to the interior. The Artic Proposal if successful would necessitate an alternate delivery system similar to that proposed in this paper.

PROJECT POTENTIAL

This pipeline as with any similar system must have a use for the products it transports to be considered for potential investment. The interior of Alaska is in dire need of low to moderate cost energy. However, this in no way could justify the need for an alternate pipeline. Less than five (5) percent of our share of the reserves could be used for energy needs. The development of a petrochemical industry as a symbiotic partner would then follow. Since this would be the major customer an overview of its potential and costs is necessary. Using the estimated gas analysis provided by the producers, we arrive at the volumes of natural gas liquids shown in Exhibit B. As you will note, Alaska's royalty share of ethane alone is sufficient to support a 500 million pound per year ethylene plant, based on an 80% yield factor. If propane is included, Alaska by itself has almost enough royalty feedstock for a billion pound per year olefin facility. This would be comparable in size to the largest worldwide facilities now under construction. It is quite possible, however, that when a petrochemical project is developed in Alaska, that one or more of the oil companies who control the remaining LPG fractions at Prudhoe would be an active participant and would assign a share of its LPG to the venture.

LPG supplies to petrochemical plants in the lower 48 will continue to decline in rough proportion to the predictable decline in natural gas

production. Spokesmen for the petrochemical industry now flatly state that no new olefin plants based on LPG facilities will be constructed. All of the new plants, including several that are now under construction, will have to employ naphthas or gas oils as the feedstock. Olefin plants using the heavier feedstocks cost at least 50% more to construct than if ethane or propane were the raw material. Another disadvantage for plants using naphtha or gas oil is that a very broad spectrum of products is produced, ranging from methane and ethylene all the way to heavy fuel oil. While the yield of ethylene from ethane is around 80%, it is only 25-30% for naphtha. Any company desiring to produce ethylene today would be most fortunate to have a secure, economical long term domestic supply of ethane and propane such as should be available in Alaska in the near future.

Let us consider the range of petrochemical projects based on natural gas and natural gas liquids that could be established in Alaska. There are only two major petrochemical candidates that are manufactured from natural gas or methane: (1) ammonia and its derivatives, and (2) methanol and its derivatives. Both products are high volume commodities. By 1980, consumption of ammonia in the U.S. will reach 21,000,000 tons of which 75% will be consumed as fertilizer nitrogen and 25% will be used to produce industrial chemicals. Worldwide consumption by 1980 will be close to 100,000,000 tons.

Unfortunately, ammonia does not appear to be a very good prospect for Alaska for the foreseeable future. The major problem seems to be

one of excessive production capacity combined with rather poor price prospects.

The situation for methanol is similar to ammonia. Without going into details at this time, I would also categorize methanol as an excellent future possibility.

This brings us to the LPG fractions; ethane, propane and butane. I believe that the most experienced venture development specialists would identify the establishment of a major olefin producing complex as a prime commercial opportunity for Alaska. The principle olefins, ethylene and propylene, have become the major building blocks in manufacturing a wide range of synthetic resins and/or organic chemicals. Ethylene would be produced by steam cracking of ethane; and propylene by cracking propane. Natural gas would be used for fuel.

Ethylene is the starting raw material for the two largest volume synthetic resins or plastics, as they are more commonly called, polyethylene and polyvinyl chloride. The latter is generally referred to as PVC. In 1976, approximately 750 mm. tons of polyethylene and 1200 mm tons of PVC were produced in the U.S. By 1980, these volumes are expected to reach 850 mm and 1300 mm tpy, respectively. The worldwide growth rate for polyethylene is established estimated at 10% annually. By 1986, 100 new high density polyethylene plants will be needed, along with an equal number of low density units.

The production of polyethylene in satellite plants appears to be the best

first choice for converting the ethylene into finished commercial products. The satellite plants could produce low density polyethylene which is used to produce pliable sheets and films and soft containers. These plants should be located in the Anchorage area to take advantage of the international traffic.

In rough round numbers, a 500 million pound per year ethylene-polyethylene complex such as I have just described would require an investment of at least $500 million; $250 million for the ethylene plant and $250 million for the satellite conversion plants. Such a complex would provide directly 300 to 400 high quality jobs including a high percentage of technical people -- possibly as many as a hundred. It is possible that a larger billion pound per year ethylene plant might prove to be economically feasible.

A second phase expansion program might logically involve a cracking plant to produce propylene from propane. Additional ethylene would be produced as a co-product. Satellite plants would include a polypropylene plant and possibly an ethylene oxide-ethylene glycol unit. Also, co-polymers and polyethylene and polypropylene could be produced, further broadening the product line. These facilities would probably cost an additional $500 million in 1976 dollars.

To provide feedstock for the petrochemical complex, it would be necessary to construct large, sophisticated extraction plants to remove ethane and propane from the pipeline gas. As the result, propane would be readily available to the public, to industry, and to agriculture in central Alaska and could be transported in the existing product pipeline to Haines. Universal availability of propane throughout Alaska would be helpful in improving living standards of the citizens.

Natural gas would be used as fuel in the ethane and propane cracking plants. We could conceivably be looking at an ultimate total investment of in the range of $2.0 billion and a product volume approaching one million tons of product per year. Total direct employment would be close to 1,000 of which about 200 could be from the engineering or chemistry professions.

These products do not sell by the ton. Rather they sell by the pound - currently close to 30 cents per pound for the products which I have described. The value added in Alaska will be substantial as shown in Exhibit D. The present value of ethane and propane from Prudhoe Bay is approximately 17 cents per gallon or about $79. per ton. Ethylene and propylene, the intermediate products, are worth about $240 per ton. Polyethylene and polypropylene, the finished products sell for $600 per ton and there is no reason that a portion of the polyethylene could not be further upgraded in Alaska. For example, a polyethylene and polypropylene pipe manufacturing plant could be established that would serve Alaska and the Pacific Coast states; or a polyethylene calendering plant could be built to manufacture various grades of films and sheets.