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An Aggregate Income Model of a Semi-Autonomous Alaskan Economy
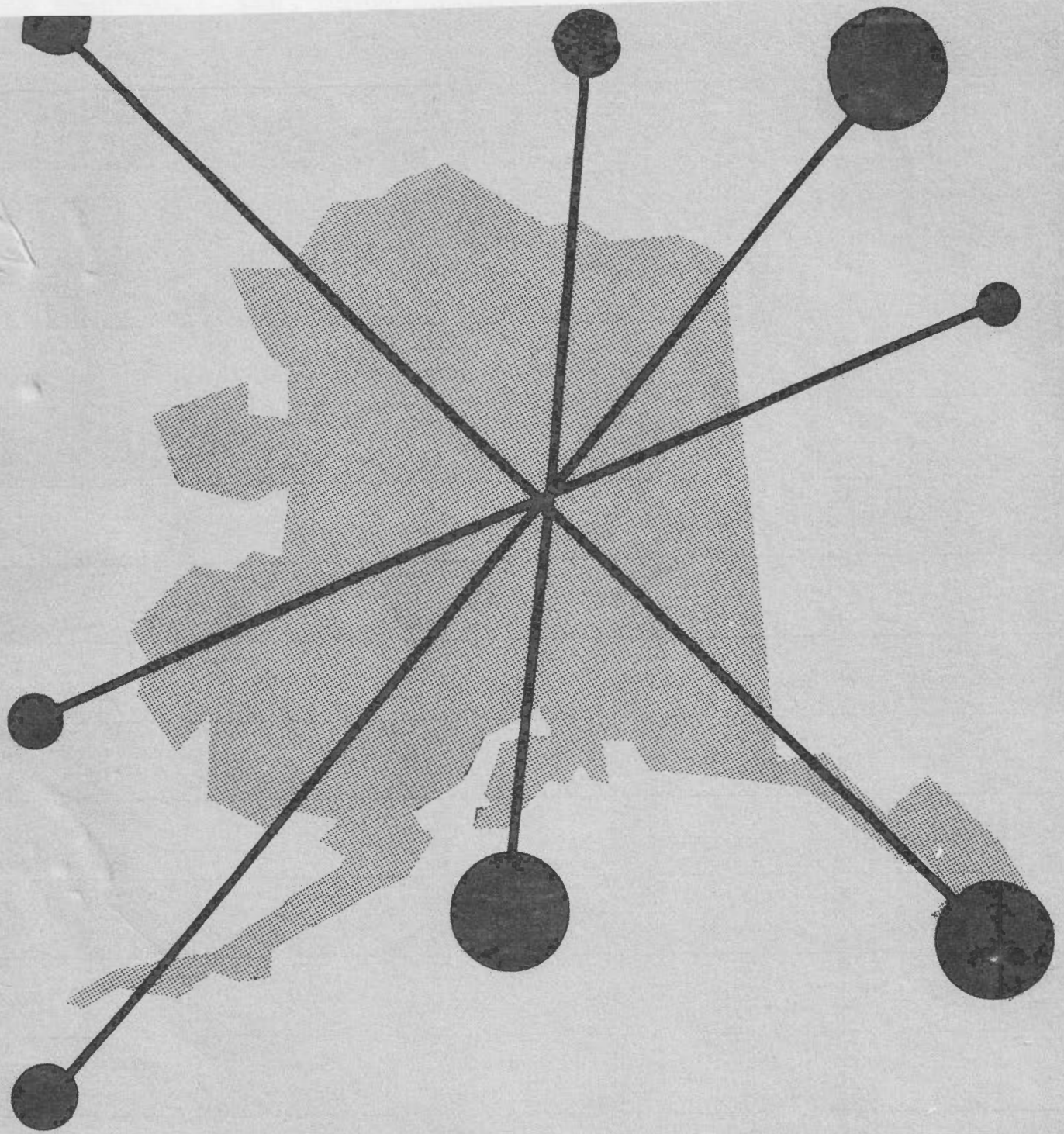
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AN AGGREGATE INCOME MODEL

OF A SEMI·AUTONOMOUS ALASKAN ECONOMY ● ● ● ● ● ● ● ●

Prepared by Bradford H. Tuck for the Federal Field Committee for Development Planning in Alaska ● Alaska, 1967

ALASKAN GROSS PRODUCT BY INDUSTRY
DIVISION BY PERCENTAGE SHARE, 1965

Pie chart segments:
- PUBLIC UTILITIES 2.0%
- COMMUNICATIONS 5.3%
- TRANSPORTATION 5.5%
- MANUFACTURING 8.0%
- CONTRACT CONSTRUCTION 11.4%
- MINING 3.7%
- AG - F - F 0.8%
- GOVERNMENT 36.2%
- SERVICES 7.2%
- F - I - R 7.5%
- WHOLESALE & RETAIL 12.3%

Source: Table I.

Legend: F-I-R = Finance, Insurance, and Real Estate
          AG-F-F = Agriculture, Forestry, and Fisheries

E R R A T A

for

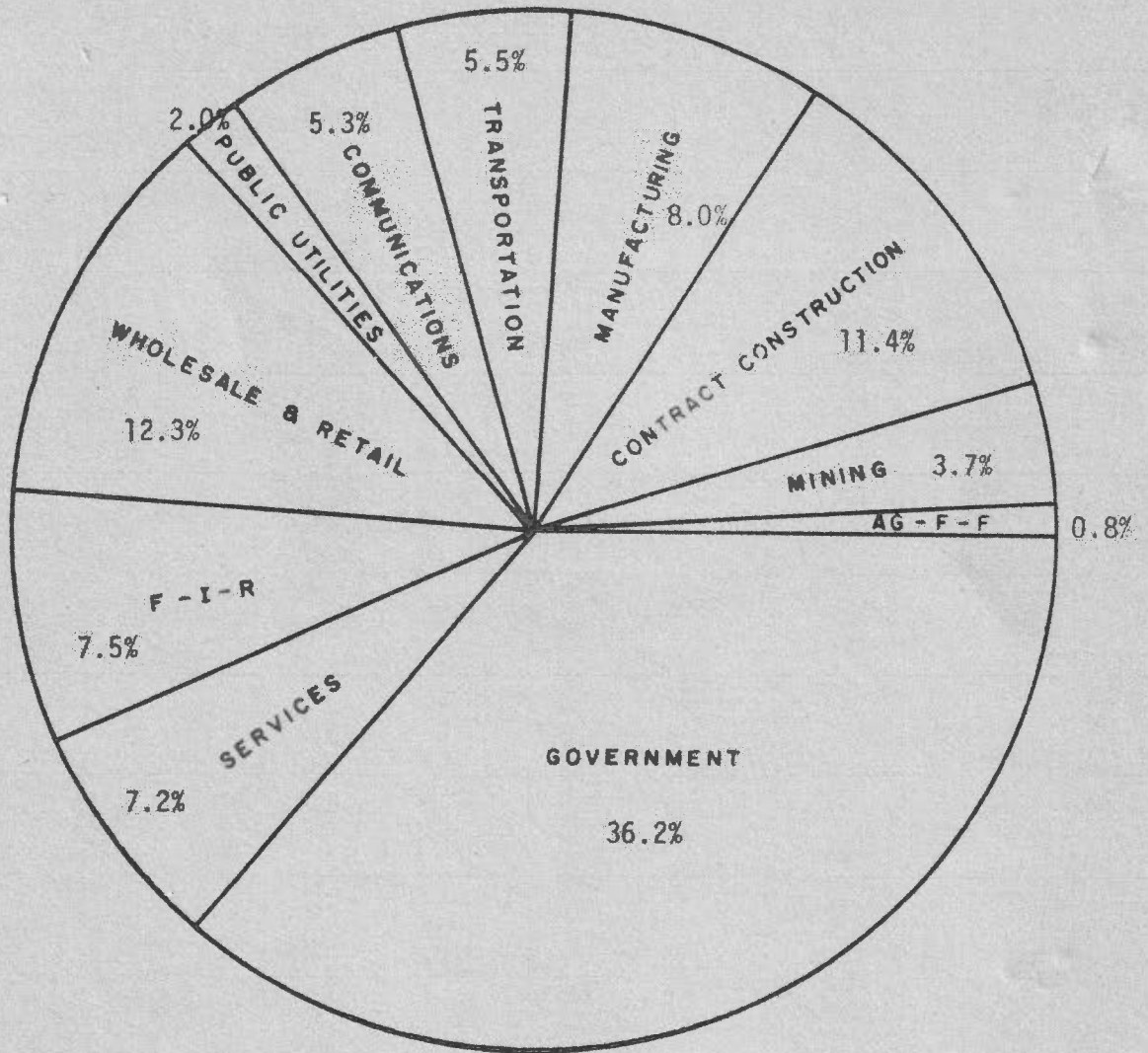*AN AGGREGATE INCOME MODEL*
OF A SEMI-AUTONOMOUS ALASKAN ECONOMY

Prepared by Bradford H. Tuck for the
Federal Field Committee for
Development Planning in Alaska

Page 39, the proportion of the total injections by quarter
is as follows:

Quarter	1967-3	1967-4	1968-1	1968-2	1968-3
Proportion	1/6	1/6	1/9	2/9	1/3

AN AGGREGATE INCOME MODEL

OF A

SEMI-AUTONOMOUS ALASKAN ECONOMY

PREPARED BY

BRADFORD H. TUCK

For
Federal Field Committee For
Development Planning in Alaska

Anchorage, Alaska

1967

PREFACE

The process of reducing an economic system to a few equations and a series of numbers is always an interesting one. However, one needs to be constantly reminded that econometric model building is not an end-all, nor is it the only useful way to analyze economic problems. Nor is it ever a final picture of the economy, but, rather, a reflection of the system as it evolves through time. Hence, the task of model building is never done. In spite of this, various stages of progress do need to be delineated; and the present project marks the completion of the initial Alaskan model.

As is generally the case, in a project such as this, much of the credit belongs with those who are least recognized. Data are the foodstuffs for econometric models, and special recognition is owed to many who have contributed generously to this end. Much of the information is generated by the government of Alaska, and the cooperation of two administrations has been excellent. Commissioners Stevenson and Ronald L. Rettig of the Department of Revenue, Mr. Gus Jurgeliet of the Business License Division and their staffs cooperated most willingly in making valuable and necessary data available. Mr. Robert E. Sharp, former deputy commissioner of administration, provided detailed data on state government expenditures. Mr. Fred Lupro, Supervisor, Resource and Analysis in the Department of Labor, compiled many valuable data not otherwise available; and, in addition, he located and suggested numerous other sources of data. Other

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data were provided by Mr. Eakins of the state Department of Health and Welfare, and Mr. A. W. Lingle and Walter Kubley of the Alaska Department of Commerce provided a continuing stream of data. The federal government also participated in the collection of data in a major way.

<div align="right">B. H. T.</div>

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CHAPTER I

INTRODUCTION

Alaska's present day economic structure, both in terms of chronology and maturity, is one of the youngest in the United States. This youthfulness has its advantages and disadvantages. On the negative side, relatively little is known about the structural relationships that exist between the various sectors of the state's economy. Even less is known about the quantitative magnitudes of the relationships involved. This lack of knowledge can be a distinct handicap in formulating and implementing economic policy. On the other hand, the lack of firmly entrenched intersectoral relationships provides an opportunity to influence and shape the state's economic future with a minimum of disruptive changes in the present economic system.

A question of particular importance deals with Alaska's economic relationship with the rest of the United States and the rest of the world: How directly is the state's economic activity influenced by changes in the level of economic activity elsewhere?

On *a priori* grounds there are good reasons to believe that Alaska's economic activity is fairly independent of that of the economies with which it interacts. First, the government input is both large and stable, or at least has a strong, stabilizing effect. Second, Alaska is subject to greater seasonal variation in much of its activity than is the case of the United States as a whole. The combined effect of these two factors can be expected to produce short-term patterns of economic activity

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that vary noticeably from those observed in the "Lower 49." However, Alaska's export industries are influenced to a large extent by economic conditions "Outside" (as is also the case in the financial sector)--a situation which increases the state's ties with the outside activity. It would appear, then, that Alaska's economic system is neither dependent nor independent but, rather, semi-autonomous.

One of the more recently developed tools for guiding economic policy making is the econometric model. This study is an initial attempt at constructing such a model for the Alaskan economy. It is called an "aggregate income model" because it is designed to incorporate the state's equivalents of major national income account entries. Hence, the model is concerned with the relationship between, for example, consumption and personal income, rather than being aimed at a particular industry or market. When the model has been constructed, it is ready to be used in its two main functions: forecasting and policy analysis.

In the realm of forecasting, the model takes currently existing information and makes a prediction of future values of the dependent variables of the model (such as income, consumption, or employment). With the present model, the forecasts are done on a quarterly basis and can be made with some degree of accuracy for four to six quarters in advance. The obvious advantage of having a forecast is that various policy measures can be initiated to alter the direction and magnitude of economic activity if such actions appear necessary.

An alternative use of the model relates to policy analysis. For example, a proposed change in a tax rate, or a change in the level of gov-

ernment spending, is "fed" into the model while holding the other variables
constant; and the impact of the change is observed. Thus, the model can
serve as a laboratory for economic experimentation by helping to evaluate
policy measures before their actual implementation. Not only can short-term
policy changes be tested, but by altering the structural relationships of
the model, longer-term growth policy can also be evaluated.

One further observation is worth making at this point. Although
designed for policy and forecasting purposes, the model provides a signifi-
cant by-product--data necessary for other research on Alaska's economy.
However, because information systems related to Alaska are generally under-
developed or lacking altogether, much of the data needed for the model can
only be obtained sporadically. This presents obvious problems in keeping
data series current and consistent. Because it is essential that Alaska
know quantitatively where it is and where it is headed, the necessity for
developing adequate and efficient aggregate information systems at all
levels of government should be one of the immediate concerns of state develop-
ment planning.

Chapter 2 gives us a brief look at the Alaskan economy and sets
the stage for the construction of the model.

Chapter 3 is divided into two parts. The first part deals with
the basic ideas and uses of the econometric model; the second presents the
model in its present state of development.

Chapter 4 contains the predictions and policy analyses. Although
it may seem strange to be predicting past events, this is the case with
respect to the forecasts for 1965 and 1966. The forecast for 1967 is that

of an event yet to be completed. Time lags in obtaining some of the crucial data are the cause of the apparent past-future discrepancies. This chapter also puts the model to its second task--that of policy analysis. Alaska's economy has been and still is faced with a cost/price relationship problem. When compared to the rest of the United States and the rest of the world, Alaska is usually at a comparative disadvantage in competitive markets. In aggregate terms, the cost of Alaska's capital, labor, and natural resources (especially land) are all usually well above that of the rest of the United States. Some of the policy measures that could affect these costs are investigated.

Chapter 5 offers some suggestions and guidelines for the further development of information systems and the model itself. Economic model building is, as mentioned, a never-ending process: as the structure of the economy changes, so must the model itself change.

Chapter 6 contains some conclusions and final observations.

Appendices are included, and these contain the basic data series and the derivations thereof. It is hoped that the information will prove useful to others. It is also hoped that others will have suggestions for improving the data or will subsequently be able to make available some of the missing data. In the bibliography, an attempt has been made to include works of general interest as well as material dealing directly with Alaska.

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CHAPTER II
SETTING THE STAGE

In specifying the structural relationships of an economic model, it is necessary to have an overall view of the economic system being approximated. Then, within the general constraints of the aggregate income and product accounts framework, the major sectors of the economy can be "written into" the model.

Aggregate income accounting attempts to measure the economic society's valuation of the system's total output of final goods and services over a given period of time. There are several ways in which the accounts can be constructed; and, in general, the basic concepts and definitions used by the U. S. Department of Commerce are followed in this study. However, certain conceptual problems arise when attempting to shift from the national accounts to the state level. Underlying the social accounting system is the assumption that the economic society is relatively homogeneous with respect to its attitudes towards and the valuation of its economic institutions and the production of its system. A second assumption is that the majority of economic activity is carried on through the market system. Both of these assumptions are perhaps not as convincingly applicable to Alaska's economy as they are at the national level.

The first assumption is of concern since Alaska's Native population historically has a different socioeconomic background from that of the "nonindigenous" population. It is reasonable to assume then that a significant portion of the state's Native population will have a somewhat

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different attitude towards economic institutions and product valuation in the state. It is also a safe assumption that a smaller proportion of the state's total economic activity takes place within the market system than is the case at the national level. This is so not only because of a noticeable "semi-subsistence" sector, but also because of the magnitude of government in Alaska's economy. Generally speaking, then, following the U. S. Department of Commerce accounts when computing, the state product will probably understate Alaska's production because of the difference in coverage of the underlying assumptions.

In spite of the fact that some distortions are introduced by paralleling the national accounts, it was felt to be advisable to do so. First, the distortions are probably not great. Second, much of the data available for the model are based on Department of Commerce figures. Finally, it is desirable to be able to compare state and national output and performance.

One of the basic approaches to valuing Alaskan Gross Product (hereafter referred to as AGP) is to add up the purchases of final economic goods and services produced in the economic system over a given time period. To simplify the process, "purchasers" are divided into four major groups: consumers, business, government, and the "rest of the world". Thus, the basic aggregate equation for the model becomes:

$$AGP = C + I_d + G + (X - M)$$

where C refers to consumption, I_d refers to domestic investment or business, G refers to government expenditures on goods and services, and $(X - M)$ refers to exports minus imports, or the "rest of the world". More precise meanings for these terms are given below.

The term, "consumption," refers to the personal consumption expenditures of the household sector of the economy on consumer goods and services. Generally speaking, these goods are those which are used in the satisfaction of the personal needs and desires of the household or individual. Some confusion can arise, however, when one tries to label a particular good a "consumer good." For example, an automobile is typically thought of as a consumer durable good. However, when a car is used as a taxi, it is no longer a consumer good; it is a "capital good" used in the production of an economic service. The point to be made here is that it is the final use of the good (or service) that determines its classification, not the good itself.

The broad category, "consumption," is divided by the Department of Commerce into three major subcategories: consumption of consumer durables (goods having more than one year's life expectancy), consumption of consumer nondurables (goods having less than one year's life expectancy), and consumption of consumer services (which are consumed at the time of purchase). Examples of the first kind are automobiles, electric appliances, home furniture, and some types of sporting goods. Food, clothing, and footwear would come under the heading of consumer nondurables. The third class, consumer services, includes a broad array of items ranging from medical and legal services to home maintenance, housing, and TV repair. Table 1 and Chart 1 present the figures for consumption in Alaska from 1960-196 6. Table 2 presents the respective percentage changes in consumption.

TABLE 1

CONSUMPTION, STATE OF ALASKA, 1960-1966
(Millions of Current Dollars)

YEAR	DURABLES	NONDURABLES	SERVICES	TOTAL
1960	57.04	191.09	155.01	403.14
1961	59.00	210.83	187.51	457.34
1962	65.08	217.24	196.19	478.51
1963	72.97	228.03	205.73	506.73
1964	83.41	251.35	228.81	563.57
1965	94.74	273.43	248.62	616.79
1966	104.24	299.06	270.05	673.35

Source: *Selected Economic Indicators*, by the author.

Note: The data on consumption presented here differ from those in Appendix II because of a different disposable income series.

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CHART 1 - CONSUMPTION, STATE OF ALASKA, BY QUARTER, 1961-1966
(Millions of Current Dollars)
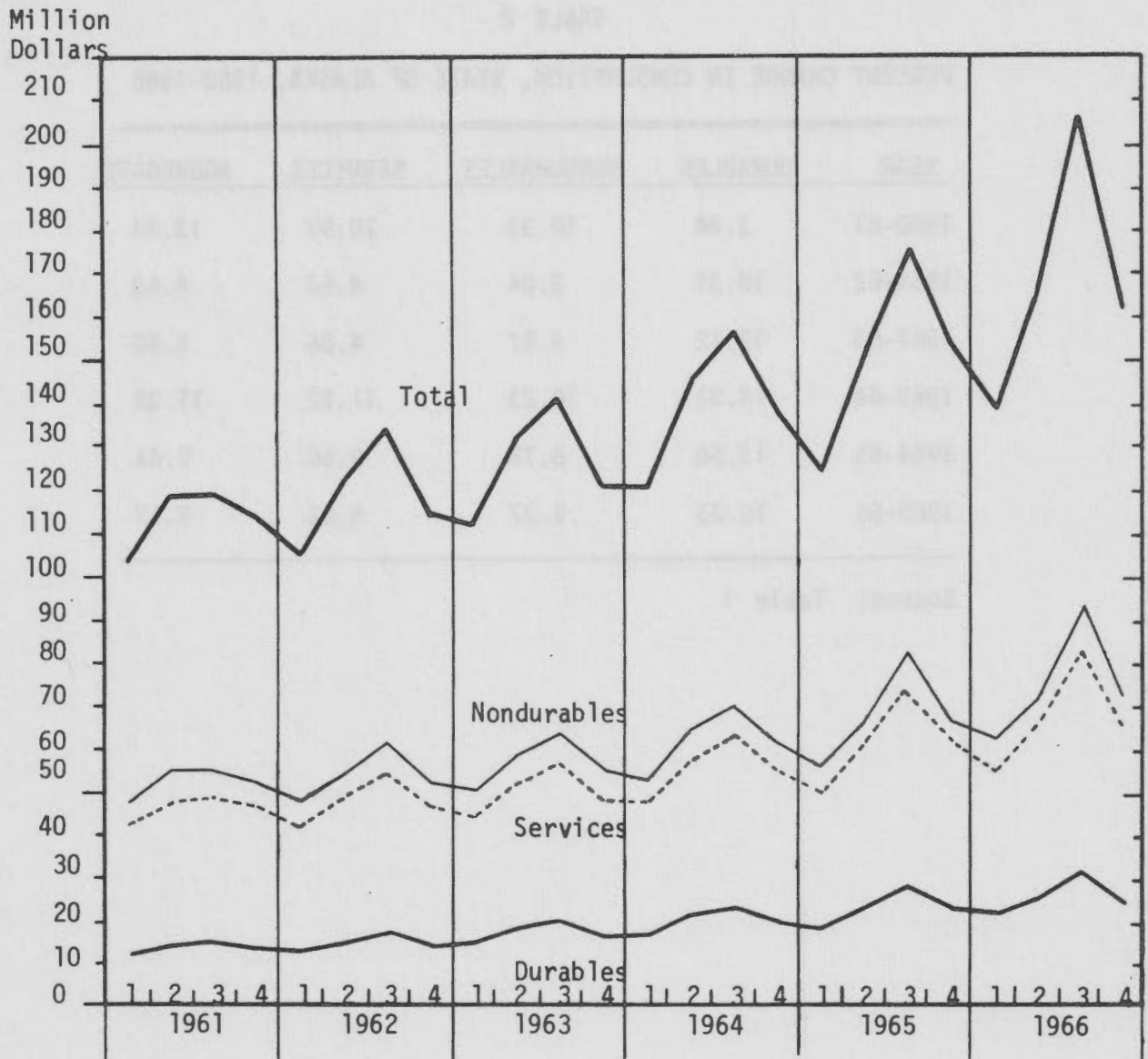
Source: Table 1.

TABLE 2

PERCENT CHANGE IN CONSUMPTION, STATE OF ALASKA, 1960-1966

YEAR	DURABLES	NONDURABLES	SERVICES	AGGREGATE
1960-61	3.44	10.33	20.97	13.44
1961-62	10.31	3.04	4.63	4.63
1962-63	12.12	4.97	4.86	5.90
1963-64	14.31	10.23	11.22	11.22
1964-65	13.58	8.78	8.66	9.44
1965-66	10.03	9.37	8.62	9.17

Source: Table 1

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It is clear from the data in Chart 1 and Table 2 that the three subcategories of consumption do not necessarily move in parallel fashion. Because of this fact, and because different sectors of the business community are affected by changes in different subcategories of consumption, it is important to incorporate each type of consumption into the model independently.

The second of the major categories of expenditure is that of investment. To the businessman or banker, investment frequently connotes the acquisition or ownership of securities or some other form of financial asset. The economist and national income accountant, however, have a somewhat different concept of the term. They have in mind the acquisition or construction of capital, not "money capital," but physical capital (e.g., trucks, machine tools, and plants). Other examples of investment might be highways, schools, hydroelectric plants, and airports. Inventory changes, nonresidential construction, residential construction, and some forms of maintenance are representative of still other forms of investment. It becomes readily apparent that some classification scheme is necessary for investment as well as consumption.

The U. S. Department of Commerce lists three basic categories of private investment: construction, producer durables, and inventories. Note that this is private investment and does not include "investment" by government. More will be said with respect to government investment shortly.

Two other points regarding private investment should be mentioned. Gross investment must be distinguished from net investment, and domestic

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investment must be distinguished from "net foreign investment." Gross investment refers to the total domestic investment taking place within the accounting period. However, since a portion of investment from previous accounting periods has been used up in the current production processes (or depreciated), the addition to Alaska's capital stock will be gross investment minus depreciation. This net addition is net investment. Net foreign investment is discussed in the section on the foreign sector account.

Data on investment in Alaska have proven to be extremely difficult to obtain, especially with respect to the private sector. Consequently, there are many gaps to be filled before a total figure can be obtained. It can be reasonably surmised that government (federal, state, and local) has been responsible for a major portion of that investment which has taken place. On the basis of this, government "investment" has been shifted from the government sector (where it is usually included as part of government expenditures on goods and services) to the investment sector. The term, "government investment," is not usually found in national income accounts; so a brief explanation of the term is in order. Government investment in this study refers generally to the construction of what is often called "social overhead capital," such as highways, ferry systems, publicly owned communications systems (e.g., the Alaska Communication System), government-owned public utilities, schools, and other such items that are paid for by government and whose ownership remains with government.

Government expenditures on gross product are divided between the government payroll and purchase of goods and services from the private

sector. Department of Commerce accounts do not show government investment
as a separate entry, but government budgets normally include both current
expenditure and capital expenditure accounts. Although the capital account
is not strictly comparable to investment, it does provide a close approxi-
mation and is used as the estimator of government investment in this study.

Some idea of the scale of total government operations in Alaska
can be obtained from figures on wage and salary payments to government em-
ployees. These figures are compared to figures for the United States as a
whole in Table 3. Especially striking are the comparisons between the rel-
ative roles of military and nonmilitary federal government wage bills.

TABLE 3

WAGE AND SALARY PAYMENTS TO GOVERNMENT EMPLOYEES, ALASKA AND THE U.S., 1965

	ALASKA		THE U. S.	
	Million Dollars	Percent of Personal Income	Billion Dollars	Percent of Personal Income
Federal (Civ.)	140	16.5	18.0	3.4
Military	141	16.6	9.7	1.8
State & Local	97	11.4	38.5	7.2
Total	378	44.5	66.2	12.4

Source: Base data were obtained from the *Survey of Current Business*,
August, 1966. Percentage data were derived from the base data.

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On a national basis the need for the foreign sector account arises[1] because not all domestic production is consumed, invested, or consumed by government. Some production enters into the world markets. The "net" concept is used because not everything consumed or invested in the domestic economy is produced domestically. This use of nondomestically produced goods and services is not part of domestic gross product and hence must be "netted"-- or subtracted out of total expenditures. Thus, the net foreign balance is basically the difference between exports and imports.

It is quite evident that Alaska is a very active "foreign" trader. The state has no industries of note engaged in the production of either producer durables or consumer goods for Alaska. Therefore, the final expenditure category, "net foreign balance," or "net foreign investment" assumes considerable importance. It should be noted that net foreign investment is not necessarily investment in the domestic investment sense but is actually more of a residual category; namely, domestic production not consumed, invested domestically, or purchased by government.

In following the net foreign investment concept, we are once again departing from the current Department of Commerce methods. Presently, Commerce is using what it calls the "Foreign Transactions Account," which includes not only exports and imports but also government- and -private-sector nonmilitary grants and personal remittances abroad. It might, in fact, be

[1] The term, "foreign," when used with reference to Alaska will mean the rest of the United States and the rest of the world combined. When necessary, the two units will be differentiated.

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more realistic to treat Alaskan accounts in the same manner; but the unavailability of the necessary data, especially with respect to the private sector, makes this impractical at present.

Before proceeding to look at an alternative measure of gross state product, it is perhaps helpful to recapitulate. Alaskan Gross Product has been defined as being equal to the total expenditure on the production of final economic goods and services, where the spending has been categorized as consumption, domestic investment, government purchases of goods and services, and net foreign investment. Generally, these concepts follow the comparable national income accounts except as noted.

One of the basic assumptions of national income and product accounting is that a dollar's worth of production gives rise to a dollar's worth of income. On the basis of this assumption, the value of gross state product can be obtained by summing up the payments to (income of) factors of production--the factors being generally classed as either labor, capital, or land (including natural resources). On the basis of Department of Commerce data, preliminary estimates of Alaskan Gross Product have been derived by major industry group. The information is most illuminating with respect to the structure of Alaska's economy.

It is not surprising that government accounts for by far the largest share of the Alaskan Gross Product or that manufacturing plays a relatively insignificant role in Alaska's economy. Significant figures for mining and contract construction are to be expected also. Although not shown in Table 4, the respective shares of mining and construction are about the

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same for both the U. S. and Alaska, with about 85 percent of the division total accounted for by construction. Chart 2 graphically presents the

Alaska divisions.

TABLE 4

ALASKAN GROSS PRODUCT BY INDUSTRY DIVISION, 1965
(Millions of Current Dollars)

INDUSTRY DIVISION	MILLION DOLLARS	PERCENT OF TOTAL AGP	U.S. INDUSTRY DIVISION AS PERCENT OF U.S. GNP
Agriculture, Forestry and Fisheries	24.1	2.1	3.8
Mining and Construction	133.1	11.8	6.3
Manufacturing	68.4	6.1	30.7
Transportation, Communication, Public Utilities	130.6	11.6	8.2
Wholesale and Retail Trade	117.3	10.4	15.1
Finance, Insurance, and Real Estate	71.9	6.4	11.0
Services	90.6	8.0	11.4
Government and Government Enterprises	492.3	43.6	13.6
Total	1128.3 = AGP	100.0	100.1

Source: Appendix I, Table A.

The most startling figure is that for Agriculture, Forestry, and Fisheries. Not only is the figure well below the respective U. S. figure, it is also the smallest industrial division in Alaska. There are two factors that explain part of the smallness of the figure. First, agriculture

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probably accounts for a much smaller portion of the total than is the case
nationally. Second, much of the fishing and forestry activity (especially
transportation and manufacturing) are included in other divisions. How-
ever, even if part of transportation and manufacturing are attributed to
forestry and fisheries, the industry's contribution to gross product is still
surprisingly small.

The most impressive fact remains that Alaska is very much
dependent upon "big" government to support its economic activity. The im-
plications of this with respect to the future development of Alaska go
beyond the scope of this study; but such problems as the "tax base," the
development of more competitive markets, and the ever-present cost/price
problem, are but a few of the areas in which government must re-examine its
great influence as it looks to policy questions.

CHART 2 - ALASKAN GROSS PRODUCT BY INDUSTRY DIVISION,
1960-1965 [2]
(Millions of Current Dollars)
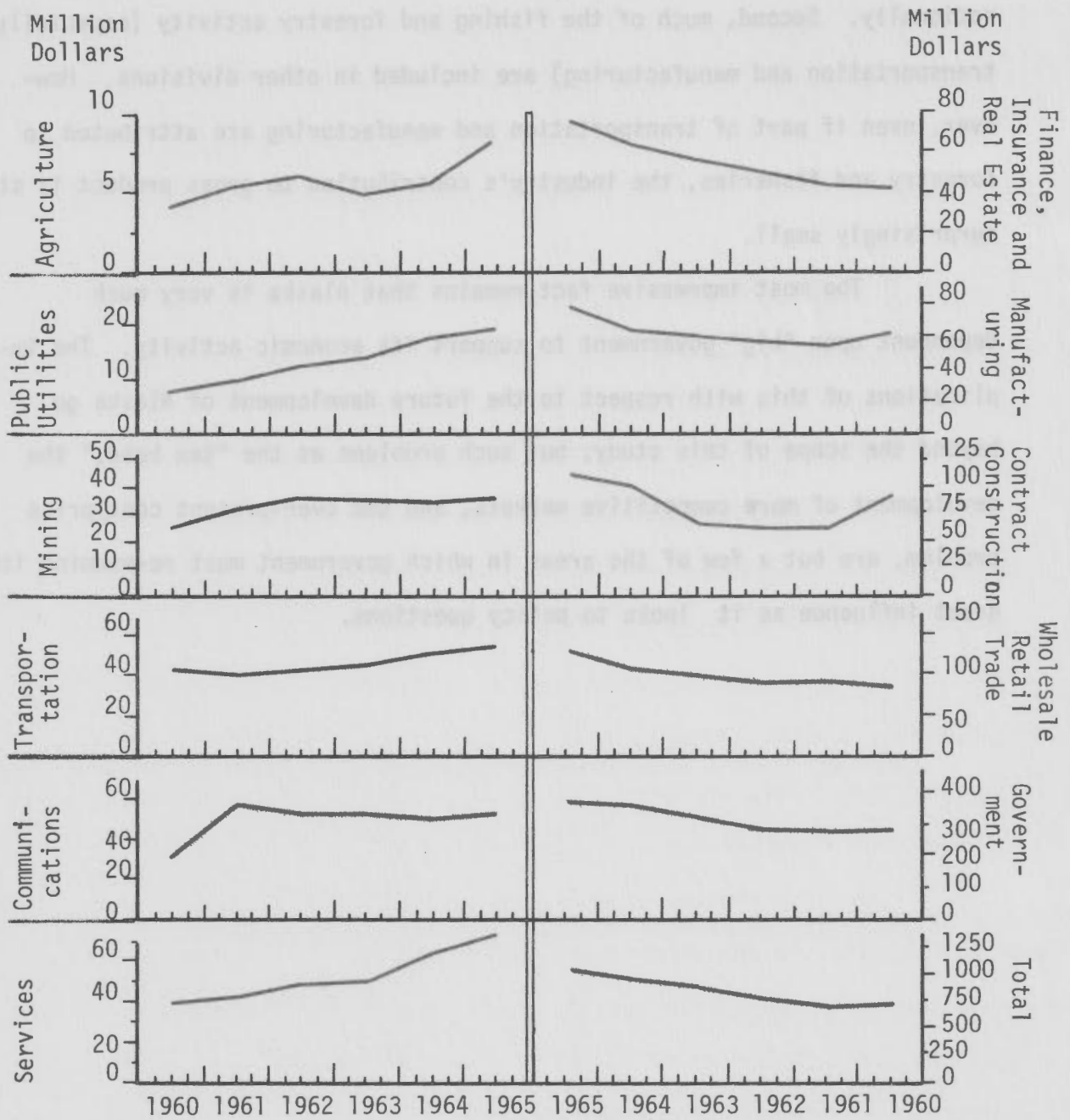
[2] Note changes in scale and direction of time axis.

Source: Appendix I, Table A.

CHAPTER III

THE MODEL

Some Basic Concepts

In principle, econometric model building is a simple task. An economic situation is described by means of a set of mathematical relationships; i.e., a mathematical model. The model can be simple or complex, depending upon the functions prescribed for the model, although simplicity comes at the cost of completeness and detail. An example of a single-equation model is

$$Q_d = Q_d(p),$$

where Q_d represents the quantity demanded of a particular economic good or service, and p represents its unit price. Q_d will be called a dependent (or endogenous) variable, the value of which is determined by the model. Price (p) will be the independent (or exogenous) variable, whose value is determined outside of the system. Hence, the model tells us that, given some value of p, we can determine the value of Q_d, provided that we know the specific functional relationship between Q_d and p.

Economic theory tells us the general shape of the function. Determining the needed functional relationship is the task of the econometrician. He takes observed values of Q_d and p and, employing econometric methods, determines the empirical relationship between the two variables. For example, the following might result:

$$Q_d = 20 - 0.6 \, p.$$

Thus, if the price were ($)5, 17 units would be demanded. In this example

simplicity was achieved at the cost of excluding other variables that could

be expected to significantly affect demand; e.g., personal income levels

and the prices of substitute goods.

Reality dictates that more complex formulations be employed than

was the case in the previous example. Hence, most econometric models are

systems of equations rather than the single-equation model observed. An

example that generally parallels the model developed in this project is

presented below:

$$(1) \quad Y = C + I + G + (X - M)$$

$$(2) \quad C = C(Y)$$

$$(3) \quad I = I(\quad)$$

$$(4) \quad M = M(Y)$$

$$(5) \quad G = \overline{G}$$

$$(6) \quad X = \overline{X}$$

$$(7) \quad \overline{\overline{/\!/}} = \overline{\overline{/\!/}}$$

The variables are defined as follows:

Y = Alaskan Gross Product (endogenous)

C = Consumption   "

I = Investment   "

M = Imports   "

G = Government Expenditure (exogenous)

X = Exports   "

$/\!/$ = Profit   "

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Mathematically speaking, we have a system of seven equations in seven unknowns. This implies that we should be able to solve the model for the unknown (endogenous) variables.

After the econometrician has applied his tools, the following might result:

(1) $Y = C + I + G + (X - M)$

(2)' $C = 10 + 0.7Y$

(3)' $I = 5 + 0.2\overline{77}$

(4)' $M = 4 + 0.1Y$

(5) $G = \overline{G}$

(6) $X = \overline{X}$

(7) $\overline{77} = \overline{\overline{77}}$

The exogenous variables will be determined outside the system. Thus, for example, given G = 20, X = 2, and $\overline{77}$ = 5, substitution of equation (7) into (3)', and substitution of equations (2)', (3)', (4)', (5) and (6) into equation (1) yields a value for Y of 85. Once Y is determined, C and M can also be determined. If the exogenous variables were estimates of Alaska's government expenditures and exports and profits for 1968, then the values obtained for gross product, consumption, investment and imports would be the predicted levels of these items for 1968. In other words, we have seen the model perform one of its two major functions—forecasting.

The second function of the model—policy analysis—can also be demonstrated simply. Suppose that the policy question is, "What will be the effect of an increase in government expenditures from 20 to 25?"

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Assuming that the other exogenous variables remain unchanged, we can simply re-solve the model for the new equilibrium values. The effect of the proposed policy application can then be seen by comparing the pre- and post-change values of our variables. (See Table 5.)

TABLE 5

EFFECT OF CHANGE IN GOVERNMENT EXPENDITURES

	Y	C	I	M	G	X	$\overline{TT}$
Before	85.0	69.50	6	12.50	20	2	5
After	97.5	78.25	6	13.75	25	2	5

It is not necessary to limit policy changes to one variable only. Suppose, for example, that profits were related to corporate taxes in some particular manner. A policy package for analysis might then be a reduction in government expenditure coupled with a reduction in corporate taxes. Simply re-solve the model, using the new values of the two variables; and again the policy implications can be observed.

Although the model developed in this project is somewhat larger and more complex than the above example, there is nothing conceptually different involved in using it for either forecasting or analysis.

A few remaining comments should be made with respect to model building and use. First, no system can hope to include all relevant variables. A line must be drawn somewhere. Hence, exogenous variables in

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one model might be endogenous in a larger system. Second, the model is only as good as the theory on which it is based. In addition, data availability and reliability are determing factors in the performance of the model. Finally, personal value judgments affect the value of exogenous variables used so that there is no certainty that two individuals will come up with the same results, even though they are using the same model. With these qualifications in mind, we can now turn to the actual model.

Present Specifications

The present specification of the model is something of a compromise.[3] On the one hand, it was desired to maintain comparability with national income concepts insofar as possible. This was so for two reasons. In the first place, an analysis of the question of Alaska's autonomy requires some comparability of data. Secondly, resource limitations made it desirable to stay within the bounds of presently existing accounting systems wherever possible. On the other hand, certain conceptual and structural differences between state and national economies do exist; and some account must be taken of this fact. In addition, the ever-present problem of data availability utimately dictates what variables can finally be incorporated into the system.

The model is divided into eight sectors: an aggregate definitional relationship; consumption; investment; government; exports; imports; employment, income, and taxes; and the connecting sector. All relationships are

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 A model which has influenced the initial specification of the present model is one constructed by the Research Seminar in Quantitative Economics at the University of Michigan. See "Forecasting with an Econometric Model" by D. B. Suits, in the *American Economic Review,* March, 1962

linear and all parameter estimates are obtained by single-equation, "least squares" estimates. Variables are either current, lagged or first differences.

Some question arose initially as to whether the model should be constructed on an annual or quarterly basis. In view of Alaska's recently achieved statehood, with implied economic structural changes and short data series, the question was easily resolved in favor of the quarterly model. Obviously, another advantage of the quarterly model, other things being equal, is the more frequent "pulse taking" of the economy. The model is now presented by sector:

I. Alaskan Gross Product

Sector I defines Alaskan Gross Product as the sum of its components: consumption, domestic investment, government expenditures on goods and services (net of "investment"), and the net foreign balance.[4]

$$(1) \qquad AGP = C + I_d + G + (X - M)$$

II. Consumption

Consumption, as earlier mentioned, will be defined as the sum of its component classifications: consumption of consumer durables, nondurables, and services.[5]

$$(2) \qquad C = C_d + -C_{nd} + C_s$$

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[4]
AGP estimates will be found in Appendix I.

[5]
Data used in the consumption sector, as well as descriptions of sources and derivations, are located in Appendix II and Appendix VII.

For certain technical reasons, it is preferable to estimate changes in consumption rather than consumption itself directly. Thus, consumption in time period t is equal to consumption in period t - 1 plus the change in consumption during period t.[6]

$$(3) \qquad C_t = C_{t-1} + \triangle C$$

The empirical relationships established for the consumption categories follow.[7]

$$(4)$$
$$\triangle C_d = 0.5382 + 0.0985 \triangle Y_d - 0.2476 \, C_{dt-1} + 0.0159 \, L_{t-1}$$
$$\qquad\qquad (0.0046) \qquad\quad (0.0902) \qquad\quad (0.0069)$$

The change in consumption of consumer durables is a function of the change in disposable income, previous quarter consumer durables consumption and the previous periods' stock of liquid assets.

The relationships for changes in consumption of consumer non-durables ($\triangle C_{nd}$) and consumer services ($\triangle C_s$) are similar.

$$(5)$$
$$\triangle C_{nd} = -0.3498 + 0.3541 \triangle Y_d + 0.0346 \, C_{nd\,t-1} - 0.0071 \, L_{t-1}$$
$$\qquad\qquad (0.0094) \qquad\quad (0.0461) \qquad\qquad (0.0073)$$

$$(6)$$
$$\triangle C_s = 0.4981 + 0.3145 \triangle Y_d + 0.0169 \, C_{s\,t-1} - 0.0057 \, L_{t-1}$$

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[6] The same type of relationship between the current value of the variables and its change in value from the previous quarter is used whenever changes in value rather than the current values of a variable are used in the functional relationship.

[7] Figures in () are standard errors.

III.   (7) $I = I_p + I_m + I_{soc}$

Investment is the sum of its parts: private sector investment (I_p),

military investment (I_m) and public investment in social overhead capital

(I_{soc}). Various problems, both with respect to private and public sector

investment, have prevented the detailed analysis that was originally intended.

As a result, present public sector investment is included in the government

accounts. Components of public investment that have been isolated are reported

in Appendix IV, Tables A and B.

> [It was the original intent when setting up the
>
> model to disaggregate private sector investment
>
> into component parts; namely, plant and equipment,
>
> residential construction and inventories.]

A fair amount of progess has been made in compiling data on private invest-

ment, but the present series are not sufficient, either in length or coverage

to satisfy established parameter estimates. Hence, I_p remains an exogenous

variable at present.[8] Present data for private investment are contained in

Appendix III.

(8) $I_p = \overline{I}_p$

IV.

(9) $G = G_{fm} + G_{fnm} + G_s + G_l = \overline{G}$

Total government expenditures (including government "investment") are the

sum of federal military, federal nonmilitary, state and local government

_____

[8] The problems with, and suggestions for data improvement in this area are
discussed in more detail in Chapter 6.

expenditures. All government expenditure estimates are exogenous. Relevant data series are found in Appendix IV.

V. (10) $\qquad X = \overline{X}$

Exports of the Alaskan economy are exogenously determined. They are primarily composed of exports of forest products, fisheries products and minerals. The export of tourism is also of increasing importance.

VI. (11) $\qquad M = \overline{M}$

Imports, although generally closely related to gross product, are also determined exogenously. This has proved necessary because of the difficulty of obtaining a sufficient series of adequate length and reliability. In general, imports are composed of consumer goods (about 90 per cent of the total consumption of consumer goods, allowing for wholesale markup), some consumer services, substantially all purchases of capital goods by the Alaskan economy, and some capital services. This is primarily a result of the fact that Alaska produces no consumer or producer durables worth mentioning and almost no consumer nondurables.

It is somewhat misleading to call I, M, X and G exogenous, in that AGP is predicted without first determining I, G, M, and X. This has proved to be necessary because of the difficulty of obtaining anything that even closely resembles useable data. Hence, there are no predictions of these components. Some rough estimates of X-M are contained in Appendix VI.

VII. <u>Income, Employment and Taxes</u>[9]

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[9] Data for Section VII will be found in Appendix VII, as well as the methods used for predicting the exogenous variables.

$$(12) \qquad Y_d = Y_{P_2} - T_P$$

Disposable income is equal to personal income minus personal taxes.

$$(13) \qquad Y_p = W + Y_{pri} + Y_{prt} + TR$$

Personal income is the sum of wage and salary payments plus other labor income, proprietor's income, property income and transfer payments.[10]

$$(14) \qquad W = W_p + W_o + W_{gm} + W_{gnm}$$

$$(15) \qquad W_{gm} = \overline{W}_{gm}$$

$$(16) \qquad W_{gnm} + \overline{W}_{gnm}$$

$$(17) \qquad W_o = \overline{W}_o$$

(18)

$$\triangle W_p = -0.187 + 1.967 \triangle E_p + 39.878 \, \overline{\triangle w_p}$$
$$\qquad\qquad (0.1065) \qquad (4.6447)$$

The change in the private sector wage bill is a function of the change in private sector employment and the change in the private sector quarterly wage rate.

$$(19) \qquad w_p = \overline{w}_p$$

$$(20) \qquad \triangle E_p = -0.485 + 0.219 \, \triangle AGP$$
$$\qquad\qquad\qquad (0.0109)$$

The change in employment (eg 20) is a function of the change in Alaskan Gross Product.

$$(21) \qquad Y_{pri} = \overline{Y}_{pri}$$

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This definition of personal income differs slightly from that of the Department of Commerce concept in that it is not net of employee contributions for social insurance. This slight change was necessary because it was not possible to obtain quarterly data on social insurance contributions. However, the majority of these payments are included in the variables T_{pfy1} and T_{pfy2} (see below).

$$(22) \qquad Y_{prt} = \overline{Y_{prt}}$$

$$(23)$$

$$TR = 10.053 + 0.303U - 2.026Q_2 - 4.844Q_3 - 3.380Q_4$$

$$(0.6278)$$

Transfer payments are a function of unemployment and the respective quarter, Q_i, $i = 2, 3, 4$. $Q_i = 0$ except for the case in which i = quarter being estimated. In that case it is equal to 1.

$$(24) \qquad U = LF - (E_p + E_{gnm})$$

Unemployment is the difference between the labor force and employment in the private and nonmilitary public sector.

$$(25) \qquad LF = \overline{LF}$$

$$(26) \qquad E_{gnm} = \overline{E_{gnm}}$$

$$(27)$$

$$T_p = T_{pfy1} + T_{pfy2} + T_{psy} - T_{ref}$$

Personal taxes are the sum of federal income taxes; "withheld individual income and FICA" (T_{pfy}), and "individual income not withheld and self-employment" (T_{pfy2}); state personal income taxes (T_{psy}); net of refunds on federal income tax payments. Refunds on state income taxes are excluded because the necessary data could not be obtained. Personal property taxes are also excluded because of the lack of adequate data.

$$(28) \Delta T_{pfy1} = -0.212 + 0.0683 \Delta (Y_{p2} - TR)_{t-1}$$
$$(0.00816)$$

$$-0.749 \, Q_{10} + 1.668 \, Q_{11}$$

The change in "withheld individual income and FICA" taxes is a function of the change in personal income, net of transfer payments, logged one quarter, and two "dummy" variables, Q_{10} and Q_{11}. Q_{10} reflects the tax cut of 1964

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and Q_{11} compensates for the strong seasonal influence of April 15. Hence, Q_{10} = 0 for all quarters prior to 1964, first quarter, and 1 thereafter. Q_{11} = 1 in the second quarter, and 0 in all others through 1963.

(29)

$$\triangle T_{pfy2} = -1.301 -0.126 \triangle(Y_{p2}-TR)_{t-1} + 0.658\ Q_{10}$$
$$(0.0121)$$
$$+ 2.801\ Q_{12} + 2.959\ Q_{13}$$

The changes in "individual income not withheld and self-employment" tax payments are a function of personal income, net of transfer payments, lagged one quarter, and three dummy variables, Q_{10}, Q_{12} and Q_{13}. Q_{12} reflects the affect of April 15, and is equal to 1 for the second quarter, 0 for all others. Q_{13} accounts for a seasonal low in the fourth quarter. The negative coefficient on the personal income variable is hard to rationalize, although the partial correlation coefficient is quite high. Possibly, the time lag is incorrect, but inspection of the data does not suggest any more appropriate lag.

(30)

$$\triangle T_{psy} = 0.106 + 0.0106\triangle(Y_{p2}-TR)_{t-1} + 0.749\ Q_4 -0.844\ Q_5$$

Changes in state personal income taxes are a function of lagged personal income, not of transfer payments, and two dummy variables, Q_4 and Q_5. Q_4 reflects high second quarter payments and Q_5 accounts for the apparent contradiction of declining tax accruals at the same time incomes are rising (in the second quarter). That is, Q_4 = 1 in the second quarter and 0 in other quarters; Q_5 = 1 in the third quarter, 0 in others.

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(31)

$$T_{ref} = 3.376 - \underset{(0.00247)}{0.001} (Y_{p2} - TR)_{-1\ yr} + 0.575\ Q_{14}$$

$$+1.389\ Q_{15} - 2.035\ Q_{16} - 2.701\ Q_{17}$$

Tax refunds depend on the previous year's personal income and dummy variables Q_{14}, Q_{15}, Q_{16} and Q_{17}. Q_{14} reflects the tax cut in 1964, with $Q_{14} = 0$ prior to 1964, and 1 thereafter. Q_{15}, Q_{16} and Q_{17} are respectively for the second, third and fourth quarters. It is somewhat unusual that seasonal influence is more significant than previous income in determining refunds. Hopefully, this can be accounted for later on.

VIII. The Connecting Sector

Because of the problems of obtaining satisfactory estimates of the exogenous variables; investment, government and the net "foreign" balance, an alternative formulation for solving the model was necessary.[11] A strong historic relationship between gross product and personal income exists for Alaska. It should be noted that part of this close tie is due to the method of estimating gross product. The following relationships were estimated:

(32) $AGP_1 = - 31.25 + 1.28\ Y_{P2}$

(33) $AGP_2 = - 31.49 + 1.30\ Y_{P2}$

(34) $AGP_3 = - 43.30 + 1.38\ Y_{P2}$

(35) $AGP_4 = - 39.55 + 1.36\ Y_{P2}$

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[11] The basic procedure for solving the model now becomes: first, solve Sector VII for personal income in terms of change in gross product; then, solve the two equations (Sector VII, Sector VIII) for AGP. The rest follows from these two solutions.

Alaskan Gross Product for the respective quarter (AGP subscript) is a function of the same quarter personal income.

This completes the specification of the model.

CHAPTER IV

PART I

THE FORECASTS

The forecast results based on the model are presented in Table 6.
For 1965 the only data forecast were those of consumption. In 1966, more of
the "knowns" were used up and finally fullfledged predictions were made for
the last three quarters of 1967.

It is obvious that the reliability of the estimates decline as
the model relies more and more on predicted rather than known variables.
This is necessarily so for two reasons. Less "known" information is in-
corporated into the later quarter forecasts and successive quarter forecasts
are dependent upon the results determined in the previous quarter. This
provides for the possibility of compounding errors made in earlier quarters.
This is not necessarily so nor even necessarily likely, since there is
some tendency for errors to exert cancelling forces. These comments apply
rather generally to forecasting models. Some comments of particular relevance
to this model follow.

As the estimating procedures got underway, some characteristics
of the model began to show up that require brief mention. Certain relation-
ships showed somewhat startling sensitivity to quite small changes in the
values of particular variables. This is especially true of the "change in

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Although it may seem strange to be "predicting" the past, this is necessary
where either time lags are significant or the generation of input data has
not been undertaken periodically. As the project was in its final stages of

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the private sector wage bill" equation (18). Other problems arose in predicting the exogenous variable $\overline{\angle W_p}$ with sufficient certainty. Hence, for the third quarter of 1967 it was necessary to adjust the value of $\overline{W_p}$ that was predicted by the technique described in Appendix VII. The value used was 0.265. There are two alternative resolutions of the problem. One is the development of more satisfactory predictions of $\overline{W_p}$. The other is to respecify equation (18) so as to reduce the sensitivity of the average wage rate variable. A third alternative, of course, would be to do both.

It also develops that when solving sector VII for Y_p in terms of $\triangle AGP$, the composite coefficient of $\triangle AGP$ exerts considerable leverage on the solution. Once the model was specified, the coefficient was determined so the model user cannot exercise the same judgment over this item as he can over a variable such as $\triangle \overline{W_p}$. However, it does imply that a certain degree of confidence be placed in one "little" coefficient. In the present case the number does seem to warrant this trust.

Another area in which the model seems to be quite "touchy"--and somewhat unsatisfactory-- is in the prediction of unemployment. The estimates for 1967--2nd and 4th quarters--(11.1, 11.5 and 9.1 thousand,

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completion, Fairbanks and the surrounding areas were struck by devastating floods. Hence the predictions contained in Table 6 are tempered to the extent that the Fairbanks conditions affect the aggregate economy of Alaska. In a separate paper (*The Fairbanks Flood Disaster and Alaska's Economy, An Analysis for Economic Policy*, by the author, with Douglas N. Jones, Anchorage, 1967) preflood condition predictions were extended through the third quarter of 1968. Various policy alternatives were then formulated and run through the model. The resulting data are summarized in Table 7.

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respectively) are obviously substantially overstated, except perhaps for the 4th quarter. They are included because they are part of the output of the model, not because they are necessarily accurate. As a result of this, transfer payments are also affected somewhat.

Part of the problem can be traced to a somewhat unsatisfactory transfer payment equation (23). A more serious event is the fact that in defining unemployment a relatively small but important segment of private sector employment was omitted. This is the self-employed group. In retrospection it is now obvious from inspection of the employment data that something was missing when employment and unemployment were totaled and the figure falls some thousands short of the workforce figure.

Once the error was discovered the unemployment equation (24) was respecified to take account of the self-employed. The second quarter, 1967, was re-run. The resulting changes were not spectacular. AGP declined by about 1.6% and the lesser components changed about proportionally. Unemployment was predicted at a reasonable 6.9 thousand. However, when 1967-3rd quarter was re-run, unemployment dropped to roughly zero. Other variables changed by approximately the same amount, percentagewise, as they did in the second quarter. The fourth quarter behaved in roughly the same manner as the third, with unemployment remaining at a grossly understated level. The implication was that the reformulation was no better, and perhaps worse, than the original, so the original predictions are those presented. Of course, it must be concluded that there are rough edges remaining to be

smoothed out in the model.

It is likely that for the above reasons or other yet undiscovered reasons, the forecasts for 1967, (last three quarters) are somewhat over-stated. The errors and biases isolated do not suffice to change the direction of swings, however, and probably do not distort the magnitudes too badly.

TABLE 6

PREDICTED VARIABLE VALUES, BY QUARTER,

1965 - 1967

VARIABLE	1965				1966				1967			
	1	2	3	4	1	2	3	4	1	2	3	4
AGP	. . .	. . .	. . .	. . .	231.0	272.4	311.8	275.3	249.5	295.6	352.8	321.6
Yp_2	. . .	. . .	. . .	. . .	204.9	233.8	257.3	231.5	219.4	251.6	287.0	265.2
W	. . .	. . .	. . .	. . .	166.4	195.8	220.0	196.2	179.4	211.9	248.1	226.7
W_p	. . .	. . .	. . .	. . .	. . .	. . .	117.6	92.0	76.0	101.8	135.9	114.9
W_o	. . .	. . .	. . .	. . .	4.4	5.9	7.7	5.9	4.7	6.4	8.6	6.8
Wgum	. . .	. . .	. . .	. . .	. . .	. . .	59.4	61.1	58.8	63.7	63.6	65.0
Wgm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40.0	40.0
Ypri	. . .	. . .	. . .	. . .	10.7	12.4	14.4	12.8	10.4	12.2	14.2	12.7
Yprt	. . .	. . .	. . .	. . .	14.7	14.5	13.9	13.7	16.7	16.1	16.1	16.4
TR	. . .	. . .	. . .	. . .	13.1	11.0	7.1	8.9	12.9	11.4	8.7	9.4
Tpfy1	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	15.56	16.90	19.29
Tpfy2	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	8.19	3.29	0.80
Tpsy	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6.14	6.82	6.44	6.95
Tref	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	5.12	3.13	3.15
Yd	. . .	. . .	. . .	. . .	179.2	215.3	231.7	208.2	193.9	230.1	263.1	241.8
Ep	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	46.9	58.9	51.6
U	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11.1	11.5	9.1
Cd	19.388	24.190	26.868	23.726	21.946	25.982	27.414	24.734	24.020	28.012	30.879	28.188
Cnd	55.464	68.284	77.741	66.528	58.421	70.474	75.854	66.359	61.247	73.217	84.419	76.526
Cs	50.705	62.254	70.621	60.504	53.305	64.130	68.854	60.294	55.769	66.491	76.352	69.095
C	125.557	154.728	175.230	150.758	133.672	160.586	172.122	151.387	141.036	167.720	191.650	173.809

SOURCE: Model Predictions.

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TABLE 7

VALUES OF SELECTED VARIABLES AND PRE-AND POST-FLOOD ESTIMATES
FOR ALTERNATIVE SETS OF POLICIES
3RD QUARTER 1967 THROUGH 3RD QUARTER 1968
(Dollars are in Millions. Employment is in Thousands)

YEAR AND QUARTER	POLICY SET[a]	ALASKA GROSS PRODUCT	PERSONAL INCOME	DIS-POSABLE INCOME	WAGE AND SALARIES (PRIVATE)	EMPLOY-MENT (PRIVATE)	CONSUMER DURABLES	CONSUMER NON-DURABLES	CONSUMER SERVICES
1967-3	Pre-Flood	352.8	287.0	263.1	135.9	58.9	30.9	84.4	76.4
	Set 1	324.2	266.3	242.8	122.4	52.1	28.9	77.2	70.0
	Set 2	328.0	269.0	245.0	125.2	53.5	28.8	76.6	69.7
	Set 3	331.7	271.8	247.9	127.4	54.3	29.1	77.7	70.4
1967-4	Pre-Flood	321.6	265.2	239.6	114.9	51.6	28.2	76.5	69.1
	Set 1	311.1	257.8	232.9	109.2	48.7	27.8	73.1	66.2
	Set 2	319.4	263.9	238.9	113.9	51.1	28.1	73.9	67.1
	Set 3	325.0	268.0	241.7	116.9	52.3	28.3	74.9	67.8
1968-1	Pre-Flood	271.9	236.9	210.5	86.5	40.2	25.1	65.7	59.4
	Set 1	267.7	233.5	207.9	83.5	38.7	25.2	63.7	57.7
	Set 2	274.0	238.5	212.9	87.3	40.7	25.4	64.1	58.3
	Set 3	278.7	242.2	217.2	90.0	41.7	25.7	65.7	59.5
1968-2	Pre-Flood	319.6	270.1	248.9	113.5	50.2	29.3	78.5	70.8
	Set 1	315.1	266.6	246 5	110.4	48.6	29.4	76.4	69.1
	Set 2	324.1	273.5	252.4	115.3	51.2	29.6	77.2	70.0
	Set 3	331.1	278.9	259.6	118.97	52.7	30.1	79.9	72.1
1968-3	Pre-Flood	381.4	307.7	283.6	149.7	63.2	32.3	90.4	81.1
	Set 1	376.2	303.9	280.8	146.3	61.5	32.3	88.1	79.4
	Set 2	388.5	312.9	289.2	152.7	64.8	32.9	90.5	81.7
	Set 3	399.1	320.6	298.5	157.9	67.1	33.3	93.3	83.8

Source: Bradford H. Tuck, with Douglas N. Jones, *The Fairbanks Flood Disaster and Alaska's Economy, An Analysis for Economic Policy*, FFC, 1967.

[a] A brief description of the policy sets is as follows:

Set 1 - a 1/3 cut in personal income for Fairbanks is
hypothesised in the third quarter of 1967, followed
by four quarters of recovery, without assistance from
the federal government.

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Set 2 - a five quarter ($15 million total) succession of
injections into the personal income stream of
Alaska, by federal government assistance.

Set 3 - same as Set 2 except that the sum of the injections
is doubled to 30 million dollars.

The proportion of the total injections (the same for both
Set 2 and Set 3) by quarter is as follows:

Quarter	1967-3	1967-4	1968-1	1968-2	1968-3
Proportion	1/6	1/6	1/7	2/7	1/3

PART II
POLICY ANALYSIS

The area of policy analysis with the model is primarily limited only by the imagination of the policy suggestor. There is one further (important) limitation and this is that the effect of the proposed change must have a determined or quantifiable influence on at least one variable of the model. Consideration must, of course, be given as to whether or not the proposed change affects the model in such a way that the anticipated changes being investigated can be observed. For example, a wage cut might initially have the effect of reducing AGP. However, this does not tell the whole story since declining wages and prices might go together. It is thus possible that in real terms the economy is actually better off as a result of the wage cut. Unless the model is stated in real terms, or the result can be adjusted for this, the question cannot be satisfactorily analyzed. With these constraints in mind a few of many possible policy questions are analyzed.

The effect of government spending is of particular interest, not only because of the dominant role that it plays in Alaska's economy, but because it is also one of the most readily altered components of spending.

Let us suppose that in the second quarter of 1966, the federal government expended a sum of four million dollars in addition to that which

it actually expended. An extremely important question at this point is to whom the expenditure is made. If it is used, for example, to purchase highway equipment from a "lower 48" dealer, the expenditure has little or no affect on the Alaskan economy. This is so because the expenditure is for the most part offset by the import. If the increase were to go strictly for increased wages to government employees, then there is an entirely different impact. Resolving the model under this last assumption gives the following results.

TABLE 8

CHANGE IN VARIABLES, GOVERNMENT WAGE INCREASE
COMPARISON WITH 1966, 2ND QUARTER

	AGP	Yp	W	Yd	Cd	Cud	Cs
1966-2, Increase	277.6	237.7	199.9	218.7	26.3	17.7	65.2
1966-2, Actual	272.4	233.7	195.8	215.3	26.0	70.4	64.1

SOURCE: Model estimates

In general the gains are not immediately dramatic, nor would one expect them to be. In the course of a few quarters, however, the increases would become more substantial. The basic conclusion to be reached is that the impact of government expenditures is highly dependent upon essentially whose income is affected. In the case of capital equipment purchases, no

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change occurred. Generally the variation in expenditures are due to a variety of purchases and the effects would fall somewhere between the bounds established.

It should also be noted that a reduction in government spending by a similar amount would have roughly the opposite effect observed. This sheds some light on a sometimes-discussed policy to reduce the "cost of living" allowance for federal government employees in Alaska. Thus, a cut of four million dollars in the federal government wage bill for the second quarter of 1966 would leave roughly an 11 percent differential. Whether or not this initial decline in personal income would have a significant effect on the individuals involved, the economy as a whole would not be adversely affected. The complete removal of the differential would not have a too much greater affect. If the deed were accomplished in the single quarter, this would produce a 3.3 percent decline in the gross product, other things remaining the same. Translated into a move from the second to the third quarter, the effect would be to reduce the rate of growth slightly, but little more. At the same time one of the most inflationary pressures in Alaska's economy would be lessened.

Another area of consideration is related to the question of development, or more specifically, where the emphasis on development should be. The following is not an attempt to recommend a particular area of concentration at the expense of another, but rather to point out how different activities affect the economy. The hypothetical situation is as follows. Alaska has its choice between having an increase in investment

by a domestic corporation in oil drilling activity or witnessing a similar amount of increased expenditures by tourists visiting from the "south 49".

In analyzing these two situations, the primary question is once again one of how expenditure components of gross products are affected. In the oil drilling case a probable pattern of events would be for the rig to be fabricated somewhere on the west coast and towed to Alaska by a west coast transportation company. The crews would also likely be from outside the Alaskan economy. As a rough estimate, 75 percent of the investment expenditure would be for capital goods and services imports,(hence, outside the Alaskan economy) with the remaining 25 percent (4 million dollars) resulting in increased expenditures in the Alaskan economy. Supposing that the total expenditure initially involved was 16 million dollars, then we could reasonably hypothesize that the change on the economy's activity would be equivalent to that observed earlier in Table 7.

In the case of increased tourist expenditure, the question is once again concerned with how much of the increase in spending remains in Alaska. It is not unreasonable to estimate that about 60-70 percent of tourist expenditures fall in the category of consumer services. As a result, a significantly higher portion of the increased spending can remain in the Alaskan economy. To be on the safe side, let us suppose that 50 percent remains. The change in economic activity resulting from this will be double that resulting from the proposed investment activity. AGP would

increase to 282.6 million dollars as compared to 277.6 million dollars.
Personal income and the remaining components would also be larger by the
same proportional amounts.

The basic conclusion to be reached from these examples is that
the more directly a change in expenditure enters the economy and the less
leakage there is to imports, the greater will be the short run stimulus
to economic activity.

Returning now to the matter of government spending, there are
other situations that can be analized.

Case 1: The importance of military spending in Alaska has
already been pointed out, and it is well to attempt to quantify the
effects of a major change in military spending. As a case in point, let
us suppose that the Department of Defense announces the cancellation
of a 30 million dollar base housing construction program in Alaska planned
for the third quarter of 1967. What are the economic implications of this
for the Alaskan economy?

In the particular instance it is a case, not of an actual
decline in economic activity, but rather one of foregone economic oppor-
tunity. The real loss is not solely determined by dollars not spent, but
is determined by the amount of economic resources rendered unemployed as
a result of the change in expenditure plans. If the economy were operating
at full capacity to begin with, then the housing expenditure would neces-
sarily result in a reallocation of economic resources (and inflationary
pressures) rather than a change in the level of economic activity. However,

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this situation is (especially for a regional economy) more of a theorectical necessity than an economic fact generally. Assuming that the full amount of increased expenditures could be absorbed into the Alaska economy without exerting undue inflationary pressures, it is meaningful to talk in terms of foregone economic activity.

In the case where the construction project would be undertaken by Alaskan contractors and labor, it can be reasonably assumed that about two-thirds of the contract amount would enter the Alaskan personal income stream, i.e., approximately 20 million dollars. Using the model it is now possible to estimate the "loss" in economic activity. Values for variables, "with" and "without" contract expenditures, are presented in Table 9.

TABLE 9

COMPARISON OF PERFORMANCE OF ALASKA'S ECONOMY
WITH AND WITHOUT PARTICULAR CONTRACT EXPENDITURE
(Employment in Thousands, Others in Millions of Dollars)

QUARTER		AGP	Y_p	E_p	Y_d	C_d	C_{nd}	C'	W_p
1967-3	w(a)	352.8	287.0	58.9	263.1	30.9	84.4	76.4	135.9
	w/o(b)	324.2	266.3	52.1	242.8	28.9	77.2	70.0	122.4
1967-4	w	321.6	265.2	51.6	239.6	28.2	76.5	69.1	114.9
	w/o	311.1	257.8	48.7	232.9	27.8	73.1	66.2	109.2
1968-1	w	271.9	236.9	40.2	210.5	25.1	65.7	59.4	86.5
	w/o	267.7	233.5	38.7	207.9	25.2	63.7	57.7	83.5
1968-2	w	319.6	270.1	50.2	248.9	29.3	78.5	70.8	113.5
	w/o	315.1	266.6	48.6	246.5	29.4	76.4	69.1	110.4
1968-3	w	381.4	307.7	63.2	283.6	32.3	90.4	81.1	149.7
	w/o	376.2	303.9	61.5	280.8	32.3	88.1	79.4	146.3

SOURCE: Table 7.

Notes: a. "w" stands for "with" contract.
       b. "w/o" stands for "without" contract.

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It is apparent that initial "losses" are substantial. However, with the passage of time the differences narrow markedly. There is an implicit assumption in the analysis here that at least some of the unemployed resources are absorbed in other forms of activity as the model moves from quarter to quarter. To the extent that this is not the case, the economic losses will be greater than actually stated. However, to the extent that declines in activity in one sector are frequently offset by gains in other sectors, the assumption is a reasonable one.

Case 2: Another area for which the military plays an important role is in the size of its manpower stationed in Alaska and the resulting affect on the size of the military wage bill. (Changes in the wage bill can, of course, also come about as a result of changes in the composition of armed forces personnel or payscale changes). In the present case, let us hypothesize a manpower buildup over four quarters as a result of the Veitnam conflict. The quarterly increases in the military wage bill are summarized in Table 10. The "with" and "without" buildup values of the major variables are presented in Table 11.

TABLE 10

HYPOTHESIZED MILITARY WAGE BILL INCREASES
BY QUARTER, 1967-4 to 1968-3
(Millions of Dollars)

QUARTER	1967-4	1968-1	1968-2	1968-3	TOTAL
AMOUNT	2.50	1.67	3.33	5.00	12.50

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TABLE 11

COMPARISON OF PERFORMANCE OF ALASKA'S ECONOMY
WITH AND WITHOUT PARTICULAR BUILDUP IN MILITARY STRENGTH
1967-4 to 1968-3
(Employment in Thousands, Others in Millions of Dollars)

QUARTER		AGP	Y_p	Y_d	W_p	E_p	C_d	C_{nd}	C_p
1967-4	Normal	311.1	257.8	232.9	109.2	48.7	27.8	73.1	66.2
	Buildup	319.4	263.9	238.9	113.9	57.1	28.1	73.9	67.1
1968-1	Normal	267.7	233.5	207.9	83.5	38.7	25.2	63.7	57.7
	Buildup	274.0	238.5	212.9	87.3	40.7	25.4	64.1	58.3
1968-2	Normal	315.1	266.6	246.5	110.4	48.6	29.4	76.4	69.1
	Buildup	324.1	273.5	252.4	115.3	51.2	29.6	77.2	70.0
1968-3	Normal	376.2	303.9	280.8	146.3	61.5	32.3	88.1	79.4
	Buildup	388.5	312.9	289.2	152.7	64.8	32.9	90.5	81.7

SOURCE: Based on values appearing in Table 7.

Note: The starting value of the variables are not the actual predictions, but are somewhat lower.

It is apparent that the buildup results in a substantial though not immense increase in the level of economic activity, based on relatively small increments on the input side.

Case 3: Turning now to the private sector for a final example of the model in use, it is of interest to consider the recent salmon run in the Bristol Bay area. Briefly, the run was of extremely disappointing proportions and duration. Reports of total season earnings by individuals of $50 to $100 were not uncommon, although these may be extreme cases. Although not a

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disaster in the Fairbanks sense of the word, the situation could be one of extra hardship for those who depend upon summer fishing earnings to see the year through. Estimates of the dollar drop in personal income for the region are not yet firm. However it is possible to roughly estimate the decline on the basis of last year's activity. Based on industry wage and salary payment reports for the area in 1966 third quarter, a relatively good year, the drop could be as much as 4 million dollars.

Two points of concern are raised by the situation. The first is, of course, what now happens to the (mostly native) workers whose incomes have been sharply cut? Unfortunately, the answer is one based primarily on relief assistance in non-cash forms. Alternative forms of employment are not generally available. The second question is of more general concern --what is the impact of the income loss on the aggregate Alaskan economy? Using the previously mentioned figure of 4 million dollars, we can use the model to generate some estimate of the effect (See Table 12).

First impressions are that the declines are not really substantial, nor are they particularly enduring. Most losses have been reduced to insignificant amounts by the second quarter of 1968.

On the basis of the income model these impressions are correct and herein lies one of the real dangers of aggregate income model analysis, i.e., the aggregate "glosses over" the particular situation that generated the analysis in the first place. The native in Dillingham whose income was so drastically cut in the first place has probably existed at near subsistence levels through the winter and spring (with no recovery of income),

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TABLE 12

EFFECT OF A 4 MILLION DOLLAR DECLINE
IN PERSONAL INCOME DURING THE 3RD QUARTER OF 1967
(Millions of Dollars)

QUARTER	a	AGP	Y_p	Y_d	W_p
1967.3	B	352.8	287.0	263.1	135.9
	A	345.6	281.8	258.0	152.5
1967.4	B	321.6	265.2	239.6	114.9
	A	319.0	263.3	237.9	113.5
1968.1	B	271.9	236.9	210.5	86.5
	A	270.8	236.0	209.8	25.7
1968.2	B	319.6	270.1	248.9	113.5
	A	318.5	269.2	248.3	112.7

SOURCE: Author's computations.

a: "B" before drop. "A" after drop conditions.

while persons elsewhere contentedly experienced the aggregates returning to "near normal" levels. In short, aggregate analyses do not have much to say for individual economic welfare.

In closing it should be pointed out, of course, that the policy analysis applications are subject to the same constraints as are the forecasts regarding accuracy and reliability of the model. Furthermore there are many factors that the model does not encompass explicitly, especially in the area of value judgments. The model can relatively accurately assess the dollar changes brought about in pursuing different economic activities, e.g., investment versus tourism expenditure. It cannot measure the desirability of one over the other on other grounds. Hence, the model can serve as a useful indication of direct economic changes resulting from policy action, but does not prescribe final decisions.

CHAPTER V

THE NEXT STEP

The task of emperical economic model building is a never ending
one. In the first place, no model ever does precisely what is expected of
it; nor does it perform with as much precision as desired. Then, too, as
the structure of the economy changes, so must the specification of the
model. A third consideration that necessitates continuing revision of the
model is the need for the improvement of old, and the development of new,
data sources and series.

The matter of the adequacy and suitability of data is one that
perhaps requires the most intensive effort in the near future. This involves
maintaining the present series on an up-to-date basis and revising and
creating necessary new series.

Updating present series is, in most cases, a now somewhat routine
task. The basic requirement is that someone familiar with the data and
sources be given the responsibility for their continuation. This could be
handled by one of the federal or state agencies concerned or arranged with
one of the universities in the state. The revision and creation of certain
series is a more complex task. A discussion of these problems can best be
handled on a sector-by-sector basis.

The present AGP figures are derived by comparing the Alaska data
on wage and salary payments by major industrial sector to similar data on
United States employee compensation and GNP using comparable industry divisions.[13]

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[13]The actual technique for deriving AGP figures described in Appendix I,
Table A.

The major shortcoming of the method is the assumption that the AGP/Alaskan

wage and salary payments ratio is the same as the national ratio. The problem

here is that, in addition to employee compensation, net interest, capital

consumption allowances, indirect business taxes, and profit-type income,

we also have the components of gross product. If the sum of these items

does not bear the same proportionate relationship to both state and national

gross product, we have introduced a certain amount of error into the esti-

mates. At present, there is no alternative but to make the assumption; and

the error introduced should, generally, not be large. The data necessary

to check the proportionality assumption will shortly become available as the

result of another study presently being made for the Federal Field Committee

for Development Planning in Alaska.[14] Hence, one of the first "next steps"

should be the revision, if necessary, of the present AGP estimates. The

consumption sector of the model is currently one of the most difficult for

which to obtain data. There is no state or federal agency presently compiling

such information on an on-going basis; and, as a result, the consumption

sector figures represent a "one-shot" affair. This is especially unfortunate

since consumption represents such a sizeable portion of gross expenditure in

Alaska. Furthermore, the present figures are probably not the most complete

or accurate numbers which could be obtained.[15]

The compilations of present consumption data are based on the

so-called "retail sales method." As such, they exclude certain important

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[14]An analysis by Roger A. Bye on selected corporate finance ratios experienced
in Alaska compared with the nation as a whole: as yet untitled and due
for publication Fall 1967.

[15]The limitations of the present consumption figures are discussed in
Appendix II.

kinds of consumption. In the area of consumer durables and nondurables, certain omissions are evident. For example, it has not been possible to obtain figures for military "on-base" consumption. Also, Alaska has a not insignificant "subsistence sector" economy in which goods and services do not pass through the dollar-counting turnstiles of the market system. Wild game and fish are two items of considerable importance here. Some estimates of the value of these items have been made but nothing that would provide quarterly estimates for a four or five-year time span has become available.

The subsector of consumer services is also in need of improvement and will be more difficult to upgrade. The basic problem here is that many of the transactions, although taking place in the market system, are not classed as retail sales. Such items as bank service charges, fees for lawyers and physicians, and values of owner-occupied dwellings are all examples of what some of the difficulties are in estimating services.[16]

The shortcomings and problems associated with the present data on consumption suggest where further development should be directed. Clearly, the single most useful development would be for the Business License Division of the Alaska Department of Revenue to report annual gross receipts by Standard Industrial Classification 3-digit code number. This

[16] One additional problem with the retail sales method in general is that it makes no distinction between sales to consumers (final sales) and sales to business (intermediate sales). However, at least some intermediate sales are netted out in Business License returns. For a detailed discussion of methodology and problems of estimating consumer services (and durables and nondurables) see Oshima, Harry T., and Mitsuo Ono, *Hawaii's Income and Expenditures, 1958, 1959, and 1960, (Preliminary & Tentative) 3 vol., chap. IV and VII*, Economic Research Center, University of Hawaii, Honolulu, Hawaii, 1965.

would provide data comparable to those on which the present figures are based. These data are the most reliable sources for the major portion of expenditures on consumer durables and nondurables. A more detailed discussion relating to these procedures is included in Appendix VII. As a supplementary project, it would be highly desirable to conduct a selected stratified sampling study among retailers in an attempt to determine mixes with respect to sales of consumer durables and nondurables as well as final sales versus intermediate sales. It is possible to roughly crosscheck the consumer durables/nondurables sales mix with the 1963 Census of Business.[17] The assumption that the mix is roughly the same for the U. S. as a whole and for Alaska is substantiated. There appears to be about a 5 percent difference. However, a more frequent check on this, with less time lag in data availability, is necessary in the interest of more precise results.

A third area of development in consumption data is complementary to this present study. Now all quarterly data must be imputed on the basis of annual data. The result is a certain amount of implied precision which may not be warranted in fact. Hence, quarterly reporting of sales by a selected sampling of retail sales firms would provide additional valuable information for the consumption series. It is likely that this step would require assistance from either state or federal agencies. Once again, these data should be collected on a sales mix basis. There is no reason why military "on-base" consumption could not be included at this point for completeness.

[17]U. S. Bureau of the Census, *Census of Business, 1963, Retail Trade: Merchandise Line Sales, Pacific States,* BC63-RS7K, U. S. Government Printing Office, Washington, D.C., 1965.

The final two areas of development include the previously mentioned subsistence and consumer services sectors. Both require special efforts. The former could, perhaps, be handled through the Bureau of Indian Affairs since it has the broadest contact with the subsistence sector. Again, consumer services are particularly difficult to estimate because of the wide variety of categories involved and the elusiveness of many of the items. It would be helpful to conduct at least one major study in this area to establish a benchmark. At the same time, a periodic reporting system could be set up which would permit reasonably accurate updating of the series on a quarterly basis.

The present shortcomings of the private sector investment data relate to investment undertaken by nonresident corporations, individual proprietorships, and partnerships. In addition, the present data are not periodically compiled; and, as in the case of the consumption data, there is little prospect of maintaining the series on an up-to-date basis. The final shortcoming of the present series is the fact that components comparable to the national income series cannot be broken out. This may not be too serious since the state and national totals are generally comparable. The principal disadvantage is that residential construction and other investment frequently move in different patterns and are determined by different variables.[18]

[18]Oshima, Harry T. and Mitsuo Ono, *Op.Cit.*, Chap. VII. Also, U. S. Department of Commerce, Office of Business Economics, *National Income, 1964 Edition, A Supplement to the Survey of Current Business*, U. S. Government Printing Office, 1964; and U. S. Department of Commerce, *Survey of Current Business*, Vol. 45, No. 8, August, 1965.

The best potential source of complete aggregate investment data is the Alaska Department of Revenue. Analyses of corporate income, partnership income, and Schedule C of the personal income tax returns could yield a very useful and relatively low-cost source of primary investment data. (Suggested outlines for data processing systems to generate the information are included in Appendix VII.) The principal shortcoming of these data is the fact that they are on an annual rather than quarterly basis. Quarterly reporting by selected firms, as well as apportionment of annual figures to wage and salary payments in certain industry groups, should produce the desired quarterly data.

The more difficult task--that of detailing investment by type-- is a major project in itself and is probably too costly to undertake until such time as comprehensive state income accounts are desired.

As is frequently the case in econometric models where one is attempting to predict future investment behavior, the results are not generally very satisfactory. This is so for several reasons. Investment is one of the most erratic and widely fluctuating series in the national income accounts. Moreover, economic theory itself leaves something to be desired in explaining investment behavior. Hence, some models incorporate independently obtained planned investment data, especially plant and equipment expenditures. Notable among these anticipatory surveys are those conducted by McGraw-Hill, the National Industrial Conference Board, and the Securities and Exchange Commission.[19] A similar type of survey of firms doing business

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[19]*Annual Survey of Business Anticipations of Plant and Equipment Expenditures*, Securities and Exchange Commission and the U. S. Department of Commerce; also, *Business Plans for New Plants and Equipment*, Mc Graw-Hill; *Quarterly Survey of Capital Appropriations of the 1000 Largest Manufacturing Firms*, National Industrial Conference Board.

in Alaska would probably produce more reliable data on future investment expenditures than would the present specifications of the model.

It was somewhat surprising that data were not more readily available for the government sector. The 1962 *Census of Governments* provided a benchmark for state and local government but only a moderately satisfactory one. One of the principal problems was that the *Census* used mixed fiscal year endings in compiling the data. As a result, the data cover fragments of an 18-month period. Surprisingly, federal government expenditures were not even reported by the state.

Aside from the *Census of Governments* and one or two other published items, the remaining government data had to be compiled by special request or derived. Needless to say, it was rather disconcerting to learn that more useful and reliable data on government expenditures (especially federal) were not available.

There are several solutions to the problem; and, of course, all should be preceded by a thorough analysis of precisely what data are needed. Certain conceptual problems need to be resolved in the aggregate income accounts relating to who is making what expenditure where and just which expenditures are supposedly being measured.

In the Alaska case, the most promising potential source of adequate government data is in the Statewide Information System, which is being developed for the state of Alaska by the Lockheed Missile and Space Company. However, for the potential to be realized, a considerable amount of guidance will be necessary. Particular emphasis will need to be

placed on the necessity of incorporating federal and local government data into the system. At present, it is not clear just what Lockheed has in mind for this important portion of the system.

Another alternative is for the responsibility of data gathering and compilation to be assumed by a government agency such as the state's Department of Economic Development of Department of Labor. Still another possibility would be to split the task among various levels of government. For example, the U. S. Bureau of the Budget should be able to compile federal government expenditures in Alaska; the state's Local Affairs Agency ought to be able to collect local government data, etc.

Although the question of precisely what data are desired will vary depending upon the particular use for the data, certain general guide-lines are clear. The primary concern is: What effects on the economy of Alaska does the particular expenditure of government dollars have? Also of real concern is whether or not the expenditure is actually made in Alaska or elsewhere.

The problem of government expenditure in Alaska, both in terms of basic data and, more broadly, in terms of its impact on the economy, is especially important in Alaska. Hopefully, some of these data questions can be resolved in the near future to facilitate the pursuit of policy analyses.

Probably the most perplexing sectors in the model, with respect to data accumulation, are those of imports and exports. No state is anywhere nearly as "closed" an economy as is the national economy. Records of inter-state commerce comparable to international commerce are almost nonexistent.

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The problem of resident-nonresident, both individual and corporate, is not very satisfactorily resolved for "export and import" analyses on the state level. For the present, the export and import sections remain essentially blank except for the rough estimates of X-M used in the paper. With the accumulation of certain basic data relating to wholesaling and retailing activity it should be possible to make some reasonable estimates of imports of consumer durables and nondurables in the fairly near future. Imports of consumer services will be more difficult to obtain but are of less significance than the other two consumption categories. The area of capital imports should also begin to yield information as more data on investment activity become available.

Exports should be somewhat easier to isolate than imports, but this has not proven to be the case. The single largest obstacle is the fact that dollar values of most exported items include the import of various services. For example, values of fish catches are frequently stated in Seattle wholesale prices and, as such, include, in part at least, imports of manufacturing and transportation services. One of the primary problems in the forest products industry is the small number of firms in the industry and, hence, the problem of maintaining confidentiality of information. It should be possible to derive fairly reliable estimates as more information on the corporate sector becomes available. Once again, however, compilation of the export series will require substantial effort as well as improved new data.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Attempts at aggregate income model construction are probably never entirely satisfying. Desired data rarely can be fully obtained, and the model never seems to perform as well as it "should". Yet, in this analysis, a substantial amount of new data has been generated; and the model should produce fairly accurate predictions over the near future.

One of the most emphatic points to emerge from the study was the total inadequacy of existing data (at the outset) necessary for the development of the model. This problem had not been unanticipated, but it was certainly underestimated. The paucity of data in so many areas cannot help but be a deterrent, not only to model building, but also to informed decision making in matters of economic concern throughout the state. It is a situation that should not be allowed to continue.

The data generated in this study, as well as by other Federal Field Committee research, have served to partially fill the gaps in limited areas. However, this is no substitute for the rapid development and implementation of an adequate overall information system for Alaska. There are several alternative courses of action open:

(1) Continue the present contractual relationship with Lockheed Missile and Space Company for development of a statewide information system;

   (2) Expand rapidly and substantially the state's Division of

      Data Processing with particular emphasis being given

      to the development of an information system;

   (3) Establish (or make use of an existing) State University

      Institute charged with the responsibility of developing

      and operating the information system; and

   (4) Explore the possibility of inducing the Regional Econ-

      omics Division of the United States Department of

      Commerce to undertake the continuing development of the

      information system as a pilot project in regional

      economic work.

   The first of these alternatives has some merit in that Lock-
heed is already involved and a transition might be complex. However, many
gaps remain in Lockheed's proposed system which must be filled before
it can be a truly statewide system of consequence regarding economic
information. (The same may be true in other information areas.) It is
positively important that more concern and attention be given in the project
to the incorporation of local and federal government information. Also
of concern is the ommission of corporate income tax return from the data
processing system. In general, considerably more care and study must be
given to the definition and form of data to be included in the system.
This is particularly true with regard to the economic analysis subsystem.

   The second alternative has several aspects that are particularly

appealing. First, the cost of maintaining a staff on a permanent basis
is substantially less than that of underwriting consultant fees, overhead
charges, and per diem allowances. Second, the staff that is ultimately
going to be responsible for the development, implementation, continuing
refinement, and operation of the system, is an integral part of the
system at all stages, rather than appearing on the scene at the last minute.
Third, a potential communication problem between user and ultimate operator
is eliminated.

The primary drawback to this approach is that operational staff
levels are less than development staff requirements. Either a longer
development-implementation period can result or certain staff reduction
problems might occur as the system comes "in line". One good solution to
this particular problem is, of course, to reduce the level of contract
assistance at the same time permanent staff is being increased. Thus, the
necessary development strength can be maintained, while avoiding the
problem of over staffing of permanent employees.

The third alternative offers many of the advantages of the second,
but in addition, it would result in more utilization of the capabilities
and resources of the state unviersity. This would be of particular benefit
in the area of development research.

The final alternative is one that has not been explored. In-
formation systems are expensive. Thus, the question of funding frequently

becomes a deterrent in the ultimate level of sophistication, operational efficiency, and utility achieved by the system.

A cost/benefit analysis of the system is difficult in part because of the many intangibles associated with it. Certain other benefits are fairly obvious. Automated data processing enables a given level of staff to substantially expand its productivity. This, in turn, reduces the demands for personnel increases to meet expanding functions of government. In the area of tax revenues, data processing is particularly valuable, both in increasing the effectiveness of enforcement and in providing better service to the taxpayer.

Intangible benefits are particularly significant in the area of economic development and analysis. Improved decision making should result as better information about the state becomes available. Also of considerable importance is better information for industry and commerce interested in establishing a base of operations in Alaska. The effect here is two-fold: Industries that can "make a go of it" can be more certain of success; at the same time, those that cannot, realize it. The result is a more viable economy.

One final point needs to be made with respect to this brief evaluation. The bureaucracy and machinery of government tend, frequently, to submerge its primary function--that of serving the people at the lowest possible cost per unit of service desired. A statewide information system can often reduce this cost significantly.

Returning to the question of funding, three observations should suffice:

(1) The benefits derived from a well-developed, well-operated information system warrant whatever expenditures are necessary; and the state should not lag in this respect;

(2) If sources of funds are available from outside of state government revenue, the state should take advantage of these, especially in the development and implementation stage; and

(3) The preceding remarks are qualified by the opinion that these expenditures (regardless of funding sources) are justified only so long as the state is receiving maximum dollar value for its dollar input. The state should not hesitate to seek assistance to insure that this is the case.

It is obvious that aggregate income models in general, and this one in particular, cannot await the development of "perfect" information systems to supply the data inputs. (It is strongly recommended, however, that the suggested subsystem in Appendix VII be incorporated with the information system as rapidly as possible.) One must work with available data, incorporating improved sources as they become available. (It is also essential that data be maintained on a periodic basis if the

model is to continue to function.) Of equal or greater importance is revising and updating the model itself, as well as the continuing utilization of the model in its two functional areas. The usefulness of the model as a forecasting instrument (Chapter IV - Forecasts and Policy) can only be evaluated over time. For the most part, the model is based on data for a single upswing in a business cycle; and, therefore, it is open to some question as to whether it will accurately predict a turning point in long-term economic activity. The fact that it is a quarterly model, and as such, indicates the seasonal swings in Alaska's economy, suggests that the model will be more sensitive to long-term declines than would be the case for an annual model. This will become clear over time. In any event, it is apparent that further development work is needed on the model as has been pointed out in Chapter III and need not be repeated here. Also in the future for the model should be the continual updating and revision of the equations as more data become available.

A final question remains to be discussed, and that is the one of Alaska's economic autonomy, or lack thereof. The original impressions of a mixed picture have been generally substantiated. Not surprisingly, Alaska's seasonal swings are considerably more pronounced than those of the United States as a whole. It is also encouraging to note that the magnitude of the seasonal fluctuations is apparently declining with time. On the long-term, cyclical fluctuation, not so much can be said. Alaska underwent a decline in gross product in 1961, as did the United States economy; and both

have been climbing more or less steadily since then. Both Alaska and the United States underwent slowdowns in economic activity recently, at about the same time. Government expenditures continue to play a major role in both the state and national economies, but the input is far greater in Alaska than nationally. As long as these expenditures are constant--or growing,--Alaska's economy will probably continue to expand, or at least not decline as much as the national economy in a downswing.

Of particular interest are the rough estimates of Alaska's deficit in the "net foreign balance", which runs roughly between 200 million dollars and 300 million dollars annually. This is approximately 20 percent of AGP. It is an extremely high figure and has persisted over several years. No national economy could hope to sustain such a proportionate deficit, and it is probably only by major federal government expenditures that the state continues on this path. The primary reason for concern here is that a deficit exerts inflationary pressure on the economy--and this is a big deficit, indeed.

Alaska should be particularly concerned because the normal equi-librating forces of balance of payment deficits do not work for a region within a given monetary system. What results instead is a continuing cost/price problem which weakens or destroys development opportunities by eliminating any competitive advantage or reasonableness that may exist. The end result is the state's continuing reliance upon artificial external supports for its economy rather than the development of a viable self-sus-taining economic system.

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APPENDIX

ALASKAN GROSS PRODUCT BY INDUSTRY DIVISION, QUARTERLY, 1960-1965
(Millions of Current Collars)

INDUSTRY DIVISION	QUARTER	1960 $	1960 %	1961 $	1961 %	1962 $	1962 %	1963 $	1963 %	1964 $	1964 %	1965 $	1965 %
Agriculture,	1	0.3		0.1		0.3		0.3		0.3		0.7	
Forestry and	2	1.1		1.9		2.4		1.2		1.1		1.9	
Fisheries	3	1.8		2.8		3.0		3.1		3.5		4.5	
	4	1.2		0.9		0.6		0.5		0.9		1.2	
Annual Division Total		4.3	0.6	5.7	0.8	6.3	0.8	5.2	0.6	5.8	0.6	8.3	0.8
Mining	1	5.2		6.3		7.0		7.9		8.0		6.8	
	2	6.9		8.6		9.1		9.2		9.1		10.1	
	3	8.7		10.7		11.6		10.7		10.0		11.4	
	4	7.5		8.9		9.2		9.5		9.2		10.0	
Annual Division Total		28.3	3.8	34.4	4.6	38.8	4.8	37.2	4.5	36.2	3.9	38.3	3.7
Contract	1	7.9		8.8		6.5		6.2		8.5		14.3	
Construction	2	22.9		15.1		14.2		14.8		22.3		31.0	
	3	41.5		25.6		27.9		30.4		44.0		44.7	
	4	26.7		14.7		16.2		17.8		30.5		27.4	
Annual Division Total		98.9	13.2	64.1	8.7	64.8	8.4	69.2	8.4	105.3	11.2	117.5	11.4
Manufacturing	1	9.3		8.2		9.0		9.6		9.9		11.6	
	2	17.4		15.7		15.5		17.2		17.0		20.7	
	3	27.7		23.9		25.0		25.4		27.6		34.4	
	4	11.0		10.3		11.5		12.9		14.1		16.0	
Annual Division Total		65.4	8.8	58.0	7.8	61.0	7.9	65.1	7.9	68.7	7.3	82.3	8.0
Transportation	1	9.3		9.2		9.7		9.8		11.2		11.5	
	2	11.7		10.7		11.3		12.1		13.7		14.2	
	3	13.0		12.3		13.2		14.2		15.3		16.7	
	4	11.0		10.5		10.8		11.5		12.4		13.9	
Annual Division Total		45.0	6.0	42.7	5.8	45.0	5.8	47.6	5.8	52.6	5.6	56.4	5.5
Communications	1	6.6		15.7		15.2		14.9		13.2		12.3	
	2	6.9		15.2		12.9		14.1		12.1		13.0	
	3	7.9		14.9		13.8		19.7		13.7		14.5	
	4	12.7		14.0		13.3		12.7		14.0		15.3	
Annual Division Total		34.2	4.6	59.8	8.1	55.1	7.2	55.5	6.7	53.0	5.6	55.0	5.3
Electric, Gas,	1	2.0		2.6		3.1		3.5		4.1		4.6	
and Sanitary	2	2.3		2.6		3.4		3.6		4.4		5.2	
Services	3	2.5		2.9		3.8		4.2		4.9		5.7	
	4	2.6		2.9		3.5		4.3		4.9		5.6	
Annual Division Total		9.4	1.3	11.0	1.5	13.8	1.8	15.7	1.9	18.2	1.9	21.0	2.0
Wholesale and	1	18.1		22.3		22.1		22.3		24.0		27.2	
Retail	2	20.0		23.7		23.3		24.9		25.7		30.5	
	3	22.9		25.3		24.8		26.7		29.1		34.2	
	4	24.2		24.7		25.1		26.4		30.5		34.2	
Annual Division Total		85.2	11.4	96.1	13.0	95.3	12.4	100.2	12.1	109.3	11.6	126.1	12.3
Finance,	1	9.6		10.6		11.8		13.0		15.1		17.2	
Insurance, and	2	10.2		10.5		12.2		13.7		15.4		18.5	
Real Estate	3	11.0		11.2		12.8		15.3		17.1		20.1	
	4	11.8		12.5		14.2		16.3		19.1		21.6	
Annual Division Total		42.6	5.7	44.8	6.0	51.1	6.6	58.4	7.1	66.6	7.1	77.4	7.5
Services	1	8.9		9.2		11.0		11.6		14.1		15.6	
	2	10.5		11.6		12.5		13.8		16.1		18.7	
	3	12.9		12.2		14.1		13.1		18.7		20.5	
	4	10.4		11.8		12.8		13.0		17.9		19.7	
Annual Division Total		42.6	5.7	44.8	6.0	50.4	6.5	51.4	6.2	66.9	7.1	74.5	7.2
Government and	1	70.2		68.0		71.0		78.5		88.0		88.0	
Government	2	72.7		68.9		70.9		79.1		89.8		92.5	
Enterprises	3	74.1		72.1		74.9		81.7		89.0		94.8	
	4	73.7		70.8		74.1		81.6		92.8		96.8	
Annual Division Total		290.8	38.9	279.8	37.7	291.0	37.8	321.0	38.8	359.6	38.2	372.2	36.2
Quarterly Total,	1	147.5		161.0		166.6		177.7		196.5		209.9	
All Divisions	2	182.6		184.4		187.7		203.7		226.6		256.3	
	3	224.0		213.9		225.0		238.5		272.8		301.6	
	4	192.8		182.0		191.4		206.5		246.2		261.7	
Annual Total All Divisions		746.8	100.0	741.2	100.0	770.7	100.0	826.5	100.0	942.1	100.0	1,029.5	100.0

Source: See author's notes on page 69

TABLE A
(Continued)

Note: The following raw data sources were used:

1. *Survey of Current Business*, April 1967, Vol 47, No. 4, for U. S. GNP by industry division (annual data).

2. Data for employee compensation for Alaska were obtained from the respective quarters of the *Statistical Quarterly*, Alaska Department of Labor, Division of Employment Security, 1st Quarter, 1960, to 4th Quarter, 1965.

3. Military payrolls for Alaska are given in the *Survey of Current Business*, August 1966, Vol. 46, No. 8, for the years 1963-1965. Earlier years obtained from U. S. Department of Commerce print-out sheets referenced on page 13 of the August, 1966, *Survey of Current Business*.

The following ratio was used to derive the AGP data:

$$\frac{AGP_i}{ECA_i} = \frac{GNP_i}{ECUS_i}$$

AGP_i = Alaska Gross Product in the "ith" industry division.

ECA_i = Employee Compensation, Alaska, "ith" industry division.

GNP_i = Gross National Product, "ith" industry division.

$ECUS_i$ = Employee Compensation, U. S., "ith" industry division.

Annual estimates were compiled first. Quarterly estimates were made by allocating annual totals to Alaska quarterly employee compensation.

APPENDIX I

TABLE B

ALASKAN GROSS PRODUCT PREDICTIONS, 1966-1967
(Millions of Current Dollars)

QUARTER	1966	1967
1	231.0	249.5
2	272.4	295.6
3	311.8	352.8
4	275.3	321.6

SOURCE: Extension of Table A

APPENDIX II

TABLE A

CONSUMPTION OF CONSUMER DURABLES AND NONDURABLES, STATE OF ALASKA, 1961-1964
(Millions of Dollars)

STANDARD INDUSTRIAL CLASSIFICATION NUMBER[a]	1960	1961	1962	1963	1964
5251	3.169	3.288	2.834	2.669	2.948
5311,5322	20.498	20.941	21.093	24.381	24.910
5331	2.091	1.968	2.750	2.196	2.982
5341,5351	0.074	0.344	0.904	0.969	0.875
53()()	36.625	45.951	42.897	46.298	47.650
54()()	46.638	51.198	51.613	63.332	77.536
5511	23.571	25.350	31.615	36.208	39.664
5531	2.950	2.421	2.307	2.599	3.691
5541	13.296	18.184	17.490	15.310	17.155
5599	3.227	4.416	5.290	6.996	7.070
5713,5733	8.772	8.217	9.310	11.766	10.694
5611,569()	12.327	10.550	12.068	11.381	12.814
58()()	32.694	33.675	39.768	32.984	39.312
59()() except 591	28.433	29.218	30.066	30.622	35.598
591()	13.768	14.104	12.310	13.290	11.859
TOTAL	248.133	269.825	282.315	301.001	334.758

[a]Copy of Code in Appendix II, Table E.

Source: See author's notes on page 72

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APPENDIX II

TABLE A
(Continued)

Note: The data on consumer durables and nondurables (Table A) were
        derived on the basis of data obtained from the files on Business
License Returns, Department of Revenue, State of Alaska. These returns
report gross receipts of retail sales. The population consisted of all firms
listed in the *Alaska Industrial Directory of Employers*, issued by the Alaska
Department of Labor, Employment Security Division. The listing carries an
effective date of July 1, 1966.

        Due to turnover of firms, some firms operating in earlier years
of the study are no longer in existence and, hence, were not included in
the sample. To compensate for this, average annual sales were computed for
those firms observed. The average was then multiplied by the number of
firms reported operating as listed in the *Statistical Quarterly*, which is
published by the Alaska Department of Labor. The resulting figure for 1963
was compared to the comparable figure in the *1963 Census of Business*. If
adjustment seemed warranted because of better coverage by the *Census*, it
was made.

        The data for consumer durables and nondurables are relatively
complete as far as the transactions which enter the market sector are
concerned. Not included are barter transactions, on-base military consumer
spending, imputed value of nonmarket-produced goods, and home-consumed farm
production. It is expected that some figures on the last two items will be
available shortly. On-base military spending for consumer goods has so far
proved to be nonattainable. However, certain sources are still to be
investigated.

        Because retail sales by a firm often include both consumer
durables and nondurables, it is necessary to apportion these in some
manner. Since no figures are available for this on a state breakdown,
the U. S. averages were used. (See Table B.) This probably introduces
some error; but, within the scope of the present study, it was the best
alternative. (See Chapter 6 for a discussion of suggested improvements.)

APPENDIX II

TABLE B

CONSUMPTION, STATE OF ALASKA, 1960-1966
(Millions of Current Dollars)

YEAR	DURABLES	NONDURABLES	SERVICES	TOTAL
1960	57.04	191.09	155.01	403.14
1961	59.00	210.83	187.51	457.34
1962	65.08	217.24	196.19	478.51
1963	72.97	228.03	205.73	506.73
1964	83.41	251.35	228.81	563.57
1965	94.74	273.43	248.62	616.79
1966	104.24	299.06	270.05	673.35

Source: *Selected Economic Indicators*, by the author.

Note: The data on consumption presented here differ from those in Tables A and C because of a different disposable income series.

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APPENDIX II

TABLE C

CONSUMPTION OF CONSUMER SERVICES, STATE OF ALASKA, 1961-1964
(Millions of Dollars)

STANDARD INDUSTRIAL CLASSIFICATION NUMBER[b]	1960	1961	1962	1963	1964
7211-7216	5.350	5.303	5.628	5.566	6.042
7221	0.384	0.300	0.202	0.243	0.229
7231	0.978	1.250	1.450	1.555	1.635
7241	0.355	1.360	1.281	1.529	1.083
7261	0.367	0.352	0.455	0.447	0.473
753()-754()	3.695	4.926	5.177	6.090	6.795
762(),1-9	2.140	2.323	2.320	2.306	2.507
783()	2.689	3.207	3.069	2.806	3.026
7931	1.707	1.489	1.911	1.760	1.348
7949	1.643	1.652	1.623	1.386	1.195
8011	5.912	6.020	6.372	6.888	6.791
8021-8041	1.913	2.151	2.462	2.862	3.337
8071-8072	0.223	0.212	0.260	0.306	0.339
8099	0.514	0.582	0.520	0.552	0.942
8211	0.330	0.242	0.307	0.325	0.947
()()()()[c]	0.105	0.152	0.163	0.145	0.238
TOTALS	28.305	31.521	33.200	34.766	36.927

[b]Copy of Code in Appendix II, Table E.

[c]Certain Standard Industrial Classification groups combined to avoid improper disclosure of information.

Source: See author's notes on page p.p. 71 and 72

TABLE C
(Continued)

The Standard Industrial Classification data on consumer services were obtained in the same manner as the data on consumer durables and non-durables. With regard to consumer services, however, it should be noted that many more types of activity are involved than in the consumer goods sector, and many of these items do not lend themselves to evaluation by the retail sales method. Items such as "imputed rental value of owner-occupied dwellings," "services of banks and other financial intermediaries," and "personal business" in general are only a few of the examples that could be cited. Some of these items constitute significant sums in the consumer services sector. Hence, Standard Industrial Classification data alone omit much that should be included.

As a consequence of the above, it has become necessary to use an alternative method of estimating the consumer services sector. The assumption has been made that the proportion of total consumption made up of services is the same in Alaska as it is for the U. S. as a whole. Given data on consumer goods and the data for the U. S., it is a simple process to derive consumption of consumer services in Alaska. Obviously, the reliability of the figure depends on the validity of the assumption. In all probability some error is introduced. However, it can safely be said that far less error is introduced in this manner than would be introduced if only Standard Industrial Classification data were used. Many of the missing items will be obtained in the near future; but, for now, these figures must be used:

TABLE D

CONSUMPTION OF CONSUMER SERVICES, STATE OF ALASKA, 1960-1966
(Millions of Dollars)

1960	1961	1962	1963	1964	1965	1966
155.01	187.51	196.19	205.73	228.81	248.62	270.05

Source: *Selected Economic Indicators*, by the author.
Table 3, page 9.

TABLE E

STANDARD INDUSTRIAL CLASSIFICATION BY THREE-DIGIT INDUSTRY

52 Retail Trade--Building Materials, Hardware, and Farm Equipment

    525   Hardware and Farm Equipment

53 Retail Trade--General Merchandise

    531   Department Stores
    532   Mail Order Houses
    533   Limited Price Variety Stores
    534   Merchandise Vending Machine Operators
    535   Direct Selling Organizations
    539   Miscellaneous General Merchandise Stores

54 Retail Trade--Food

    541   Grocery Stores
    542   Meat and Fish (Seafood) Markets
    543   Fruit Stores and Vegetable Markets
    544   Candy, Nut, and Confectionery Stores
    545   Dairy Products Stores

59 Retail Trade--Miscellaneous Retail Stores

    598   Fuel and Ice Dealers
    599   Retail Stores, n.e.c.

72 Personal Services

    721   Laundries, Laundry Services, and Cleaning and Dyeing Plants
    722   Photography Studios, including Commercial Photography
    723   Beauty Shops
    724   Barber Shops
    725   Shoe Repair Shops, Shoe Shine Parlors, and Hat and Clothing Shops

82 Educational Services

    821   Elementary and Secondary Schools
    822   Colleges, Universities, Professional Schools, and Junior Colleges
    824   Correspondence and Vocational Schools
    829   Schools and Educational Services, n.e.c.

APPENDIX II

TABLE F

CONSUMPTION, STATE OF ALASKA, BY QUARTER, 1961-1967
(Millions of Current Dollars)

QUARTER		DURABLES	NONDURABLES	SERVICES	TOTAL
1961	1	12.914	46.146	41.042	100.102
	2	15.054	53.795	47.845	116.694
	3	16.696	59.661	53.062	129.419
	4	14.336	51.227	45.561	111.124
1962	1	14.437	48.190	43.521	106.148
	2	16.152	53.915	48.690	118.757
	3	18.488	61.714	55.734	135.936
	4	16.004	53.421	48.245	117.670
1963	1	15.893	49.667	44.810	110.370
	2	18.431	57.596	51.963	127.990
	3	20.590	64.343	58.051	142.984
	4	18.055	56.421	50.904	125.380
1964	1	17.913	53.980	49.139	121.032
	2	20.586	62.036	56.473	139.095
	3	23.540	70.936	64.575	159.051
	4	21.371	64.401	58.626	144.398
1965	1	19.388	55.464	50.705	125.557
	2	24.190	68.284	62.254	154.728
	3	26.868	77.741	70.621	175.230
	4	23.726	66.528	60.504	150.758
1966	1	21.946	58.421	53.305	133.672
	2	25.982	70.474	64.130	160.586
	3	27.414	75.854	68.854	172.122
	4	24.734	66.359	60.294	151.387
1967	1	24.020	61.247	55.769	141.036
	2	28.012	73.217	66.491	167.720
	3	30.879	84.419	76.352	191.650
	4	28.188	76.526	69.095	173.809

Source: The 1961-1965 data are apportioned annual con-
sumption data based on the disposable income
series in Appendix VII, Table A. The 1965-1967
data are predictions.

APPENDIX II

TABLE G

TIME AND DEMAND DEPOSITS IN ALASKA BANKS, BY QUARTER, 1961-1967
(Millions of Dollars)

QUARTER	1961	1962	1963	1964	1965	1966	1967
1	198.47	208.83	245.85	263.34	332.00	338.14	367.16
2	201.86	220.64	256.05	290.09	338.95	358.68	378.00
3	221.33	260.06	270.82	327.51	377.26	382.91	409.96
4	213.35	257.07	259.56	323.25	355.53	382.54	

Source: Jones-Tuck Study, *Consolidated Deposits of Alaskan Banks 1959 Through 1965: A Time Series Analysis*, March, 1966, and Alaska Department of Commerce.

TABLE A

SELECTED SECTORS, DOMESTIC CORPORATE INVESTMENT, STATE OF ALASKA, 1964-1965
(Millions of Current Dollars)

Industry Division	Gross Investment	Depreciation	Net Investment	Change in Inventories
1964				
Mining	1.668	1.194	0.474	-0.322
Contract Construction	3.588	1.529	2.059	-5.342
Manufacturing	5.414	1.818	3.595	-1.185
Transportation, Communications and Utilities	4.223	3.812	0.412	0.262
Wholesale Trade	2.098	0.509	1.589	1.460
Total	16.991	8.862	8.129	-5.127
1965				
Mining	1.299	1.210	0.089	-0.205
Contract Construction	4.238	2.097	2.141	-0.005
Manufacturing	4.763	2.096	2.666	-2.903
Transportation, Communications and Utilities	9.097	4.328	4.769	0.492
Wholesale Trade	3.160	0.824	2.335	2.029
Total	22.557	10.555	12.000	-0.592

Source: See author's notes on pages 80 and 81.

TABLE A
(Continued)

Note: Corporate Investment,[d] Domestic Firms. Data are based on information
contained in Alaska Corporation Income Tax Returns. A listing of
active domestic and nonresident corporations was compiled by cross checking
the Alaska Department of Commerce's listing of registered corporations with
the Alaska Department of Labor's *Alaska Industrial Directory of Employers,
Statewide Alphabetic within Industry Listing*. The latter lists corporations
(as well as other firms) subject to the Alaska Employment Security Act
as of July 1, 1965. The listing is by Standard Industrial Classification
Code.

With the generous assistance of the Alaska Department of Revenue,
Division of Corporations (who did all of the initial data collection),
individual returns were analyzed. The following data were compiled from
the Alaska Corporation Income Tax Returns. (The format is slightly different
for 1962.)

        Page 1--Line: 1--gross receipts less returns and allowances
                              17--taxes
                     20 + 22--depreciation and loss from fire, etc.
                              30--net taxable income
                              31--total income tax (Alaska)

        Page 4, Schedule L,
                Line: 3B, 3D--inventories
                         8B, 8D--buildings and other fixed depreciable assets
                Schedule M-1
                Line: 2--federal income tax

On the basis of the above, the following information was derived:

        Gross Profits (π_G) = Lines 30 + 17 + M-1,2
        Net Profits (π_N) = Lines 30 - 31
        Depreciation (DEP)   = Lines 21 + 22 + 23
        Net Investment (I_N) =   8L(D-B)
        Gross Investment (I_G) =   (DEP) + (I_N)
        Change in Investment   = Lines 3L(D-B)
        in Inventory (ΔI_{INV})

It should be noted that, because of incomplete corporate listings for
earlier years, the data will be somewhat understated as one moves back

_____

[d]The raw data involved have been generated as part of another
study now in process for the Federal Field Committee for Development
Planning in Alaska.

from 1965. Since no reliable method was available for adjusting pre-1965 data, it has been used in its initially compiled form.

During early processing of some of the data certain control problems developed that resulted in errors large enough to require extensive rechecking. Hence, the present figures should be considered preliminary and tentative.

TABLE B

NEW HOUSING UNITS AUTHORIZED IN PERMIT-ISSUING PLACES, STATE OF ALASKA, 1960-1964

12,000 Place Series	PRIVATE DWELLING UNITS			PUBLIC (Contract Awards)	VALUATION (Millions of Dollars)				
	1 unit	2-4 unit	5 or more		1 unit	2-4 unit	5 or more	Public	Total
1964	318	150	333	191	7.244	2.245	3.219	2.641	15.350
1963	325	226	335	--	7.463	3.178	2.883	--	13.525
1962	267	146	156	--	7.761	2.300	1.138	--	11.199
10,000 Place Series									
1962	240	134	140	--	7.338	2.168	1.041	--	10.547
1961	189	61	73	1	4.377	0.832	0.530	0.036	5.775
1960	303	24	32	--	7.651	0.321	0.269	--	8.241

Source: U. S. Bureau of the Census, *Housing Construction Statistics: 1889 to 1964*, U. S. Government
Printing Office, Washington, D. C., 1966, p. 55.

Note: The data cover only areas where building permits are required. Hence, actual residential
construction is considerably understated. For example, new public housing in permit and nonpermit
areas totaled to the following: 1964, 385 units; 1963, 49 units; 1962, 43 units; 1961, 72 units;
and 1960, 46 units. (*Ibid.*, p. 553.) Using the average cost per unit in 1964 for the 191 units
as a guide, the total 1964 public housing contract awards amount to roughly $5,323,000.

TABLE A

SELECTED ITEMS, EXPENDITURE BY STATE AND LOCAL GOVERNMENT,
STATE OF ALASKA, FY 1962[e]
(Thousands of Dollars)

	STATE	LOCAL	TOTAL
Total	111,952	37,897	149,849
Intergovernmental Expenditures	14,217	112	14,329
Direct Expenditures	97,735	37,741	135,476
Direct General Expenditures	90,084	32,886	122,970
Capital Outlay	32,494	6,150	38,644
Other	57,590	26,827	84,417
Education	20,639	20,900	41,539
Institutions of Higher Learning	10,227	. . .	10,227
Capital Outlay	1,772	. . .	1,772
Other	8,445	. . .	8,445
Local Schools	9,557	20,900	30,457
Capital Outlay	2,740	2,671	5,411
Other	6,817	18,229	25,046
Other Education	855	. . .	855
Highways	29,528	1,432	30,960
Capital Outlay	20,063	626	20,689
Other	9,465	806	10,271
Hospitals	6,132	613	6,745
Own Hospitals	4,084	613	4,697
Capital Outlay	3,912	613	4,525
Other	172	. . .	172
Other Hospitals	2,048	. . .	2,048
Sewerage	. . . .	1,231	1,231
Capital Outlay	. . . .	854	854
Other	. . . .	377	377
Local Parks and Recreation	. . .	124	124
Capital Outlay	. . . .	32	32
Other	. . . .	92	92
Natural Resources	7,105	. . .	7,105
Capital Outlay	424	. . .	424
Other	6,681	. . .	6,681
Utility Expenditures	. . . .	4,808	4,808
Insurance Trust Expenditures	7,651	. . .	7,651

[e]State data end on June 30, 1962; school district data on
June 30, 1962; municipalities data generally end December
31, 1962. Fifty percent of municipalities items subtracted
from local total to obtain above local totals.

Source: Derived from U. S. Bureau of the Census, *Census of
Governments, 1962. Vol. VII, No. 2, Government in
Alaska,* pp. 22 and 23. U. S. Government Printing
Office, Washington, D.C., 1964.

TABLE B

SUMMARY OF CASH DISBURSEMENTS, ALL FUNDS[f], STATE OF ALASKA, 1960-1966

	1960-61	1961-62	1962-63	1962-64	1964-65	1965-66
Current Consumption	$37,673,900	$48,518,600	$66,339,500	$63,509,800	$64,025,400	$76,020,400
Federal	14,863,000	18,474,500	22,407,400	24,010,400	23,498,900	25,166,100
Nonfederal	22,810,900	30,044,100	43,932,100	39,499,400	40,526,500	50,854,300
Capital Expenditures	16,065,600	31,548,600	45,177,200	58,899,400	66,684,200	56,931,100
Federal	11,388,900	18,562,200	29,482,800	43,580,600	54,545,800	48,317,900
Nonfederal	4,676,700	12,986,400	15,694,400	15,318,800	12,138,400	8,613,200
Retirement & Death Benefits	104,400	134,700	157,600	198,300	259,000	302,400
Refunds of Retirement Contributions	231,400	299,800	433,500	494,700	596,900	668,900
New Loans Issued	1,776,000	1,914,000	2,506,900	1,804,200	2,568,000	3,026,100
Loan Repayments	1,307,900	1,547,800	1,580,300	1,298,600	1,799,800	1,612,500
Unemployment Benefits	6,726,100	7,214,800	5,989,600	5,942,500	5,002,500	6,515,100
Debt Service	185,200	963,400	1,373,500	1,859,400	1,976,700	3,357,400
Disaster Assistance	. . .	. . .	. . .	119,200	10,423,700	9,180,700
Federal	. . .	. . .	. . .	119,200	9,351,500	6,756,500
State	. . .	. . .	. . .	. . .	1,072,200	2,424,200

[f]For certain reasons the following types of disbursements were excluded:
 (1) All disbursements to the University of Alaska for operations and capital improvements;
 (2) All shared revenues paid to local governments;
 (3) All district school support;
 (4) All library, museum, special milk and other school program payments to local government;
 (5) All other disbursements to local government;
 (6) Disaster assistance funds distributed to local governments.

The principal reason for most of the exclusions is to net out intergovernmental transfers.

Source: State of Alaska, Department of Administration, Juneau

APPENDIX IV

TABLE C

FEDERAL GOVERNMENT EXPENDITURES IN ALASKA, BY DEPARTMENT, FY 1960-1966
(Millions of Current Dollars)

| DEPARTMENT | Year | | | | | | |
	1960	1961	1962	1963	1964	1965	1966 [g]
Commerce	20.136	16.220	22.258	25.726	26.899	68.140	62.236
Agriculture	9.294	7.975	13.963	15.092	44.453	14.335	20.354
Interior	42.573	38.916	43.349	46.654	49.872	77.367	73.789
Health, Education and Welfare	34.951	30.960	30.294	36.315	35.346	39.830	45.763
Military & Civilian Payroll, D.O.D.	171.936	168.863	176.600	175.710	174.852	197.463	213.592
Military Prime Contracts Awarded[h]	78.649	91.797	63.320	103.476	101.545	74.175	71.666
. . . .
Total, Net of Contracts	278.890	262.934	286.464	299.497	331.422	397.135	415.734
Total	357.539	354.731	349.784	402.973	432.967	471.310	487.400

[g]1966 data are estimates.

[h]Contract awards do not necessarily reflect equivalent expenditures in the same fiscal year.

Source: *Congressional Record, Proceedings and Debates of the 89th Congress, Second Session*, "Eight Years of Unprecedented Achievement--The Greatest Progress in Alaskan History." Extension of remarks of Honorable Ernest Gruening in the Senate of the United States, Saturday, October 22, 1966.

TABLE D

FEDERAL GOVERNMENT EXPENDITURES IN ALASKA, BY QUARTER, 1960-1965
(Millions of Current Dollars)

YEAR AND QUARTER		CIVILIAN APPORTIONED	MILITARY APPORTIONED	TOTAL
1960	1	34.319	53.663	87.982
	2	37.123	53.663	90.786
	3	35.997	54.324	90.321
	4	32.748	54.324	87.072
1961	1	34.188	54.324	88.512
	2	34.445	54.324	88.769
	3	46.399	44.455	90.854
	4	41.747	44.455	86.202
1962	1	42.278	44.455	86.733
	2	41.543	44.455	85.998
	3	46.218	55.369	101.587
	4	43.843	55.369	99.212
1963	1	46.123	55.369	101.492
	2	45.315	55.368	100.684
	3	49.263	58.136	107.399
	4	47.251	58.136	105.387
1964	1	51.549	58.136	109.685
	2	52.353	58.136	110.489
	3	67.097	53.669	120.766
	4	68.000	53.669	121.669
1965	1	57.212	53.668	110.881
	2	64.323	53.669	117.992
	3	67.372	53.167	120.539
	4	69.993	53.167	123.160

Source: Appendix IV, Table C and Appendix VII were the basic sources used. The derivations follow:

(1) FY federal government expenditures, net of military contract awards and military payrolls, were divided by the respective 4-quarter total of federal civilian wage and salary payments.

(2) The ratio obtained in (1) was multiplied by the quarterly civilian wage and salary payments total to obtain respective quarterly government civilian expenditures.

(3) Military prime contracts awarded and military payrolls were apportioned equally over the four quarters.

(4) The expenditures estimates were then combined to give the quarterly totals.

APPENDIX IV

TABLE E

ESTIMATED LOCAL GOVERNMENT EXPENDITURES, STATE OF ALASKA, BY QUARTER, 1960-1965
(Millions of Current Dollars)

YEAR AND QUARTER		Dollar Amounts	
		QUARTERLY	ANNUAL
1960	1	10.593	
	2	10.318	
	3	10.002	
	4	12.215	43.128
1961	1	11.753	
	2	12.112	
	3	11.896	
	4	13.921	49.682
1962	1	13.761	
	2	13.942	
	3	13.345	
	4	14.903	55.951
1963	1	14.443	
	2	14.567	
	3	14.357	
	4	16.540	59.907
1964	1	16.102	
	2	17.343	
	3	12.832	
	4	18.172	64.449
1965	1	19.274	
	2	19.262	
	3	20.265	
	4	22.069	80.870

Source: The benchmark source was the *Census of Governments* cited in Table A.
The ratio of local government expenditures to the sum of the respect-
ive 4-quarter totals of local government wage and salary payments was
used to obtain the adjustment factor. Thus, the estimates are the
ratio multiplied by the respective quarter wage and salary payments
figure (Appendix VII, Table A).

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APPENDIX IV

TABLE F

ESTIMATED STATE GOVERNMENT EXPENDITURES, STATE OF ALASKA, BY QUARTER, 1960-1965
(Millions of Current Dollars)

| YEAR AND | Dollar Amounts | |
QUARTER	QUARTERLY	ANNUAL
1960 1	7.425	
2	8.225	
3	9.463	
4	10.929	36.043
1961 1	10.014	
2	10.819	
3	11.342	
4	12.442	44.617
1962 1	14.229	
2	14.724	
3	16.080	
4	16.141	61.176
1963 1	14.861	
2	16.394	
3	17.746	
4	17.947	66.946
1964 1	15.472	
2	16.298	
3	15.679	
4	16.603	64.051
1965 1	15.383	
2	16.404	
3	18.698	
4	18.375	68.860

Source: Fiscal year totals of state government expenditures were compiled by the Department of Administration, State of Alaska. These data were broken down as to sources of funds as shown in Table B. Fiscal year data were adjusted to calendar years, and the "net of federal government" calendar year data were then apportioned to quarterly state government wage and salary payments. Hence, the state government data are net of all intergovernmental transfers. This is the reason for the apparent large understatement of state government expenditures.

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APPENDIX IV

TABLE G

GOVERNMENT EXPENDITURES, ALL LEVELS, STATE OF ALASKA, BY QUARTER, 1960-1965
(Millions of Current Dollars)

YEAR AND QUARTER		Dollar Amounts	
		QUARTERLY	ANNUAL
1960	1	106.0	
	2	109.3	
	3	109.8	
	4	110.2	435.3
1961	1	110.3	
	2	111.7	
	3	114.1	
	4	112.6	448.6
1962	1	114.7	
	2	114.7	
	3	131.0	
	4	130.3	490.7
1963	1	130.8	
	2	131.6	
	3	139.5	
	4	139.9	541.8
1964	1	141.3	
	2	144.1	
	3	149.3	
	4	156.4	591.1
1965	1	145.6	
	2	153.7	
	3	159.2	
	4	163.6	622.1

Source: Sum of Appendix IV, Tables D, E, and F.

Note 1:   Since the annual totals run at better than half of AGP, it must be
inferred that significant portions of government expenditures are
for imports.

Note 2:   Annual estimates based on the falling trend lines yield the follow-
ing estimate of government expenditures for 1966 and 1967:
$673 million for 1966
$717 million for 1967
$\hat{G} = 359.0 + 44.6\ X$
$X = 0$, 1963, million dollars

TABLE H

DEPARTMENT OF DEFENSE ESTIMATED EXPENDITURES[i] ALASKA, FISCAL YEARS 1960-1967
(Thousands of Dollars)

FISCAL YEAR	TOTAL	MILITARY PAY	CIVILIAN PAY	RESERVE and NAT'L GUARD	OTHER[j]
1960	$270,000	$128,000	$ 44,000	$3,000	$$95,000
1961	273,000	124,000	45,000	3,000	101,000
1962	283,000	129,000	46,000	3,000	105,000
1963	283,000	127,000	47,000	4,000	105,000
1964	301,000	144,000	48,000	4,000	105,000
1965	326,000	150,000	48,000	3,000	125,000
1966	356,000	155,000	52,000	4,000	146,000
1967	377,000	166,000	56,000	4,000	151,000

[i] Excluding major procurement.

[j] Includes other operation and maintenance, construction, research, development, test and evaluation, family housing.

Source: Office of the Assistant Secretary of Defense, Comptroller, Directorate of Statistical Services.

Note: Tables H and I are included for informational purposes. The data were acquired too late to be incorporated into the present model.

APPENDIX IV

TABLE I

DEPARTMENT OF DEFENSE NET VALUE OF PRIME CONTRACTS AWARDS OF $10,000 OR MORE, ALASKA, FISCAL YEARS 1960-1966
(Thousands of Dollars)

FISCAL YEAR	AMOUNT
1960	$ 78,649
1961	91,497
1962	64,805
1963	104,342
1964	112,144
1965	113,691
1966	87,474

Source: Office of the Assistant Secretary of Defense, Comptroller, Directorate for Statistical Services.

APPENDIX V

Rough Estimates of X-M, State of Alaska, 1961-1967
(Millions of Dollars)

YEAR	AGP	C	G	I	X-M
1961	741	457	449	31	-196
1962	771	479	491	37	-236
1963	827	507	542	43	-265
1964	942	564	591	50	-263
1965	1030	606	622	65	-263
1966	1091	618	673	60	-260
1967	1220	674	717	70	-241

Sources: AGP - Appendix I
        C - Appendix II
        G - Appendix IV. The 1966 and 1967 figures are based on the trend line $\hat{G} = 359.0 + 44.6\ X(X=0,\ 1963)$.
        I - Appendix III. The investment figures used here are very speculative.

APPENDIX VI

ESTIMATION TECHNIQUES FOR EXOGENOUS COMPONENTS OF PERSONAL INCOME

Other Labor Income

$$W_{01} = 0.0213 \ Y_{P1}$$

$$W_{02} = 0.0254 \ Y_{P2}$$

$$W_{03} = 0.0299 \ Y_{P3}$$

$$\dot{W}_{04} = 0.0256 \ Y_{P4}$$

Other labor income is a fixed proportion of personal income for the respective quarter.

Average Quarterly Wage

These are predicted on the basis of trends in the same quarter series.

$$\hat{\overline{W}}_{P1} = 1.850 + 0.046X \qquad X = 0, \ 1963$$

$$\hat{\overline{W}}_{P2} = 1.980 + 0.058X \qquad X = 0, \ 1963$$

$$\hat{\overline{W}}_{P3} = 2.170 + 0.097X \qquad X = 0, \ 1963$$

$$\hat{\overline{W}}_{P4} = 2.060 + 0.084X \qquad X = 0, \ 1963$$

Proprietor's Income

Although proprietors' income can be expected to move seasonally with the rest of the economy, the annual pattern has been somewhat erratic, bearing little or no relationship to any of the major series. Hence, a purely pragmatic approach is used in the estimation process. The previous three years' respective quarters average is used as the predictor.

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Property Income

The basic approach has been to fit trend lines to property income as a percentage of personal income. This determines the appropriate coefficient (b_i) for the relation

$$Y_{prt,t} = (0.01)\, b_i\, Y_{pt}$$

The respective quarter trend lines are (i = quarter)

$$b_1 = 6.00 + 0.39X \qquad X = 0,\ 1963,\ 1st\ qt.$$

$$b_2 = 5.37 + 0.26X \qquad X = 0,\ 1963,\ 2nd\ qt.$$

$$b_3 = 4.72 + 0.23X \qquad X = 0,\ 1963,\ 3rd\ qt.$$

$$b_4 = 5.28 + 0.22X \qquad X = 0,\ 1963,\ 4th\ qt.$$

Labor Force

Growth of the labor force has been estimated on the basis of trend lines fitted to same quarter series.

$$\widehat{LF}_1 = 72.53 + 2.83X \qquad X = 0,\ 1963$$

$$\widehat{LF}_2 = 82.36 + 3.16X \qquad X = 0,\ 1963$$

$$\widehat{LF}_3 = 88.18 + 4.25X \qquad X = 0,\ 1963$$

$$\widehat{LF}_4 = 77.83 + 4.00X \qquad X = 0,\ 1963$$

Employment, Civilian Government

These data are also predicted on the basis of respective quarter trends.

$$\hat{E}_{gnm_1} = 25.60 + 1.29\ X \qquad X = 0,\ 1963$$

$$\hat{E}_{gnm_2} = 26.50 + 1.38\ X \qquad X = 0,\ 1963$$

$$\hat{E}_{gnm_3} = 27.60 + 1.77\ X \qquad X = 0,\ 1963$$

$$\hat{E}_{gnm_4} = 27.20 + 1.47\ X \qquad X = 0,\ 1963$$

Government Nonmilitary Wage Bill

$$\hat{W}_{gnm} = \hat{E}_{gnm} \cdot \overline{W}_{gnm_{t-4}}$$

Government Military Wage Bill

U. S. Department of Defense

COMPONENTS OF PERSONAL INCOME, STATE OF ALASKA, 1960-1967
(Millions of Current Dollars)

QUARTER	W_p	W_{gnm} FEDERAL	STATE	LOCAL	TOTAL	W_{gm}	W_o	W	Y_{pri}	Y_{prt}	TR	T_{si}	Y_{p1}	Y_{p2}	Y_{D2}
1960 1	43.2	24.9	5.1	5.2	35.2	34.0	2.4	114.8	10.2	8.2	7.8	2.2	138.8	141.0	N.A.
2	64.3	26.9	5.6	5.1	37.6	34.0	3.6	139.5	12.3	8.3	6.5	2.7	163.9	166.6	N.A.
3	90.6	27.7	6.5	4.9	39.0	34.0	5.1	168.7	14.8	8.3	4.3	3.3	192.8	196.1	N.A.
4	68.5	25.2	7.5	6.0	38.6	34.0	3.8	144.9	12.8	8.2	5.4	2.8	168.5	171.3	N.A.
1961 1	50.4	26.3	6.7	5.8	38.8	28.7	3.3	121.2	11.9	7.7	9.6	2.9	147.5	150.4	131.2
2	64.3	26.5	7.3	5.9	39.7	28.8	4.3	137.0	13.4	7.8	8.2	3.2	163.2	166.4	153.0
3	81.2	29.4	7.6	5.8	42.8	28.8	5.4	158.2	15.4	7.8	5.4	3.7	183.1	186.8	169.7
4	60.9	26.4	8.3	6.8	41.6	28.7	4.0	135.3	13.3	7.7	6.9	3.2	160.0	163.2	145.7
1962 1	50.5	28.8	8.1	6.8	41.6	28.5	3.5	124.1	11.6	9.0	10.0	3.5	151.2	154.7	136.2
2	63.5	26.3	8.4	6.8	41.5	28.5	4.4	137.9	12.9	9.0	8.1	3.9	164.0	167.9	152.3
3	85.0	29.7	9.2	6.6	45.4	28.5	5.8	164.7	15.3	9.0	5.1	4.6	189.5	194.1	174.4
4	63.7	28.2	9.2	7.3	44.7	28.5	4.4	141.3	13.2	9.0	6.7	4.0	166.2	170.2	150.9
1963 1	51.7	29.6	9.8	7.1	46.5	30.5	3.4	132.1	11.6	9.5	9.4	4.2	158.4	162.6	141.0
2	68.0	29.1	10.8	7.2	47.0	30.5	4.4	150.0	13.1	9.5	8.2	4.7	176.1	180.8	163.5
3	88.2	30.9	11.7	7.1	49.6	30.5	5.8	174.1	15.1	9.5	5.4	5.4	198.7	204.1	182.6
4	67.4	29.6	11.8	8.1	49.5	30.5	4.4	151.8	13.2	9.5	7.0	4.8	176.7	181.5	160.1
1964 1	55.6	32.3	11.2	7.9	51.4	35.0	3.5	145.5	10.2	11.5	10.7	4.7	173.2	177.9	158.4
2	74.7	32.8	11.8	8.5	53.1	35.0	4.7	167.5	11.7	11.5	8.6	5.3	194.0	199.3	182.0
3	104.1	34.7	11.4	6.3	52.4	35.0	6.6	198.1	13.7	11.5	5.7	6.3	222.7	229.0	208.1
4	83.3	35.1	12.1	8.9	56.1	35.0	5.2	179.6	12.5	11.5	7.0	5.7	204.9	210.6	189.0
1965 1	63.9	29.6	11.7	9.5	50.7	35.2	4.1	154.0	10.4	12.7	11.4	4.8	183.7	188.5	164.9
2	90.1	33.2	12.4	9.5	55.1	35.3	5.8	186.3	12.5	12.8	9.5	5.7	215.4	221.1	203.3
3	116.3	33.3	14.2	10.0	57.4	35.3	7.5	216.5	14.5	12.8	6.2	6.7	243.3	250.0	231.1
4	88.5	34.6	13.9	10.8	59.3	35.2	5.7	188.7	12.7	12.7	7.9	5.8	216.2	222.0	200.4
1966 1	69.6	30.6	13.7	11.0	55.2	37.2	[4.4]	[166.4]	[10.7]	[14.7]	[13.1]			[204.9]	[179.2]
2	91.7	34.7	14.5	11.8	60.9	37.3	[5.9]	[195.8]	[12.4]	[14.5]	[11.0]			[233.8]	[215.3]
3	[117.6]				[59.4]	37.3	[7.7]	[222.0]	[14.4]	[13.9]	[7.1]			[257.3]	[231.7]
4	[92.0]				[61.1]	37.2	[5.9]	[196.2]	[12.8]	[13.7]	[8.9]			[231.5]	[206.2]
1967 1	[76.0]				[58.8]	40.0	[4.7]	[179.4]	[10.4]	[16.7]	[12.9]	-		[219.4]	[153.0]
2	[101.0]				[63.7]	40.0	[6.4]	[211.9]	[12.2]	[16.1]	[11.4]			[251.0]	[230.1]
3	[135.5]				[63.6]	[40.0]	[8.6]	[248.1]	[14.2]	[16.1]	[8.7]			[287.0]	[263.1]
4	[114.9]				[65.0]	[40.0]	[6.8]	[226.7]	[12.7]	[16.4]	[9.4]			[265.2]	[241.8]

Sources: (1) For W (wage and salary payments, other labor income and the government civilian and military wage bills) and W_p (private sector wage and salary payments), *Statistical Quarterly*, Alaska Department of Labor, *1st Quarter, 1960* and *2nd Quarter, 1966*.

(2) For $\overline{W}_p$ ($W_p \div E_p$, the private sector average quarterly wage) and W_o ("other labor income", composed primarily of employer contributions to private pension funds, health and welfare funds, and other minor items), the annual data were obtained from print-out sheets on state personal income, provided by the U. S. Department of Commerce. The same information for 1963-1965 is available in the August, 1966, issue of *Survey of Current Business*. Quarterly data were derived by apportioning annual figures to private sector wage and salary payments.

(3) For W_{gm} (military wage and salary payments), annual data obtained from U. S. Department of Commerce print-out sheets. The years 1963-65 are also available in the *Survey of Current Business*, August, 1966.

(4) For W_{gnm} (nonmilitary government wage and salary payments), quarterly data for 1960-1966 were compiled by the Alaska Department of Labor. Data for 1964-present are also available in the respective *Statistical Quarterly*, Alaska Department of Labor

(5) For Y_{pri} (proprietor's income, or income of unincorporated enterprise), annual data were obtained from the same source as "other labor income." Quarterly data were apportioned to total wage and salary payments. The logic for this is as follows: A survey of Alaskan corporate/non-corporate structures indicates that unincorporated enterprises are well distributed over most sectors of the economy. Hence, proprietor's income should fluctuate in roughly the same pattern as personal income, and wage and salary payments are the main component of personal income. What may be true on a seasonal basis is no indication that the same will hold for annual movements. In fact, the pattern of annual movement has been quite erratic and bears little relation to movements of any of the major series.

(6) For Y_{prt} (property income; dividends, interest income (personal) and rental income), same as Y_{pri} and W_o for annual data. Quarterly data were obtained by apportioning the annual total equally over the four quarters. In terms of dividends and interest, this may not be too unsatis-factory. In all likelihood, there is some seasonal variation in rental income, but to date, no reliable indicators of the appropriate magnitudes have been found.

(7) For TR (transfer payments, composed of such items as unemployment compensation, various general assistance and other welfare-type payments, and "social security" benefits. See Appendix VII, Table 8 for sources and derivations of quarterly series.) and T_{si} (employee contributions to social insurance programs, primarily FICA payments), print-out sheets, Department of Commerce, and the August 1966 *Survey of Current Business*. Quarterly data were derived by apportioning annual totals to quarterly wage and salary payments, private sector, plus proprietor's income. This obviously introduces some error, since many wage earners reach the maximum payable sum well before the fourth quarter. Off-setting this to some extent are workers who are not employed until the second or third quarter and those who are in and out of employment throughout the year.

(8) For Y_{p1} = personal income, net of employer contributions for social insurance.

For Y_{p2} = personal income, including employer contributions for social insurance.

For $Y_{p2} - T_p$

Bracketed figures are estimates based on the model.

APPENDIX VI

TABLE B

COMPONENTS OF TRANSFER PAYMENTS, STATE OF ALASKA, 1960-1965
(Millions of Current Dollars)

QUARTER	(1) UIC	(2) EX. SER. UIC	(3) FORMER FED. CIV. EMP.	(4) CHILD WEL. BIA	(5) G.A. WEL. BIA	(6) ALS.D. WEL. ADC	(7) ALS.D. WEL. GEN. REL.	(8) ALS.D. WEL. APA	(9) S.S. AD.	(10) TOTAL QUARTERLY SERIES	(11) DEPT. COMM. APPORTIONED
1960				0.193							
1	2.600	0.054	0.316						4.489	10.583	24
2	1.372	0.038	0.299		0.314	0.409	0.015	0.301		4.009	7.8
3	0.362	0.017	0.155		0.265	0.414	0.014	0.307		2.709	6.5
4	1.229	0.034	0.230		0.150	0.415	0.011	0.312		1.422	4.3
1961				0.210	0.198	0.425	0.013	0.314		2.443	5.4
1	2.687	0.069	0.331						4.998	11.734	30
2	2.001	0.050	0.250		0.272	0.449	0.013	0.316		4.137	9.6
3	0.713	0.020	0.100		0.250	0.434	0.012	0.318		3.334	8.2
4	1.408	0.047	0.158		0.141	0.413	0.010	0.315		1.712	5.4
1962				0.211	0.183	0.431	0.012	0.312		2.551	6.9
1	2.956	0.056	0.267						5.637	11.439	30
2	1.935	0.040	0.205		0.258	0.449	0.015	0.315		4.316	10.0
3	0.456	0.021	0.079		0.244	0.450	0.016	0.312		3.202	8.1
4	1.157	0.030	0.141		0.166	0.457	0.013	0.317		1.509	5.1
1963				0.192	0.295	0.455	0.014	0.320		2.412	6.7
1	2.519	0.048	0.269						6.056	11.509	30
2	1.860	0.046	0.271		0.304	0.483	0.016	0.332		3.971	9.4
3	0.529	0.021	0.137		0.241	0.480	0.014	0.341		3.253	8.2
4	1.314	0.044	0.214		0.113	0.512	0.011	0.350		1.673	5.4
1964				0.166	0.181	0.501	0.008	0.350		2.612	7.0
1	2.572	0.072	0.361						6.300	11.092	32
2	1.551	0.049	0.293		0.312	0.540	0.011	0.355		4.223	10.7
3	0.405	0.020	0.128		0.251	0.579	0.012	0.362		3.097	8.6
4	0.968	0.033	0.162		0.117	0.496	0.008	0.368		1.542	5.7
1965				0.141	0.203	0.489	0.007	0.368		2.230	7.0
1	2.273	0.059	0.315						7.097		35
2	1.356	0.044	0.298		0.338	0.502	0.006	0.369		3.862	11.4
3	0.525	0.029	0.154		0.281		0.004				9.5
4	1.365	0.045	0.228								6.2
											7.9

Code: (1) Unemployment Insurance Payment
    (2) Ex-servicemen's Unemployment Compensation
    (3) Former Federal Civilian Employees
    (4) Child Welfare
    (5) General Assistance
    (6) Aid for Dependent Children
    (7) General Relief
    (8) Adult Public Assistance
    (9) Social Security Administration Benefits Payments

Sources: Items 1-3, Table B-9, *Statistical Quarterly*, Alaska Department of Labor
    Items 4-5, U. S. Department of the Interior, Bureau of Indian Affairs, Juneau Area Office, Juneau, Alaska
    Items 6-8, State of Alaska, Department of Health & Welfare, Division of Public Welfare
    Item 9, Honorable Ernest Gruening, "Eight Years of Unprededented Achievement—The Greatest Progress in Alaskan History," *Congressional Record*, proceedings and debates of the 89th Congress, Second Session.

Note: Derivation of quarterly totals: Because the individual quarterly series fall well short of the Department of Commerce total, it was necessary to apportion the annual figure on a quarterly basis, rather than to use the sum of the quarterly series. The major missing series is quarterly social security payments. The apportionment technique was decided upon rather arbitrarily and is as follows. Two-thirds of the annual total was apportioned on the basis of the sum of columns 2, 3, 4, 6, 7, 8 and 9. The remaining one-third was evenly distributed over the four quarters. The rationale for this is the fact that some transfer payments are unaffected by seasonality and economic activity. The 2/3 - 1/3 division is an educated guess, but probably produces more accurate estimates than no adjustment at all.

TABLE C

EMPLOYMENT, UNEMPLOYMENT, AND WORKFORCE
STATE OF ALASKA
1960-1967
(Thousands)

| QUARTER | EMPLOYMENT Private Sector E_p | EMPLOYMENT, CIVILIAN GOVERNMENT | | | | UNEMPLOYMENT | WORKFORCE |
		FEDERAL	STATE	LOCAL	E_{gnm}		
1960 1	26.2	15.6	3.1	3.2	21.9	8.23	64.00
2	34.8	15.9	3.6	3.1	22.6	6.33	74.23
3	42.7	16.1	4.3	2.9	23.4	3.37	82.40
4	33.0	14.9	4.5	3.5	23.0	5.27	70.97
1961 1	27.3	15.4	4.2	3.6	23.1	9.63	68.33
2	34.3	15.4	4.5	3.5	23.4	8.73	76.77
3	40.1	16.1	4.7	3.4	24.2	4.97	81.23
4	31.7	15.5	5.0	3.9	24.4	6.47	71.50
1962 1	27.8	15.1	4.9	4.1	24.0	9.90	69.67
2	34.2	15.7	5.1	4.1	24.9	8.77	78.10
3	41.2	16.1	5.5	3.9	25.4	4.20	82.70
4	32.6	15.7	5.4	4.4	25.5	5.70	72.37
1963 1	28.4	16.1	5.4	4.3	25.9	9.10	71.03
2	35.5	16.7	6.1	4.2	27.0	8.53	80.73
3	42.5	17.1	6.9	4.1	28.0	5.10	87.60
4	33.8	16.5	6.3	4.5	27.3	6.87	76.93
1964 1	29.6	16.2	5.9	4.5	26.7	9.90	74.13
2	36.6	17.4	6.3	4.5	28.2	8.17	83.23
3	45.4	18.0	6.6	4.2	28.9	4.43	91.07
4	37.6	17.3	6.3	4.9	28.6	5.47	81.37
1965 1	32.7	17.0	6.0	5.1	28.2	9.23	78.17
2	42.3	17.4	6.5	5.1	29.0	8.57	90.83
3	48.4	18.0	8.0	5.4	31.3	5.73	98.30
4	40.0	17.3	7.4	5.5	30.2	7.07	87.00
1966 1	35.0	16.9	7.1	5.6	29.6	10.07	82.37
2	42.4	17.5	7.3	5.7	30.6	9.90	92.63
3	49.6				32.4	6.13	100.60
4	39.7				31.1	7.20	87.10
1967 1	37.3				31.5	9.40	86.40
2					[32.0]		[95.00]
3					[34.7]		[105.18]
4					[33.1]		[93.83]

Source: E_p (Employment, Private Sector) and E_{gnm} (Civilian Government Employment):

1960-1963, *Workforce Estimates, Alaska; by Industry & Area, Revised August, 1966.* Alaska Department of Labor, Employment Security Division, Research and Analysis Section.

1964-   , *Statistical Quarterly,* Alaska Department of Labor, Employment Security Division.

Unemployment and Workforce:

1960-1965, *Workforce Estimates, Alaska.*
1966-   *Trends in Alaska's Employment and Economy.* Alaska Department of Labor, Employment Security Division.

Note: In all cases the quarterly figures are three month averages.

Figures in [ ] are predicted values.

APPENDIX VI

TABLE D

INDIVIDUAL INCOME TAX RECEIPTS, STATE OF ALASKA, 1961-1967
(Millions of Current Dollars)

YEAR-QUARTER	WITHHELD IND. INC. & FICA	IND. INC. NOT WITHHELD & SELF-EMPMNT	STATE PERSONAL INCOME	FEDERAL REFUNDS
1961				
1	12.00	2.35	2.75*	2.02
2	12.32	5.56	3.30*	3.98
3	12.34	2.22	2.83*	0.37
4	13.49	0.83	3.18*	0.06
1962				
1	11.78	2.63	3.16	3.46
2	12.01	6.16	3.83	3.42
3	13.30	2.56	3.13	0.56
4	15.72	0.94	3.63	0.07
1963				
1	13.16	2.79	3.38	2.92
2	13.78	6.78	4.01	4.12
3	15.00	2.90	3.57	0.94
4	17.33	1.18	3.93	0.16
1964				
1	15.11	2.93	3.50*	3.73
2	13.94	5.12	4.19*	4.18
3	14.33	3.21	3.93	1.28
4	16.09	1.49	4.57	0.65
1965				
1	14.46	3.43	4.41	2.90
2	11.71	9.52	5.28	4.14
3	14.23	3.21	4.48	1.21
4	13.89	1.20	4.98	0.00
1966				
1	12.34	4.17	5.06	2.34
2	11.80	10.20	6.04	5.87
3	16.08	2.98	5.32	0.80
4	18.56	1.49	6.33	0.21
1967				
1	15.41	3.99	[6.14]	5.11
2	[15.56]	[8.19]	[6.82]	[5.12]
3	[16.90]	[3.29]	[6.44]	[3.13]
4	[19.29]	[0.80]	[6.95]	[3.15]
1968				
1	[16.79]	[3.00]	[6.82]	

*Indicates derived figure.

Sources: Data for the state of Alaska were obtained from annual statements
and worksheets of the Department of Revenue. Federal data were
obtained from the U. S. Internal Revenue Service.

Note: Figures in "[]" are estimates.

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APPENDIX VII

A. RECOMMENDED DATA PROCESSING SYSTEM FOR BUSINESS LICENSE DIVISION

I. Classification of Businesses.

As the number of licenses has increased substantially over the
history of the tax, the need for a standard classification system
has become more important. Business license returns contain one of
the most important sources of information on the structure and
strengths of the state's economy. However, present usefulness of
the data is extremely limited because of lack of detailed classifi-
cation and compilation of the information. Probably the most
logical system to adopt would be the Standard Industrial Classifica-
tion system. The requirements for adoption and implementation of
this system should be minimal. A brief outline of the implementation
process follows:

A. Distribute an SIC classification form with each
Business License Application. Initially, these
would have to go to all businesses; but, after
the first year, only new applications would require
the inclusion of the SIC form. Updating would be
necessary at about three-year intervals. On the
basis of information supplied on the SIC form, the
business would be assigned an SIC number; and this
would appear on the business license.

At present, about 5,000 of the business license
holders have already been classified by the state
Department of Labor. Hence, those firms already
classified could simply report their SIC number.

B. On the Business License Return, substitute SIC
number for type of business blank.

II. Recording (or Posting) of Returns.

A. Record the items below on IBM coding sheets. These
hand-written sheets can be read by machine and the
information transferred onto cards, tapes, or discs
for storage and processing:[9]

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[9]The information could also be punched directly.

1. SIC number
2. Total gross receipts
3. Taxable gross receipts
4. Total tax due
5. Initial fee paid
6. Other payments
7. Balance due
8. Penalty
9. Interest
10. Total remitted

It would be relatively simple to also code and record the information on Schedule A.

III. Analysis and Reporting.

On the basis of the preceding items (or minor modifications thereof), much valuable economic data could be made available. In addition, several useful functions could be performed for the Business License Division:

1. Arithmetic check of returns. An additional datum entry, the business license number, would be required for identification purposes.

2. Allocation of Receipts (Schedule A) could be performed automatically.

3. Aggregation of such items as 3-10 would serve as a useful crosscheck for accounting purposes.

4. Reporting of economic data by 3-digit SIC classification.

   (a) Number of businesses in Group.
   (b) Total gross receipts.
   (c) Taxable gross receipts.
   (d) Total Tax Due.

Note: An additional bit of information would also be valuable: corporation, proprietorship, or partnership. These subtotals could also be grouped by SIC classification.

At present the state of Alaska has contracted with Lockheed Missiles and Space Company for studies on a statewide information system. A Business License Division subsystem is presently being developed that in part closely parallels the above suggestions. However, the system

description is vague as to the type of business classification code to be employed. It would be most wasteful to employ some type of code other than the SIC code. If it is based on the SIC code, there are no provisions for the necessary detailed distribution of data. Hopefully, these shortcomings can be overcome before the system is implemented.

B. RECOMMENDED DATA PROCESSING SYSTEM FOR ANALYSIS OF CORPORATE INCOME TAX RETURNS, STATE OF ALASKA (FORM DR 700)

       The principal purpose of this system is to generate the necessary data to determine the following variables: gross profit, net profit, depreciation, gross investment, net investment, and change in inventories.

I. Classification of Corporations

    A. By SIC Number:

       At present, all active corporations with one or more employees have been assigned a Standard Industrial Classification code number. This number should be incorporated into the tax return form, either in addition to or in place of the Business Code Number.

    B. By Resident/Nonresident Status:

       This information is important in analyzing Alaska's industrial structure.

II. Specific Data to Be Recorded

    A.

Page	Line	Item
1	1	Gross receipts or sales, less return and allowances
1	2	Less: cost of goods sold
1	4	Dividends
1	5	Interest on obligations of the O. S.
1	6	Other interest
1	7	Rents
1	8	Royalties
1	9	Net gain
1	11	Total income
1	15	Bad debts
1	16	Rents
1	17	Taxes
1	18	Interest
1	19	Contributions or gifts paid
1	20	Loss by fire, etc.
1	21	Amortization
1	22	Depreciation

	1	23		Depletion
	1	27		Total deductions
	1	30		Line 28 less line 29
	1	31		Total income tax

Schedule

L	4	3	(Col B)	Inventory, beginning of year
L	4	3	(Col D)	Inventory, end of year
L	4	8a	(Col B)	Buildings & other fixed depreciable assets, less accumulated depreciation
L	4	8a	(Col D)	
L	4	9a	(Col B)	Depletable assets less accumulated depletion
L	4	9a	(Col D)	
L	4	10	(Col B)	Land, net of amortization
L	4	10	(Col D)	Land, net of amortization
L	4	13	(Col B)	Total assets
L	4	13	(Col D)	
M-1	4	13	(Col D)	Federal income tax

B. Standard Industrial Classification Number

In addition to providing the data for the above-mentioned variables, the items listed provide the necessary inputs to determine corporate contributions to Alaskan Gross Product; namely, net interest, capital consumption allowance, indirect business taxes, and profit type income. Employee compensation, also a component of AGP, is presently available from the Department of Labor.

The data requested here require a substantial portion of the form to be recorded. Hence, it might be useful to report the entire form. This would not involve too great an increase in cost, and additional data of value would be generated.

Unfortunately, the above item inputs are not generally reported by the nonresident corporation, and a separate analysis of these firms would be necessary. A first step in this direction would be the development of a standardized page to accompany returns of the nonresident corporation. The following items would be included: (All items are for Alaska only.)

1. Net sales in Alaska.

2. Wage and salary payments in Alaska and commissions and other compensation.

3. Inventories, beginning of year.

4. Inventories, end of year.

5. Land and other fixed depreciable assets, beginning of year, end of year, net of accumulated depreciation.

6. Depreciation (Schedule G of tax return).

7. Total income tax due.

8. Losses by fire, storm, shipwreck, or other casualty, or theft.

III. Reporting of Data

A. The data should be reported by 3-digit SIC groups. In some cases this would not be possible since improper disclosure of data would occur. This problem can be resolved easily by aggregation where necessary.

B. Same as A, except by resident, nonresident status.

APPENDIX VII

C. RECOMMENDED DATA PROCESSING SYSTEM FOR ANALYSIS OF ALASKA PARTNERSHIP RETURN OF INCOME (FORM DR 800)

The principal purpose of this system is to generate data comparable to that of the Corporate Income Tax Return Analysis.

I. Classification of Partnership

Firm filing a partnership return would be classed according to SIC number. This number would be incorporated into the return. Those firms with one or more employees are already classified. If the Business Science System is initiated, then all firms will have an SIC number.

II. Specific Data to Be Recorded

A. Standard Industrial Classification Number

B.

Page	Line	Item
1	1	Gross receipts less returns and allowances
1	2	Less cost of goods sold
1	4	Income (or loss) from other partnerships, etc.
1	5	Nonqualifying dividends
1	6	Interest
1	7	Rents
1	8	Royalties
1	9	Net farm profit
1	10	Net gain (or loss) from sale or exchange of property
1	12	Total income
1	15	Rent
1	16	Interest
1	17	Taxes
1	18	Losses by fire, etc.
1	19	Bad debts
1	21	Depreciation
1	22	Amortization
1	23	Depletion of mines, etc.
1	26	Total deductions
1	27	Ordinary income

L	4	3 (Total, beginning of year)	Inventories
L	4	3 (Total, end of year)	Inventories
L	4	7a (Total, beginning of year)	Building and other fixed depreciable assets
L	4	8a (Total, beginning of year)	Depletable assets
L	4	8a (Total, end of year)	Depletable assets
L	4	9 (Beginning of year)	Land
L	4	9 (End of year)	Land
L	4	12 (Beginning of year)	Total assets
L	4	12 (End of year)	Total assets

III. Reporting of Data

Data should be reported by 3-digit SIC group where disclosure rules are not violated. Necessary aggregation to 2-digit SIC group would eliminate any problems.

APPENDIX VII

D. RECOMMENDED DATA PROCESSING SYSTEM FOR ANALYSIS OF ALASKA
INDIVIDUAL INCOME TAX RETURN (FORM DR 600)

This analysis has two distinct purposes. The first is the same
as that stated for the corporation and partnership analyses. The second
is to generate the inputs necessary to determine the components of Alaskan
personal income; specifically: wages and salaries, other labor income,
proprietors' income, and property income (rents, interest, and dividends).
Since the Division of Data Processing, Department of Administration, is
presently working on the design of an entire page-1 system, the present
suggestions are confined to other portions of the return.

I. Specific Data to Be Recorded (in addition to Page 1)

A.
Schedule	Page	Line	Item
C	5	1	Total receipts, less allowances, etc.
C	5	2	Inventory, beginning of year
C	5	8	Inventory, end of year
C	5	9	Cost of goods sold
C	5	10	Gross profit
C	5	12	Rent on business property
C	5	13	Interest on business debt
C	5	14	Taxes on business and business property
C	5	16	Bad debts
C	5	17	Depreciation
C	5	19	Depletion of mines, etc.
C	5	20	Amortization
C	5	22	Total
C	5	23	Net profit (loss)

B. SIC Code

Assuming that Business License Division assigns SIC numbers
to all business licenses, this classification scheme presents
no problem.

C.
Schedule	Page	Line	Item
A	6	2	Total
A	6	5	Total
B	6	--	Enter total here
D Summary	6	1	Total
D Summary	6	2	Total
E (Part I)	6	4	Amount received
E (Part II)	6	4	Amount received

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G          6     1    Total 2 )
G          6     1    Total 3 )  By rent,
G          6     1    Total 4 )     royalty
G          6     1    Total 5 )
H          6     1    Partnership
H          6     2    Estate or trust
H          6     3    Other source
```

II. Reporting of Data

    A. Page 1, statewide and by election district.

    B. Schedule C items by SIC 2-digit or 3-digit--where possible--group.

    C. Items in I-C above, statewide and by election district.

    C. Other groupings may be of interest, such as by occupation, resident, nonresident, number of examptions, and by income groups.

GLOSSARY OF TERMS

Alaska Gross Product (AGP): the total production of final economic goods and services in a given time period.

Personal Income: composed of wage and salary payments, property income, proprietor's income, and transfer payments.

Property Income: dividends and interest and income from rentals.

Proprietor's Income: income of unincorporated enterprises.

Transfer Payments: payments from government to individual for which no services or goods are rendered.

Disposable Income: personal income minus personal taxes.

Private Sector Employment: nonagricultural wage and salary employment, net of civilian government employees.

Consumer Durables: consumer goods with life expectancy of at least one year; e.g., automobiles, refrigerators.

Consumer Nondurables: consumer goods with life expectancy of less than one year; e.g., food, clothing.

Consumer Services: consumed at time of purchase; e.g., oil burner repairs, medical assistance.

Real Income: money income adjusted for change in the level of prices.

Endogenous Variable: a variable whose value is determined by the model.

Exogenous Variable: a variable whose value is determined outside of the model--usually prior to the solution of the model.

Income Accounting (state of national): a system for measuring the flow of income and production over a given time period.

Econometric Model: a set of functional relationships mirroring the structural relationships existing between sectors of the economic system.

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