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Secondary Economic Impacts Of the Boise Project of Idaho 1947-1970

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This report was originally published by the Idaho Water Resources Research Institute at the University of Idaho. Extensive data were included in appendices in the original printing. The appendices were deleted from this printing, though the text references remain. Individuals interested in the original data are invited to contact the senior author at the Department of Agricultural Economics and Applied Statistics, University of Idaho, Moscow, Idaho 83843.

STUDY PERSPECTIVE

Introduction

The Boise Irrigation Project of southern Idaho has been in operation since 1910 and waters from this project have stimulated economic development in the area since that time. The primary purpose of the project was to supply irrigation water in the Boise and Payette River valleys. Because irrigation water had become more available both in terms of total quantity and a more adequate supply late in the growing season, a thriving irrigated agricultural production area has developed (some 340,000 acres in 1970). Because of irrigation, input supplying industries have grown to meet farm needs, and agricultural processing industries have developed to process products into a form desired by consumers.

The research problem dealt with in this paper is to measure the secondary or induced economic impacts that have resulted from the development of the Boise Project over time. Since the state of Idaho, the industrial sectors of the state, and the Boise Project have all been growing at the same time, it is rather difficult both conceptually and in terms of data needs to measure these changes.

Briefly, the objectives of this study, specifically developed to help solve the above problem, were as follows:

- 1) Develop an aggregate regional economic model that would simulate the economies of the state and region;
- 2) Analyze the growth of the state, region, and the irrigation project through their economic inter-relationships in order to facilitate evaluation of the impact on income and output;
- 3) Evaluate the economic impact of the Boise Project on the Boise region and the state over time.

The general paucity of economic data, both in terms of specific model parameters and in terms of data that has never been collected hampers the analysis.

The general procedures followed to achieve these objectives included the following:

- 1) Assemble the best economic data available to construct representative input-output tables that depict the state and region over time.

- 2) Determine growth of the following parameters:
 - a) output of economic sectors in Idaho
 - b) income contributions of economic sectors
 - c) demand for Idaho production in terms of personal consumption and exports (final demand).
- 3) Analysis of the secondary impacts (on input requirements and processing activities) of irrigated production from the Boise Project.
- 4) Evaluation of Boise Project impacts on the state of Idaho and the Boise Project region.

Complete statewide data for the history of the project (since 1910) were not available. However, information was generally available (or was developed in earlier stages of this study on direct project output) regarding the structure of the state's economy, sector output, and sector income contribution since 1947.

Direct Economic Impacts

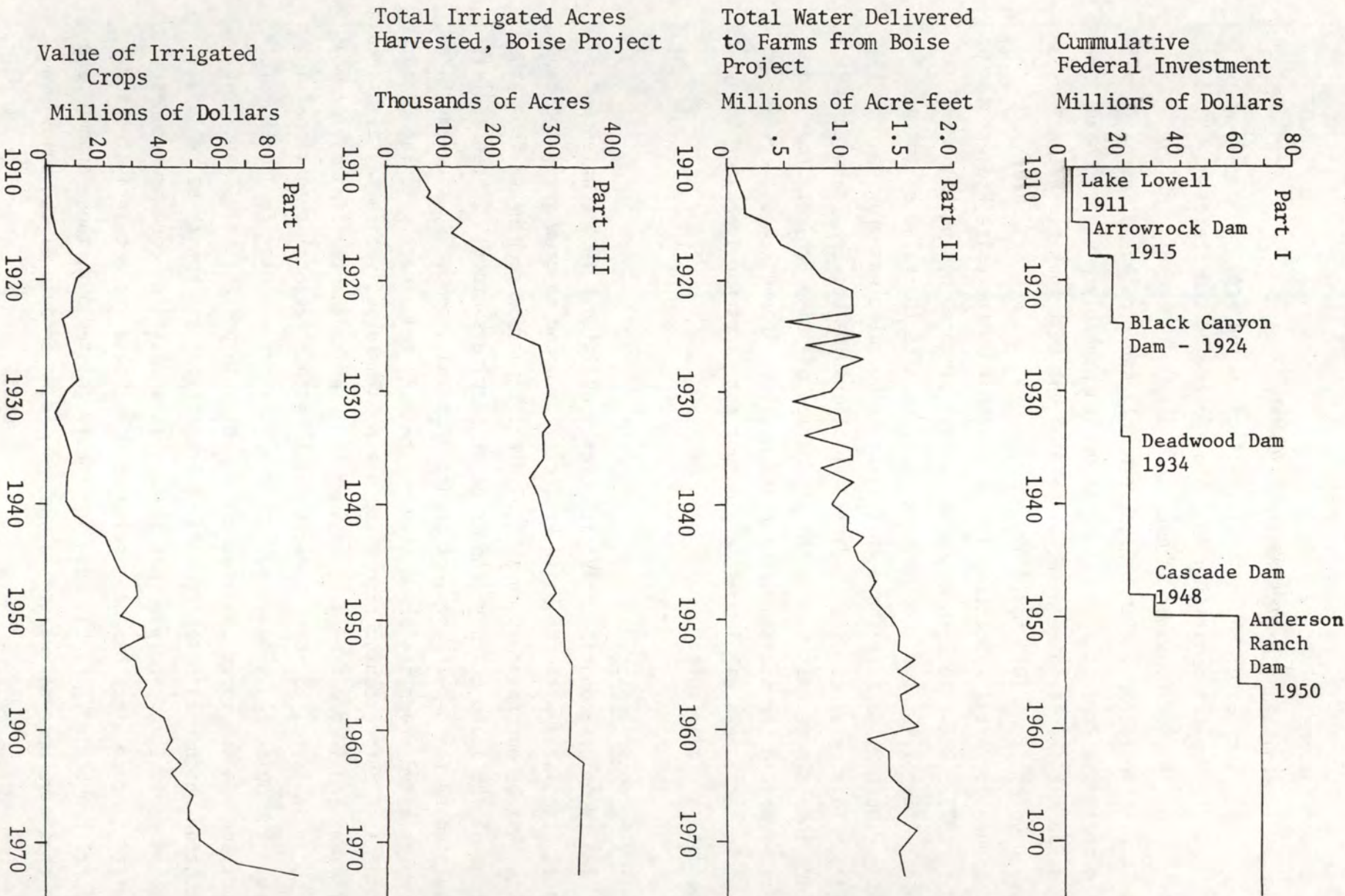
Since the Boise Project began servicing the water needs of the Boise Valley in 1910, the crops and productivity of the area have been changing. For example, federal investments in the project grew to nearly \$60 million from 1910 to 1956, the water supply available during the growing season increased in quantity and decreased in variation as more structures were added to the system, and the irrigated acreage expanded from 50,000 acres in 1910 to 270,000 acres by 1926, and to 340,000 acres by 1970 (see Fig. 1).

Returns from irrigated crops grown with project water varied greatly from 1910 to 1940; they were especially low during the depression years of the 1930's. During World War II, however, gross returns began to increase and rose quite steadily from about \$3 million per year in 1940 to over \$50 million in 1970 (Figure 1, part IV). Reasons for this increase were many, and include the following:

Supply factors:

- 1) More irrigated land
- 2) Increased and more stable water supply
- 3) Greater crop diversity
- 4) Advancing technology
- 5) Improved managerial skills of farmers

Figure 1. Summary of direct impacts of the Boise Project, Idaho, 1947-1970.



Demand factors:

- 1) Shifting product demand
- 2) Increased processing facilities in the area
- 3) Growing population in Idaho and the United States
- 4) Higher consumer income.

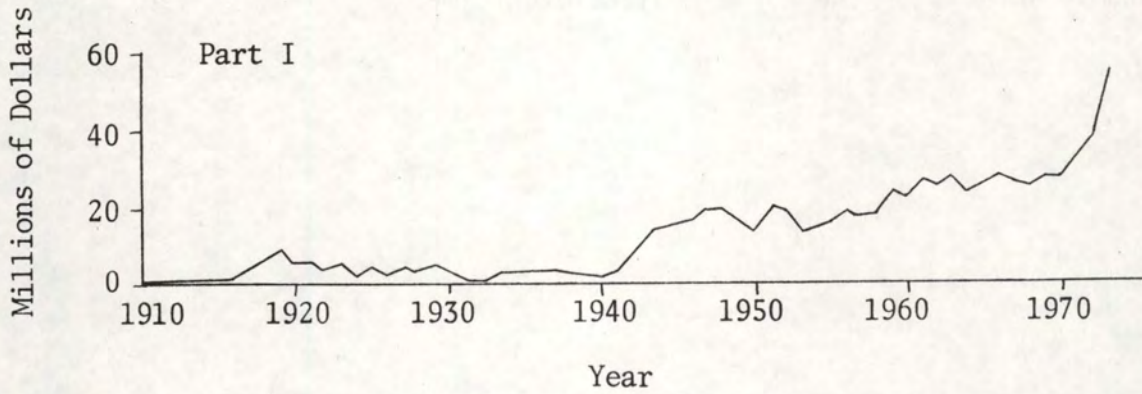
While the above factors, plus others, probably contributed to increased output in the Boise Project area, economic growth probably would not have occurred had not the stage been set by development that took place the previous 30 years (from 1910 to 1940).

Figure 2, part I summarizes income growth from the Boise Project during 1910 to 1973. Prior to 1940 economic success (income) was both low and unstable. After 1940, project income grew along with the value of irrigated crops. Figure 2, part II shows that Idaho income also was growing from 1947 to 1973. This research will study the relationships between Idaho economic sectors to estimate what impact the production of Boise Project crops had on income earned in the state and the Boise Region. Appendix A summarizes sector employment, personal income, and output estimates for Idaho for the years these data are available.

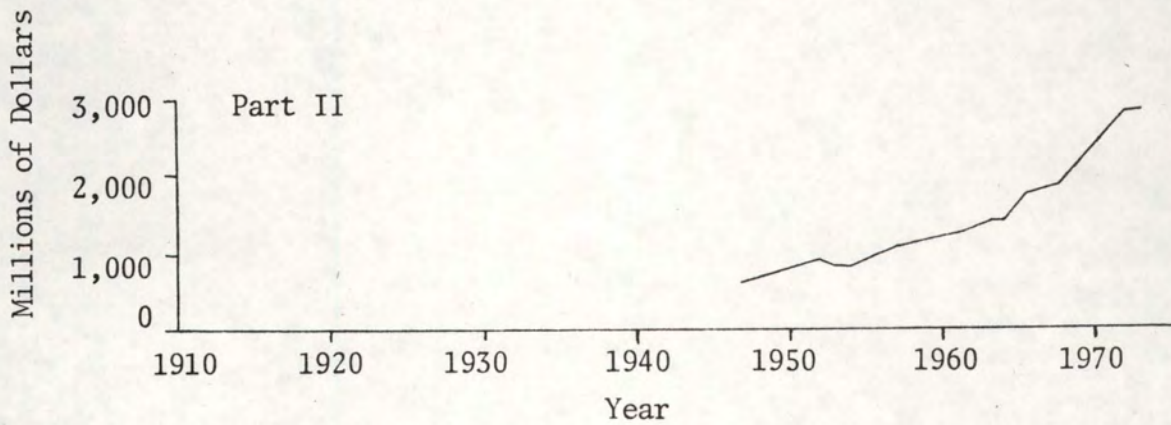
Secondary Economic Impacts

Two types of economic activities create additional income or secondary impacts associated with the Boise Project. In order to grow irrigated crops, inputs must be purchased (such as fuel, fertilizer, or machinery) from other sectors of the Idaho economy (the trade or service sectors). These activities, stimulated by the growing project create jobs and income. By the same token, after irrigated crops are grown they may be marketed directly to the consumer or processed before consumption takes place. These activities may also create employment and income for Idaho residents. The above activities may or may not occur in Idaho, so their impacts may be either regional or national in scope. The Boise area, however, is known as a trade center for southwestern Idaho, and has developed considerable capacity to process animal and crop production which originates from Boise Project lands. For these reasons, it seems logical to conclude that there exists positive economic secondary benefits (income) that has been stimulated by Boise Project irrigated agricultural production. As has been previously pointed out, these income benefits that have been stimulated to occur in Idaho because of the Boise Pro-

Figure 2. Income growth associated with the Boise Project and the State of Idaho, 1910 - 1970.



Value Added Income Associated with the Boise Project



Idaho Personal Income

ject are only associated with the project, separate factors of production are responsible for creating the income resulting from trade and processing. The relative amount of income and output stimulated by Boise Project production are of interest to policymakers who must recommend if, when, and where future public funds are to be spent. Unfortunately, secondary income and impacts from the project are easier to describe in words than they are to measure. This research will attempt to quantify the secondary income and economic impacts of the Boise Project over time.

METHODOLOGY

Economic Models

In order to study the impact of the Boise Project on the Idaho economy, information must be available relative to the nature of the output of the Boise Project, the structure of the Idaho economy, and the changes that have taken place over time. Unfortunately, data are not readily available relative to all the appropriate parameters over time. In short, data are available relative to the physical production of the Boise Project from 1910 to present. Economic output data for Idaho are scattered and only available from 1947 to present. Structural inter-relationships concerning Idaho's economy, however have never been collected in a complete or consistent manner. Consequently, it was necessary to use available Census data and statistics to depict Idaho's economy.

After reviewing past studies and data availability it was decided to utilize the input-output framework constructed by Karen Polenske at the Massachusetts Institute of Technology (6). From Polenske's work simulated input-output models could be constructed for Idaho for the years 1947, 1958, and 1963. While these models were not empirically derived for Idaho they have the advantage of being in balance with data from the remainder of the United States and gave the only estimate of what the Idaho economy might have been like in 1947 and 1958. Polenske's work was modified by that of Peterson in 1968, who derived a provisional input-output model for Idaho for 1963 (5). Peterson's work had the best information relative to industrial inputs imported by Idaho in 1963, while Polenske's work was more representative of the relationships in the trade, service, and financial sectors and offered some insight into the past.

Polenske's and Peterson's models were used to help measure the secondary impacts of the Boise Project from 1947 to 1970, especially as they affected the food processing sector (see Appendix B). To illustrate the impacts of the Boise Project on the immediate regional economy surrounding the project (primarily Ada and Canyon counties) a regional input-output model was developed which separated the state into two parts; those known as the Boise Region and the Rest of Idaho. While complete data are lacking to conclusively construct these models over time, sufficient information is available to simulate economic activity that is consistent with what occurred elsewhere in the United States. The status of information used is dis-

cussed briefly in the following section.

Data Availability and Quality

Boise Project

Excellent information was available concerning Boise Project irrigated crop production, value of output, and income from those crops from 1910 to 1973. Secondary projects impacts were studied only after 1946 since supplementary information on economic activity in Idaho was lacking or so scattered as to make it impractical for evaluation prior to that time.

Sector Output

The Idaho economy was initially divided into thirteen sectors with emphasis on crop agriculture and food processing in order to follow the impacts of processing Boise Project output. Production of each sector was estimated using information developed by Polenske, the Census of Manufactures, and the Survey of Current Business. Using these sources, sector output was estimated when necessary for the years 1947 to 1970. These estimates are presented in Appendix C.

Idaho Economy

As indicated above, input-output models developed from Polenske's work were used to simulate the structure of Idaho's economy from 1947 to 1970. Polenske's work allowed for output changes in eighty Idaho sectors for 1947, 1958, and 1963, and was consistent with total production in the United States for those years. In other words, new sectors were allowed to come into the model and output was allowed to change. This approach, however, does not allow for measuring increased productivity from technological advancements. Even though Idaho sectors were allowed to increase or decrease their output and enter or leave the economy little change was noted in the technological coefficients from 1947 to 1963 after the three original eighty sector models were each reduced to thirteen sectors. Evidently, established Idaho sectors tended to expand over this period, and consequently newly developing sectors failed to change the pattern of input usage appreciably.

Sector Income

Sector income and value added data were generally available from the same government sources as were output data. The relationship between those two variables was assumed to be constant for the aggregated sectors. When data was available for either income or total output, but not the other variable, estimates were made using a constant relationship. While this assumption is an oversimplification of the real world, it was necessary due to the lack of collected information. In the case of certain sectors it became necessary to use value of sales or value of shipments data to approximate total output. Sometimes it was necessary to evaluate information from various sources and select what was felt to be the most representative.

Investment

Data relative to sector investments are necessary to make a truly dynamic analysis of an economy and its sector interactions. Data relative to the sources of capital are nearly completely lacking for Idaho. For this reason it was necessary to attempt to measure Boise Project impacts on a year by year basis using the available input-output models, outputs by sector, Boise Project output data, and information available concerning the processing of Idaho agricultural inputs by various sectors. Increased investments in Idaho's economy undoubtedly accounted for its growing output, but cannot even be estimated with present knowledge.

Boise Project Region

Data are also lacking in regard to the economic interrelationships that occur within Idaho. In order to evaluate Boise Project impacts on the Boise region within Idaho (essentially Ada and Canyon counties) sector outputs for Idaho were separated on the basis of employment within the sector for each respective region. Here again, actual input-output relationships would improve the measurement of Boise Project economic impacts. Results could also be improved if and when better data becomes available.

In summary, while data to evaluate the impact of the Boise Project on Idaho have many missing and partially completed elements, it is felt the

available information allows for reasonable estimates of actual impacts, while allowing for the development of methodology, and pointing out exactly what is necessary to do a more accurate job. Clearly, the Boise Project helped create output and income for irrigation farmers and was partially responsible for the establishment of the food processing industry in the Boise area. The purpose of this part of the study is to measure economically how much impact the irrigation project has had on the Boise region in encouraging further production, employment, and income.

IDAHO ECONOMIC GROWTH

The period following World War II has been an era of steady growth for the state of Idaho. For example, between 1947 and 1972 government statistics indicate total employment increased from 131,200 to 241,500. Between 1957 and 1973 total personal income in Idaho increased from \$1,042 million to \$2,828 million. In agriculture, for the period between 1947 and 1973 livestock sales increased from \$204 million to \$640 million, crop sales increased from \$312 million to \$918 million, while the sales of the food and kindred products industry went from \$175 million to \$960 million. Since agricultural prices were fairly constant during this period these agricultural prices were fairly constant during this period these figures are good indicators of growth in output. Figure 3 shows the above sector output from 1947 to 1973 in comparison to Boise Project crop output.

Total Personal Income

Income growth by sector is also available from government sources for the period 1957 to 1973 (see Appendix A-2). They show that farm income increased from \$169 million in 1957 to \$560 million in 1973. At the same time manufacturing income increased from \$128 million to \$441 million. In Idaho about one-third of manufacturing employment is associated with the food and kindred products industry. Over the 1957 to 1973 period, income in most Idaho sectors increased from three to four times.

Table 1 summarized total farm personal income in Idaho and the direct income generated from the Boise Project. In 1957 the Boise Project was estimated to produce 1.6 percent of the state's income, while in 1973 it was estimated to produce 1.9 percent of the income. Compared to state farm personal income the Boise Project generated from 8.5 to 17.6 percent of the total.

Population and Employment

The majority of the Boise Project is located in Ada and Canyon counties of southwestern Idaho, consequently farm income and population data from these two counties are quite representative of the project. Table 2 presents farm income, number of rural residents, average number of residents per household, and per capita income for Census years since the beginning of the project in 1910. The number of rural residents in Ada and Canyon

Figure 3. Sector outputs for Idaho agriculture and food processing sectors, 1947 - 1973.

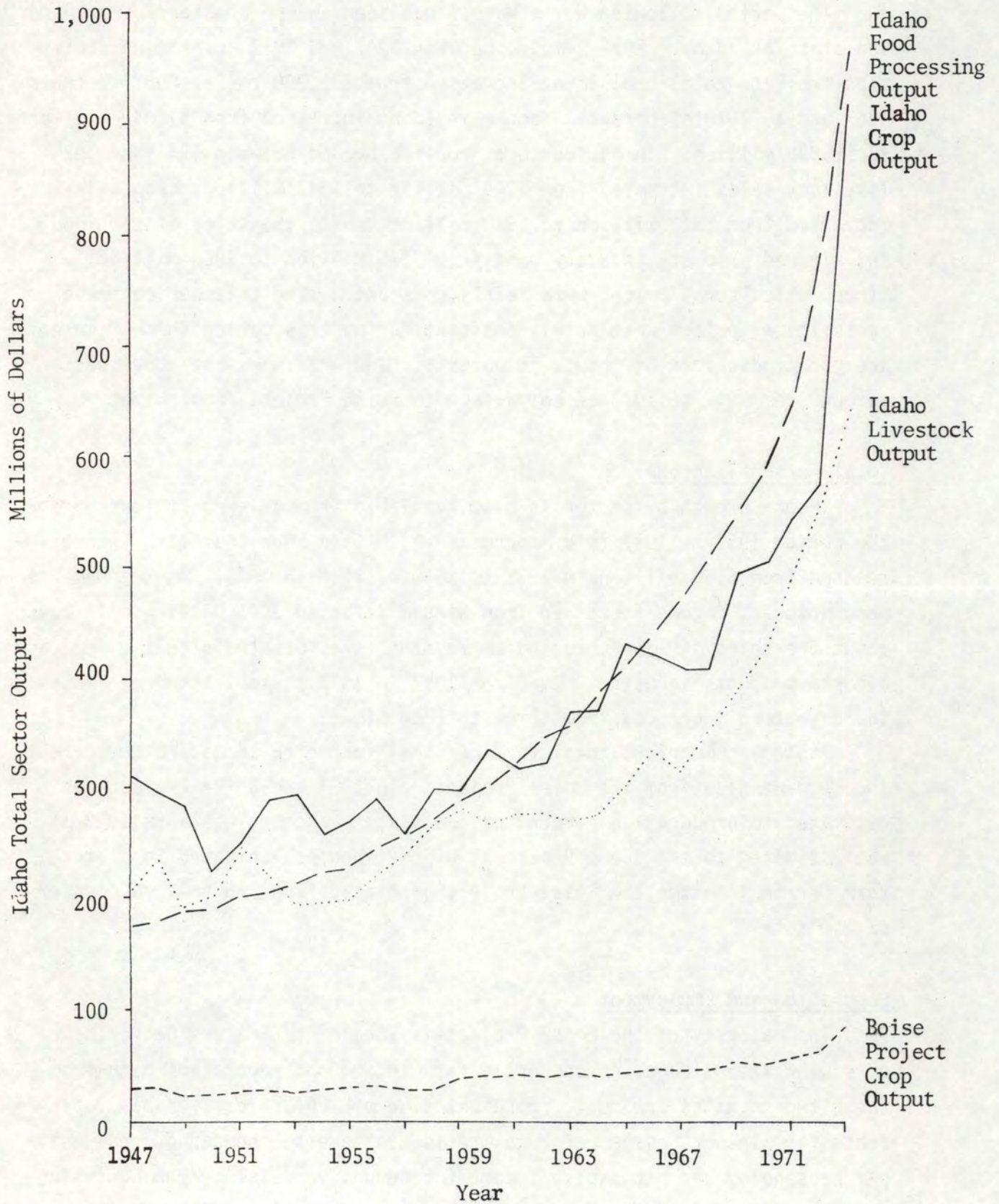


TABLE 1. TOTAL PERSONAL FARM INCOME COMPARED TO TOTAL VALUE-ADDED INCOME FROM THE BOISE PROJECT, IDAHO, 1957 - 1973

Year	Total Idaho Personal Income	Farm Personal Income	Value-added Income from Boise Proj.	Farm as % of total income	Boise Proj. as % of farm income
		(millions of dollars)		(percent)	
1957	1,042	169	17	16.2	10.1
1958	1,091	179	18	16.4	10.1
1959	1,184	174	24	14.7	8.5
1960	1,204	163	23	13.5	14.1
1961	1,238	148	26	12.0	17.6
1962	1,354	181	25	13.4	13.8
1963	1,367	172	27	12.6	15.7
1964	1,397	151	23	10.8	15.2
1965	1,661	254	25	15.3	9.8
1966	1,721	208	27	12.1	13.0
1967	1,825	222	26	12.2	11.7
1968	1,898	194	26	10.2	13.4
1969	2,149	277	29	12.9	10.5
1970	2,364	278	27	11.8	9.7
1971	2,592	289	33	11.2	11.4
1972	2,844	340	38	12.0	11.2
1973	2,828	560	55	19.8	9.8
Compound rate of growth 1957-1973	6.5%	7.7%	7.6%		

TABLE 2. FARM INCOME AND POPULATION DATA FOR ADA AND CANYON COUNTIES,
IDAHO, 1910 - 1970 *

Year		Total Farm Income	# Rural Residents	Av. Residents/ Household	Per Capita Income
1910	Ada	1,302,622	11,730	7.80	111.05
	Canyon	1,979,084	17,575	6.05	112.60
	Idaho	34,357,851	255,696	8.29	134.36
1920	Ada	6,856,089	13,820	6.28	496.09
	Canyon	11,312,282	14,205	5.34	796.35
	Idaho	126,495,111	196,563	4.66	643.53
1930	Ada	5,666,522	9,731	4.22	582.31
	Canyon	10,510,762	14,707	4.48	714.67
	Idaho	135,802,055	186,100	4.46	729.72
1940	Ada	3,890,604	11,356	4.22	342.60
	Canyon	6,747,256	17,143	4.72	393.58
	Idaho	83,890,896	200,016	4.58	419.42
1950	Ada	10,433,430	9,236	3.68	1,129.64
	Canyon	26,232,977	17,270	4.33	1,518.99
	Idaho	281,025,323	164,960	4.08	1,703.59
1960	Ada	16,266,990	7,064	3.37	2,302.80
	Canyon	47,505,483	13,682	4.03	3,472.11
	Idaho	438,383,524	145,739	4.32	3,008.00
1970	Ada	23,824,000	5,243	3.44	4,543.96
	Canyon	76,635,000	8,790	3.67	8,717.43
	Idaho	649,571,000	84,074	3.37	7,726.00

* United States Department of Commerce, Bureau of the Census

counties declined from 29,305 in 1910 to 14,033 in 1970. On the other hand, per capita incomes increased from \$111.98 in 1910 to \$7,158.76 in 1970. Over this period both the number of rural residents and number of farms declined while the average size of farm and farm incomes increased.

Between 1950 and 1970 per capita income for rural residents increased from \$1,129.64 to \$4,543.96 in Ada County and increased from \$1,518.99 to \$8,717.43 in Canyon County. Based on 1950 per capita income figures this amounted to a 402.25 percent change in Ada County and a 573.90 percent change in Canyon County in 20 years. Total farm income in Ada County was 228.34 percent higher in 1970 than in 1950, and 292.13 percent greater in Canyon County. Since the land base of the county and farm prices did not change appreciably over the period, a tremendous increase in agricultural productivity is apparent. By comparison, total farm income for Idaho increased from \$281,025,323 in 1950 to \$649,571,000 in 1970, an increase of 231.14 percent; Ada and Canyon counties together increased 273.98 percent, a considerably higher growth than for the state.

Over the life of the Boise Project (1910 to 1970) farm income in Ada County increased from \$1,302,622 to \$23,824,000 (18.2 times) while in Canyon County farm income increased from \$1,979,084 in 1910 to \$76,635,000 (38.72 times). Most of the income change, however, came after 1950 (as is shown in Table 2).

Idaho Sector Output

Along with the growth of the Boise Project counties, output was also increasing in other sectors of Idaho's economy that are important in this study. For example, it was estimated that total Idaho livestock output increased from 204 to 640 million dollars between 1947 and 1973. During this period crop output increased from 312 to 918 million dollars, and the food and kindred products sector increased output from 175 to 960 million dollars. Since sector output data is not available from Census reports, it was necessary to estimate outputs based on data that was available. These procedures are summarized in Appendix C.

Table 3 compares estimated total Idaho crop output with that from the Boise Project and the relative importance of Boise Project output. It shows that Boise Project crop varied from 8.6 to 13.6 percent of total crop output from Idaho. The relative importance of the Boise

Project crop production is fairly constant considering the cultivated area has changed little over the period, while the state of Idaho has been adding considerable acreage. Table 3 compares total output from Idaho food processing, Idaho crop output, and Idaho livestock output with the Boise Project crop output. It is interesting to note the output from the food processing sectors had a lower value in 1947 than either crops or livestock, however, by 1973 food processing output was higher (\$960 million) than either crops (\$918 million) or livestock (\$640 million).

The food processing or food and kindred products sector is particularly important in this analysis of secondary Boise Project impacts since processing of Boise Project products constitutes a large part of the secondary impacts. During 1967 in Idaho 27.6 percent of all employment in the state's food processing sector took place in the Boise Valley according to Idaho Manufacturing Directory (see Appendix D). Secondary Boise Project impacts are closely tied to food processing in Ada and Canyon counties and the relationships that exist between these sectors.

TABLE 3: TOTAL IDAHO AND BOISE PROJECT CROP OUTPUT VALUES COMPARED,
1947 - 1973

Year	Idaho Crop Output Value	Boise Project Crop Output Value	Boise Project as a % of Total Output
1947	\$312 x 10 ⁶	\$30.1 x 10 ⁶	9.6
1948	298	30.7	10.3
1949	281	28.1	10.0
1950	224	25.7	11.5
1951	249	32.7	13.1
1952	290	32.9	11.3
1953	294	25.3	8.6
1954	259	30.4	11.7
1955	270	31.3	11.6
1956	293	34.1	11.6
1957	263	32.6	12.4
1958	298	34.4	11.5
1959	297	40.4	13.6
1960	336	41.8	12.4
1961	319	43.5	13.6
1962	323	42.1	13.0
1963	368	46.1	12.5
1964	371	43.3	11.7
1965	431	46.3	10.7
1966	423	49.8	11.8
1967	410	48.5	11.8
1968	412	48.9	11.9
1969	493	52.7	10.7
1970	504	52.9	10.5
1971	545	58.4	10.7
1972	574	65.1	11.3
1973	918	87.5	9.5

THE STRUCTURE OF IDAHO'S ECONOMY

Past Studies

At least three researchers have studied the nature of the interrelationship that exists in Idaho's economy. Such work has been done by Peterson (5), Rafsnider (8), Ferguson (2), and Polenske (6). The work by Peterson and Rafsnider were attempts to build input-output models of Idaho's economy in 1963 and 1967 respectively. Ferguson developed a regional input-output model to study the impact of federal expenditures on the Sawtooth National Recreation Area, on the immediate region, and Idaho as a whole (2). Polenske's work allows researchers to develop state input-output models for 1947, 1958, and 1963, thus allowing some examination (although superficial) of the structural changes that might have taken place in Idaho during these years. Unfortunately none of the above studies, except Peterson's, to a degree, were based on a comprehensive and statistically sound empirical sample of Idaho firms. Since this situation is impossible to remedy in terms of establishing past relationships it was necessary to utilize available data and studies on this analysis of the impact of the Boise Project on its immediate region and Idaho.

The above mentioned studies were utilized to help gain insights into the structure of the Idaho economy from 1947 to 1970, and the role of the Boise Project. Briefly, the work by Polenske and Peterson were used to establish the nature of Idaho's economy in 1947, 1958, and 1964 and to evaluate the changes in its structure and that impact on the technical (input-output) coefficients. A procedure similar to Ferguson's regional model methodology was applied to the yearly input-output models to estimate the structure of the Boise Region economy (Ada and Canyon counties) and the rest of Idaho (Appendix E). The experience gained in the above research efforts provided regional input-output models for the Boise Project area for the years between 1947 and 1970 and with them the opportunity was gained to evaluate project impacts. Obviously, empirical data collected on a state and regional basis for each year would be far superior to the above methodology. Unfortunately, however, it is impossible at this point in time to collect such historical data in detail.

Idaho---Input-Output Structure

To accommodate the analysis of the impact of the Boise Project on the Boise Region over time it was necessary to utilize the work of Peterson in 1963 and Polenske in 1947, 1958, and 1963. Peterson's original model had 16 sectors while Polenske's work contained 80 sectors. Table 4 shows a 13 sector Idaho input-output table containing livestock, crop, and food processing sectors which was developed from the work by Peterson and Polenske (see Appendix B for Polenske's tables). The advantage of Polenske's work is that it allows for structural changes over time and it is consistent with the rest of the United States. Peterson's work has the advantage of being conducted in Idaho with Idaho data, although it is not based on an empirical sample.

Table 4 is a simulated model of Idaho's economy that utilizes the best information available from past research. By subdividing this model into two regions (Boise Project and Rest of Idaho), it allows an evaluation of the impact of the Boise Project on the Boise Region. Since the secondary impacts of the Boise Project depend on its relationships with sectors that either provide inputs for project farms or process its output, the measurement of these impacts depend on the quality of the information available. Obviously, if the quality of the data could be improved so could the estimates.

Sector Output Growth of the Idaho Economy

Given the structure of Idaho's economy (Appendix B) and the estimates of total output (Appendix C), changes in final demand (personal consumption plus exports) may be evaluated. For it is the purchase of goods in terms of final demand that provides the stimulus or incentive for the state's economy to function and develop. Without the out-of-state need for agricultural products and processed food products Idaho's agriculture and food processing sectors could not develop as they have. Consequently, it is of interest to this study, both in terms of growth of aggregate demand and in terms of using the input-output structure, to estimate final demand functions for Idaho agricultural sectors over time.

To study the nature of final demand for Idaho's economic sectors a 10 sector input-output model was developed as follows:

Table 4. The Gross Flows in Idaho's Economy, 1963 (Polenske).
(Dollars x 10⁶)

*adjusted by Peterson's Import data for sectors 4,5,6.

Purchases/Sales	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Sales to Idaho Industries	Idaho Personal Consumption	Exports	Total Final Demand	Total Sales
1. Livestock Agriculture (1)	43.230	24.607	.001	83.886	.006	.005	.002	.008	.005	.015	.056	.001	.000	151.822	42.343	76.897	119.240	271.062
2. Crop Agriculture (2,3,4)	127.139	28.270	.004	39.047	.015	.016	.006	.348	.139	.406	.106	.002	.008	195.506	21.195	207.452	228.647	424.153
3. Mining (5-10)	.006	.025	9.427	.082	23.561	.002	.000	4.693	.001	.000	.005	.000	.006	37.808	.000	16.230	16.230	54.038
4. Food Processing (14)	15.539	.925	.094	18.662	1.286	.398	.117	.488	.234	.828	1.417	.044	.014	40.046	21.728	322.119	342.847	383.893
5. Other Manufacturing (13, 16-64)	.126	5.485	.741	15.086	59.119	.658	.148	57.804	3.275	5.706	3.775	.102	.147	152.172	30.085	344.845	374.930	527.102
6. Transportation and Communications (65-67)	9.492	6.046	.648	14.400	16.722	12.065	2.716	10.260	2.220	6.925	4.712	1.897	.440	88.543	79.937	.006	79.943	168.486
7. Utilities (68)	1.048	12.686	1.665	2.744	10.180	1.185	21.813	.896	1.409	7.055	3.417	.179	2.617	66.894	49.501	.000	49.501	116.395
8. Construction (11, 12)	1.481	4.325	.571	.797	2.242	5.700	3.507	.073	19.457	1.358	1.720	.117	4.881	46.229	229.235	.062	229.297	275.526
9. Fire (70, 71)	4.825	27.087	2.441	3.967	6.924	6.269	1.512	3.231	22.250	27.066	14.023	.422	.572	120.589	194.872	.167	195.039	315.628
10. Trade (69)	10.708	12.355	.390	14.333	10.614	3.707	.679	22.475	1.542	5.942	9.299	.120	.148	92.312	283.260	.007	283.267	375.579
11. Services (72-77)	6.630	19.917	.857	11.813	8.903	7.600	2.218	11.764	7.635	21.531	12.455	.383	1.017	112.723	109.252	.019	109.271	221.994
12. Federal Government (78)	.048	.083	.062	.239	.425	.397	.320	.079	2.310	1.681	2.082	.006	.025	7.757	8.553	.000	8.553	16.310
13. State Government (79)	.007	.017	.046	.138	.046	.203	.030	.150	.032	.228	.116	.006	.010	1.029	25.986	.000	25.986	27.015
Total Idaho Industry Purchases	220.279	141.828	16.947	205.194	140.043	38.205	33.068	112.269	60.509	78.741	53.183	3.279	9.885	1,113.430	1,095.947	967.804	2,063.751	3,177.181
Imports	16.483	53.702	11.352	89.046	187.719	15.284	17.797	36.273	47.117	16.774	35.335	1.057	1.261	529.200	283.152	.000	283.152	812.352
Depletion	.000	1.430	.287	.043	5.330	.000	.000	.104	.000	.023	.103	.000	.000	7.320	.000	.000	.000	7.320
Value Added	34.300	227.193	25.452	89.610	194.010	114.997	65.530	126.880	208.002	280.041	133.373	11.974	15.869	1,527.231	165.644	.000	165.644	1,692.875
Total Purchases	271.062	424.153	54.038	383.893	527.102	168.486	116.395	275.526	315.628	375.579	221.994	16.310	27.015	3,177.181	1,544.743	967.804	2,512.547	5,689.728

<u>Sector Number</u>	<u>Name of Sector</u>
1	Livestock
2	Boise irrigated
3	Other Idaho irrigated
4	Dryland crops
5	Mining and manufacturing
6	Food processing
7	Utilities
8	Construction
9	Trade
10	Service, F.I.R.E., Transportation, Government

Figures 4-13 present total sales and final demand comparisons for Idaho sectors based on the estimates of sector outputs and the structure of the state's economy adjusted for changes in technical coefficients over time. For most sectors final demand increases as total output increases. The exception to this generality is the Boise Irrigated sector, in which case total output increases and at the same time final demand is constant or falling. This can only occur if the amount of Boise Project output utilized within the state, in the case by the food processing sector, is increasing. Since we have already seen how food processing output has been growing relative to crop and livestock production, this conclusion is reasonable. In addition, the Boise Project grows many crops that require processing such as vegetables for canning or freezing, sugar beets, and potatoes. The Boise Project area also produces considerable quantities of dairy products which are grown and processed locally.

Comparing the outputs and resulting final demands for the 10 sectors shows that the agricultural based sectors and construction were quite irregular in nature compared with the fewer ups and downs of manufacturing, utilities, trade, and service sectors. Crop agricultural shows the greatest number of ups and downs of the agricultural sectors. Construction appears to have the greatest variation in output and final demand, as would be expected. The food processing sector shows none of the irregularities in output or final demand as do the agricultural sectors. Final demand for both irrigated crop sectors fail to follow their respective sector outputs as do other sectors, indicating that increased amounts of irrigated production was staying in Idaho for further processing. Such a situation is beneficial to Idaho in terms of increased employment and

Figure 4. Livestock output and final demand, Idaho, 1947-1970.

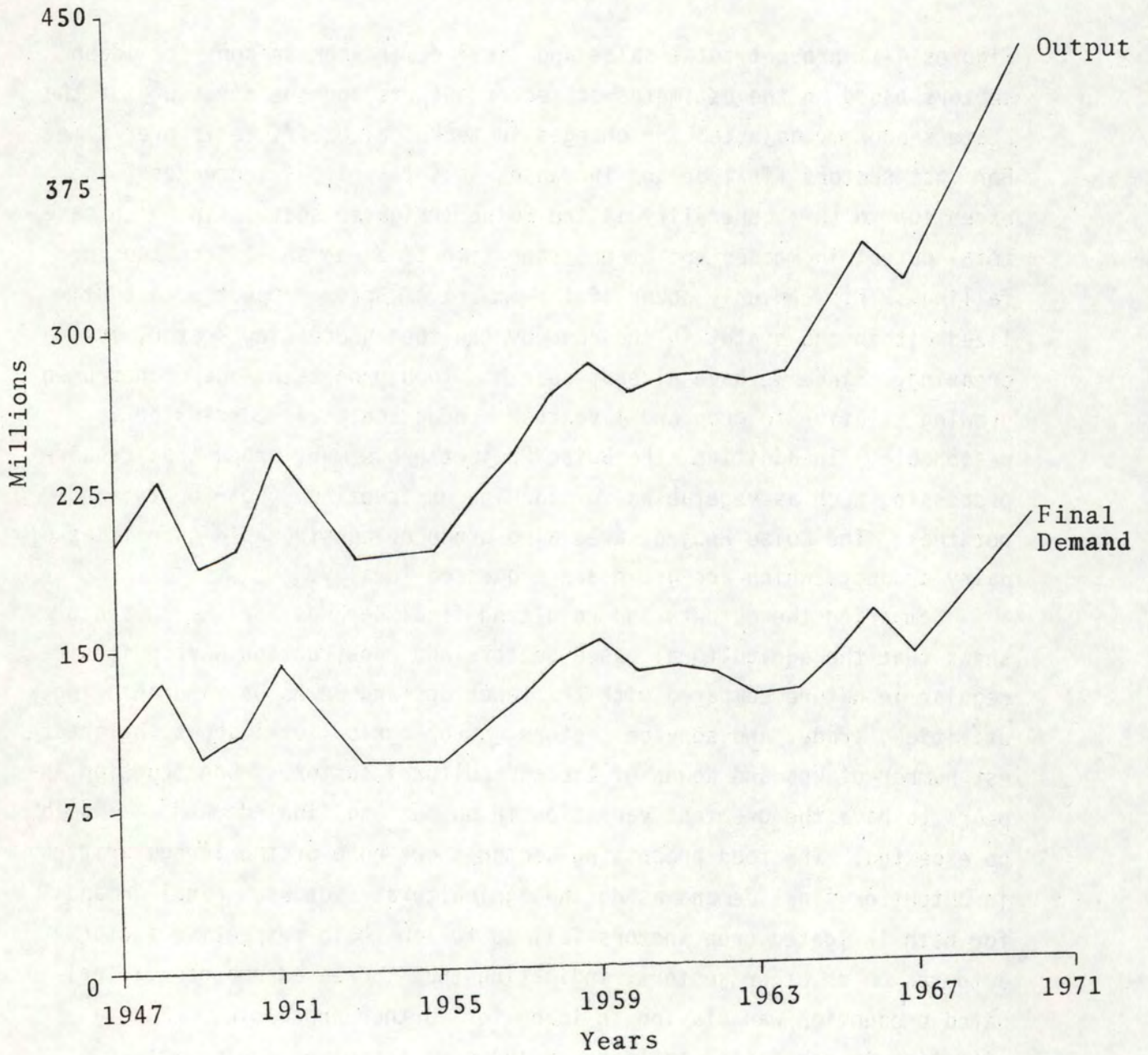


Figure 5. Boise irrigated output and final demand, Idaho, 1947-1970.

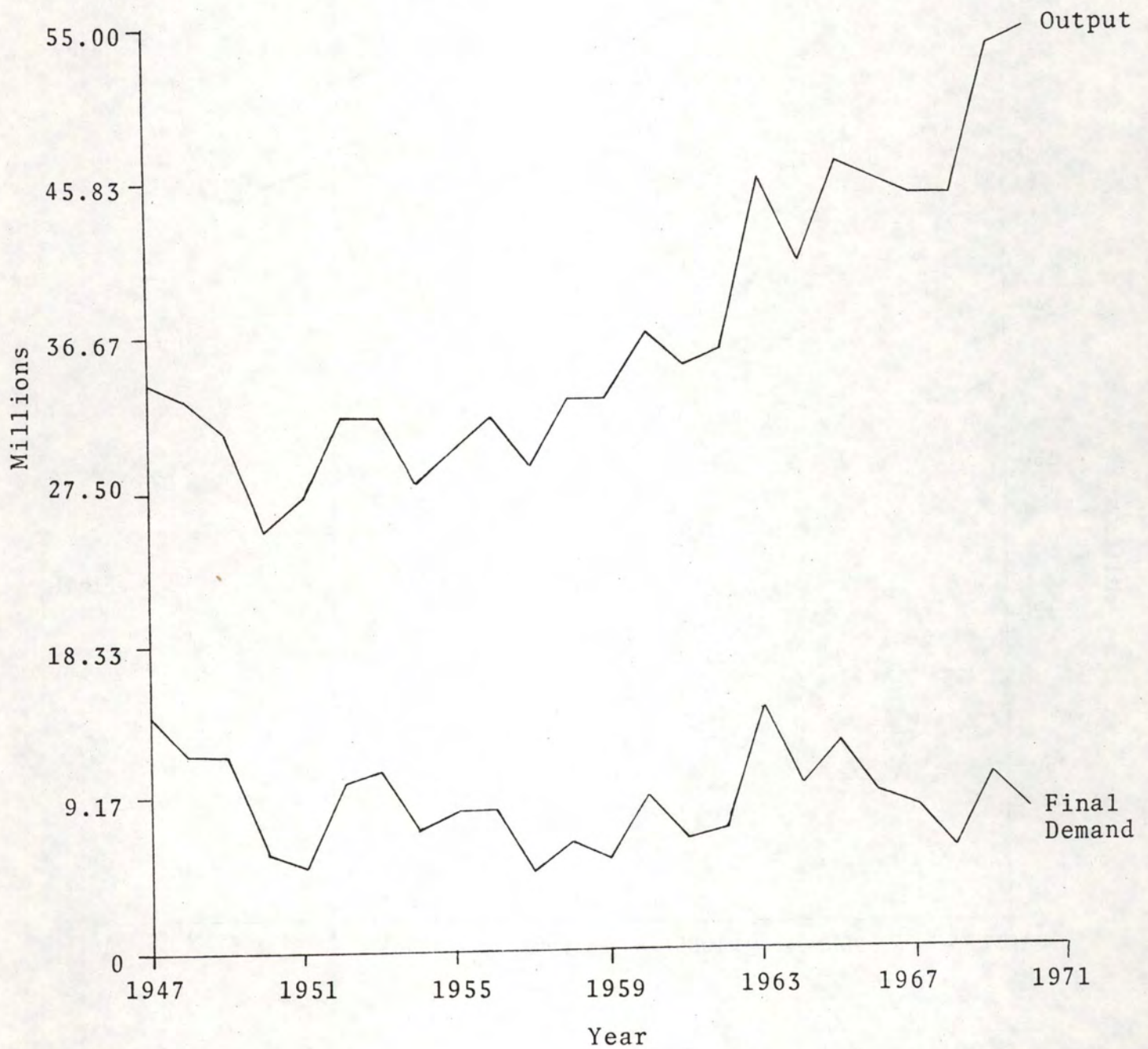


Figure 6. Other Idaho irrigated output and final demand, Idaho, 1947-1970.

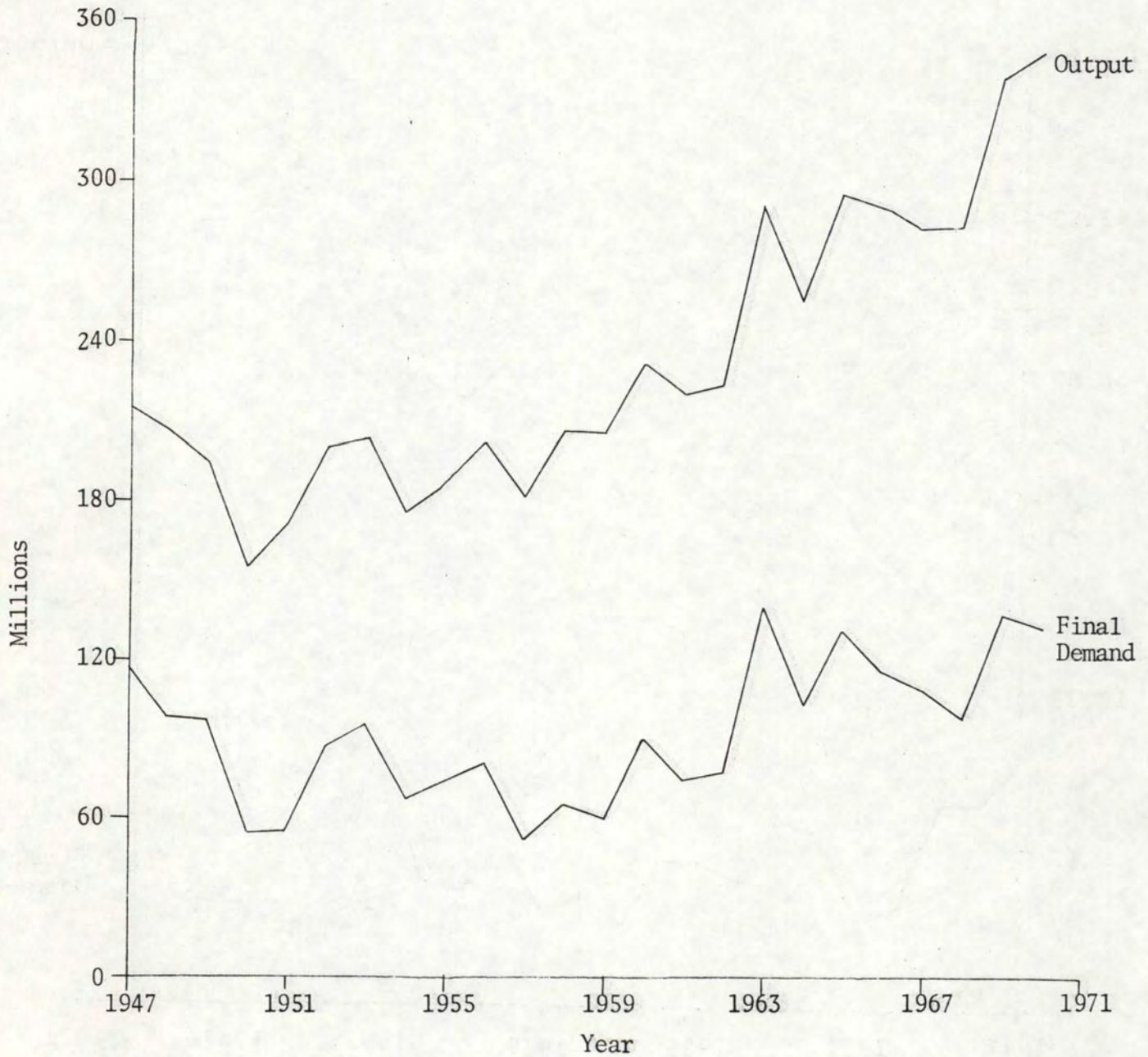


Figure 7. Dryland crop output and final demand, Idaho, 1947-1970.

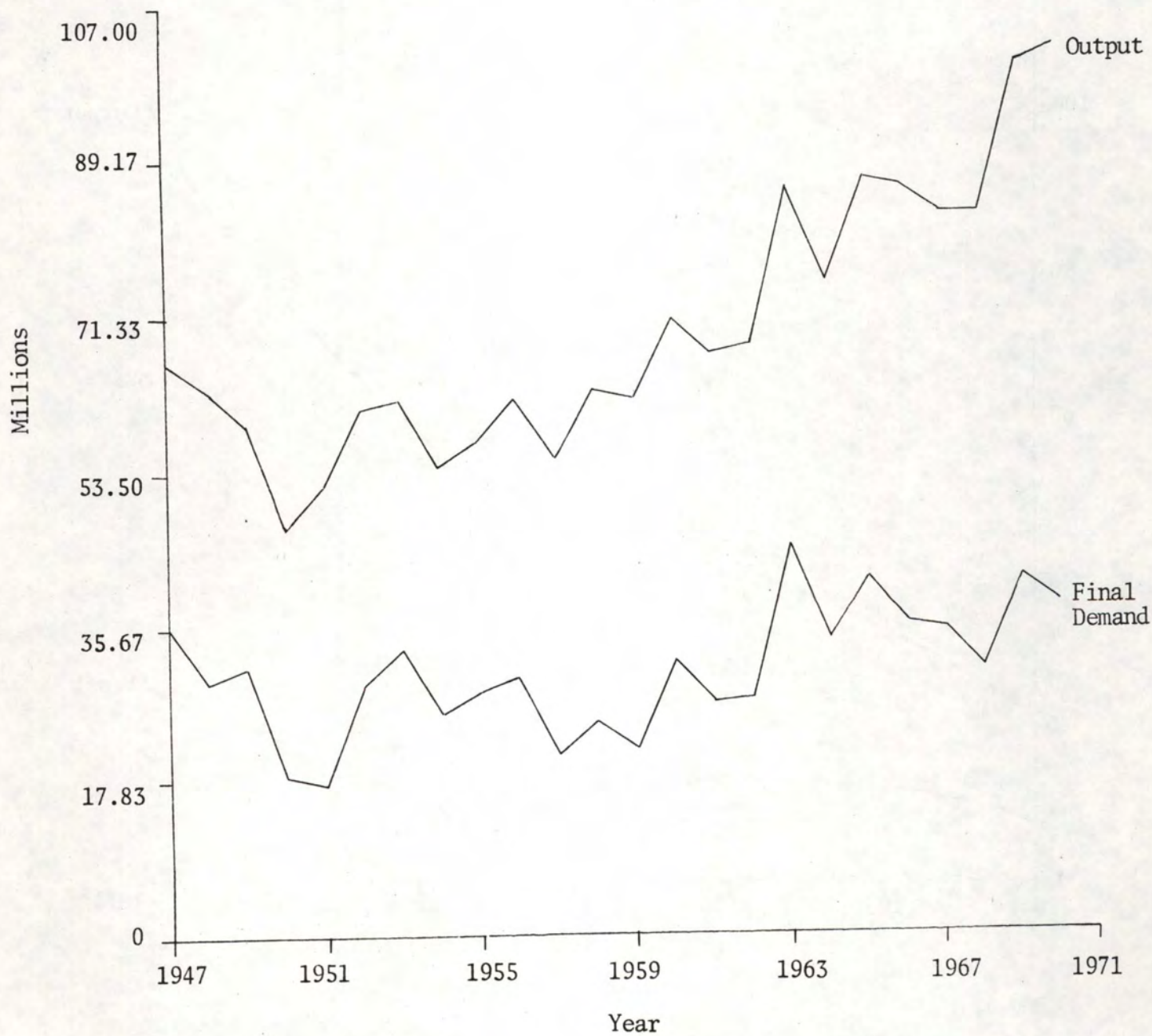


Figure 8. Mining and manufacturing output and final demand, Idaho, 1947-1970.

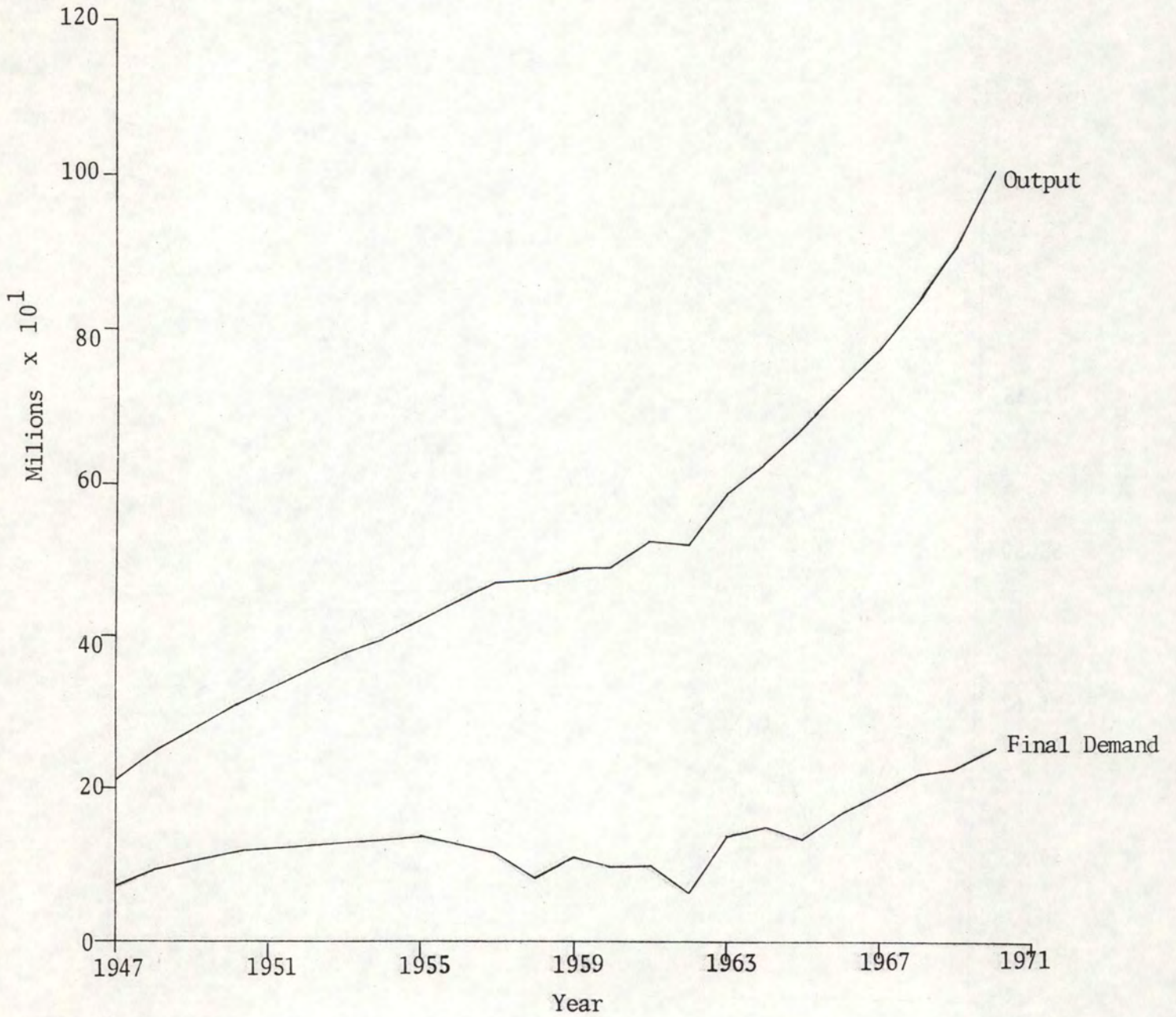


Figure 9. Food Processing output and final demand, Idaho, 1947-1970.

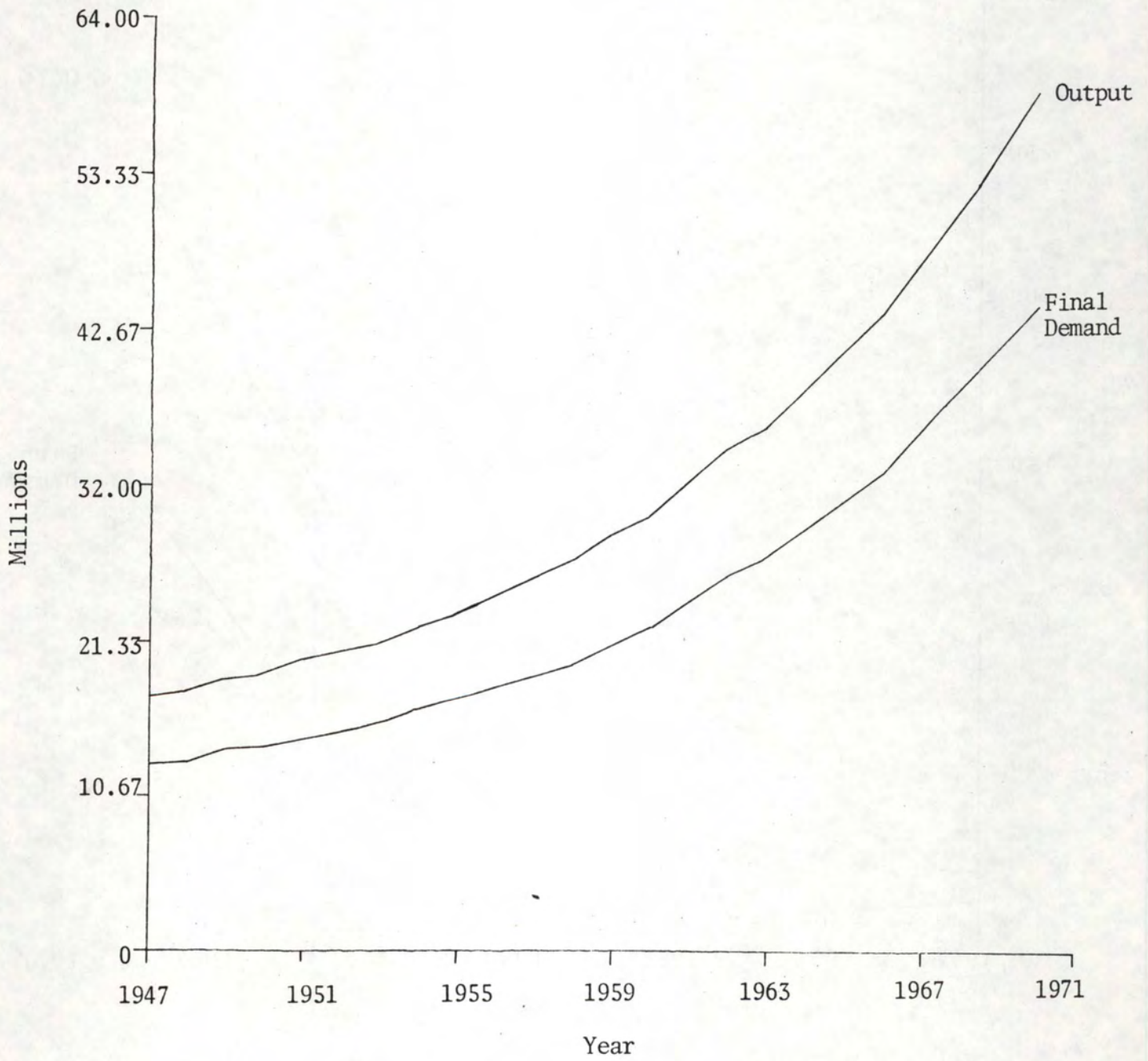


Figure 10. Utilities output and final demand, Idaho, 1947-1970.

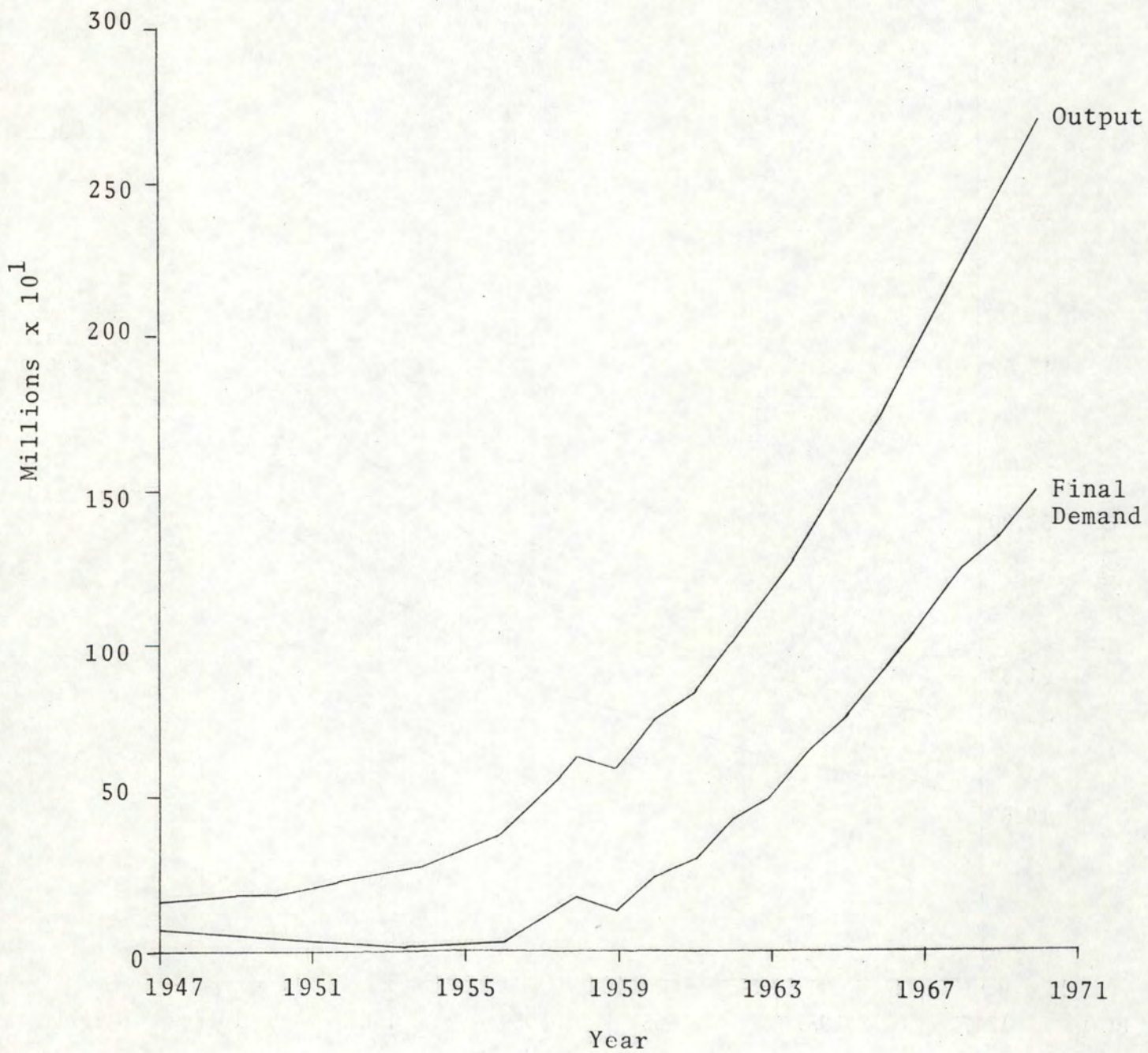


Figure 11. Construction output and final demand, Idaho, 1947-1970.

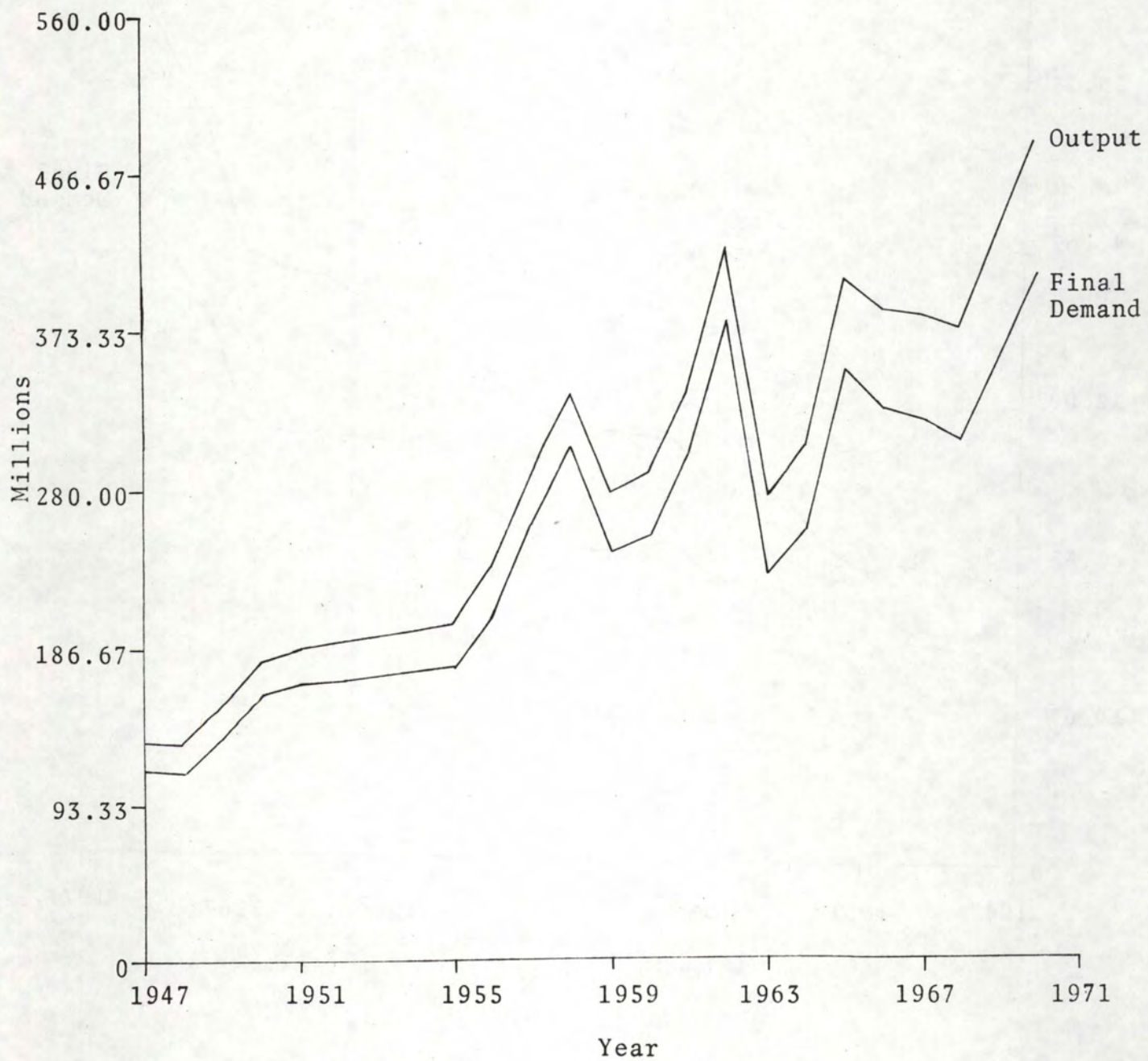


Figure 12. Wholesale and retail trade output and final demand, Idaho, 1947-1970.

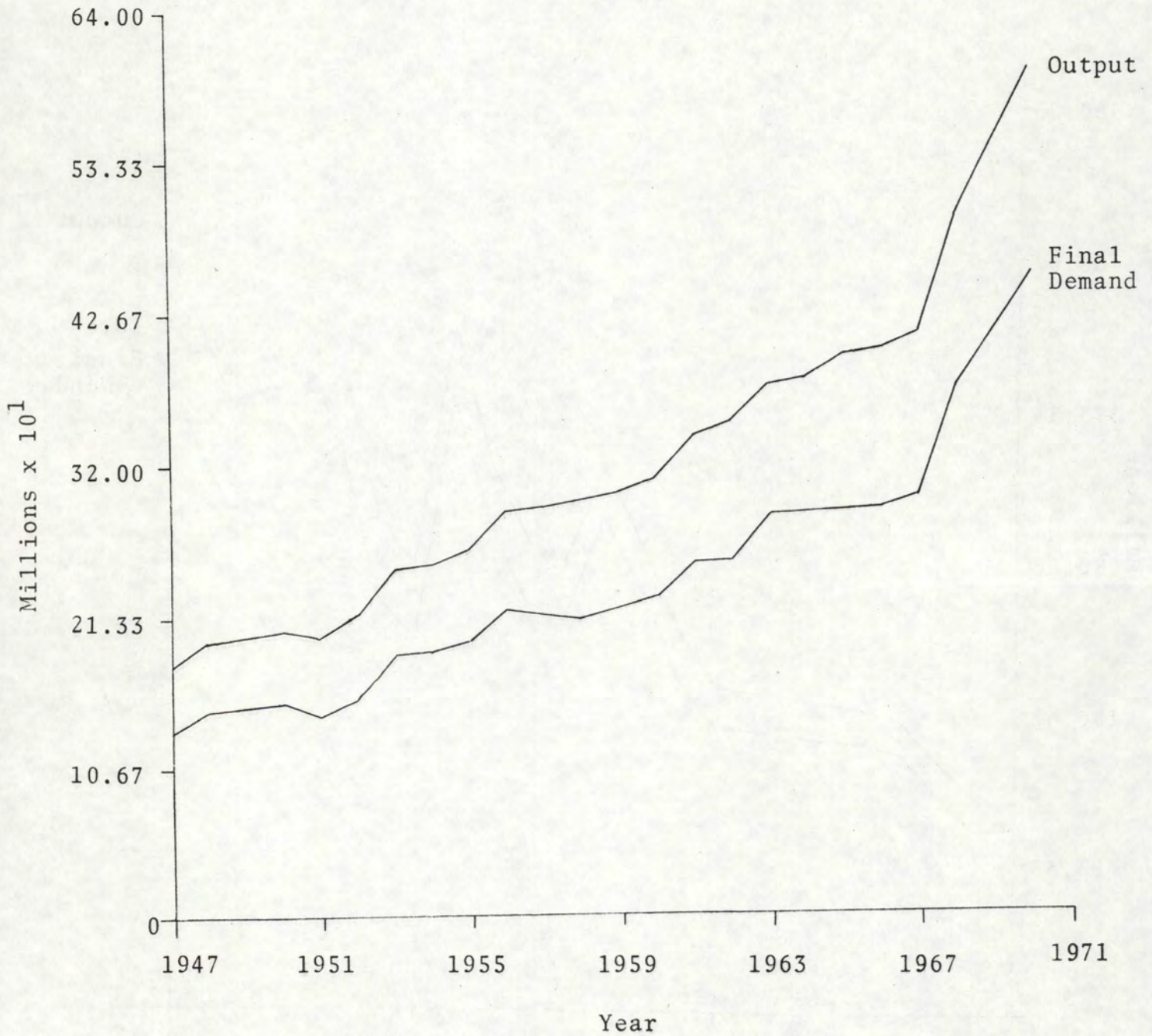
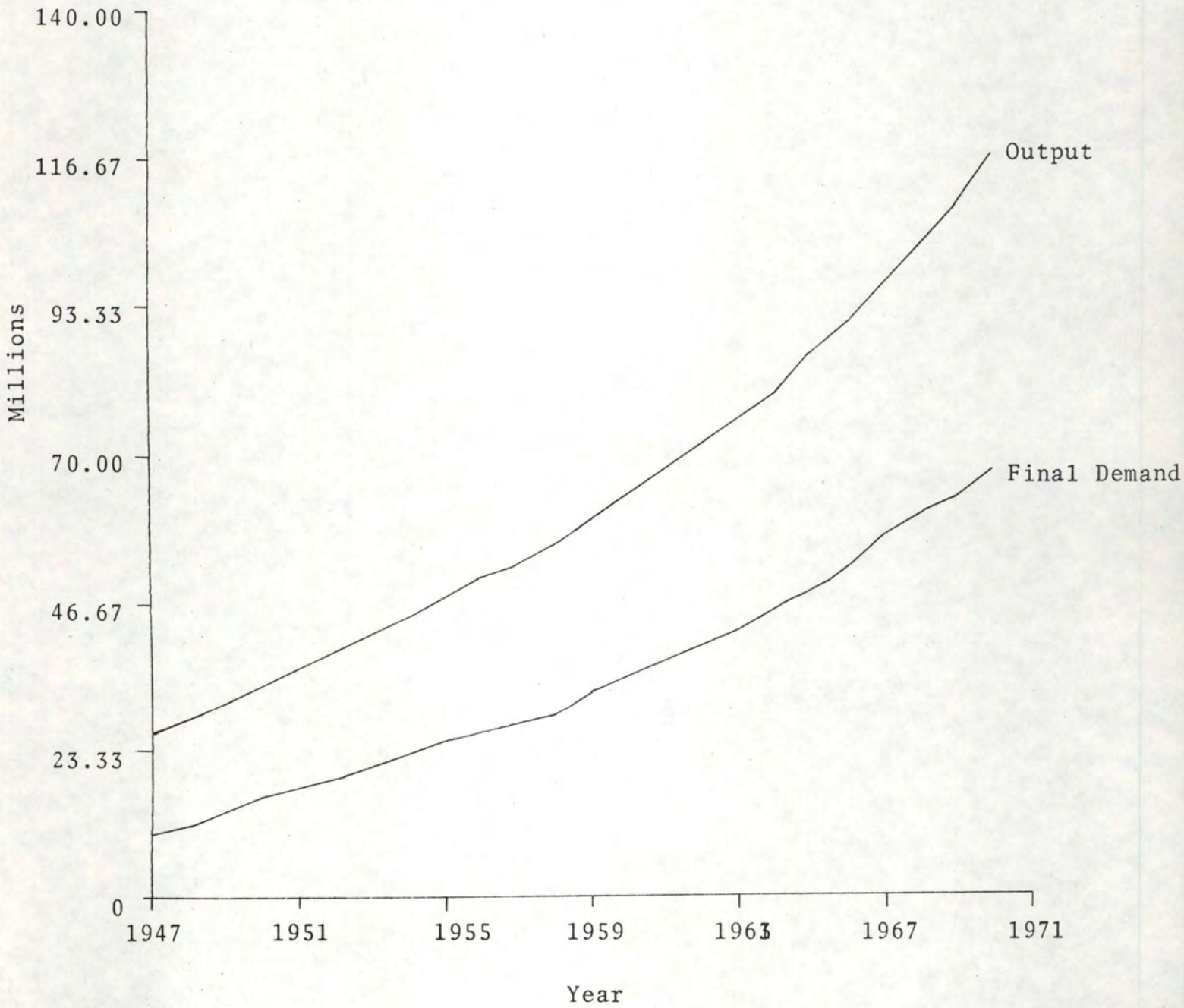


Figure 13. Services, FIRE, Transportation, and Government, output and final demand, Idaho, 1947-1970.



income. On the other hand, output from food processing is highly correlated with final demand indicating heavy dependence upon consumption and exports for its output markets. Since about 83 percent of the food processing output was exported from Idaho in 1963 the role of the food processing industry in Idaho is heavily dependent upon outside markets.

REGIONAL IMPACTS

Total Output

The Boise Region (Ada and Canyon counties) of Idaho has been growing quite rapidly since 1947. This region is the governmental center of Idaho, a crossroads for transportation, and a center for trade and service activities for southwestern Idaho. Using the methodology previously described, programming results indicate the total regional output (output of all the sectors) increased from \$446 million in 1947 to \$1,923 million in 1970. By comparison the total output of the Boise Project increased from \$51 million in 1947 to \$114 million in 1970, and total output of the food processing industry increased from \$50 million in 1947 to \$169 million in 1970. From these data one would conclude that regional output is growing rapidly, and that the output from the Boise Project and food processing sectors are also growing but not at as fast a pace. As was similarly true at the state level, the level of output from Boise Region food processing passed that of the Boise Project during the period. In 1947 total output from both sectors was approximately \$50 million each, however, by 1970 the output from food processing was \$55 million greater than Boise Project output (Figure 14).

Figure 14 summarizes output trends for the Boise Region, Boise Project, and the food processing sector in the Boise Region. Both Boise Project output and food processing output appear somewhat minor compared to regional output, but as we shall see later, the total income impacts of both sectors are very important in the region, primarily because of their interrelationships with other sectors of the economy. Also, it will become apparent that Boise Project output and food processing output are closely related and that the total impacts of each group of sectors is very similar.

Regional Income and Sector Impacts

Figure 15 presents regional income and impact data for the Boise Region, the Boise Project, and the food processing sector. Regional income from the Boise Region was estimated to increase from \$154 million in 1947 to \$574 million in 1970. In a similar manner direct food processing income increased from \$10 million in 1947 to \$29 million in 1970, while

Figure 14. Comparison of total outputs for the Boise Region, food processing and the Boise Project, Idaho, 1910 - 1970.

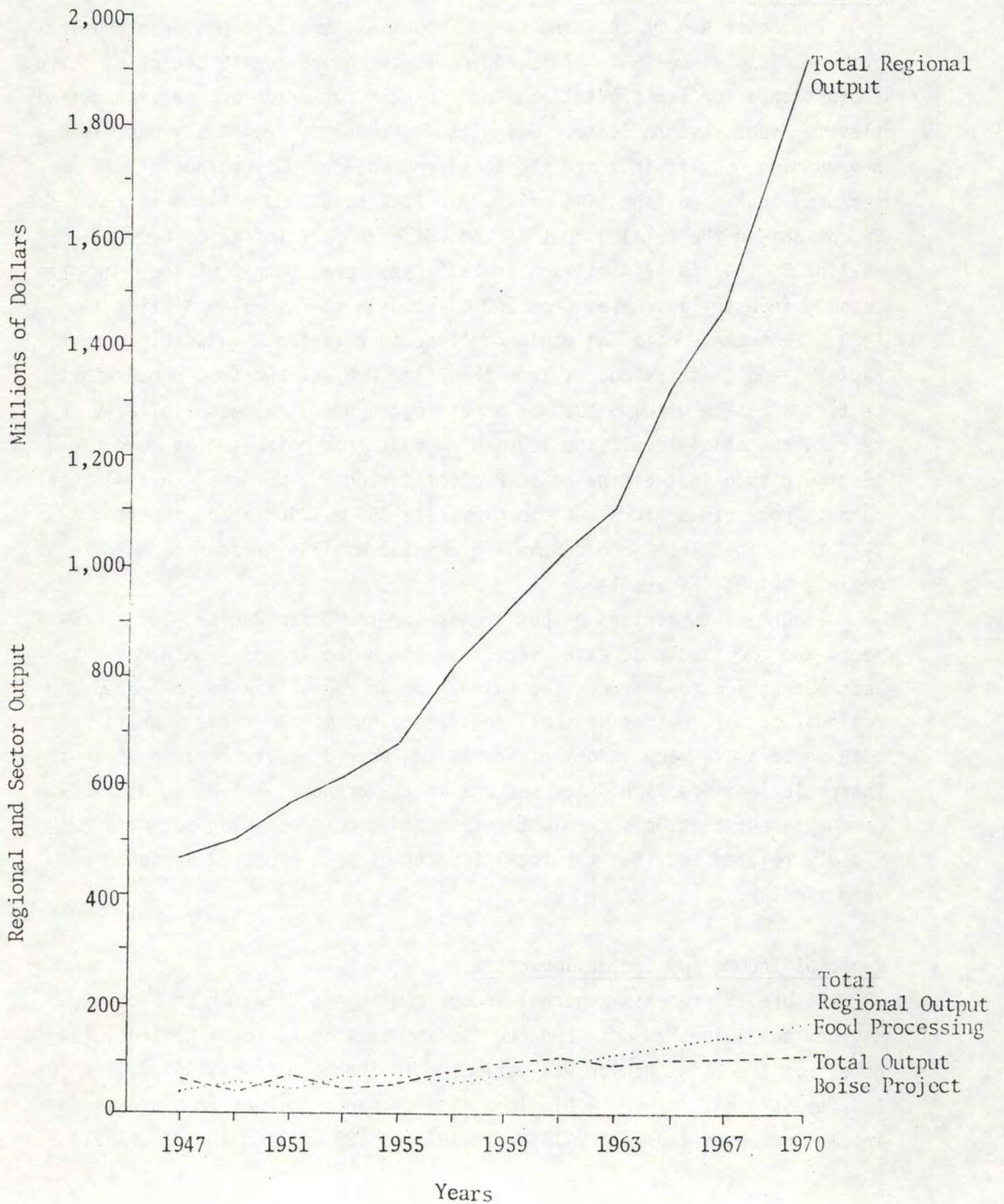
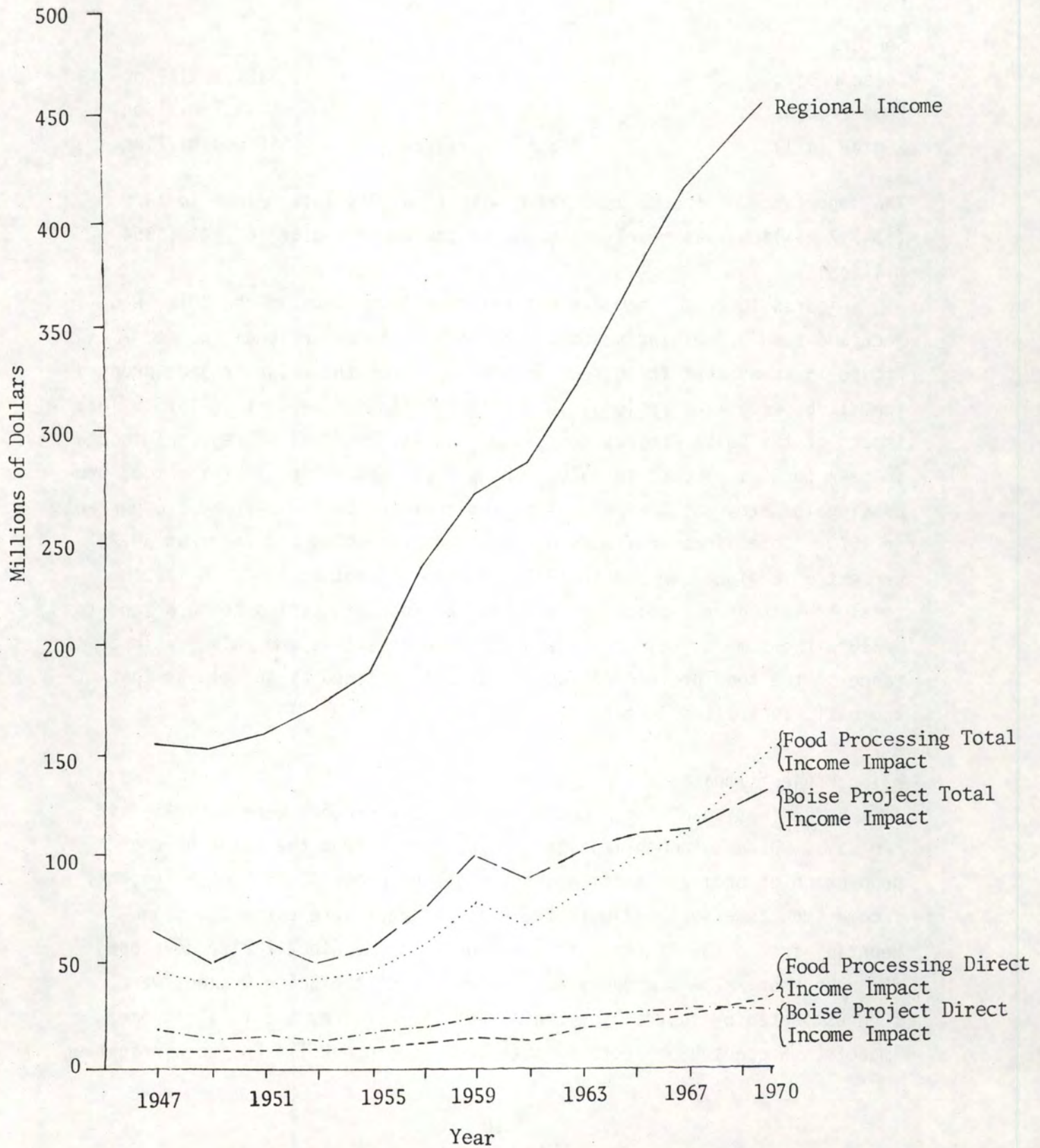


Figure 15. Regional, Boise Project, and food processing income and impact on income, Boise Region, Idaho, 1947 - 1970.



Boise Project direct income increased from \$19 million in 1947 to \$28 million in 1970. Looking at the food processing sectors and the Boise Project sectors separately, the total impact income associated with each sector was as follows:

<u>Sectors</u>	<u>Total Income Impacts</u>	
	<u>1947</u>	<u>1970</u>
Boise Project	\$63.8 million	\$127.2 million
Food Processing	\$46.6 million	\$143.7 million
Region (all)	\$154.2 million	\$574.4 million

The importance of income associated with food processing alone in 1970 (\$143.7 million) was nearly as great as the whole region in 1947 (\$154 million).

Figures 16 and 17 compare the relative importance of the Boise Project and food processing sectors with that of total regional income. Figure 16 shows that the direct income impact of the Boise Project dropped from 11.6 percent of regional income in 1947 to 4.8 percent in 1970. Total impact of the Boise Project decreased from 41.3 percent of regional income in 1947 to 22.1 percent in 1970. The direct income impact of the food processing industry was 6.5 percent of regional income in 1947 and 5.0 percent in 1970. Total income effects of the food processing industry was 30.2 percent of regional income in 1947 and 25.0 percent in 1970. While the total impacts of the Boise Project and the food processing sectors tend to measure the same things, it is important to note that the relative importance of the food processing sector has not declined as greatly as that of the basic agricultural sectors (Boise Project).

Boise Project Impacts

Determination of the impacts of the Boise Project were estimated in two ways. Direct income impacts were estimated from the value of crop production on project lands, and the costs of production. Total regional income impacts associated with the Boise Project were estimated using Leontief income coefficients from regional input-output tables developed for each year. The secondary income impacts of the Boise Project were then estimated by subtracting the direct impacts from the total income impacts. Secondary projects impacts occur because Boise Project irrigation

Figure 16. Boise Project Income Impact as a Percent of Regional Income, Idaho, 1947 - 1970.

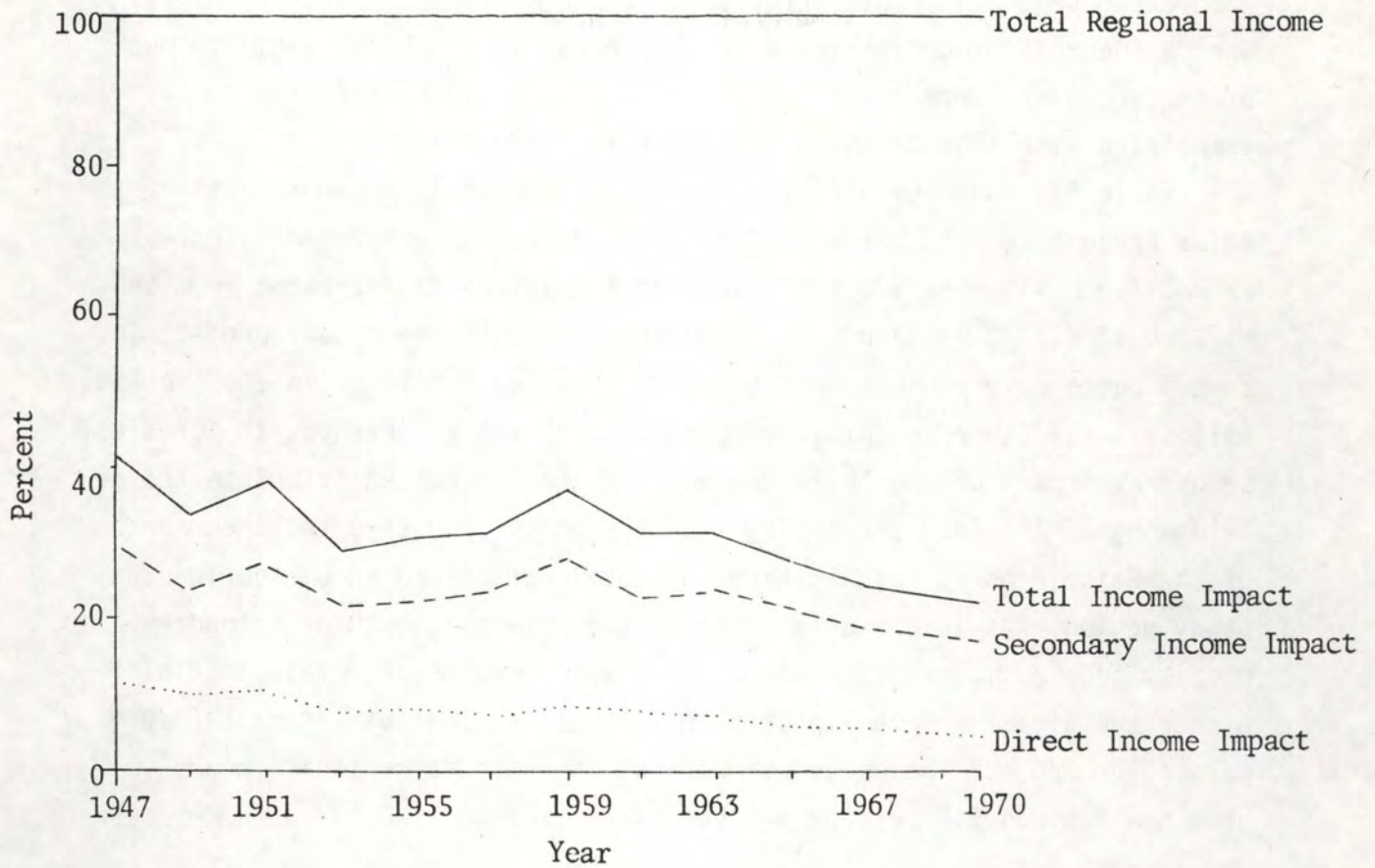
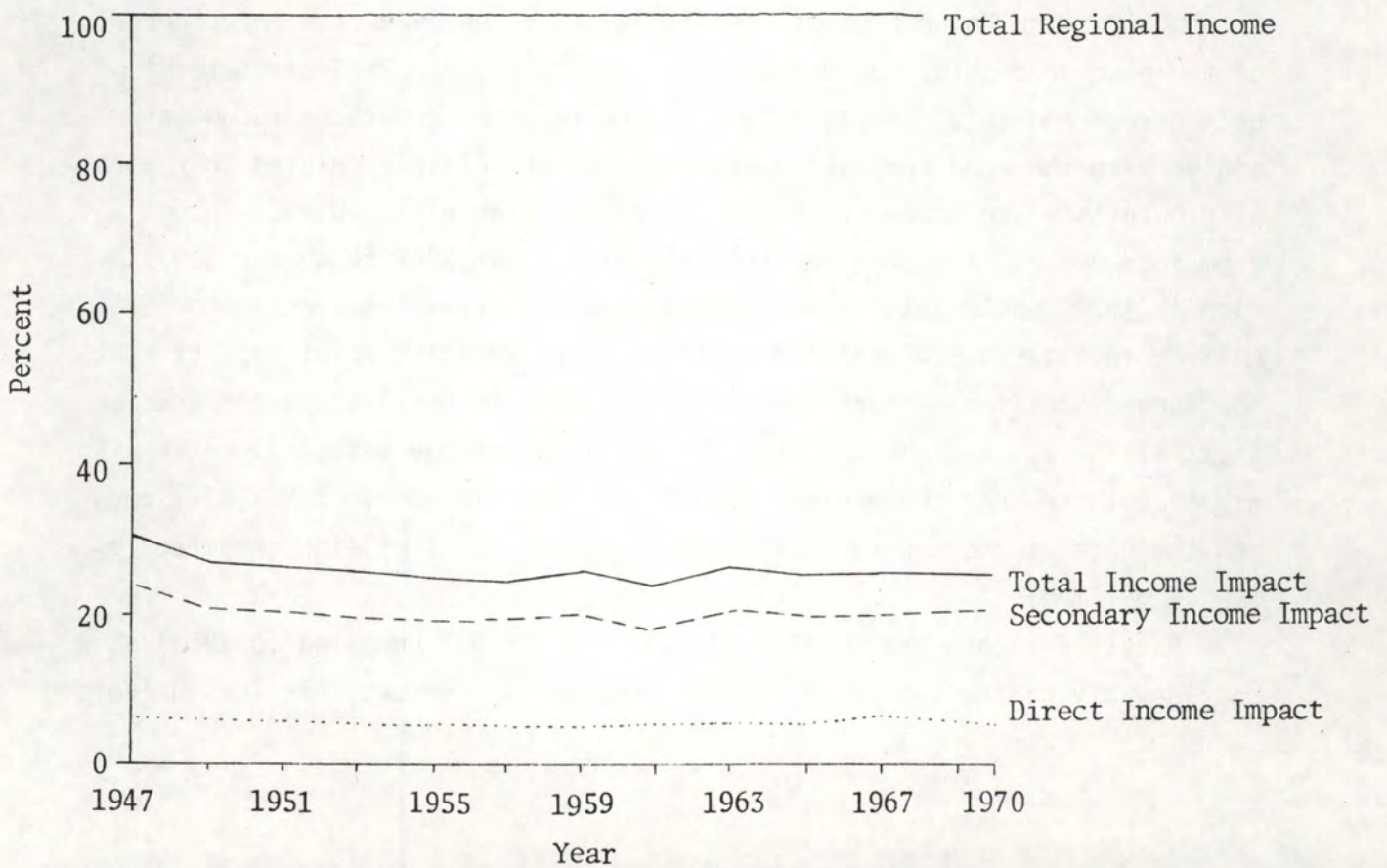


Figure 17. Food Processing Impact Income as a Percent of Regional Income, Idaho, 1947 - 1970.



production requires inputs for production, and project output requires various degrees of processing which may occur in the Boise Region. Much of the secondary impacts of the Boise Project would be expected to be associated with that of the food processing industry.

Table 5 summarizes direct, secondary, and total income impacts of the Boise Project output. From 1947 to 1970, direct income impacts increased from \$17.9 million to \$28.1 million and total impacts increased from \$63.8 million to \$127.2 million. Based on these results, secondary project income impacts were estimated to increase from \$45.9 million in 1947 to \$99.1 million in 1970, or essentially doubled in 23 years. Perhaps the greatest secondary impact of the Boise Project was that it helped stimulate the development of the food processing industry which surpassed the importance of the Boise Project both in terms of total output and income during the study period. As is shown in Table 5, the rate of growth of secondary project income impacts (3.4 percent per year) was greater than that of either the direct income impact (1.9 percent) or the total impact (3.0 percent). Project income growth was not as great as regional income growth which was 5.8 percent per year from 1947 to 1970.

Food Processing Impact

The food processing industry of the Boise Region came after the development of the Boise Project itself. By 1970, however, the importance of the food processing sectors had surpassed the Boise Project in terms of both direct and total income impacts. The rates of growth of income associated with the food processing sectors are more closely related to regional growth than are those of the Boise Project (Table 6). Direct income from food processing increased from \$10 million in 1947 to nearly \$30 million in 1970, while total impact was estimated to have increased from \$46 million in 1947 to \$143 million in 1970. The important point here is that the food processing sectors represent (at least in part) the secondary impacts of the Boise Project. By 1970 the direct income effects were as great as those from the project (\$29.2 million compared to \$28.1 million), and the total impacts were considerably greater (\$143 million compared to \$127.2 million).

Rates of income growth of food processing (1947 compared to 1970) show considerably higher increases for food processing sectors than for the Boise

TABLE 5. DIRECT, SECONDARY, AND TOTAL INCOME IMPACTS OF THE BOISE PROJECT ON THE BOISE REGION, IDAHO, 1947 - 1970

Year	Boise Project Agricultural Sectors			Boise Regional Income
	Direct	Secondary	Total	
	(millions of dollars)			
1947	\$17.9	\$45.9	\$ 63.8	\$154.2
1949	15.0	35.4	50.4	149.0
1951	16.1	43.2	59.4	156.5
1953	12.4	36.9	49.4	168.6
1955	14.7	41.6	56.7	184.4
1957	16.9	56.9	73.8	234.4
1959	22.1	76.4	98.5	267.6
1961	21.9	66.7	88.6	282.3
1963	23.1	76.1	99.2	317.1
1965	24.7	82.9	107.6	390.3
1967	25.3	82.1	107.4	434.4
1970	28.1	99.1	127.2	574.4
Rate of Growth (1947 - 1970)	1.9%	3.4%	3.0%	5.8%

TABLE 6. DIRECT, INDIRECT, AND TOTAL INCOME IMPACTS OF THE FOOD PROCESSING SECTORS ON THE BOISE REGION, IDAHO, 1947 - 1970

Year	Food Processing Sectors			Boise Regional Income
	Direct	Indirect	Total	
	(millions of dollars)			
1947	\$ 9.9	\$ 36.6	\$ 46.6	\$154.2
1949	9.2	30.8	40.0	149.0
1951	9.2	31.6	40.7	156.5
1953	9.4	33.1	42.5	168.6
1955	10.2	35.0	45.2	184.4
1957	12.2	44.9	57.0	234.4
1959	14.0	53.8	67.8	267.6
1961	14.6	51.2	65.8	282.3
1963	17.0	64.6	81.6	317.1
1965	20.2	76.8	97.0	390.3
1967	23.4	85.8	109.2	434.4
1970	29.3	114.5	143.7	574.4
<hr/>				
Rate of Growth (1947 - 1970)	4.8%	5.0%	5.0%	5.8%

Project sectors. The irregular output values for the Boise Project make such comparisons somewhat unreliable, especially since direct income from the Boise Project was \$17.9 million in 1947 and then dropped to \$12.4 million in 1955 and took until 1959 to pass the 1947 level. Total income impact of the Boise Project grew at the rate of 3.0 percent per year while that of the food processing sectors grew at an estimated 5 percent per year. Prior to 1940 the Boise Project itself undoubtedly was more important to the region than food processing, however, since the late 1960's the food processing impact was greater than that from the Boise Project. The reader should keep in mind that the total impact of the Boise Project and food processing represent many of the same economic forces.

Secondary Boise Project Income Impacts and Total Food Processing Income Impacts Compared

Since a major portion of secondary income impacts of the Boise Project are expected to be associated with the food processing sectors, a comparison of the two sets of sectors is of interest. Figure 18 presents total income impacts of both the Boise Project sectors and the food processing sectors. Total income impacts of both sectors have moved up together over time, but prior to 1967 the total impact of Boise Project exceeded that of food processing. These results would indicate that the impact of food processing has grown beyond that which was induced by the Boise Project. The initial development of the food processing industry was probably closely tied to the Boise Project.

Figure 19 tends to support the above conclusion. It presents the secondary income impacts of the Boise Project and total income impacts of the food processing sectors. One might expect these impacts to be nearly identical since the secondary impacts of the Boise Project are those resulting from induced activities in the service input and processing sectors. From 1947 to 1961 secondary impacts of the Boise Project and total impact of the food processing sectors are nearly identical. After 1961, however, the total impact of the food processing sector continually exceeds the secondary impact of the Boise Project indicating the processing of agricultural inputs outside of those supplied by the Boise Project. In terms of development associated with the Boise Project one may conclude that the water resources allowed for a highly successful

Figure 18. Total Income Impacts of the Boise Project and Food Processing, 1947 - 1970.

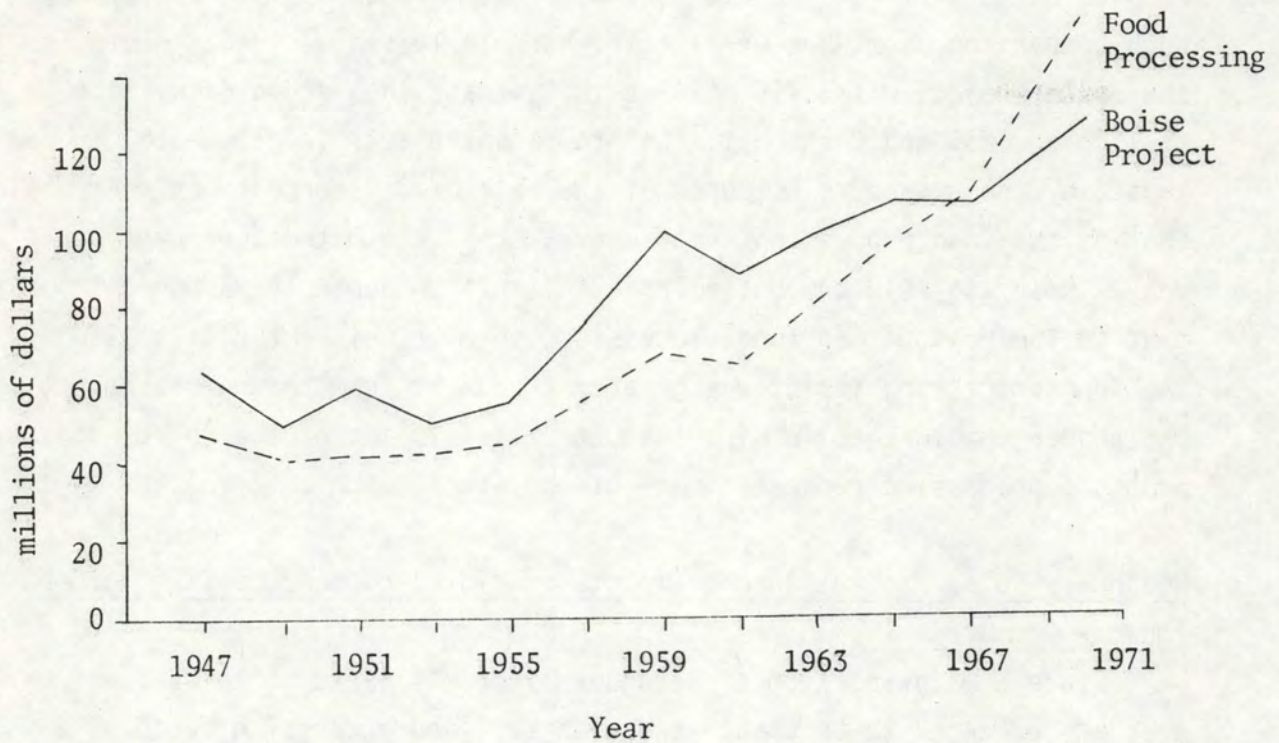
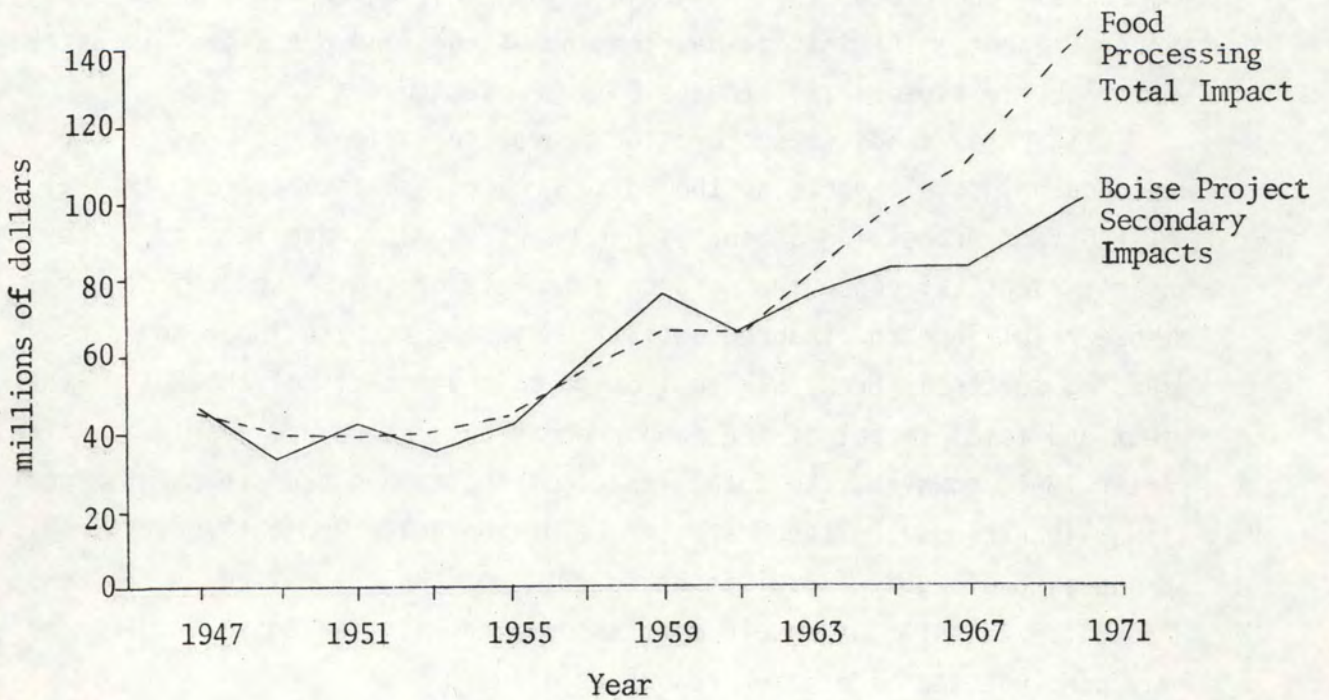


Figure 19. Secondary Income Impacts of the Boise Project and Total Income Impacts Food Processing, 1947 - 1970.



irrigated agriculture and a food processing industry that in itself is at least as important and probably more important than the irrigated agriculture. These sectors, of course, are heavily dependent upon one another.

Another way to compare secondary Boise Project income impacts with total income impacts of food processing is to plot the results against one another. This is done in Figure 20. The data generated for each variable tended to fall in a straight line from 1947 to 1963, however, after 1963 this was not true. A 45° guide line is also plotted in Figure 20 and serves as an indicator that total income impact of food processing was an almost perfect indicator of secondary project impacts from 1949 to 1963, but was not after 1963 because of the greater importance of food processing impacts.

Figure 21 shows why the above situation occurs when total output of food processing is compared with that of the Boise Region. From 1947 to 1961 gross outputs are very similar for food processing and Boise Project; once past 1961, the output from food processing is continually higher and increasing faster than that of the Boise Project. These comparisons tend to confirm the result that one of the major impacts of the Boise Project was the instigation of a strong and growing food processing sector -- a sector that is more important economically than the project itself. These two sectors are highly interrelated and it is doubtful that either would exist at present levels without the other.

Figure 20. Secondary Income Impacts of the Boise Project, Idaho, 1947 - 1970.

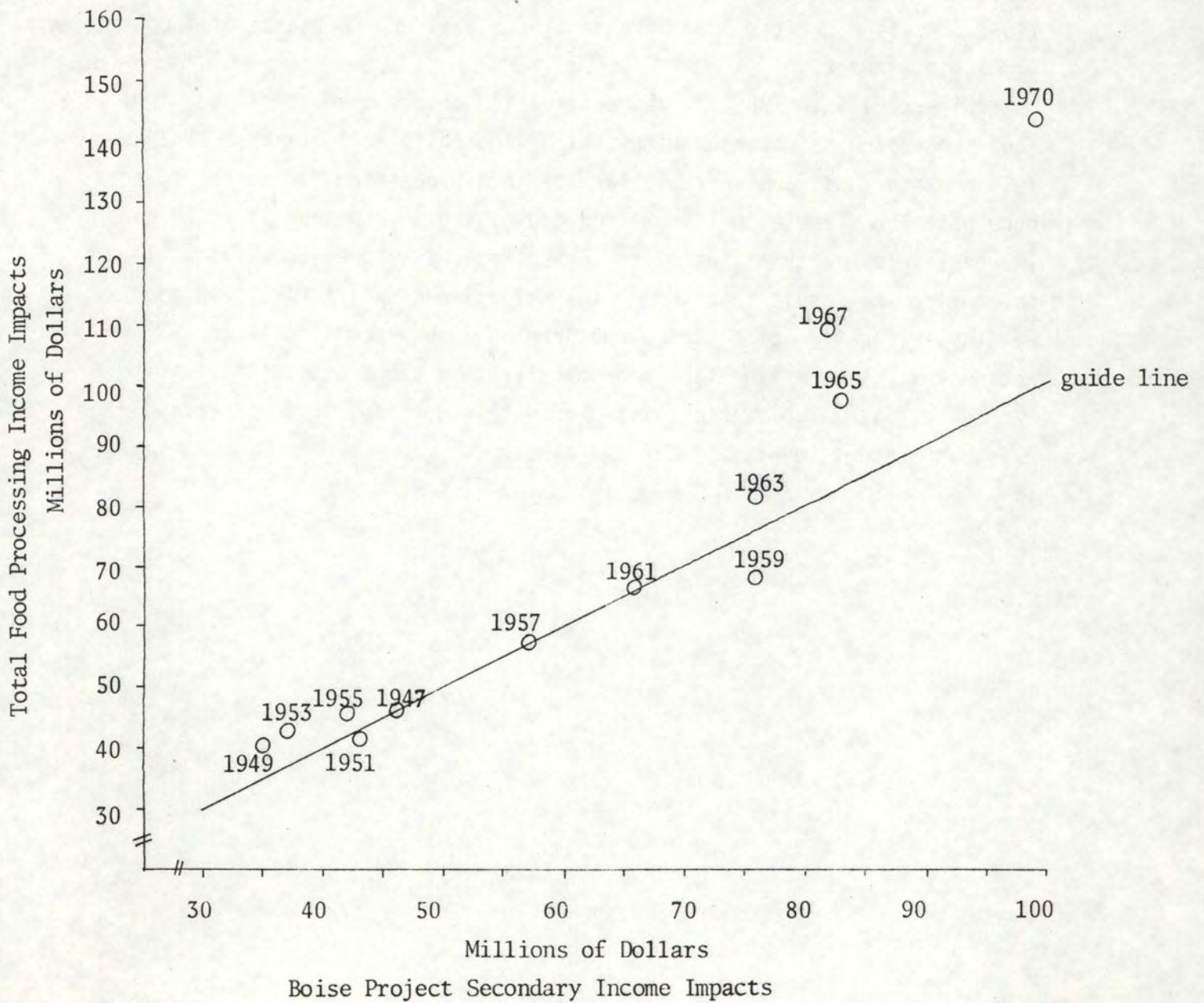
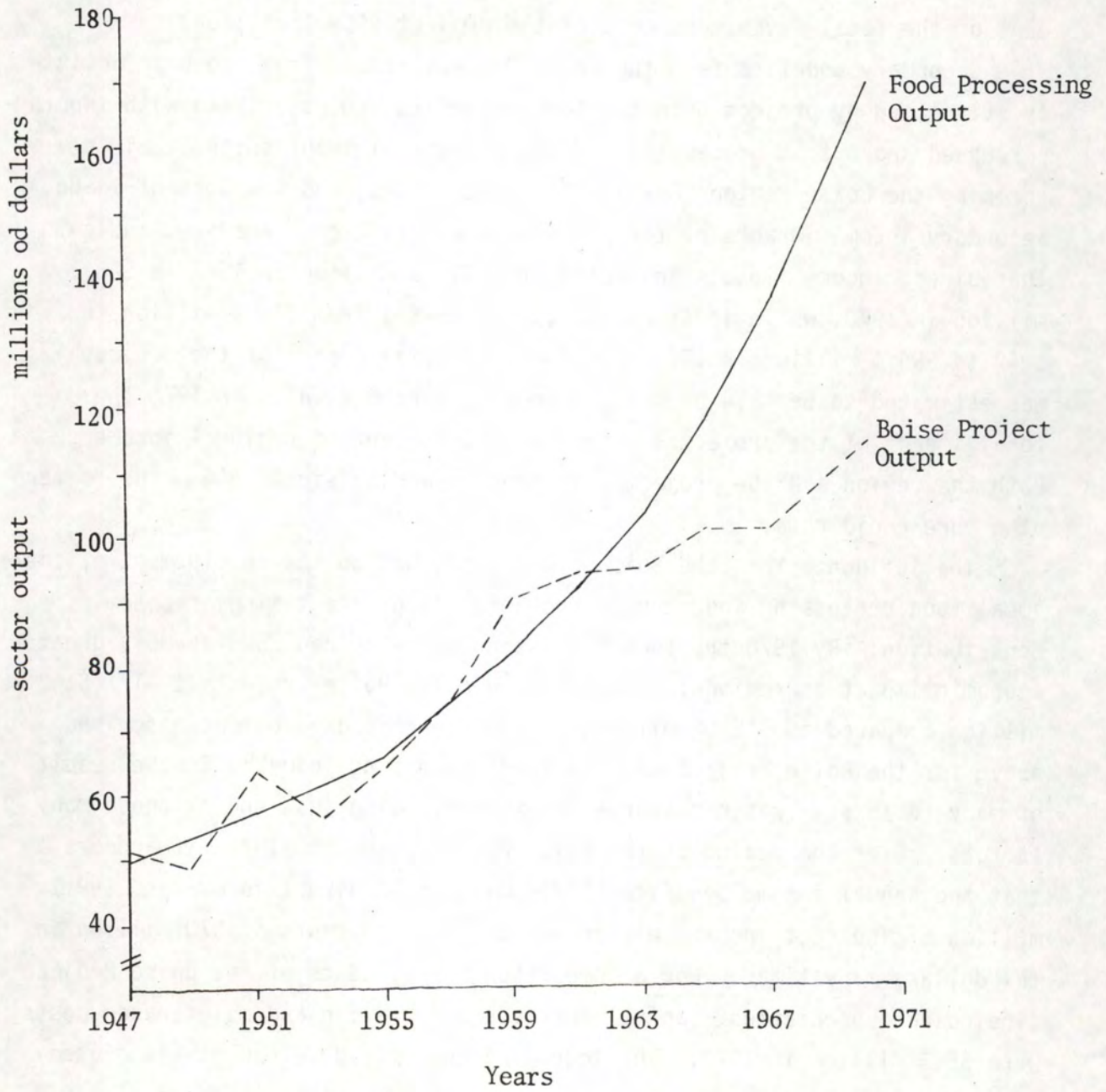


Figure 21. Total Boise Project and Food Processing Output, Idaho, 1910 - 1970.



SUMMARY

The Boise Irrigation Project of southern Idaho was built by the Bureau of Reclamation between 1910 and 1955. Whether or not one considers this project an economic success depends on the point in time when the question is asked. Prior to 1940 direct benefits (income) from the project were not always greater than costs and at one time (during the depression) they were negative. Since 1940, however, direct income impacts have increased to about \$28 million per year (in 1970). This value-added figure is 40 percent of the total investment cost of the project (\$69.1 million).

Secondary benefits from the Boise Project result from economic activity stimulated by project output. These benefits are associated with inputs purchased and output processing. Using a regional input-output table describing the Boise Region (Ada and Canyon counties) and the Rest of Idaho, secondary income impacts of the project were estimated. Analyses indicate that direct income impacts increased from \$17.9 million in 1947 to \$28.1 million in 1970, while indirect impacts increased from \$45.9 million in 1947 to \$99.1 million in 1970. In 1947 the total impact of the project was estimated to be 41.4 percent of regional income, while in 1970 the total impact of the project dropped to 22.1 percent of regional income. Both the region and the project have been expanding since 1946 - the former at a more rapid rate.

The influence that the Boise Project has had on the development of the local food processing industry is probably its greatest single economic contribution. By 1970 the food processing industry had considerably greater economic impact on regional income than did the Boise Project itself (\$143.7 million compared to \$127.2 million). The economic development described above for the Boise Project and the food processing industry is the result of many factors -- water resource development being just one of those many factors. Over the period of the Boise Project, 1910 to 1970, it appears that the annual income benefits (\$28.1 million of direct income and \$99.1 million of indirect income) will repay the project costs of \$70 million in tax dollars many times. For a comparison annual costs of the Boise Project (including depreciation, capital costs, and operative and maintenance costs) were \$5.5 million in 1970. The degree of economic development associated with the Boise Project would have been nearly impossible to foresee in 1910,

or for that matter during the 1930's; however, since 1940 the benefits (income) associated with the project have been increasing steadily.

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