

Projections of The Post-Vietnam Economy, 1975

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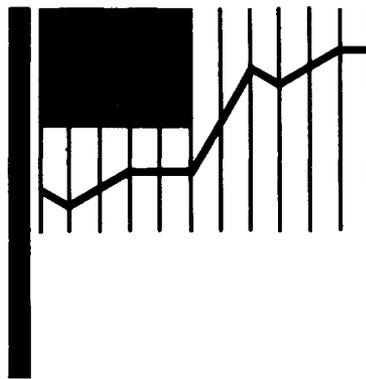
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Preface

This report was prepared in the U.S. Department of Labor's Bureau of Labor Statistics, Office of Economic Trends and Labor Conditions, Division of Economic Growth, with the financial assistance of the U.S. Arms Control and Disarmament Agency. The Arms Control and Disarmament Agency has broad responsibility for the conduct of research on the economic and political consequences of arms control and disarmament. Pursuant to that responsibility, the Arms Control and Disarmament Agency has sponsored numerous studies dealing with the measurement of the economic impact of defense and disarmament, and the problems of economic adjustment to changes in defense spending. Henry Wyner of the Economic Affairs Bureau of the Arms Control and Disarmament Agency provided liaison for this research.

The Federal Government expenditures assumptions of this study do not represent the policies of any agency of the Federal Government. They were drawn up by the Bureau of Labor Statistics as being within a reasonable range of possibilities to illustrate the potential patterns of growth in the U.S. economy by 1975. The estimates are within the framework of looking at future national output presented in the *Economic Report of the President, February 1971*, chapter 3, and the *Budget of the U.S. Government for Fiscal Year 1972*, part 3, "Perspectives," extended to include employment implications.

The research was performed by the staff of the Division of Economic Growth. Ronald E. Kutscher, Chief of the Division of Economic Growth, was responsible for direct supervision of the projections and for preparation of the report. Eva E. Jacobs developed the macro projections, developed the projections of output per man-hour, and assisted in writing the report. Donald P. Eldridge prepared total final demand estimates; Richard P. Oliver prepared the projections of military expenditures; William I. Karr developed the projections of input-output coefficients; Thomas F. Fleming, Jr. developed the projections of State and local governments; nondefense Federal projections were by Arthur J. Andreassen; Kenneth R. Tyree prepared the projections of gross private domestic investment; Charles T. Bowman projected exports and imports, and assisted in developing the macro projections; and Steven C. Cochran prepared the projections of personal consumption expenditures.

A detailed description of the techniques used in developing each step of these projections is available upon written request to the Division of Economic Growth of the Bureau of Labor Statistics. It follows, in general, the methodology developed in BLS Bulletin 1672, *Patterns of U.S. Economic Growth*, which provided projections to 1980.

The input-output bill of goods for selected historical years and 1975, in total and for each component of demand, in 80 sector detail, the direct requirements input-output matrix, the inverse matrix, and the interindustry employment table for 1975 also are available upon written request to the Division of Economic Growth. These data are available also in computer useable format, such as punch cards or magnetic tape for a small charge. For further details, contact Ronald E. Kutscher, Division of Economic Growth, Office of Economic Trends and Labor Conditions, Bureau of Labor Statistics.

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Chapter I. Summary and Implications

This report presents projections of the U.S. economy in 1975, under the assumption that the withdrawal of U.S. forces in Vietnam will be completed and full employment achieved. The projections are based on econometric and interindustry models, which are used to simulate possible conditions of peace and international arms limitation. These estimates may contribute to a better understanding of the macroeconomic and industry-employment adjustments that might be needed if the 1975 peace-time full employment economy is to be achieved. Because the effect of changing defense requirements on employment cannot be analyzed in isolation from the effect of other categories of demand on employment, the projections cover the entire economy, not just those sectors affected directly by changes in defense expenditures. The projections are based on three alternative models; each assumes a reduction in defense expenditures as American combat forces are phased out of the fighting in Vietnam. The first model contains a level of defense spending in real terms somewhat above the pre-Vietnam level, and a level of residential construction in 1975 consistent with meeting national housing goals. Model II is an environmental model with higher expenditures than model I for nonresidential construction, producer durable equipment, and State and local government spending all related to environmental problems. These increases are offset by lower expenditures for residential construction. Model III contains a lower level of defense under the assumption of an arms limitation agreement. The projections were developed by using the major assumptions in each of these three alternative models to develop aggregate economic variables, and estimating the resulting effects on output and employment by industry.

To further highlight the effect of a shift in spending from defense to nondefense, an analysis is presented of

the differential effects on employment, direct and indirect, of selected nondefense purchases by government and the private sector.

Assumptions

The results of the study are dependent on the assumptions underlying the projections. Obviously, different assumptions could result in different projections. The basic assumptions for model I are summarized in Exhibit A below and discussed in greater detail in later chapters.

In line with the assumption of a full employment economy, the unemployment rate is assumed to decline to 3.8 percent by 1975.¹ This is based on the further assumption that fiscal and monetary policies will be able to achieve a satisfactory balance between low unemployment rates and relative price stability, so that the rise in the GNP deflator slows to a rate comparable to that which prevailed in the early 1960's.

If another unemployment rate, such as 4.5 percent, had been assumed for 1975, the rate of growth in real

¹In this report, all historical data and projections are presented for the years 1959, 1965, 1969, 1970, and projected 1975. The year 1959 was selected as the earliest year for comparison for which all data on output and employment are available on an industry basis consistent with the classification system used in this study. The years 1965 and 1969 encompass the expansion period of the Vietnam war. The 1959-65 period is a period of comparable length to the projected period where the economy was operating or moving toward operating at full utilization of resources in a period free of large scale war. Growth rates are shown for 1959-65, 1965-69, and 1969-75. The 1969-75 period is considered indicative of peak to peak growth so that growth rates are not distorted by the 1970-71 slowdown in economic activity. The 1970-75 implications are indicated later, however.

Exhibit A. Assumptions for Model I, compared with data for selected years

Category	1959	1965	1969	1970	Projected 1975 model I
Unemployment rate (percent)	5.5	4.5	3.5	4.9	3.8
Armed forces (thousands)	2,552	2,723	3,506	3,188	2,500
Federal purchases of goods and services:					
Billions of current dollars	53.6	66.9	99.2	97.2	114.1
Billions of 1958 dollars	52.5	57.9	73.8	65.4	66.0
Grants-in-aid (billions of current dollars)	6.8	11.1	20.3	24.4	39.8
Federal transfer payments to persons (billions of current dollars)	20.1	30.3	50.4	61.2	100.0

GNP would have been lowered by about 0.1 percent per year for the 1969-1975 period. While this would give a slightly lower level of real GNP by 1975, the impact of the lower GNP would not appreciably alter the industry distribution of demand, output, and employment, and thus would not in any significant way alter the results presented in this report.

The withdrawal of armed forces from Vietnam is assumed to have been completed by 1972, with the exception of some support and logistical troops, and the level of armed forces is assumed to drop to 2.5 million by 1975. The assumed mix of Federal government policy is a major influence on the economy. Federal purchases of goods and services (in real terms) are assumed to decline as a result of the end of the war to a level in 1975, which is \$8 billion higher (1958 prices) than in 1965 just prior to the large scale Vietnam buildup, but \$15 billion lower than in 1968, the peak year for the Vietnam era. Federal grants in aid to State and local government are assumed to almost double from 1969 to 1975 (in current prices), as a result of continuing Federal policy in this direction.² Transfer payments to persons, consisting largely of social security benefits, and other retirement pension payments, also are expected to double (in current prices) from the 1969 level. For the purpose of these projections, it was assumed that 1969 tax laws will remain in effect, incorporating only future changes called for by present social security legislation and the Tax Reform Act of 1969.

² Whether these grants are in the form of grants as now constituted, or in the form of revenue sharing does not change the results as presented here, since both forms would constitute grants in the accounting system used in this report.

Also assumed in these projections is that the national housing goals as called for in the Housing and Urban Development Act of 1968, and as set forth in the Second Annual Housing Report to the Congress are achieved by appropriate government and private policies, including an assumption of a drop in the interest rate. This goal translates into 2.7 million housing units in 1975.

This set of assumptions, with the resulting projections, is termed the basic model, or model I. Two other models were developed to introduce specific desired variations in the pattern of demand. The general economic outlook and potential GNP and employment are the same, but selected changes in demand were made to determine the effect on output and employment of such changes. Model I, II, and III assumptions are shown in Exhibit B below.

Alternative models

The first of the alternative models has a lower level of residential construction, about 2 million in new housing units in 1975, rather than the 2.7 million in model I. This level of residential construction may still be consistent with achieving the housing goals over the 1968-78 decade, if a different time path prevails with higher starts in 1971-74. Since the supply GNP is the same as in model I, the lower residential demand is offset by increases in other parts of the economy. With the current interest in improving the environment, it was assumed that the offset demand would be related to the desire to solve some of these problems. Model II is called the environmental model and contains higher demand for nonresidential construction, producer durable equip-

Exhibit B. Models I, II, and III, compared with data for selected years

Item	1965	1969	1970	1975 Projections		
				Model I	Model II	Model III
Armed forces (millions)	2.7	3.5	3.2	2.5	2.5	2.4
Unemployment rate (percent)	4.5	3.5	4.9	3.8	3.8	3.8
Housing starts (millions) ¹	1.5	1.5	1.5	2.7	2.0	2.0
National defense expenditures (billions of 1958 dollars)	43.4	58.9	51.9	47.0	47.0	44.0
State and local purchases (billions of 1958 dollars)	56.8	71.9	74.0	95.0	100.0	103.0
Nonresidential construction (billions of 1958 dollars)	22.3	24.5	24.2	30.0	30.1	30.1
Producer durable equipment (billions of 1958 dollars)	44.0	55.7	54.4	78.0	81.9	81.9

¹ Public and private starts, but excludes mobile homes.

ment, and State and local government services, all related to environmental protection.

Model III is the arms limitation model. In this model, defense expenditures are projected \$3 billion (1958 dollars) lower in 1975 than in the other two models. In 1975 dollars, the decline is estimated to be \$5 billion. This lower expenditure is consistent with the assumption of an arms limitation agreement, calling for a freeze of the number of strategic weapons. Such an agreement does not show large immediate reductions in defense expenditures by 1975, but larger amounts would accumulate over a longer time from not purchasing new weapons. To be consistent with the armament reduction, the level of the armed forces is lower in this alternative model by 100,000. State and local expenditures, largely for housing and urban development are assumed to be the offset in the arms limitation model.

These alternative models were not prepared for the purpose of identifying the "best" path for the economy, but to provide a framework for evaluating the employment effects of alternative public or private policies. Individual decisions affecting the economy—for example, decisions by private firms regarding additional investment—normally are made by weighing economic factors affecting the individual unit involved, including, of course, certain manpower considerations. The cumulative effect of these individual economic decisions becomes important in determining the general level of employment and its distribution among industries and occupations. By providing 1975 projections under three alternative models, a basis is established for indicating how alternative policies and actions can alter the distribution of employment. From the viewpoint of public policy, these projections in turn can imply alternative programs dealing with the availability of needed skills, training, and retraining programs, and the need for possible relocation of workers from labor surplus to labor shortage areas.

In addition to the three complete models resulting from different demand assumptions, a briefer analysis was prepared showing alternative employment effects per billion dollars of different types of construction and State and local government activity. This was undertaken because of the growing importance of State and local government expenditures, and the concomitant interest of the Federal Government in these activities.

Qualifications

The assumption about Federal expenditures which affects the projections contained in this report is based on the long range estimates set forth in the fiscal year (FY) 1971 budget document. Federal expenditures such

as grants and transfers have continued to rise beyond the estimates in this report, because of price and workload increases and new legislation. It is assumed that projections of government expenditures based on actual 1971 expenditures or later budget proposals would be different from those contained in this report. Changes such as the recent devaluation have not been incorporated into these projections. However, the potential GNP and employment and the relative dimensions of the demand components are considered valid for the purpose of examining manpower requirements by industry.

Of course, uncertainties are involved in the projected variables and assumptions affecting growth. Neither major new dimensions nor contractions in the role of government in the economy are contemplated. A continuation of government activity, as stated in present legislation or existing policy, was assumed. Although no major shifts in government's role is projected, some shifts in the expenditure mix at the various levels of government are expected.

Defense expenditure estimates are subject to a great deal of uncertainty, because of possible changes in the international situation. Even within the level of defense expenditures contained in these projections for 1975, the distribution could change because of a change in the defense strategy affecting the mix of weapons systems in force. Another shift would be introduced by the approval of a volunteer army, and the resulting sharply higher pay for servicemen. The effects of this change could be to divert a larger share of defense spending (in current prices) to salaries, and a smaller share to procurement. Other possibilities are that total defense spending would be increased to cover increased pay costs, or that such costs would be compensated for by a smaller armed force. Also, the Nation could have about the same level of real defense expenditures as projected, but this could be accompanied by bigger price increases, which would result in a higher level of defense purchases in current prices by 1975. Of course, all of the uncertainty regarding the defense budget is not concerned with whether it would be higher. International tensions could continue to ease, a comprehensive arms control agreement come about, or a reduction in defense spending could result from increased demands from other segments of the economy. All of these factors considered, the defense projections in the basic model are recognized to be necessarily approximate, but within the range of reasonable possibilities.

Labor force participation of women may continue to grow at a faster rate than presently projected. Participation rates for women at all levels of education have been increasing. A further increase may be in order in the future, since participation rates tend to increase with

additional education. Lower birth rates might permit more women with children to enter the labor market sooner than in earlier years. Establishment of better day care centers and equal pay achievement could encourage younger women to enter and stay in the labor force. Because of uncertainty concerning the expected birth rate as well as the difficulty of discerning whether short-run deviations, particularly during the Vietnam war period, represent a new long run-trend, the participation rates projected for 1975 reflect the long-term trends.

Average hours may continue to decline faster than now anticipated. This factor may be tied to the labor force change in that the availability of large numbers of persons (particularly women with young children) wanting to work part-time may stimulate the continued increase in the use of part-time workers. However, total hours would not necessarily change under this alternative, since the lower average hours would be offset by a larger number of employees. A faster decline in hours was not selected since sufficient time has not elapsed to establish a clear trend, particularly until the influence of the peak Vietnam years, 1965-69, and cyclical changes for 1970-71 can be isolated from the long-term trend.

Output per man-hour could vary from historical rates. Tendencies toward a different rate of increase might result from: (a) a shift in employment to industries with lower levels, and slower increases in output per man-hour such as the service sectors; these are the industries where it may be most difficult to introduce faster productivity through application of technology; (b) increased part-time employment and lower standard workweek which increase productivity because of less fatigue and boredom; (c) the big increase in the labor force among young, better educated adults; this factor may have a positive influence on productivity even though this group has a lack of experience; (d) shifts in research from defense to nondefense activities leading to new technological breakthroughs; (e) the substantial capital expenditures in recent years that should pay off in productivity gains during the years immediately ahead; (f) efforts directed toward pollution abatement may adversely affect productivity growth.

On net balance, since many of these effects would be offsetting and are difficult to assess as to extent, the projected growth rate in productivity for the farm and nonfarm sectors is projected at the post-World War II historical rate, in addition to an allowance for reaching that rate from below trend during 1969-70.

Summary of potential GNP and its composition

Potential GNP. The potential growth rate of the economy, 1969-75, is projected at 4.4 percent a year, it

would reach a level of 935.0 billion in 1975 (1958 dollars) under each of the alternative models, a rate of increase similar to the rates of increase in the previous periods selected for comparison. (See table 1.) Although the potential growth of the economy is 4.4 percent a year measured from two points of reasonably full utilization of resources, a different outlook results from using 1970, a year with a great deal of slack. The growth in real GNP required from 1970 to reach the 1975 level is 5.3 percent a year. (The rate is 6.2 percent a year from the level at end of 1971.) The relative growth of the public and private sectors is somewhat different over the projected period. The projected growth in private GNP is close to the period 1959-65 before the Vietnam war, because the GNP growth in the war period 1965-69 was influenced by the high military requirements, and its resulting high growth in public GNP, the constant dollar wage and salaries of government employees.³ Government GNP is projected to grow more slowly in the future as military needs level off and State and local government increases decelerate.

The 1965-69 period saw an unusual surge in the labor force, and a drop in the unemployment rate. Though average hours dropped, the employment growth was sufficient to increase total man-hours substantially. The labor force increase is expected in the projected period to return to a trend rate more nearly like the 1959-65 rate. Average hours are projected to continue to decline slowly through 1975, but the decline would occur without the employment spurt that results from taking up the unemployment slack (using 1969 as a base). Consequently, the increase in total private hours will slow down. Such a spurt happened in 1965-69. Productivity is projected to increase at a rate sufficiently higher than the long-term trend rate to make up for the slow

³ Public or government GNP is not the government purchases of goods and services, which includes compensation of employees as a component.

Table 1. Average annual rate of change for selected economic factors, selected periods, 1959-1975¹

Economic factors	1959-1965	1965-1969	1969-1975
Total GNP (1958 dollars)	4.4	4.1	4.4
Total employment (jobs concept)	1.6	2.9	1.4
Private GNP	4.6	4.1	4.6
Total man-hours	1.1	1.7	1.2
Output per man-hour	3.5	2.4	3.3
Public GNP ²	3.0	4.6	1.2

¹ Compound interest rates between terminal years.

² See footnote 3 above.

1965-69 increase, but future productivity no longer would benefit from the shift of low productivity farm employment to nonfarm employment, which was a factor in the 1959-65 rate of productivity increase.

Composition of demand. Some change in the structure of demand GNP is projected. (See table 2.) For instance, personal consumption expenditures are projected to increase faster than historical rates as a result of the assumed large increase in transfer payments, and the

Table 2. Average annual rates of change of gross national product by major component, selected periods, 1959-75¹

(Billions of 1958 dollars)

Major components	1959-65	1965-69	Projected 1969-75 Model I
GNP	4.4	4.1	4.4
Personal consumption expenditures	4.4	4.2	4.6
Durables	7.3	6.2	4.0
Nondurables	3.3	3.0	3.5
Services	4.5	4.5	5.7
Gross private investment	5.1	3.3	5.8
Nonresidential fixed investment	7.0	4.8	5.1
Residential structures	-0.6	-0.8	10.0
Government	3.2	6.5	1.4
Federal Government	1.7	6.3	-1.9
State and local government	5.1	6.1	4.8
Exports	7.8	6.7	5.6
Imports	4.8	11.5	4.6

¹ Compound interest rate between terminal years.

Table 3. Total civilian employment by major sectors, selected years, 1959-75¹

Economic sector	1969	1970	Projected 1975 Model I	Average annual rate of change ²		
				1959-65	1965-69	1969-75 Model I
TOTAL	83,080	83,293	91,430	1.6	2.7	1.6
Agriculture, forestry, and fisheries	3,932	3,729	3,350	-3.6	-4.2	-2.6
Mining	654	659	620	-2.3	-0.5	-0.9
Construction	4,208	4,117	5,100	1.2	1.3	3.3
Manufacturing	20,545	19,756	21,295	1.3	2.7	0.6
Durable	12,119	11,438	12,495	1.7	3.3	0.5
Nondurable	8,426	8,318	8,800	0.8	1.9	0.7
Transportation, communications, and public utilities	4,633	4,702	4,935	0.1	2.2	1.1
Trade	17,274	17,614	18,940	1.6	3.0	1.5
Finance, insurance, and real estate	3,896	4,021	4,450	2.5	3.7	2.2
Services	13,412	13,817	15,950	3.8	4.8	2.9
Private households	2,322	2,281	2,240	0.2	-2.8	-0.6
Government	12,204	12,597	14,550	3.8	4.9	3.0
Federal	2,758	2,705	2,750	1.0	3.8	-0.1
State and local	9,446	9,892	11,800	4.7	5.2	3.8

¹ Employment is a count of jobs rather than persons. It is higher than an employment count based on persons, because many individuals hold more than one job. Employment includes

provisions of the tax reform law which result in increased personal income because of higher personal exemptions. The projected rate of increase for gross private domestic investment also is higher than historical patterns, largely because of the rate of growth of residential structures. Nonresidential fixed investment is also projected to increase somewhat faster than private GNP, spurred by the increasingly important business purchases of computers and anti-pollution equipment. Federal government purchases will decline because of the assumptions concerning military activities. On the other hand, State and local purchases are projected to continue increasing but at a moderate rate because of slower rates of increase for education that will result from the projected lower public school enrollment.

Output and employment. The major sectors showing the fastest rates of increase between 1969 and 1975 are those which to a considerable extent have been increasing rapidly in the last 10 years. (See table 3.) The projected high consumer expenditure demand will lead to increased output and employment in services, a development which would parallel the recent expansion in this sector. State and local government purchases imply a large increase in employment within these governments. Wholesale and retail trade are projected to be significant sources of new job opportunities. High residential construction demand would lead to a large increase in employment in construction. This, of course, would be a departure from past trends, in which construction, output, and employment have not shown significant increases. The four sectors—construction,

wage and salary workers, self-employed persons, and unpaid family workers.

² Compound interest rate between terminal years.

wholesale and retail trade, services, and State and local governments—which accounted for about 50 percent of total jobs in 1969 are projected to account for over three-fourths of the increase in jobs for the 1969-75 period.

The manufacturing sector, on the other hand, is not projected to be a significant source of growth in employment, 1969-75. Although growth in output is expected to equal or exceed the overall growth in the economy, on the average, most of it could be accommodated by increased productivity. The growth in employment which took place in 1965-69 was largely attributable to increasing defense activities during this period. Growing private and government activities do not require as much manufacturing output as defense purchases, because they demand relatively more from the services sector and direct government employment than goods. Within the manufacturing sector are widely divergent trends, as this sector contains some of the fastest growing industries, like computers and plastics as well as the declining defense-related industries, ordnance and aircraft.

Alternative models. The major emphasis in this bulletin is on the basic model. The two alternative models described earlier were developed to analyze the effects of selected alternative assumptions on output and employment by industry.

In developing the alternative models, the factors affecting overall GNP in the three models were similar so that the total GNP is the same, but the distribution of

that GNP was changed to include the different assumptions about residential construction and defense expenditures. (See table 4.)

The changes assumed in the distribution of demand are not radically different from the distribution of demand in the basic model, so that the influence of these alternatives on output and employment is limited. In the environmental model, the lower residential construction is only partially offset by higher nonresidential construction for pollution control. Therefore, output and employment in the construction sector is projected to have slower growth, 2.3 percent a year in the alternative model, compared with 3.3 percent in the basic model. Within the manufacturing sector, the general industrial machinery and service industry machinery industries, which produce pollution control equipment, show larger increases than in the basic model.

The arms limitation model results in further negative prospects for the defense-related industries, ordnance and aircraft, offset by increased State and local government and construction employment.

Comparative employment requirements. The composition of projected industry employment is influenced by the size of demand components and industry mix and levels of productivity of the industries supplying the demand. By computing employment in terms of unit labor requirements, i.e., employment, direct and indirect, per billion dollars of final demand, employment generated by different types of demand can be com-

Table 4. Components of gross national product and average annual rates of change, 1969-75

(Billions of 1958 dollars)

GNP components	1969	1970	Projected 1975			Average annual rate of change ¹		
			Model I	Model II	Model III	Projected 1969-75		
						Model I	Model II	Model III
Gross national product	724.7	720.0	935.0	935.0	935.0	4.4	4.4	4.4
Personal consumption expenditures	469.3	475.9	614.0	614.0	614.0	4.6	4.6	4.6
Gross private domestic investment	109.6	102.2	156.0	150.0	150.0	6.1	5.4	5.4
Nonresidential	80.1	78.6	108.0	112.0	112.0	5.1	5.7	5.7
Residential	23.1	21.3	41.0	31.0	31.0	10.0	5.0	5.0
Change in inventory	6.4	2.3	7.0	7.0	7.0	-0.8	-0.8	-0.8
Net exports	0.1	2.4	4.0	4.0	4.0	----	----	----
Exports	48.5	52.2	67.3	67.3	67.3	5.6	5.6	5.6
Imports	48.3	49.8	63.3	63.3	63.3	4.6	4.6	4.6
Government	145.6	139.4	161.0	167.0	167.0	1.7	2.3	2.3
Federal	73.8	65.4	66.0	67.0	64.0	-1.9	-1.6	-2.3
State and local	71.9	74.0	95.0	100.0	103.0	4.8	5.7	6.2

SOURCE: Historical data are from the U.S. Department of Commerce, Office of Business Economics. Projections are by the Bureau of Labor Statistics.

¹ Compound interest rate between terminal years.

pared without the influence of the size of the demand components that result from a particular set of assumptions. In chapter II, unit employment requirements per billion dollars are compared for selected construction, State and local activities, and defense expenditures. The data show that State and local operational activities generate more employment per billion than defense expenditures, but that defense generates more than construction. The extent of this difference is influenced by the concepts and definitions of the national accounting system.

Implications of the projections

General implications. This bulletin does not differ in its major conclusions concerning employment trends from those previously made by the Bureau or from those made by other government agencies and private individuals. The continuing decline of agricultural employment, the increasing importance of state and local government activity in the economy and in total employment, the shift in employment towards the service sectors, diminished importance of the manufacturing sector as a source of employment growth—all of these trends have been noted in other research and are reinforced by the present study. In addition, this bulletin contains a good deal of detailed information which, it is hoped, highlights other areas of concern.

The projections to 1975 show very rapid rates of growth in potential real GNP and output per man-hour from the 1970 levels. In only one previous recovery, 1961-66, was the growth in real GNP as high as the projected 5.3 percent a year for 1970-75 and, of course, the year 1966 saw a significant increase in military purchases. The difficulties the Nation faces in reaching the projected total GNP and employment include the problem of recovery from the 1970-71 recession, in which unemployment was 5.9 percent in the fourth quarter 1971; continuing adjustment to the shift from defense activities; and the necessity of improving the recent rates of productivity increase.

The transition from defense activities to other activities would entail some problems. Although the projections to 1975 show unemployment at 3.8 percent, the required adjustment for localities and individuals may be difficult. For the defense-related sectors, employment is not expected to show any appreciable increase and may show some further slight declines. Increased employment is projected for construction, wholesale and retail trade, State and local government, and selected service industries. The occupational composition of these sectors is much different from the defense-related sectors in terms of both highly skilled jobs, such as scientists and

engineers, and blue-collar workers. The adjustments will be made more difficult by the relatively low growth projected for manufacturing, a large source of blue-collar employment. Consequently, many personal adjustments such as relocation and lower salaries may be necessary, as well as retraining programs by both industry and the government. For cities or regions specializing in defense work or aerospace production, continuing economic adjustments are probable.

The analysis of employment related to defense expenditures shows that while defense related jobs have declined 1.7 million over the FY 1968-71 period, a further drop of 700,000 is expected from FY 1971 to CY 1975. Of this total, somewhat over 100,000 will be in the private sector. The remainder will be in the armed forces (500,000) and civilian employment of the Department of Defense (100,000). The continuing decline in defense-related jobs reinforces the need for public and private efforts to ease these adjustments as much as possible.

The continuing decline in farm employment projected for 1975, while far from new, does present continuing problems because usually this farm employment is shifted to already congested urban areas. This shift will entail further pressures on the cities to provide jobs and housing and schools and hospitals for the continually expanding urban population. At the same time rural areas will be faced with maintaining economic viability with a declining tax base, which will make it difficult to maintain public facilities.

The projected increase in government employment and service employment has implications for the increase in productivity and GNP. In the service sectors, productivity increases are difficult to achieve; in government, by definition, no measures of productivity increase can be derived. Employment increases in the service sectors imply increasing difficulty in achieving previous overall rates of increase in productivity. A slower rate of increase in productivity results in lowering the potential rate of growth in real GNP. At the same time, these shifts in employment are taking place, a significant increase in anti-pollution expenditures is expected to take place, which may further lessen the rate of productivity and real GNP increase.

Employment implications. Many of the sectors that are projected to be a source of a high proportion of new jobs already have encountered manpower problems. For example, in the construction industry, filling many highly skilled jobs is a major problem. Therefore, to provide the number of workers to meet the projected growth in construction requirements may call for an increase and possible upgrading of present apprentice-

ship and training programs in a very short period of time. This is a particularly difficult problem in view of the present situation of high unemployment in this sector. Large increases in the number of jobs in wholesale and retail trade and personal services are projected for 1975. These increases may require a rethinking of the traditional low levels of compensation in these industries.

In the medical and educational services sectors, and to a lesser extent in business services, a two-level manpower problem exists. First, a need exists to provide additional training and educational facilities for occupations with a high skill or training requirement such as medicine, nursing, accounting, and computer programming as well as the whole range of paraprofessionals. At the same time, preparations must be made to insure an adequate supply of individuals to fill the less skilled jobs in hospitals and schools, such as those concerned with maintenance, laundry, food preparation, cleaning, and similar operations.

The large employment increases projected for State and local government include expansion for policemen, firemen, and sanitation workers, as well as professional

workers and associated clerical, administrative, and maintenance personnel. Much remains to be done in recruiting, education, and training and providing funds to give proper wages to this rapidly expanding group of workers.

The economy developing along the lines shown in the alternative models for 1975 would have important implications for a few sectors. Under either of the alternative models, the expansion of construction employment would be less than under the basic model; this difference would reduce slightly the problems of training the skilled workers needed in this sector. Lower construction would mean also slower growth for sectors closely tied to construction such as lumber and stone and clay products. Under the assumptions of an arms limitation model, the decline in defense-related employment would be somewhat sharper and would heighten the adjustment problems, particularly for the ordnance and aircraft sectors. However, higher environmental protection expenditures would mean sharper rates of increase in output and employment in the general industrial machinery, service industry machines, and scientific and controlling instrument sectors.

Chapter II. Employment Implications of Changing Government Expenditures

Expenditures by the Federal Government have varied effects on the economy, depending not only on the level but the type. The major types of expenditures are (1) direct purchases of goods and services, consisting of purchases from the private sector and compensation of government employees; (2) transfers to individuals, largely social security benefits; and (3) grants in aid to State and local governments. Purchases of goods and services are dominated by purchases for defense. This chapter will summarize the effect of defense expenditures on employment and consider the employment implications for some selected types of expenditures.

Even though defense purchases have risen sharply because of the Vietnam War, they still represented in 1969 a smaller part of GNP than they had in 1959. (See table 5.) Of course, the level and proportion that defense expenditures were in 1969 represented an increase from 1965, the pre-Vietnam low. The 1975 projections of defense purchases show a modest increase of 0.7 percent, 1969-75, in current prices, but in constant (1958) dollars, they are projected to continue to decline from their 1969 and 1970 levels. Defense purchases will continue to take a declining share of national output.

The nondefense part of Federal purchases has shown different trends than defense, and is projected to do so through 1975. In the 1959-65 period, nondefense

purchases were increasing at a very rapid rate (14.1 percent in current prices and 11.9 percent in constant dollars). This period included the buildup of the space program, the expenditures for which are a part of nondefense purchases. From 1965 to 1969, the rate of increase of these purchases slowed down considerably, because the space program had peaked and also because other Federal nondefense budgets were constrained as resources were devoted to the Vietnam War effort. The projection for nondefense purchases, at least from 1969 to 1975, is for a modest rate of real growth. However, if 1970 is used as the reference point, the historical rate of growth of nondefense purchases, 1965-70, is 6.6 and 1.7 in current and constant dollars respectively, and the projected growth rate (1970-75) is 6.9 percent a year in current prices, and 3.8 percent a year in constant prices. These figures show some moderate increase in the rate of growth of these purchases and indicate that a larger proportion is expected to be real increase.

Employment impact

To assess the changing effect of defense on the U.S. economy, particularly on employment, a separate analysis has been made. This analysis is made by calculating separately the employment requirements,

Table 5. Federal Government purchases of goods and services, and average annual rates of change, selected years, 1959-75

(Billions of dollars)

Purchases	1959	1965	1969	1970	Projected 1975	Average annual rate of change ¹		
						1959-65	1965-69	1969-75
Federal Government Purchases:								
Current Dollars	53.6	66.9	99.2	97.2	114.1	3.8	10.3	2.4
National defense	46.0	50.1	78.4	75.3	81.8	1.4	11.8	0.7
Nondefense	7.6	16.8	20.7	21.9	32.3	14.1	5.4	7.7
Constant 1958 Dollars	52.5	57.9	73.8	65.4	66.0	1.6	6.3	-2.2
National defense	45.1	43.4	58.3	50.7	47.0	-0.6	7.7	-3.6
Nondefense	7.4	14.5	15.5	14.7	19.0	11.9	1.7	3.5
As a Percent of GNP:								
Current Dollars								
Federal	11.1	9.8	10.7	10.0	8.1	----	----	----
National defense	9.5	7.3	8.4	7.7	5.8	----	----	----
Nondefense	1.6	2.5	2.2	2.2	2.3	----	----	----
Constant 1958 Dollars								
Federal	11.0	9.4	10.2	9.1	7.1	----	----	----
National defense	9.5	7.0	8.0	7.0	5.0	----	----	----
Nondefense	1.6	2.3	2.1	2.0	2.0	----	----	----

¹ Compound interest rate between terminal years.

direct and indirect, for defense purchases.⁴ These defense employment requirements by sector and for the total are compared with total employment by sector and in the economy in table 6.⁵ This analysis gives the relationship between total jobs in an industry and those supported, directly or indirectly, by defense purchases.

Total public (including armed forces) and private employment attributable to defense purchases in fiscal year 1965 was 5.8 million jobs—this increased to 7.8 million by FY 1968, declined to 6.1 million by FY 1971, and is projected to further decline to 5.4 million jobs by 1975.⁶ Fiscal year 1965 represented the pre-Vietnam low in defense spending and fiscal year 1968 represented the peak procurement period for Vietnam. As part of total employment, defense related employment showed an increasing share during the Vietnam buildup (8.3 to 10.2 percent), had declined by FY 1971 to 7.7 percent of

employment, and is projected in 1975 to decline further to 6.2 percent of total employment.

The pattern of defense dependency in the private sector is similar to that found for the total economy. A total of 2.1 million jobs in the private sector was attributable to defense purchases in fiscal year 1965. By fiscal year 1968, because of the large buildup associated with Vietnam, the number had reached 3.2 million jobs. By 1971, this had declined to 2.1 million jobs, In 1975, the projections are for the private jobs related to defense purchases to return to a level of 2.0 million jobs—lower than the level which prevailed in FY 1965. The employment effect in the private sector of defense purchases is expected to be lower in 1975 than in FY 1965, in spite of the fact that defense purchases (in real terms) are about \$4 billion higher.⁷ In fact, purchases from the private sector in 1975 compared with those in FY 1965 would be even higher, because the 1975 defense budget is projected to support 200,000 fewer military personnel and 28,000 military personnel and 28,000 fewer Federal civilian employees which would release more funds (in real terms) for purchases from the private sector. The

⁴ This is accomplished by separately running the defense "bill of goods" through an input-output employment table for each of the respective years.

⁵ Data for each of the 82 sectors is available upon request.

⁶ The estimates for FY 1968 were previously published in "Increases in Defense-Related Employment During the Vietnam Buildup," by Richard P. Oliver, *Monthly Labor Review*, Feb. 1970, pp. 3-10. Another article on this subject appeared in the *Monthly Labor Review*, Dec. 1971.

⁷ The level of defense purchases in table 5 is for calendar year 1965. If fiscal year 1965 (the pre-Vietnam low) is used, the 1975 level is about \$5 billion higher in real terms.

Table 6. Employment effects of defense purchases¹

Sectors	Defense-related employment (thousands)					As a percent of total employment				
	FY 1965	FY 1968	FY 1970	FY 1971	CY 1975	FY 1965	FY 1968	FY 1970	FY 1971	CY 1975
Total, defense generated ²	5,759	7,828	7,085	6,123	5,415	8.3	10.2	8.9	7.7	6.2
Federal, military	2,716	3,483	3,398	2,994	2,500	100.0	100.0	100.0	100.0	100.0
Federal, civilian	928	1,111	1,082	1,000	900	39.3	40.7	39.3	37.6	32.7
Private business	2,102	3,217	2,589	2,130	2,005	3.9	5.5	4.2	3.5	3.0
Agriculture, forestry and fisheries	70	102	67	50	38	1.5	2.5	1.8	1.4	1.2
Mining	32	37	31	26	26	5.0	6.1	5.0	4.2	4.5
Construction	67	58	44	41	63	2.1	1.8	1.3	1.2	1.5
Manufacturing	1,391	2,141	1,742	1,387	1,298	7.9	10.9	8.7	7.3	6.2
Durable	1,212	1,829	1,517	1,207	1,112	12.1	15.9	12.9	11.1	9.1
Nondurable	179	312	225	180	186	2.4	3.9	2.7	2.2	2.2
Transportation, com- munications, and public utilities	163	331	250	214	166	4.1	7.7	5.6	4.7	3.5
Wholesale and retail trade	115	191	149	128	122	.9	1.4	1.0	.9	.8
Finance, insurance, and real estate	39	51	46	40	43	1.3	1.5	1.3	1.1	1.1
Services	224	307	260	244	249	2.6	3.0	2.3	2.1	1.8

NOTE: Employment is wage and salary employees only, except agriculture, which includes the self-employed and unpaid family workers. Data relates to a count of jobs rather than a count of persons.

¹ The defense purchases used in these calculations are different from the national defense purchases in table 5. The principal differences are that national defense includes purchases

by the Atomic Energy Commission and stockpiling for national defense purchases. Defense purchases do not include these items, but reflect only the military activities of the Department of Defense.

² Includes a small effect on State and local government not separately shown.

phenomenon of larger real purchases supporting fewer jobs is explained by changes in productivity which have or are expected to take place, FY 1965 to 1975.

These estimates of defense-related jobs show a decline of 28 percent in employment in the private sector from the peak FY 1968 to 1975. Most of this decline had taken place by FY 1971. In fact, the decline may be somewhat sharper because defense expenditures in real terms may reach a level somewhat below the 1965 level between 1971 and 1975, and by 1975 already have begun a gradual upturn.

The pattern of effects of defense purchases on individual sectors is, in general, similar to that for the total private economy. However, some sectors are projected to stabilize at levels higher than pre-war 1965. The general pattern over the period, increase in levels between FY 1965-68, decline by 1975, is most vivid in the important durable goods manufacturing sector. This sector, which has over one-half the defense-related private employment, showed a drop of 600 thousand jobs from FY 1968 to FY 1971. However, only a small further drop is anticipated by 1975. This sector of the economy would be helped by the higher goods content of projected defense expenditures. But this sector contains industries with relatively high productivity, so that the higher expenditures would generate less employment per dollar of expenditure and thus keep the level of employment at about the 1965 level. In transportation, a decline of 160,000 is projected from the peak. In these two industry groups, a significant part of this decline had taken place by FY 1971. For transportation, communication, and public utilities, the projected level is about the same as the 1965 level. In nondurable manufacturing and services, it will be slightly higher. Two factors are behind the higher 1975 levels; in services, productivity is lower than in other sectors and the use of services per dollar of production is increasing as are certain nondurable manufacturing products—particularly synthetic fibers and plastics. In construction,

the resurgence by 1975 will be the result of resumption of delayed projects.

The relationship of defense generated employment to total employment by 1975 is expected to show in most industry groups a lower ratio than in the pre-Vietnam year of FY 1965. However, in durable manufacturing, the projected 1975 ratio of 9.1 percent is significantly lower than the FY 1965 level of 12.1, and about one-half the peak Vietnam relationship of 15.9 percent. This reflects the expected lower proportion of defense expenditures in the GNP and increasing civilian demand.

For selected individual industries within these broad sectors, data on generated employment is shown in table 7, and the relationship of total employment in chart 1. In each case, the 1975 projected relationship is lower than the defense employment ratio in that sector in FY 1965. In some sectors such as ordnance, machine shop products, and transportation services, the difference is very small. In other sectors, particularly communication equipment, electronic components, and aircraft, the projected 1975 ratio is considerably lower than FY 1965. The lower ratios in these sectors signify a growing civilian segment coupled with stable or declining defense requirements. By 1971, in many of these sectors, most, but in no case all, of the adjustments to declining defense relationships had taken place.

A limited number of industries are predominant in any examination of defense-related employment. For these sectors, an examination of the defense-related employment in 1970 and 1975 is particularly important for what it reveals about job prospects in these sectors. In the next chapter, these sectors are examined from the viewpoint of their overall job prospects, not just the defense-related proportion. However, for these sectors, the defense requirement is an important, if not the most important, determinant of changing job prospects.

Aircraft, ordnance, and transportation were the sectors in which employment related to defense purchases rose the most on a percentage basis during the

Table 7. Defense employment requirements for selected sectors, selected years, 1965-75

(Thousands of jobs)

Sectors	FY 1965	FY 1968	FY 1970	FY 1971	Projected 1975
Ordnance	138	241	203	149	135
Communications equipment	195	276	243	203	148
Electronic components	82	116	93	69	67
Aircraft	331	526	445	346	301
Other transportation equipment	66	63	70	65	46
Transportation	117	260	191	162	117
TOTAL	929	1,482	1,245	994	814

Vietnam buildup. These same sectors are being affected most noticeably by the Vietnam phase out. Communications equipment and electronic components also increased greatly during this buildup, but at slower rates. In general, the defense requirements in Vietnam were not as electronically oriented as defense purchases in

general. Other transportation equipment, which includes shipbuilding, shows only small changes (relatively) during the cutbacks. Shipbuilding has longer time periods for construction and is influenced less by short term defense decisions than other transportation equipment.

The defense employment levels shown in table 7 indicate that for these six industries, such jobs have declined 500,000 between FY 1968 and FY 1971. A further decline of 180,000 is projected by 1975.

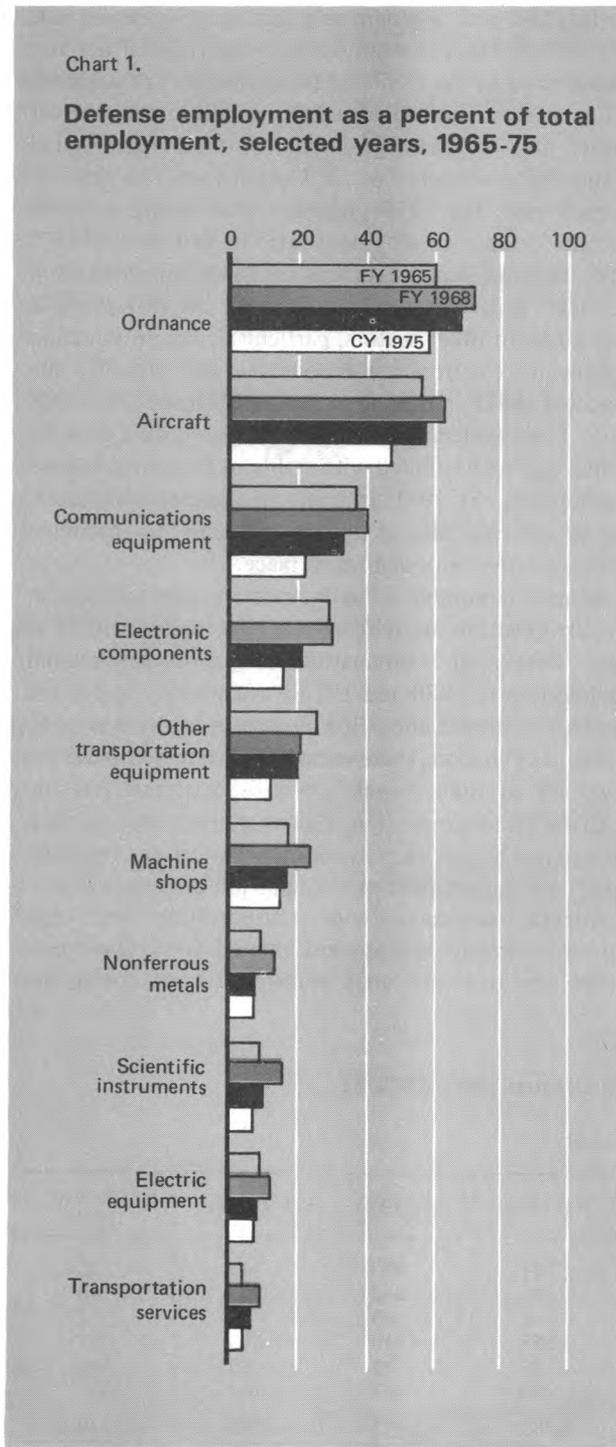
The picture of the defense industries near the bottom of their expected employment decline is only half the picture. Indications are that many individuals formerly associated with the aerospace industries have not found alternative employment. In general, the workers in defense related industries have higher skill levels than the average skill level in the other industries of the economy.⁸ With a high unemployment rate, difficulty arises in placing these former defense workers in nondefense occupations of equal skill and pay—particularly in the short run.

Employment impact of alternative types of expenditures

As the war in Vietnam has wound down and defense expenditures have been reduced, other Federal expenditures have been rising, particularly for transfers to individuals and grants to State and local governments. Grants to State and local governments stimulate spending by these governments for particular activities. In addition, expenditures by State and local governments from their own revenue sources have increased very rapidly in recent years. Table 8 shows the change in Federal expenditures over time and projected under the assumptions stated in chapter I. Clearly, the 1970 drop in current dollar defense and nondefense purchases (even greater in real terms) was more than compensated for by increases in grants and transfers, and that this trend is expected to continue and perhaps accelerate in the future. Personal consumption expenditure increases and State and local expenditures stimulated or financed partly by grants have replaced declining direct Federal purchases.

Each type of expenditure has a different pattern of demand that requires the output of different industries. Because each industry has a different level of productivity (employment requirement per dollar of output), alternative expenditures may generate different total

⁸Richard Dempsey and Douglas Schmude, "Occupational Impact of Defense Purchases," *Monthly Labor Review*, December 1971, pp. 12-15.



employment requirements as well as different industry distributions. These distributions are particularly important in periods with rapid changes in the mix of demand such as defense buildup or cutbacks.

What is the comparative employment effect of various types of expenditures? Some preliminary work along these lines for specific types of expenditures has been done, mostly in the area of government expenditures. Also, the distribution for total personal consumption expenditures has been developed, but the pattern would not necessarily be relevant for the expenditures of persons whose income is derived from transfers. More work needs to be done to determine consumption patterns for welfare recipients, the aged, etc., to see which industries receive the effects of their consumption as distinguished from overall consumption expenditures. Experimental work done indicates that, as one would expect, food, housing, and medical care are the industries receiving the differential influences of accelerated transfer payments.

For State and local governments, expenditure patterns for several types of activities have been prepared. These have been translated into employment. They do not exhaust all State and local expenditures, but are important components of State and local spending.

Five areas of construction and two areas of State and local operations have been selected for analysis. The employment generated per billion dollars of purchases of goods and services for these activities is summarized in table 9. An additional column summarizing the Federal defense expenditures effect is added for comparison. In the construction sectors, the activity is not performed by the government itself. Government purchases construction from the construction industry, but to better see the industries involved, these are treated on a "first order input" basis as though the government is buying the necessary components from each industry. To the

employment generated by these purchases of materials and services is added the employment required by the construction activity itself to obtain the total effect. All of this employment is in the private sector.⁹

For the two direct government operations, education and health and welfare, employment generated in the private sector by purchases is first computed. To these are added estimates of the direct government employment involved in the operation. The total employment generated covers both the private and public sectors.

The comparison is made per billion dollars of expenditures to eliminate the influence of the relative amounts spent for various functions either for the past year or as assumed in these projections. Presentation in this form allows the reader to use the estimates with alternative levels of expenditures.

These estimates do not include the multiplier—the additional employment generated by the spending of income of the employees involved in satisfying the government purchase, and they do not include the employment involved in supplying the additional capital equipment that might be purchased as a result of additional expenditures. If one could estimate this factor, there might be greater variation among the activities since some, like highway construction, may use relatively larger quantities of heavy equipment.

Direct government expenditures, both Federal and State and local, have a higher employment content per billion dollars of demand than the private sector. Partly, this disparity is the result of the way government output is defined, since government product consists only of the compensation of government employees. When the

⁹Some government employment is involved in planning, engineering, site acquisition and supervision of construction contract performance. Their number is not known but addition of this amount would not affect the basic conclusions.

Table 8. Federal and State and local expenditures, selected years, 1965-75

Federal expenditures	Current dollars				Percent distribution			
	1965	1969	1970	Projected 1975	1965	1969	1970	Projected 1975
TOTAL	124.7	191.3	206.2	268.0	100.0	100.0	100.0	100.0
Purchases	66.9	101.3	99.7	108.0	53.6	53.0	48.4	40.0
Defense	50.1	78.8	76.6	77.0	40.2	41.2	37.1	29.0
Nondefense	16.8	25.5	23.1	31.0	13.5	13.3	11.2	12.0
Grants	11.1	20.2	24.4	40.0	8.9	10.6	11.8	15.0
Transfers	32.5	52.1	62.0	100.0	26.1	27.2	30.1	37.0
Other	14.2	17.7	20.1	20.0	11.3	9.3	9.7	7.0
State and local expenditures	Current dollars				Grants as a percent of expenditures			
TOTAL	74.5	118.9	131.2	201.0	14.9	16.9	18.6	20.0

government is purchasing its own output, therefore, it purchases compensation only. However, when the government is purchasing private output, it is implicitly purchasing profit and depreciation as well as compensation, so that the labor content of purchases from the private sector is less than an equivalent level of purchases of government output. Also, it is probably true that certain government activities such as education and health are relatively labor intensive. Defense, by reason of the inclusion of all of the relatively low-paid military personnel also shows a relatively high employment per dollar of output.

For all the activities, the employment is broken down between direct and indirect. Direct employment is in the industry performing the activity; the indirect is in the industries supplying materials and services necessary to the activity.¹⁰

Within the construction category, the various types generate similar amounts of total employment per billion dollars of purchases, except for residential which is noticeably higher. Within these totals, however, the relationship between direct and indirect varies, indirect exceeding direct in both residential and educational

¹⁰The direct coefficients are based on extrapolations of survey studies for different years. These have been adjusted roughly for 1971 prices and 1975 productivity to put them all on the same basis. See labor and material requirements studies for different kinds of construction, BLS Bulletins 1390, 1402, 1404, 1441, 1490, 1586, and 1671 (1964 to 1971).

construction. The indirect employment generated in manufacturing by highways is lower largely because of the limited inputs in this activity compared with other types of construction. However, the mining sector is affected more by highways, because of heavy use of sand and gravel. The residential construction sector traditionally makes substantial purchases through lumber yards, rather than directly from the manufacturer, and thereby has a larger than average input from the trade sector. Also, residential construction has a much greater employment effect in the lumber industry because of its high lumber usage.

The construction activity has been compared with two kinds of State and local operational activities—education and health, welfare and sanitation. Excluded from these activities are construction of new facilities. Employment generated by State and local activities would be lower if they included construction. How much lower would depend on the weight of construction expenditures in the total expenditures. The indirect employment requirements for health, welfare, and sanitation resemble the level of employment per billion generated by the construction activities, because this operation involves large purchases from other sectors. These purchases, however, are about equally divided between goods and services (other than own employees), but in construction, purchases of manufactured goods are great.

The indirect employment requirements for education are considerably lower than for the other activities, because of the relatively small amount of purchases from outside the government. The noteworthy aspect of the

Table 9. Employment generated per billion dollars¹ of State and local government purchases by selected final demands, 1975

Demand sectors	Construction					State and local government purchases ²		Federal purchases
	Highways	Residential ³ construction	Hospitals	Sewers	Educational construction	Education	Health	DOD
Indirect	21,730	28,495	21,481	20,407	22,512	13,434	25,996	28,440
Agriculture, forestry, and fisheries	260	1,536	342	440	389	839	1,424	567
Mining	1,183	287	264	229	288	249	330	307
Construction (maintenance)	265	309	233	199	235	1,156	827	1,198
Manufacturing	9,748	14,507	11,952	12,647	12,815	5,515	8,275	17,374
Transportation, communications and public utilities	2,726	2,763	2,061	1,818	2,202	1,984	2,380	2,335
Trade	2,818	4,844	3,074	1,764	3,109	1,119	2,137	1,875
Finance, insurance, and real estate	982	967	761	777	752	651	1,012	581
Services	3,748	3,282	2,794	2,533	2,722	1,921	9,611	4,203
Direct (new construction)	26,257	26,604	26,470	21,919	19,913			
Direct government						90,585	54,045	47,372
Total	47,987	55,099	47,951	42,326	42,425	104,019	80,041	75,812

¹ 1971 prices.

² Excludes construction.

³ Single family housing only.

education operation is the large number of direct employees generated compared with the other activities. The direct jobs in education consist of more than teachers. Educational activities generate a large number of supporting personnel in the form of librarians, administrators and specialists of many types, as well as janitorial, maintenance, and food service personnel. Also, public education includes the junior college and college levels where the personnel-pupil ratio is very high.

These relationships for education are based on the experience of the recent past. They do not take into account possible basic changes in the education process. A massive shift to teaching machines or other computer-assisted teaching obviously could affect purchases from the private sector, but is not considered to be a significant factor within the next five years.

Lastly, a comparison was made with employment generated by defense expenditures of the Federal government (DOD). The indirect employment per billion is largely in manufacturing, the level higher than that generated by construction. The affected industries within manufacturing are obviously not the same. Instead of the emphasis on stone and clay, lumber, and steel, the emphasis is on aircraft, ordnance, and communications equipment. The direct employment requirements are lower than for the two operating activities of State and local government, but, of course, considerably higher than construction. As was previously mentioned, the direct includes the armed forces and Department of Defense civilian employment. The armed forces alone contributes almost half of the employment generated per billion dollars of defense expenditures.

Because the armed forces are included, the defense sector is particularly susceptible to the assumption as to the content of the expenditures. The distribution between the size of the armed forces and material will affect the direct-indirect employment relationship. Defense expenditures as noted earlier are assumed to increase at the same time the Armed Forces are being reduced. Total employment, therefore, including armed

forces, would be less under this assumption than under the same expenditures with higher armed forces level.

The question analyzed in this section was the employment level and industry distribution generated by various types of demand with particular relevance to defense activities. When the totals of employment per billion are compared, clearly defense dollars diverted toward construction will not generate as much total employment, and money going into education or health would produce higher employment than defense activity. In evaluating the employment effects on the private sector, the range for most of the activities studied is small; highway construction would be somewhat lower than the other activities. However, one activity, education, has per billion about one-half the effect on the private sector of the other activities analyzed. Within manufacturing, defense is higher than any other activity covered; the others range down to education which generates one-third the employment in manufacturing of defense activities.

From this, it can be seen that diverting defense dollars to other activities will have several effects. First, if defense dollars go to construction, the effect on employment will be small unless a larger number of dollars are involved. If the defense monies go into education or health, resulting employment will be greater. In all cases in manufacturing, a larger amount of money will be needed to maintain the same employment level. In all of the activities studied, certain defense-related sectors, such as aircraft and ordnance, are involved in nondefense activities to a considerably smaller extent than they are in defense.

This shifting demand structure is brought into perspective by referring back to the previous part of this chapter which showed that from FY 1968 (peak Vietnam) to 1975, it is projected that 2.4 million fewer job opportunities will result from defense activity and from FY 1971, the decline in job opportunities is about 700,000. The range of expenditures necessary to absorb that difference can vary considerably depending on the type of demand.

Chapter III. Potential GNP, Income, and Demand

Projection of potential GNP

The assumptions discussed in chapter I described the general outline of the economy. The quantitative determination of the dimension in terms of GNP and its major income and demand components follow. First, the potential GNP is projected to 1975, followed by the associated income and demand components. The demand components are then further projected to industry detail. The present chapter is devoted to the projection of potential GNP and its components.

Potential GNP was projected using a number of factors that underlie economic growth, labor force,

employment, average hours, and output per man-hour.¹¹ Table 10 shows the derivation of the GNP for the projected period (1969-75), and compares projected growth with the pre-Vietnam period (1959-65) the peak war period (1965-1969), the most recent year, and 1975. In discussing growth rates to 1975, reference will be to 1969-75 growth rates, to discuss generally the movement of the economy during periods of growth at or near its potential.

¹¹ A detailed description of the methods used to derive potential GNP is available on request from Ronald E. Kutscher, Chief, Division of Economic Growth.

Table 10. Labor force, employment, hours, productivity, and gross national product

Category	1959	1965	1969	1970	Projected 1975 Model I	Average annual rate of change ¹		
						1959-65	1965-69	1969-75
Total labor force (including armed forces)	70,921	77,177	84,240	85,903	92,792	1.4	2.2	1.6
Unemployed	3,740	3,366	2,832	4,088	3,431	-1.8	-4.2	3.2
Employed (persons concept)	67,181	73,811	81,408	81,815	89,361	1.6	2.5	1.6
Adjustment to jobs concept	3,496	3,878	5,598	4,709	5,000	1.7	9.6	-1.9
Employment (jobs concept)	70,677	77,689	87,006	86,524	94,361	1.6	2.9	1.4
Government ²	9,930	11,994	14,727	14,483	16,035	3.1	5.4	1.4
Federal	4,239	4,569	5,529	5,109	4,535	1.2	4.9	-3.3
Military	2,543	2,732	3,463	3,096	2,500	1.2	6.1	-5.3
Civilian	1,696	1,837	2,066	2,013	2,035	1.3	3.0	-0.3
State and local	5,691	7,425	9,198	9,374	11,500	4.5	4.6	3.8
Private	60,747	65,695	72,279	72,041	78,326	1.3	2.4	1.3
Agriculture	5,519	4,338	3,587	3,416	3,000	-3.9	-4.7	-2.9
Nonagriculture	55,228	61,357	68,692	68,625	75,326	1.8	2.9	1.5
Average annual man-hours paid, private	2,078	2,051	1,991	1,966	1,964	-2	-0.7	-0.1
Agriculture	2,350	2,376	2,304	2,288	2,274	.2	-0.8	-0.2
Nonagriculture	2,051	2,028	1,975	1,950	1,964	-2	-0.7	-0.1
Total man-hours (millions), private	126,221	134,781	143,912	141,624	154,762	1.1	1.7	1.2
Agriculture	12,972	10,307	8,263	7,816	6,822	-4.3	-5.4	-3.1
Nonagriculture	113,249	124,474	135,649	133,808	147,940	1.6	2.2	1.5
GNP per man-hour (1958 dollars), private	3.43	4.21	4.61	4.66	5.63	3.5	2.3	3.4
Agriculture	1.63	2.30	2.93	3.06	3.91	5.9	6.2	4.9
Nonagriculture	3.64	4.36	4.72	4.75	5.71	3.1	2.0	3.2
Total GNP (billions of 1958 dollars)	475.9	617.8	724.7	720.0	³ 936.7	4.4	4.1	4.4
Government	42.5	50.8	60.7	60.6	65.3	3.0	4.5	1.2
Federal	20.2	21.8	25.9	24.3	21.9	1.3	4.4	-2.7
Military	10.2	10.9	13.7	12.5	9.9	1.1	5.9	-5.3
Civilian	10.0	10.9	12.2	11.8	12.0	1.5	2.9	-0.3
State and local	22.3	29.0	34.7	36.4	43.4	4.5	4.6	3.8
Private	433.4	567.0	664.0	659.4	871.4	4.6	4.0	4.6
Agriculture	21.1	23.7	24.2	23.9	26.7	2.0	0.5	1.7
Nonagriculture	412.3	543.3	639.8	635.5	844.7	4.7	4.2	4.7

¹ Compound interest rate between terminal years.

² The government employment used here is from the Office of Business Economics in order to be consistent with the government GNP. Elsewhere in this report, employment in government is from the Bureau of Labor Statistics. There are conceptual dif-

ferences between the two sources which makes BLS government employment about 400,000 lower.

³ This is GNP as derived. It has been rounded to \$935 for use throughout this report.

Labor force. The labor force is projected to increase, 1969-75, at 1.6 percent a year,¹² a slowdown from the most recent period but faster than the early 1960's. The slower rate is the result of two factors: in the 1965-69 period, the young people born in the immediate postwar period had already begun to enter the labor force, and further increases in labor force growth in the 1965-69 period resulted from the extraordinarily rapid increases in women's labor force participation. The completed entrance of the former group into the labor force is accounted for in the projection. As for women's participation, the assumption is that it will begin to increase at longterm rates, until more evidence is available on which to judge the permanence of the unusually rapid growth during the 1965-69 period. A rapidly increasing proportion of the labor force will be in early career working ages, 20-34, thus providing unprecedented numbers of employed persons. An estimate of the total number of employed persons is derived from the projected labor force, and the assumed levels of armed forces and the unemployment rate.

Employment. The final purpose of this study is a projection of employment by industry rather than just total employment. Since the past industry employment data with detailed sector disaggregations are based on available data which are a count of jobs rather than persons (many persons hold more than one job), total employment must be translated into total jobs.¹³ The adjustment factor between the two, which includes statistical as well as coverage differences, has been erratic in the past, but, for the purposes of this projection, has been kept at about the 1969 level. Because this adjustment factor between the two series is not estimated to continue to increase, the rate of increase in employment on a jobs concept is somewhat slower than for the persons concept.

Employment (jobs concept) is projected to increase to 1975 at a rate slower than the rate during the 1959-65 period. That period involved a drop in the unemployment rate from 5.5 to 4.5 percent. The projected rate of increase in employment is considerably slower also than the 1965-69 rate. During the 1965-69 period, the employment increased from a combination of an extraordinary labor force rise and a drop in the unemployment rate, whereas in the projection the unemployment rate is almost the same in the 2 years.

¹²Sophia C. Travis, "The Labor Force: Projections to 1985," *Monthly Labor Review*, May 1970, pp. 3-12.

¹³This conversion is discussed further in the appendix. See also the discussion in *Patterns of U.S. Economic Growth*, BLS Bulletin 1672, 1970, pp. 13 and 53-56.

The unemployment rate assumed in 1975 would be a decline from the higher 1970 level, but if 1969 is the base, the 1975 unemployment rate is somewhat higher, 3.8 percent compared with 3.5 percent.

Hours. Average hours for the nonfarm economy are projected to decline slowly from 1969 to 1975 at .1 percent a year.¹⁴ Measured from 1965, however, the projected drop approaches a rate of 1 percent a year. Between 1965 and 1969, particularly in 1967, there was a sharp, one-time drop in reported hours in almost all sectors. Since then, the rate seems to have resumed its trend decline, and a continuation of this trend is used in the 1975 projections.

In the early 1950's, the decline in hours resulted to a considerable extent from a reduction in the scheduled workweek. In later years, however, the increasing numbers of part-time employees contributed more to the decline in hours than changes in the scheduled workweek. During the 1960's, as total employment increased about 20 percent, voluntary part-time employment rose 70 percent in a persistent year-to-year pattern of increase. This trend has been fortified by shifts in the hours and days of operation in the trade and service sectors, which are predominant employers of part-time personnel.

The 1975 projections of average hours assumes a continued increase in part-time employment as a percent of the total, but no substantive reductions in the standard workweek. Although some indications of possible change in the structure of the workweek have occurred, for example, the 4 day week in some firms, the influence on total average hours is expected to be minimal by 1975. Government hours in these projections are assumed not to change.

Output per man-hour. The early paragraphs of this chapter pointed out the importance of separating the farm and nonfarm sectors because of past effects on overall private output per man-hour. This separation has been continued, because the productivity trends and levels have been and continue to be different, though the effect of farm on the overall level of productivity is not as significant as before.

The important projection is the one for the private nonfarm sector, because it covers such a large part of the total economy. The long-term rate of increase in output

¹⁴The data on average hours used in making these projections are measures of hours paid. Although it would be preferable, at least from the viewpoint of productivity, to have a measure of hours worked, such measures do not exist for detailed industries.

per man-hour for this sector has been 2.8 percent a year. The productivity rate increased from 1959 to 1965 somewhat faster than the long-term rate, but slowed to 2.0 percent increase in the 1965-69 period, as the economy operated at consistent high levels of output and very low levels of unemployment. Some of the years in the 1965-69 period showed no increase at all. The 1975 projection implies a return to the average postwar historical rate but uses 1967 as a base, thereby assuming that the losses of the 1967-70 period will be made up as output and employment climb to potential levels. Even though total nonfarm productivity is projected at its historical rate, individual industries may deviate from the past rates.

In the past, increases in the farm sector have averaged close to 6 percent a year as a result of rapid changes in technology, and a continuing movement of employment away from farms as the number of marginal farms declined. In recent years, this rate has slowed down slightly. Traditionally, farm output per man-hour has fluctuated widely, and a rate of increase close to that of the recent past is projected.

Government productivity is held constant to conform to the national accounting system.¹⁵ The level and rate of change in government output per man-hour is, therefore, substantially different from the private sector. As a result of this convention, the relative importance of government employment influences the overall rate of productivity increase. As government employment rises substantially, as is expected for State and local government employment, and its productivity is held constant, the rate of increase in productivity for the total economy will be lower than the projected increase in the private sector alone.

Potential GNP growth rate. By combining the projections of labor force, changes in hours and output per man-hour, the 1975 private GNP is determined. Projected government product is added to the private product to determine total GNP. For the Federal Government, the projected number of employees and, therefore, government GNP is exogenous, derived from the assumptions about the armed forces and civilian employment set forth in chapter I. For the State and local government sector, employment and government

¹⁵In the national income accounting framework, government product is employment in government multiplied by an average compensation per employee in base period prices. This assumption means that all wage increases for government employees are counted as price increases with no allowance for productivity gains.

GNP are derived from an equation adapted from the Thurow econometric model.¹⁶

The rate of growth in total GNP from 1969-75 is projected to be 4.4 percent a year, as a result of a rate of 4.6 percent for the private sector, and 1.2 percent for the public sector. The implication is that an even greater growth will be required to attain this potential from the lower 1970 levels. From 1970, the estimated growth of GNP required to 1975 would be 5.3 percent a year.

Components of gross product

Having estimated the potential GNP, a macro-econometric model was used to determine the income and demand components of GNP.¹⁷ The advantage of this model is that it provides a link between these relationships, since production creates income and income creates demand.¹⁸

Income components. The model estimates the various components of aggregate income consistent with assumed policies. The assumptions about government policy that influence income are transfer payments to individuals, social security taxes, the wage base, and corporate and personal taxes.

The income components generated by the model are shown in table 11. Since these components are not involved directly in the derivation of output and employment, less examination has been made of the income portion of the model than of the production function and the demand aspects. Further work on the income equations are necessary and will be undertaken. One of the most difficult estimates to make is projections of taxes, both corporate and personal. The Tax Reform Bill of 1969 changed the kinds of allowable deductions and personal exemptions rather than rates. The eventual effect of these changes on effective rates is difficult to estimate precisely, but has been accounted for by an aggregate adjustment. Because of offsetting movements, the disposable income level projected by the model

¹⁶Lester Thurow, "A Fiscal Model of the United States," *Survey of Current Business*, Vol. 49, No. 6, June 1969, pp. 45-64. Variables influencing State and local employment are (1) the general level of economic activity represented by an estimate of GNP, (2) grants-in-aid from the Federal Government, which is an exogenous assumption discussed in chapter I, and (3) school population, since over half of the employment in this sector is for education. A detailed description of the model is available on request.

¹⁷Ibid.

¹⁸Exogenous price deflators are used to move from one section of the model to the other.

Table 11. Derivation of personal income and average annual rates of change, selected years, 1959-69 and projected 1975, model I

Components	1959	1965	1969	1970	Projected 1975 Model I	Average annual rate of change ¹		
						1959-65	1965-69	Projected 1969-75
Gross national product	483.7	684.9	929.1	974.1	1,405.0	6.0	7.9	7.1
Less:								
Capital consumption and corporate profit	93.0	135.9	159.7	158.4	270.0	6.5	4.1	9.1
Indirect business tax	42.4	62.5	85.7	92.9	135.0	6.7	8.2	7.9
Social security contributions	17.6	29.6	54.0	57.6	84.0	9.1	16.2	7.6
Plus:								
Government transfers	24.9	37.2	62.2	75.6	118.0	6.9	13.7	11.3
Interest	13.6	20.5	29.0	31.7	40.0	7.1	9.1	5.5
Dividends	12.6	19.8	24.4	25.0	37.0	7.8	5.4	7.2
Other ²	1.7	4.5	5.2	6.2	2.0	na	na	na
Personal income	383.5	538.9	750.3	803.6	1,113.0	5.8	8.6	6.8
Disposable personal income	337.3	473.2	634.2	687.8	960.0	5.8	7.6	7.2
Disposable personal income (1958 dollars)	333.0	435.0	513.5	531.5	671.0	4.6	4.3	4.6

SOURCE: Historical data are from the U.S. Department of Commerce, Office of Business Economics. Projections are by the Bureau of Labor Statistics.

²Subsidies less current surplus of government enterprise and statistical discrepancy.
na = not available.

¹Compound interest rate between terminal years.

seems to be reasonable when translated into personal consumption expenditures.

The projection of GNP growth in current prices, 1969-75, is 7.1 percent a year. (See table 11.) This is slower than the rate of increase from 1965-69, because of the projected slowdown in the rate of increase of prices. However, the projected rate of increase in GNP is faster than the rate of increase, 1959-65, in this case, because the projected rate of increase in prices is faster than prevailed during that period. As shown in table 12, the rate of increase in GNP, in constant 1958 dollars, for these three periods are virtually the same. Therefore, the difference in current dollar GNP reflects price differences. As discussed in chapter I, the projected price assumptions are for a return by 1975 of low rates of price change. However, the period 1969-75 includes the very high prices increases of 1970 and expected higher than average increases for 1971.

The rate of increase in government transfer payments to individuals has been increased during the 1965-69 period at an exceptionally high rate of 13.7 percent a year. The projections, 1969-75, are for a continued rapid growth in this category at 11.3 percent a year, or a rate more than half again as fast as the GNP increase. This rate compares with the 1959-65 period, when transfer payments were increasing at a rate only slightly faster than GNP. The continued increase in transfer payments follows from the assumption about growth of social security payments and expansion of welfare payments.

Disposable personal income is projected to increase, 1969-75, at a rate of 7.2 percent a year, or slightly faster than current dollar GNP. This projected rate of increase is slower than the 1965-69 rate but faster than that for 1959-65. The change in rates, historical and projected, reflect differences in the implicit price increases of this category, historical and projected. Disposable personal income in real terms will increase at 4.6 percent, or at the same rate as during the 1959-65 period.

Demand GNP. The primary interest in the model for this project was in the components of the demand side of GNP, since these are the values that form the basis for projecting demand by industry in the input-output framework. Four major components of demand were estimated by the model: personal consumption expenditures, business investment, residential investment, and State and local government expenditures. Net exports and Federal government expenditures are exogenous.

The model is designed so that the sum of the demand components does not necessarily add to the supply GNP. They would not be equal if the incomes consistent with the supply GNP did not generate sufficient demand. The gap between supply GNP and demand GNP depends in part on the government policies incorporated into the model. If there is a gap, potential GNP, and its associated desired unemployment rate, would not be achieved unless the government altered its policies. The model provides estimates of the effect of alternative

combinations of policies that could be used to stimulate demand to equal supply GNP or to reduce demand that exceeds supply GNP.

The Federal Government may change its own purchases of goods and services which operate directly on demand, or it may change other variables which have an effect on other demand sectors, mostly through income effects. Personal, social insurance, and indirect business taxes and transfer payments affect disposable personal income and, therefore, personal consumption expenditures. Corporate tax and depreciation policies affect corporate incomes and, therefore, investment in nonresidential structures and equipment. Policies influencing interest rates affect residential investment. Grants-in-aid influence State and local purchases.

In this project, the assumptions about exogenous factors and government policy have generated demand consistent with the supply GNP so that there is no supply-demand gap. In a sense, the gap which might have existed has been closed by three major assumptions:

1. large increases in transfer payments and the lower personal taxes resulting from the tax reform bill both of which stimulate personal consumption spending;
2. increases in Federal grants-in-aid which stimulate State and local government spending;
3. assumed interest rates which stimulate residential construction demand.

The demand components in 1975 consistent with the assumptions are shown in table 12. The relative rates of growth in each component reflect the effects of these assumptions.

Personal consumption expenditures will rise at 4.6 percent a year, 1969-75, or at a faster rate than the GNP and faster than this component has historically. This faster rate of increase in personal consumption is consistent with the lower personal tax liability, and increased income partially spurred by government transfer payments. Residential investment is projected to increase at 10.0 percent a year, and achieve the level of housing called for in the housing goals, which require a

Table 12. Gross national product and average annual rates of change, selected years, 1959-70 and projected 1975

(Billions of 1958 dollars)

Components	1959	1965	1969	1970	Projected 1975	Average annual rate of change ¹			
						1959-65	1965-69	Projected 1969-75	
Gross national product	475.9	617.8	724.7	720.0	935.0	4.4	4.1	4.4	
Personal consumption expenditures	307.3	397.7	469.3	475.9	614.0	4.4	4.2	4.6	
Gross private domestic investment	73.6	99.2	109.6	102.2	156.0	5.1	2.6	6.1	
Nonresidential investment	44.1	66.3	80.1	78.6	108.0	7.0	4.8	5.1	
Residential structures	24.7	23.8	23.1	21.3	41.0	-0.6	-0.8	10.0	
Change in inventories	4.8	9.0	6.4	2.3	7.0	11.0	-8.2	1.5	
Net exports	.3	6.2	.1	2.4	4.0	----	----	----	
Exports	23.8	37.4	48.5	52.2	67.3	7.8	6.7	5.6	
Imports	23.5	31.2	48.3	49.8	63.3	4.8	11.5	4.6	
Government	94.7	114.7	145.6	139.4	161.0	3.2	6.1	1.7	
Federal	52.5	57.9	73.8	65.4	66.0	1.7	6.3	-1.9	
State and local	42.2	56.8	71.9	74.0	95.0	5.1	6.1	4.8	
	Percent Distribution								
Gross national product	100.0	100.0	100.0	100.0	100.0				
Personal consumption expenditures	64.6	64.4	64.8	66.1	65.7				
Gross private domestic investment	15.5	16.1	15.1	14.2	16.7				
Nonresidential investment	9.3	10.7	11.1	10.9	11.6				
Residential structures	5.2	3.9	3.2	3.0	4.4				
Change in inventories	1.0	1.5	0.9	0.3	0.7				
Net exports	0.0	1.0	0.0	0.3	0.4				
Exports	5.0	6.1	6.7	7.3	7.2				
Imports	4.9	5.1	6.7	6.9	6.8				
Government	19.9	18.6	20.1	19.4	17.2				
Federal	11.0	9.4	10.2	9.1	7.1				
State and local	8.9	9.2	9.9	10.3	10.2				

SOURCE: Historical data are from the U.S. Department of Commerce, Office of Business Economics. Projections are by the Bureau of Labor Statistics.

¹ Compound interest rate between terminal years.

sharp recovery from the low level of 1969 and 1970. This increase in residential construction, 1969-75, is in sharp contrast to the trend of residential structures in earlier periods, when high interest rates and tight money restricted the growth of residential construction and in fact, led to declines during some periods.

Federal Government purchases of goods and services will decline 1.9 percent a year as hostilities in Vietnam end. From 1970, the Federal Government purchases of goods and services in 1975 will be less than 2 billion (1958 dollars) lower. Federal expenditures, in real terms, are expected to decline through 1972 or 1973 and then begin a gradual upturn. State and local government purchases will continue to rise faster than GNP, but the projected rate of increase of 4.8 represents a slowdown from earlier periods. This slowdown will be partly the result of slower rates of increases in school population, which follows from the lower birth rates in the 1960's.

Business investment is projected to increase a little less than the rate during the high capital investment years, 1959-65, but since it is still growing faster than GNP, its share will continue to rise. The slower rate of investment increase compared with the 1959-65 period will be influenced by the higher corporate taxes estimated to result from the tax reform bill, and from the fact that the rate of increase during the 1959-65 period was not sustainable.

Prices

Use of the Thurow model requires an assumption about a set of GNP deflators for the overall GNP, and for all of the components of demand. The model is not designed to test the consistency of the unemployment and price assumptions in terms of possible trade offs such as the familiar Philips curve analysis. Prices are exogenous, and since the same prices are used for inflation and deflation and do not move very differently, they do not affect the relative size of the demand components significantly. The overall GNP deflator is exogenous and the component deflators are estimated to be consistent with the overall deflator. For this research, the overall level assumed would mean a return by 1975 to the modest price increases prevalent in the 1959-65 period. This effect on the model of these price assumptions would result because the prices for the demand components move at different rates over time. The further the point from the base period (in this case, 1958), the greater the disparities in the deflators.

The deflators for government purchases of goods and services significantly diverge from deflators for other demand components after long periods of time, because

the national accounts treat wage changes for government employees as price change. This has a unique effect on the relationship between current and constant dollar accounting for the government sector.

In the 1975 projections, derived by the Thurow model with the conversion of the demand side of the model to current dollars, a basic set of national income accounts containing the elements for deriving government budgets (NIA concept) are available. Normally, in using this model, any changes in the budget resulting from changes in government policy required to close a possible demand-supply gap could be examined. Because this projection has no gap, the implicit effect of the assumptions which resulted in closing the gap, such as taxes, transfers, etc., can be seen.

The revenue elements for the Federal Government are available from the income side of the model: indirect business taxes, contributions for social insurance, transfer payments, and corporate and personal income taxes. Purchases of goods and service by the Federal Government are an exogenous part of the demand side of the model as are other Federal expenditures, transfer payments to individuals (part of the income side), and grants-in-aid to State and local government. State and local revenue are derived similarly from the income side with the addition of Federal grants-in-aid. The final product of these rearrangements of components show Federal expenditures and Federal revenue and the surplus or deficit. Similar data for State and local government are shown in table 13.

These projections show Federal receipts and expenditures returning to a rate of increase similar to the pre-Vietnam, 1959-65, experience. In the projected period, however, assumed expenditures increase slightly faster than projected receipts. The projected rate of increase of Federal receipts and revenues are considerably slower than the rates for 1965-69, when expenditures were increased drastically to meet Vietnam requirements, and revenues were increasing at very high rates because of the income tax surcharge.

State and local receipts and expenditures are projected to increase at better than 9.0 percent a year, 1969-75, or somewhat faster than the 1959-65 rate, but slower than the fast pace of 1965-69. The projected rate of increase is aided by the projected increases in grants-in-aid. Revenues and expenditures of State and local government are projected to be in balance in 1975.

The projection of government receipts and expenditures requires a clear statement about their limitations. First, the price assumptions affect government expenditures and revenues more than other components of the

model. Second, the estimates of the effect of the tax reform bill are tentative. However, the budgets are presented as being a useful step in tracing the possible

effects of changes in government policy. This proposition, of course, follows only if the economy is viewed as described by the relationship of this model.

Table 13. Government budgets (NIA concept) and average annual rates of change, selected years, 1959-70, projected 1975

(Billions of current dollars)

Budgets	1959	1965	1969	1970	Projected 1975	Average annual rate of change ¹		
						Model I	1959-65	1965-69
					Federal Government Budget			
Receipts	89.7	124.7	196.9	191.5	277.0	5.7	12.1	5.9
Expenditures	91.0	123.5	189.5	205.1	268.0	5.2	11.3	4.6
Surplus or deficit	-1.3	1.2	7.3	-13.6	9.0	----	----	----
State and Local Government Budget								
Receipts	46.0	75.5	119.0	133.4	201.0	8.6	12.0	9.1
Expenditures	46.8	74.5	118.9	132.9	201.0	8.1	12.4	9.1
Surplus or deficit	-0.8	1.0	0.1	0.5	0.0	----	----	----

SOURCE: Historical data are from the U.S. Department of Commerce, Office of Business Economics. Projections are by the Bureau of Labor Statistics.

¹ Compound interest rate between terminal years.

Chapter IV. Changes in Employment, Output

In the input-output model used in these projections, the projected demand by the final purchasers of the economy triggers the process that results in estimates of industry employment. The final demand by purchaser is translated into demand for final products by industry through the use of the input-output table of inter-industry relationships, which has been projected to 1975.¹⁹ The final product generates industry output not only in the industry producing the final product, but also in the industries supplying raw materials, parts and services to the final industry. Employment-output relationships or productivity ratios then are applied to the output generated by the input-output model to derive the end product of this research, employment by industry. Projections of the intricate relationships are made at each step, making it possible to trace the effect on employment of the set of assumptions discussed in chapter I. These projections postulate a full employment economy in a nonwar situation with specified government policies concerning transfers, grants, and taxes. Estimates of industry employment result from these assumptions, as do all resulting projections through the separate steps of the model.

Civilian employment by major sector is shown in table 8.²⁰ Data for recent past periods are provided for comparison. These tables show some noteworthy trends in what is projected under full employment. Total civilian employment is projected to increase from 83.1 million in 1969 to 91.4 million jobs by 1975, or an increase of nearly 8.4 million jobs. Trends for total employment and among major sectors generally reflect longer term trends shown in 1959-65. However, some, such as manufacturing, show growth distinctly slower than that which prevailed during the Vietnam war period. In general, all sectors will have slower growth rates in the 1969-75 period than during 1965-69. Construction, however, is projected to grow at rates distinctly faster than either of the periods shown here. Part of the projected slowdown in total employment growth reflects the expected return of productivity to its longer term rate, which would be a distinct improvement over productivity gains for 1965-69. From 1969 to 1970, total employment rose by less than 300,000. The

projections imply an increase of over 8 million jobs from the 1970 level.

Sector changes

Goods-producing sectors. Despite a steadily rising total output of goods to unprecedented levels by 1975, the goods-producing industries encompass the only major industries in which employment is expected to decline—mining and agriculture—and one industry—manufacturing—for which employment growth is expected to be slower than during the 1960's. Only one goods-producing industry, construction, is expected to show a quickened pace of employment growth through the early 1970's. This modest employment expansion for goods-producing industries, in the face of an overall healthy increase in output, reflects their anticipated rise in productivity.

In agriculture, small gains in output and continuation of the trend to large farms will result in a projected decline in employment of 600,000 by 1975. Although the rate of decline is somewhat slower than in the past, there is no indication of the end of the migration out of this sector. This sector is projected to account for less than 4 percent of total employment in 1975 compared with 4.7 in 1969 and 8.6 percent in 1959. (See table 14.)

Mining employment has been declining for many years because of above average gains in productivity and decreased demand, particularly for coal. Mining is projected to have the lowest rate of increase in output among all nonfarm industries. Continued employment declines are projected through 1975, although at a reduced rate because of some resurgence in the demand for coal.

Manufacturing, still the biggest sector, is expected to remain as the largest single source of jobs in the economy. Manpower requirement in manufacturing, however, are expected to increase at a slower pace, at 0.6 percent a year, than that experienced during the 1960's, chiefly because the recent increases in employment in industries heavily oriented toward defense are not expected to continue at the same pace. Employment, however, is expected to rise about 800,000 from 1969 to 1975. From the 1970 low, employment in manufacturing is projected to increase nearly 1.5 million.

As in the past, changes in employment in individual manufacturing industries will vary widely as the sector is more heterogeneous than the others. Variation in demand and productivity within the sector is as great as it is between this sector and the other major sectors.

¹⁹The methods used in developing these estimates are available from the Bureau on request, as well as tables of the final demand by producing sector for selected years and projected to 1975. In addition, the 1975 inverse matrix is available.

²⁰Detailed industry output and employment for each of the 80 sectors is available on request.

Table 14. Civilian employment and average annual rates of change, by major sector, selected years, 1959-70 and projected 1975

(Thousands of jobs)

Major Sector	1959	1965	1967	1968	1969	1970	Projected 1975	Average annual rate of change ¹		
								Model I	1959-65	1965-69
							Total	67,882	74,568	78,906
Agriculture, forestry and fisheries	5,822	4,671	4,196	4,148	3,932	3,729	3,350	-3.6	-4.2	-2.6
Mining	769	667	649	641	654	659	620	-2.5	-0.5	-0.9
Construction	3,717	3,994	3,981	4,033	4,208	4,117	5,100	1.2	1.3	3.3
Manufacturing	17,061	18,454	19,805	20,141	20,545	19,756	21,295	1.3	2.7	0.6
Durable	9,400	10,644	11,670	11,866	12,119	11,438	12,495	2.1	3.3	0.5
Nondurable	7,661	7,810	8,135	8,275	8,426	8,318	8,800	0.3	1.9	0.7
Transportation, communications, and public utilities	4,219	4,250	4,470	4,523	4,633	4,702	4,935	0.1	2.2	1.1
Trade	13,947	15,352	16,160	16,658	17,274	17,614	18,940	1.6	3.0	1.5
Finance, insurance and real estate	2,901	3,367	3,569	3,719	3,896	4,021	4,450	2.5	3.7	2.2
Services	8,888	11,118	12,194	12,765	13,412	13,817	15,950	3.8	4.8	2.9
Government	8,083	10,091	11,398	11,845	12,204	12,599	14,550	3.7	4.9	3.0
Households	2,575	2,604	2,484	2,317	2,322	2,281	2,240	0.2	-2.8	-0.6
Percent Distribution										
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
Agriculture, forestry and fisheries	8.6	6.3	5.3	5.1	4.7	4.5	3.7			
Mining	1.1	0.9	0.8	0.8	0.8	0.8	0.7			
Construction	5.5	5.4	5.0	5.0	5.1	4.9	5.6			
Manufacturing	25.0	24.7	25.1	24.9	24.7	23.7	23.3			
Durable	13.7	14.3	14.8	14.7	14.6	13.7	13.7			
Nondurable	11.3	10.5	10.3	10.2	10.1	10.0	9.6			
Transportation, communications, and public utilities	6.2	5.7	5.7	5.6	5.6	5.6	5.4			
Trade	20.5	20.6	20.5	20.6	20.8	21.1	20.7			
Finance, insurance and real estate	4.3	4.5	4.5	4.6	4.7	4.8	4.9			
Services	13.1	14.9	15.5	15.8	16.1	16.6	17.4			
Government	11.9	13.5	14.4	14.7	14.1	15.1	15.9			
Households	3.8	3.5	3.2	2.9	2.8	2.7	2.4			

NOTE: Includes wage and salaried employees and self employed and unpaid family workers. Employment is a count of jobs rather than a count of individuals, thus, a person who

holds more than one job would be counted more than once in this series.

¹ Compound interest rate between terminal years.

Construction output and employment will increase sharply, 1969-75, as a result of the assumption about achieving the national housing goals. The rate of change in employment is more than twice the rate of increase in recent years when housing was depressed. Increases in construction activity will come not only from demand for residential buildings, but also from private construction, particularly utilities, government construction of sewage treatment facilities, urban redevelopment, and rapid transit facilities.

The projections for service-producing sectors, 1969-75, are for continued, if not increased, rates of growth in output, some modest increases in productivity, and continued high rates of employment growth.

The service sector is projected to provide the largest addition to employment between 1969 and 1975. This growth will reflect continuing and in some cases accelerating demand for personal, business, recreation, and health services resulting from a rapid rise in disposable income and expanding economic activity. Employment growth in this sector will result from both its relatively low productivity as well as increasing demand for services. Employment required per dollar of output is higher than in manufacturing because of the high labor content of service industries. For the same reason, the rate of increase in productivity tends to be lower, so that

Service-producing sectors. In the service-producing industries, the past trends have shown moderate to high rates of increase in output and below average rates of change in productivity which have led to above average growth in employment in many service-producing sec-

the gap in productivity between this sector and manufacturing will continue to grow.

The trade sector also will continue to grow in output at a rate close to the growth in the total economy, and sufficient to maintain its share of total employment, which has been stable for many years. This sector, next to manufacturing, is the largest of the major sectors. In increasing at the same rate as total employment, the sector is an important source of employment, projected to add over 1.5 million jobs by 1975.

Finance, insurance, and real estate will continue its slow upward climb as a proportion of total employment as a result of increased demand. The only service-producing sector that will lose some ground in its share of total employment is the transportation and utilities sector. The loss will occur in spite of continued high rates of growth in output. Even with the declining proportion of employment, employment in this sector will continue to increase faster than during the 1959-65 period.

In the nonfarm sector, a most obvious trend is the increase in government employment. The level increased almost 50 percent from 1965 with a consequent rise in its share of total employment. The projected rise in the government share of employment will occur even though the rate of increase in government employment is expected to be slower than in the 1959-65 or the 1965-69 period. The total increase in government comprises an assumed slight increase in Federal Government employment, and a continuing strong increase in State and local government employment. These conclusions follow closely from the changing structure of final demand discussed in previous chapters. The State and local employment estimate reflects the general growth in demand for more and better government services, even though the rate of growth for all levels of educational services will be easing. The Federal employment estimate assumes that the major Federal expenditures will be in grants and transfers rather than in direct purchases and, thus, will not require large expansion of Federal employment.

Trends in selected industries' output and employment

The implications of the trends projected for some of the industries within the major sectors, especially within the large manufacturing group, are worthy of further note. The projected increase in demand for construction will carry with it increased demand for the output of industries supplying materials to construction. For instance, output of the lumber industry (sector 20) is expected to increase at a much faster rate than it did in the 1959-69 period. (See table 15.) Although much of

this increase will be absorbed by rising productivity, the demand will be strong enough to moderate the long-term decline in employment to a virtually stable level. Other sectors with more rapid output and employment increases are stone and clay products and glass. One industry indirectly affected by construction demand, particularly by the emphasis on residential construction and the projected increase in household formations, is the household furniture sector, which is projected to increase at a faster rate in 1969-75.

The defense-oriented industries have a mixed future but in no case particularly optimistic. Ordnance and aircraft, at the peak of Vietnam expenditures in 1968, had over 70 percent of employment attributed to defense. They are not expected to resume high levels of employment by 1975, even though demand by defense for aircraft will recover somewhat. Compared with the end of 1970, aircraft employment will rise a little by 1975 to something above the pre-Vietnam levels. But for the ordnance industry, the assumption about defense and space spending do not indicate increases such as resulted in the industry output and employment growth in the 1960's.

Two other defense-oriented industries had about a third of employment attributed to defense in 1968. They are expected to recover substantially from the low points of the end of 1970 on the basis of civilian demand. The electronic components industry (sector 57) supplies components to the fast growing computer industry, and has not had the same drop in employment as the other industries. Employment in this industry is expected to continue to rise but at a much slower pace than during the peak war years. The larger radio, television, and communication industry (sector 56) has customers in two growth areas, the telephone industry and consumer purchases. Employment is expected to decline from 1969 to 1975. However, though employment dropped sharply in 1970, much of it is expected to be recovered by 1975, but not to the peak 1968 or 1969 levels.

The overall transportation industry has had a reasonable steady growth in output, but has had a decline in employment caused by declines in railroads employment. It is projected to show a persistent small increase in level largely as a result of demand for trucking and air transportation. The output projection, 1969-75, for transportation is a return to the rate of increase which prevailed during the 1959-65 period.

The communications industry has had years of fairly stable employment, caused by a decline in operator employment and increases in other types. The effect of the decline is now substantially completed, and employment is expected to increase to keep pace with increased

Table 15. Trends in output and employment in selected industries,¹ selected periods, 1959-69 and projected 1969-75

(Average annual rates of change²)

Sectors	Output ³			Employment ⁴		
	1959-65	1965-69	Projected 1969-75	1959-65	1965-69	Projected 1969-75
Construction-related sectors:						
New construction	2.7	0.8	5.5	1.2	1.3	3.3
Lumber and wood products	3.0	1.5	5.0	-1.2	-0.3	-0.2
Glass	4.1	3.8	5.3	1.9	2.0	2.0
Stone and clay products	3.4	5.5	6.2	0.3	0.6	1.5
Household furniture	3.2	4.0	4.7	1.9	2.1	2.1
Defense-related sectors:						
Ordnance	na	17.4	-4.1	1.7	9.0	-5.7
Communications equipment	12.7	9.0	1.2	3.3	5.5	-0.8
Electronic components	12.5	12.1	6.5	6.3	6.0	1.2
Aircraft	0.8	11.5	-0.5	-2.4	6.8	-3.8
Other manufacturing sectors:						
Synthetic fibers	8.6	7.4	7.2	4.5	3.9	3.3
Rubber and plastic products	7.0	8.0	6.9	3.9	5.9	2.7
Computers	10.6	18.4	10.0	5.6	9.6	4.0
Optical, ophthalmic, and photographic equipment	10.3	12.2	8.6	3.3	6.3	3.2
Other nonmanufacturing sectors:						
Coal	2.8	0.8	2.6	-5.3	-1.0	-1.0
Transportation	4.3	4.9	4.3	-0.2	1.6	0.6
Communications	7.3	9.0	6.5	0.6	4.4	2.2
Utilities	5.8	7.4	6.0	0.3	1.6	1.1
Medical, educational, and nonprofit organizations	5.0	4.5	6.5	4.1	5.4	4.2

¹ Growth rates in output and employment for all industries are available on request.

² Compound interest rate between terminal years.

³ Average annual rate of increase in gross duplicated output in real terms.

⁴ Average annual rate of increase in civilian employment on a jobs concept. Employment includes wage and salary employees and self employed and unpaid family workers.

needs for new installations and improved service. A similar situation will affect the utilities industries; thus, the projected increases at this time are larger than would have been foreseen during its long period of stable employment in the 1960's. In both of these sectors, the larger projected increases in employment reflect some slowdown in the rate of increase in productivity.

Within the fast growing service sector, the most rapid increase will be in the medical, education, and nonprofit organizations sector. Since the level of employment in this industry now is over 6 million, the projected rise will mean additional employment of almost 1.5 million. Resultant strong demand for medical care and the addition of medicare and medicaid also have stimulated the drug industry (29) to rapid growth.

Business services and auto repair will increase rapidly also, but the rate of increase in employment in personal services is expected to slow down, mostly as a result of declines in demand for some personal services.

The decline in employment in coal mining, which has

been sharp for some time, is expected to slow down. Increased demand for coal from electric utilities and for export may mean opening new mines with a consequent slowdown in the very high increase in productivity, which prevailed during the period of mechanization of the industry.

The fastest growing industry in terms of projected rates of output and employment growth is the computer industry (sector 51). Although future growth rates cannot be expected to attain the height achieved since the introduction of their use and particularly the very high 18.4 percent a year growth, 1965-69, the rate of growth in output and employment is expected to continue to exceed any other sector in the economy.

Another rapidly growing area of the economy is concerned with plastics. Both the raw material industry (sector 28) and the manufactured product (sector 32) show strong growth rates in both output and employment, although not as high as in the past.

The previous discussion of individual sectors has

highlighted those sectors employment in which is projected to increase at rapid rates. If, however, an examination is made of the important job sources of the early 1970's, a total increase of 8.4 million jobs between 1969 and 1975 is projected and over 75 percent is expected to be provided by four sectors:

	(in millions)
State and local government	2.4
Wholesale and retail trade	1.6
Medical, educational, and nonprofit organizations	1.7
Construction9
Total	6.6

Chapter V. Alternative Models

In chapter I, a short description was given of the three alternative models contained in this report. In chapters II through IV, the emphasis was on one of these models—the basic model or model I. In this chapter, the two alternative models will be discussed in detail.

Assumptions

A number of the assumptions for 1975 used in the basic model are similar for the other two models, including the unemployment rate, which is 3.8 percent in all three models. The assumptions concerning no change in tax laws and return of the economy to growth under its full employment potential are the same in all models. However, the alternative models are not complete models, so that a complete range of assumptions similar to model I are not available. The two alternative models have certain assumptions that have been modified from those used in the basic model. Model II, called the environmental model, has the following changes from model I: The time path for achieving the housing goals is assumed to be modified so that 1975 level of residential construction is 10 billion dollars less than in model I. This 10 billion dollars of resources is assumed to be devoted to expenditures for combating air and water pollution. Thus, in model II, the expenditures in 1975 by State and local governments, Federal Government and business investment in plant and equipment are higher than in model I.

The third alternative model is an arms limitation model. It assumes a limited arms agreement between the major powers will take place in 1972 and that 1975 defense expenditures, in real terms, will be 3 billion dollars lower than they would have been without the agreement. The additional resources are assumed to be spent by State and local governments on urban problem areas such as transit and low income housing. All other aspects of the economy are the same in this model as in model II. These alternative models are not meant to provide the basis for selecting alternative paths for the economy to move, but are meant to show the manpower implications of the various choices available.

Gross national product and components

Potential GNP. Many of the basic assumptions that affect potential GNP are the same in the two alternative models as in the basic model. Since the labor force growth, unemployment rate, projected change in hours and productivity are the same in all models, the only

factor which affects potential GNP is the projected split between public and private employment. In the environmental model, the State and local government employment is projected 100,000 higher than in the housing goals model. The higher State and local government employment is consistent with the larger State and local activity in pollution control. Since total employment in all three models is the same, private employment in the environmental model is 100,000 lower. The effect of the shift of these employees from the private sector to the public sector is to lower potential 1975 GNP by .7 billion dollars. (See table 16.)

In the arms limitation model, the lower military expenditures are assumed to be accompanied by 100,000 fewer men in the armed forces; this number is offset by higher projected State and local government employment. The assumed shift in employment from the military to State and local government employment would have no effect on potential 1975 GNP, because of the nearly comparable average pay per person in the military, and in State and local government. As can be seen in table 17, the potential GNP under the three alternative models are 936.7, 936.0, and 936.0 billion dollars. Since in developing these projections the GNP is rounded to the nearest 5 billion dollars, the 1975 potential GNP in all three models is assumed to be the same—935.0 billion dollars (1958 dollars).

Components of GNP. Although the factors influencing potential GNP in the two alternative models are not significantly different from those in the basic model, the composition of GNP does, by assumption, have some important differences. The first significant difference is the lower rate of growth of residential structures in the environmental model (II) and the arms limitation model (III). (See table 17.) With the level of residential structures projected lower in 1975 in the two alternative models by ten billion dollars (1958 dollars), the projected growth in residential structures, 1969-75, is more than halved from a rate of 10.0 percent a year in model I to 5.0 percent, or about the same rate as overall GNP in the two alternative models. In unit terms, this reduction is from 2.7 million to 2.0 million residential units. Part of the resources which in the basic model is devoted to residential construction, in the environmental model is projected to be split three ways. State and local expenditures are projected 5 billion dollars higher and these resources are assumed to be spent on activities directly related to air and water pollution. About one-half of this amount has been projected to be added to construction

Table 16. Labor force, employment, hours, productivity, and gross national product, 1969 and projected 1975 for 3 economic models

Category	1969	1975			Average annual rate of change ¹		
					Projected 1969-75		
		Model I	Model II	Model III	Model I	Model II	Model III
Total labor force	84,240	92,792	92,792	92,792	1.6	1.6	1.6
Unemployed	2,832	3,431	3,431	3,431	3.2	3.2	3.2
Employed (persons)	81,408	89,361	89,361	89,361	1.6	1.6	1.6
Adjustment to jobs concept	5,598	5,000	5,000	5,000	-1.9	-1.9	-1.9
Employment (jobs concept)	87,006	94,361	94,361	94,361	1.4	1.4	1.4
Government ²	14,727	16,035	16,135	16,135	1.4	1.5	1.5
Federal	5,529	4,535	4,535	4,435	-3.3	-3.3	-3.6
Military	3,463	2,500	2,500	2,400	-5.3	-5.3	-5.9
Civilian	2,066	2,035	2,035	2,035	-0.3	-0.3	-0.3
State and local	9,198	11,500	11,600	11,700	3.8	3.9	4.1
Private	72,279	78,326	78,226	78,226	1.3	1.3	1.3
Agriculture	3,587	3,000	3,000	3,000	-2.9	-2.9	-2.9
Nonagriculture	68,692	73,326	75,226	75,226	1.5	1.5	1.5
Average annual man-hours paid for							
private	1,991	1,976	1,976	1,976	-0.1	-0.1	-0.1
Agriculture	2,304	2,274	2,274	2,274	-0.2	-0.2	-0.2
Nonagriculture	1,975	1,964	1,964	1,964	-0.1	-0.1	-0.1
Total man-hours (millions)							
private	143,912	154,762	154,566	154,566	1.2	1.2	1.2
Agriculture	8,263	6,822	6,822	6,822	-3.1	-3.1	-3.1
Nonagriculture	135,649	147,940	147,744	147,744	1.5	1.4	1.4
GNP per man-hour (1958 dollars)							
private	4.61	5.63	5.63	5.63	3.4	3.4	3.4
Agriculture	2.93	3.91	3.91	3.91	4.9	4.9	4.9
Nonagriculture	4.72	5.71	5.71	5.71	3.2	3.2	3.2
Total GNP (1958 dollars)	724.7	936.7	936.0	936.0	4.4	4.4	4.4
Government	60.7	65.3	65.7	65.7	1.2	1.3	1.3
Federal	25.9	21.9	21.9	21.5	-2.7	-2.7	-3.1
Military	13.7	9.9	9.9	9.5	-5.3	-5.3	-5.9
Civilian	12.2	12.0	12.0	12.0	-0.3	-0.3	-0.3
State and local	34.7	43.4	43.8	44.2	3.8	4.0	4.1
Private	664.0	871.4	870.3	870.3	4.6	4.6	4.6
Agriculture	24.2	26.7	26.7	26.7	1.7	1.7	1.7
Nonagriculture	639.8	844.7	843.6	843.6	4.7	4.7	4.7

¹ Compound interest rates between terminal years.

² The employment used here is from the U.S. Department of Commerce, Office of Business Economics. Elsewhere throughout

the report the government employment is from the Bureau of Labor Statistics.

of sewers and sewage treatment facilities. Other portions are projected for expenditures on equipment which might be added to publicly owned power plants and incinerators in order to lower air pollution. One billion dollars of the additional resources is projected to be added to Federal Government purchases to be devoted to the same types of activities as the State and local government in areas of direct Federal responsibility.

Nonresidential investment is projected higher also in the environmental model by 4 billion dollars (1958 dollars). This additional 4 billion dollars in nonresidential investment in 1975 raises the growth rate, 1969-75, from 5.0 percent a year in the housing goals model to 5.7 percent a year in the environmental model. This additional expenditure on nonresidential investment,

both plant and equipment, is assumed to be spent on equipment or facilities necessary to lower air and water pollution. All other elements of demand in the environmental model are the same as in the housing goals model.

In the arms limitation model, the lower residential construction and higher business investment and State and local government expenditures found in the environmental model are used as a starting point. The projected lower Federal defense expenditures of 3 billion dollars (1958 dollars) in the arms limitation model changes the rate of decline in total Federal expenditures from 1.9 percent in model I to 2.3 percent a year decline in model III. State and local government expenditures are projected at 3 billion dollars higher in model III, and these

Table 17. Components of gross national product and average annual rates of change, selected years 1959-70 and projected 1975

(Billions of 1958 dollars)

Components	1959	1965	1969	1970	Projected 1975			Average annual rate of change ¹				
					Model I	Model II	Model III	1959-65	1965-69	Projected 1969-75		
										Model I	Model II	Model III
Gross national product	475.9	617.8	724.7	720.0	935.0	935.0	935.0	4.4	4.1	4.4	4.4	4.4
Personal consumption expenditures	307.3	397.7	469.3	475.9	614.0	614.0	614.0	4.4	4.2	4.6	4.6	4.6
Gross private domestic investment	73.6	99.2	109.6	102.2	156.0	150.0	150.0	5.1	2.6	5.1	5.4	5.4
Nonresidential	44.1	66.3	80.1	78.6	108.0	112.0	112.0	7.0	4.8	5.0	5.7	5.7
Residential	24.7	23.8	23.1	21.3	41.0	31.0	31.0	-0.6	-0.8	10.0	5.0	5.0
Change in inventory	4.8	9.0	6.4	2.3	7.0	7.0	7.0	11.0	8.2	1.5	1.5	1.5
Net exports3	6.2	.1	2.4	4.0	4.0	4.0	----	----	----	----	----
Exports	23.8	37.4	48.5	52.2	67.3	67.3	67.3	7.8	6.7	5.6	5.6	5.6
Imports	23.5	31.2	48.3	49.8	63.3	63.3	63.3	4.8	11.5	4.6	4.6	4.6
Government	94.7	114.7	145.6	139.4	161.0	167.0	167.0	3.2	6.1	1.7	2.3	2.3
Federal	52.5	57.9	73.8	65.4	66.0	67.0	64.0	1.7	6.3	-1.9	-1.6	-2.3
State and local	42.2	56.8	71.9	74.0	95.0	100.0	103.0	5.1	6.1	4.8	5.7	6.2
	Percent Distribution											
Gross national product	100.0	100.0	100.0	100.0	100.0	100.0	100.0					
Personal consumption expenditures	64.6	64.4	64.8	66.1	65.7	65.7	65.7					
Gross private domestic investment	15.5	16.1	15.1	14.2	16.7	16.0	16.0					
Nonresidential	9.3	10.7	11.1	10.9	11.6	12.0	12.0					
Residential	5.2	3.9	3.2	3.0	4.4	3.3	3.3					
Change in inventory	1.0	1.5	0.9	0.3	0.7	0.7	0.7					
Net exports	0.0	1.0	0.0	0.3	0.4	0.4	0.4					
Exports	5.0	6.1	6.7	7.3	7.2	7.2	7.2					
Imports	4.9	5.1	6.7	6.9	6.8	6.8	6.8					
Government	19.9	18.6	20.1	19.4	17.2	17.9	17.9					
Federal	11.0	9.4	10.2	9.1	7.1	7.2	6.8					
State and local	8.9	9.2	9.9	10.3	10.2	10.7	11.0					

SOURCE: Historical data are from the U.S. Department of Commerce, Office of Business Economics. Projections are by the Bureau of Labor Statistics.

¹ Compound interest rate between terminal years.

funds are assumed to be devoted to urban transit and urban development. All other demand categories in model III are the same as in model II.

In developing these models, value judgments were not involved in selecting which of the alternative models might be preferable. The alternative models only serve to illustrate what the effect is on output and employment, if the economy moves one way or another.

Industry structure of demand

The use of an input-output model for developing employment and output projections requires that explicit estimates be made of the industry structure of demand. In chapter III, a discussion is presented of the detailed structure of demand for the basic model. In order to proceed with these projections for the alternative models, detailed input-output bills of goods are required.

Environmental model. The environmental model assumes \$4.0 billion (1958 dollars) will be spent by business for pollution control in 1975. Reports prepared by the Federal Water Quality Administration²¹ and the

²¹U.S. Department of Interior, Federal Water Pollution Control Administration, *The Cost of Clean Water*, Vol. II, Washington, D.C., U.S. Government Printing Office, January 1968; and U.S. Department of Interior, Federal Water Pollution Control Administration, *The Cost of Clean Water and its Economic Impact*, Vol. I, Washington, D.C., U.S. Government Printing Office, Jan. 1969; and U.S. Department of Interior, Federal Water Pollution Quality Administration, *The Economics of Clean Water*, Vol. I, Washington, D.C., U.S. Government Printing Office, March 1970; and "Figures on Water and Wastewater Equipment Shipments," by K. L. Kollar of the U.S. Department of Commerce, Business Defense Services Administration, printed in June 1968 *Water and Waste Engineering*.

National Air Pollution Control Administration²² provide useful information for the distribution of this \$4.0 billion to producing industries.

These studies do not cover all industries or all possible pollutants, but the coverage probably is indicative of those industries which might be most affected. The pollutants covered are particulates, sulphur oxides, hydrocarbons, carbon monoxide, settleable and suspended solids, and oxygen-demanding dissolved organics. In addition, it is assumed that expenditures will be made in an attempt to return industrial cooling water to the source temperature before discharge.

As mentioned, all industries and possible pollutants were not covered by these projections. No doubt, expenditures will be made in 1975 for the control of other pollutants and sources such as acid mine drainage, animal feedlots, wastes from watercraft, and solid waste disposal, but these projections do not cover these expenditures for 1975. In this analysis, direct costs to the consumer, for example, the cost of installing antipollution devices on autos, are not considered; neither are the effects of pollution control equipment on the price structure.

Table 18 presents the estimated effect of pollution

²²Research Triangle Institute, *Comprehensive Economic Cost Study of Air Pollution Control Costs for Selected Industries and Regions*, Research Triangle Park, North Carolina, Feb. 1970; U.S. Department of Health, Education and Welfare, National Air Pollution Control Administration, *Control Techniques for Particulate Air Pollutants*, Washington, D.C., U.S. Government Printing Office, Jan. 1969; and U.S. Department of Health, Education and Welfare, Second Report to the Congress of the United States, *The Cost of Clean Air*, Senate Document 91-65, Washington, D.C., U.S. Government Printing Office, March 1970.

control on producer durable equipment producing industries in millions of 1958 dollars, and in terms of a percent distribution of the total. General and industrial machinery (industry 49) is the largest producer of air pollution control equipment in the present stage of technology. Fabricated metal products and general industrial machinery (sectors 40 and 49) dominate in the production of water pollution control equipment.

It should be noted that many of the controlling devices require installation which adds substantially to—and in some cases exceeds—their basic cost. Therefore, the largest single effect of pollution controlling efforts is projected to be in the construction industry. Significant effects are projected to be in the general industrial machinery industry—SIC 356—where pumps, compressors, blowers and such equipment are made; the services industries machines—SIC 358—where sewage purification equipment and filters are made; the instrumentation industry—SIC 382—where mechanical measuring and controlling instruments are made.

In the environmental model, an additional 5 billion dollars (1958 dollars) is assumed to be spent by State and local government on water and air pollution. In table 19, the effect of the additional 5 billion dollars of State and local expenditures is shown by activity.

Of the 5 billion dollars, 2.5 billion is assumed to be spent by State and local enterprises for sewer lines and sewage treatment plants. Input data from a study of labor and material requirements²³ is used to provide the industry breakdown. The remaining 1.2 billion dollars of expenditures in the enterprises category in 1975 is

²³U.S. Department of Labor, Bureau of Labor Statistics, *Labor and Material Requirements for Sewer Works Construction*, BLS Bulletin 1490.

Table 18. Value of air and water pollution control equipment by producing industries, 1975

Industry number and title	Millions of 1958 dollars			Percent distribution		
	Air	Water	Total	Air	Water	Total
TOTAL	1,344.2	2,655.8	4,000.0	100.0	100.0	100.0
11 New construction	93.2	----	93.2	6.9	----	2.3
36 Stone and clay products	----	10.4	10.4	----	.4	.3
40 Heating, plumbing, and fabricated structural metal products	144.1	956.7	1,100.8	10.7	36.0	27.5
48 Special industry machinery and equipment	----	15.7	15.7	----	.6	.4
49 General industrial machinery and equipment	965.9	749.6	1,715.5	71.9	28.2	42.9
52 Service industry machines	----	385.1	385.1	----	14.5	9.6
62 Professional, scientific, and controlling instruments and supplies	----	253.1	253.1	----	9.5	6.3
65 Transportation and warehousing	48.4	46.0	94.4	3.6	1.7	2.4
69 Wholesale and retail trade	92.6	239.2	331.8	6.9	9.0	8.3

Table 19. 1975 State and local government expenditures by activity, basic and environmental model

(Billions of 1958 dollars)

Activity	Basic model	Environmental model
Total	¹ 95.0	100.0
Education	33.8	33.8
Enterprises	7.6	11.3
Sanitation	0.9	2.2
All other	52.7	52.7

¹ For a more detailed breakdown of 1975 State and local government expenditures, see chapter III.

distributed among the industries noted, which produce equipment for water pollution control. The higher 1975 expenditures by State and local government for sanitation (largely solid waste collection and disposal) is projected to be directed toward those industries noted which produce equipment used for air pollution abatement.

In describing what was done to develop an input-output bill of goods for environmental expenditures, it is equally important to stress, in addition to what was done what was not done. These estimates were developed using today's technology. Therefore, since some of the technology to control pollution is not known, a new development may come from sectors other than those shown here. Further, the Bureau prepared no estimate of the amount of the various types of pollutants generated by industry and region—information vitally important to actual pollution abatement. The attempt was to estimate, with today's knowledge, the industries most likely to be affected in output and employment by additional monies spent on air and water pollution control.

Arms limitation. In the arms limitation model, 1975 defense purchases are projected at 3 billion dollars (1958 dollars) lower than in the other two models. The assumption in this model of a limited arms agreement does not lower defense requirements drastically in the short run. Such an agreement would limit the future expansion and development of new weapon systems, so that its effect on defense expenditures would be marginal immediately after such an agreement. Of course, over a longer period, such as a decade, the cumulative effect could be quite significant.

In terms of specific systems, the arms limitation model assumes a limited arms pact taking place in 1972 along the lines being discussed at the Strategic Arms Limitation Talks (SALT). The details of these discussions are highly classified and certain highly arbitrary

assumptions have had to be made. The assumption is that the pact would lower defense requirements by 5 billion dollars in current prices and 3 billion dollars in 1958 dollars. The systems which would be affected would be strategic missiles and bombers. The armed forces also would be lowered by 100,000, thus reducing constant dollar defense expenditures by 4 billion dollars. The remaining 2.6 billion dollar reduction would be distributed among the major defense sectors as follows: ordnance (sector 13)—\$1.0 billion, aircraft (sector 60)—.6 billion, communication equipment (sector 56)—.4 billion, and .2 billion dollars for other transportation equipment. The ordnance reduction would follow directly from the reduced growth of missile development, the aircraft drop would result partially from lower aircraft development, and partially from lower missile booster purchases. The electronic equipment would be lower because of guidance systems associated with missiles, and the transportation equipment reduction would follow from lower submarine requirements.

The resources in the arms limitation model freed by the lower defense purchases are assumed to be spent by State and local government on urban development and transit facilities. In terms of the distribution of State and local government expenditures by activity, these expenditures fall into the enterprises category. Most of these expenditures ultimately would go to construction, although some of these expenditures would be involved in urban transit equipment.

Output and employment

The demand distributions prepared for the environmental model, and the arms limitation model are used in conjunction with the projected input-output table to calculate growth rates in output by sector, and from these employment estimates by sector are calculated. However, in as much as large elements of demand, particularly personal consumption expenditures, are identical in all models, the output and employment of most industries are identical or nearly identical in all three models. Of course, some industries are affected by the alternative models and the discussion which follows is centered on these industries.

Environmental model. In table 20, the sectors significantly affected in output and employment are shown and compared with the basic model. These sectors are grouped into two broad groups: construction related and pollution equipment related. Those construction related sectors' output growth is slower in this model because of the lower residential construction. Of course, since construction and its supplying industries are treated in

Table 20. Average annual rates of change, output and employment, selected sectors, projected 1969-75

Sector	Average annual rate of change 1969-75 ¹			
	Output ²		Employment ³	
	Housing goals model	Environmental model	Basic	Environmental model
Construction related sectors:				
New and maintenance construction	5.5	4.5	3.3	2.3
Lumber and wood products	5.0	4.3	-0.2	-0.9
Stone and clay products	6.2	5.9	1.5	1.2
Electric lighting and wiring equipment	6.3	5.9	3.0	2.7
Pollution control-related sectors:				
Primary iron and steel	1.5	1.7	-1.0	-0.8
General industrial machinery	4.3	8.7	1.7	6.0
Service industry machinery	7.3	8.3	2.7	3.8
Scientific and controlling instruments	2.6	3.7	0.6	1.7

¹ Compound interest rate between terminal years.

² Gross duplicated output in real terms.

³ Employment is a count of jobs rather than persons. It includes wage and salary employees and self employed and unpaid family workers.

these projections as one sector, the cutback in residential construction is offset partially by the pollution-related construction increase. In addition to construction, three closely related sectors are projected to have a slower output and employment growth in the environmental model than the basic model. (See table 21.) Other construction-related sectors are affected to a smaller degree also, such as glass, nonferrous metals, fabricated metal products, paint, business services, architectural and engineering services, and forestry products. One sector, plumbing and structural metal, shows no change, because its construction related losses are offset by pollution control equipment-related gains.

The other group of industries is related to pollution control equipment. The most significant increases are found in the general industrial machinery industry, which manufactures products such as filters, electrostatic precipitators, air purification equipment, cyclonic wet scrubbers, dust collection equipment, sludge digestors, fume collecting equipment, afterburners, ventilators, settling tanks, and filter elements; service industry machines where sewage purification equipment is manufactured; and the scientific and controlling instrument sector, where measuring and controlling instruments are manufactured. Most other sectors are affected only slightly, if at all.

Table 21. Average annual rates of change,¹ output and employment, selected sectors, projected 1969-75

Sector	Average annual rate of change, 1969-75					
	Output ²			Employment ³		
	Housing goals model	Environmental model	Arms limitation model	Basic model	Environmental model	Arms limitation model
Construction-related:						
New construction	5.5	4.5	4.8	3.3	2.3	2.5
Lumber and wood products	5.0	4.3	4.5	-0.2	-0.9	-0.7
Stone and clay products	6.2	5.9	6.1	1.5	1.2	1.4
Electric lighting and wiring equipment	6.3	5.9	6.2	3.0	2.7	3.0
Defense-related:						
Ordnance	-4.1	-4.1	-6.4	-5.6	-5.6	-7.8
Machine shops	2.2	2.3	2.0	1.8	1.8	1.4
Communication equipment	1.2	1.2	0.8	-0.6	-0.6	-1.1
Aircraft	-0.5	-0.5	-1.3	-3.6	-3.6	-4.4

¹ Compound interest rate between terminal years.

² Gross duplicated output in real terms.

³ Employment is a count of jobs rather than persons. The count includes wage and salary workers and self employed and unpaid family workers.

Arms limitation model. In the arms limitation model, only three sectors are directly affected to any significant degree by the lower defense requirements in this model—ordnance, communication equipment, and aircraft. State and local construction is increased in model III over the projections under model II assumptions, but total construction activity is still lower in 1975 than under the assumption found in model I.

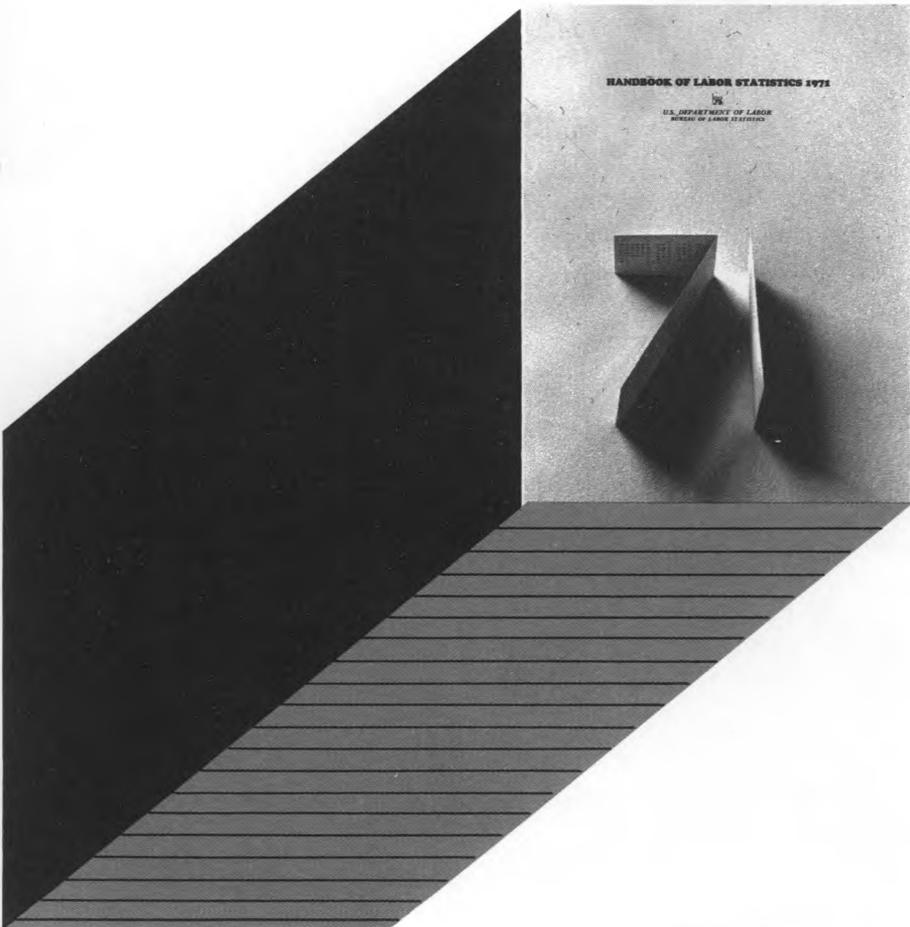
The indirect construction-related sectors are similar

to the ones identified in the discussion on the environmental model. Most of these sectors are somewhat higher in this model than in model II, but still lower than model I. In the defense-related sectors, one indirect sector, machine shop products, is noted. All other sectors are affected only marginally, if at all. The employment levels in the four defense-related sectors are 75,000 lower in the arms limitation model than in the other two models.

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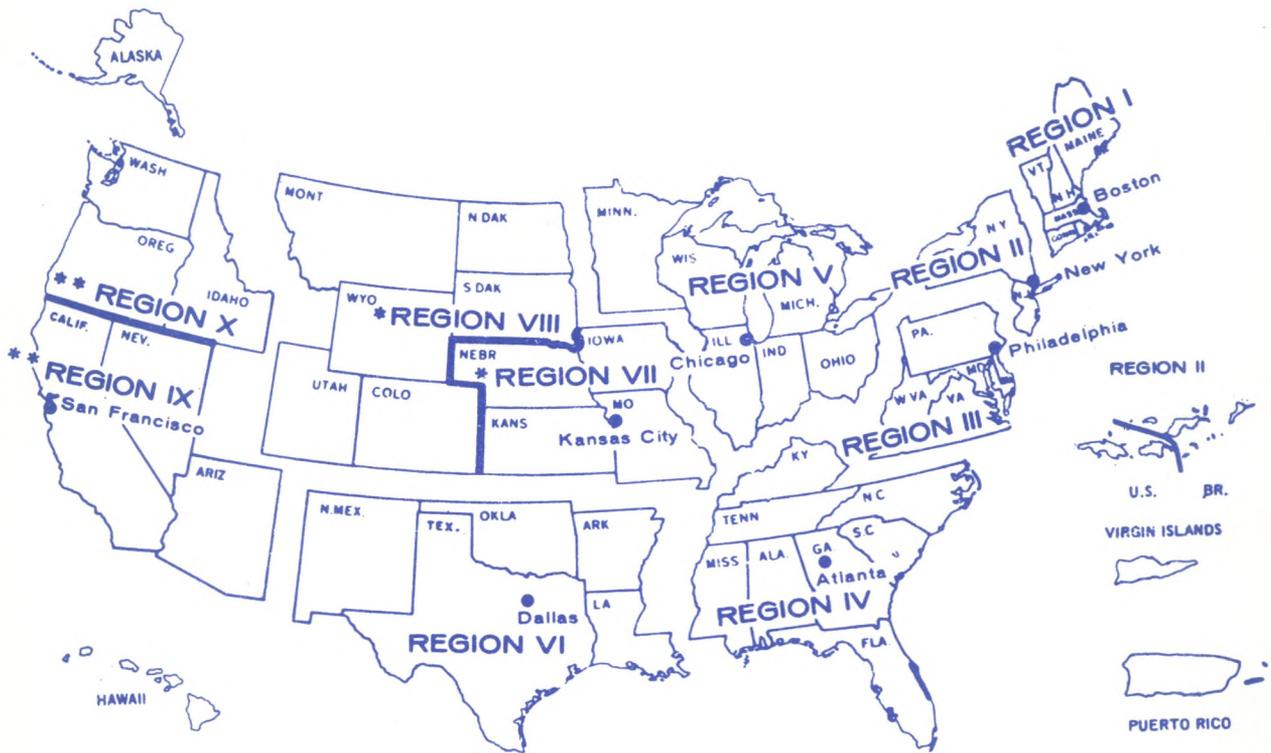


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