

Radio Markets After The War

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Introduction

THE INSTITUTE OF RADIO ENGINEERS desires to present this analysis: "Radio Markets After the War," with its compliments, to the membership of the Institute and to the interested executives of the radio industry. This publication is of a distinctly different type from the predominantly technical papers normally appearing in the PROCEEDINGS OF THE I. R. E. since it deals primarily with economic and commercial planning. It is accordingly thought appropriate rather to present it as an entirely separate publication of The Institute of Radio Engineers in a special field of thought and analysis.

In transmitting this material to the readers of its PROCEEDINGS and its other recipients, the Institute has several aims. It desires to stimulate early planning

toward the further expansion and success of the radio field and a widening of the service of that field to the public. It hopes to assist in the relatively prompt consideration of constructive plans for the radio industry. And it has in mind the urgent necessity for the creation of a vast demand for labor in the radio-and-electronic field directly after the war to the end that those who fought for a better world may in fact find open gates of employment and opportunity on their return, and that the great plant, laboratory, and equipment facilities created during the war shall be effectively utilized for the welfare of our society after hostilities cease. To these ends, The Institute of Radio Engineers presents the following analysis as one of its contributions to the radio-and-electronic field.

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Radio Markets after the War*

FOREWORD

THE following presentation deals with studies of hypothetical postwar radio markets developed by the staff of the United States Department of Commerce—not as predictions but solely as indications of possible trends provided certain clearly stated preliminary assumptions and extrapolations of previously derived relationships are first accepted and later found to be valid.

The steady progress of the United Nations toward ultimate victory naturally turns the minds of radio engineers and other radio-industry workers, at least occasionally and for limited periods, to the constructive direction of postwar planning. First and foremost comes—and will come—an all-out war effort. But in place of occasional relaxation or partially recuperative leisure, enthusiastic and hopeful radiomen will devote some moments to an endeavor to picture their field after victory is won.

To win the peace will inevitably require large-scale utilization of our manpower resources. Our steadily returning soldiers, as well as our vastly expanded industrial staffs at home, must find useful and profitable occupation after the war. Thus alone can large-scale unemployment be avoided, and thus only can national and world-wide prosperity and an accompanying measure of good will result from the comfort and wealth produced by expanded and newly created industries. The great war machine must be largely turned to the uses of peace, and as promptly and completely as possible. And the magnitude of this transformation may be gauged from the fact, stated by the Secretary of Commerce, Jesse H. Jones, that the Reconstruction Finance Corporation, through its subsidiary the Defense Plant Corporation alone, has authorized the erection of ninety-eight factories for the production of radio and allied scientific apparatus prior to October, 1943. These must be added to those already in operation prior to the war, and to those sponsored by the Army and Navy Departments and the Maritime Commission.

There are accordingly here placed before the readers of the PROCEEDINGS excerpts from certain recent publications¹⁻³ of the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce, prepared in the National Economics Unit by

* Decimal classification: R700. Original manuscript received by the Institute, June 17, 1943.

¹ S. Morris Livingston, "Markets after the War—An Approach to Their Analysis," Department of Commerce, Washington, D. C. March, 1943.

² Paul W. McCracken, "A Hypothetical Projection of Expenditures for Commodity Groups Based on Past Relationships to Gross National Product," Department of Commerce, Washington, D. C. May, 1943.

³ "Domestic Commerce," April 29, 1943 (including particularly "Appraising the Post-War Radio Market," by E. J. Detgen and Lawrence D. Batson of the Division of Industrial Economy).

S. Morris Livingston, Chief, and under his direction by Paul W. McCracken, and in the Specialties Unit of the Division of Industrial Economy by E. J. Detgen, Chief, and Lawrence D. Batson. Certain modifications of these publications have been made to bring the data up to date as of October, 1943. Appreciation is here expressed for the permission which has been granted The Institute of Radio Engineers to present this material as a publication, as well as for the counsel given by Mr. Livingston during its preparation.

These publications deal broadly with analyses of postwar markets in many and diverse fields. The excerpts here presented are primarily in the nature of either general explanations of the scope (and limitations) of these postwar studies, specific portions of these publications dealing in some detail with "radio apparatus and phonographs," or recommendations for more detailed and specialized studies by experts in the individual units of the radio industry. The excerpts are on occasion presented in somewhat abridged form. The original publications may be consulted for more complete information concerning many other fields.

As has been indicated above, the object of the publications is to stimulate commercial and engineering experts in the radio industry to use the methods of the analyses together with their own detailed knowledge in the preparation of their own industry plans and forecasts, and to help them to organize the activities of the industry and of their own companies in logical fashion and on an appropriate scale of operations. As Mr. Livingston has stated in a communication to the Editor: "We feel very strongly that those who are experts in each field should not accept the projections as given. . . . They should develop a real analysis of the market for their products if the volume of business should be substantially above the prewar level. This would necessarily take into consideration all of the war development and their effect on future markets. It would also depend to a large extent on the kind of radio which is produced after the war and the price for which it can be sold; on such potential developments as frequency modulation and television."

The Editor

I. MARKETS AFTER THE WAR

1. AN EXTRACT FROM THE INTRODUCTION, O. P. Hopkins, Acting Director, Bureau of Foreign and Domestic Commerce.

"Markets after the War" is designed to assist marketing analysts in setting their sights on a common goal of postwar opportunity for American business.

Starting with the now widely accepted proposition that a high level of highly productive employment must be maintained after the war, it seeks to answer three questions:

1. What would total business volume be if most of the people who will want to work after the war do have productive jobs?

2. How does the war affect the possibility of reaching that goal? What will be the magnitude of the accumulated demand for goods? How big a backlog of purchasing power in the form of extra savings? What obstacles must be overcome?

3. What opportunities would such a national market offer your business? Starting with an assumed total volume of business which may be far above the best prewar year, how can you determine the market potential for your products?

The answer to the third question is necessarily preliminary and incomplete. It provides the background and suggests possible methods of attacking the problem. A hypothetical breakdown of total output by commodity groups is given for a postwar year. Being based exclusively on past relationships, this gives only a crude picture of market potentials. In practice every market will be subject to a host of influences hardly hinted at here. Also the validity of every detail is dependent on attainment of the over-all national goal.

Even a casual reading of "Markets after the War" should suggest a great need for refinement of the picture given. The job of appraising postwar markets must of course fall primarily on those in industry who are directly concerned. It is hoped that those men in business who have the job of appraising markets will contribute their experience and technical knowledge to a clearer picture of the market opportunities.

2. A COMMON OBJECTIVE

The Need for Planning by Business

Looking beyond the immediate task of war production, business enterprise, both individually and as a whole, is confronted with no more pressing problem than that of laying plans for the period after the war.

The war is demonstrating the vast productive capacity of this country when the demand exists. The national output has reached a level which few people believed possible three years ago. Stimulated by war demands, a decade of technological development has been crowded into a few months, thus giving promise of further increases in efficiency when these developments are fully utilized for civilian production. There remains the job of distributing an output of civilian goods equal to present wartime production.

This job offers fascinating possibilities for the individual enterprise. The potentially large increase over the prewar volume of business, and the potential changes in products and markets as the result of the war, offer unusual opportunities for those who are prepared to take advantage of them.

Business as a whole must assume a large share of the responsibility of preparing for a high level of production and consumption after the war. The Federal Government now buys half the nation's output of goods

and services. Such public works planning as is now visualized will not account for more than a fraction of the gap when this large volume of war expenditures is no longer necessary.

There is much that the Federal Government can do to facilitate this planning by business, and to create a more favorable environment for the production of more goods for more people at less cost. In large part, however, the planning requires the aggregate effort of thousands of businessmen each of whom has a detailed knowledge of the problems and possibilities of a particular enterprise.⁴

This planning will be most successful if business will set its sights on a common goal of postwar opportunity.

The Goal: An Expanding Free-Enterprise Economy

From the national viewpoint this goal might be variously described. It should be an economy of opportunity as well as abundance. It should provide security, but in such a way as to strengthen the incentives to individual initiative and expand opportunities for business enterprise. Other characteristics might be included.

For our immediate purpose, however, the important points are first, that none of these things is possible unless business can provide productive jobs for the vast majority of those who will seek employment, and second, that in providing these jobs the volume of production would go so far above any prewar level that special methods are required to analyze its effect on the individual business.

We turned out more goods and services in 1940 than in any previous year. Yet of total available manpower (including only those civilians able and willing to work) only forty-six million were employed and nine million were unemployed. (This compares with one and one-half million unemployed at the end of 1942.) In addition to the unemployed millions of those employed were eking out an existence on submarginal farms and other equally unproductive jobs.

Fewer people, working shorter hours, produced substantially more goods and services in 1940 than in 1929. This was possible because of continued improvement in efficiency through the greater use of labor-saving devices and techniques. The large increase in available manpower resulting from population growth remained unemployed. The volume of business had not

⁴ This does not mean that you should depart from the profit motive in order to assume a social obligation to put people to work. Business is not an entity. It is an aggregate of individual firms no one of which can afford to get very far away from its own competitive problems.

The production and sale of a large volume of goods can only be accomplished if the purchasing power exists. Business as a whole can create this purchasing power by putting more people to work producing goods. The individual enterprise, however, can follow this policy only so long as it shows a profit.

This profit and the resulting financial strength of the enterprise are essential if we are to achieve a high level of productive employment. Since the good of the country as a whole and the financial success of the individual enterprise both point in the same direction there is a double incentive for making the most of the opportunities for making more profits by putting more people to work.

expanded in line with our capacity to produce and our desire to consume.

The Nation's Capacity for Production

The ultimate limit of productive capacity is determined by the number of persons willing to work and the potential output per person. There may be other more immediate limits. Even with an unlimited market the output may be restricted by lack of physical plant to employ all of these people at civilian production, or because the people who want jobs may be in the wrong places. Such possibilities cannot be ignored, but the total capacity of available manpower is still a very useful idea.

This capacity is continually growing. Between 1940 and 1946 another two and one-half million persons will have been added to the civilian labor force. This will result from the increase in population of working ages with allowance for other influences, notably the trend toward longer schooling and earlier retirement. It assumes that most of the women and other war workers who were not employed before the war will not seek employment after the war, and that there will be almost two million in the armed forces as against less than half a million before the war.

Assuming that two millions of unemployed is a practical minimum, the potential increase in civilian employment between 1940 and 1946 is almost ten million jobs.⁵

Of equal importance in measuring the capacity of the available manpower is a continuation of the past trend toward increased output per worker. This results partly from technological developments and partly from the shift out of less productive to more productive jobs.

Over the twelve years, 1929 to 1941, the nation's output per man-hour of employment increased 34 per cent. This was at the rate of $2\frac{1}{2}$ per cent per year compounded. There is ample evidence of about the same rate of gain during the preceding thirty years. It is likely to be accelerated rather than retarded by the war.

By combining the increase in the labor force with the increase in output per man-hour, and assuming that people will want to work about the same hours as in 1940, the potential capacity of the available man power in 1946 is almost 50 per cent greater than the total output in 1940. The dollar value of capacity output will depend on prices at that time. In 1940 prices the gross national product⁶ would be around 142 billion dollars as against 97 billion dollars in 1940. In 1942 prices it would be about 165 billion dollars. With a further increase in prices the dollar total could be still larger.

This capacity is being proved during the war. With

⁵ The 8.9 millions unemployed in 1940, plus the six-year increase of 3.9 millions in available manpower, minus 1.3 millions more in the armed forces, minus a practical minimum of 2.0 millions equals 9.5 million additional jobs.

⁶ This is the total cost of goods and services to the ultimate consumer, including producers' capital goods and government services. See page 4 for definition.

the employment of women and other additional war workers and increased hours of work just about offsetting the diversion of man power to the armed forces, the gross national product in the second quarter of 1943 was at the annual rate of 185 billion dollars, or 155 billion dollars in 1940 prices. The physical output of goods and services is already 50 per cent greater than in 1940 and before the end of the war the increase will be well over 50 per cent.

The 142 billion dollars in 1940 prices or 165 billion dollars in 1942 prices is a measure of the capacity of available man power after the war. It is not a forecast of the postwar volume of business. The optimum employment of 96 per cent of available manpower, leaving only two million out of work while changing jobs or for seasonal reasons, will be difficult to maintain. It was reached in 1929 and is being exceeded during the war but average performance over the last two decades has been well below this rate.

As the planning for your own business progresses, you will want to decide how close to capacity the nation can operate after the war. You will need to bear in mind not only the potential markets for such a large output but also the difficulty of overcoming the serious maladjustments left by the war. Both points are covered in the following pages.

It seems almost certain that postwar output must exceed the best prewar year. If it should be no more than in 1940 there would be the nine million who were unemployed in 1940 plus the two and one-half million added to the civilian labor force between 1940 and 1946 plus eight million who would be displaced by improvements in efficiency over the six years—a total of over nineteen million unemployed. Even with an average work week five hours shorter than in 1940 there would be more unemployed than the thirteen million in 1932.

Remember that this country is still experiencing a strong growth trend. Beyond 1946 the continued growth of available man power and its productivity can be expected to add to this capacity at the rate of perhaps 3 per cent or five billion dollars per year.

The Market for Capacity Production

The failure even to approach capacity production in the decade prior to the war was not due to any lack of human wants. The food consumption of the nation as a whole, both in quantity and quality, was drastically below that achieved by those who could afford to pay for what they wanted. The detailed information collected in the 1940 Census clearly indicates that much of the housing was inadequate. Large numbers of people went without such things as sheets and shoes which would be generally recognized as necessities. In the field of comforts and luxuries the contrast between wants and effective demand was even greater.

Even capacity production would not fill all of those wants. After taxes and a reasonable rate of savings it would leave an average of about seven hundred dollars

per year, at 1940 prices, for each man, woman and child to spend for goods and services. For many people falling below that average it would not provide what we have come to accept as an adequate standard of living.

Granting that human wants are inexhaustible, and that our ideas as to an adequate standard of living tend to grow faster than our ability to supply it, who who is going to pay for all this? Where is the money coming from? The market analyst must necessarily be concerned with *effective* demand—the willingness to buy a particular product and the purchasing power to complete the transaction. What reason is there to suppose that business can be more successful after the war in creating this effective demand for a high level of production?

The best reason is the impact of the war itself.

3. THE IMPACT OF THE WAR ON POSTWAR MARKETS

Historical Perspectives

A thumbnail sketch of developments during and after the first World War should provide a helpful perspective for appraising the effect of the present war on the postwar volume of business.

Stimulated by the demand for foodstuffs, raw materials, and munitions for the Allies, the value of our total output of goods and services almost doubled between 1914 and 1918. More than half of this expansion was merely an increase in price but there was a large gain in physical output. This gain in physical output was relatively less than we are experiencing during the present war.

There was less unused man power available in 1914 than in 1939. Such unemployment as did exist in 1914 had been largely eliminated by 1918 and women and other marginal workers, not normally part of the labor force, were taking the places of men who had gone into the Army.

The conversion to war production was less complete than in this war. There was a smaller expansion in new plant and equipment. There were about half as many men in the armed forces as are now estimated for the end of 1943. There was less drastic curtailment of non-essential industries.

Hence, the reconversion problem was less than it will be at the end of this war. There was a slight dip in business volume in the first half of 1919, but reconversion was largely completed and the returning soldiers were largely re-employed by midyear. The total output of goods and services for the full year was little, if any, below 1918.

The accumulated demand for goods and the accumulated savings were also relatively less important than they will be after this war. Nevertheless, the physical volume of production of consumers durable goods in either 1919 or 1920 was almost double the best year before the beginning of war in Europe. Expenditures

on producers' capital goods in these years were more than 50 per cent above the prewar level.

In spite of the comparatively large expansion of physical plant during the war there was surprisingly little overcapacity in the postwar period. For example, steel-ingot capacity was expanded from 44.5 million tons in 1914 to 61.0 million tons in 1919 and continued to grow to 65.4 million tons in 1922. There were some obvious exceptions to this generalization, notably shipbuilding, but since these specialized facilities were not convertible to other uses they did not detract from the demand for additional plant and equipment in other fields.

Price controls were less drastic and less effective than during this war. They were removed promptly at the end of the war. The price inflation during the following eighteen months was as great as during the eighteen months we were in the war. This facilitated the reconversion to peacetime production but it also led to the speculative collapse in 1920, a sharp deflation of prices, and a comparatively brief recession in business volume. By 1922 the physical volume of business was at a new peak following which the upward trend was not seriously interrupted until 1929.

Residential construction in 1919 was already above the prewar level, even when measured in terms of dwelling units rather than dollars. After a brief recession the upward trend was resumed. By 1925 the volume was double the best prewar year and there was no substantial curtailment of the housing boom until ten years after the war. The foundations for this boom seem to lie partly in the low level of construction during the war and partly in the high level of postwar national income which enabled people to spend more for housing. There was evidence of a housing shortage at the end of the war similar to that which is now developing. Population growth was a relatively more important influence than it is likely to be after this war, but the possibilities for replacement of existing structures were less favorable.

Private-capital outlays in some other fields, for example, the railroads, reached their postwar peak in 1923. This year might be labeled as the culmination of the immediate postwar boom arising from demands created by the war. The growth of the automobile industry and its satellites, plus a number of new and unforeseen industries such as radios, added to the continued high level of residential and related types of construction, go a long way toward explaining the continued upward trend in total production and the relatively high level of prosperity over the following six years. There is no means of determining to what extent these subsequent developments were the result of the forces of expansion generated in the earlier post-war period.

There is no reason to suppose that the exact pattern of events after the last war will be repeated. In several respects the impact of this war is greater. A larger part

of the nation's resources have been channeled into the war effort. The reconversion to civilian production offers more serious problems. The purchasing power of the national income will be greater relative to the best prewar year. Civilians are going without more things and are accumulating more savings to be spent after the war.

Similar difficulties beset any analogy to earlier wars. Nevertheless, there is room for the general observation that major wars usually have initiated rapid and extensive changes and that they usually have been followed by a substantial increase in national income and production over the prewar level.

A National Income Statement for American Business

To measure the impact of this war on postwar markets we need an over-all picture of American business.

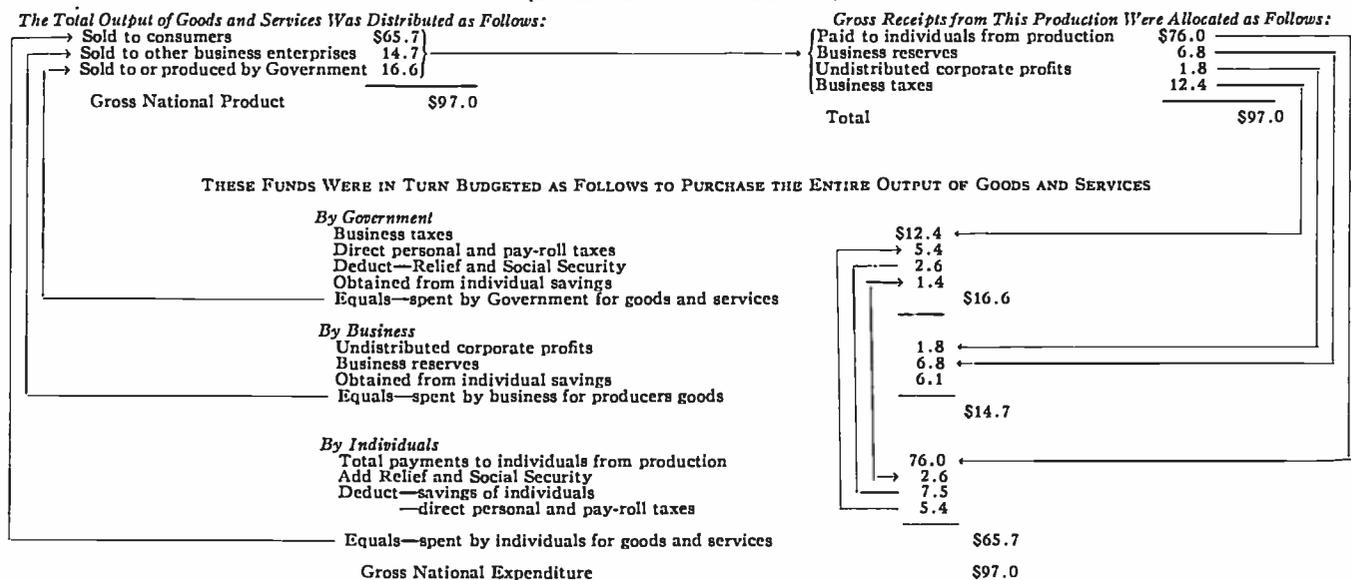
Like the corporate-income statement it is also limited to only approximate accuracy. While the sources of the data are entirely adequate to give a general picture of what has happened, the reader should not be disturbed by any subsequent minor revisions or refinements of the estimates for past years.

The gross national product is simply the gross sales of the "holding company" (except that it also includes the net change in business inventories). This term is less familiar than the net national income because current estimates of gross product were not available until last year, but it is more useful for many purposes. It is the total output of goods and services, excluding sales to another enterprise for further fabrication or resale, but including sales to another enterprise for capital investment.

The net national income is the amount paid to indi-

Fig. 1

THE CIRCULAR FLOW OF FUNDS BY WHICH PRODUCTION MAKES MARKETS (Billions of Dollars for the Year 1940)



No manager could grasp all of the problems and possibilities of a large business without a financial statement. Such a statement is even more necessary to an understanding of the national economy. Table I is a comparative national income statement for every year back to 1929. It treats the total production of goods and services by business and government as though it were one enterprise. It is analogous to the consolidated-income statement of a holding company whose subsidiaries would include all business enterprise and governmental units.

All income statements are expressions of opinion. Accountants disagree as to how certain items should be handled, and as to the adequacy of certain charges and adjustments. The businessman recognizes that accounting is not an exact science, but nevertheless he finds the resulting statement very useful. The national-income statement in Table I is subject to the same qualifications.

viduals for their contribution to the gross national product plus the undistributed corporate profits held for their account. It is simply the gross national product minus depreciation, other business reserves, and business taxes.

Production Makes Markets

From management's standpoint, sales make jobs. No firm can stay in business long if its output continually exceeds sales.

It is equally true that production makes markets. It provides jobs, income, and purchasing power.

The national-income statement shows this circular flow of funds by which the production of goods and services provides the purchasing power and, therefore, the markets to absorb those goods and services. This circular flow is shown for the year 1940 in Fig. 1. It is given in greater detail and for other years in Table I.

It is axiomatic that the gross national product must

TABLE I
A NATIONAL INCOME STATEMENT FOR AMERICAN BUSINESS
(in billions of dollars)

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
<i>The total output of goods and services was distributed as follows:</i>													
<i>Sold to consumers</i>													
Services	24.5	23.1	20.8	18.1	17.1	17.8	18.7	20.2	21.7	21.8	22.7	23.9	25.4
Nondurable and semidurable goods	36.4	33.7	27.1	20.7	21.9	25.1	27.8	32.2	33.2	30.7	32.6	34.4	40.0†
Durable goods ¹	9.9	8.1	6.3	4.2	3.4	4.8	5.7	6.7	7.6	6.0	6.4	7.4	9.1
	70.8	64.9	54.2	43.0	42.4	47.7	52.2	59.1	62.5	58.5	61.7	65.7	74.5†
<i>Sold to other business enterprises</i>													
Machinery and equipment	7.3	6.0	4.2	2.4	2.1	3.1	4.0	5.2	6.3	4.5	5.5	6.9	8.9
Private construction (including residential)	8.3	5.6	3.8	1.8	1.3	1.6	2.1	2.9	3.7	3.3	3.6	4.3	5.2
Net change in business inventories	1.6	-0.3	-2.0	-2.3	-0.7	-0.1	0.2	2.2	1.1	-1.3	0.9	1.8	3.5
Net exports	0.6	0.7	0.2	0.2	0.2	0.5	0.2	-0.1	0.1	1.1	0.8	1.4	0.9
Domestic output of monetary gold and silver	-0.2	0.1	0.2	0.1	0.4	0.2	0.2	-0.2	0.4	0.1	0.1	0.3	0.3
	17.6	12.1	6.4	2.2	3.3	5.3	6.7	10.0	11.6	7.7	10.9	14.7	18.8
<i>Sold to or produced by government</i>													
Nonwar public construction	2.4	2.8	2.6	1.8	1.2	1.5	1.5	2.2	2.1	2.1	2.4	2.1	2.0
Nonwar commodities and services	8.6	8.4	8.9	8.4	7.9	9.3	10.4	10.4	11.5	12.3	12.2	11.8	11.2
War outlays	*	*	*	*	*	*	*	*	*	*	1.4	2.7	12.5
	11.0	11.2	11.5	10.2	9.1	10.8	11.9	12.6	13.6	14.4	16.0	16.6†	25.7
Gross National Product	99.4	88.2	72.1	55.4	54.8	63.8	70.8	81.7	87.7	80.6	88.6	97.0	119.0
<i>Gross receipts from production were allocated as follows:</i>													
Net income of unincorporated business													
Farmers	5.2	3.8	2.4	1.5	2.2	2.7	4.1	4.4	5.1	4.0	4.3	4.4	6.2
Professional people and other self-employed	8.5	6.3	4.8	3.4	4.3	4.9	5.4	6.5	6.8	6.1	6.9	7.8	9.3
Compensation of employees	53.0	48.2	40.6	31.7	29.8	34.4	37.5	43.0	48.3	45.1	48.1	52.4	64.6
Interest and dividends	11.8	11.6	10.2	8.3	7.3	7.9	8.0	9.8	9.9	8.3	8.8	9.1	9.6
Net rents and royalties	3.6	2.9	2.3	1.5	1.5	1.7	2.0	2.1	2.2	2.2	2.3	2.3	2.6
Undistributed corporate profits	1.2	-3.9	-5.8	-6.4	-2.8	-2.1	-1.3	-0.9	-0.8	-1.5	0.4	1.8	3.3
Net national income	83.3	68.9	54.5	40.0	42.3	49.5	55.7	64.9	71.5	64.2	70.8	77.8	95.6
Depreciation, depletion, and other business reserves, including charges to current earnings on account of capital outlays and inventory revaluations	9.1	12.5	11.4	9.3	5.9	6.8	7.0	8.0	7.2	8.1	7.4 ²	6.8 ²	5.1 ²
Business taxes	7.0	6.8	6.2	6.1	6.6	7.5	8.1	8.8	9.0	8.3	10.4	12.4	18.3
Total	99.4	88.2	72.1	55.4	54.8	63.8	70.8	81.7	87.7	80.6	88.6	97.0	119.0
<i>These funds were in turn budgeted as follows to purchase the entire output of goods and services:</i>													
<i>By consumers</i>													
Net national income	83.3	68.9	54.5	40.0	42.3	49.5	55.7	64.9	71.5	64.2	70.8	77.8	95.6
Deduct:													
Undistributed corporate profits	1.2	-3.9	-5.8	-6.4	-2.8	-2.1	-1.3	-0.9	-0.8	-1.5	0.4	1.8	3.3
Pay-roll taxes	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6	1.7	1.9	2.0	2.1	2.6
Add:													
Relief, social security, and similar government payments	0.7	0.7	1.9	1.3	1.4	1.5	1.8	2.9	1.7	2.4	2.4	2.6	2.5
Total income payments to individuals	82.6	73.3	62.0	47.5	46.3	52.9	58.6	68.1	72.3	66.2	70.8	76.5	92.2
Deduct:													
Direct personal taxes	3.0	2.6	2.4	1.9	1.8	1.9	2.3	2.9	3.1	3.3	3.1	3.3	4.0
Disposable income	79.6	70.7	59.6	45.6	44.5	51.0	56.3	65.2	69.2	62.9	67.7	73.2	88.2
Savings of individuals (including unincorporated business)	8.8	5.8	5.4	2.6	2.1	3.3	4.1	6.1	6.7	4.4	6.0	7.5	13.7
Spent for goods and services	70.8	64.9	54.2	43.0	42.4	47.7	52.2	59.1	62.5	58.5	61.7	65.7	74.5

Radio Markets after the War

TABLE I—Continued

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
<i>By producers</i>													
Undistributed corporate profits	1.2	-3.9	-5.8	-6.4	-2.8	-2.1	-1.3	-0.9	-0.8	-1.5	0.4	1.8	3.3
Depreciation, depletion, and other business reserves, including charges to current earnings on account of capital outlays and inventory revaluation	9.1	12.5	11.4	9.3	5.9	6.8	7.0	8.0	7.2	8.1	7.4 ²	6.8 ²	5.1 ²
Obtained from individual savings	7.3	3.5	0.8		0.2	0.6	1.0	2.9	5.2	1.1	3.1	6.1	10.4
Deduct:													
Gross business savings not used by business				0.7									
Spent for goods and services	17.6	12.1	6.4	2.2	3.3	5.3	6.7	10.0	11.6	7.7	10.9	14.7	18.8
<i>By government</i>													
Business taxes	7.0	6.8	6.2	6.1	6.6	7.5	8.1	8.8	9.0	8.3	10.4	12.4	18.3
Direct personal taxes	3.0	2.6	2.4	1.9	1.8	1.9	2.3	2.9	3.1	3.3	3.1	3.3	4.0
Pay-roll taxes	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6	1.7	1.9	2.0	2.1	2.6
Deduct:													
Relief, social security, and similar government payments	0.7	0.7	1.9	1.3	1.4	1.5	1.8	2.9	1.7	2.4	2.4	2.6	2.5
Obtained from individual savings	1.5	2.3	4.6	3.3	1.9	2.7	3.1	3.2	1.5	3.3	2.9	1.4	3.3
Spent for goods and services	11.0	11.2	11.5	10.2	9.1	10.8	11.9	12.6	13.6	14.4	16.0	16.6	25.7
Gross National Expenditure	99.4	88.2	72.1	55.4	54.8	63.8	70.8	81.7	87.7	80.6	88.6	97.0	119.0
					<i>Output in Physical Terms</i>								
Gross National Output in 1940 prices ³	85.5	78.4	69.2	57.9	59.7	66.5	72.4	82.9	85.3	80.1	89.0	97.0	113.5
Federal Reserve Board Index of Industrial production (1935-1939=100)	110	91	75	58	69	75	87	103	113	89	108	123	156
Domestic Production of Steel Ingots and Castings ⁴	61.7	44.6	28.6	15.1	25.7	29.2	38.2	53.5	56.6	31.8	52.8	67.0	82.8
Production of Electric Energy ⁵	95.9	94.7	90.7	82.4	84.7	90.8	98.5	112.2	121.8	116.7	130.3	145.0	168.2
					<i>The Utilization of Available Man Power</i>								
Civilian Labor Force ⁶	49.3	49.9	50.4	50.9	51.4	51.9	52.4	53.0	53.5	54.1	54.6	54.9	54.4
Civilian Employed ⁶	46.4	44.2	41.0	37.3	37.5	39.9	41.2	43.2	44.9	42.9	44.2	46.0	48.8
Per Cent Employed	94.1	88.6	81.3	73.3	73.0	76.9	78.6	81.5	83.9	79.3	81.0	83.7	89.7

* Not listed separately until 1939.

† Due to rounding, this figure is one tenth of a billion lower than that given in the original source.

Source unless otherwise specified: National Income Unit, Bureau of Foreign and Domestic Commerce. Cf. Milton Gilbert and Robert B. Bangs, "Preliminary estimates of gross national product, 1929-41," *Survey of Current Business*, pp. 9-13, May, 1942; Milton Gilbert and Robert B. Bangs, "National income and the war effort—First half of 1942," *Survey of Current Business*, pp. 10-17, August, 1942; and Milton Gilbert and George Jaszi, "National income and national product in 1942," *Survey of Current Business*, March, 1943.

¹ Prior to 1939 this is total sales of finished durable consumers' goods without any deduction for government purchases. This overstatement is offset by a corresponding understatement of nondurable and semidurable goods. Beginning with 1940, estimates of net national income distributed to individuals plus undistributed corporate profits and all reserves and business taxes have exceeded corresponding estimates of gross national product by approximately one billion dollars. This discrepancy has been arbitrarily eliminated by deduction from the item "Depreciation, depletion, and other reserves, including charges to current earnings on account of capital outlays and inventory revaluation." Thus this item is probably too low.

² National Economics Unit, Bureau of Foreign and Domestic Commerce. Allowance for price changes was made by applying to each component of gross national product a relevant price index, but the B.L.S. cost of living index applied to the total gross national product will give for most of the period substantially similar results.

³ Millions of net tons. 1942 Supplement—*Survey of Current Business*, p. 139.

⁴ Billions of kilowatt hours. 1942 Supplement—*Survey of Current Business*, p. 111.

⁵ The earlier estimates of the labor force compiled by the American Federation of Labor have been adjusted to be comparable with the Monthly Report on the Labor Force which has been available since April, 1940, and which is now released by the Bureau of the Census. Since the A.F. of L. data make no allowance for the seasonal increase in the labor force, their yearly average is about 1.5 million below the Census report for the same year. This is the amount which was added to the A. F. of L. data. The A. F. of L. estimates show a greater increase over the ten years than that enumerated by the Decennial Census but this appears to be due, in part at least, to a change in the method of enumeration. Therefore no further correction was made.

Civilian employment data prior to 1940 are also A. F. of L. estimates adjusted to the Monthly Report on the Labor Force. Armed forces (included in A. F. of L. employment and labor force data) were deducted and an allowance was made for a downward bias of A. F. of L. data for the decade 1930 to 1940 relative to the Decennial Census.

Bureau of Foreign and Domestic Commerce

equal the gross national expenditure. All the goods and services produced must be purchased, if we include as "purchases" the net additions to business inventories. If we increase our gross national product, the gross receipts from the sales of this output, when paid out as wages, dividends, etc., or retained as business reserves, automatically provide the necessary increase in purchasing power to absorb the additional product.

This is subject to two important qualifications. Increased production creates purchasing power to absorb the additional output. It does not necessarily create the disposition to buy the specific things produced. Business must shoulder the responsibility of translating purchasing power into effective demand. This puts a premium on a thorough understanding of potential markets and on forceful accurate merchandising. It means that costs must be at levels where people can buy and quality improvements must be made to create a strong desire for new goods.

Also production will remain at a high level only if the circular flow is completed, only if the funds not spent for consumption goods are spent for or offset by investment expenditures. Thus in 1940 the net savings of individuals amounted to 7.5 billion dollars. Business expenditures for producers' goods exceeded depreciation, other reserves, and undistributed profits by 6.1 billion dollars. The other 1.4 billion dollars was made up by an equivalent amount of government expenditures. The drastic decline in total business volume from 1929 to 1932 was in large part a reflection of the decline in investment expenditures. Similarly the incomplete recovery through 1940 reflected the inadequate volume of such expenditures.

This problem of an adequate flow of investments will be important in maintaining a large output after the war. It is still true, however, that in large part the maintenance of a high level of production will provide the purchasing power to absorb that output.

The Latent Purchasing Power of High Incomes

One important effect of the war is that as it ends the nation will be experiencing a boom in terms of the national income and a depression in terms of what civilians have been able to buy with that money.

There will be all the pent-up desire of consumers to increase their purchases of consumption goods and services and their ownership of durable goods in line with a much higher level of income than they ever had in peacetime. If, as the result of long-range planning, business and government can successfully bridge the immediate reconversion period, so that this purchasing power will still be there when the goods start rolling off the assembly lines again, then there will be opened up enormous markets which did not exist before the war.

Consumers are not being given a chance to show what they would do with their greatly increased income because the commodities they would like to buy are not available in sufficient quantity. Even after

much higher taxes their disposable income in 1943 will be in the neighborhood of one hundred and twenty-six billion dollars as against 73.2 billion dollars in 1940. Allowing for the normal tendency to increase expenditures with an increase in disposable income, they would be spending in 1943 well over thirty billion dollars for services, almost sixty-five billion dollars for nondurable and semidurable goods, and more than fifteen billion dollars for durable goods. Largely because of shortages total consumer expenditures will be held to roughly two thirds of that amount, with the greatest cuts coming in the durable goods which are most competitive with war work.

Similarly the capital outlays by business, instead of increasing with the demands of a higher rate of production have been curtailed to a fraction of the pre-war level. Most of the normal replacements as well as the desired increases in capacity will necessarily be postponed until after the war. This is accentuated by a forced liquidation of business inventories beginning in the last half of 1942.

Some government nonwar expenditures are also being curtailed, particularly through the postponement of construction projects which are not essential to the war effort. At the same time the outlays for war are being stepped up to the point where they will absorb more than half of a greatly enlarged gross national product.

The national income statement summarizes what is happening. The actual curtailment in the volume of goods and services available to consumers is, of course, greater than is indicated by the dollar values because of price increases.

The Accumulated Demand for Goods

With the maintenance of a high level of production after the war, and the corresponding increase over pre-war consumers' incomes, there would be a more than proportionate increase in the demand for consumers' durable goods. This would result partly from the desire to reach a higher standard of living in terms of such things as more automobiles on the road and more electrical appliances in the home. There are also the existing automobiles and appliances which are wearing out and which cannot be replaced during the war.

To cite one example: there were 28.8 million passenger cars on the road at the end of 1941. If the war lasts for another eighteen months we shall not produce cars in any quantity before 1945. By that time the normal mortality would reduce this inventory to 20.8 million cars. By the end of another two years it would be only sixteen million. The other eight or thirteen million might not actually be scrapped because of the impossibility of getting replacements. Also they may be in slightly better condition because for the last two or three years of their life they will have been driven fewer miles than they would have been driven if there had been no war. On the other hand they will have

suffered because war shortages of man power and materials make adequate maintenance and repairs difficult. They will be candidates for replacement as soon as new cars are available.

Judging by past relationships the incomes which go with one hundred sixty-five billion dollars of gross national product (the estimated capacity of available man power in 1946 in 1942 prices) would create a demand for almost thirty-four million cars on the road in 1945. To build up to this level, at the same time taking care of current replacements, would require an output of over six million cars a year for about four years. This

TABLE II

	(Billions of dollars)			
	1940	1941	1942	1943
Consumers' services	23.9	25.4	27.5	29
Consumers' nondurable and semidurable goods	34.4	40.0	48.0	55
Consumers' durable goods	7.4	9.1	6.4	6
	65.7	74.5	81.9	90
Private capital outlays including net change in business inventories and net exports	14.7	18.8	8.0	-1
Government nonwar expenditures	13.9	13.2	12.6	12
Government war expenditures	2.7	12.5	49.1	87
Gross national product	97.0	119.0	151.6	188

equals the peak rate reached momentarily in April, 1937, including production for exports.

For other items of about the same durability the accumulated demand at the end of the war will be of the same order of magnitude. In semidurable goods it is likely to be satisfied more quickly. In housing the resulting boom might last a full decade.

Housing provides a particularly striking example of the leverage exerted by an increase in consumer purchasing power. It is significant because the relatively low volume of construction was the chief reason for the failure to achieve full recovery in the thirties.

In 1940 the average nonfarm household lived in a dwelling with a rental value of only twenty-seven dollars per month as against forty-three dollars ten years earlier. They could not afford anything better because the average income per household had declined in about the same proportion.

The net increase in nonfarm families was greater in the five years, 1936 to 1940, than in any five years during the height of the construction boom in the twenties. But most of this increase was concentrated in the low-income groups which could not afford new construction. The number of new dwellings constructed during the decade was considerably less than the increase in households and many of the new dwellings were of the cheapest sort. There was practically no replacement demand.

Given a continuation of the present average family income, which is commensurate with the effective utilization of available manpower after the war, the conditions of the past decade would be reversed. Sev-

eral million families would move up into an income class where they could afford new construction. Several million of the most unsatisfactory dwellings would have no market and would have to be replaced. On the other hand the demand for additional housing in those price classes where new construction can compete with existing structures would be considerably larger than the increase in population since 1940.

Since the cost of a dwelling is roughly ten times the annual rent or the equivalent current cost of ownership, and since typically a large part of this cost is borrowed, the necessary expenditures on new construction to meet this demand would be much larger than the increase in expenditures on housing out of current income. Thus in this important field the increase in the demand for goods would be considerably greater than the increase in consumer purchasing power. The same sort of leverage exists to a lesser extent in durable goods with a shorter life.

Accumulated Purchasing Power

To supplement the high incomes which will exist at the end of the war, and to offset deflationary tendencies as the result of reconversion difficulties, there is the enormous accumulation of savings forced by the war.

In 1942 individual consumers received in excess of twenty-five billion dollars more than they were able to spend. Of this total about three and one-half billion dollars was used to retire installment and other short-term consumer debt; about four billion dollars went into increased equity in insurance and in housing; about nine billion dollars was invested in government bonds; and roughly ten billion dollars was in the form of increased individual holdings of cash and commercial bank deposits.

In 1943 more than thirty-five billion dollars may be added to individual holdings of cash, bank deposits, government bonds, and other savings. This is possible even though direct personal taxes are between two and three times as large as those collected in 1942. Again the national income statement summarizes what is happening.

TABLE III

	(Billions of dollars)			
	1940	1941	1942	1943
Total income payments to individuals	76.5	92.2	115.5	142
Less: direct personal taxes	3.3	4.0	6.7	16
Disposable income	73.2	88.2	108.8	126
Less: spent for goods and services	65.7	74.6	81.9	90
Savings of individuals	7.5	13.7	26.9	36

The magnitude of these abnormal savings is indicated by comparison with the 7.5 billion dollars saved in 1940 and the even smaller amounts for earlier years. Prior to 1941 individual savings had never reached ten billion dollars per year. Even with present high

incomes they would normally be only a fraction of the amount indicated above.

The extent of the accumulated purchasing power at the end of the war will depend on the length of the war and on Federal fiscal policies which have not yet been determined. If the war should last through 1944, the total savings for three years might exceed one hundred billion dollars as against a normal tendency to save no more than half that amount.

This total includes a number of items of varying importance as reservoirs of purchasing power. Included is the liquidation of consumer installment and other short-term debt which would make possible an expansion of about ten billion dollars in such debt after the war. Many of the people who are buying war bonds because of patriotism or other compulsion will not wish to hold them until maturity. Part of the large increase in individual holdings of currency and bank deposits represent a natural tendency to carry a larger cash balance commensurate with a higher income, but much of it is money which the holder does not want to save and would like to spend if the desired goods were available.

The amount of accumulated savings which might be spent after the war defies even approximate measurement. This is particularly true since the spending of war savings after the war will depend to some extent on the attractiveness of the goods offered for sale. If the war lasts until the end of 1944, it will be of the order of magnitude of forty to sixty billion dollars.

Since the production of goods and services after the war will in large part create its own market, this accumulation of purchasing power should be more than ample to assure an aggregate demand for all the goods the available manpower can produce. In fact it suggests that the problem after the war may be to control a boom rather than prevent a depression.

This assumes reasonably effective control over prices during the war. To the extent that this purchasing power is used to pay higher prices for the same volume of goods during the war, it will be a less important factor in the postwar period.

The Capital-Goods Market

The outlays for manufacturing plant and equipment in 1941 and 1942 were nearly as large as the total of the preceding ten years. The net addition, in excess of depreciation charges, was greater than for the preceding twenty years. Where does this leave the important capital-goods market? Have we built most of the new facilities we shall need for the decade following the war?

To answer these questions, and to avoid having our perspective distorted by particular situations, we need a picture of the whole capital-goods market.

In the four years, 1937 to 1940, an average of between seven and eight billion dollars per year was spent on producers' plant and equipment. In round numbers this was broken down as follows:

Manufacturing and mining	2.5
Public utilities	1.5
Agriculture	1.0
Trade, services, and miscellaneous	2.5

Of the total for manufacturing and mining over half was taken by industries whose outlays in the aggregate have been curtailed rather than expanded by the war. These include food and kindred products, textiles, apparel and related products, lumber and lumber products, pulp, paper and allied products, printing, publishing and allied products, stone, clay and glass products, oil-well drilling, and a number of industries.

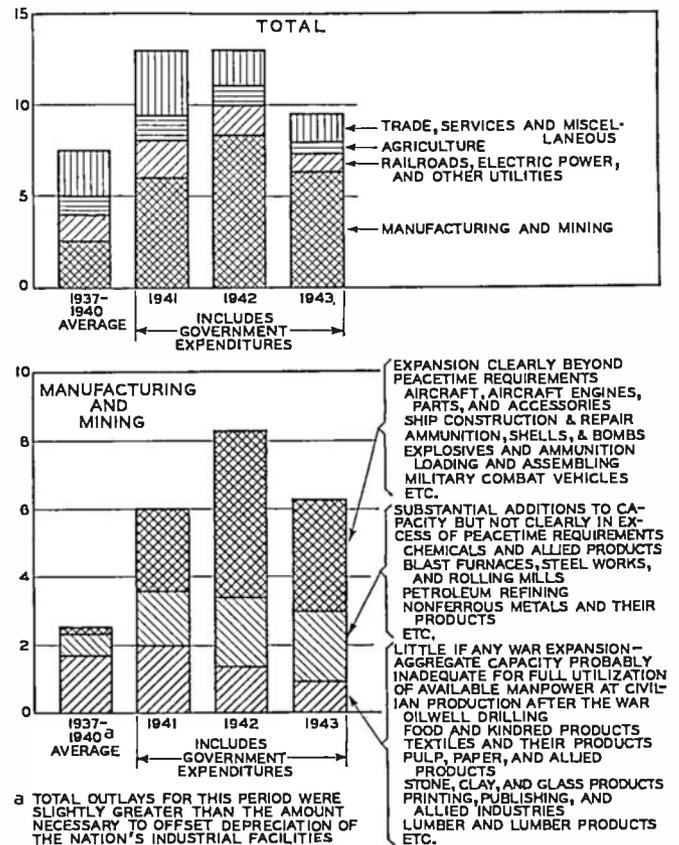


Fig. 2—Annual outlays.

To cite one example: the biggest single item in the prewar total of two and one-half billion dollars per year for manufacturing and mining plant and equipment was between five hundred and six hundred million dollars for oil and gas-well drilling. In 1942 the number of wells drilled declined to less than two thirds of the prewar rate. New oil reserves, according to preliminary figures, amounted to only one quarter of the oil consumed.

Throughout the nonwar industries the normal replacement of capital goods has been postponed wherever possible. No attempt has been made to expand capacity for a civilian output considerably in excess

of the prewar level. Where increased output has been necessary it has been achieved by overtime and multiple-shift operations. There is no reason to suppose that these emergency measures will be any more popular or more practical after the war than they were before.

Much of the expansion has occurred in rather specialized war industries where conversion to civilian production will be difficult if not impossible. Shipways are of comparatively little use for any other purpose. The same is true of the explosive and shell-loading plants. While airplane plants offer possibilities for conversion some of the buildings are not advantageously located for civilian production and much of the equipment is special-purpose machinery. Synthetic rubber is a new industry which in large part does not detract from the market for producers' goods in other fields.

The public utilities present a somewhat similar picture. The capital outlays which the railroads are allowed to make are only moderately above the prewar rate and much less than they would like to spend. Given anywhere near present volume of business after the war, they will have both the need and the resources for large outlays. New power plants have been built to supply aluminum, magnesium and other war plants but the normal replacement and expansion of facilities to supply the civilian population has been postponed wherever possible. Because many consuming plants are being operated twenty-four hours a day the ratio of electric power output to installed capacity is greater than will be maintained in peacetime. The communications companies are turning away business they cannot handle.

The farmers are also being restricted in their purchases of new equipment. Given a high level of productive employment after the war, there will be a demand for more farm products and there will be more farm income pay for labor-saving machinery.

Retail and wholesale trade, the professions, and the broad group of service industries together make up a large market for plant and equipment. In general they are also being restricted in their purchases of capital goods.

In summary, it should be remembered that prewar facilities were inadequate for the productive employment of the then available manpower, to say nothing of the further growth of the labor force. The present total output of goods and services, which is approximately equal to the estimated capacity of available manpower after the war, is possible only because of the enormous outlays for new plant and equipment in war industries in the last two years.

Aside from the difficulty of converting many war plants to civilian use, there are other reasons why this expansion will not be adequate to turn out the same volume in civilian goods. In general, the physical plant of the country has been operated at considerably more than the optimum rate which would prevail if business were free to reduce costs by adding to capacity.

There are a number of potentially difficult situations for particular lines of business. One example is the market for general-purpose machine tools. In the aggregate, however, a high level of peacetime output will require large outlays for capital goods.

Of the other items of producers' capital goods, the enormous potential market for residential construction has already been discussed.

Inventories will also be important. Since the middle of 1942 the value of total business inventories, including goods in process for government account, has been declining. With the further liquidation of retail and wholesale inventories of civilian goods which are no longer being produced, there will be a substantial vacuum to be filled before these goods can be made available to consumers after the war.

In the international sphere there is general agreement among experts that the demand for goods will exceed the supply for several years after the war. Granting the difficult problem of how other countries are going to pay for our exports, this can be an important market.

Even in the field of government expenditures a backlog of demand is being built up through the forced curtailment of sound public-works projects. This curtailment has applied to the maintenance of existing highways and other structures as well as new construction. In addition, plans are being made to supplement private outlays by government outlays if that is necessary to maintain maximum employment.

A Business Reserve of Purchasing Power

Business enterprise is in the aggregate also accumulating a reserve of purchasing power to match the postponed expenditures for plant and equipment. Normally business spends somewhat more than its gross savings (undistributed profits, plus depreciation and other reserves). The balance is obtained directly or indirectly from individual savings. In 1942 however, these expenditures for producers goods were less than the gross savings, and in 1943 business will be able to spend only a small fraction of its reserves. Again, the national-income statement summarizes what is happening.

Some of the "unused" business savings or an equivalent amount from other sources will be needed for additional working capital commensurate with a high volume of business. Part of these reserves should be available for the job of reconversion from war to peace production.

This does not answer the question whether these reserves are adequate for the reconversion job. That question cannot be answered intelligently until business has a clearer picture of what is involved in the reconversion. Also, it cannot be answered by an aggregate total which does not relate resources to requirements of particular industries or enterprises. It seems probable, however, that they are not adequate

TABLE IV

	(Billions of dollars)			
	1940	1941	1942	1943
Spent by business enterprise				
Machinery and equipment	6.9	8.9	5.1	2.1
Private construction (including residential)	4.3	5.2	3.0	1.3
Net change in business inventories	1.8	3.5	-0.6	-3.0
Net exports and net change in monetary stock ¹	1.7	1.2	0.5	-1.4
Total	14.7	18.8	8.0	-1.0
Undistributed corporate profits				
Depreciation, depletion, and other business reserves, including charges against current earnings on account of capital outlays and inventory revaluation	6.8	5.1	7.6	13.0
Total	8.6	8.4	11.2	18.0
Net obtained from other sources ²	6.1	10.4	—	—
Net unused business savings (including reserves)	—	—	3.2	19.0
Total required for expenditures on producers' goods	14.7	18.8	8.0	-1.0

¹ Part of which was paid for by government purchases of gold and silver.

² Including some borrowing by individuals for residential construction.

to finance all of the purchases of war plants and financing of new plants which may be necessary.

4. THE RECONVERSION PROBLEM

Potential versus Effective Demand

Granting that a high level of production after the war will go a long way toward creating the markets for this production; granting that the accumulated demand for both producers' and consumers' goods at the end of the war and the accumulated purchasing power with which to pay for them will tend to support a high level of business activity for at least several years after the war; granting the pressure of public opinion and the intentions of government officials to do whatever is necessary to prevent widespread unemployment; there is still no positive assurance that peacetime production will even approach capacity. All that has been said in the preceding pages needs to be qualified in two very important respects.

In the first place, there is nothing automatic or inevitable about this postwar market. The market potential that goes with high income, deferred demand, and accumulated purchasing power needs to be translated into effective demand for particular goods or services.

A peacetime level of production which approaches the capacity of available man power after the war means a substantial increase over prewar standards of living. To reach this higher standard of living, consumers must be persuaded to buy more things than they have ever had before.

Granting that human wants are inexhaustible there is also inertia to change. Even before the war there were notorious examples of consumer groups who showed a distressing preference for part-time employment rather than the more adequate food, clothing, and housing which could be brought with a full pay envelope.

This is a challenge to business enterprise. Can the whole gamut of goods and services be made so attrac-

tive and can they be sold so effectively that the consumer will be willing to work about the same number of hours as in 1940 (an average of 38.1 per week in manufacturing) to obtain them? This calls for better market analysis, more sales research, more imagination and ingenuity in developing new products or new markets for old ones, and more strenuous efforts to improve promotion and distribution methods.

This increase in living standards does not mean a uniform increase over the prewar volume of production, with the same products sold through the same distribution channels to the same income groups. Entirely aside from new technological developments, the mere fact of such a large increase in consumer purchasing power means that the potential market will be different from prewar conditions in many other respects than mere size.

There is real danger that business will underestimate these changes and thereby miss vital opportunities to translate the potential into an effective demand for goods or services.

The Danger of Simultaneous Boom and Depression

The second qualification lies in the process of conversion from war to peace production. The maladjustments brought about by the war may leave business unprepared to produce in adequate quantity those goods which consumers will want. Thus certain industries and communities may have a demand for more than they can produce for several years after the war while other industries and communities have a large volume of unemployment.

This combination of postwar boom and depression is a serious threat. It can only be avoided by careful planning which goes far beyond the mere reconstruction of an assembly line, difficult as that may be. This can be demonstrated by dividing business up into three segments according to the type of reconversion necessary.

About 80 per cent of all the civilians now employed are still engaged in the production and distribution of essential civilian goods and services, or in war production which is so similar to prewar civilian output both in volume and type that no serious plant-reconversion problem is created. This includes agriculture, the utilities, most retail and wholesale trade, a broad group of service industries, and a large part of manufacturing covering such items as food, clothing, fuel, steel, lumber, and cement.

While these industries do not offer any serious problem of plant reconversion, they do face reconversion problems with regard to markets and general organization. The attempt to reach a postwar volume of business substantially above the best prewar year will encounter maladjustments which could seriously impede the full use of available manpower. A high level of postwar output will require additions to plant capacity at some points and as yet there is no clear picture of these requirements. There will also be some

displacement of marginal workers by men returning from the armed forces or from war industries.

Something less than 10 per cent of total civilian man power is engaged in industries which are largely or wholly converted from civilian to war production. If we include those industries which have been partially or wholly curtailed as the result of the war a full 10 per cent of the economy is in this category. It includes such industries as automobiles, refrigerators, and office equipment. This group faces all of the engineering problems involved in resuming production of civilian goods plus the marketing problems connected with the rebuilding of a sales organization.

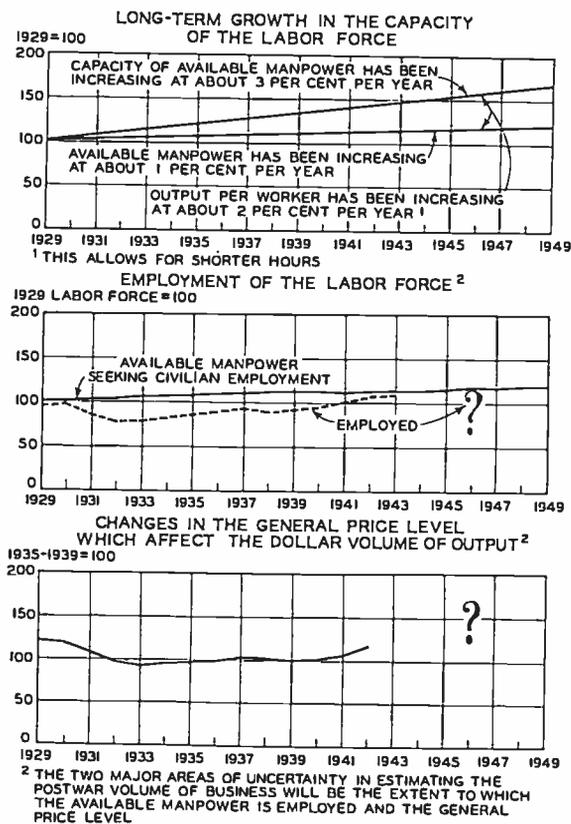


Fig. 3

In addition, these industries share with the first group the question of how they can make the most of a greatly expanded consumer purchasing power. There are also the effects of possible war-born improvements in the product or its competition and of possible changes in distribution methods or price policy. It is already clear that the postwar period is going to be one of increased competition with many concerns reaching out of their established lines of business to fight for a share of other markets.

The remaining 10 per cent of the nation's business contains the most serious reconversion problems. It is typified by the airplane and shipbuilding companies but is not limited to these industries. The output of a number of commodities has been expanded so greatly for war purposes that there is no reasonable possibility of finding peacetime markets for more than a fraction

of present production in the same or a closely related line of business.

If these companies are to maintain a large part of their present organization, their present volume of business, and the place they have achieved in our economy, they must be prepared to go into fields which are relatively foreign to their present operations. The difficulties in the way of such a move are very great.

There is a natural tendency to seek those lines in which they can make the most effective use of demonstrated technical engineering and production skills. Frequently, however, this involves distribution through unfamiliar channels to a completely different type of market. It may also mean breaking into a field where the established concern has an enormous advantage because of existing dealer organization and the ability to distribute promotion and other overhead costs over a large volume.

These difficulties are not insoluble. They will, however, require the best brains that the management of these concerns can concentrate on the problems. To the extent that they are solved and the necessary plans formulated before the end of the war, the danger of postwar depression in those areas will be alleviated.

To the extent that there is unemployment because of bottlenecks in physical plant, because the marketing, engineering, and organization problems of conversion to peacetime output have not been solved, the purchasing power and the market created by full production will no longer exist. This is a challenge to business ingenuity.

5. MARKET ANALYSIS FOR THE POSTWAR PERIOD

The Basis for Planning

We have calculated that if the civilian-labor force which will be available after the war is effectively used, with unemployment held to a practical minimum and with 1940 hours of work, the country has demonstrated a capacity to produce almost fifty per cent more than the best prewar year; one hundred and forty-two billion dollars of goods and services in 1940 prices as against an output of ninety-seven billion dollars in 1940, proportionately more in dollars if the general price level is higher.

We have analyzed the conditions which will make a high output after the war a reasonable possibility: the purchasing power of a high income and its leverage on the demand for durable goods, the accumulated demand for goods and the accumulated savings as the result of the war, the needed investment in expansion of civilian-goods industries to reach this high output.

We have appraised the serious difficulties to be encountered in even approaching this goal: the need to translate purchasing power into effective demand for the things industry is prepared to produce, the danger in the serious maladjustments which will be left by the war, the importance of thinking these problems

TABLE V
GROSS FLOW OF SERVICES, FINISHED COMMODITIES, AND NEW CONSTRUCTION
(Unit: One million dollars)

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
CONSUMERS' GOODS AND SERVICES													
<i>Services¹</i>													
1. Housing, (rent, depreciation on owned homes, etc.).....	8,928.0	*	*	*	6,924.0	*	7,001.0	7,227.0	7,608.0	7,886.0	8,031.0	8,232.0	8,574.0
2. Home maintenance (domestic service, storage, insurance, repairs, etc.)	1,663.0	*	*	*	760.0	*	1,056.0	1,225.0	1,430.0	1,362.0	1,397.0	1,512.0	1,548.0
3. Household utilities	1,920.0	*	*	*	1,807.0	*	1,880.0	1,959.0	2,035.0	2,102.0	2,187.0	2,324.0	2,444.0
4. Personal care	1,931.0	*	*	*	992.0	*	1,209.0	1,360.0	1,489.0	1,470.0	1,472.0	1,559.0	1,772.0
5. Transportation	3,306.0	*	*	*	1,745.0	*	2,003.0	2,266.0	2,427.0	2,293.0	2,394.0	2,352.0	2,589.0
6. Medical care and death expenses	2,784.0	*	*	*	0,812.0	*	2,089.0	2,313.0	2,456.0	2,454.0	2,572.0	2,766.0	3,014.0
7. Recreation	1,597.0	*	*	*	1,033.0	*	1,210.0	1,361.0	1,511.0	1,509.0	1,531.0	1,773.0	1,948.0
8. Other	2,417.0	*	*	*	1,986.0	*	2,268.0	2,513.0	2,743.0	2,733.0	2,809.0	3,024.0	3,319.0
Total	24,546.0	*	*	*	17,059.0	*	18,716.0	20,224.0	21,699.0	21,809.0	22,393.0	23,542.0	25,208.0
<i>Perishable Goods²</i>													
1. Food	20,605.0	19,164.7	16,219.5	12,774.7	13,079.8	15,798.5	17,061.9	19,024.1	20,090.4	19,137.7	19,736.1	20,929.9	25,190.0
2. Cigars, cigarettes, tobacco, and smoking supplies	2,114.4	1,934.1	1,993.9	1,643.1	1,474.6	1,584.1	1,571.1	1,780.3	1,860.5	1,828.9	1,879.2	1,993.3	2,270.0
3. Drug preparations and household medical supplies	676.6	684.4	624.2	545.0	502.7	602.9	569.1	630.7	674.2	670.2	760.7	803.5	960.0
4. Toilet preparations	495.0	492.3	465.5	394.1	326.0	389.8	365.6	384.4	405.6	409.9	483.7	508.1	570.0
5. Cleaning and polishing preparations	299.1	301.4	271.2	208.1	206.7	229.7	237.0	278.6	320.5	353.7	369.8	355.1	400.0
6. Magazines, newspapers, and other printed matter	552.2	530.9	516.4	453.5	441.4	474.9	482.1	492.3	541.3	521.5	588.5	616.7	640.0
7. Stationery and writing supplies	279.0	283.6	249.8	172.0	148.7	173.3	192.7	214.0	235.6	222.4	256.3	279.5	330.0
8. Miscellaneous household paper products	233.3	228.2	186.7	133.6	136.5	162.1	181.2	207.7	233.6	237.1	254.0	274.1	320.0
9. Toys, games, sport supplies	191.4	173.1	154.7	122.8	106.1	121.8	119.6	137.7	151.5	154.4	171.0	191.3	230.0
10. Manufactured household illuminating and heating products	254.0	253.9	261.3	311.9	257.2	366.8	402.8	523.5	500.9	522.3	555.5	669.4	770.0
11. Nonmanufactured household fuels	1,103.6	1,040.5	868.2	718.6	715.9	840.1	764.3	789.6	749.2	665.0	707.0	791.6	930.0
12. Fuels for passenger cars	1,184.8	1,049.5	943.4	866.9	796.9	899.3	920.0	1,003.1	1,113.3	1,161.0	1,158.4	1,210.5	1,400.0
Total	27,988.4	26,136.6	22,754.8	18,344.0	18,192.5	21,643.3	22,867.4	25,466.0	26,876.6	25,884.1	26,920.2	28,623.0	34,010.0
<i>Semidurable Goods²</i>													
1. Clothing and accessories	6,893.8	6,277.1	5,195.5	3,763.4	3,533.4	4,192.4	4,605.2	5,129.3	5,217.5	4,845.6	5,403.8	5,697.8	7,080.0
2. Shoes and other footwear	1,710.5	1,509.0	1,210.7	995.3	972.0	1,095.8	1,067.2	1,157.9	1,272.5	1,186.5	1,220.0	1,222.6	1,540.0
3. Personal furnishings	245.2	232.2	173.3	118.3	101.1	123.6	154.2	184.1	195.0	181.4	201.8	211.3	250.0
4. Dry goods and notions	885.6	771.0	624.1	436.7	450.8	486.3	523.5	563.5	606.6	513.1	525.6	551.9	630.0
5. Semidurable house furnishings	655.0	526.4	490.0	367.8	361.4	481.0	575.6	661.7	736.0	815.7	815.7	878.5	1,080.0
6. Replacement tires and tubes	511.1	418.6	370.7	294.9	217.1	239.3	239.0	233.4	245.2	261.1	299.5	268.5	310.0
7. Passenger-car replacement parts and accessories	265.9	284.0	307.9	258.9	235.1	298.8	373.3	427.0	469.5	365.1	391.9	462.5	550.0
Total	11,167.1	10,018.3	8,372.2	6,235.3	5,873.9	6,917.2	7,502.0	8,356.9	8,794.0	8,088.8	8,858.3	9,293.1	11,440.0
<i>Durable Goods²</i>													
1. Household furniture	1,070.3	912.0	702.7	487.7	312.5	524.9	559.9	716.2	834.3	720.0	799.0	870.9	1,070.0
2. Floor coverings	554.8	389.4	334.4	231.9	139.6	292.0	263.3	321.8	381.8	318.0	359.3	384.7	470.0
3. Miscellaneous durable house furnishings	879.2	770.7	682.6	488.8	360.0	436.7	474.5	579.3	619.1	620.5	794.0	886.1	1,090.0
4. Heating and cooking apparatus	364.7	332.3	245.3	160.2	143.3	205.8	262.1	337.5	371.9	297.0	344.5	433.7	650.0
5. Refrigerators, washing machines, and sewing machines	376.5	340.3	293.8	194.6	234.5	292.3	325.8	394.2	491.7	344.3	381.3	460.4	640.0
6. Electrical household appliances	138.5	135.3	121.1	79.1	67.3	104.3	130.2	159.2	175.6	169.8	194.7	217.0	260.0
7. Other household appliances	22.6	22.2	18.4	12.7	10.3	13.3	14.1	15.7	18.8	20.7	22.5	25.7	30.0
8. China, glassware, tableware, and household utensils	591.2	487.2	505.2	430.4	306.8	445.3	428.5	520.2	513.0	463.2	542.5	564.5	800.0
9. Radio apparatus and phonographs	878.1	813.4	475.5	225.4	184.9	236.5	282.4	358.7	366.5	310.4	377.8	415.6	500.0
10. Pianos and organs	78.5	56.5	35.7	20.7	14.2	18.7	24.1	32.4	40.6	37.7	41.7	47.0	60.0
11. Other musical instruments	32.9	28.5	21.9	15.4	11.6	16.5	25.1	26.8	28.3	25.9	28.7	28.7	35.0
12. Clocks and watches	187.0	176.2	133.3	90.2	65.8	96.4	100.5	127.4	184.9	151.9	178.2	205.1	270.0
13. Jewelry and sterling silverware	518.8	471.3	335.7	250.7	162.6	212.0	232.5	214.2	245.5	263.2	292.0	336.0	440.0
14. Books and other durable printed matter	426.4	368.3	336.5	243.6	196.2	239.4	249.8	285.7	304.1	287.0	311.9	327.8	410.0
15. Writing equipment	104.5	90.5	72.5	50.6	39.8	39.6	48.5	54.6	57.0	52.9	52.9	52.6	70.0
16. Ophthalmic products, surgical and orthopedic appliances	148.5	164.9	123.5	97.0	108.1	133.1	134.3	140.7	159.8	149.2	175.8	181.1	220.0
17. Monuments and tombstones	127.1	120.4	98.0	70.9	52.5	60.7	62.6	67.3	72.1	63.7	61.0	61.9	65.0
18. Luggage	116.9	92.9	58.3	38.9	29.9	26.3	30.3	47.1	58.8	53.4	49.4	52.7	80.0
19. Wheel goods, durable toys, and sports equipment	276.4	254.3	225.1	172.8	142.9	172.1	189.2	217.5	259.9	271.7	298.5	337.6	390.0
20. Passenger cars	2,953.5	2,089.2	1,490.9	828.8	840.8	1,239.9	1,804.0	2,114.4	2,364.2	1,418.4	1,810.4	2,382.5	2,750.0
21. Pleasure craft	16.6	11.5	9.7	4.2	2.4	3.7	5.2	7.0	9.0	5.5	5.9	6.3	10.0
Total	9,863.0	8,127.3	6,320.1	4,194.6	3,426.0	4,809.5	5,646.9	6,737.9	7,556.9	6,044.4	7,122.0	8,277.9	10,310.0

TABLE V—Continued

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
PRODUCERS' GOODS²													
<i>Equipment</i>													
1. Factory machinery	598.3	448.2	345.7	207.0	214.6	282.2	353.4	450.1	523.0	362.3	415.4	531.0	850.0
2. Mining machinery	110.0	75.6	32.0	21.7	24.9	41.7	60.9	98.7	114.8	69.3	81.0	92.6	160.0
3. Construction machinery	166.3	134.4	96.0	42.9	29.3	46.8	63.6	100.0	125.4	94.7	109.9	136.9	220.0
4. General and miscellaneous machinery and equipment	969.9	813.1	539.0	293.2	274.1	387.6	504.8	642.8	769.8	517.9	595.6	891.3 ⁵	2,120.0 ⁵
5. Engines and turbines	68.1	56.3	35.9	16.4	13.7	22.6	31.0	43.1	52.7	35.3	41.5	77.9	180.0
6. Pumps and pumping equipment	199.0	176.0	132.3	74.4	51.5	62.5	82.3	122.2	157.5	135.8	145.4	185.3	260.0
7. Machine tools and accessories	388.7	220.5	136.6	64.1	76.3	121.3	192.6	282.3	355.7	213.2	288.8	507.4	920.0
8. Electrical apparatus and equipment	613.7	514.9	396.0	185.5	131.5	198.7	269.6	344.5	481.6	353.1	433.6	575.9	1,000.0
9. Farm machinery and equipment	271.2	232.6	184.4	98.8	51.9	89.0	148.5	194.5	244.3	239.1	220.1	254.4	330.0
10. Tractors	210.2	199.1	122.2	60.3	44.4	84.2	148.0	219.7	272.2	215.0	222.7	279.5	390.0
11. Office machinery	166.6	123.7	89.3	62.6	60.7	93.5	108.6	129.5	162.9	151.8	149.8	163.3	250.0
12. Nonresidential furniture and equipment	409.8	338.5	267.7	148.8	108.8	154.6	173.9	204.0	263.1	220.3	247.6	328.7	540.0
13. Durable containers	191.7	176.0	123.3	94.4	100.3	123.7	127.5	140.2	176.8	134.2	142.4	158.3	220.0
14. Professional and scientific equipment	111.6	99.9	76.9	48.6	37.9	48.2	66.9	77.3	101.3	91.8	116.8	149.6	270.0
15. Tools	193.0	160.6	118.9	83.3	73.3	103.9	118.2	137.6	164.1	141.5	152.1	185.3	330.0
16. All other subsidiary durable equipment	386.2	327.3	246.0	177.7	174.3	206.6	234.0	267.0	287.9	249.8	294.1	355.9	580.0
17. Wagons and carts	9.7	7.2	5.2	3.3	3.7	7.0	6.9	7.4	7.0	3.8	1.5	2.6	5.0
18. Business motor vehicles	1,729.5	1,354.0	1,003.0	558.5	542.4	818.2	1,103.7	1,304.1	1,425.8	930.5	1,177.8	1,548.3	2,270.0
19. Motorcycles	7.4	7.2	6.1	3.5	2.4	3.5	4.5	5.6	7.4	6.1	8.0	10.4	15.0
20. Locomotives and railroad cars	360.7	364.9	95.6	44.6	21.6	99.9	116.0	188.2	363.8	143.4	166.6	306.7	410.0
21. Ships and boats	96.2	133.3	104.8	33.3	33.1	42.0	79.4	127.9	136.4	148.1	225.6	347.5	3,170.0 ⁶
22. Aircraft	68.4	51.0	46.7	28.6	28.8	32.0	38.3	63.2	91.2	81.6	145.9	312.3	
Total	7,326.2	6,014.3	4,203.6	2,351.5	2,099.5	3,069.7	4,032.6	5,149.9	6,284.7	4,538.6	5,382.2	7,401.1⁷	14,490.0⁷
<i>Private Construction</i>													
1. Residential	3,562.0	1,790.0	1,460.0	638.0	413.0	591.0	913.0	1,368.0	1,655.0	1,767.0	2,046.0	2,323.0	2,675.0
2. Other	4,695.0	3,831.0	2,310.0	1,146.0	856.0	967.0	1,135.0	1,520.0	2,055.0	1,539.0	1,806.0	2,198.0	2,797.0
Total	8,257.0	5,261.0	3,770.0	1,784.0	1,269.0	1,558.0	2,048.0	2,888.0	3,710.0	3,306.0	3,852.0	4,521.0	5,472.0
<i>Net Inventory Change³</i>	1,600.0	-300.0	-2,000.0	-2,300.0	-700.0	-100.0	200.0	2,200.0	1,100.0	-1,300.0	900.0	1,800.0	3,500.0
<i>Net Exports³</i>	600.0	700.0	200.0	200.0	200.0	500.0	200.0	-100.0	100.0	1,100.0	800.0	1,400.0	900.0
<i>Domestic Output of Monetary Gold and Silver³</i>	-200.0	100.0	200.0	100.0	400.0	200.0	200.0	-200.0	400.0	100.0	200.0	300.0	200.0
GOVERNMENT													
<i>Public Construction³</i>	2,411.0	2,777.0	2,577.0	1,794.0	1,216.0	1,486.0	1,449.0	2,174.0	2,038.0	2,086.0	2,515.0	2,754.0	5,884.0
<i>Other Services⁴</i>	5,841.3	*	*	*	5,764.1	*	7,938.1	8,803.3	9,140.8	8,943.1	9,657.3	9,087.9	7,586.0
Total Gross National Product	99,400.0	88,200.0	72,100.0	55,400.0	54,800.0	63,800.0	70,800.0	81,700.0	87,700.0	80,600.0	88,600.0	97,000.0	119,000.0

* Not available. See reference cited in footnote 1 below.

¹ William C. Shelton, and Louis J. Paradise, "Monthly estimates of total consumer expenditures, 1935-42," *Survey of Current Business*, pp. 8-14, October, 1942.

² William H. Shaw, "The gross flow of finished commodities and new construction," *Survey of Current Business*, pp. 13-20, April, 1942. Private construction data for the years 1939 to 1941 are from the following source: Burton H. Klein, "Quarterly estimates of construction," *Survey of Current Business*, p. 25, May, 1942 (revisions are in process.)

³ National Income Unit, Bureau of Foreign and Domestic Commerce. Cf. Milton Gilbert and R. B. Bangs, "Preliminary estimates of gross national product, 1929-41," *Survey of Current Business*, pp. 9-13, May, 1942; and Milton Gilbert and George Jaszi, "National income and national product in 1942," *Survey of Current Business*, March, 1943. Elsewhere in this table the gross flow of finished commodities to the ultimate consumer excludes production which was added to business inventories and includes commodities which were not produced during the current year but were withdrawn from inventories for current consumption. Similarly production for export is excluded but consumption of imports is included. Therefore, these adjustments are necessary to arrive at the gross national product.

⁴ Essentially total compensation of governmental employees excluding those working on public construction (which are already included in the item Public Construction).

⁵ Includes durable armaments (ordnance, arms, tanks, etc.), some of which were produced in government plants.

⁶ Combined in order to avoid disclosure. The 1941 estimates for ships include the output of government shipyards.

⁷ The difference between these figures and the machinery and equipment figures given in Table I is government purchases.

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through now and having adequate plans to cope with them.

The question of how much postwar output will fall short of capacity—of how much unemployment will exceed the practical minimum of two million—is left to you.⁷

This is the broadest possible starting point. It provides the background for the planning for your own enterprise. Having decided how much you will discount capacity production in order to arrive at a reasonable objective, and having made some assumption as to the effect of future price changes on the total dollar volume of business, one of your requirements will be a means of calculating how much you can get as your share of a potential postwar market which can be raised far above the prewar level.

This market analysis is necessarily the basis for all postwar planning.

Expenditures by Commodity Groups

One possible starting point is an analysis of the cyclical fluctuations in the sales of groups of commodities and services relative to the gross national product before the war. Recent studies of the Department of Commerce give this information for the years since 1929.

Table V covers only end products at their cost to the ultimate buyer. Thus steel is shown only in terms of finished steel products; tires which are part of the original equipment of a car are not shown separately; value of automobile production includes all of the wholesale and retail selling expenses.

This table contains valuable raw material for the analysis of postwar possibilities. Typically there has been a fairly definite and determinable relationship between each of these groups and the gross national product. This is not necessarily a constant percentage. As people's incomes increase they do not step up all items of their budget proportionately. Similarly the national outlays on some items fluctuate much more widely than on others. The relationship also may be modified by clearly discernible long-term trends of growth or decline. In a few instances, other influences seem to have had an important bearing on the output of particular groups of commodities.

A Postwar Projection

Some indications of the impact of a high national income on different lines of business can be obtained by simply projecting these past relationships. Such a projection is given in Table VI. Starting with the assump-

tion of a peacetime gross national product of one hundred sixty-five billion dollars in 1946, which is the estimated capacity of the then available civilian-labor force expressed in 1942 prices, it breaks this total down into the component group. It allows not only for the large increase in the total output over the best prewar year but also for a continuation of the past trends of relative growth or decline of particular groups and occasionally other influences which appear to have been important over the period from 1929 to 1940. It is purely hypothetical in that it does not allow for the probable distortion of these prewar relationships after the war.

There is no room here for a more detailed description of the method by which experts in the Department of Commerce derived this hypothetical breakdown of the postwar gross national product. This technical information is available for those who are interested.⁸

What's Wrong with this Picture?

If Table VI serves its purpose it should raise more questions than it answers. It does not purport to be an attempt at market analysis. It is quite possible that under the assumed conditions the market for your product would call for much more or less than the indicated output. Here are a few of the points to be considered.

1. Since this is a projection of relationships which existed over a period of sharp cyclical decline and recovery it implicitly assumes that the hypothetical postwar year will be a peak boom year such as we had in 1929 and 1937, only more so. Because we have never had a period of high but relatively sustained output we do not know how such an output might be divided among commodity groups.

It is difficult to see how the projected domestic sales of automobiles, for example, could be maintained for more than a very few years without putting a ridiculously large number of cars on the road. On the other hand it is equally difficult to visualize a wholesale diversion from the projected outlays for durable goods toward an even greater increase in consumption goods and services. Part of the answer lies in new products, or new markets for old ones. It is easier to imagine a limit on the market for a particular durable good at a particular price than for durable goods in general.

2. The past relationships between individual groups and the gross national product are the result of fluctuations in both physical volume and price. The dollar value of food consumption, for example, fluctuated over almost as wide a range as the total for all goods.

⁷ "Markets after the War" is not concerned with the depression which might come ten years after the war. The immediate problem is the transition from war production to a peacetime output well above any prewar level and the need to take full advantage of the opportunities for maintaining this output over a period of at least several years.

If this is accomplished there will be time to tackle the problem of permanently preventing depressions.

⁸ Use was made of the regression formula whereby the past relationship between the item in question and one or more independent variables can be calculated mathematically. This does not eliminate the element of judgment in appraising the influences which determined the output of a particular group of commodities but it does reduce the error in measuring these influences. In at least one private concern it has been demonstrated that a less technical approach produced substantially the same answer.

TABLE VI

A HYPOTHETICAL PROJECTION OF EXPENDITURES BY COMMODITY GROUPS BASED ON PAST RELATIONSHIPS TO THE GROSS NATIONAL PRODUCT
(Unit: One million dollars)

NOTE: This is not a forecast! It does not attempt to appraise the markets for these items after the war. There are good reasons for believing that, even if the assumed level of gross national product were achieved, the other factors for which no allowance has been made would create wide distortion in some instances.

This table is an indication of the magnitude of the increases all along the line if a high level of total output is achieved. It is a starting point from which to exercise your judgment as to the probable distortion of past trends.

The given level of gross national product in 1946 is only for purpose of illustration. It is based on the following arbitrary assumptions: (a) that the war and the immediate postwar reconversion period will be over before 1946; (b) that 96.5 per cent of those seeking employment will have productive jobs; and (c) that prices will be the same as in 1942.

Item	1940 ¹	1946 Assuming Full Utilization of Available Man Power and the 1942 General Price Level ²	
		Amount	Per Cent Increase over 1940
CONSUMERS' GOODS AND SERVICES			
<i>Services</i>			
1. Housing (rent, depreciation on owned homes, etc.)	8,232	11,823	44
2. Home maintenance (domestic service, storage, insurance, repairs, etc.)	1,512	2,884	91
3. Household utilities	2,324	2,897	25
4. Personal care	1,559	2,638	69
5. Transportation	2,352	4,159	77
6. Medical care and death expenses	2,766	4,169	51
7. Recreation	1,773	2,526	42
8. Other	3,024	4,353	44
Total	23,542	35,349	51
<i>Perishable Goods</i>			
1. Food	20,929	33,917	62
2. Cigars, cigarettes, tobacco, and smoking supplies	1,993	2,965	49
3. Drug preparations and household medical supplies	804	1,156	44
4. Toilet preparations	508	690	36
5. Cleaning and polishing preparations	355	526	48
6. Magazines, newspapers, and other printed matter	617	786	27
7. Stationery and writing supplies	280	468	67
8. Miscellaneous household paper products	274	449	64
9. Toys, games, sport supplies	191	317	66
10. Manufactured household illuminating and heating products	669	1,249	87
11. Nonmanufactured household fuels	792	1,016	28
12. Fuels for passenger cars	1,211	1,780	47
Total	28,623	45,319	58
<i>Semidurable Goods</i>			
1. Clothing and accessories	5,698	9,777	72
2. Shoes and other footwear	1,223	2,021	65
3. Personal furnishings	211	414	96
4. Dry goods and notions	552	984	78
5. Semidurable house furnishings	878	1,562	78
6. Replacement tires and tubes	269	455	69
7. Passenger-car replacement parts and accessories	462	841	82
Total	9,293	16,054	73

¹ For sources and explanations see footnotes to Table V.

² If you prefer to use the 1940 price level, the gross national product would be 142 billion dollars, an increase of 45% over 1940 instead of 90%. The increase for each item would be correspondingly less. If you think prices are going to be above 1942 then the dollar volume of capacity production would be correspondingly increased. Similarly you should discount these figures by whatever extent you think the country will fall short of capacity output.

and services. This change, however, was more in price than in physical volume. Since agricultural production was not curtailed in proportion to the decline in consumer purchasing power, food consumption was not changed.

Exhaustive studies of family expenditures by income classes give ample evidence that those that can afford it do consume substantially more than the average amount of food. This is true of quantity as well as quality and the increase by income brackets is remarkably consistent. In other words, the diet of a large part of the nation is not only well below expected scientific standards, but also well below that achieved by those who could afford to pay for what they wanted.

This suggests that if food prices did not go up, the average consumer would be glad to increase his food

TABLE VI—Continued

Item	1940 ¹	1946 Assuming Full Utilization of Available Man Power and the 1942 General Price Level ²	
		Amount	Per Cent Increase over 1940
<i>Durable Goods</i>			
1. Household furniture	871	1,784	105
2. Floor coverings	385	882	129
3. Miscellaneous durable house furnishings	886	1,526	72
4. Heating and cooking apparatus	434	814	88
5. Refrigerators, washing machines, and sewing machines	460	799	74
6. Electrical household appliances	217	389	79
7. Other household appliances	26	44	69
8. China, glassware, tableware, and household utensils	564	865	53
9. Radio apparatus and phonographs	415	1,100	165
10. Pianos and organs	47	118	151
11. Other musical instruments	29	60	107
12. Clocks and watches	205	393	92
13. Jewelry and sterling silverware	336	620	85
14. Books and other durable printed matter	328	562	71
15. Writing equipment	53	108	104
16. Ophthalmic products, surgical and orthopedic appliances	181	283	56
17. Monuments and tombstones	62	114	84
18. Luggage	53	141	166
19. Wheel goods, durable toys, and sports equipment	338	538	59
20. Passenger cars	2,382	5,718	140
21. Pleasure craft	6	20	233
Total	8,278	16,878	104
PRODUCERS' GOODS			
<i>Equipment</i>			
1. Factory machinery	531	1,079	103
2. Mining machinery	93	238	156
3. Construction machinery	137	333	143
4. General and miscellaneous machinery and equipment	891	1,848	107
5. Engines and turbines	78	150	92
6. Pumps and pumping equipment	185	396	114
7. Machine tools and accessories	507	984	94
8. Electrical apparatus and equipment	576	1,244	116
9. Farm machinery and equipment	254	585	130
10. Tractors	280	629	125
11. Office machinery	163	330	102
12. Nonresidential furniture and equipment	329	651	98
13. Durable containers	158	297	88
14. Professional and scientific equipment	150	259	73
15. Tools	185	353	91
16. All other subsidiary durable equipment	356	640	80
17. Wagons and carts	3	—	—
18. Business motor vehicles	1,548	3,231	107
19. Motorcycles	10	—	—
20. Locomotive and railroad cars	307	830	170
21. Ships and boats	348	417	20
22. Aircraft	312	422	35
Total	7,401	14,916	102
<i>Private Construction</i>			
1. Residential	2,323	7,000	201
2. Other	2,198	6,700	205
Total	4,521	13,700	203
Net Inventory Change	1,800	—	-100
Net Exports	1,400	—	-100
Domestic Output of Monetary Gold and Silver	300	200	-33
GOVERNMENT			
Public Construction	2,754	4,000	45
Other Services ³	9,088	18,484	103
Total Gross National Product	97,000	165,000	70

³ The large increase shown for 1946 relative to 1940 is the result of an allowance for considerably heavier interest payments on the government debt, substantially increased military expenditures, and the trend toward larger general expenditures by all units of government.

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consumption between one third to one half which would be commensurate with a high level of gross national product. It is probable, however, considerable inertia would have to be overcome in people's eating habits in order to reach this goal.

This also assumes that the country's farms are capable of the additional production. Considering the inertia and the time lag to be encountered in any such expansion in the production of food for a more varied diet, it seems likely that at least part of the increase would be in price.

This problem of the relationship of changes in price

to changes in volume exists all through this table. To cite one more example, how is the relative dollar volume of production of refrigerators affected, if the postwar general price level is higher than prewar but the price of this item is lower? Remember that even if the general price level after the war should happen to approximate the 1942 level used in the table the prices of many individual commodities or groups of commodities may be much higher or lower than this average.

3. The projection based on the experience between 1929 and 1940 does not allow for the acceleration of past trends or for completely new developments as the result of the war. For example, the projected outlays for aircraft are only about 2 per cent of the presently planned capacity of the industry at the end of 1943. Even though postwar aircraft production falls far below some of the optimistic forecasts, it is likely to exceed this figure by a wide margin.

4. The very large war expenditures on certain durable goods will leave a very large supply of such goods at the end of the war which could be a glut on the market for years to come. The projected domestic sales of machine tools, for example, appear too high. An analysis of the machine-tool market would have to appraise this glut in terms of the division between general and special-purpose tools, the tools required to convert industry to a high level of peacetime output, the probable disposition of government-owned plants, and the potential export demand.

5. The pressure of accumulated demands is likely to distort buying habits in peculiar and not always foreseeable ways. Where this accumulated demand is in excess of productive capacity the output of durable goods in the immediate postwar years may depend largely on the capacity of the respective industries and the speed with which they can reconvert from war to peace production.

Various special influences will affect the output of particular products. Thus gasoline sales may be limited by the smaller number of cars on the road immediately after the war.

6. This projection of past relationships does not include new products and new services which must necessarily be an important part of any sustained high output after the war. It makes very little allowance for prefabrication or other changes in residential construction which conceivably may make new houses available in the three- to five-thousand-dollar price range to people who have never been able to afford new construction. It does not allow for the general application of summer cooling to private homes. *It does not include television or the rapidly growing application of electronics to other fields.* It ignores potential new developments in recreation and related lines of business. You will undoubtedly think of other possibilities.

The Advantage of Quantitative Analysis

Without attempting to answer these and other im-

plied questions, a few general observations are in order as to the reasonableness of the projections.

While they are in no sense forecasts, many of the items are probably sufficiently accurate to serve as a preliminary basis for planning as well as a starting point for market analysis. Since a return of the 1940 volume of business would mean an inconceivably large number of unemployed, you need a means of visualizing a volume of business substantially above any prewar year and translating it into potential markets for your product. You cannot avoid making decisions which involve assumptions as to this future volume. Granting its crudity and the urgent need for further refinement, this breakdown is a convenient tool.

The possibility of error can be exaggerated. Expenditures on food and clothing, for example, have shown a remarkably consistent relationship with gross national product. To a lesser extent this has been true of other consumers' goods. The trends and developments which may upset these relationships frequently add up to a relatively unimportant change.

This is true only if you deal with broad groups of items. Thus a projection of the combined output of household furniture, floor coverings, and miscellaneous durable house furnishings should command greater confidence than the output of a particular type of furniture. Whether you get your share of this market is largely your responsibility.

Once you have decided on a postwar gross national product which you consider reasonable for planning purposes, your adjustment of the individual items should add up to 100 per cent of the total. They cannot all be too high or too low. Remember that if most of the available manpower is employed, the available purchasing power will be far above the best prewar year. Most, if not all, of that money is going to be spent and you want to participate in that market, if not in terms of your old products, then possibly new products which will be in greater demand because of increased incomes.

Finally, any approach of this sort which forces you to appraise the future in specific quantitative terms can be extremely useful. The risks of action or inaction cannot in any event be avoided by dodging the issue. The attitude that the future is so uncertain that such estimates are impossible leaves you in the position of assuming these risks without marshalling all of the facts and without the mental discipline of quantitative analysis.

One simple example will illustrate this last point. Much has been said of the displacement of steel by aluminum after the war. If all of the planned capacity for aluminum production were substituted for steel at the rate of one pound of aluminum for two of steel it would amount to less than 5 per cent of present steel production. Actually only part of it will be so substituted.

It is important that there could be an error of 100 per cent in this calculation without altering the basic

conclusion that increased competition from aluminum is not a dominant factor in the outlook for the steel industry.

The Need for Better Information on Markets

This is no argument against the need for real market analysis. The postwar projections in Table VI are based only on prewar relationships and serve largely to illustrate the importance of a single factor—the total volume of business as measured by the gross national product. These projections need to be examined and corrected in light of all of the available information on all of the factors which will affect the markets for these products after the war. In large part this is not a statistical problem but a job of organizing and applying the practical knowledge of experts in each field.

The seventy groups of commodities need to be broken down into more detail so you can find your product. This multiplies the chance for error through unforeseen developments within the industry or its competitors. Therefore, you who are most familiar with these possibilities should assume a major share of the responsibility for the answer.

The markets need to be expressed in other terms than the dollar cost of finished goods and services to the ultimate consumer. You probably are used to thinking in physical quantities. Also, your product may be a raw material or a partly fabricated item.

Even more important is an understanding of the *character* of the market. How sensitive is it to changes in purchasing power? What other influences are likely to be important? What are the possibilities of achieving additional sales through changes in the product, its cost, or the way it is sold? This sort of information should be more useful as a basis for long-range planning than any attempt to measure the *size* of the market.

Up to a point this market analysis can and should be a co-operative job. You will also, however, want to appraise the effect of a high national output and income on the postwar sales of your company.

How Will a High National Output Affect Your Sales?

The possible approaches to this problem are almost as varied as the lines of business in which you might be engaged. Many concerns will find that their sales have had a definite relationship to the total sales of all goods and services, i.e., the gross national product, and that this seems a logical basis for a postwar projection. One very simple means of doing this is provided in Fig. 4.

On this chart the fluctuations in gross national product are already plotted. By plotting your company's sales on the same chart it is possible to see the extent to which the sales of your company have been dependent on the general level of business activity.

To do this it is first necessary to devise a scale which

is suited to your company's average sales. The following procedure is suggested:

1. Compute your company's average dollar volume of sales for the twelve years 1929 through 1941. Round off to the first two figures, e.g., 648 thousand dollars would be 65.

2. Divide this figure by 80, the first two figures of the approximate average gross national product for the twelve years, e.g., $65/80 = 0.81$. Round off to one figure and ignore the decimal point, e.g., 0.81 would be 8.

3. Beginning with zero at the bottom use this figure as the value of the successive intervals on the right-hand scale, e.g., the successive values would be 8, 16, 24, 32, etc.

4. Now add zeros to the figures on the right-hand scale so that your average dollar volume of sales (com-

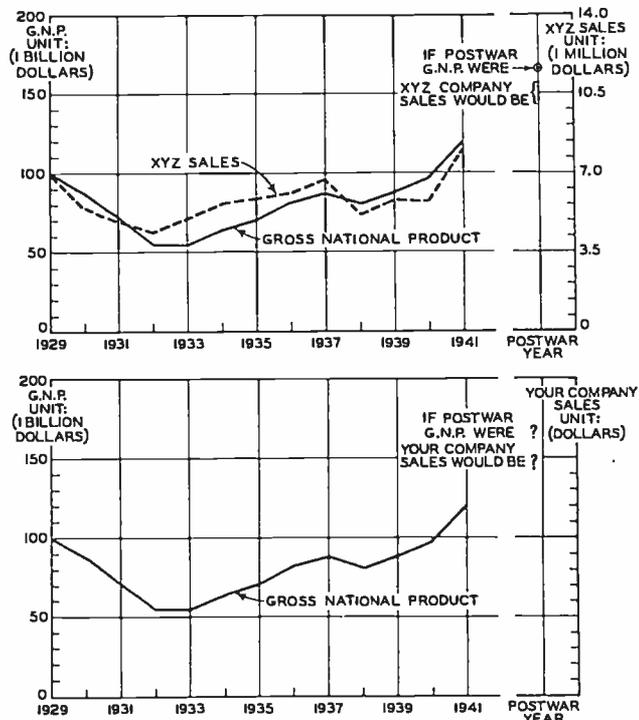


Fig. 4—Sales projection for individual company.

puted in step one above) will be approximately opposite 80 on the left-hand scale.

By way of illustration consider the sales of "XYZ" Corporation, a well-known manufacturing concern. Its average sales from 1929 through 1941 were 5.84 million. Rounding this to 58 and dividing by 80 we obtain 0.725. Rounding this off to one figure and ignoring the decimal point we may then assign each of the intervals on the right-hand scale a value of 7 (i.e., 7, 14, 21, 28, 35, etc.). Upon inspection it is apparent that each of the intervals must represent 700 thousand or 0.7 million, if the company's average dollar volume of sales of 5.8 million is to fall approximately opposite the average gross national product of 80 billion dollars. When the sales of this company are then plotted on the same graph with the gross national product, it is clear that both series tend to move in the same direction. If the gross national product were about one hundred and

TABLE VII

A NATIONAL INCOME STATEMENT FOR AMERICAN BUSINESS

(Unit: one billion dollars)

Preliminary Estimates for 1942 and 1943 and a Projection at Postwar Capacity Output

	1942	1943	Postwar Capacity Output at the 1942 General Price Level ^{1,2}
<i>The total output of goods and services was distributed as follows:</i>			
<i>Sold to consumers</i>			
Services	27.5	29.0	35
Nondurable and semidurable goods	48.0	55.0	59
Durable goods	6.4	6.0	16
	81.9	90.0	110
<i>Sold to other business enterprises</i>			
Machinery and equipment	5.1	2.4	
Private construction (including residential)	3.0	1.3	
Net change in business inventories	-0.6	-3.0	
Net exports	0.4	-1.4	
Domestic output of monetary gold and silver	0.1		
	8.0	-1.0	27
<i>Sold to or produced by government</i>			
Nonwar public construction	1.1		4
Nonwar commodities and services	11.5	12.0	18
War outlays	49.1	87.0	6
	61.7	99.0	28
Gross National Product	151.6	188.0	165
<i>Gross receipts from production were allocated as follows:</i>			
Net income of unincorporated business			
Farmers	9.7	12.5	
Professional people and other self-employed	10.4	11.2	
Compensation of employees	83.7	105.4	
Interest and dividends	9.4	10.0	
Net rents and royalties	3.0	3.5	
Undistributed corporate profits	3.6	5.0	
Net national income	119.8	147.5	134
Depreciation, depletion and other business reserves, including charges to current earnings on account of capital outlays and inventory revaluations	7.6	13.0	10
Business taxes	24.2	27.5	21
Total	151.6	188.0	165
<i>These funds were in turn budgeted as follows to purchase the entire output of goods and services:</i>			
<i>By consumers</i>			
Net national income	119.8	147.5	134
Deduct:			
Undistributed corporate profits	3.6	5.0	3
Payroll taxes	3.3	3.8	3
Add:			
Relief, social security and similar government payments	2.6	3.3	3
Total income payments to individuals	115.5	142.0	131
Deduct:			
Direct personal taxes	6.7	16.0	7
Disposable Income	108.8	126.0	124
Savings of individuals (including unincorporated business)	26.9	36.0	14
Spent for goods and services	81.9	90.0	110
<i>By producers</i>			
Undistributed corporate profits	3.6	5.0	3
Depreciation, depletion and other business reserves, including charges to current earnings on account of capital outlays and inventory revaluation	7.6	13.0	10
Obtained from individual savings			14
Deduct:			
Gross business savings not used by business	3.2	19.0	
Spent for goods and services	8.0	-1.0	27
<i>By government</i>			
Business taxes	24.2	27.5	21
Direct personal taxes	6.7	16.0	7
Payroll taxes	3.3	3.8	3
Deduct:			
Relief, social security and similar government payments	2.6	3.3	1
Obtained from individual savings	30.1	55.0	
Spent for goods and services	61.7	99.0	28
Gross National Expenditure	151.6	188.0	165

TABLE VII—Continued

	1942	1943	Postwar Capacity Output at the 1942 General Price Level ^{1,2}
<i>Output in Physical Terms</i>			
Gross national output in 1940 prices	135.0	157.0	142
Federal Reserve Board index of industrial production (1935-1939 = 100)	180	207.0	194
Domestic consumption of steel ingots and castings—million tons	86.1	90.0	120 ³
Production of electric energy—billion kilowatt-hours	190.3	223.5	220
<i>The Utilization of Available Manpower</i>			
Civilian Labor Force	54.5	53.5	57.5
Civilian Employed	51.9	52.5	55.5
Per cent Employed	95.2	98.0	96.5

¹ In 1940 prices the capacity of available man power will be about 142 billion dollars of gross national product, with each item correspondingly smaller. If commodity prices, wage rates, and the prices of all the other items in the gross national product should exceed the 1942 average, the capacity in dollars would be even larger than the figures shown.

This is an optimum volume with unemployment reduced to a practical minimum. It is probable that production will not reach capacity and that unemployment will exceed the minimum shown by a corresponding amount.

² Capacity of total available manpower. The first three items in the table ((1) Sold to consumers; (2) Sold to other business enterprises; (3) Sold to or produced by government) are derived by projecting the past relationships of the items to gross national product. See Table VI. Taxes are assumed to be just sufficient to balance the government budget.

³ Since this is a projection of relationships which existed over a period of sharp cyclical decline and recovery, it implicitly assumes that the hypothetical postwar year will be a peak boom year such as we had in 1929 and 1937 only more so. Because we have never had a high but relatively sustained output, we do not know what production of steel this total output would require.

sixty-five billion dollars in the postwar period, the sales of "XYZ" company might be expected, on the basis of the 1929-1941 experience, to be something like nine or ten millions. Even a gross national product of one hundred forty-two billion dollars, which could be the capacity of the then available manpower in 1940 prices, or proportionately less than capacity at higher than the 1940 general price level, would indicate a postwar volume for the "XYZ" Corporation well above any prewar level.

Using the same procedure on the bottom half of Fig. 4 you can project your sales for the first prewar years. You will have to use your judgment as to what allowances should be made for the effect of changes in management policies, new product development, potential untapped markets, new competition or any other influences which may upset past relationships.

More elaborate statistical tools are available to determine this relationship between your sales and total output of goods and services. A scatter chart may be prepared or a regression equation may be computed.⁹ Using either of these procedures it is possible to obtain estimates of the increase in your company's sales to be expected from a given increase in gross national product.

Some concerns selling direct to the ultimate consumer have found a closer and more logical relation between their sales and "disposable income." This is simply the total of income payments to individuals minus personal taxes. If you are interested in this figure, it is given for the past years in Table I, and for a hypothetical postwar year in Table VII. The latter figure is based on the assumption that the gross national product is 165 billion dollars (capacity output

⁹ Any standard statistics textbook contains directions for the preparation of scatter charts and the computation of the regression relationship.

at 1942 prices) and that the budget is balanced in spite of a large increase in government expenditure. In effect this allows for (a) increased outlays for national defense, (b) interest on the expended public debt, and (c) a continuation of past trends toward more government services.

You may be interested in relating your unit sales to total industrial production. If so, a projection of the Federal Reserve Board index is given in Table VII. This is based on past relationships of industrial production to gross national product. Capacity in this instance refers to the gross national product possible with full utilization of available manpower. It disregards the question as to whether the physical plant exists to achieve the corresponding volume of industrial production.

It is quite possible that you will be less concerned with a quantitative estimate of the level of business activity after the war and its effect on markets for your products than with the impact of new materials, new manufacturing methods, and new products. Where the probable error in calculating the impact of these developments is greater than the effect of any probable changes in the gross national product, it may be enough to proceed on a very general assumption as to business conditions after the war.

It should be pointed out, however, that it is not necessary to assume that your products, distributing methods, and prices will be unchanged in the postwar period in order to use profitably past relationships between sales of your product and gross national product (or disposable income) as a basis for estimating the market potential for your product.

Furthermore, it is clear that there is nothing automatic or inevitable about these markets. This is still a competitive world where some businesses prosper while others decline. Courage, imagination, and ingenuity plus practical, hard-headed, long-range planning may create a volume of business far in excess of that suggested by any reasonable market analysis. Where these qualities are lacking the most accurate appraisal of postwar markets becomes a futile gesture.

Obviously a good picture of market potentials is a necessary background for a whole series of decisions which lie beyond the scope of this discussion. Will your company make the same products as before the war or something completely different? Can plants built for war production be utilized to exploit new markets? Can new materials be used to improve quality or lower cost?

What is involved in converting your plant from war to peace production? How long will it take and what can be done now to speed up the process? How much will it cost and where is the money coming from? How can manufacturing methods or plant layout be improved at that time, having in mind all of the technological advances wrought by the war? What additions to capacity may be required?

Will your company be handicapped because those with whom you do business are not equally alert to the possibilities? Are your sources of supply aware of your tentative plans and are they prepared to supply materials and parts in the required quantities at the right time? Are your customers prepared to do their part in getting a larger volume of goods to the ultimate consumer?

Will more or fewer employees be needed than are now employed? How can the personnel changes attendant to reconversion and the re-employment of returning soldiers be handled so as to create an effective, well-integrated, hard-hitting organization and at the same time facilitate the transfer of any surplus to productive employment elsewhere?

Most important are the questions dealing with distribution. If your distributor organization is being disrupted by the war, how can it be most quickly re-established and refinanced? Would different channels of distribution or methods of selling be more effective or more economical, and if so, is the reconversion period a good time to make the change? How would sales of your product be affected if a reduction in production or distribution costs should make it possible to cut the price by a substantial amount? Have you explored the possibilities of mass production and mass marketing?

To answer these questions intelligently will require a thorough understanding of the market for your company's product. The development of such an understanding of the market is a big job but is fundamental. Without this any management is badly handicapped in the attempt to capitalize its opportunities. Business has demonstrated its ability to produce. Thus the postwar problem becomes largely one of distribution.

In introducing the next section of this presentation, a brief note is in order. It appears that the fluctuations in the sales of radio apparatus and phonographs over the period 1929 to 1940 have been due partly to cyclical changes in gross national product, and in national income, and partly to a declining trend over the whole period caused perhaps by declining average price per set. Since the following projection is based on this historical experience it assumes a continuation of this declining trend which may, however, be contrary to fact.—*The Editor*.

II. A HYPOTHETICAL PROJECTION OF EXPENDITURES FOR COMMODITY GROUPS BASED ON PAST RELATIONSHIPS TO GROSS NATIONAL PRODUCT

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The purpose of this report is to provide a description and critique of the statistical methods utilized in the

mechanical projections published in Table VI of "Markets after the War" by S. Morris Livingston. That publication stressed what must here be restated emphatically: Data in Table VI, "Markets after the War" are purely mechanical projections and represent no attempt at comprehensive market analysis for any single commodity group. Some form of mechanical projection seemed desirable for illustrative purposes.

1. A GENERAL CRITIQUE

In earlier studies we have concluded that there is a strong growth trend in the labor force and in its productivity. Because of this growth trend the capacity of available man power in 1946 will be 15 to 20 per cent greater than capacity in 1940 and 40 to 50 per cent greater than actual production for that year. If the first postwar year is at a later date there will be an even greater potential increase over the best prewar year.¹⁰

The dollar volume of business will, of course, depend not only on how far we fall short of capacity but also on prices at that time. In terms of the 1942 general price level, peacetime capacity in 1946 would be in the neighborhood of 165 billion dollars of gross national product.¹¹ In 1940 prices it would be about 142 billion dollars as against 97 billion dollars in 1940.

Because of the growth in the labor force and its productivity a return to the 1940 volume of business would mean an inconceivably large number of unemployed. Conversely, even if that capacity should not be fully utilized, there is a very large potential increase over the best prewar year.

In its long-range thinking each enterprise has a new problem. How will it be affected by a national output which could be as much as 40 to 50 per cent above 1940? What opportunities are opened up by a corresponding increase in consumer purchasing power?

When the income of a family is increased it does not increase each item of its budget by the same proportion. More is spent for food, clothing, and other basic necessities but a larger share of the increase goes for luxuries and for durable goods which need not be purchased regularly. The expenditures of the country as a whole display a similar pattern.

Data are available on these fluctuations in seventy-seven groups of commodities and services comprising the gross national product over the period of sharp cyclical decline and recovery from 1929 to 1941.¹² By

¹⁰ Cf. S. Morris Livingston, "Postwar manpower and its capacity to produce," *Survey of Current Business*, April, 1943.

¹¹ The assumption of a 1942 general price level does not mean that all individual prices will be at their 1942 level. The 1942 average could result even if no single price were the same providing there are compensating movements.

¹² Cf. W. H. Shaw, "The gross flow of finished commodities and new construction, 1929-41," *Survey of Current Business*, pp. 13-20; April, 1942; Milton Gilbert and R. B. Banks, "Preliminary estimates of gross national product, 1929-41," *Survey of Current Business*, pp. 9-13; May, 1942; Milton Gilbert and George Jaszi, "National income and national product in 1942," *Survey of Current Business*, pp. 10-26; March, 1943; Louis J. Paradiso and William C. Shelton, "Monthly estimates of total consumer expenditures, 1935-

projecting the relationships which existed over this period by correlation analysis we can arrive at the first crude approximation of how a much larger gross national product might be broken down in a postwar year.

The results of these projections are given in this memorandum, along with the equations and charts which show how well or how poorly the mechanical relationships used for the postwar projection fit the historical data. To avoid any misconceptions or any misuse of the data, a few of the more serious limitations should be summarized.

Important Limitations

1. Any projection of this sort involves one or more assumptions as to what the gross national product will be in a hypothetical year after the war. These assumptions can be very useful provided they are not accepted as forecasts. The analyst must never be hypnotized by his own figures to the point where a hypothetical assumption becomes in his own mind an established or forthcoming fact.

The figure assumed for gross national product is simply the calculated capacity of the 1946 labor force in 1942 dollars. Capacity is an optimum goal which probably will not be reached. Furthermore, whatever the postwar price level, it almost certainly will not be the same as in 1942.

2. The historical data from which the projections are made suffer from several limitations. The total for each group of commodities or services represents the dollar cost to the ultimate customer. For those who do not sell direct to the consumer or who do their thinking in physical units these may not be very useful data. The groups are broad enough to hide many comparatively unrelated items which may have quite divergent trends of growth or decline. Also the classification fails to distinguish goods sold to the government. Thus the total of consumers durable goods, for example, is overstated to the extent of government purchases of these items which are covered in the total of other services of the government.

3. These are merely mechanical projections of prewar relationships. Therefore they are based on the assumption that these prewar relationships will continue to prevail after the war. This is obviously not true (although it may be nearer the truth than the opposite assumption that such projections are completely meaningless because "everything will be changed" by the war). In some instances the war has greatly accelerated past trends of growth or decline. New products, new materials, new production methods, and

42," *Survey of Current Business*, pp. 8-14 and 22; October 1942; Edward F. Denison, "Consumer expenditures for selected groups of services, 1929-41," *Survey of Current Business*, pp. 23-30; October, 1942; and "Output of manufactured commodities, 1929-1939," available from the National Income Unit, Bureau of Foreign and Domestic Commerce.

other developments arising out of the war need to be taken into consideration in modifying these purely mechanical projections to get a more accurate picture of potential markets.

4. The use of the 1929 to 1941 data as a base for projecting a breakdown of a high postwar output involves two serious difficulties. Mechanically, and as a matter of pure statistical theory, projections have less and less significance as they are pushed beyond the range of data from which the relationships are derived (in this case 1929 to 1941). The mere existence of a much higher consumer purchasing power than we have ever had before might by itself serve to make our results quite dubious.

Also a projection based on a period of sharp cyclical decline and recovery clearly assumes that the postwar year will be a cyclical peak like 1929 and 1937 only more so. Because we have never had a period of high but relatively sustained output, we do not know how such an output might be divided among commodity groups. This point is particularly important in the case of durable and capital goods. It is difficult to see how the projected output of automobiles, for example, could be maintained for more than a very few years without putting a ridiculously large number of cars on the road even if income or gross national product remained high.

5. The past relationships between individual groups and the gross national product are the result of fluctuations in both physical volume and price. In some instances price was the more important variable. Whatever the "general price level" in the future, it will certainly be a composite of widely divergent trends in the prices of individual commodities and these prices will have an important bearing on the volume of output and demand relative to other commodities. The war has accelerated these divergences so that there is no reason to expect the past cyclical patterns to hold.

Also the projection makes the quite possibly unreasonable assumption that this higher physical volume of output could be achieved within the same pattern of price changes which prevailed over the 1929 to 1941 movements of gross national product and related price changes.

6. The war is creating shortages of some commodities and gluts in other fields. Both will act to disturb past relationships. The postponement of purchases of durable goods at the bottom of the depression and the building up of consumers' inventories during periods of higher income were characteristic of the base period. But a new element has been introduced in the form of a forced and almost complete elimination of the output of many of these durable goods. Indirectly this will also affect other commodities. For example, the smaller number of cars on the road may reduce the consumption of gasoline immediately after the war.

The war is also creating surpluses. For example, there is the enormous output of general-purpose ma-

chine tools which could be a glut on the market for years to come. Past relationships are of little help in analyzing this situation.

In summary, there is hardly one of the projections about which serious questions cannot be raised. Even where the correlation with gross national product has been very close, this does not in itself establish a cause and effect relationship which existed in the base period or which must carry over into the postwar period.

Possible Uses of the Projections

After all these qualifications one may well wonder what-use, if any, can be made of these mechanical, first-approximation projections. There are at least two. First, they force us to lift our sights above the prewar, half-depression levels of the late thirties. In short, they give some indication of the order of magnitude of the increases which must occur if the goal of a high total gross national product is to be achieved.

Second, with all of the necessary qualifications, these projections do provide a springboard or point of departure from which to form judgments concerning the total effects of social, economic, technological, and wartime influences on economic activity in this period.

2. STATISTICAL ANALYSIS¹³

General Statement

Scatter-diagram charts of expenditures on each of the seventy-seven groups of goods and services were prepared. These are constructed by placing a dot on the chart for each year. The vertical distance to the dot as shown by the scale on the left represents the particular commodity or service expenditure for the year and the horizontal distance to the dot as shown by the bottom scale represents gross national product for that year. In many cases the data arranged themselves into a definite pattern moving upward to the right. If the dots were not too badly "scattered," it was possible to draw a line freehand through these dots which would illustrate the general movement of the expenditure item as gross national product moves. It is also possible to derive algebraically the equation of this line, and this was usually done. This line can now be extended in order to read off the commodity expenditure related to the capacity output figure of 165 billions (or any other level); or it is possible to substitute any value for gross national product in our equation and derive a related calculation for the commodity or service expenditure.

When a multiple correlation was required, a chart is also presented showing the movements of actual expenditures and expenditures as calculated from our equation. The closeness of these calculated expenditures to the actual expenditures over the period from

¹³ The statistical methods used here are not complicated or technical for two reasons. First, those working on the project do not in any sense consider themselves technical statisticians. Second, the more simple and straightforward the analysis the more useful are the results apt to be.

1929 to 1940 gives a rough indication of how well our equation has fitted the data. Both calculated and actual values are also extended on by a series of dots to 1941 though, as mentioned above, that year was usually not included in the computations.

In the equations Y^{24} (in the case of simple-regression equations) or X_1 (in the case of multiple-regression equations) is always expenditures on the item in question; X or X_2 is gross national product (depending on whether the correlation was simple or multiple);¹⁵ and X_3 is, with one or two indicated exceptions, time or an allowance for a secular trend.¹⁶ The correlation coefficient is indicated by R when multiple correlation is used and r when simple correlation is used. The upper limit of the simple correlation coefficient r is $+1$. If the r is $+1$ all of the points in the scatter diagram lie exactly on the straight line and the line slopes upward to the right.¹⁷

The limits of the multiple correlation coefficient R are 0 and $+1$. If $R = +1$, all of the calculated values (from the regression equation) exactly equal the actual values. This rarely if ever occurs. However, correlations involving economic data tend to give reasonably high coefficients of correlation. Therefore a correlation coefficient much below 0.90 has little even mechanical significance.

This does not imply that a correlation coefficient of 0.90 or above indicates that the analyst's problem has been solved. *A good correlation never implies causation!* The analyst who forgets this is surely headed for trouble. If common sense and judgment enable him to decide that something is caused by something else, he can study the mechanical corelationship by correlation analysis. Without this word of warning, the data presented here would be worthless. Even worse, they would be dangerous.

The discussions of the individual projections which follow should be related to the appropriate charts which also give the equations and indicate the units in terms of which each equation has been computed. As previously discussed, in those equations where "time" is a variable, 1929 is the point of origin and 16 was the maximum time unit used.

3. RADIO APPARATUS AND PHONOGRAPHS

A marked time trend down is evident here so that time (X_3) must be added to the equation which becomes $X_1 = -3.034 + 0.1274X_2 - 0.4365X_3$ with a correlation coefficient R of 0.986. This mechanically is an exceedingly good fit. However, it is not entirely clear whether prices continued to decline after the precipitate *price* drop (much of it a shift to cheaper units) oc-

¹⁴ The unit of Y or X_1 is indicated for each equation in the charts.
¹⁵ The unit of gross national product is always one billion dollars.

¹⁶ The unit of "time" is one year counting from 1929 unless otherwise stated.

¹⁷ It is also possible to get negative simple correlation coefficients. The lower limit of -1 indicates all points fall exactly on a line which slopes downward to the right.

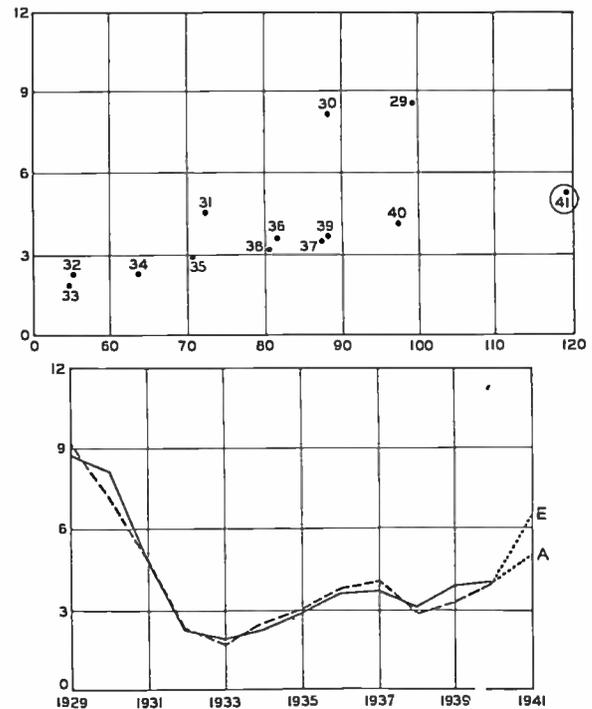


Fig. 5—Radio apparatus and phonographs. Unit: 100 million. Gross national product. Unit: 1 billion.

— Actual
 - - - - - Estimated
 $X_1 = -3.034 + 0.1274 X_2 - 0.4365 X_3$
 $R = 0.986$.

curing in the early part of this period. If they did not, the mechanical projection of a declining time trend may result in a postwar understatement of the magnitude of the markets for these goods.

III. DOMESTIC COMMERCE

1. APPRAISING THE POSTWAR RADIO MARKET, E. J. Detgen and Lawrence D. Batson, Division of Industrial Economy, Bureau of Foreign and Domestic Commerce.

"Markets after the War" in its hypothetical breakdown, by commodity groups, of the distribution of an assumed total expenditure for all goods and services of 165 billion dollars in a postwar year, indicated that approximately a billion dollars, an increase of 165 per cent over the 1940 volume, might be spent for radio apparatus and phonographs. This includes receiving sets of all kinds, phonographs, radio-phonograph combinations, electric record players, tubes and replacement parts, needles, storage batteries, records, and blanks. This article discusses some of the factors that were not considered because of the purely mechanical nature of the projection.

The figures given in Table VIII pertain to the entire radio-phonograph industry. But to facilitate discussion, this article considers only the home-radio field which constituted 80 per cent of the combined radio and phonograph industry total in 1940.

TABLE VIII
CONSUMER EXPENDITURES FOR RADIOS AND ALLIED PRODUCTS
COMPARED WITH TOTAL EXPENDITURES
(Millions of Dollars)

Year	Expenditures for Radio Apparatus and Phonographs	Total Expenditures	Percentage Ratio of Expenditures for Radio-Phonograph to Total Expenditures
1929	878.1	99,400.0	0.88
1930	813.4	88,200.0	0.92
1931	475.5	72,100.0	0.68
1932	225.4	55,400.0	0.41
1933	184.9	54,800.0	0.34
1934	236.5	63,800.0	0.37
1935	282.4	70,800.0	0.40
1936	358.7	81,700.0	0.44
1937	366.3	87,700.0	0.42
1938	310.4	80,600.0	0.39
1939	377.8	88,600.0	0.43
1940	415.6	97,000.0	0.43
1941	500.0	119,000.0	0.42
1946	1,100.0	165,000.0	0.67

Source: "Markets after the War".

If the hypothetical statistical projection of "Markets after the War" is a true indication of the postwar market, we could expect an annual expenditure for household radios in the postwar era of approximately 880 million dollars, 165 per cent of the 1940 estimated volume of 345 million. Assuming further that the average retail price of a radio set remains at \$35 (the 1938 to 1941 average), 25 million radio sets may be sold annually in the United States in the postwar period. How may these figures be tested?

Primary and Secondary Markets

First, how would this volume compare with previous experience in the industry? Of 36 million families in the United States in 1942, approximately 30 million owned about 60 million radio sets. Industry estimates indicate that 50 per cent of these families owned one set each, or a total of 15 million sets, and that the remaining 15 million families owned 45 million sets, and of these, probably 15 million are first or primary sets and 30 million, second or additional sets. In other words, there were approximately 30 million first or primary sets and an equal number of second or additional sets in use in 1942.

With reference to the market for the primary or first set, assuming an average life span of approximately 7 years, a very high percentage of the prewar sets in this class may be considered by their owners as obsolete by 1946. Can we estimate, therefore, that there will be an immediate market in 1946 for 30 million primary sets, which will mean a new set for each radio family in the United States? Looking ahead to 1947 and subsequent years of high levels of employment (and remembering that annual sales have never exceeded 11 million sets) can we assume a continuation of this new high volume of business?

Will High Volume Continue?

In seeking the answer to this question, we must consider, among other factors, the market for the second or additional set, which represented 30 million units in 1942. To what extent and how soon will second or additional sets be replaced? What effect would the sale of 30

million sets in one year have on the number of second or additional sets in use? How many families will retain the first or primary set used during the war period to serve a second or additional set after purchase of this new postwar set? All these statistical factors must be applied to our original figure of 30 million sets to determine its validity as a starting point for discussion of the radio market in the postwar period.

Unit Price a Factor

The foregoing is based on the continuation of the assumed average retail price of \$35 per set. But since "Markets after the War" discusses the dollar volume of business that may be obtained by an industry, with its resulting effect on employment and pay rolls, rather than the number of units any particular industry produces careful study should be made of the changes in prices paid for radios.

Will the average price per set be higher or lower? What knowledge have we now, concerning the technological changes taking place in the industry, that will permit us a glimpse of this phase of the industry in the future? Will radio production be changed so radically that prices will be cut in half resulting in an average retail price of around \$15 or \$20 and necessitating a volume of 60 million sets per year, or will there be emphasis on larger, higher-quality sets which will increase the unit price and thereby reduce this hypothetical annual quota of 30 million units which we are using for the purpose of this discussion? For example, can we assume that in the postwar period frequency modulation will be a *must* among radio users?

Frequency Modulation Enters Picture

To some radio manufacturers questions of this type will be considered elementary since they are convinced that the benefits of frequency modulation are so great it will *have to be*. And they reason that since the production of this type of set involves more man hours and materials the cost will be higher. They point out that the lowest retail price of a complete frequency-modulation set in 1942 was approximately \$60, or almost double the average price paid for radio sets. If a market of this type is developed, annual sales of 15 million sets would achieve the hypothetical goal of 880 million dollars in retail sales of home radios.

The possibilities of frequency modulation raise other interesting questions, including the future of the market for the lowest-price set (\$10 and under) and the possibility that many owners of high-quality sets may purchase frequency-modulation converters for use in conjunction with these sets. There is also the problem of setting up and staffing a large number of radio stations to provide frequency-modulation broadcasts, because of the limited range of such stations, compared with present amplitude-modulation stations.

The implications of television and its accompanying developments have not even been mentioned here

TABLE IX
HOME RADIOS AND PHONOGRAPH COMBINATIONS—PRODUCTION, SIZES,
AVERAGE PRICES, AND NUMBER IN USE

Year	Production (a)			Retail Sales (Industry Estimates) (b)			Use Statistics (b) (000 sorted)	
	Thou- sands of Sets	Factory Value (c) (\$1,000)	Average Price	Thou- sands of Sets	Value (\$1,000)	Average Price	Number of Sets	Families Owning Sets
1922				100	\$ 5,000	\$ 50	400	60
1923	414	\$ 13,995	(d)	250	15,000	60	1,500	1,000
1924				1,500	100,000	67	3,000	2,500
1925	2,293	89,145	(d)	2,000	165,000	83	4,000	3,500
1926				1,750	200,000	115	5,000	5,000
1927	1,938	95,162	(d)	1,350	168,750	125	6,500	6,500
1928				3,281	388,000	118	8,500	7,500
1929	4,938	249,602	\$50.50	4,435	591,543	134	10,500	9,000
1930				3,793	206,100	54	13,000	12,049
1931	3,647	113,214	31.00	3,312	219,060	66	15,000	14,000
1932				2,477	117,710	47	18,000	16,810
1933	2,788	53,837	19.30	3,082	102,301	33	22,000	20,402
1934				3,304	122,880	37	28,000	21,456
1935	4,398	103,563	23.60	4,375	216,590	49	30,500	22,869
1936				6,746	394,819	59	33,000	24,600
1937	5,844	131,526	22.40	7,631	303,690	40	37,600	26,429
1938				5,823	210,000	36	40,800	27,500
1939	8,735	129,767	14.80	9,000	289,000	32	45,200	28,700
1940				10,900	345,000	32	50,100	29,400
1941				11,100	420,000	38	56,000	30,300
1942				3,550	124,250	35	59,340	30,800

(a) Census of manufactures.

(b) Industry estimates principally from *Radio Retailing, Radio Today, and Broadcasting*. Principal exception: 1930 number of radio families from Census of Population.

(c) Value only of the sets reported by number. Small additional margin where number was not given.

(d) Totals include considerable proportion of sets not for home use.

because of limitations on space; certainly that development alone requires intensive and elaborate investigation by anyone attempting to appraise the future of radio.

Table IX has been prepared to provide background statistical data on this subject.

Table IX shows the status of the radio industry in 1942 only insofar as civilian-radio production is concerned and is not a complete picture for that year. And since the industry has converted 100 per cent to war production it will be faced with the important problems of postwar reconversion.

Industry Expansion Must Be Considered

Generally, war demands on the parts industry have required no major changes in methods or design and peacetime products are still being made in identical form or modified only to the extent necessary to circumvent materials shortages. However, this industry has expanded greatly during the past 2 years, frequently by the comparatively simple process of taking over personnel and factory space temporarily idle owing to scarcity of materials or the unessential nature of the goods formerly produced.

A major factor in reconversion will be the continued availability of these plants and workers. Will radio manufacturers be able to retain them or must they develop new facilities and train new workers? In the assembly industry reconversion may be largely a matter of providing a short training period for radio-assembly operations, for workers now producing items of military equipment.

Availability of materials necessary for the manufacture of radios presents another important postwar problem. In what quantity will these necessary materials immediately be available? The answer provides

a basis for determining whether or not the radio industry will be in a less difficult position at the end of the war than most other industries having the same general markets.

What About Foreign Competition?

Many other important considerations must receive careful study as we look into the postwar radio situation. Not the least are questions regarding foreign industries and markets. In such a study attention must be directed not only to past export experience and the potentials of the future, but also to the possibilities of competition from abroad. Much of this will be intimately tied up with the expansion of radio industries in countries that have been producers in the past as well as with the establishment of radio factories in countries which formerly imported all their requirements. What effect will these developments have on our domestic production and sales?

These puzzling questions complicate an analysis of the postwar situation. But one of the most interesting results of thinking about them is the feeling that an apparently too-optimistic domestic annual sales goal of 880 million dollars may be not only reached but exceeded in a period of sustained high levels of employment.

CONCLUSION

In closing, it is desired again to emphasize the thoughts expressed at the beginning of this presentation. The data here given do not represent a forecast. They do disclose in considerable measure methods whereby, granting certain assumptions and accepting specific limitations, the activities of the radio-and-electronic industry in the postwar years may be estimated with some accuracy. Naturally, the accuracy of the estimates cannot exceed the correctness of the underlying assumptions.

The methods here shown are mainly intended as a stimulus to more detailed and elaborate radio industrial planning. And they should lead the engineering and commercial groups in individual companies, working in close co-operation, to plan for whatever place they analytically believe may be filled by their respective organizations. The future success of the radio-and-electronic industry and of the workers in that field will, in considerable measure, depend on the wisdom and skill with which such planning is carried out. To be successful, free enterprise must be not only free—it must be intelligent, effective, resourceful, and even daring. The radio-and-electronic field is obviously in the earlier stages of what, with thoughtful planning and courage, may become a domain vast beyond earlier imaginings. It is to assist in approaching that goal that The Institute of Radio Engineers has welcomed the privilege of presenting the preceding material to the industry with which it is most closely associated.

The Editor