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A NON-PROFIT MEMBERSHIP CORPORATION FOR IMPARTIAL STUDIES IN ECONOMIC AND SOCIAL SCIENCE

# Production in Depression and Recovery

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CHARLES A. BLISS

DURING periods of rapid economic change special significance attaches to measures of the physical volume of production. Here, in relatively unequivocal terms, are summaries of the accomplishments of an economy in providing the material goods that contribute to the national income. Other information is useful, but is often obscured by confusing shifts in prices. The output of physical goods of course reveals but one aspect of the functioning of the economy; for example, the figures give little indication of the changes in conditions under which the goods were produced. Moreover, the contributions of service occupations are inadequately represented. But in a wide realm of the nation's productive life, the record of the physical volume of output provides the best single index of economic activity.

Measurements presented in this *Bulletin* indicate the extent of decline and recovery in domestic and world output; they also suggest the changes that have taken place in the character of production, indicating where activity has been most pronounced, where it has been most depressed. In addition, changes in production volume are shown in relation to changes in the total population and in the number of workers employed. We first compare fluctuations of production volume in the United States and in the other major countries of the world.

## I. WORLD RECESSION AND WORLD RECOVERY

In 1934 recovery in the physical volume of world production continued. Although basic commodities did not increase in output, those used as industrial raw materials did advance some 6 per cent, reaching a level 16 per cent above the output of 1932. Partially offsetting this increase, there was a decline of 2 per cent in the world's output of crude foodstuffs. Greater recovery has occurred in purely industrial activity (mining, manufacturing and, in most countries, construction). World output in these lines in 1934 was roughly 10 per cent greater than in 1933 and 24 per cent above 1932. That the improvement has continued into the present year is indicated by monthly estimates. The rate of industrial output in the last month for which figures are available (July 1935) is the same as the rate for March 1930, and is not much below the 1929 high. The percentage decline from the peak month to the low point and the subsequent increase are tabulated below, together with similar figures for the United States.[1] The greater severity of the decline in this country, and the smaller degree of recovery, are clearly evident.

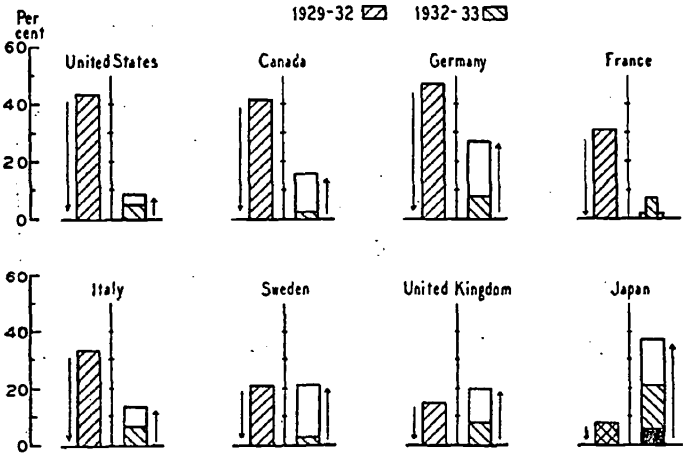
CHART 1

DECLINE AND RECOVERY

INDUSTRIAL PRODUCTION IN EIGHT COUNTRIES

1929=100

Changes relative to 1929: 1929-31 ▨ 1931-32 ▩ 1933-34 □ 1929-32 ▨ 1932-33 ▧




The column on the left of each diagram represents the depression decline; the column to the right shows the progress made during each year of recovery towards offsetting that decline. Recovery in France has been set back by the 1934 decline.

| | DEPRESSION DECLINE IN RATE OF INDUSTRIAL PRODUCTION (*per cent*) | RECOVERY TO JULY 1935 AS PERCENTAGE OF PEAK ACTIVITY | PERCENTAGE BELOW PEAK ACTIVITY, JULY 1935 |
|---|---|---|---|
| World | —35 | +30 | —5 |
| United States | —56 | +27 | —29 |

[1] The index of world industrial production, computed by the Institut für Konjunkturforschung of Berlin, is based upon available national indexes of industrial production. The annual index

The above tabulation is supplemented by Chart 1, which shows the relative amounts of decline and recovery in the physical volume of industrial production in eight selected countries. The first column of each diagram represents the depression decline in the annual output of the country to which the diagram refers; the second column records the recovery through the year 1934. In but three instances is the recovery equivalent to recession. In the United Kingdom, industrial output for 1934 (including construction) was slightly greater than that of the relatively modest high point registered in 1929. Records for Sweden also indicate that the pre-recession volume of production has been matched. In Japan the rate of industrialization has been progressing so rapidly that an absolute increase over the pre-recession level appears. In France alone of the eight countries here represented did the volume of output fail to increase during 1934. The increase in the United States, while substantial when the extent of its industrial activity is considered, was still much less than that indicated for the other major countries of the world. A more precise picture of the change may be had by comparing the industrial records for different countries in greater detail. This is done in Chart 2.

Two facts stand out clearly: First is the failure of the textile industries in the United States, France and Italy to maintain, in 1934, the increases in output that marked the recovery of 1933. In the other five countries the textile industries forged ahead steadily, and in all but the United Kingdom their output exceeded the levels of 1929. The second significant feature of Chart 2 is the wide fluctuation in the output of the heavy industries, represented by the output of steel and the volume of building activity. A disproportionate influence in measures of industrial activity may frequently be given to the iron and steel industry because of the ready availability of records of its physical output. Yet the great fluctuations in steel output, together with those in building, account for much of the movement in the volume of aggregate production. Activity in these industries has been a major factor in swelling the volume of production in those countries where recovery has surpassed that of the United States. In this country there has been a small but continued rise in steel output, and in 1934 an encouraging increase in construction volume.

## THE SHARE OF THE UNITED STATES IN WORLD PRODUCTION AND WORLD TRADE

Available measures of production volume indicate that recovery in the United States has lagged behind the gains of certain other industrial countries. A factor contributing to the sluggishness of American recovery is to be found in the relatively reduced foreign sales of American products. The materials here presented bear upon this second feature of the recession and recovery periods.

In certain countries, notably England, a high rate of construction activity is a large factor of recovery in production. The comparison, therefore, of the recovery movements in the United States and in other countries tends to overstate the relative loss of this country in the production of the movable goods that enter into world trade. However, the ratios of domestic to world output of selected commodities given in Table 1 do indicate for 1934 a much less important role for the United States than in 1929. These ratios reflect, of course, a temporary displacement that will tend to be corrected as activity in this country gains headway. They also reflect an indeterminate, and possibly permanent, shift caused by the increasing diversification of productive endeavor in other countries.

TABLE 1

THE SHARE OF THE UNITED STATES IN WORLD OUTPUT OF SELECTED COMMODITIES, 1929 AND 1934

| COMMODITY | RATIO OF DOMESTIC TO WORLD OUTPUT (*in percentages*) | | 1934 RATIO AS A PERCENTAGE OF 1929 RATIO |
|---|---|---|---|
| | *1929* | *1934* | |
| Copper | 52.3 | 18.8 | 36 |
| Oats | 23.7 | 13.2 | 56 |
| Wheat[1] | 19.1 | 10.9 | 57 |
| Cement | 39.0 | 23.6 | 61 |
| Silver | 23.0 | 14.5 | 63 |
| Steel | 47.5 | 32.2 | 68 |
| Maize (corn) | 56.3 | 38.1 | 68 |
| Cotton | 55.9 | 41.0 | 73 |
| Coal | 41.4 | 34.2 | 83 |
| Artificial silk[1] | 27.8 | 23.1 | 83 |
| Motor cars | 84.8 | 74.2 | 88 |
| Tobacco | 30.2 | 26.7 | 88 |
| Petroleum[1] | 67.1 | 59.6 | 89 |
| Woodpulp | 25.8 | 23.0 | 89 |
| Gold[1] | 11.0 | 11.8 | 107 |
| Sugar beets[1] | 10.8 | 12.0 | 111 |

[1]Commodities the world output of which increased between 1929 and 1934.

numbers of the output of basic commodities given in the text are computed by the Economic Intelligence Service of the League of Nations. The measures for the United States are based on the annual indexes of mining, manufacturing and construction of Table 3 and various data on monthly changes. The world index utilizes a somewhat different index for the United States but tests indicate that the substitution of the present series would not appreciably alter the above comparison.

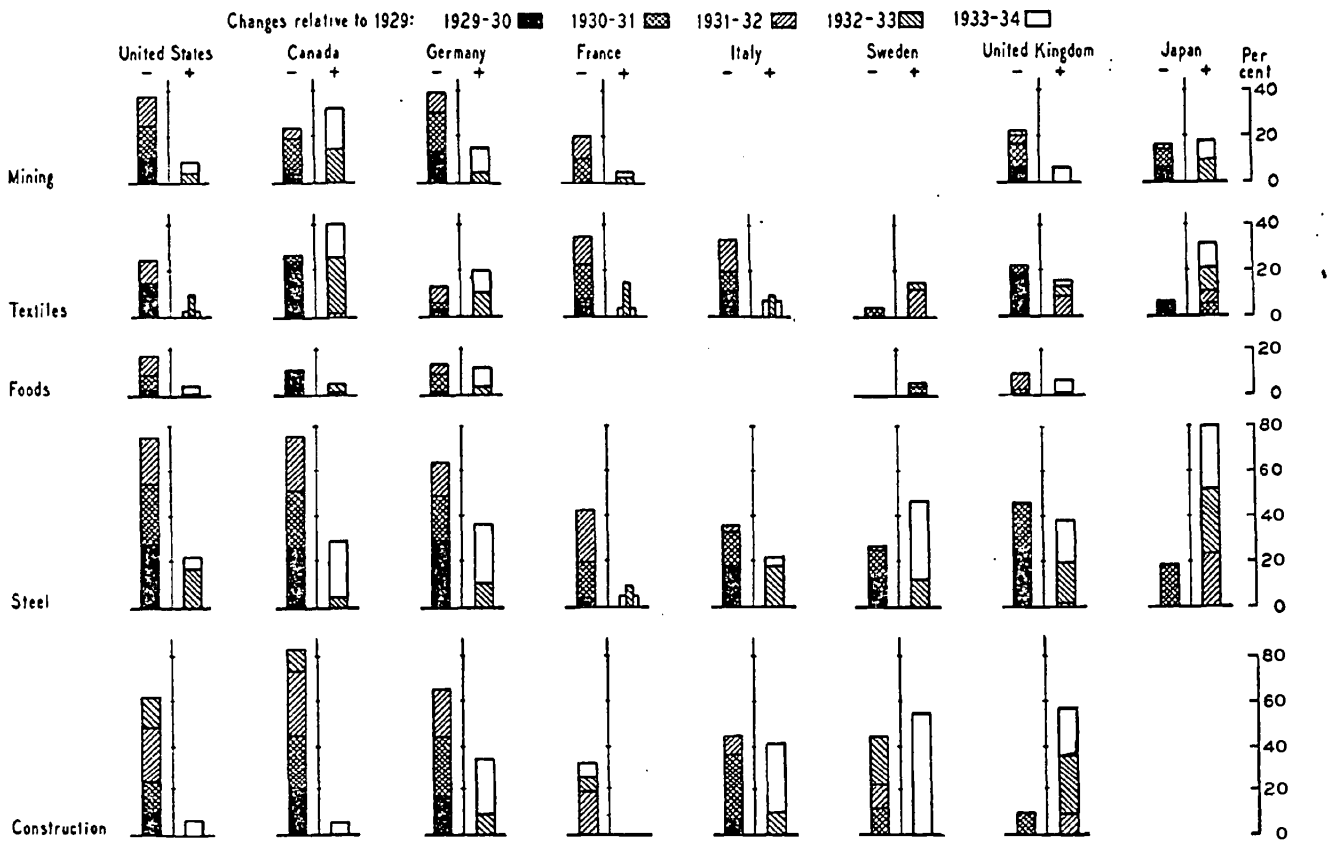
The world figures presented above include the output of the U.S.S.R. Annual figures excluding this country make possible the following comparison (all figures are on a 1929 base). The general picture shown by these annual averages is much the same as that given by the more widely fluctuating monthly figures. World output during the first seven months of 1935 was three per cent below the 1929 level; output in this country was 27 per cent below 1929 (108 and 82 on 1927 as 100, respectively).

| | DECLINE 1929-32 | RECOVERY 1932-34 | PERCENTAGE BELOW 1929 IN 1934 |
|---|---|---|---|
| World, including U.S.S.R. | −29 | +17 | −12 |
| World, excluding U.S.S.R. | −34 | +16 | −18 |
| United States | −44 | + 9 | −35 |

CHART 2

DECLINE AND RECOVERY IN FIVE INDUSTRIAL DIVISIONS - EIGHT COUNTRIES

1929=100




The column on the left of each diagram represents the depression decline; the column on the right shows the progress made during each year of recovery towards offsetting that decline.

Evidence bearing on the decline in the relative position of the United States in world output is given in Table 2, which summarizes changes in the export-import relationships of the United States with various regions of the world. The measures suggest that while the diminished percentage of world output suffered by the United States may in part be due to nationalistic efforts towards economic self-sufficiency, it is also due to the loss to other nations of competitive foreign markets and the resulting smaller share for this country in the current volume of world trade. Of the goods imported into all other countries in 1929, 16.8 per cent were from the United States; in 1934 this percentage had fallen to 11.5. When trade with particular regions is examined, this general decline appears to be almost universal. Only in the imports of Asia has the share of the United States in foreign trade been maintained anywhere near the levels of 1929. Some recovery in 1934 is to be noted in our relative export position, except in our trade with Europe; in its foreign purchases our share continued to decline.

These general relationships, of course, hide much that is important for an understanding of the trade position of the United States. The decline in the world's takings of American cotton, to cite a single commodity, has influenced these ratios profoundly. Moreover the shifts in the character of world trade under the peculiar influences of the depression should be considered. The diminished share in world imports is in some measure a cyclical phenomenon and a consequence of the severe depression and tardy recovery in this country. So also, of course, is the reduced percentage of foreign exports shipped to American ports. In 1929 the United States took 15.8 per cent of foreign exports; in 1932 this percentage had fallen to 11.7, and by 1934 to 9.8. The departure of the dollar from the gold standard and its devaluation in terms of foreign currencies has tended, since early 1933, to discourage the purchase of the products of other countries.

## II. CHANGES IN THE TOTAL VOLUME OF PRODUCTION IN THE UNITED STATES

The measurements presented in the preceding section have touched on various aspects of productive activity in the United States. To obtain some notion of the change in the aggregate, we now bring together estimates of the volume of production in all lines. This composite of productive activity measures the commodity income of the nation.[2] The shrinkage of the annual product during the

[2] To the extent that a portion of this annual product must go towards the replacement of capital, the measure is one of gross rather than net income.

TABLE 2

THE SHARE OF THE UNITED STATES IN WORLD TRADE, 1929-1934[1]

| | 1929 | 1932 | 1933 | 1934 |
|---|---|---|---|---|
| Imports from the United States as a percentage of total imports | AMERICAN EXPORT TRADE | | | |
| Europe | 11.8 | 9.2 | 8.8 | 7.9 |
| North America (excluding U.S.) | 64.8 | 53.2 | 48.1 | 49.6 |
| Asia | 13.8 | 15.4 | 13.2 | 14.0 |
| South America | 28.5 | 20.6 | 17.2 | 19.2 |
| Africa | 7.7 | 4.4 | 4.3 | 5.9 |
| Oceania | 19.8 | 13.3 | 10.3 | 11.9 |
| World (excluding U.S.) | 16.8 | 12.7 | 11.4 | 11.5 |
| Exports to the United States as a percentage of total exports | AMERICAN IMPORT TRADE | | | |
| Europe | 8.3 | 5.9 | 6.1 | 5.2 |
| Asia | 26.0 | 20.5 | 19.5 | 16.5 |
| North America (excluding U.S.) | 45.0 | 38.1 | 32.0 | 29.6 |
| South America | 28.4 | 24.9 | 21.3 | 17.6 |
| Africa | 7.3 | 2.8 | 2.6 | 2.6 |
| Oceania | 6.4 | 1.9 | 2.4 | 2.4 |
| World (excluding U.S.) | 15.8 | 11.7 | 10.8 | 9.8 |

[1]Since imports from and exports to the United States have been measured as they leave or arrive at American ports, losses in transit and differing methods of valuation affect the ratios somewhat. Before computing the ratios, the basic data were converted into terms of gold dollars.

The regions are listed in order of their importance in the trade of the United States.

recession, and its increase during the last three years are estimated in Table 3. The increase, meanwhile, in the number of claimants to this annual product is indicated by the index of population growth.

Domestic production fell off during the successive years of depression well over one-third, according to the averages of total output. Converted into 1929 dollar values, the difference between 1932 and 1929 output is roughly equal to four times the total exports of 1929; it is greater than the combined 1929 output of all but the twelve most important producing states.* This decline from 1929 to 1932 reduced by 37 per cent the per capita share of the population in the flow of production—the most drastic reduction in the output of this country of which we have record. Following such a drop in the volume of production, the increases since 1932 leave us with much still to be gained before we approach pre-recession levels. Progress in that direction was made by the increase of 7 per cent in 1933 and 1934, and by the further gain of 6 per cent indicated for the first eight months of 1935. Progress has been difficult since in many instances it has been accompanied by adjustments in the areas of productive activity, of which those sponsored by the AAA in agricultural production represent one type. The decline in the output of farm products since 1932 has served to keep the general average down.

*Agriculture*

The peculiar circumstances that caused an increase in the volume of farm produce at a time when all other forms of production were declining, and the deliberate steps taken under government sponsorship to regulate output and increase total farm income, are well known. These influences govern the movement of the general agricultural index in Table 3. The wide scope of farm activity, and the varying changes in the components of the aggregate are better described by the divisions of the total shown in Table 4.

In only two of the major divisions, grains and cotton, has there been any drastic reduction in output during the depression. The production of fruits and vegetables, including truck crops, has been above the 1929 level through-

*According to estimates based on data of the Bureau of the Census and the Department of Agriculture for different productive activities. The twelve states are: New York, Pennsylvania, Illinois, Ohio, California, Michigan, New Jersey, Massachusetts, Texas, Indiana, Wisconsin, Missouri.

TABLE 3

PHYSICAL VOLUME OF PRODUCTION AND POPULATION, UNITED STATES, 1927-1934

(*1927=100*)

| YEAR | FARM PRODUCTS | MINERALS | MANUFACTURES | CONSTRUCTION | TOTAL PRODUCTION | POPULATION |
|---|---|---|---|---|---|---|
| *1927* | 100 | 100 | 100 | 100 | 100 | 100.0 |
| *1928* | 105 | 100 | 108 | 105 | 106 | 101.2 |
| *1929* | 102 | 109 | 116 | 99 | 110 | 102.2 |
| *1930* | 102 | 97 | 98 | 90 | 98 | 103.1 |
| *1931* | 108 | 82 | 83 | 75 | 87 | 103.9 |
| *1932* | 101 | 68 | 66 | 50 | 71 | 104.5 |
| *1933* | 98 | 73 | 75 | 38 | 75 | 105.2 |
| *1934* | 92 | 78 | 80 | 44 | 78 | 105.9 |
| *1935* (8 mos.) | (95) | (81) | (90) | (45) | (85) | (106.6) |
| PERCENTAGES OF 1929 | | | | | | |
| *1929-32* | —1 | —38 | —43 | —49 | —35 | +2.3 |
| *1932-33* | —3 | + 5 | + 8 | —12 | + 4 | +0.7 |
| *1933-34* | —6 | + 5 | + 4 | + 6 | + 3 | +0.7 |
| *1934-35* (est.) | +3 | + 3 | + 9 | + 1 | + 6 | +0.7 |

SOURCE: See Appendix Note

TABLE 4

AGRICULTURAL PRODUCTION, 1929-1934[1]

(*1929=100*)

| YEAR | GRAINS | FRUITS, VEGETABLES, TRUCK CROPS | COTTON AND COTTONSEED | MEAT ANIMALS (SHIPMENTS) | DAIRY AND POULTRY PRODUCTS | TOTAL |
|---|---|---|---|---|---|---|
| *1929* | 100 | 100 | 100 | 100 | 100 | 100 |
| *1930* | 91 | 109 | 93 | 100 | 102 | 100 |
| *1931* | 96 | 115 | 113 | 106 | 104 | 106 |
| *1932* | 91 | 105 | 87 | 105 | 102 | 99 |
| *1933* | 66 | 102 | 87 | 107 | 103 | 96 |
| *1934* | 44 | 107 | 65 | 114 | 99 | 90 |
| *1935* (est.) | (66) | (119) | (78) | (78) | (98) | (93) |

[1] The figures for years other than 1935 have been compiled by the U. S. Department of Agriculture. Certain subgroups of the Department's index have been combined for purposes of presentation. The 1935 estimates are based on crop reports as of October 1, and on marketings and inspected slaughter for the first eight months of the year.

The increase in the marketings (total slaughter) of meat animals in 1934 accompanied a decline in the number of livestock on farms, in part the result of this increased slaughter, in part due to the loss of animals during the drought. If marketings be reduced by an amount sufficient to offset this loss in inventories, the 1934 index for meat animals becomes 77 and the index of total agricultural production 81 (on 1929 as 100).

out the period. The output of meat animals, as measured in terms of shipments (slaughter), has also been high. The 1934 peak in the slaughter of meat animals, largely the result of distress selling of cattle during the drought, has meant a reduction in breeding stock which will be reflected in lowered production for some time to come (evident in the 1935 estimate). But with crop production in 1934 at the lowest level since 1890[2] the net volume of agricultural production in 1934 was some 6 per cent below that of 1933, and 10 per cent below 1929. Rough estimates of the probable volume of net farm production in 1935 place it at about three per cent above 1934.

*Mineral Production*

The averages of mineral production indicate that the recovery in manufacturing has carried the output of mines and quarries also to higher levels. Although the minerals index represents chiefly the production of primary raw materials, which might be expected to fluctuate widely, it declined less during the depression period than did the index of manufactured goods. Recovery likewise has been no more rapid. This is because included among minerals are certain products which enjoy a relatively stable and inelastic demand. It is desirable therefore that the general average be supplemented with measures relating to the chief components of the index. The measures reveal two major trends in the output of mineral products. The output of metals and building materials declined with the reduced volume of investment and replacement of plant and equipment, while the widespread character of the demand for fuels accounts for their less drastic decline. The output of coal, however, declined rather sharply during the depression,[4] in part because of the competitive displacement of this fuel by natural gas, petroleum and electricity. Electricity is not here included among mineral products (nor is it included among manufactured goods, as is manufactured gas). The records of the generation of electricity indicate that output declined 15 per cent from 1929 to 1932; by 1934 there had been an increase amounting to 8 per cent of 1929 output.

| YEAR | METALS | BUILDING MATERIALS OTHER THAN METALS | COAL AND NATURAL GAS | PETROLEUM |
|---|---|---|---|---|
| *1929* | 100 | 100 | 100 | 100 |
| *1930* | 80 | 87 | 92 | 89 |
| *1931* | 55 | 69 | 77 | 84 |
| *1932* | 33 | 50 | 65 | 78 |
| *1933* | 35 | 44 | 68 | 90 |
| *1934* | 42 | 51 | 75 | 90 |

*Manufacturing*

Of all the divisions of productive activity, the manufacturing industries are of greatest economic importance.[5] The

[2] The production of 12 major crops from 1866 to 1934 has been measured by a new index constructed by the Bureau of Agricultural Economics (*The Agricultural Situation*, January 1935, p. 4). The average for 1934, which is 66.5 in terms of the average of 1910-14 as 100, is below the average for any year since 1890, and on a per capita basis is well below that for any year covered by the index.

[4] Recent changes in the output of individual commodities, including both bituminous and anthracite coal, are described in the Appendix Table.

From the consumers' point of view, account should be taken of technological improvements tending to economize the consumption of coal. Similarly for petroleum, improvements have been made in methods of extracting gasoline, the principal product of petroleum, and other improvements have, in turn, increased the efficiency of gasoline consumption.

[5] The importance of manufacturing industries is shown approximately by the value added by manufacture (i.e. value of product less cost of materials and fuel). In 1927 and 1931, the years used as the reference base in the calculation of the general index of Table 3, value added by manufacture averaged 23.7 billion dollars. Comparable weighting factors for the other elements of the total index are as follows: agriculture, 9.3 billion; minerals,

elements of manufacturing output are analyzed at some length in Section III. Measurements pertaining to individual manufactured products are given in the Appendix Table.

*Construction*

The association of activity in the construction industry with industrial recovery in many of those countries where the increase in industrial production has been greater than in the United States has already been noted. Particularly has this been true in the United Kingdom, where, it is estimated, some 300,000 dwelling units were built in 1934 in contrast to less than 50,000 in the United States.[6] Partly because of the significant role the construction industry seems to play in recovery movements and partly because of the efforts of the Federal government to swell public construction, records of building volume during the present recovery are of great interest. The estimates presented in Table 3 show an increase in 1934 over the 1933 low, equal to 6 per cent of the 1929 volume—a modest increase when contrasted to the 61 per cent decline of the preceding four years. These percentages relate to the estimated physical volume of total construction. This total is based upon the accompanying series of estimated expenditures in private, public utility and public construction.[7] The effect of rising construction costs since early 1933, as well as their decline through 1932, must be considered when interpreting these unadjusted figures.

| YEAR | PRIVATE CONSTRUCTION | PUBLIC UTILITY AND RAILROADS | PUBLIC CONSTRUCTION | TOTAL |
|---|---|---|---|---|
| | | *(in billions of dollars)* | | |
| *1929* | 4.6 | 4.1 | 2.8 | 11.5 |
| *1930* | 2.9 | 3.8 | 3.3 | 10.0 |
| *1931* | 1.9 | 2.7 | 2.9 | 7.5 |
| *1932* | .8 | 1.4 | 2.1 | 4.3 |
| *1933* | .8 | 1.1 | 1.5 | 3.4 |
| *1934* | .7 | 1.3 | 2.4 | 4.4 |

Construction projects sponsored by the Public Works Administration exert, of course, considerable influence upon these totals. In 1929 public construction comprised about one-fourth of all construction expenditures, in 1934 they were over half of the total. In absolute terms, the Federal allotments are much too small to raise the aggregate to anywhere near the levels of 1929, even if we exclude utility construction, which includes a considerable expenditure on equipment.[8]

## III. COMPONENTS OF MANUFACTURING OUTPUT

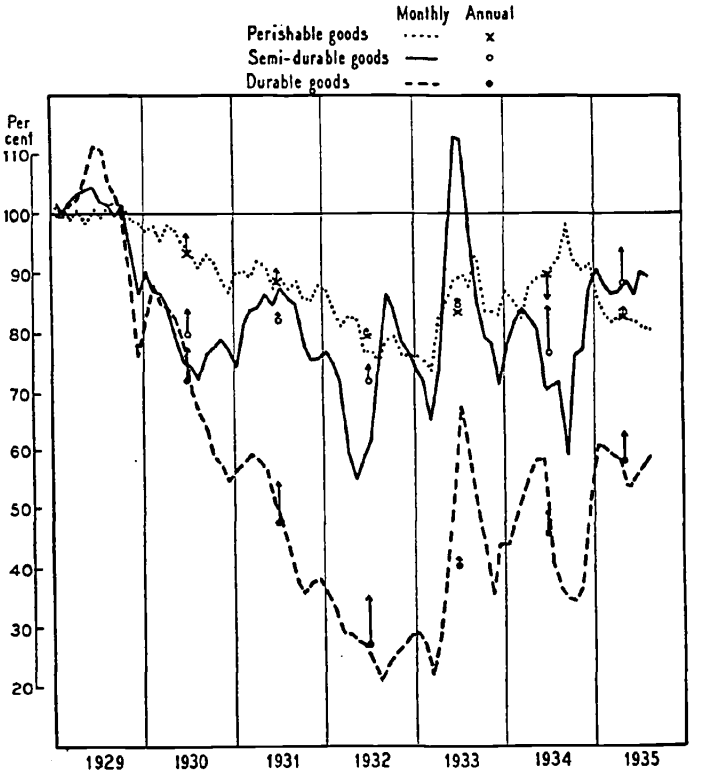
The index of total manufacturing production given in the preceding section is a satisfactory measure of the aggregate of manufacturing output. But it by no means represents a homogeneous movement in production volume, as the figures for selected industries given in the Appendix Table testify. Further information about the divisions of the total may be secured by classifying and combining the measures relating to individual commodities. These group index numbers provide the following record of the direction of productive effort during the years of recession and of recent recovery.

*Durable and non-durable goods*

An important classification of goods is that according to the period of their usefulness. In Table 5 are given

CHART 3

INDEX NUMBERS OF MANUFACTURING OUTPUT
PERISHABLE, SEMI-DURABLE AND DURABLE GOODS
1929–1935




Arrows indicate differences between annual indexes of Table 5 and the annual averages of the monthly series. See Appendix Note.

3.1 billion; construction, 4.8 billion. The full values of raw materials are here taken since there is little direct duplication; in construction total value is reduced one-half as an approximation to value added. The bulk of lumber production is represented in the index of manufactures.

[6] Estimates of the F. W. Dodge Corp., *Building Business,* July 1935, p. 3.

[7] Essentially the same series of estimates is given in some detail through 1932 in *Bulletin 52,* Gross Capital Formation, 1919-1933, p. 17. The present figures, which are rough estimates particularly for the recent years, are taken with permission from a privately circulated research publication. Estimates for the first eight months of 1935 indicate a considerable increase in the volume of private construction, a decline in public construction.

[8] An analysis of the Federal program of public works is included in *Public Works in Prosperity and Depression,* by Arthur D. Gayer, recently published by the National Bureau.

TABLE 5

CHANGES IN THE PHYSICAL VOLUME OF MANUFACTURING PRODUCTION, 1927-1935
ANALYZED ACCORDING TO THREE CLASSIFICATIONS OF COMMODITIES

| | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 (8 mos.) | CHANGES AS PERCENTAGES OF 1929 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1929-1932 | 1932-1933 | 1933-1934 | 1934-1935 |
| All manufactures | 100 | 108 | 116 | 98 | 83 | 66 | 75 | 80 | 90 | −43 | + 8 | + 4 | + 9 |
| A. Durable goods | 100 | 114 | 122 | 95 | 67 | 44 | 52 | 61 | 77 | −64 | + 7 | + 7 | +13 |
| Semi-durable goods | 100 | 102 | 107 | 90 | 90 | 80 | 92 | 91 | 101 | −25 | +11 | − 1 | + 9 |
| Non-durable goods | 100 | 105 | 112 | 108 | 101 | 90 | 93 | 96 | 94 | −20 | + 3 | + 3 | − 2 |
| B. Consumption goods | 100 | 107 | 115 | 101 | 93 | 80 | 88 | 90 | | −31 | + 7 | + 2 | |
| Capital equipment | 100 | 115 | 126 | 96 | 66 | 45 | 52 | 65 | | −64 | + 6 | +10 | |
| Construction materials | 100 | 104 | 106 | 83 | 59 | 35 | 42 | 46 | | −67 | + 7 | + 4 | |
| C. Consumption goods | | | | | | | | | | | | | |
| Durable | 100 | 122 | 132 | 105 | 80 | 56 | 66 | 77 | | −58 | + 8 | + 8 | |
| Other | 100 | 103 | 109 | 100 | 96 | 87 | 94 | 94 | | −20 | + 6 | 0 | |
| Capital equipment and construction materials | 100 | 110 | 117 | 90 | 63 | 40 | 47 | 56 | | −66 | + 6 | + 8 | |

index numbers measuring the changes in the manufacturing output of non-durable, semi-durable and durable goods (Classification A). Monthly fluctuations in the output of these types of goods are shown in Chart 3.

Since the replacement of durable goods may be postponed, their production ordinarily will be more seriously curtailed during periods of economic stress than will the production of other goods. Thus during the recent depression the output of durable goods dropped to 36 per cent of the 1929 level—almost three times the decline recorded for other goods. This relatively greater decline is also to be accounted for by the fact that many durable goods are essentially articles of luxury, and therefore satisfy marginal wants, or else are capital goods subject to a sensitive, derived demand. These factors tend to explain as well the greater advance in the output of these goods prior to the depression, an advance which is here shown only for 1927-29. In these two years alone the output of durable goods rose 22 per cent. Other evidence has shown that the rapidly increasing output of durable goods was one of the striking features of the entire post-War decade.[9]

In terms of a pre-recession base, the 1933 improvement was greatest in those industries which produce semi-durable goods. Chief among the products in this group are textiles, the output of which sky-rocketed in the early summer of 1933, largely in anticipation of possible inflation and of expected increases in costs under the codes of fair competition. While the activity that marked these early months of recovery was not continued, the increase was sufficiently great to raise the annual average[10] for the group by 11 per cent of the 1929 level. This is an improvement that compares with increases of 3 and 7 per cent (of 1929 output) in the production of perishable and durable goods respectively. However, the advance in the output of semi-durable goods was not continued into 1934, although the 1935 total will probably show a considerable increase. The rate of output of semi-durable goods during the first eight months is almost equal to that of 1929.

The processing of perishable goods has been one of the most stable of manufacturing activities. Closely allied with the general category of foods, the products in this group lagged in the general increases prior to 1929 and were spared much of the drastic decline that marked the depression. Declining least, this group likewise gained least on the upturn. Our measures place the 1934 level of output 15 to 20 per cent below 1929 per capita output. It is true that certain products formerly enjoyed a large export market, as for example flour; moreover, certain non-processed but increasingly important foodstuffs, such as fruits and vegetables, are not here included.[11] Notwithstanding these qualifications, there can be no return to former living standards until these elementary products are produced in greater volume.

*Human consumption goods and capital equipment*

Further analysis of the various elements of manufacturing production distinguishes between goods that are destined for use by final consumers and those for use as capital

[9] Cf. *Economic Tendencies in the United States*, by Frederick C. Mills (National Bureau of Economic Research, 1932).

[10] In textiles the averages for the years covered by the Census of Manufactures (1927, 1929, 1931, 1933) have been computed from extensive data on the output of various textile products, but for the intervening years, and for the monthly indexes, the information available relates chiefly to the mill consumption of basic raw materials.

[11] Another group of products not included in the above averages of manufacturing production are liquors and intoxicating beverages, omitted because of the technical difficulties of introducing new series into general index numbers. The increase in their output has been most rapid since the repeal of the Eighteenth Amendment in the summer of 1933. Activity in the industry is

equipment. This is a classification that is difficult to complete, because of the diverse uses of a primary material like lumber or steel or of a finished product like an automobile. Employing available data on the consumption of our manufactured product, and distinguishing building materials as a separate category,[13] we have the index numbers in Table 5 (Classifications B and C).

As would be expected, the production of goods for use as capital equipment declined far more than did the output of consumption goods. Production of building materials suffered similarly, since ultimately they are used in the creation of capital structures. How inadequate the current, curtailed rate of output of capital goods is, we cannot measure precisely. Even though a volume as great as that of 1929 is possibly not now necessary to an ordered and balanced productive structure, there exists a great amount of depreciated and obsolescent machinery which an active economy must soon replace.[14] In addition to expenditures for replacements and repairs new capital investments are necessary to install improvements delayed by the depression; other investments have been made necessary by new trends in consumer demand. These influences should further expand the increased activity in the capital goods industries of which our index numbers give evidence.

The physical output of goods for human consumption provides, in a sense, a measure of the changing welfare of the population. Gauged by such a criterion, consumers' real income, exclusive of services, declined about 30 per cent, 1929-32 (25 per cent, when non-manufactured consumers' goods are included, as in Table 6). Rising in volume 7 per cent of 1929 in 1933 and 2 per cent more in 1934, the level of output of goods destined for human consumption in 1934 remained over 20 per cent below 1929. Since the population increased 3.6 per cent during the same period, the per capita output of manufactured consumption goods in 1934 was almost 25 per cent below that of 1929. As measures of consumer takings, of course, these indexes are qualified by changes in stocks of goods and in foreign trade. Both factors would tend to reduce the extent of depression decline.

The components of the aggregate of consumption goods are marked by interesting and illuminating differences. If we combine certain of the major items in the general index, we can study the movements of four subgroups: foods, clothing, automobiles and related products, and finally, all other manufactured consumption goods. These group indexes are given in Table 6. In addition, measurements of certain consumption goods that require no processing are included. The output of these commodities has been maintained above the 1929 level throughout the period.

indicated by the following figures on production compiled by the Bureau of Internal Revenue.

| | FERMENTED MALT LIQUORS (*M bbls.*) | DISTILLED SPIRITS (*M proof gals.*) |
|---|---|---|
| *1933* | | |
| July-December | 16,211 | 17,324 |
| *1934* | | |
| January-June | 21,163 | 52,723 |
| July-December | 21,657 | 65,987 |
| *1935* | | |
| January-June | 23,297 | 93,380 |

A full appraisal of the extent of recovery in manufacturing should take account of this industry, which is about equal in importance to the boot and shoe or cigar and cigarette industries. Significant as is the activity in this industry, it is hardly of sufficient weight to alter materially the general averages presented above.

[13] Also distinguished is the minor group, producers' supplies (fuels, etc.), omitted from Table 5.

[14] The editors of the *American Machinist* estimate that 65 per cent of all metal working equipment is over ten years old and in their opinion obsolete. A similar ratio was found in the study of equipment in industrial power plants by another trade journal, *Power* (*American Machinist,* April 24, 1935, pp. 314-28, 348).

TABLE 6

OUTPUT OF CONSUMPTION GOODS, 1929-1934

| | MANUFACTURED CONSUMPTION GOODS | | | | | | |
|---|---|---|---|---|---|---|---|
| | FOODS | CLOTHING | AUTOMOTIVE PRODUCTS | OTHER | TOTAL | NON-MANUFACTURED CONSUMPTION GOODS[1] | TOTAL |
| *1929* | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| *1930* | 98 | 87 | 71 | 90 | 88 | 105 | 91 |
| *1931* | 92 | 89 | 59 | 74 | 81 | 107 | 86 |
| *1932* | 82 | 81 | 45 | 58 | 69 | 103 | 75 |
| *1933* | 84 | 93 | 52 | 66 | 76 | 102 | 81 |
| *1934* | 86 | 88 | 62 | 70 | 78 | 104 | 83 |
| Change as a percentage of 1929 | | | | | | | |
| *1929-32* | −18 | −19 | −55 | −42 | −31 | +3 | −25 |
| *1932-33* | + 2 | +12 | + 7 | + 8 | + 7 | −1 | + 6 |
| *1933-34* | + 2 | − 5 | +10 | + 4 | + 2 | +2 | + 2 |

[1] The classification of non-manufactured consumption goods includes all or a part of the following: fruits, vegetables and truck crops; milk; poultry products; fresh fish; anthracite coal; natural gas; electricity.

## IV. CHANGES IN OUTPUT PER WORKER AND OUTPUT PER MAN HOUR

One of the interesting depression relationships within the productive structure is that between the volume of goods produced and the amount of labor effort required to produce them. This relationship is usually described by the change in the ratio of production to the number of workers or the number of labor hours. Where there have been frequent and serious shifts in the working hours of employed labor, as during recent years with part-time work and the general introduction of a shorter work week, it is the second ratio which is the more significant. Unfortunately output per man hour is the more difficult to estimate, and the margin of error is accordingly greater. On the basis of available materials, estimates of productivity in manufacturing industries are presented in Table 7.

Combining our estimates of changes since 1929 in the volume of production and employment we secure an index (column 6) of the change in manufacturing output per employed worker. Reflecting the effect of work spreading through part-time employment and a shortened work week, this ratio was almost 10 per cent below 1929 in 1932, and after a slight rise in 1933, fell again in 1934.[14] When it is remembered that to this reduced output of employed workers, many of whom are employed only part time, must be added the annual reductions in output resulting from the idleness of approximately three or four million fully unemployed in manufacturing industries, the current loss to the community is obvious.

The operating efficiency of individual plants is better indicated by the ratios of production to aggregate man hours. These measurements indicate that the output per man hour of employed workers in manufacturing has increased considerably during the depression and has even further increased by relatively small amounts during recovery. While the amount of this increased productivity cannot be measured with absolute precision, there is strong evidence of the upward tendency in the ratio of output to labor effort. Whether the increase is twenty-five per cent or even as low as fifteen per cent,[15] the change indicates an economy of man power at a time when the community could perhaps best afford to spend it. The contrast of this economy of the labor supply in private productive operations to the lavish use of man power in relief employment projects is one of the anomalies of the recovery situation.

These recent increases in output per man hour must not be interpreted as increases in labor efficiency alone. Added requirements made of individual workers have of course operated towards a lower labor cost per unit of output and an increased labor productivity. Other forces, however, and certainly powerful ones, have served to increase the

[14] It is probable that during 1935 the ratio of output per worker will rise, for the reduction of part-time work rather than an increase in the number of workers is the first result of an increase in output. The present extent of part-time work in manufacturing is indicated by the fact that of the 87 industries for which the Bureau of Labor Statistics compiles data on average weekly hours worked, 28 industries reported for August 1935 an average work week of less than 36 hours and all but 15 industries a week averaging less than 40 hours. In this month the general average of 36.6 hours (secured by weighting the industries according to number employed in the years 1923-25) was the highest since August 1933. It should be noted, however, that fewer establishments report data on average hours worked than on employment and payrolls.

[15] That the 'typical' increase in output per man hour during the depression has been somewhat less than the amount given in Table 7 is indicated by the frequency distribution of estimates for 32 industries presented in Chart 4. An unweighted median of the changes in output per man hour in these industries is the figure given in *Bulletin 53,* Changes in Prices, Manufacturing Costs and Industrial Productivity, 1929-1934, by F. C. Mills. The series in Table 7 of the present *Bulletin* extends estimates that appeared in *Bulletin 51* (June 28, 1934). Certain of the earlier figures have been revised on the basis of 1933 Census of Manufactures figures now available.

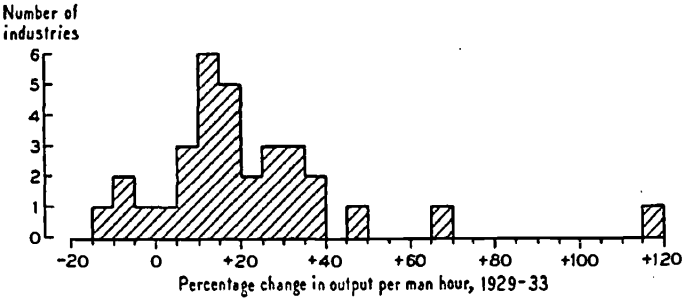
TABLE 7

OUTPUT PER WAGE EARNER AND PER MAN HOUR IN MANUFACTURING ESTIMATES[1] OF CHANGES, 1929-1934

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|
| YEAR | PHYSICAL OUTPUT OF MANUFACTURES | AVERAGE NUMBER OF WAGE EARNERS EMPLOYED | AVERAGE HOURS WORKED PER WEEK | MAN HOURS (3)x(4) | OUTPUT PER WAGE EARNER (2)÷(3) | OUTPUT PER HOUR MAN (2)÷(5) |
| *1929* | 100 | 100 | 100 | 100 | 100 | 100 |
| *1930* | 84 | 87 | 93 | 81 | 97 | 104 |
| *1931* | 72 | 74 | 87 | 64 | 97 | 112 |
| *1932* | 57 | 62 | 77 | 48 | 91 | 118 |
| *1933* | 65 | 69 | 76 | 53 | 94 | 123 |
| *1934* | 69 | 78 | 70 | 55 | 88 | 125 |

[1] These figures, which must not be accepted as precise measurements, apply only to activity in manufacturing industries as a whole. Variation in output per man hour in different industries is indicated by Chart 4; see also footnote 15 and the description of the basic index numbers given in the Appendix Note.

CHART 4
FREQUENCY DISTRIBUTION OF CHANGES IN OUTPUT PER MAN HOUR
32 MANUFACTURING INDUSTRIES, 1929-1933




output per man-hour ratio. We mention the more important of these, for they have serious bearing upon the interpretation of the striking figures of Table 7.

The recent increases in the ratio of output per man hour have been largely a phenomenon of contraction, during which the volume of output, the number of employed workers and of establishments were declining over 30 per cent. Some of the increase in output per man hour may thus be the result of a lightened load on the productive structure. Moreover, during periods of falling prices and continued business depression the less efficient workers, the less efficient equipment and the less efficient establishments are eliminated. This repeated culling of the best of productive resources for use in that activity which continues tends naturally towards a high, selective ratio of output per man hour. It would seem to follow from this argument that when a more normal rate of production has again been reached, the necessary absorption of the now idle elements will tend to reduce the index to pre-recession levels. But this tendency is not likely to be effective, for positive improvements in productive processes have already been made and will, in all probability, continue to be made. In some industries, including those marked by sharp increases in output per man hour, considerable labor-saving machinery has been installed during the depression and recovery periods; in other instances improvements have been secured without further capital investment. This second type of improvement has probably been more common during the recession period, for available records show little activity either in the production or the financing of capital goods. Simplification of processes, savings in the handling of materials, and the elimination of unessential steps or occupations as well as the dropping of activities not immediately necessary, such as research, construction or maintenance have all contributed towards the economical use of labor. These are improvements that tend to reduce costs of operation, but in contrast to technical and mechanical improvements they are the more difficult to hold fast during recovery.

That there are wide variations among different industries in the increase in output per man hour is indicated by estimates for 32 individual industries, shown in the unweighted frequency distribution of Chart 4. In some industries there is evidence of a loss. The general tendency, however, is definitely upward.

## SUMMARY

Records of the physical volume of production provide, during periods of changing price levels, one of the best of economic thermometers. Such records indicate that recovery continued in the United States in 1934 although lagging somewhat behind the improvement in the majority of the industrial countries of the world. In 1934 the nation's annual product was 7 per cent nearer the high levels of 1929 than it had been in 1932. Data for the first half of 1935 indicate that if the current rate be continued this year there will be a further increase equal to 6 per cent of 1929 output. Against this recovery must be set the depression decline of 35 per cent, which leaves the volume of production still 22 per cent below pre-recession levels. When population growth is considered the annual deficit is increased to over 26 per cent of 1929 production. In short, although recovery has been advancing, it has far to go before the rate of output and the standard of living of 1929 are restored.

APPENDIX TABLE
CHANGES IN THE OUTPUT OF INDIVIDUAL COMMODITIES, 1929-34

| | PERCENTAGES OF 1929 | | | |
|---|---|---|---|---|
| | CHANGE, 1929-32 | CHANGE, 1932-33 | CHANGE, 1933-34 | NET CHANGE, 1929-34 |
| *Agricultural products* | | | | |
| Sugar, domestic | +29.7 | +21.9 | −37.5 | +14.1 |
| Corn | +14.6 | −21.9 | −38.2 | −45.5 |
| Oats | +11.5 | −46.0 | −18.2 | −52.7 |
| Potatoes | + 9.2 | −11.5 | +19.9 | +17.6 |
| Wool | + 8.0 | + 4.2 | − 2.8 | + 9.4 |
| Barley | + 7.8 | −52.2 | −13.2 | −57.6 |
| Fruits and vegetables | + 7.4 | − 2.1 | + 3.2 | + 8.5 |
| Meat animals | + 5.0 | + 1.9 | + 7.0 | +13.9 |
| Milk | + 3.8 | 0 | − 3.8 | 0 |
| Rice | + 1.6 | −10.3 | + 3.0 | − 5.7 |
| Truck crops | 0 | − 7.1 | + 8.0 | + 0.9 |
| Poultry products | − 0.9 | + 0.9 | − 3.8 | − 3.8 |
| Hay | − 7.5 | − 5.6 | −18.7 | −31.8 |
| Wheat | − 9.2 | −26.4 | − 4.1 | −39.7 |
| Cottonseed | −12.2 | + 0.3 | −22.5 | −34.4 |
| Cotton | −12.3 | + 0.3 | −22.4 | −34.4 |
| Tobacco | −33.2 | +22.9 | −18.4 | −28.7 |
| *Minerals* | | | | |
| Gold | +13.9 | + 2.5 | +24.4 | +40.8 |
| Natural gas | −18.9 | 0 | +10.3 | − 8.6 |
| Crude petroleum | −22.0 | +12.0 | + 0.3 | − 9.7 |
| Anthracite coal | −31.9 | − 1.1 | +11.0 | −22.0 |
| Bituminous coal | −42.2 | + 4.9 | + 4.0 | −33.3 |
| Crushed stone | −43.9 | − 7.0 | +16.3 | −34.6 |
| Sand and gravel | −46.1 | − 7.2 | + 5.7 | −47.6 |
| Lead | −60.2 | + 3.6 | + 7.0 | −49.6 |
| Silver | −62.6 | + 0.6 | +15.4 | −46.6 |
| Zinc, slab | −66.7 | +17.6 | + 7.0 | −42.1 |

| | PERCENTAGES OF 1929 | | | |
|---|---|---|---|---|
| *Minerals (cont.)* | CHANGE, 1929-32 | CHANGE, 1932-33 | CHANGE, 1933-34 | NET CHANGE, 1929-34 |
| Gypsum | −71.8 | − 1.6 | + 4.0 | −69.4 |
| Copper | −72.8 | − 4.7 | + 1.9 | −75.6 |
| Iron ore | −86.5 | +10.5 | + 9.7 | −66.3 |
| *Series relating to manufacture* | | | | |
| Sheep, inspected slaughter | +28.0 | − 3.4 | − 0.9 | +23.7 |
| Mechanical refrigerators | +22.0 | +47.0 | +48.9 | +117.9 |
| Rayon | +11.1 | +60.8 | + 1.5 | +73.4 |
| Butter | + 6.1 | + 4.3 | − 6.9 | + 3.5 |
| Cheese | + 1.5 | + 9.9 | −15.6 | − 4.2 |
| Calves, inspected slaughter | 0 | + 9.9 | +54.9 | +64.8 |
| Cottonseed oil | − 4.6 | −10.3 | − 2.8 | −17.7 |
| Hogs, inspected slaughter | − 6.2 | + 7.2 | −10.3 | − 9.3 |
| Cattle, inspected slaughter | − 8.0 | +12.6 | +55.2 | +59.8 |
| Gasoline | −10.0 | + 2.5 | + 3.0 | − 4.5 |
| Silk deliveries | −11.2 | −13.1 | − 1.4 | −25.7 |
| Cigarettes | −13.3 | + 7.3 | +11.4 | + 5.4 |
| Boots and shoes | −13.6 | +10.0 | + 1.8 | − 1.8 |
| Electricity | −14.6 | + 2.3 | + 5.9 | − 6.4 |
| Flour, wheat | −15.8 | + 0.9 | + 1.0 | −13.9 |
| Canned milk | −18.2 | + 5.5 | + 9.8 | − 2.9 |
| Kerosene | −21.9 | + 9.4 | + 7.3 | − 5.2 |
| Sugar meltings | −22.1 | − 1.9 | 0 | −24.0 |
| Wrapping paper | −22.5 | +12.2 | − 5.2 | −15.5 |
| Wood pulp | −22.7 | +11.0 | + 4.1 | − 7.6 |
| Leather | −23.2 | +12.2 | +14.7 | + 3.7 |
| Newsprint paper | −25.7 | − 8.4 | + 4.3 | −29.8 |
| Paperboard | −25.8 | +17.4 | − 0.1 | − 8.5 |
| Cotton consumption | −29.6 | +17.4 | −11.3 | −23.5 |
| Cigars | −33.0 | − 2.1 | + 4.2 | −30.9 |
| Wool consumption | −34.0 | +22.3 | −23.3 | −35.0 |
| Fuel oil | −34.1 | + 5.1 | + 1.5 | −27.5 |
| Lubricating oil | −35.2 | + 4.1 | + 7.3 | −23.8 |
| Book paper | −36.8 | + 8.9 | − 1.7 | −29.6 |
| Fertilizers | −40.7 | + 4.1 | +12.7 | −23.9 |
| Tires | −41.7 | + 7.9 | + 2.9 | −30.9 |
| Inner tubes | −46.6 | + 8.7 | + 4.9 | −33.0 |
| Sulphuric acid | −48.1 | + 8.7 | + 6.1 | −33.3 |
| Explosives | −53.0 | + 4.5 | +11.9 | −36.6 |
| Lime | −54.1 | + 7.2 | + 3.3 | −43.6 |
| Cement | −55.3 | − 7.9 | + 8.8 | −54.4 |
| Tin deliveries | −59.1 | +23.7 | −12.6 | −48.0 |
| Wool carpet and rug loom activity | −62.2 | +17.8 | − 2.3 | −46.7 |
| Coke | −63.6 | + 9.7 | + 7.0 | −46.9 |
| Plate glass | −65.3 | +22.5 | + 3.5 | −39.3 |
| Trucks | −69.5 | +14.4 | +31.4 | −23.7 |
| Copper consumption | −70.8 | + 9.0 | − 3.7 | −65.5 |
| Lumber | −72.0 | +11.1 | + 0.1 | −60.8 |
| Flooring | −73.3 | + 1.5 | 0 | −71.8 |
| Passenger cars | −75.2 | + 9.5 | +13.6 | −52.1 |
| Steel ingots | −75.6 | +16.8 | + 5.4 | −53.4 |
| Air craft | −77.5 | − 1.1 | + 4.7 | −73.9 |
| Pig iron | −79.7 | +11.1 | + 5.9 | −62.7 |
| Locomotives | −87.8 | − 9.8 | + 9.8 | −87.8 |
| Railroad cars | −96.5 | − 1.3 | +24.3 | −73.5 |

## NOTES ON SOURCES OF DATA AND CONSTRUCTION OF INDEXES

*Chart 1.* The measures of industrial output in the United States include the production of minerals and manufactures and also the volume of construction. The component indexes appear in Table 3. Index numbers for other countries are those computed by the following agencies: Canada, Dominion Bureau of Statistics; United Kingdom, Board of Trade (see below); Germany, Institut für Konjunktorforschung; France, Statistique General; Italy, Ministero delle Corporazioni; Sweden, Sveriges Industriförbund; Japan, Ministry of Commerce and Industry. Different methods used in constructing the index numbers and variation in the coverage of productive activities reduce somewhat the comparability of the measurements. The index for the United Kingdom as published by the Board of Trade has been altered somewhat by combining with it the estimates of construction volume shown in Chart 2, with weights based upon the numbers employed in 1931 in building and in other industrial activities. The purpose of this adjustment of the British series is to improve its comparability with the other indexes.

*Chart 2.* Changes in the output of mineral products, textiles, and manufactured foodstuffs are based upon groupings of series included in the general index numbers. Changes in steel output and in construction activity are taken from available records for each country. The output of steel is represented in every general index. Construction is also included in the general averages, except in that for Japan, for which no estimates of building activity are available, and in that for Sweden, for which estimates of residential construction only are available. The Swedish estimates are used in Chart 2, however.

All measures showing the extent of decline and recovery in the various industrial divisions are relative to 1929 output. Whenever the decline, relative to 1929, did not occur until 1931 or 1932, the change has been computed from the 1929 level and no entry made for the changes during the intervening years. Where the 1933 recovery did not continue in 1934, chiefly in the textile division, the extent of recovery remaining is the 1934 figure shown.

*Chart 3.* The monthly series are subgroups of the Federal Reserve Board index of manufacturing production, the two groups, perishable and semi-durable goods having been computed from the Board's index of non-durable goods. The industries included in each group are as follows. Perishable: meat packing, flour, sugar refining, tobacco products, petroleum refining, paper and printing; Semi-durable: textiles, leather, boots and shoes, rubber tires and tubes; Durable: iron and steel, coke, lumber, transportation equipment, cement, glass, lead, zinc, tin. It is probable that fluctuations in the aggregate of manu-

facturing industries are somewhat less in amplitude than is indicated by these samples, first, because the possibilities of offsetting movements of the components are greater; second, because a higher percentage of the more fabricated products is present than in these restricted samples. The annual index numbers given in the tables and in the text differ somewhat from the annual averages of these monthly figures. These differences are indicated on the chart by the length of the arrows joining the charted points of the two annual averages. With one exception the more comprehensive averages are higher, with reference to the 1929 base, than those of the monthly series. This exception occurs in the average of the output of perishable goods in 1934, the smaller sample being the more influenced by the sharp rise in the meat packing industry occasioned by the distress selling of cattle following the drought. The decline in the slaughter of meat animals in 1935 has restored the former relationship between the two averages.

*Table 3.* The output of farm products is measured by the index of agricultural production of the United States Department of Agriculture. The indexes of output of minerals and of manufactured products have been constructed by the National Bureau of Economic Research from statistics of annual production of 18 minerals (pig iron is considered a manufactured product) and from available data on manufacturing industries. The index of manufactures, which is based on the biennial reports of the Census of Manufactures, is similar to that described in *Economic Tendencies* and in *Bulletin 51,* Appendix B. In applying weights to the various components, changes during the depression in the importance of different industries are considered.

The index of construction volume is based upon the estimates of private, public utility and public construction given in the text. Correction was made for changes in construction costs as measured by the composite of (a) an index based upon wages of skilled and unskilled workers employed in building as compiled by the *Engineering News-Record* and a specially weighted index of wholesale prices of building materials; and (b), an average of the index of costs in all types of building of the American Appraisal Company and the index computed by the United States Bureau of Public Roads from data in bids accepted for Federal highway construction. Some attempt is made in the latter indexes to take account of technological changes. The index of total production is a composite of the above groupings with the weighting factors given in footnote 5 to the text. The figures used in this and all other calculations have been carried to more decimal points than are given in the tables.

*Table 7.* The indexes given in Table 7 extend those given in Table III of *Bulletin 51,* which were described in the Appendix Note to that *Bulletin.* The index of manufacturing output, which includes both finished and semi-finished goods, is that of Table 3 above; the index of average number employed is from the Census of Manufactures, with estimates for non-censal years based upon the employment index of the Bureau of Labor Statistics. The index of hours worked per week for 1932-34 is based on the sample returns compiled by the Bureau of Labor Statistics; for 1929 the estimate is the full-time hours reported in the Census adjusted by the ratio of actual to nominal hours per week for the industries in the National Industrial Conference Board sample. Estimates for other years were obtained by interpolation.

## COOPERATIVE RESEARCH

Following its custom of inviting representatives of other agencies to assist it in planning its research program the National Bureau held a conference on June 1 at which the following resolution was adopted:

That at the initiative of the National Bureau of Economic Research a committee be appointed by the departments of economics of selected universities, or by the appropriate equivalent economic research organizations of these universities. The representatives should be not more than two from each university so invited.

That this committee, in conjunction with the National Bureau, through its two representatives on the committee, should examine the major research problems of common interest, should undertake if possible one or more cooperative projects of economic research, and not later than the end of 1937 should recommend that form of continuing organization which study and experience have suggested.

Accordingly the National Bureau invited representatives of six universities—Harvard, Columbia, Pennsylvania, Chicago, Wisconsin and Minnesota—to meet with its representatives at Shawnee-on-Delaware, September 7-8. After discussion concerning the best methods of organizing research so as to retain the stimulus of intellectual initiative on the part of individuals while securing the advantages of cooperation, it was agreed that the National Bureau should call two conferences, one on price research, the other on the distribution of wealth and of income. At these conferences specialists will examine the objectives of studies in their respective fields, consider the formulation of programs of research and explore the possibilities of cooperative action. Both universities and organizations which are carrying on research in these and allied fields are to be represented.

The meeting on price research is to be held on November 29-30; the date of the meeting on the distribution of wealth and of income has not yet been determined.