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Changes in Prices, Manufacturing Costs and Industrial Productivity, 1929-1934

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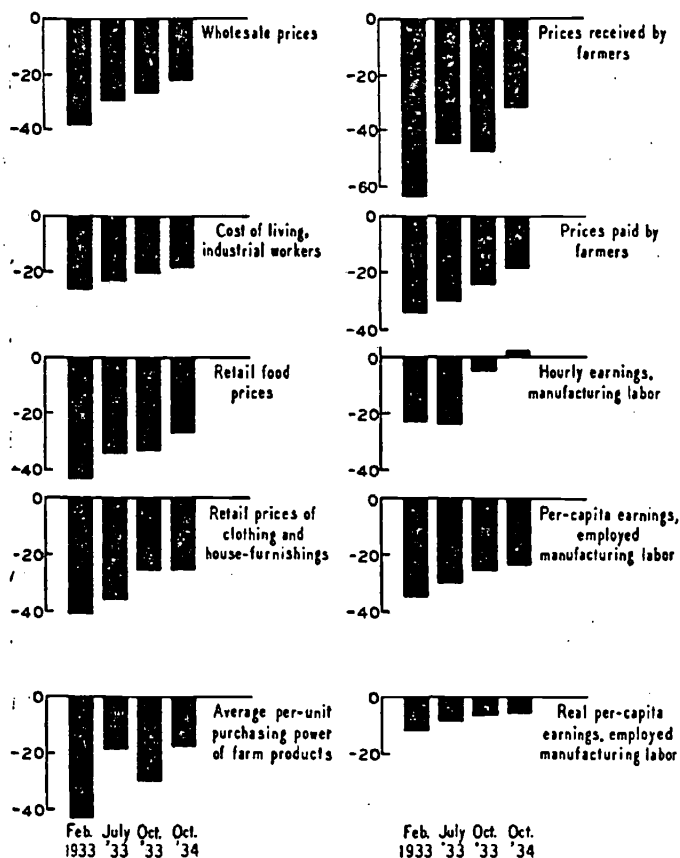
RECESSION AND RECOVERY IN PRICES AND EARNINGS

EVERY major business recession disrupts existing ties among the elements of the economic system. This process of disruption, it is true, may be preceded and paralleled by correctional changes—movements tending to lessen strains developing during the phase of business expansion. But in a serious decline the correctional movements pass into a destructive stage that may outlast and outweigh the period of amelioration. In this stage such balance as may have existed between the incomes of consumers and the aggregate values of goods offered for sale is dislocated. Established relations between production costs and final selling prices are radically altered. The host of price relations that condition the movements of goods along the channels of trade are subject to shifting and distortion. Recovery, following such a general tumbling of values, may be effected through adaptation to altered relations, through restoration of earlier relations, or through some combination of these two modes of adjustment.¹

The wide inequalities of price changes occurring during the last five years have been, at once, manifestations of profound disturbances in the physical conditions of production and distribution and obstacles to the resumption of normal activity. The character and significance of these disturbances have been discussed in earlier *Bulletins* of this series.² The price scene is a rapidly changing one, however, and current price relations are of continuing in-

¹ Space limitations prevent an adequate statement of the relation of the price and other 'distortions' of recession and depression to the system in existence prior to the recession. This pre-existing system may have been far removed indeed from one of perfect equilibrium. The fact that recession occurred is evidence that correctional changes were required. It is a fair assumption, however, that the distortional effects of the most recent recession were dominant between, let us say, 1930 and the winter of 1932-33, and that the extreme differences between relative prices which pre-

Figure 1
GRAPHIC PRESENTATION OF CHANGES IN VARIOUS ELEMENTS OF THE PRICE STRUCTURE OF THE UNITED STATES, AND IN RELATED FACTORS JULY, 1929, TO OCTOBER, 1934
(Changes are measured as percentage deviations from the level of July, 1929)



vailed in February, 1933, represented barriers to the movement of goods in customary volume.

² No. 40, November 22, 1930; No. 42, December 23, 1931; No. 45, February 20, 1933; No. 48, October 31, 1933.

Table 1

INDEX NUMBERS DEFINING CHANGES IN VARIOUS ELEMENTS OF THE PRICE STRUCTURE OF THE UNITED STATES, AND IN RELATED FACTORS, JULY, 1929, TO OCTOBER, 1934

| <i>Economic element</i> ¹ | <i>July</i> <i>1929</i> | <i>Feb.</i> <i>1933</i> | <i>July</i> <i>1933</i> | <i>Oct.</i> <i>1933</i> | <i>Oct.</i> <i>1934</i> |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Wholesale prices | 100 | 62 | 71 | 74 | 79 |
| Cost of living of industrial workers | 100 | 74 | 77 | 80 | 82 |
| Retail food prices | 100 | 57 | 66 | 67 | 73 |
| Retail prices of clothing and house-furnishings | 100* | 59 | 64 | 74 | 74 |
| Prices received by farmers | 100 | 37 | 56 | 53 | 68 |
| Prices paid by farmers | 100 | 66 | 70 | 76 | 82 |
| Hourly earnings, manufacturing labor | 100 | 77 | 76 | 95 | 102** |
| Per capita earnings, employed manufacturing labor | 100 | 65 | 70 | 74 | 76 |
| Average per-unit purchasing power of farm products ² | 100 | 57 | 81 | 70 | 82 |
| Real per capita earnings, employed manufacturing labor ³ .. | 100 | 88 | 91 | 93 | 94 |

*October, 1929

**September, 1934

¹ Sources and descriptions of these index numbers appear in the Appendix Note.

² Percentage relation of index of average prices received by farmers to index of average prices paid by farmers for commodities used in production and in family maintenance.

³ Percentage relation of index of average weekly earnings of manufacturing employees to index of cost of living of industrial workers.

terest. These relations may be viewed against the background of changes which have occurred since July, 1929. Table 1 and Figure I provide materials for such a survey.

Here we have a graphic record of the price aspects of the recession which culminated in the winter of 1932-33, and of the subsequent recovery. The picture is an impressive one. Without exception the series presented were higher in October, 1934, than in October, 1933,³ and substantially higher than at the low point of February, 1933. The upward climb was not unbroken, but the diagram gives a faithful impression of the cumulative effects of price recovery over this period. All major elements of the price system have felt the lift in values that has occurred during the last twenty months.⁴

The two final entries in the table and the corresponding figures in the chart relate to 'real values', in that account is taken of the effects of changing prices. The per-unit purchasing power of farm products, which had fallen 43 per cent during the recession, recovered the major part of

³ Retail prices of clothing and house-furnishings were only fractionally higher in October, 1934. The check to the advance of these prices, after the very sharp climb in the summer and fall of 1933, is worthy of note.

⁴ We are here concerned with the manifestations and consequences of the price advance that may be dated from February, 1933, rather than with the causal factors in that advance. Escape from some of the fears and uncertainties of the interregnum between administrations, suspension of specie payments, buying and building up of inventories in expectation of inflation and of higher prices under the codes, the quickening influence of reviving domestic trade, and, more recently, crop shortages, all contributed at different times and in varying degree to the upward movement.

this loss in the succeeding twenty months. In October, 1934, this index was 18 per cent lower than in July, 1929. The real earnings, per capita, of employed manufacturing labor advanced from a level 12 per cent below the 1929 base, in February, 1933, to a level only six per cent below that base, in October, 1934. The gain in the average dollar income of manufacturing workers was more than sufficient to offset rising living costs. The net advance over a period of twenty months amounted to seven per cent, a notable gain in real earnings, achieved in the face of reductions in the hours of labor. Hourly earnings advanced materially, of course, the chief gain being made between July and October, 1933.

SHIFTS IN THE STRUCTURE OF WHOLESALE PRICES

We pass now to certain of the changes occurring within the field of wholesale prices. The entries in Table 2, which are graphically portrayed in Figure II, define the relevant movements.

These measures show changes in the real values, per unit, of the commodities in the groups named. That is, the actual price index numbers of these groups have been divided by a general index of wholesale prices. The measurements thus define deviations from the general price level, with relations prevailing prior to the recession taken as the standard of reference.

The major differences developing between July, 1929, and February, 1933, are clearly revealed in the graphic presentation.⁵ The recession brought advances in the real ⁵These price differences represent, in some degree, adjustments to varying changes in producing costs. Among manufactured

Table 2
INDEX NUMBERS OF AVERAGE PURCHASING POWER, PER UNIT,
OF COMMODITIES AT WHOLESALE, IN THE UNITED STATES, JULY, 1929 TO OCTOBER, 1934

A. MAJOR COMMODITY GROUPS¹

| Commodity group | Index numbers of purchasing power, per unit | | | | |
|---------------------------------------|--|--------------|--------------|--------------|--------------|
| | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 |
| Raw materials | 100 | 82 | 91 | 87 | 92 |
| Manufactured goods | 100 | 111 | 106 | 108 | 104 |
| Foods | 100 | 81 | 88 | 82 | 92 |
| Non-foods | 100 | 112 | 108 | 111 | 105 |
| Products of American farms, raw | 100 | 64 | 82 | 73 | 85 |
| All other products | 100 | 110 | 105 | 108 | 104 |
| Producers' goods | 100 | 96 | 100 | 98 | 99 |
| Consumers' goods | 100 | 104 | 100 | 102 | 101 |

B. CLASSES OF PRODUCERS' AND OF CONSUMERS' GOODS¹

| Classes of pro- ducers' goods | Index numbers of purchasing power, per unit | | | | | Classes of con- sumers' goods | Index numbers of purchasing power, per unit | | | | |
|--|--|--------------|--------------|--------------|--------------|----------------------------------|--|--------------|--------------|--------------|--------------|
| | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 | | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 |
| All producers' goods | 100 | 96 | 100 | 98 | 99 | All consumers' goods | 100 | 104 | 100 | 102 | 101 |
| Raw | 100 | 80 | 89 | 87 | 92 | Raw | 100 | 90 | 96 | 90 | 94 |
| Processed | 100 | 116 | 111 | 112 | 107 | Processed | 100 | 108 | 102 | 105 | 103 |
| Intended for human con- sumption | 100 | 74 | 89 | 85 | 90 | | | | | | |
| Intended for use in capital equipment | 100 | 118 | 108 | 107 | 104 | | | | | | |
| Intended for use in build- ing materials | 100 | 123 | 116 | 118 | 109 | | | | | | |
| Producers' goods intended for human consumption | 100 | 74 | 89 | 85 | 90 | Consumers' goods, processed | 100 | 108 | 102 | 105 | 103 |
| Foods | 100 | 65 | 82 | 71 | 88 | Foods | 100 | 96 | 92 | 90 | 97 |
| Non-foods | 100 | 83 | 96 | 97 | 92 | Non-foods | 100 | 119 | 110 | 118 | 109 |

¹ The price index numbers from which the above measurements of per-unit purchasing power have been derived are given in Appendix Table A. They are described in the Appendix Note.

per-unit worth of manufactured goods, declines in the real per-unit worth of raw materials, advances among non-foods, declines among foods, advances among consumers' goods, and declines among producers' goods.* Conspicuous

goods the reduction of costs is almost inevitably slower than among raw materials, because of the greater importance of fixed charges in the production of fabricated products. Yet with respect to trading relations between major producing groups, such as raw-material producers and manufacturing groups, price differences created over a short period are true disparities, tending to alter the basis of trade and to lessen the volume of inter-group trade.

* Producers' goods include capital equipment, building materials and all those raw and partly processed products not ready for use in the satisfaction of ultimate human wants. Consumers' goods include all commodities ready for consumption or use by the final consumers.

is the difference developing between the average per-unit values of raw farm products and of all other goods. Notable, too, are the differences developing among different classes of producers' and of consumers' goods, and the exceptionally high values of building materials and of goods for use in capital equipment. The strikingly wide price margin prevailing in February, 1933, between processed consumers' goods and producers' goods intended for human consumption is an indication of the relatively high per-unit cost of fabrication at the low point of depression. The significance of such disparities has been suggested above. Each of these major differences represents a host of individual cleavages, breaks in a multitude of producing and trading relations. The net result is to check normal activity until readjustment to new relations can be effected,

or until working approximations to old relations may be established.

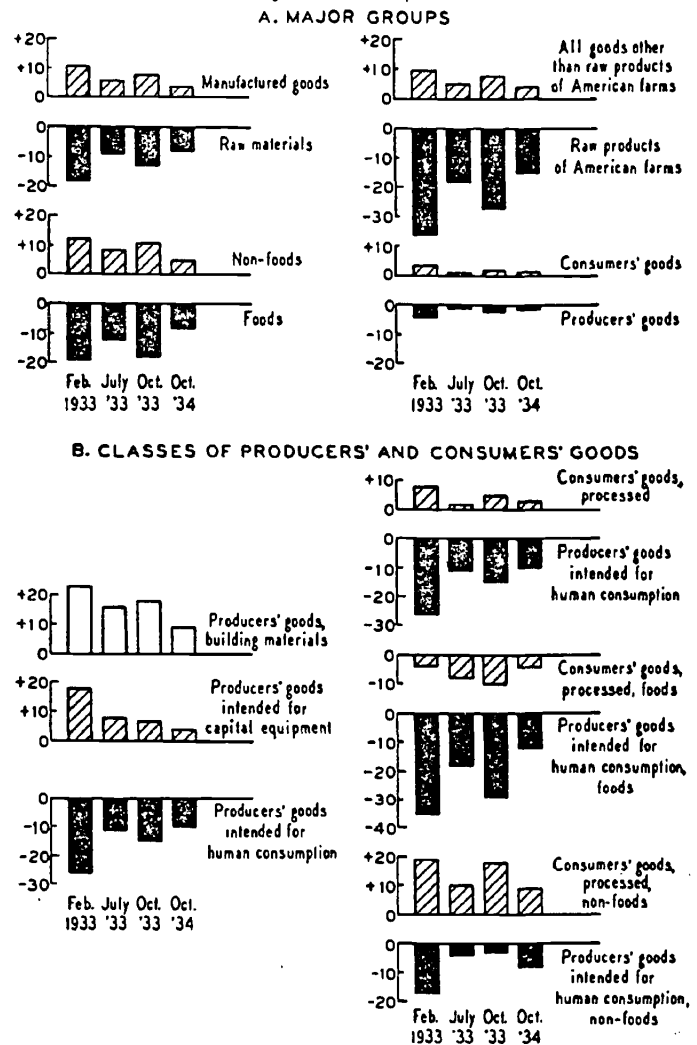
If we assume that some degree of return toward pre-recession relations is conducive to a restoration of economic activity, then we must conclude from the record that the price movements of the twenty months from February, 1933, to October, 1934, have been salutary. Price cleavages among the major commodity groups have been reduced. The high real values of building materials and of goods for capital equipment have been somewhat lowered, as a result of the advance in other prices, although they remain out of line with commodities in general. The high fabrication margin between producers' goods intended for ultimate human consumption and finished consumers' goods has been narrowed. The last twelve months, in particular, have brought notable gains in all these cases. This improvement is significantly in contrast to the definitely retrogressive tendencies prevailing from July to October, 1933. The general enforcement of new industrial codes during the third quarter of 1933, combined with a swing back from the sharp advance of the preceding quarter, served to widen relative price differences, raising costs which were already high and depressing prices already low. But recent movements have taken a more favorable turn. Crop shortage, on the one hand, an apparent lessening of the pressure toward higher prices under industrial codes, on the other, have been factors in these changes. Although some important discrepancies persist, definite progress has been made toward the establishment of price relations closer to those prevailing prior to the economic blizzard of 1929. These price movements do not, of course, constitute recovery, but it is fair to assume that they clear the ground for renewed physical activity.

In using July, 1929, as the standard of comparison in this survey, we should not assume that the relations then prevailing constituted a 'normal' condition. That month is a convenient base of reference. It provides a standard against which the magnitude of later changes may be measured, but it does not provide a criterion of what is economically or socially desirable. The reader may find it of interest to compare the shifts in price relations defined in Table 2 with changes measured against a broader base. Table B, in the Appendix, contains measurements corresponding to those in Table 2, in the text, but on a base secured by averaging measurements for the years 1927, 1928 and 1929.

PRODUCTION AND PRICE MOVEMENTS AND THE AGGREGATE PURCHASING POWER OF PRODUCING GROUPS

This conspectus of recent price history has shown how serious were the breaks resulting from the first impact of the recession, and has revealed the extent of the readjustment already effected. To secure a general picture of the

Figure II
GRAPHIC PRESENTATION OF CHANGES IN THE REAL VALUES, PER UNIT, OF COMMODITIES IN SELECTED GROUPS
JULY, 1929, TO OCTOBER, 1934
(Changes are measured as percentage deviations from July, 1929, parity with general wholesale prices)



economic shifts of recession and recovery, we must supplement this account with a brief survey of changes occurring in the volume of production, the average price of products or services and the gross income of certain major producing groups in the United States.

The income estimates given below for producers of farm products, raw mineral products and manufactured products, and for industries engaged in railroad transportation and in construction, relate to gross income, without any reduction for cost of materials or for other production costs. They are highly significant, however, in defining changes in the aggregate purchasing power of producing groups in each of these five fields. Perhaps the most effective comparison among these industrial groups is that which may be made with reference to Figure III. Here are shown production changes, price changes and changes in gross income between

Table 3
INDEX NUMBERS OF PRODUCTION, PRICES AND GROSS INCOME, 1929-1934
SELECTED INDUSTRIES OF THE UNITED STATES¹
(1929=100)

| Year | Farm | Raw | Manufacturing | Construction | Railroad |
|-----------------------|-----------------|---------|---------------|--------------|----------|
| | | mineral | | | freight |
| <i>Production</i> | | | | | |
| 1929 | 100 | 100 | 100 | 100 | 100 |
| 1930 | 98 | 89 | 87 | 90 | 86 |
| 1931 | 103 | 75 | 75 | 76 | 69 |
| 1932 | 95 | 62 | 60 | 49 | 52 |
| 1933 | 92 | 66 | 67 | 36 | 56 |
| 1934* | 87 | 71 | 70 | 38 | 60 |
| <i>Average Prices</i> | | | | | |
| 1929 | 100 | 100 | 100 | 100 | 100 |
| 1930 | 86 | 93 | 91 | 96 | 99 |
| 1931 | 60 | 81 | 78 | 85 | 98 |
| 1932 | 45 | 78 | 70 | 75 | 97 |
| 1933 | 48 | 78 | 72 | 82 | 93 |
| 1934* | 61 | 88 | 80 | 87 | 92 |
| <i>Gross Income</i> | | | | | |
| 1929 | 100 | 100 | 100 | 100 | 100 |
| 1930 | 81 | 81 | 79 | 87 | 85 |
| 1931 | 60 | 53 | 58 | 65 | 67 |
| 1932 | 42 | 42 | 42 | 37 | 51 |
| 1933 | 44 ² | 43 | 48 | 29 | 52 |
| 1934* | 53 ² | 52 | 58 | 33 | 55 |

*Based on first ten months of 1934, except as stated in the Appendix Note.

¹ This classification refers to individual products. The indexes derived, therefore, may differ somewhat from groupings in which an entire enterprise is treated as a whole, without regard to the fact that it may be engaged in several diverse fields of production.

Index numbers measuring changes in production, average price and gross income in a given industrial group should be self-consistent, in that the gross income index for a given year should be capable of derivation, by multiplication, from the two other measurements. For certain of the groups named above these three sets of index numbers have been independently derived, and are somewhat inconsistent. Reasons for this are found in differences of weighting, coverage, and procedures used in averaging the basic measurements. As they stand, however, the measurements portray with reasonable accuracy the major changes occurring over the period covered. Detailed descriptions of the several index numbers are given in the Appendix.

² These index numbers would be 46, for 1933, and 58, for 1934, if in the gross income of farmers we include benefit, rental and drought-relief payments.

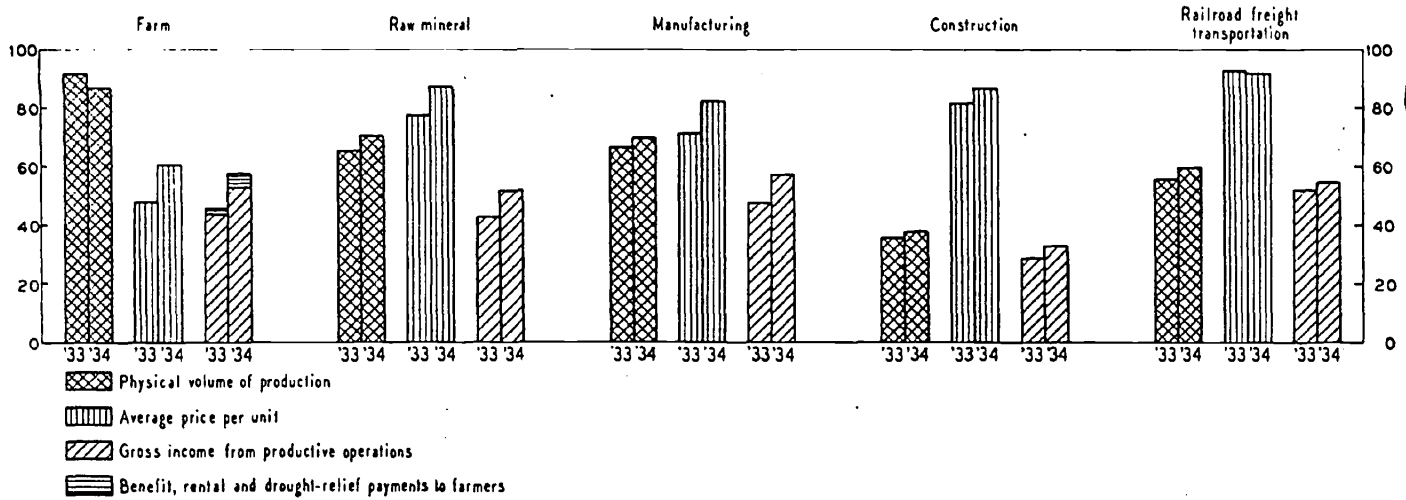
1929 and 1933, between 1929 and 1934, and between 1933 and 1934. (It should be noted that the 1934 entries are estimates based upon the latest available records, which cover, in most instances, the first ten months of the year.)

Measurements of production changes from 1929 to 1933 reveal wide differences among these groups. The output of farm products remained high, being, in 1933, only eight per cent below the 1929 average. At the other extreme we find a drop of 64 per cent in the volume of construction and a decline of 44 per cent in the volume of railroad freight transportation. In the field of prices the story is different. As compared with farm prices 52 per cent below the 1929 level, the average per-unit cost in construction industries in 1933 stood only 18 per cent below the same standard, and the average per-unit cost of railroad transportation services was only seven per cent below the 1929 level. The 1933 gross

income figures for the five groups show no such wide variation. With the exception of construction industries, for which income was 71 per cent below the 1929 level, the industrial groups represented are fairly close together. Gross income was reduced for these other groups by amounts ranging from 48 to 57 per cent. This result was brought about in agricultural industries through the reduction of prices and the maintenance of production, in railroad transportation (as in construction) through the maintenance of prices and the reduction of production. Raw mineral producers and manufacturing producers suffered declines in both production and prices, but production decreases exceeded price declines.

From 1933 to 1934 production increased for all groups except farmers; for all groups except railroads prices increased; for all groups without exception gross income ad-

Figure III
 INDEX NUMBERS OF PRODUCTION, AVERAGE PRICES AND GROSS INCOME
 SELECTED INDUSTRIES OF THE UNITED STATES
 (1933 and 1934 as percentages of 1929)



vanced. These advances, as estimated from data now available, ranged from six per cent for railroads to 26 per cent for agricultural industries (the latter including benefit, rental and drought-relief payments).

The month-by-month record of changes in the volume of production and in the average prices prevailing over broad industrial areas is sometimes less revealing than are the annual figures. The annual aggregates of production and gross income, and the annual averages of prices for the five major groups here represented give unmistakable evidence of substantial progress from 1933 to 1934.

PRODUCTION AND PRICE CHANGES IN MANUFACTURING INDUSTRIES

From these general records of industrial changes we proceed to a more detailed consideration of the fortunes of manufacturing industries during depression and recovery. Some of the sharpest economic issues of the crisis and depression have centered about production and price policies in manufacturing industries. Here the difficulties due to the interaction of diverse forces have been as tough and as complex as any raised by the depression. Problems of production control, of price making, of readjusting capital values to changed standards have complicated the special difficulties of code making and code application that arose under the National Recovery Act. The trading relations of manufacturing industries with other major producing groups have been demoralized by the price inequalities developing during the recession, and persisting thereafter. In following the fortunes of these industries during depression and recovery we shall be dealing with matters lying near the heart of our current troubles.

This survey of production and cost changes in manufacturing industries is the more interesting because of the special character of the industrial structure of the United

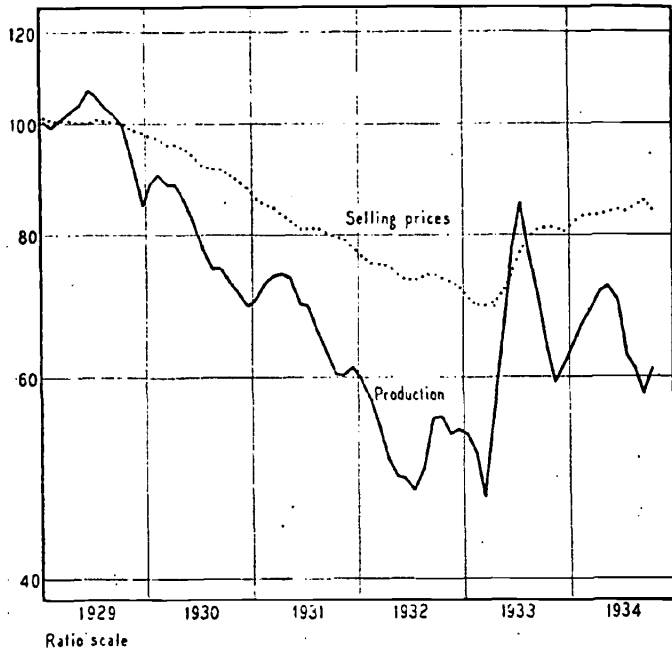
States. This structure represents a unique combination of raw-material producing and manufacturing industries. During the strains of cyclical fluctuations these two important elements of the economy react in distinctive ways to the forces of recession and recovery. Where one type of industry predominates some homogeneity of response to the forces of business cycles is to be expected. But in an economy which combines two major elements, with distinctive modes of behavior, special strains may be expected during a cycle, particularly during those phases which involve substantial readjustment over fairly short periods. Internal schisms leading to both economic and political friction are more likely to develop under these conditions, and the economic situation is likely to be more confused and uncertain than where the impact of economic forces is more uniform.

Precisely such a situation developed in the United States during the most recent recession. Indeed, the fortunes of raw-material producers and of manufacturing producers had followed notably divergent courses during earlier periods, including many years when the dominant tone of American economic life was one of prosperity. But during the years following the initiation of the 1929 recession major disparities appeared among the records which define the price, production and employment changes in the various elements of the national economy. These elements, never in perfect step even during eras of general prosperity, became badly tangled during the violent disturbances of the most recent recession. Elements of varying flexibility and of varying sensitivity, exposed to major shocks, respond in diverse ways. The national economy of the United States, containing more heterogeneous elements, perhaps, than any other major national economic system, has suffered especially severe internal distortion under the strains of readjustment.

Some indication of the magnitude of those strains has been given in preceding tables and charts, depicting the divergent movements of various economic elements under the impact of recession. One major element is composed of the group of manufacturing industries. Behaving in distinctive ways during recession and depression, facing particularly difficult obstacles in the task of readjustment, containing within itself subordinate groups of widely different character, this element of the national economy is worthy of somewhat more detailed study.

Evidence of the strains of readjustment in this group is afforded by the records of month-to-month changes in the volume of manufacturing production and in the average selling prices of manufactured products. These changes, for manufacturing industries in the aggregate, are shown

Figure IV
CHANGES IN PRICES AND PRODUCTION
MANUFACTURING INDUSTRIES OF THE UNITED STATES
1929 - 1934

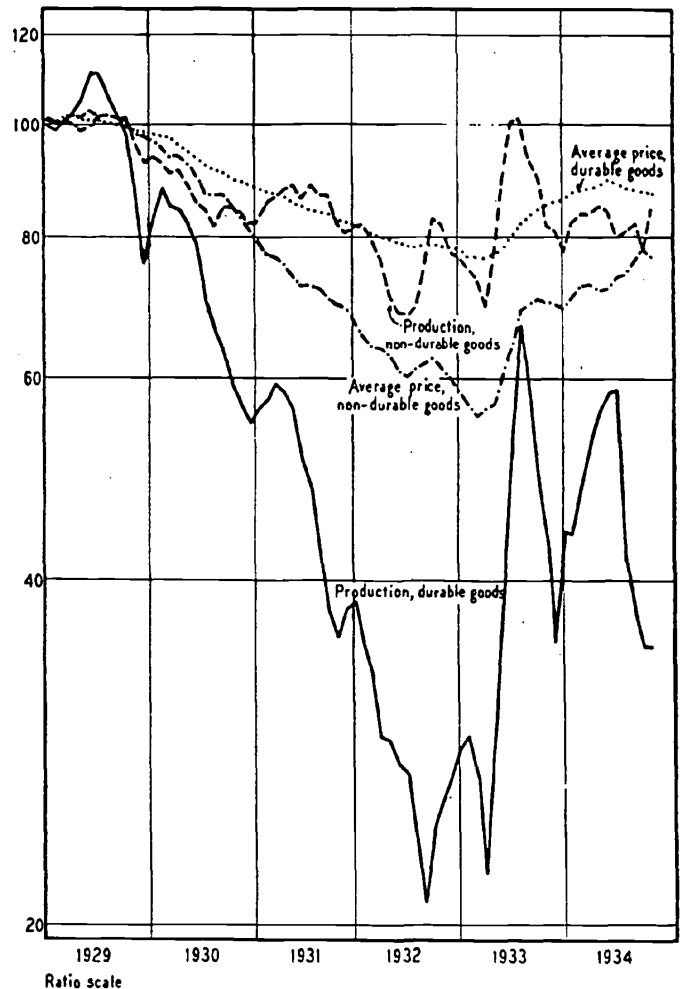


graphically in Figure IV. The volume of production, it will be noted, dropped from 1929 to 1932 in a series of precipitous declines interrupted by sporadic recoveries. The net decline from the high point in June, 1929, to the low point in July, 1932, amounted to 55 per cent. After the attainment of this low and the erratic swings of the eight months following came the upward surge of the spring recovery in 1933, followed by a sharp decline in the fall, an upswing in the spring of 1934, a subsequent decline in the summer months, and the recent advance. In contrast to these sporadic and violent changes is the steady although relatively severe decline in selling prices from July, 1929, to February, 1933, and the fairly steady advance since then. As we have already noted, the net decline in volume of

manufacturing production was considerably greater than the net decline in average selling prices. Declining sales and reduced production were necessary accompaniments of the retarded drop in the selling prices of manufactured goods.

These aggregate and average figures for manufacturing industries conceal many divergent movements. Striking examples are afforded by the series plotted in Figure V. Here are depicted the changes occurring in the aggregate output

Figure V
CHANGES IN PRICES AND PRODUCTION
MANUFACTURING INDUSTRIES OF THE UNITED STATES
1929 - 1934
Durable and Non-durable Products



and in the average prices of durable and of non-durable products of manufacture. The most severe decline in production occurred among industries producing durable goods. Here we have a drop to a level 76 per cent below the 1929 average, as contrasted with a decline of only 31 per cent in the production of non-durable manufactured goods. Just the reverse of these relations is found among the corresponding price series. Durable goods remained relatively high in price, while non-durable goods, for which produc-

tion was relatively well sustained, suffered a much more severe price decline. These relationships are, of course, to be expected. When production is maintained during a period of recession, prices necessarily suffer. On the other hand the maintenance of prices when demand is declining usually entails a sharp reduction of output.

CHANGES IN INDUSTRIAL PRODUCTIVITY

For a better understanding of the currents of change affecting manufacturing industries during this period of drastic recession and of recovery, we should trace alterations in manufacturing productivity and in production costs. Available records permit these movements to be followed only through 1933, for most manufacturing industries. We shall concern ourselves first with changes in industrial productivity in manufacturing industries. For convenience, productivity changes may be measured in terms of output per wage-earner or of output per man-hour. Actually, of course, the factors affecting productivity are many, including equipment, elements of organization and administrative efficiency, as well as the industrial skill and constancy of application of members of the working force.

The decade 1919-1929 witnessed one of the greatest advances ever recorded in industrial productivity in American manufacturing industries. Output per worker employed increased no less than 41 per cent. The significance of this figure may be brought home more vividly if we realize that it means that in 1929, 71 men, working with the improved equipment then available, could produce the volume of goods for which 100 men were required in 1919. What have the depression years added to this striking advance? The answer to this question is suggested by the figures in Table 4.

Table 4

MEASUREMENTS OF CHANGES IN PRODUCTIVITY, 1929-1933

MANUFACTURING INDUSTRIES OF THE UNITED STATES

| Year | Index of output per wage-earner ¹ | Index of output per man-hour ² |
|------|--|---|
| 1929 | 100 | 100 |
| 1931 | 99 | 111 |
| 1931 | 100 | 100 |
| 1933 | 95 | 104 |

¹ Median of measurements relating to 112 manufacturing industries for the years 1929-31, and to 60 manufacturing industries for the years 1931-33 (based upon data compiled by the United States Bureau of the Census).

² Median of measurements relating to 33 manufacturing industries for the years 1929-31, and to 25 manufacturing industries for the years 1931-33 (based upon data compiled by the United States Bureau of the Census, United States Bureau of Labor Statistics, and the National Industrial Conference Board). These indexes differ somewhat from those appearing in *Bulletin No. 31* of this series because, for the present purpose, use was made of unweighted medians rather than of weighted averages, and because more recent data have been used in deriving the present measurements.

From 1929 to 1931 output per wage-earner employed remained practically constant; from 1931 to 1933 it de-

clined by about five per cent. Here is a notable change from the steady advance recorded during the pre-recession decade. However, in interpreting these figures we must note one important industrial change in recent years. During this recession, particularly in its later stages, the practice of reducing hours in order to retain men in employment was widely adopted. This would, of course, involve a reduction in output per wage-earner employed, even though no change had occurred in the actual productivity of labor.

More significant conclusions concerning recent changes in productivity may be drawn if we measure change in output with reference to a man-hour unit. Distortion due to changing hours of work may be thus avoided. On this basis we find an advance of about 11 per cent in industrial productivity between 1929 and 1931, and a gain of four per cent between 1931 and 1933. These figures are in accordance with our expectations. Depression brings a tightening up of efficiency and a systematic attempt to eliminate sources of waste. Industrial productivity almost invariably increases during such a period of economic strain.

Other records, relating to a smaller sample of manufacturing industries, indicate that this movement toward higher productivity has continued during the present year, after a drop during the business decline of last fall. It is clear that the advances in productivity during the decade 1919-1929 did not exhaust the potentialities of improvement in our industrial system. Whether we experience prosperity or depression we may expect a continued gain in industrial productivity. In prosperity the chief facilitating agency is probably improved equipment. In depression, this factor is supplemented by the pressure to eliminate waste and to increase efficiency. How to adapt productive practices and distributive procedures to this steady improvement constitutes one of the major problems today. The growing margin of unemployment which characterized the first post-War decade was in some degree a resultant of rapidly-increasing industrial productivity. Recent advances intensify this problem. Until we solve it, we shall not enjoy a standard of living equal to the promise of our productive resources.

SELLING PRICES AND PRODUCTION COSTS IN MANUFACTURING INDUSTRIES

We should expect notable changes in production costs to have accompanied these variations in industrial productivity. The actual course of events, however, has been clouded by the many complications introduced by the enforcement of the National Recovery Act. Working conditions have been modified, wage rates have been altered, and pricing policies have been substantially changed. All of these factors find expression in the records of changing pro-

Table 5

CHANGES IN SELLING PRICES AND IN PRODUCTION COSTS, 1927-1933

MANUFACTURING INDUSTRIES OF THE UNITED STATES

(All price and cost index numbers define changes per unit of manufactured product.)¹

| Year | Average selling price | Average cost of materials | Average cost of fabrication | Average labor cost | Average overhead costs plus profits |
|------|-----------------------|---------------------------|-----------------------------|--------------------|-------------------------------------|
| 1927 | 100 | 100 | 100 | 100 | 100 |
| 1929 | 98 | 96 | 101 | 93 | 107 |
| 1931 | 76 | 71 | 85 | 81 | 88 |
| 1931 | 100 | 100 | 100 | 100 | 100 |
| 1933 | 88 | 88 | 90 | 85 | 94 |

¹ Relating to 112 manufacturing industries for the years 1927-31, and to 60 manufacturing industries for the years 1931-33. For the earlier period, the indexes are derived from weighted averages; for 1931-33, the figures shown are unweighted medians. Both indexes are based upon data originally compiled by the United States Bureau of the Census.

duction costs and of changing selling prices for the products of manufacturing industries.

Table 5 presents measurements relating to these movements.

The bundle of materials and services represented by the final product of manufacture sold in 1931 at an average price 24 per cent lower than in 1927 and 22 per cent lower than in 1929.⁷ The two major components of this price differed markedly in degree of decline. Material costs per unit of manufactured goods were 29 per cent lower in 1931 than in 1927, while fabrication costs were but 15 per cent lower. If we measure changes with reference to 1929 as base, we find declines of 26 and of 16 per cent, respectively, in these two series. The two elements of fabrication costs, in their turn, differed substantially. In 1931 labor costs per unit of manufactured product were some 19 per cent lower than in 1927, while the composite of overhead costs and profits, per unit of product, was but 12 per cent less. The changes from 1929 to 1931 were more nearly equal, however, being approximately 13 per cent for labor costs and 18 per cent for overhead plus profits. The shift of base makes a noticeable difference, for 1929 was marked by relatively low labor costs and by high charges in the form of overhead costs and profits, per unit of product.

⁷ These index numbers of average selling price, derived from Census data of quantities produced and of aggregate values, show general agreement with index numbers derived directly from price quotations. A comparison follows:

INDEX NUMBERS OF SELLING PRICES OF MANUFACTURED GOODS

| Year | National Bureau of Economic Research (derived from Census data) | United States Bureau of Labor Statistics (average of prices of semi-manufactured and manufactured goods) | National Bureau of Economic Research (derived from price quotations) |
|------|---|--|--|
| 1927 | 100 | 100 | 100 |
| 1929 | 98 | 99 | 99 |
| 1931 | 76 | 80 | 80 |

From 1931 to 1933 there was little difference of movement among the two major divisions of cost. Material costs per unit of product dropped 12 per cent, while fabrication costs declined 10 per cent. During this period, however, a notable difference developed between the two components of fabrication costs. Labor costs per unit of manufactured product dropped 15 per cent, while overhead costs plus profits declined only six per cent.⁸

DIVERSITY OF THE FORTUNES OF MANUFACTURING INDUSTRIES IN RECESSION AND DEPRESSION

The figures we have been discussing are averages, relating to manufacturing industries in general. All such averages suffer from the fact that the measurements for the hundreds of individual industries entering into the total differ among themselves. These differences may, under certain circumstances, be very wide indeed. It is of interest to know just how divergent the fortunes of different manufacturing industries have been during the four years of recession and depression extending from 1929 to 1933. We shall not truly grasp the nature of the economic storm to which the country has been exposed unless we have some conception of the degree to which individual manufacturing industries differed among themselves with respect to changes in output, productivity, selling prices of their products, and elements of manufacturing cost.

A striking portrayal of the divergence of fortunes among different manufacturing industries in these respects is afforded by the series of graphs in Figure VI. In each of these graphs the measurement relating to a change in a single industry over a two-year period is represented by a single line. Since the records available for the period

⁸ It is unfortunate that the available data provide us only with composite figures relating to the movements of overhead costs and profits. The two elements of the composite are affected by quite different influences during periods of business expansion and recession, and are related in quite different ways to the movements of final selling prices.

1929-31 are more complete than are those available for 1931-33,⁹ the number of industries represented in the first of each pair of graphs is larger than the number in the second.

To facilitate the interpretation of these graphs, arrows have been placed along the scales to indicate the locations of the median values and of the first and third quartiles. The median (second quartile) is, of course, that point on the scale which halves the total number of observations. The quartiles, similarly, are points so located on the scale of values as to divide the entries for all the industries recorded into quarters. Thus the middle half of all the industries represented in each diagram falls within the upper and lower arrows placed on the right-hand scale.

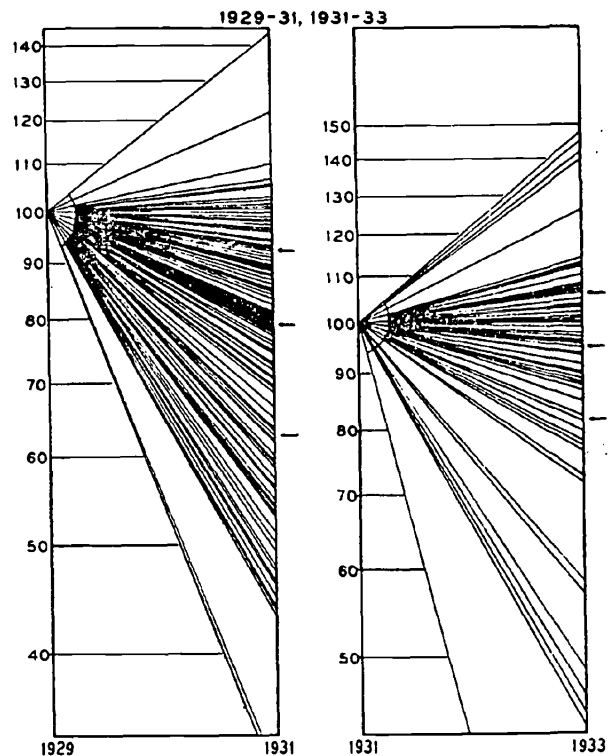
The diagrams in Figure VI relate to changes in the physical volume of production and in the average selling prices of the products of different manufacturing industries. The nature of these movements is described, in summary form, by the entries in Table 6. This table also includes figures defining the average (median) change and the degree of 'scattering' among measurements relating to productivity and to various elements of manufacturing cost. Limitations of space prevent the graphic portrayal of the separate measurements, in all these cases, but the summary figures are significant.

The output of manufacturing industries as a whole declined sharply, of course, between 1929 and 1931. But there was wide variation in degree of decline, as is shown by the scattering of the radial lines representing individual industries. That the impact of recession falls with uneven force upon different industrial groups is clearly revealed in this extraordinary divergence. Much less pronounced was the variation among industries in respect of changes in productivity. Changes in factors of organization, of technical equipment, of skill in the working force appear to affect different industries in a much more uniform manner than do the shifts in market conditions which are reflected in the volume of physical output.

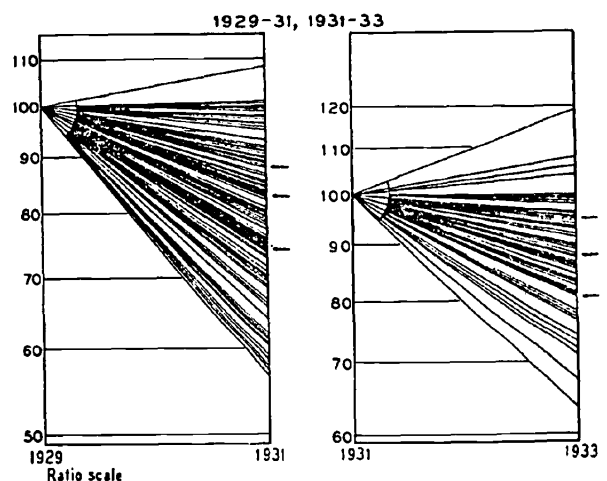
Manufacturing industries are marked by greater coherence in respect of price and cost changes than in the changes in volume of output. The measure of variation in selling price changes from 1929 to 1931 is just half that found among measurements of changes in volume of production. This is probably to be expected. The market impresses uniformities of behavior upon industry through the price ties which bind economic elements together. Manufacturing industries, moreover, are in a better position to enforce policies of price maintenance than are most industries producing raw materials. This uniformity is especially marked among measurements of changing labor costs, and is most conspicuously absent among the indexes of change in the

⁹ Census records for 1933 have not as yet been released for all manufacturing industries.

Figure VI
A. INDEXES OF PHYSICAL VOLUME OF PRODUCTION,
INDIVIDUAL MANUFACTURING INDUSTRIES
OF THE UNITED STATES



B. SELLING PRICES OF PRODUCTS OF INDIVIDUAL
MANUFACTURING INDUSTRIES OF THE UNITED STATES



composite, overhead costs and profits. Here differences in the relative importance of capital equipment and in the notoriously variable factor of profits introduce wide divergencies in the movements of the measurements relating to different manufacturing industries.

SUMMARY

Our first concern in this *Bulletin* has been to summarize recent price movements, viewing them with reference to the relations prevailing among major elements of the price

Table 6

CHANGES IN VOLUME OF PRODUCTION, IN PRODUCTIVITY, IN AVERAGE SELLING PRICE
AND IN ELEMENTS OF PRODUCTION COST, 1929-1933

MANUFACTURING INDUSTRIES OF THE UNITED STATES

The measurements presented define the average (median) change and the degree of dispersion among individual manufacturing industries¹

| | 1929-1931 | | | 1931-1933 | | |
|---|-----------|------|---------------------------------|-----------|------|---------------------------------|
| | Median | | Degree of dispersion (per cent) | Median | | Degree of dispersion (per cent) |
| | 1929 | 1931 | 1931 | 1931 | 1933 | 1931 |
| Physical volume of production | 100 | 79 | 18 | 100 | 95 | 13 |
| Average selling price, per unit | 100 | 83 | 9 | 100 | 88 | 8 |
| Average cost of materials, per unit | 100 | 78 | 10 | 100 | 88 | 9 |
| Average cost of fabrication, per unit | 100 | 88 | 10 | 100 | 90 | 9 |
| Average labor costs, per unit | 100 | 88 | 8 | 100 | 85 | 7 |
| Average overhead costs plus profits, per unit | 100 | 86 | 15 | 100 | 94 | 14 |
| Output per wage-earner | 100 | 99 | 9 | 100 | 95 | 8 |
| Output per man-hour | 100 | 111 | 9 | 100 | 104 | 5 |

¹ The measure of dispersion is secured by expressing one-half the range between the first and third quartiles as a percentage of the median value. The median values given are derived from unweighted measurements. All the indexes relate to changes per unit of manufactured product.

system prior to the recession of 1929. For an understanding of the importance of recent changes we should recall the characteristics of the price situation at the beginning of 1933, and the nature of the problems presented by the conditions then prevailing. Prices to consumers of finished goods were high, with reference to the prevailing price level; the prices of raw materials, on which the incomes of important consuming groups depend, were very low. The prices received by producers of agricultural products, in particular, were seriously depressed, while the prices paid by farmers for goods needed for production and for family maintenance were high. Low prices of the raw materials of industry, coupled with relatively high prices for finished goods, put manufacturers in an advantageous trading position. This price advantage, of course, was largely fictitious, because the volume of goods produced and sold was so abnormally low. On the investment side, however, there prevailed relatively high prices for goods entering into capital equipment and for building materials, a condition which (with other circumstances) tended to restrict activity in industries producing capital goods. A factor which has in the past served to stimulate revival from depression was thus reduced materially in potency.

These conditions presented certain definite problems. One was how the flow of goods to consumers was to be stimulated when the real value of raw materials was so low, in comparison with earlier standards, and the real value of consumers' goods so high.²⁰ The restoration of activity in industries producing capital goods, when production and sales were low in volume and the costs of new equipment excessively high, constituted a second major problem.²¹

The first push of the price recovery that was initiated in March of 1933, tended to restore earlier relations through a rapid advance of the more seriously depressed prices. The effects of this movement are clear in Figure II, which shows the sharp reduction of major disparities between February, 1933, and July, 1933. The reaction of the fall months reversed this tendency. It appeared that new forces had been released, following the summer advance, which threatened to increase prices already relatively high, and thus perpetuate the difficulties created during the recession. The price movements of the last twelve months, however, have definitely operated, in every major category, to lessen the disparities in the price system. Advancing raw material prices have enhanced the purchasing power of raw material producers. The margin representing costs of fabrication has been reduced. The obstacles to activity in the capital goods industries created by the persistence of exceptionally high prices among building materials and articles of capital equipment have been partially overcome. A situation that looked black twelve months ago, because of the apparent check suffered by forces of readjustment, bears a brighter aspect now. Physical activity still lags, it

²⁰ For the effect of low prices of materials was to reduce the aggregate purchasing power of an important group of consumers. Impaired volume of activity stemming from this condition served, in turn, to reduce incomes of other consuming groups. Behind these difficulties, of course, lay more profound problems of impaired balance, but the price conditions we have emphasized were at least the proximate causes of reduced trading activity.

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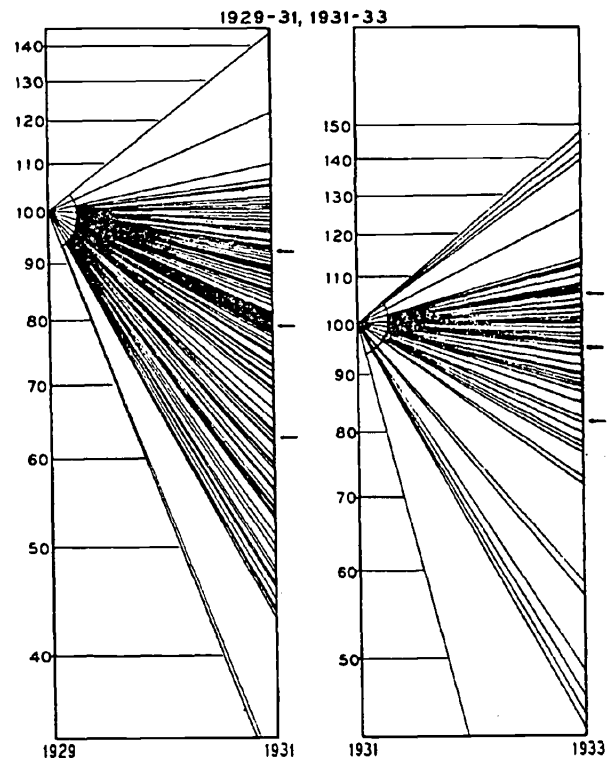
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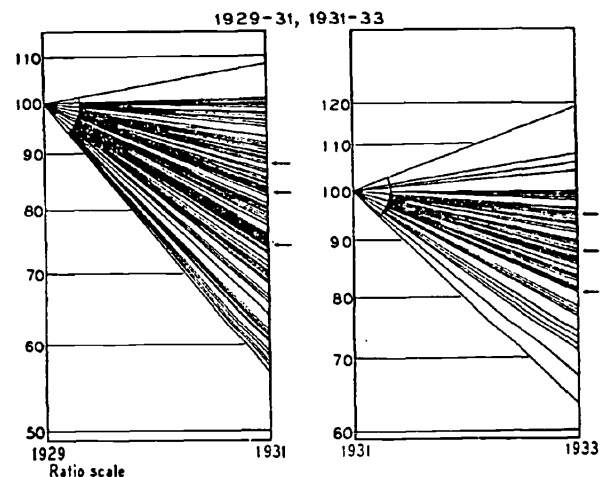
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For a fuller discussion of the significance of the price disparities opened during the depression, see earlier *Bulletins* of this series, especially *Bulletin 48* (October 31, 1933).

is true, and such activity is the final index of economic health. But some important obstacles to the renewal of physical activity in the production and distribution of goods have been removed and others have been reduced. Ameliorative tendencies have been at work in the complicated structure of prices. In this there is ground for hope.

Other evidence of substantial gains in the purchasing power of important economic elements is found in the records for important producing groups. Estimates for 1934, based upon such data as are now available, indicate that price and production factors have combined to increase gross income for producers of raw minerals, for manufacturing producers, and for construction industries. Among farm producers price gains have offset production losses, and in the railroad transportation industry a modest production gain has been more than enough to offset a slight decline in average price per unit of service rendered. Without exception, among these five groups, 1934 gross incomes promise to exceed those for 1933.

In tracing the recent experience of manufacturing industries emphasis has been placed upon the notable gains in productivity which have persisted throughout the depression. From 1929 to 1933 there appears to have been an advance of approximately 15 per cent in output per man-hour, this on top of a gain of 41 per cent in output per capita during the preceding ten years. This increase

in productivity and a parallel reduction in hourly wage rates during the stage of business recession have made possible a steady reduction in labor cost per unit of manufactured product. The decline in labor cost per unit of product probably exceeded 25 per cent from 1929 to 1933. Material costs per unit have declined by a greater percentage, and the decline of overhead costs plus profits approximates that of labor costs. The 1929 standard of reference is not altogether satisfactory, since labor costs and material costs were relatively low in that year, while overhead costs, in combination with profits, were high. On an earlier base, the latter element still appears to have been disproportionately high in 1933. Reduction of the fixed elements of manufacturing costs is always a slow and painful process in periods of slack business, and this depression has been no exception to the rule. Notably heavy investment in capital equipment during the preceding period of expansion has added to the current difficulties of readjustment.²³

This survey has dealt with recent changes in certain elements of the price system, and related factors of cost and productivity. The elements studied are, in some degree, of strategic importance in the recovery situation.

²³ This investment, it is proper to say, was the chief means through which industrial productivity was increased and labor cost reduced during this period of expansion.

Appendix Table A
INDEX NUMBERS OF WHOLESALE PRICES

| Commodity group | July 1929 | Feb. 1933 | Oct. 1933 | Nov. 1933 | Dec. 1933 | Jan. 1934 | Feb. 1934 | Mar. 1934 | Apr. 1934 | May 1934 | June 1934 | July 1934 | Aug. 1934 | Sept. 1934 | Oct. 1934 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|---------------|--------------|
| All commodities | 100.0 | 61.7 | 74.5 | 74.6 | 74.3 | 75.7 | 76.9 | 77.0 | 76.6 | 77.1 | 78.2 | 78.4 | 80.0 | 80.9 | 80.0 |
| Raw materials | 100.0 | 50.6 | 65.2 | 66.0 | 65.9 | 67.1 | 68.7 | 68.4 | 68.0 | 68.1 | 70.3 | 71.2 | 73.8 | 75.3 | 73.9 |
| Manufactured goods | 100.0 | 68.7 | 80.3 | 80.1 | 79.7 | 81.0 | 82.0 | 82.3 | 82.0 | 82.6 | 85.0 | 82.8 | 83.7 | 84.4 | 83.1 |
| Foods | 100.0 | 50.0 | 61.1 | 60.9 | 59.6 | 61.7 | 64.1 | 64.5 | 63.5 | 64.3 | 67.4 | 68.6 | 72.8 | 75.5 | 73.6 |
| Non-foods | 100.0 | 69.1 | 83.0 | 83.3 | 83.6 | 84.4 | 84.9 | 84.8 | 84.8 | 85.0 | 84.8 | 84.5 | 84.3 | 84.3 | 84.0 |
| Products of American farms, raw | 100.0 | 39.5 | 54.6 | 55.1 | 54.6 | 57.2 | 59.4 | 59.1 | 57.9 | 57.8 | 62.0 | 63.1 | 67.5 | 70.0 | 67.7 |
| All other products | 100.0 | 68.2 | 80.3 | 80.3 | 80.1 | 81.0 | 82.0 | 82.2 | 82.1 | 82.7 | 82.9 | 82.9 | 83.5 | 84.1 | 83.5 |
| Producers' goods | 100.0 | 59.4 | 73.4 | 73.6 | 73.6 | 74.8 | 76.3 | 76.3 | 76.3 | 76.8 | 77.6 | 78.0 | 79.5 | 80.4 | 79.1 |
| Consumers' goods | 100.0 | 64.4 | 75.7 | 75.7 | 75.2 | 76.7 | 77.7 | 77.9 | 77.1 | 77.4 | 78.8 | 79.0 | 80.2 | 81.5 | 81.0 |
| Producers' goods | 100.0 | 59.4 | 73.4 | 73.6 | 73.6 | 74.8 | 76.3 | 76.3 | 76.3 | 76.8 | 77.6 | 78.0 | 79.5 | 80.4 | 79.1 |
| Raw | 100.0 | 49.1 | 64.6 | 64.9 | 64.8 | 65.9 | 67.9 | 68.0 | 68.0 | 68.3 | 69.8 | 70.9 | 73.8 | 75.7 | 73.5 |
| Processed | 100.0 | 71.4 | 83.4 | 83.4 | 83.6 | 84.9 | 85.6 | 85.6 | 85.5 | 86.3 | 86.4 | 85.9 | 86.0 | 85.9 | 85.5 |
| For human consumption | 100.0 | 45.8 | 63.0 | 62.9 | 62.5 | 64.6 | 67.0 | 67.0 | 66.3 | 66.2 | 67.8 | 68.8 | 72.2 | 73.9 | 71.7 |
| For capital equipment | 100.0 | 73.1 | 80.0 | 80.3 | 80.9 | 81.9 | 83.1 | 83.4 | 84.5 | 86.1 | 85.2 | 84.2 | 84.0 | 83.8 | 83.4 |
| For building materials | 100.0 | 75.8 | 87.6 | 88.4 | 88.7 | 87.7 | 87.9 | 87.9 | 88.2 | 89.1 | 89.3 | 88.5 | 87.7 | 87.2 | 86.9 |
| Consumers' goods | 100.0 | 64.4 | 75.7 | 75.7 | 75.2 | 76.7 | 77.7 | 77.9 | 77.1 | 77.4 | 78.8 | 79.0 | 80.2 | 81.5 | 81.0 |
| Raw | 100.0 | 55.8 | 67.3 | 68.9 | 69.4 | 71.1 | 71.1 | 70.2 | 67.7 | 67.0 | 71.9 | 72.6 | 73.4 | 74.0 | 75.3 |
| Processed | 100.0 | 66.5 | 78.0 | 77.5 | 76.7 | 78.1 | 79.3 | 79.8 | 79.4 | 80.0 | 80.4 | 80.5 | 81.9 | 83.3 | 82.4 |
| Producers' goods intended for human consumption | | | | | | | | | | | | | | | |
| Foods | 100.0 | 40.2 | 53.2 | 52.6 | 51.1 | 54.0 | 57.0 | 57.1 | 56.2 | 57.0 | 60.7 | 62.4 | 69.8 | 73.7 | 70.0 |
| Non-foods | 100.0 | 51.1 | 72.3 | 72.8 | 73.4 | 74.8 | 76.4 | 76.4 | 75.9 | 74.7 | 74.8 | 74.8 | 74.4 | 74.1 | 73.3 |
| Consumers' goods, processed | | | | | | | | | | | | | | | |
| Foods | 100.0 | 59.1 | 67.0 | 66.1 | 64.3 | 65.9 | 68.9 | 70.2 | 69.7 | 70.8 | 72.6 | 73.4 | 76.4 | 79.1 | 77.3 |
| Non-foods | 100.0 | 73.2 | 88.0 | 87.8 | 87.8 | 89.0 | 88.8 | 88.6 | 88.2 | 88.2 | 87.5 | 86.9 | 86.9 | 87.1 | 86.9 |

The records define a condition marked by badly tangled price relations at the end of 1932 and in early 1933. Subsequent movements, to October, 1934, have been irregular, but the net changes have worked toward higher real purchasing power of consumer groups, and lower real costs of fabrication and of capital construction. Definite progress has been made toward a readjustment of values and the creation of relations favorable to an increase in the movement of goods from producers to consumers.

NOTE ON SOURCES OF DATA AND CONSTRUCTION OF INDEXES

TABLE 1—The index numbers of wholesale prices and retail food prices are those of the United States Bureau of Labor Statistics. The indexes of cost of living and hourly earnings compiled by the National Industrial Conference Board have been combined with those of the Bureau of Labor Statistics to obtain the measure-

ments here given. The indexes of retail prices of clothing and house-furnishings are those computed by Fairchild Publications from prices reported by leading retail organizations. The index numbers of farm prices and of prices paid by farmers are compiled by the United States Department of Agriculture from prices received by farmers for their crops and animal products and from prices paid for commodities used in production and family maintenance. The index of per capita earnings for manufacturing labor has been secured by dividing the index of factory payrolls of the Bureau of Labor Statistics by an index measuring changes in the number of persons on these payrolls.

TABLE 3—*Agriculture*: The production index consists of the index of net agricultural production of the Department of Agriculture for 1929-33; the 1934 figure is based on the Department of Agriculture crop estimates as of November 1, and the Department of Commerce index of marketings of animal products for the first ten months of the year. The price index is that of prices received by farmers (Department of Agriculture). The index

Appendix Table B

INDEX NUMBERS OF AVERAGE PURCHASING POWER, PER UNIT, OF COMMODITIES AT WHOLESALE IN THE UNITED STATES, 1927-1934

A. MAJOR COMMODITY GROUPS

| Commodity group | Index numbers of purchasing power, per unit | | | | | |
|---------------------------------------|---|-----------|-----------|-----------|-----------|-----------|
| | 1927-29 average | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 |
| Raw materials | 100 | 101 | 83 | 91 | 88 | 93 |
| Processed goods | 100 | 100 | 111 | 105 | 107 | 103 |
| Foods | 100 | 102 | 82 | 90 | 84 | 94 |
| Non-foods | 100 | 99 | 111 | 106 | 110 | 104 |
| Products of American farms, raw | 100 | 102 | 65 | 84 | 75 | 86 |
| All other products | 100 | 99 | 110 | 105 | 107 | 104 |
| Producers' goods | 100 | 100 | 96 | 100 | 99 | 99 |
| Consumers' goods | 100 | 100 | 104 | 100 | 102 | 101 |

B. CLASSES OF PRODUCERS' AND OF CONSUMERS' GOODS

| Classes of producers' goods | Index numbers of purchasing power, per unit | | | | | | Classes of consumers' goods | Index numbers of purchasing power, per unit | | | | | |
|---|---|-----------|-----------|-----------|-----------|-----------|-----------------------------------|---|-----------|-----------|-----------|-----------|-----------|
| | 1927-29 average | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 | | 1927-29 average | July 1929 | Feb. 1933 | July 1933 | Oct. 1933 | Oct. 1934 |
| All producers' goods | 100 | 100 | 96 | 100 | 99 | 99 | All consumers' goods | 100 | 100 | 104 | 100 | 102 | 101 |
| Raw | 100 | 101 | 81 | 90 | 88 | 93 | Raw | 100 | 100 | 90 | 95 | 90 | 94 |
| Processed | 100 | 99 | 115 | 110 | 111 | 106 | Processed | 100 | 100 | 108 | 102 | 104 | 103 |
| Intended for human consumption | 100 | 100 | 75 | 90 | 85 | 90 | | | | | | | |
| Intended for use in capital equipment | 100 | 101 | 120 | 109 | 109 | 105 | | | | | | | |
| Intended for use in building materials | 100 | 101 | 124 | 117 | 118 | 110 | | | | | | | |
| Producers' goods intended for human consumption | 100 | 100 | 75 | 90 | 85 | 90 | Consumers' goods, processed | 100 | 100 | 108 | 102 | 104 | 103 |
| Foods | 100 | 104 | 68 | 85 | 74 | 91 | Foods | 100 | 101 | 97 | 93 | 91 | 98 |
| Non-foods | 100 | 98 | 81 | 94 | 95 | 90 | Non-foods | 100 | 99 | 117 | 109 | 117 | 107 |

of gross income of farmers is derived from the product of the price and production indexes.

Mining: The production index is that of the United States Bureau of Mines for 1930-33, extended by the National Bureau to cover the period 1929-33; the 1934 figure is based on the index of the Federal Reserve Board for the first ten months of the year. The price index has been computed by the National Bureau from wholesale prices of raw or slightly processed mineral products. The gross income index for 1929-33 is based on the value of mineral production (Bureau of Mines); for 1934 it is derived from the price and production indexes.

Manufacturing: The production index is that of the National Bureau for 1929-33, with the 1934 figure based on the index of the Federal Reserve Board for the first ten months of the year. The price index has been computed by the National Bureau from reports of the Census of Manufactures, interpolated and extrapolated on the basis of wholesale price data. The gross income figure is derived.

Construction: The index of gross income is based on estimates of the total value of private, public utility and public construction. The original data include compilations of the F. W. Dodge Corporation for private construction, records of expenditures on new construction and for maintenance of railroads and other public utilities, and construction outlays by federal, state and local governments. The 1934 figure is a very rough estimate.

The scope of the estimates is much greater than that of the contract figures for 37 states currently published by the Dodge Corporation, figures which indicate a much greater drop in 1932 and 1933, and a sharper rise in 1934. The price index is based upon currently published index numbers of construction costs. The production figure is obtained by dividing the index of gross income by the index of construction costs (see *Bulletin No. 51*, June 28, 1934, p. 3).

Railroad freight transportation: The index of gross income is based on the freight revenues of Class I railways (Interstate Commerce Commission). The production index is estimated from ton-miles of freight, and the price figure corresponds to freight revenue per ton-mile. The figures for 1934 are based on the first nine months of the year.

APPENDIX TABLES A AND B—These index numbers have been constructed by the National Bureau of Economic Research from price quotations compiled by the United States Bureau of Labor Statistics. They are derived from weighted aggregates of actual prices, with weights based on average quantities produced in 1927 and 1931. The index numbers for March to October, 1933, appear in *Bulletin No. 48* (October 31, 1933), p. 14.

FIGURES IV AND V—The production indexes are those of the Federal Reserve Board, adjusted for seasonal changes. The price indexes have been computed by the National Bureau of Economic Research (see note to Appendix Table A).

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.

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The article that Dr. Mills contributes to this issue of the *National Bureau BULLETIN* is the fifth of a series of annual reports on aspects of the current price situation with particular reference to the inter-group disparities found beneath the surface of general price averages. These price BULLETINS serve both as appraisals of current developments and as a convenient medium for the release of some of the price measurements the National Bureau has been developing. These first appeared in various volumes published by the National Bureau. Results of the initial study appeared in *THE BEHAVIOR OF PRICES (1925)*, which is now out of print. Continuing his investigation of price movements Dr. Mills contributed a chapter to *RECENT ECONOMIC CHANGES (1929)*, in which changes in the related factors of production volume and elements of cost were also considered. A survey of the divergent rates of growth in the various elements of the pre-War and post-War economy, *ECONOMIC TENDENCIES IN THE UNITED STATES (1932)*, also devoted considerable space to the price aspects of modern economic development. As a further step in his research Dr. Mills is preparing a volume on recent changes in the structure of prices and a discussion of the significance of the developments that have characterized the recession and the recovery efforts of the past five years. It is expected that during the coming year a manuscript will be submitted for review to the Board of Directors.

THE MITCHELL
JUBILEE VOLUME

Readers of the *Bulletin* will be interested in the fact that, on the day when this issue went to press, a signal honor was paid to one of the founders of the National Bureau, one who ever since its inauguration has given direction and inspiration to its activities. On the evening of December 17, at a dinner in celebration of his sixtieth birthday, Professor Wesley C. Mitchell was presented with a volume of economic essays written in his honor by a group of former students. The range of the economic topics with which they deal as well as the variety of approach represented in the authorship testify to the catholicity and breadth of interest of the leader and teacher to whom they join in tribute. Of the essays contained in the volume five are by present or former members of the staff or Board of the National Bureau. The volume, entitled *Essays in Economics*, is published by the Columbia University Press.

A portrait of Dr. Mitchell, painted by Winifred Rieber, was presented on the same occasion, and tributes to him were paid by Dr. Edwin R. A. Seligman, Dr. Edwin F. Gay, Dr. Joseph H. Willits and Dr. Willard L. Thorp.

THE BULLETIN

With this issue the series of five *Bulletins* planned for 1934 is completed. For the convenience of our subscribers we print herewith a table of contents of the preceding four issues.

NATIONAL INCOME, 1929-1932
by Simon Kuznets

(No. 49, issued January 26, 1934; revised and extended, June 7, 1934; 12 pp., 10 tables, 2 charts, 25 cents)

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| Income Paid Out and Income Produced | 1 |
| The Classification of National Income | 2 |
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| Distribution by Types of Payment | 5 |
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| Summary. Reliability of Estimates | 10 |

RECENT CORPORATE PROFITS IN THE UNITED STATES
by Solomon Fabricant

(No. 50, issued April 18, 1934; 12 pp., 7 tables, 3 charts, 25 cents)

| | |
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RECENT CHANGES IN PRODUCTION
by Charles A. Bliss

(No. 51, issued June 28, 1934; 12 pp., 5 tables, 2 charts, 25 cents)

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GROSS CAPITAL FORMATION, 1919-1933
by Simon Kuznets

(No. 52, issued November 15, 1934; 20 pp., 12 tables, 3 charts, 50 cents)

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Plans for the 1935 series of *Bulletins* are now announced by the editor, Dr. Mills. Subscribers may expect to receive during the course of the year five issues, three in the spring and two in the autumn. The topics will be selected from the tentative list of seven following:

| | |
|--|--|
| Wage Changes during Depression and Recovery, by Leo Wolman | |
| Business Profits, by Solomon Fabricant | |
| Changes in the Volume and Character of Production during Depression and Recovery, by Charles A. Bliss | |
| The National Bureau Technique for Measuring Cyclical Movements, by Wesley C. Mitchell and his associates | |

Recent Employment Changes in the United States, by
Meredith B. Givens

Aspects of Recent Price Changes, by Frederick C. Mills
Changes in the Size and Industrial Distribution of the Na-
tional Income during a Quarter of a Century, by
Simon Kuznets

The *Bulletin* by Dr. Mitchell and his associates will de-
scribe the technique which the National Bureau has de-

veloped for measuring cyclical fluctuations of time series.
The results obtained by applying this technique to some 600
time series will serve as the foundation of the National
Bureau's forthcoming volume entitled, *Business Cycles:
Analysis of Cyclical Behavior*. Although this *Bulletin* will
be somewhat technical in character, it will introduce the
presentation in later issues of certain results possessing
special interest.

Mechanization in Industry

HARRY JEROME

Professor of Economics, University of Wisconsin

From the Preface by Frederick C. Mills:

"In the face of the vague conceptions current regarding mechanization we have had sore need of an account in realistic detail, but presenting these details in a broad economic setting, and interpreting them with reference to the mechanization process as a whole, and to related processes of economic life. For in dealing with the characteristics and consequences of mechanization, as in many other economic fields, a part, to be truly appraised, must be seen in its place in the whole working of the economic system.

It is a great virtue of Dr. Jerome's study that he has tried to do this difficult job and has, indeed, done it better than it has ever been done before. We find here a wealth of detail as to the actual changes which mechanization has involved over a wide area of industrial activity. Conveyors, electric hoists, mechanical stokers, concrete mixers, steam ditchers, steam-jet weed destroyers, rotary ballast sweepers, power tie tampers, portable escalators, trench excavators—these are the stuff of modern industry. Here is realism about the industrial process. But Dr. Jerome sees beyond his details. He has emphasized the wide range of consequences which must be traced if one is accurately to measure the effects of a mechanical change. In doing so he provides an effective corrective alike for the visions of doom and for the prophecies of a mechanical millennium."

478 pp., 55 tables, 5 charts

\$3.50

(ready December 29)

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