Volume Title: Aspects of Manufacturing Operations During Recovery

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Volume Publisher: NBER

Volume URL: http://www.nber.org/books/mill35-1

Publication Date: 1935

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Chapter URL: http://www.nber.org/chapters/c0852

Chapter pages in book: (p. 5 - 10)

II. CHANGES IN MANUFACTURING PRODUCTION, PRICES, EMPLOYMENT, WAGE DISBURSEMENTS AND COSTS DURING THE RECOVERY OF 1933-1935

In following changes in the operations of manufacturing industries since the early months of 1933 we shall deal with various combinations of the measurements presented in Tables 1 and 2. Each combination will contain a single series of major importance and two component elements of that series. In each case the movements of the three related series should be compared. For convenience of reference, the measurements entering into the various combinations are brought together in Table 3. The subsequent discussion should be followed with reference to the detailed entries in this table.

occurring in manufacturing industries at large in the United States. Attention has been drawn to the lack of perfect comparability among some of the series employed. However, the general conclusions drawn from these comparisons are supported by evidence relating to the smaller sample of 15 major manufacturing industries, for which comparable measurements were given in footnote 2. Index numbers derived from these measurements appear below, together with similar measurements for all manufacturing industries.

	Feb.-March 1933	*June-July 1933*	*Dec. 1934-Jan. 1935*
Gross income			
All manufacturing industries	100	171	169
15 industries	100	195	195
Total employment (man-hours)			
All manufacturing industries	100	131	123
15 industries	100	150	135
Average output per wage-earner			
All manufacturing industries	100	137	105
15 industries	100	139	108
Average output per man-hour			
All manufacturing industries	100	120	111
15 industries	100	114	111
Average earnings per wage-earner			
All manufacturing industries	100	110	126
15 industries	100	121	140
Average hourly wages			
All manufacturing industries	100	97	134
15 industries	100	99	144
Average labor cost per unit of product			
All manufacturing industries	100	81	120
15 industries	100	87	130

In the pages that follow no detailed reference is made to the index numbers relating to these 15 industries. We have here, however, a set of measurements more carefully controlled, in respect of comparability, than are the more comprehensive series cited in the text. The reader seeking to check the statements in the text, concerning general tendencies in manufacturing industries, should refer to the index numbers in this note and in note 2.

Manufacturing Gross Income and Component Elements

Changes in the gross income of manufacturing industries may result from changes in the number of units produced, or in the average selling price per unit. The first three sets of measurements in Table 3 define these movements during the recovery of 1933-35.[4] In tracing these movements an effective comparison may be made between the changes occurring in the sharp revival of the first four to five months and the net changes of the succeeding year and one-half. As regards gross income and production, a clear conflict of tendencies is revealed. The net gains of the entire period were substantial (85 per cent in gross income, 49 per cent in number of units produced and 24 per cent in average price per unit). Prices advanced persistently in both periods, but in the field of production the advance was achieved within the first brief phase of recovery. During the later era of code installation and operation under the codes, output declined. Gross income, supported by favorable price movements, showed a net advance of eight per cent.

Of course, many factors operated during both the pre-code and code periods. Anticipation of the codes played a part in the first advance. A natural reaction from the tremendous activity of the first advance, activity leading to production of goods in excess of current needs, is reflected in the later record. We shall have a better basis for judgment concerning the part played by code enforcement in the changes of these periods when we have pressed our inquiry further, for the changes defined by certain of the other series are more closely connected with code provisions. The factors affecting total employment are in this category.

Total Manufacturing Employment and Component Elements

The total volume of employment is properly measured in terms of man-hours. Changes in the number of persons employed and in the average hours of work will affect this total. Items (4), (5) and (6) of Table 3 summarize the record of recovery in these elements. The notable increase of 31 per cent in total employment in the pre-code period resulted from almost equal advances in the number employed and in the average number of hours worked per wage-earner. Between mid-summer, 1933, and early 1935 the total volume of employment dropped 4 per cent. This took the form of a considerable decline in average hours worked, a decline only partially offset by an increase in the number employed. These changes, of course, are the manifestations of definite elements of the recovery program. There was spreading of work under the codes, it is true, but by early 1935 it was a smaller total volume of employment that was

[4] In all threefold comparisons of this sort the figure relating to one series is the product of the corresponding figures for the two other series, in the sense that $1.71=1.57\times1.09$.

TABLE 3

CHANGES IN MANUFACTURING OPERATIONS, 1933-1935
A COMPARISON OF MOVEMENTS DURING DIFFERENT PHASES OF RECOVERY

	Percentage change from		
	Feb.-March 1933 to June-July 1933	*June-July 1933 to Jan.-Feb. 1935*	*Feb.-March 1933 to Jan.-Feb. 1935*
GROSS INCOME AND ITS ELEMENTS			
1. Gross income	+71	+ 8	+85
2. Production (physical volume)	+57	− 5	+49
3. Selling price of products (average)	+ 9	+14	+24
EMPLOYMENT AND ITS ELEMENTS			
4. Total employment (man-hours)	+31	− 4	+26
5. Wage-earners employed	+15	+16	+33
6. Working hours per person (average weekly)	+14	−17	− 5
PRODUCTION AND ITS ELEMENTS			
2. Production	+57	− 5	+49
5. Wage-earners employed	+15	+16	+33
7. Output per wage-earner (average)	+37	−18	+12
4. Total employment (man-hours)	+31	− 4	+26
8. Output per man-hour (average)	+20	− 1	+18
WAGE DISBURSEMENTS AND ELEMENTS			
9. Wage disbursements	+27	+35	+72
5. Wage-earners employed	+15	+16	+33
10. Earnings per wage-earner (average)	+10	+16	+29
4. Employment (man-hours)	+31	− 4	+26
11. Hourly wages (average)	− 3	+41	+37
2. Production	+57	− 5	+49
12. Labor cost per unit (average)	−19	+42	+15

shared among a body of workers some 16 per cent larger. The period of recovery as a whole shows fairly substantial increases in total employment and in number of persons employed, and a drop of 5 per cent in the average number of hours worked, per person.

Physical Volume of Manufacturing Production and Component Elements

Changes occurring in the volume of manufacturing production may be viewed as the resultants (though not necessarily in a causal sense) of changes in the number employed and in output per worker. Items (2), (5) and (7) of Table 3 relate to these series.

The sharp advance in volume of production during the pre-code period was achieved through an increase in the number of workers and a still more pronounced increase in output per person employed. (This latter gain was partially attributable, of course, to an increase in hours of work.) These were changes of the sort customarily occurring in revival, though of exceptional magnitude.[5] A gain of 57 per cent in volume of output, from the very low level of early 1933, carried with it, almost inevitably, a notable advance in output per person, per machine in use, and per man-hour. (We would mis-read the figures if we should take this gain to be the result of a great technical revolution. No such revolution occurred during this brief period of four or five months. The potential advantages of earlier improvements, technical and otherwise, could be realized when this sharp gain in volume of output occurred.) During the year and one-half that followed this early pre-code spurt the number employed continued to increase. Both output per person and aggregate production declined, however.

Changes in the average length of the working week affect the preceding measurements of output per person. In Table 3 changes in total output are shown, in relation to changes in man-hours and in output per man-hour [items (4) and (8)]. Indexes of output per man-hour are a measure of true productivity, far more accurate, of course, than is a measure of output per person under conditions marked by changing hours of work.

The advance of 20 per cent in output per man-hour in

[5] It is probable that returns from all manufacturing establishments, if they could be secured, would show a somewhat smaller increase in production than that indicated by the present records. The great staples necessarily bulk large in any representative index number of production, and these staples are subject to somewhat more extreme swings than are the more diversified final products of manufacture. But that the gain of this period was one of extraordinary magnitude is not to be doubted.

the first early spurt was in some degree a cause, in greater degree a result, of the notable increase in total output. Increased market demand made possible an increase in productivity, an increase in its turn facilitated by earlier improvements in equipment, in technique and in the quality of labor. Over the 19 months that followed this pronounced gain in productivity, output per man-hour was substantially unchanged. A net decline of one per cent is indicated by the available records. This, of course, is an average figure, behind which there doubtless lie productivity losses in certain industries, gains in others.[6] The figures defining net change, over the entire period of recovery, show a rise of 49 per cent in volume of production, an advance of 18 per cent in output per man-hour.

Total Wage Disbursements of Manufacturing Industries, and Elements of the Total

We turn to a survey of wage disbursements during the recovery, viewing these, first, from the point of view of wage recipients. Changes in the aggregate, and in two elements of the aggregate, during the several phases of recovery are defined by the measurements following items (9), (5) and (10) of Table 3.

Total wage disbursements expanded during both pre-code and code periods, the relative advance in the second period being somewhat greater than the gain in the shorter pre-code period. Increases in the number of wage-earners and in average earnings per wage-earner contributed, during both phases of recovery, to the expansion of the aggregate wage bill.

More light is thrown on the changes in wages and earnings during these periods by a somewhat different division of elements. Total wage disbursements may be considered as the product of the number of hours worked and the average wage per hour. Analysis into these elements, which appear as items (4) and (11) in Table 3, makes it possible to follow changes in wage rates, and to determine the relation of these changes to fluctuations in total wage disbursements.

We find quite diverse changes during the two periods compared. The pre-code advance of 27 per cent in the aggregate earnings of manufacturing labor was accompanied by a sharp rise in total man-hours worked (31 per cent), and by a drop of 3 per cent in the average hourly wage. In the later period, characterized by operation under new wage provisions and by a net decline in volume of production, we find a drop of 4 per cent in total man-hours worked, an advance of 41 per cent in average hourly wages. Here was a new factor at work in a period of revival, with definite wage regulations increasing hourly rates at a much earlier stage than was to be expected from the processes of customary revival. The net effect was to increase total wage disbursements 35 per cent between June-July,1933, and January-February, 1935, in spite of declining employment and declining production. Over the entire period of recovery we have a pronounced advance in total wages paid, a considerable rise in man-hours worked, and a notable increase in hourly rates of pay.

It is desirable to trace some of the economic accompaniments of these widely different means of achieving the same result—the result being a given gain in the aggregate wages disbursed to manufacturing labor. Certain of these consequences may be followed by comparing changes in wage disbursements [item (9) of Table 3], with changes in total volume of production [item (2)], and in labor cost per unit of product [item (12)].

The increase of 27 per cent in the total wage bill of manufacturing industries during the period of pre-code expansion may be viewed as the net resultant of a gain of 57 per cent in number of units produced and a decline of 19 per cent in average labor cost per unit. Thus, although the average hourly wage dropped only 3 per cent, and average earnings per wage-earner increased 10 per cent, the labor cost per unit fell 19 per cent. This was the result, of course, of a gain of 20 per cent in output per man-hour. This reduction of an important element of production costs worked definitely toward the correction of the great disparity between the prices of raw materials and of manufactured goods that existed at the low point of the depression.

The advance of 35 per cent in total wage disbursements during the code period resulted from two quite different types of change in the component elements. The number of units produced fell 5 per cent, while average labor costs, per unit of product, rose 42 per cent. Increasing production and falling labor costs accompanied the first rapid gain in the total rewards of manufacturing labor. Decreasing production and sharply rising labor costs accompanied the later advance in aggregate payments to labor.[7] For the

[6] It is convenient to measure industrial productivity on a man-hour basis. This is not to be taken to mean that changes in productivity are due exclusively, or even primarily, to the human factor in production. Mechanical equipment and business organization may be far more important factors in changing productivity than human skill or intensity of application.

[7] This measurement of advance in labor costs is subject to at least two types of bias. It is probable that the larger establishments, which are represented in the sample from which data on payrolls are secured, conformed more closely, on the whole, to code regulations than did the smaller establishments. This would tend to make the measurement of labor costs somewhat higher than it would be were complete coverage possible. On the other hand, it is known that there is a negative bias in the reported payroll statistics, arising from the use of a constant sample. Such bias would tend to lower the measure of labor costs. It is to be noted that these errors, if present, tend to offset one another.

period of recovery as a whole an increase of 15 per cent in labor costs per unit and an increase of 49 per cent in number of units produced contributed to an advance of 72 per cent in total wages paid.

In interpreting these figures and in comparing the pre-code and code periods we must allow, again, for the influence of factors not connected with code administration. A sharp drop in labor costs per unit of product was to be expected, during the first spurt of revival, as an accompaniment of the pick-up from the very low level of activity prevailing in February, 1933. The situation in mid-summer, 1933, offered no such potentialities of sudden reduction in operating costs, even though all working conditions had remained unchanged. On the other hand, had working conditions remained unchanged, it appears altogether unlikely that the first reduction of 19 per cent in labor costs would have been followed by an advance of 42 per cent.[8]

Summary of the Changes of Recovery in Manufacturing Industries

The period between February-March, 1933, and the beginning of 1935 was marked by a curious combination of movements, in the operations of manufacturing industries. We shall understand these movements better if we place in contrast the series in which reversals of movement occurred, after the pre-code spurt of the early months, and the series in which movement of the same general character persisted, during the entire period. We note the following:

Series increasing during pre-code period, with net decline thereafter:

a. Physical volume of manufacturing production
b. Total employment (man-hours)
c. Average weekly working hours per person
d. Output per wage-earner
e. Output per man-hour. (There was a slight net decline in this index, in the code period, but, substantially, it stood at the same level in early 1935 as in mid-summer, 1933.)

Series declining during pre-code period, with net advance thereafter:

a. Average hourly wages
b. Labor cost per unit of product

(At the time of writing, these individual records are available only through January, 1935.)

INDUSTRY	INDEX NUMBERS FOR DEC. 1934-JAN. 1935 (AVERAGE OF FIGURES FOR FEB.-MAR. 1933=100)		
	TOTAL WAGE DISBURSEMENTS	PHYSICAL VOLUME OF PRODUCTION	LABOR COST PER UNIT OF PRODUCT
All manufacturing industries	165	137	120
Fifteen manufacturing industries	195	150	130
Flour milling	131	98	134
Meat packing	160	127	126
Sugar refining, cane	114	103	111
Carpets and rugs	211	153	138
Cotton goods	189	101	187
Woolen and worsted goods	177	174	102
Lumber (sawmills)	200	128	156
Petroleum, refining	122	114	107
Rubber tires and tubes	225	179	126
Boots and shoes	125	96	130
Leather	160	122	131
Cement	139	113	123
Iron and steel	231	228	101
Automobiles	268	212	126
Cigars and cigarettes	131	123	107

These detailed figures confirm the measurements relating to aggregates. The advance in labor costs during the two years of recovery from 1933 to early 1935 was general, among the individual industries for which we have records.

The figures given above for the automobile industry call for comment. It is characteristic of this industry that pronounced shifts occur in the relations between wage payments and final production, because of seasonal marketings and annual changes in models. To allow for these shifts, we may compare production and wage shifts in the automobile industry by six-month periods.

PERIOD	TOTAL WAGE DISBURSEMENTS (PAYROLLS)	PHYSICAL VOLUME OF PRODUCTION	AVERAGE LABOR COST PER UNIT OF PRODUCT
January-June, 1933	100	100	100
July-December, 1933	129	93	139
January-June, 1934	237	172	138
July-December, 1934	170	108	157

The most unambiguous comparison is probably that between the first six months of 1933 and the first six months of 1934, for seasonal movements are thus avoided. An advance of 72 per cent in production was accompanied by an advance of 38 per cent in labor costs per unit of product, in the automobile industry.

This example illustrates the difficulty of comparing monthly data relating to wage payments and total production. General movements may be followed, but the figures should not be looked upon as completely accurate for any one month.

[8] The apparent advance of 42 per cent in average labor cost per unit of product in American manufacturing industries between June-July, 1933, and January-February, 1935, reflects, in part, the abnormal conditions prevailing in mid-summer, 1933, after the first spurt of revival. This figure is useful for comparative purposes, but is not to be taken as an accurate measure of changing industrial efficiency. More significance attaches to the measure defining the change in average labor cost per unit over the two years from February-March, 1933, to January-February, 1935. This net advance of 15 per cent, over a period which includes the sharp reduction of labor costs that occurred during the first four months, was substantial, representing a notable deviation from the typical movement of recovery.

The importance of this matter warrants the presentation of detailed figures on changes in production, in aggregate wage payments and in estimated labor cost per unit of product for the 15 individual industries for which comparable data are available.

Series increasing in both periods:

a. Gross income of manufacturing industries
b. Average selling price of manufactured products
c. Number of wage-earners employed in manufacturing industries
d. Total wage disbursements by manufacturing industries
e. Average earnings per employed wage-earner

If we look at the first two lists, there is every evidence of a reversal of business tendencies after the general upward movement of early 1933. Not only did physical output show a net decline, but the evidence of internal difficulties in the form of retarded productivity and advancing labor costs adds to the darkness of the picture. And yet, thereafter, prices continued to rise, gross income advanced, wage disbursements continued to increase, earnings per employed worker rose, and the number of workers on payrolls continued to increase. Purchasing power was being disbursed in ever-expanding volume, despite the apparently adverse conditions indicated by the various records of physical production, productivity, and labor costs. Here was a curious set of conflicting movements. But we shall have a better perspective on these shifts when we compare them with changes during the preceding recession, and during earlier periods of business revival.

Recovery Movements in Relation to a Pre-Recession Standard

Any economic recovery is, obviously, closely related to the preceding period of recession. That recession must condition the recovery at many points, and vitally affect its character. The exceptional gravity and extent of the recession in American business between 1929 and early 1933 cannot be ignored in surveying the changes brought by recovery. For this reason, we supplement the survey of changes occurring during the phase of recovery, alone, by a summary account of these changes viewed against a pre-recession base. Measurements are given in Table 4. (Certain of the series given in Table 3 do not appear in Table 4.

TABLE 4

RECESSION AND RECOVERY IN AMERICAN MANUFACTURING INDUSTRIES, 1929-1935

	June-July 1929	*February-March 1933*	*June-July 1933*	*January-February 1935*
	IN CURRENT DOLLARS			
GROSS INCOME AND ITS ELEMENTS				
1. Gross income	100	34	58	62
2. Production (physical volume)	100	49	77	72
3. Selling price of products (average)	100	69	75	86
PRODUCTION AND ITS ELEMENTS				
2. Production	100	49	77	72
5. Wage-earners employed	100	57	65	76
7. Output per wage-earner	100	86	118	95
WAGE DISBURSEMENTS AND ELEMENTS				
9. Wage disbursements	100	35	45	61
5. Wage-earners employed	100	57	65	76
10. Earnings per wage-earner (average)	100	61	69	80
11. Average hourly wage	100	78	76	102
2. Production	100	49	77	72
12. Labor cost per unit of product (average)	100	71	58	85
	IN DOLLARS OF CONSTANT PURCHASING POWER			
GROSS INCOME AND ITS ELEMENTS				
1. Gross income[1]	100	54	82	75
2. Production (physical volume)	100	49	77	72
3. Selling price of products (average)[1]	100	111	106	104
WAGE DISBURSEMENTS AND ELEMENTS				
9a. Wage disbursements[2]	100	49	61	74
5. Wage-earners employed	100	57	65	76
10. Real earnings per wage-earner (average)[2]	100	86	94	97
11. Average hourly wage[2]	100	108	103	124
9b. Wage disbursements[1]	100	56	63	73
2. Production	100	49	77	72
12. Labor cost per unit of product[1]	100	114	82	102

[1] The index number of wholesale prices constructed by the National Bureau of Economic Research was used as a deflator.
[2] The index of the cost of living of industrial workers constructed by the National Industrial Conference Board was used as a deflator.

Where doubts as to the accuracy of the measurements for the longer period were serious, it appeared desirable to restrict statements to general terms, and not to cite specific figures.)

Shifting the standard of reference to a pre-recession base has one immediate effect—that of reducing the apparent magnitude of the shifts of recovery. For the recession carried most economic series to such low levels in the winter of 1932-33 that the succeeding rises, in percentage terms, run into relatively high figures. On a pre-recession base the percentage changes are much less pronounced.

In summary, the situation as of January-February, 1935, with reference to the situation existing in June-July, 1929, was marked by the following features:

The gross income of manufacturing industries had been reduced 38 per cent, in current dollars, 25 per cent, in dollars of constant purchasing power, at wholesale. The physical volume of manufacturing production was 28 per cent below the 1929 standard. Per-unit prices were lower, but the average per-unit purchasing power of manufactured goods in wholesale markets was higher. Relatively to other goods, commodities of this type cost more, per unit, than in 1929.

The actual volume of manufacturing employment, measured in man-hours, had been reduced more than 40 per cent and the working force had been reduced one-fourth.

Industrial productivity, per wage-earner employed, had declined. Productivity per man-hour had risen. The amount of the rise may be estimated at something more than 20 per cent. This gain had been scored during the period of recession and in the first spurt of revival.

The aggregate purchasing power of manufacturing labor was some 26 per cent lower. The purchasing power of the earnings of each employed worker (whose hours of work were reduced about 30 per cent) had been reduced about 3 per cent. The purchasing power of an hour's wage (i.e. the real hourly wage) had increased approximately 24 per cent.

The total wage bill of manufacturing industries, measured in dollars of constant purchasing power, at wholesale, was approximately 27 per cent lower. Average labor cost per unit of goods produced had risen approximately 2 per cent (cost being here measured in terms of the same constant value standard).

It is apparent from these figures that the recovery in American manufacturing industries has fallen far short of restoring the pre-recession level of gross income, of production, of employment, or of aggregate purchasing power of labor. Industrial productivity on a man-hour basis, is higher than before the recession, nominal and real wage rates are higher, and real labor costs are somewhat higher.

But we need other criteria, in appraising the shifting movements of the current recovery. Earlier periods of business expansion furnish a useful standard of reference.

III. ECONOMIC CHANGES IN MANUFACTURING INDUSTRIES DURING FIVE PERIODS OF BUSINESS EXPANSION, APPROXIMATELY EQUAL IN RESPECT OF DEGREE OF RECOVERY

A comparison of manufacturing operations during different periods of business expansion may be expected to disclose some of the distinctive features of the current movement. It is true that there exists no fixed schedule of recovery, to which business movements always conform, but something of the nature of a common pattern is found in the cyclical fluctuations of the economic system. Some of the characteristics of this pattern, and distinctive deviations from it, are revealed by the series of measurements presented in this section.

Various modes of comparison are possible, in any such survey. For the present purpose it seems desirable to trace the movements of important economic series over periods of expansion marked by approximately equal degrees of increase in the physical output of manufacturing industries. This magnitude, as averaged for the months of December, 1934, and January, 1935, was 37 per cent greater than at the low point of February-March, 1933.[9] It is pertinent to inquire how the changes occurring in manufacturing industries during this period, in respect of employment, productivity, labor costs, etc., compared with corresponding changes during earlier periods of equal increase in volume of output.[10] We should note that in concentrating attention upon the operations of manufacturing industries we ignore numerous economic factors—such as monetary and credit conditions, relations among elements of the price structure, saving and investment—which condition the course and character of recovery. Our interest, however,

[9] Advances of approximately equal magnitude could not be secured for the three preceding revivals, if the record were carried through January-February, 1935. Since we are interested in operating changes accompanying similar advances, we restrict the survey of recent changes to the movements up to January, 1935.

[10] If we compare, with respect to changes in aggregate production, periods of business recovery widely separated in time, error may be introduced into our conclusions by the changing character of the elements entering into the aggregate. Different industries, marked by important differences of cyclical behavior, may dominate a national economy at different times. These dominant industries would place their own impress on the aggregate into which they enter. But over a period of fifteen years no great changes occurred in the relative importance of elements entering into aggregate manufacturing production, in the United States. It is true that the incidence of recovery may be different, at different times, but this is a condition affecting all comparisons of this sort, in which aggregates of any kind are used.