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Aspects of Manufacturing Operations during Recovery

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I. THE PROBLEM, THE DATA, AND SOME LIMITING CONDITIONS

A SUBSTANTIAL economic recovery has occurred in the United States since the low point of the depression was reached early in 1933. By January-February, 1935, the level of wholesale prices had risen 33 per cent. In manufacturing industries the volume of production had increased 49 per cent, the total number of persons employed had increased 33 per cent, and total wage disbursements had advanced 72 per cent. The evidence of real improvement is unmistakable, despite the recurrent checks that have been felt from time to time.

Particular interest attaches to the nature of this recovery, because of the novel elements that have played a part in it. The forces operating in the traditional revival have been compounded in complex ways with elements of a consciously formulated program of economic recovery. For this reason it is of particular interest to know whether there have been shifts in the internal processes of recovery, shifts that might be associated with special elements of the recovery program. Again, we may ask whether this recovery has conformed, in general, to the pattern of earlier business revivals. This question is pertinent today not only as a matter of historical interest but also because it bears upon the probable future course of recovery. We may not appraise current economic changes solely with reference to past standards, but reference to these standards may illuminate the present situation.

There are, of course, more specific questions centering about the recovery program, as it affected manufacturing industries. What has been the effect of the novel conditions of 1933-35 upon industrial productivity? How have labor costs in manufacturing plants been affected? How much has the aggregate purchasing power of manufacturing

labor been increased? Has this increase differed in important ways from the customary expansion of labor's purchasing power during business revival? These, and the more general questions suggested above, deal with matters of major importance today, when recovery is being sought under an intermixture of old and new conditions. Not all these questions may be answered definitely, but their urgency justifies an attempt to cull from available data evidence relevant to these central issues.

This attempt has been made in preparing the measurements given in this paper. A considerable margin of error is present, for certain items, because of limitations upon the coverage of the original records utilized, or because of imperfect comparability of series drawn from different sources. Recognition of this margin of error, of the type that is present whenever representative data are employed, is necessary in using the detailed figures given below. But the general consistency of the results secured leaves no doubt as to the substantial truth of the evidence drawn from these records.

The records of recovery are to be interpreted, of course, with reference to the background of the preceding recession, as this affected manufacturing industries. Over a period of less than four years the physical volume of manufacturing production had been cut in half, the average selling price of manufactured products had fallen 31 per cent, and the aggregate gross income of manufacturing enterprises had been reduced almost two-thirds. The number of employed wage-earners had fallen approximately 43 per cent, the average hourly wage had declined some 23 per cent, and average earnings per wage-earner had dropped 39 per cent. The total wage disbursements of manufacturing industries had declined 65 per cent, a drop which, corrected for changes in living costs, meant a loss of ap-

proximately 50 per cent in the actual aggregate purchasing power of manufacturing labor. In no recent business recession have equal losses been suffered by manufacturing industries. The price decline of 1920-21 exceeded the drop of 1929-33, it is true, and in other respects the first post-War recession was of a magnitude roughly comparable to the most recent decline. But in prolonged severity the recession and depression of 1929-33 have no counterpart in the economic records of recent years. Reflections of the drastic preceding recession will appear in the movements of recovery, which may be dated from the early months of 1933.¹

This recovery was spotty and uneven, probably less homogeneous than any similar period of economic revival of which we have record. Relief from the immediate fears engendered by the banking crisis, a series of developments affecting the present and anticipated values of the dollar, the prospect, and then the reality, of extensive changes in operating and marketing conditions growing out of the adoption of industrial codes, fundamental changes in the conditions affecting the issuance of new securities and the allocation of investment funds, the initiation of Federal expenditures for relief on a hitherto unprecedented scale—these followed one another in rapid succession. Within 24 months the business 'climate' underwent a series of changes such as might normally have been spread over many years. These and other developments affected the shifting course of recovery between February, 1933, and the early months of 1935. The first sharp spurt, which carried to mid-summer, 1933, was followed by a recession, extending to the end of 1933, a spring revival in 1934, a set-back extending through the summer months, and a recovery that has continued through the end of 1934 and the early part of 1935.

Some new factors were present in each of these periods, but the most notable differences separate the first phase of sharp expansion from the alternations of contraction and expansion that follow. These differences lie, partly, in the extent of the movements. The first recovery far exceeded in magnitude the two short up-turns that occurred in the spring of 1934 and the winter of 1934. Again, the first

¹ It is an open question whether this revival in the United States should be dated from February-March, 1933, or from mid-summer, 1932. The physical volume of production reached lower levels in 1932 than in 1933; the number of wage-earners employed was as low in 1932 as in early 1933. On the other hand, aggregate wage disbursements and average prices, at wholesale, fell to lower levels in 1933. The domestic statistical evidence is thus conflicting, on the interesting question as to whether the downswing that accompanied the political uncertainties of late 1932 and early 1933 marked a continuation of recession and depression, or a check to recovery that was already under way. (As regards world conditions generally, a recovery seems to have begun in 1932.) For the present purpose, it is desirable to measure changes from the low point of early 1933.

rise and the later movements are marked off by important differences in operating conditions, in the field of manufacturing. The first of the codes introduced under the National Industrial Recovery Act was approved on July 9, 1933; the blanket code accepted by industry under the President's Re-employment Agreement went into effect on August 1, 1933. The operating conditions prevailing in manufacturing industries underwent a major change with the inauguration of the codes. In this fundamental respect, then, the circumstances attending the first phase of recovery, up to the summer of 1933, are clearly distinct from those prevailing thereafter. It is true that the prospect of operation under the codes helped to stimulate the early advance and affected the character of that advance. But the detailed regulations later prescribed under the industrial codes did not, of course, affect operating conditions during this first surge of recovery.

We must recognize that many factors, other than the codes, distinguish the first phase of recovery from the period that followed. The stimulus of monetary change was a potent force in the first surge of renewed activity. Hopes and fears centering around the prospects of inflation were stronger in the first few months than later. Production for stock was perhaps more important during the first phase than during the second, and such production would leave its impress upon the movements of the later period. The potentialities of rapid advance in productivity and sharp reduction of operating costs were greater at the very low level of activity prevailing in February, 1933, than they were after the bloom of the first revival had passed. The factors affecting operating conditions over a short period differ in various ways from those that affect operating conditions over a longer interval. It would be improper to attribute to the influence of the industrial codes all the differences we shall note between the operating conditions prevailing in manufacturing industries prior to and following the adoption of these codes. Yet these differences are part of the data required for an appraisal of the codes and of the shifting currents of economic change from 1933 to 1935.

For these reasons, then, we shall break the two years of recovery here reviewed into two phases—the sharp rise extending from February-March, 1933, to June-July, 1933, and the period from the summer of 1933 to January-February, 1935. Since the turning points that mark off these periods of recovery from one another are not in all cases clearly to be located in one particular month, and since they do not coincide, in time, for all the series to be followed, the limits of the several periods are set with reference to averages of measurements covering two months.

The basic series from which all other measurements are derived, in tracing the changes of recovery, are given in

TABLE 1

A RECORD OF THE FORTUNES OF MANUFACTURING INDUSTRIES OF THE UNITED STATES DURING RECOVERY, 1933-1935¹

BASIC MEASUREMENTS

	<i>February- March 1933</i>	<i>June- July 1933</i>	<i>January- February 1935</i>
Physical volume of production	100	157	149
Number of wage-earners employed	100	115	133
Total wage disbursements (payrolls)	100	127	172
Average number of working hours per week, per person	100	114	95
Average selling price of products	100	109	124

¹ Descriptions of the series given in this table will be found in the notes at the end of this paper.

Table 1, in relative form. These series are based upon records of production, employment, payrolls, hours and selling prices relating to the operations of the major manufacturing industries of the United States.

The general changes occurring during the periods distinguished in Table 1 are familiar. The first spurt of recovery carried all series upward, the advance of 57 per cent in production being outstanding. The changes of the nineteen months following brought a net reduction in production, further notable advances in prices, payrolls and number employed, and a pronounced decline in average hours worked per week.

But a more detailed comparison of these movements is required to bring out the distinctive features of the period that opened with the spring revival of 1933. In making such comparisons, and in deriving the requisite measurements, we must recognize the limitations of the data. There are some differences in the degrees of coverage of the series listed above. Payroll and employment statistics are drawn

* That these series do reflect the general changes occurring in the operations of manufacturing industries is indicated by a comparison with measurements that are comparable, in detail, in respect of coverage. The following series all relate to the same group of 15 important manufacturing industries: those producing iron and steel, automobiles, cigars and cigarettes, cement, leather, boots and shoes, rubber tires and inner tubes, lumber, woolen and worsted goods, cotton goods, carpets and rugs, and flour, and the meat packing, sugar refining and petroleum refining industries. In 1933 the total 'value added' by these industries constituted 24 per cent of the aggregate 'value added' by all manufacturing industries of the United States. We have in this group, therefore, a substantial representation of all manufacturing industries. Measurements derived from these industries will serve to check the more general measurements given in the text. Since, at the time of writing, the detailed measurements are available only

from 90 manufacturing industries. Records of average hours worked per week relate to 78 manufacturing industries, and within these industries the coverage is somewhat less than for payrolls and employment. Price and production records relate to still different samples of manufacturing operations at large—broad samples, but not the same, in detail, as those from which the other figures come. Comparison of these records and the derivation of measurements from such comparisons must proceed on the assumption that each of the basic series is representative of manufacturing industries in general. Since this assumption is made, the various derived measurements given below should be looked upon as indexes of general tendencies, not as highly accurate measurements of detailed movements.²

In respect of timing, certain other difficulties face us, in making comparisons. The basic production statistics are monthly averages or aggregates, while the records of employment, payrolls and hours for each month are derived from data relating to the week ending at the date nearest the middle of the month. The original price quotations vary in this respect, some being averages of daily figures, some averages of weekly quotations, some quotations as of specific dates.

through January, 1935, the comparative measurements given extend only through December, 1934-January, 1935.

The fundamental series, for all manufacturing industries and for these 15 industries, appear below.

	<i>Feb.-March 1933</i>	<i>June-July 1933</i>	<i>Dec. 1934- Jan. 1935</i>
Physical volume of production			
All manufacturing industries	100	157	137
15 industries	100	171	150
Number of wage-earners employed			
All manufacturing industries	100	115	131
15 industries	100	123	139
Total wage disbursements (payrolls)			
All manufacturing industries	100	127	165
15 industries	100	149	195
Average number of working hours per week, per person			
All manufacturing industries	100	114	94
15 industries	100	122	97
Average selling price of products			
All manufacturing industries	100	109	123
15 industries	100	114	130

In this sample, rather heavily weighted by certain basic industries, we find fluctuations more violent than those occurring in manufacturing industries at large, but of the same general character. What is equally important, the relations among the series, with a single minor exception, are the same. It is these relations with which we are concerned.

The difficulties, in respect of the comparability, in time, of the production records and the other series, are greatest for the automobile industry. The cotton textile industry, during the recovery of 1933-35, was also marked by distinctive changes. We may test

Each set of figures may be taken, however, to be generally representative of conditions prevailing in given months. Greater difficulties are introduced by the fact that the final emergence of finished manufactured products lags behind the expenditure of labor and of money in the preliminary productive processes. This lag is not a serious barrier to accurate comparison of statistics of final production and statistics relating to the earlier processes of production if the flow of materials be reasonably steady. When the process is an extended one, however, and when considerable variations in the rate of flow occur, the accuracy of comparisons of concurrent statistics is lessened. Records of employment and payrolls relating to a period of reduced activity may be set against a flow of finished products resulting from a preceding period of excessive activity. Conversely, technical conditions of production may force the maintenance of a considerable labor force even though the production of finished products has been sharply reduced. The automobile industry, with its periods of preparation for the output of new models, and the steel industry furnish examples of production and labor statistics not always strictly comparable on a current monthly basis. If the lags in a particular industry were constant, account could be taken of them, but in some instances they vary appreciably from time to time.

The seasonal factor also complicates the task of comparison. Some of the basic series compared are subject to seasonal fluctuations, others are not. However, there are real doubts as to whether the customary seasonal movements have prevailed, in all cases, under the abnormal conditions of severe depression. In some instances it is certain that they have not. Moreover, the magnitude of the usual sea-

sonal movements is much smaller than the changes here recorded. For these reasons it has seemed desirable, in the present comparisons, to attempt no correction for assumed seasonal variations. The actual records of manufacturing operations have been utilized.

Various technical difficulties, of the types mentioned, are faced in the comparative study of month-to-month fluctuations. Those general movements that persist over longer periods will not be obscured, however, by the erratic changes arising from varying temporal relations of production, employment and prices. In the comparisons actually made in the following pages the difficulty introduced by erratic month-to-month movements is met, in part, through the comparison of averages for several months, rather than indexes for single months. Even so, not too much weight should be attached to extreme movements for limited periods, in records relating to single industries. When the records for different industries support one another, however, and when movements persist over time, it is justifiable to conclude that we are dealing with significant changes, and not with erratic fluctuations resulting from shifting leads and lags among the series compared.

With these considerations and limitations in mind, we may draw such information as we can from the basic measurements cited in Table 1. The index numbers presented in Table 2, which have been derived from those in Table 1, define important aspects of the changes occurring in this period of revival.

TABLE 2
A RECORD OF THE FORTUNES OF MANUFACTURING
INDUSTRIES OF THE UNITED STATES DURING
RECOVERY, 1933-1935

DERIVED MEASUREMENTS¹

	February- March 1933	June- July 1933	January- February 1935
Gross income	100	171	185
Total employment (man-hours)	100	131	126
Average output per wage-earner	100	137	112
Average output per man-hour	100	120	118
Average earnings per wage-earner	100	110	129
Average hourly wages	100	97	137
Average labor cost per unit of product	100	81	115

¹ Explanations of the methods employed in deriving these index numbers will be found in the notes at the end of this paper.

the representative character of the general record by narrowing the sample still further, omitting these two industries. The following measurements relate to 13 manufacturing industries.

	Feb.-March 1933	June-July 1933	Dec. 1934- Jan. 1935
Physical volume of production	100	164	141
Number of wage-earners employed	100	121	130
Total wage disbursements (payrolls)	100	148	178
Average number of working hours per week, per person	100	124	98
Average selling price of products	100	116	134

Again, in this smaller sample of comparable measurements, we find general agreement with the record of the more comprehensive index numbers. There is not absolute agreement in respect of the magnitude of fluctuation, but the directions of movement and the relations among the various series are similar. The representative character of the more general measurements given in the text is validated by the more closely controlled comparisons based on the smaller samples.

The five basic series and the seven sets of derived measurements constitute the materials of the following analysis. Using these, we may follow the course of recovery and note certain of the changes occurring in the operating conditions of manufacturing industries, and in the relations of these industries to other elements of the national economy.²

² In this survey we shall use the measurements given in Tables 1 and 2, which are taken to be representative of the movements