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I. INTRODUCTION AND SUMMARY

The Task

This study is concerned with the length of the average workweek as an indicator of cyclical changes in business conditions. To interpret the behavior of economic indicators, a good deal must be known—about their past cyclical behavior, about their relationship to other economic variables, about institutional and other factors that may tend to change the historical patterns and relationships. Ideally, not only should the cyclical characteristics of each indicator be known, but the causes for typical as well as atypical behavior should be understood. The present paper seeks to contribute to both these goals.

Long Term Changes in Weekly Hours

Let us begin by briefly reviewing some long term changes in the length of the average workweek. Chart 1, summarizing average weekly hours in All Manufacturing, shows a long term decline in the length of the workweek, from almost 50 hours during the twenties to about 40 hours in recent years—a development that deeply affected the living and spending habits of the population. This decline was not a gradual change. The near-50 hour week continued until the onset of the Great Depression. Then hours declined abruptly and fluctuated around an average of about 37 hours during the thirties. Weekly hours climbed to more than 45 hours in the course of World War II, declined during 1945 and oscillated around the 40 hour level in the postwar years. The broad economic causes and consequences of the long-run decline in hours have attracted the attention of many students.¹ For our purposes, it is essential to note that during the Great Depression and its aftermath the behavior of hours must

¹For a recent summarization of long-term trends in average weekly hours, and a discussion of basic factors affecting these trends, see Joseph S. Zeisel, "The Workweek in American Industry 1850-1956," *Monthly Labor Review*, January 1958, pp. 23-29. An earlier analysis of the long term trends toward a shorter workweek is found in Herbert R. Northrup and Herbert R. Brinberg, *Economics of the Work Week* (National Industrial Conference Board, Studies in Business Economics, Number 24).

Chart 1
 Weekly Hours and Related Economic Activities, All Manufacturing, 1920-1957
 (1) Labor Input

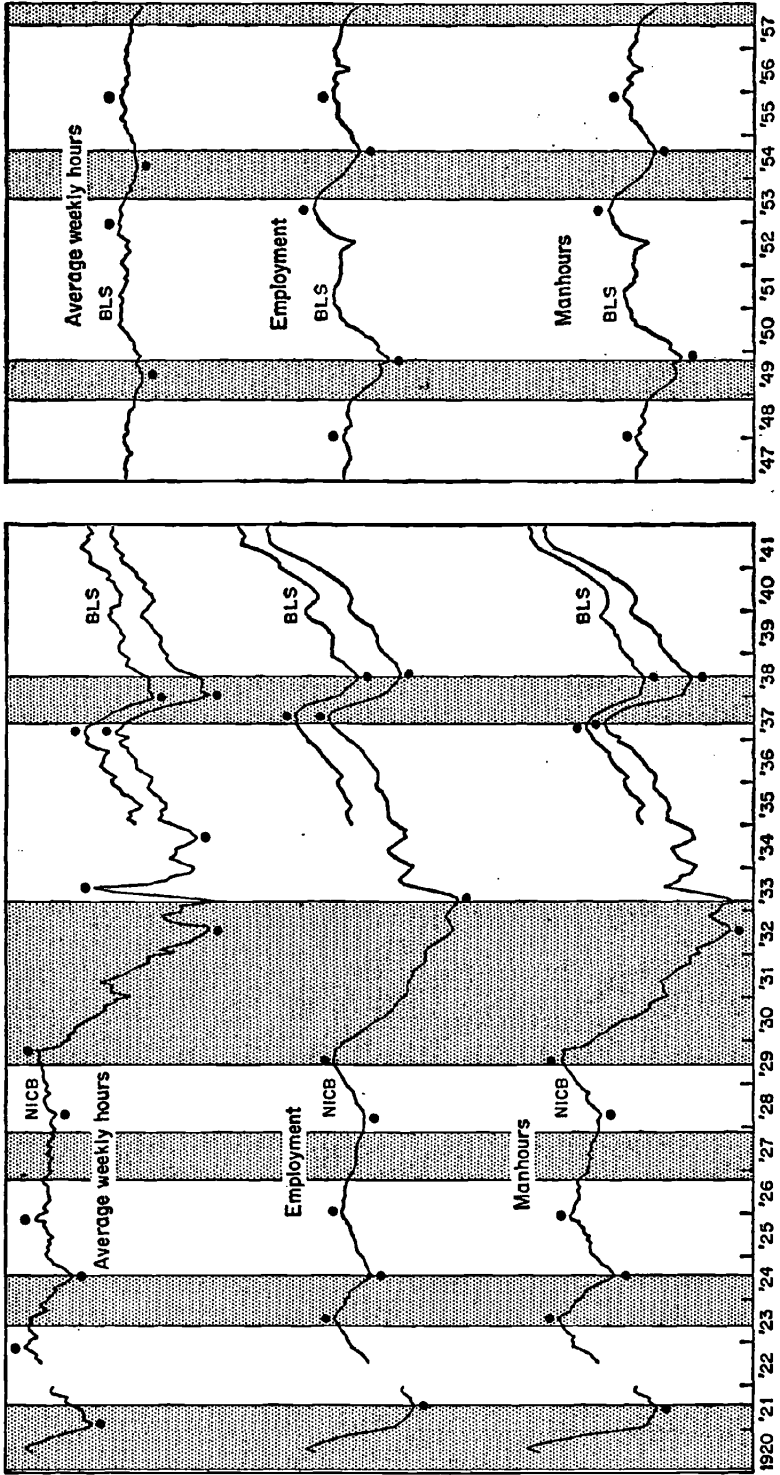
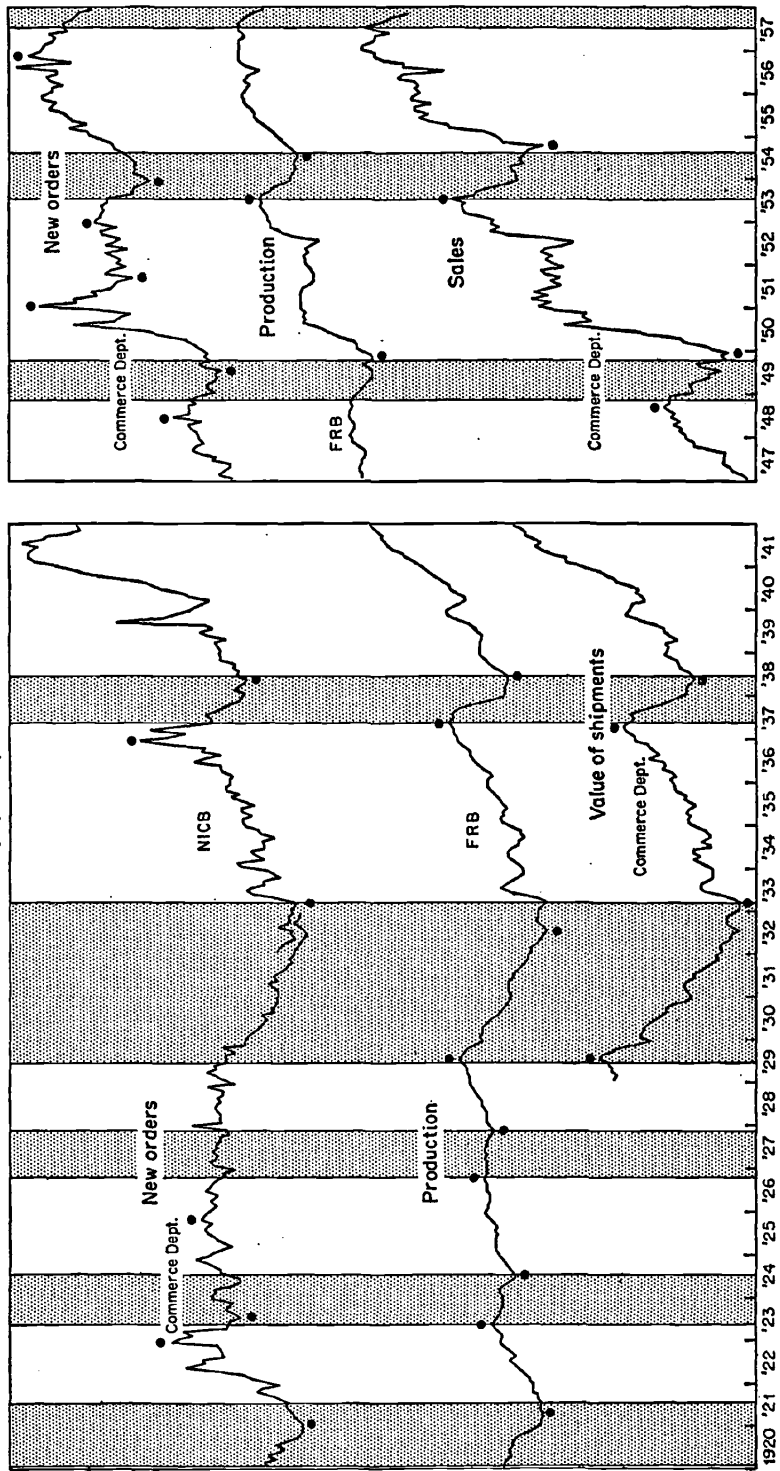


Chart 1, concluded
(2) Output and Sales



Series in this chart were plotted on different arithmetic scales, chosen to approximate similarity of amplitude. Shaded areas represent business cycle contractions, according to NBER chronology. Dots identify peaks and troughs of specific cycles.

have been fundamentally affected by noncyclical forces; during the remainder of the period under review, trend forces are not likely to disturb materially our observations on cyclical timing—at least not in weekly hours worked in Manufacturing.

After World War II, there was not much more reduction in the length of the workweek in All Manufacturing. Recent declines in the workweek have been largely restricted to nonmanufacturing industries. Chart 2 contains some evidence to this effect. The nonagricultural workforce experienced a decrease in the length of the workweek, not shared by manufacturing labor. And the strong decline in the workweek in agriculture, from about 50 to 45 hours, led to a shortening of the average workweek of “all persons at work,” more pronounced than that of the nonagricultural population. Of the total decline in the average workweek for “all persons at work” (3 hours), about half an hour must be attributed to the increase in part time work.

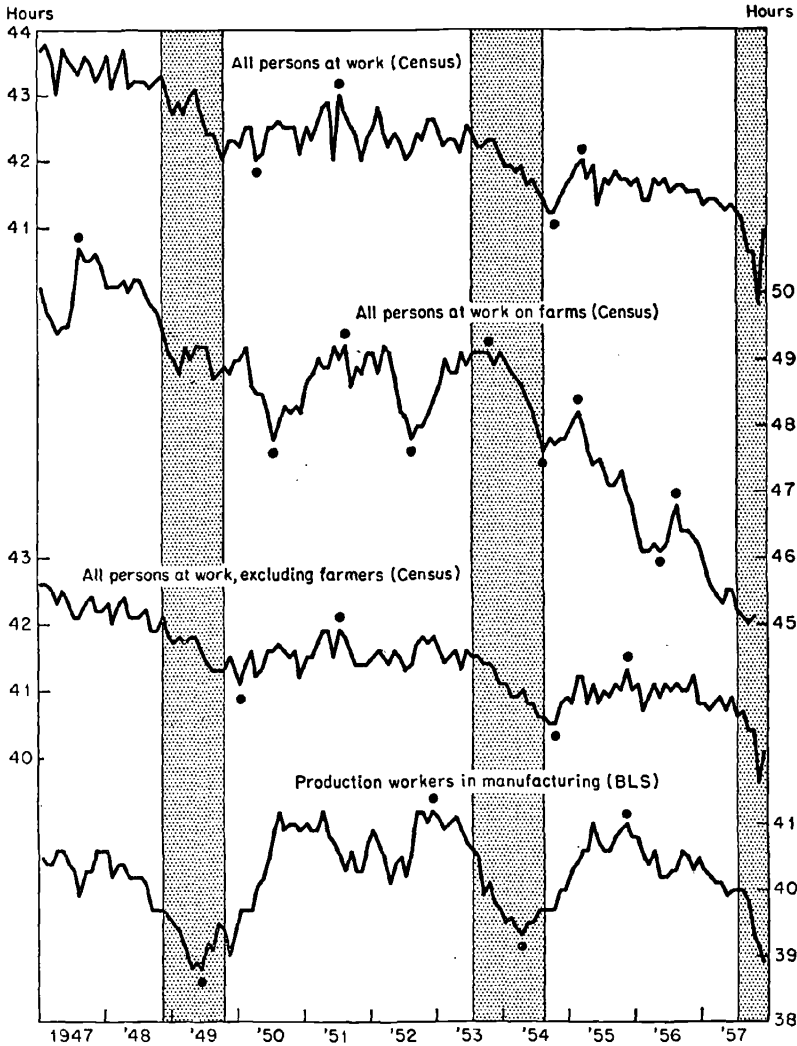
Evidence not here presented, makes it possible to identify the industries in which the decline of the workweek was most pronounced. Anthracite mining and some long-hours industries in transportation and communication registered substantial declines. For others, such as public utilities and trade, the downward adjustment was milder. Also within manufacturing, there were some industries (such as food products, lumber products, paper and allied products) in which the length of the workweek was reduced. In general one can say that, outside or inside of manufacturing, industries with a workweek in excess of 41 hours in 1947 tended to experience declines during the decade 1947-1957, while those with a workweek of 39 hours or less experienced increases. This finding is also confirmed by information on average hours worked in All Manufacturing, by individual states. The result is a 1957 workweek of about 40 hours in manufacturing, of a little under 41 hours in all nonagricultural pursuits, and of a little above 41 hours for all persons at work.

Altogether, the length of the average workweek has become less unequal as among workers in different industries or in different regions. This may be regarded as part of a “democratization” of labor input, analogous to similar processes that have been described in the fields of incomes and expenditures.

The Workweek as a Cyclical Indicator

Our graphs of average hours in manufacturing industries (Charts 1 and 2) show a series of rather mild fluctuations which appear to be fairly regularly related to expansions and contractions in general business activity. Closer observation reveals that in most cycles the turning points of

Chart 2
Weekly Hours Worked, 1947-1957



For explanation of shaded areas and dots, see Chart 1.

average hours in All Manufacturing preceded those of general economic conditions, with the lead averaging about four months. This characteristic earned the workweek in manufacturing its selection as one of the eight "leading" indicators of business conditions in the National Bureau's twenty-one basic indicator series.

To be useful, an economic indicator must represent a broad segment of the economy and must describe a process of fairly stable significance.² In these respects the average workweek seems eminently to qualify. Hours worked measure the average labor input of employed workers and co-determine, together with the number employed, their skills, etc., the labor input of society. However, the indicator is presently restricted to average hours worked by production workers in manufacturing, and this means less than complete coverage. Thus let us briefly investigate whether the cyclical behavior of hours in manufacturing is also representative of that in other segments of the economy. Chart 2 shows, for 1947 to 1957, that there are considerable differences in behavior of average hours among different segments of industry. Cyclical fluctuations are most distinct and widest in manufacturing and agriculture, less so in the total nonagricultural labor force or the total work force. Furthermore, the timing of cyclical turns varies among the series charted, manufacturing showing the closest, and agriculture showing the loosest relation to business cycles.

Thus, although average weekly hours in manufacturing may be a preferred indicator of prospective changes in business conditions, they cannot be regarded as representative of the workweek in the nation at large. The cyclical behavior of hours worked in nonmanufacturing industries is quite different from that in manufacturing industries and must be analyzed separately.³

Some Problems

Among the questions which the student of business cycles would raise about the workweek are the following: How typical, how reliable, how regular in length are the "leads" of hours observed for manufacturing as a whole? Are they also found in most of the individual manufacturing and nonmanufacturing industries? What is the relationship of turns in hours to employment turns in the same industries? Are there certain industries which tend to turn early (a characteristic of obvious importance for forecasting purposes)? And, above all, what explains the timing characteristics of average weekly hours? Similar questions could of course be raised about other aspects of cyclical behavior, such as amplitudes and cycle patterns; and some of these aspects should indeed be considered in the analysis of cyclical conditions. However, this study is part of a broader attempt to use the sequence of short-term changes for business

²Geoffrey H. Moore, *Statistical Indicators of Cyclical Revivals and Recessions*, National Bureau of Economic Research, Occasional Paper 31, p. 22.

³In the current paper, analysis will be restricted to average weekly hours in industries other than agriculture.

cycle analysis. In that context, the timing of cyclical turning points plays a decisive role. Hence the present paper will be concerned mainly with the timing characteristics of average weekly hours.

Valuable contributions toward the description and analysis of variations in the length of the average workweek have been made in the past,⁴ but the available data have never been systematically exploited. This is what this study sets out to do. A major problem in this undertaking was the processing of a large mass of data in a form that permitted us to compare and analyze. This involved, as a basic step, the seasonal adjustment of about 200 time series—a task which would have been forbidding before large scale electronic computers became available. It also involved the determination of a far greater number of specific turning points and the “matching” of corresponding turns of hours, employment and business activity at large.

The predominantly empirical approach of this paper should not, however, create the impression that our findings are based entirely on objective facts. There is a surprising amount of discretionary leeway even in this type of quantitative analysis—in the choice of various seasonal adjustments, in the selection of turning points, in the matching of turns in hours with business cycle or employment turns, and in other matters. However, we have tried to make these decisions conscientiously, and we believe that the broad conclusions here presented would be little affected by alternative decisions in borderline cases.

The monographic treatment of a single economic variable has certain disadvantages, particularly in the area of interpretation. The cyclical behavior of average hours cannot really be understood without reference to the concomitant behavior of other variables, such as overtime work, employment, productivity, labor cost and labor turnover rates, production, sales, and so forth. Some of these activities may suggest reasons why and when labor input is varied, and others might indicate under what circumstances business management chooses to vary this input by means of hours rather than by means of employment changes. Employment will be discussed in some detail. But production, sales, labor turnover and other economic activities will be presented and analyzed on an aggregate level only, that is, for All Manufacturing or similarly broad classifications. Nevertheless, on the basis of these data and some supplementary informa-

⁴There are numerous articles in the *Monthly Labor Review*, *Survey of Current Business*, and various publications of the National Industrial Conference Board. See also Leo Wolman's *Hours of Work in American Industry*, National Bureau of Economic Research, Bulletin 71, 1938, and, recently, Geoffrey Moore's article, "Business Cycles and the Labor Market," *Monthly Labor Review*, March 1955.

tion, we will attempt to analyze the reasons why average weekly hours show the cyclical characteristics which will be described in the body of this paper.

The Data

In this study we are concerned with average hours worked, or hours paid for, per week. They should be clearly distinguished from so called "normal" or "nominal" hours. The latter denote the length of the standard workweek, i.e., the maximum number of hours for which no premium payments have to be made. Average hours actually worked per week differ from normal hours by reason of overtime, short time, Sunday and holiday work, time lost by sickness, labor turnover, etc. Statistically, average hours worked are usually derived by dividing employment into manhours. This introduces other elements of variation, such as changing proportions among groups of workers whose workweek may be of different length (men vs. women, skilled vs. unskilled, workers on time rates vs. workers on piece rates).

Another distinction to be kept in mind is that between hours worked and hours paid for. This distinction is particularly important for the postwar period with its paid vacation, paid sick-leave, paid time-off during strikes, and so forth. One might wish to approximate the concept of hours actually worked. However, most of the hours data at our disposal refer to "hours paid for."

Average weekly hours are available for production and related workers in manufacturing, and in a few nonmanufacturing industries. The category of production workers excludes supervisory personnel (above the working foreman level) and all clerical workers. This classification assures a fair amount of homogeneity, and comparability with the available employment and earnings data. Several industries—railroads, trade, financial and some other services, for example—have no "production" workers proper, hence the hours are ascertained for nonsupervisory employees, including working foremen.⁵

There are several major collections of information at the disposal of the student who wishes to analyze the behavior of hours during business cycles or over longer periods. One consists of the statistics of hours in 25 manufacturing industries, which were compiled by the National Industrial Conference Board on a monthly basis, from 1920 to 1948. From

⁵For a definition of production and related workers see BLS *Bulletin 1168*, p. 6, footnote 14, or the glossary in the Annual Supplement issues of *Employment and Earnings*.

1932 on, the Bureau of Labor Statistics has compiled monthly information on average hours. Fourteen major manufacturing and about as many nonmanufacturing industries were covered from about 1935 on, in the classification used during the interwar period. For the postwar years, we have the Bureau of Labor Statistics information for 21 major manufacturing industries, many subdivisions thereof, and some industry divisions outside manufacturing.⁶

For manufacturing, our analysis will be largely restricted to the major industries; for nonmanufacturing, we sometimes were obliged to use narrower industry classes. For all these industries we assembled not only information on hours but also on employment. This permits us to analyze the timing of cyclical changes in average hours in relation to comparable employment turns as well as in relation to turning points of business cycles at large. Since January 1956, the BLS has published separate data for overtime hours in manufacturing industries, making it possible to derive straight time hours by subtraction. In this paper, some limited use is made of this material.

For some purposes, particularly in connection with our search for the causes of the timing behavior of industry series, we required information in greater detail than available in published form. The Bureau of Labor Statistics supplied information on the behavior of hours and employment in 20 individual plants—coded in such a way as to comply with the rigorous requirements of the disclosure rules.

Each month the Bureau of the Census conducts a sample inquiry into labor force characteristics, employment status and number of hours worked during the report week. The information is based on visits to households rather than on plant statistics, and from it are constructed percentage distributions of all persons and of wage-salary workers working specified numbers of hours. These data are available only for relatively broad industrial groupings. The hours and overtime data published by the Census Bureau will be used in our inquiry. Scattered information on the average workweek and on frequency distributions of hours worked, for one point in time or for census years, is neglected in our study which is concerned with the cyclical behavior of hours over time and must therefore mainly rely on monthly time series.

For purposes of cyclical analysis, all time series had to be adjusted

⁶An increasing number of digits in the code denotes increasingly finer subgroups, the extra digit being used to specify the subclassification. Thus the broad class of textile mill products has the industry code 22, the smaller group of knitting mill products the code 225, and within this group the full-fashioned hosiery industry the code 2251.

for seasonal variations. This was necessary not only for employment but also for the average workweek. Although the seasonal movements in the latter are slight, they are fairly regular and large enough to obscure the characteristics of the relatively mild cyclical swings. Some data, such as the postwar BLS employment series, are also published in deseasonalized form; for other data we could utilize previous adjustments in the files of the National Bureau. The bulk of the data was adjusted by electronic method, programmed for the Univac by Julius Shiskin and Harry Eisenpress. A more detailed description of the data used in this study can be found in an appendix to this paper. Among the topics dealt with are concepts, coverage, sample size, collection procedures and methods of aggregation.

The Approach

Analysis of the cyclical behavior of hours is not only of academic interest but also may enhance our ability to analyze current business conditions. Suppose we found that average hours tend to lead business cycle turns with fair regularity and with moderate industrial dispersion; this would surely have some bearing on the interpretation of economic conditions. Suppose further that the decline of average weekly hours occurred in a persistent industrial sequence—this would permit us to gauge the progress of declines or recoveries, as they occur.

Even if there is no clear-cut sequence in terms of specific industries, the percentage of industries with declining hours, as given by diffusion indexes, provides some indication of the extent to which declines in the length of the workweek are diffused throughout manufacturing or through industry at large. Thus, knowledge on the behavior of average weekly hours, by industry and by region, will be an additional tool for the realistic interpretation of economic conditions.

In Section II of this paper, the timing of turns in hours in All Manufacturing is first compared with that of employment, manhours, new orders, production, sales and labor turnover. We then investigate the relation of fluctuations in overtime and short time to those in average hours. And for some of these variables we shall endeavor to find out whether differential behavior in the aggregate measures is reflected in the corresponding diffusion indexes, and to what extent the latter measures have indicator characteristics of their own.

The main part of the paper deals with a detailed analysis of timing relationships in individual major manufacturing and nonmanufacturing industries. The cyclical turning points in average weekly hours will be

measured against business cycle turns⁷ as well as against turning points in the corresponding employment series. We shall establish how regularly turns in hours can be matched with those in business cycles and with those in corresponding employment series; how consistently the average leads observed in the aggregates appear in the component series; how widely dispersed turns in hours are and how the timing of hours in manufacturing industries compares with that in nonmanufacturing industries. We shall also investigate how average timing relations vary from cycle to cycle and whether there is any persistence in the sequence of the turns for individual industries.

In the last section of this paper we shall attempt to shed some light on the managerial considerations affecting the manipulation of labor input by means of changes in hours as against employment, in individual plants.

Summary of Findings

All Manufacturing. Months before business activity reverses its direction, businessmen collectively begin to change the average length of the workweek. Spreading among firms and industries, these changes produce a cyclical turn in the average for all manufacturing industries. The result is that turns in the workweek usually precede business cycle turns by about four months. Leads tend to be somewhat longer at peaks than at troughs, but it is not certain that this is a systematic relationship. The lead of average weekly hours can be found in all segments of the work force. It appears in the statistics for skilled and unskilled workers, for men and women; it is found in any region, and generally in individual industries. Before the average workweek for All Manufacturing attains its peak, the percentage of industries with increasing hours reaches its zenith. This is reflected in diffusion indexes of hours, which at business cycle turns show leads two or three times as long as those of the average workweek itself. Overtime hours and short time hours are responsible for a good part of the fluctuation in average weekly hours, particularly in the neighborhood of turning points. At peaks, management reduces overtime hours early, to avoid premium rates; at troughs, overtime does not show such a lead. Short time may be used under two sets of widely divergent

⁷ These business cycle turns are taken from the reference chronology established by the National Bureau. They denote peaks and troughs of cycles in the economy at large (business cycles) and are based on the analysis of a large number of time series. A recent revision of the business cycle chronology, shifting the 1929 peak from June to August, could not be used in this paper. Its effect on the average timing measures presented would be a slight increase in the average lead of weekly hours. It would, of course, reduce the lag or increase the lead shown by various series at the 1929 peak by two months.

circumstances: in case of insufficient work and in case of extreme labor shortages. The former condition, however, dominates the behavior of short time. Thus we find short time work fluctuating inversely to changes in general business conditions.

Early managerial action affecting labor input is not restricted to average weekly hours, but also affects employment. Although cyclical turns in the number employed occur close to reversals in general business activity, accessions and layoffs—i.e. those elements of employment changes over which management exercises discretion—turn considerably in advance of business cycle peak and trough dates. At peaks, also, voluntary quitting of jobs by workers tends to lead, but at troughs it lags; quit rates stay low until labor markets tighten. Net accession rates, reflecting labor turnover as a whole, show a consistent lead at all turning points, on the average exceeding the lead of weekly hours though not that of the corresponding diffusion index of hours. In evaluating this timing behavior one must realize that labor turnover rates, based on month-to-month changes, are more akin to diffusion indexes than to measures of absolute levels.

Businessmen do not wait to adjust labor input until changes in demand are indicated by turns in sales. They are more likely to take their cues from new orders. During the period under investigation, the average lead of new orders in All Manufacturing exceeds indeed the lead of weekly hours. However, cyclical turns in new orders cannot be relied upon to foreshadow turns in hours; only in seven of twelve instances do turns in new orders actually precede those of average weekly hours.

Individual Industries and Plants. Analysis of industrial detail within the manufacturing group produces additional observations. The tendency of hours to precede business cycle turns thoroughly pervades the experience in all major manufacturing industries. Also the longer lead at peaks than at troughs can be observed in the industry detail. The differential lead is sharply reduced if turns in hours are measured against employment turns.

Changes of labor input in nonmanufacturing industries are less closely related to general business activity than those in manufacturing. Average hours in nonmanufacturing industries frequently show no cyclical fluctuations or fluctuate in largely independent rhythm. Hence peaks and troughs of hours in nonmanufacturing industries can be related to business cycle turns in only two-thirds of the possible opportunities, compared with 96 per cent in manufacturing. Cyclical turns of hours in nonmanufacturing industries lead business cycle turns by two months, on the average, compared with four months in manufacturing. However, measured against

employment, the average timing of hours shows little difference between the two industry sectors. Hence, if differences in economic activity among various industries are considered, the timing of hours shows a fair degree of consistency throughout the industrial structure.

Investigation of the reasons for the lead of turns in hours over those of employment required analysis below the industry level. It had to be established whether the lead is a result of the process of aggregating industry measures, or whether it is also apparent at the plant level. Evidence drawn from a sample of 20 manufacturing plants shows that leads of weekly hours over employment occur, in individual plants, in the vast majority of matched turns. To be specific: Turns of weekly hours lead those of employment in 62 of 74 comparable turns, or in 84 per cent of the cases.

Why Do Hours Lead? Initially the cyclical decline of weekly hours is largely brought about by reduction in overtime. The decline of straight time hours makes its influence felt at a later date. The reasons why labor input is adjusted initially by hours rather than by employment are manifold. Labor costs per hour can be reduced sharply by cutting overtime hours. A reduction in the workweek can be implemented quickly and reversed easily if necessary. It does not involve sacrificing part of an experienced work force; and sharing the work by working fewer hours may help maintain worker morale. Most of these reasons for choosing hours rather than employment as means to cut labor input involve short-term considerations. The actions flowing from them are taken largely by supervisory personnel, in response to current pressures on production schedules. They are not based on changes in policy. The reduction of hours near the peak is not different from numerous other temporary reductions in the course of cyclical expansion.

Employment and even manhours continue to rise after the peak in weekly hours, largely as a continuation of past policies. A reversal of these policies implies fairly drastic changes in anticipations; the external and internal evidence warranting these changes accumulates only in the course of several months. This is the reason that reversals in employment trends occur only after considerable delay. It is true that hiring rates begin to be reduced and lay-off rates begin to rise even before the peak in the average workweek is reached; but these changes are partly compensated by a decline in voluntary quits. Some short-term factors support the continued employment increases. The attempt to reduce overtime may produce some demand for additional workers. Some lay-offs are postponed by worksharing provisions in union contracts. Seniority rules and retraining needs may lead to temporary "doubling up" for the same job even when lay-offs are in prospect or actually under way.

Near troughs, adjustments in the workweek are made in preference to sharp increases in hiring, in order to reduce undesirable part time work, to comply with provisions in labor contracts, to limit training costs, and to avoid unfavorable experience ratings which affect unemployment insurance contributions. The general softness of the labor market makes it unnecessary for most business establishments to do advance hiring in anticipation of future needs. Again, the cyclical turn in employment occurs only when managerial policies change—and these changes are based on a revision of anticipations or made in response to demand pressures that cannot be taken care of by the currently employed work force. This explains why also at troughs, where the avoidance of overtime premium rates plays no role, cyclical changes in average weekly hours precede those in employment.