7

CYCLICAL FLUCTUATIONS

One of the most intriguing aspects of the development of a service economy is the prospect it offers of increasing stability over the business cycle. The tendency for employment and earnings to be less sensitive to the business cycle in service industries than in goods-producing industries has been noted by many observers.[1] This chapter explores the hypothesis of stability in services in some detail. Monthly data for 1947 through 1965 are presented for various service industries and comparisons are made with manufacturing and other goods-producing industries. Time series on output and on output per man-hour are included as well as on employment, and relative measures of the amplitude of fluctuation are calculated.

A Priori Considerations

Before looking at the data, it is useful to review some of the factors that might contribute to differences in stability between service industries and, say, manufacturing. Since the demand for employment is derived from the demand for output, the factors affecting the stability of output will be considered first; a discussion of those that bear only on employment will follow.

Probably the most important difference between goods output and service output is that the former can be stored and the latter cannot. True, some goods output, such as perishable food, cannot be stored for very long. Most of the output of farms and mines can be stored, however, and much of the output of manufacturing takes the form of durable goods. Wesley Mitchell observed that "The characteristic of goods that

[1] See, for example, Arthur F. Burns, "Progress Towards Economic Stability," *American Economic Review,* March 1960, No. 1, pp. 6–7; also Daniel Creamer, *Personal Income During Business Cycles,* Princeton University Press for the National Bureau of Economic Research, 1956, p. 47.

seems to have most influence upon cyclical amplitudes is durability." [2]

In the case of consumer durable goods, true consumption (i.e., the use of the goods or of their services) depends upon the stocks in the hands of consumers, not on the rate of purchase of new goods. The latter, which is comparable to investment in capital goods, may evidence wide cyclical swings in response to changes in availability of credit, expectations, and other investment determinants, while the true consumption rate remains relatively stable. In addition, cyclical swings in the rate at which businessmen add to or deplete their inventories of goods may increase the amplitudes of fluctuation of industries producing such goods. In the case of services, consumption and output must coincide; inventories are nonexistent.

Another potentially relevant factor is the income elasticity of demand for goods and services. Some evidence, presented in Chapter 2, suggests that demand for services might be more elastic than for goods. If agricultural goods are excluded, however, the difference does not appear to be large. A higher income elasticity for services, other things being equal, would lead to greater cyclical instability in service output. The effect of this differential, however, is diminished to the extent that consumption patterns are determined by permanent income rather than by transitory or cyclical changes.[3] Furthermore, income elasticity refers to consumption rather than purchases. In the long run the two are identical, but, as has been noted, in the short run the existence of stocks in the hands of consumers tends to dampen the link between consumption and output for durable goods.

One other factor that might affect cyclical fluctuations in measured output of goods and services is the possibility of substitution between market and nonmarket production in response to cyclical changes in labor market conditions. When jobs are easy to find, unemployment usually falls and additional workers are attracted to the labor force. This increased employment in the market production of goods and services may be offset to some extent by a decrease in "nonmarket" or "home" production because the newly employed have less time available for such activities. This substitution between home and market production is par-

[2] Wesley C. Mitchell, *What Happens During Business Cycles: A Progress Report,* New York, NBER, 1941, p. 115. Mitchell went on to say that durability is "a somewhat ambiguous term." Arthur F. Burns has suggested that the high unit cost of most durable goods is a key element in the greater cyclical swings in their sales. This is another way of pointing up the difference between acquiring a stock and purchasing a flow of services.

[3] See Milton Friedman, *A Theory of the Consumption Function,* Princeton for NBER, 1957.

ticularly characteristic of women and other secondary workers.[4] If, as seems likely, this substitution occurs more often for services (e.g., restaurants, laundries, household cleaning, beauty care, nursing care) than for goods, there would be a tendency for the differential between fluctuations in measured output and true output to be greater for services than for goods. That is to say, if market production of goods is more volatile than market production of services, the difference is likely to be even greater if nonmarket production is taken into account.[5]

Given the cyclical behavior of output, there are several questions to be asked concerning the relative stability of employment in goods and services. First, there are large numbers of self-employed in the Service sector; as will be shown, their employment is almost completely insensitive to moderate cyclical fluctuations in output. Second, the role of salaried employees as opposed to hourly workers is much larger in services than it is in goods. Also, the educational level of service workers is higher than that of workers in Industry, and the costs of hiring are probably greater.[6] This means that dismissals or layoffs during recessions that are expected to be short-lived, will be less frequent. Finally, it should be noted that a substantial number of service industry employees are classified as "wage and salary workers" but are actually compensated on a "piecework" basis. Their wages, in whole or in part, are determined by their output and take the form of commissions, tips, or a share of "profits." Employers have little reason to dismiss such employees when business falls off. This group includes real estate, insurance, and security brokers, waiters and waitresses, barbers and beauticians, and most retail salesmen of durable goods. Because their earnings are more sensitive to cyclical fluctuations in spending than are their hours of work, we can think of these workers as having "flexible" wages.[7]

There is some "piecework" employment in manufacturing, as well as in the Service sector, but the effect on measured employment is not the same because of differences in the production process. When demand

[4] See Jacob Mincer, "Labor Force Participation of Married Women," in *Aspects of Labor Economics,* Universities—National Bureau Conference 14, Princeton for NBER, 1962, pp. 66–67; and "Market Prices, Opportunity Costs, and Income Effects," in *Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld,* Stanford, 1963, pp. 70–78.

[5] I am grateful to Michael Grossman for calling this point to my attention.

[6] The higher *level* of education of service industry employees should not be confused with *changes* in the level of education, which have been greater in the Industry sector.

[7] I am grateful to Jacob Mincer for this formulation.

falls in manufacturing, the employer will probably cut back on production, regardless of whether labor is paid on an hourly or piecework basis, and this cutback will result in less employment. The effect in services is different because the amount and timing of the output and employment required is not known in advance, and because there are practically no raw material costs for the employer to consider. In both situations a decrease in demand means a fall in the marginal revenue product of labor. In manufacturing, the wage per hour tends to remain the same, and there is a reduction in man-hours. In the case of waiters, barbers, salesmen, and so on, employment tends to remain unchanged, and the necessary adjustment is achieved through a fall in hourly earnings.

These considerations suggest that for equal cyclical changes in output there will be a greater accompanying change in employment in manufacturing than in services. If this tendency is present, the result may be greater cyclical swings in productivity in services than in manufacturing, even though output may fluctuate more in manufacturing.

One final point to be mentioned is the larger role of nonprofit organizations in services than in the Industry sector. Nonprofit organizations, public and private, account for over one-third of Service sector employment, but for only a small percentage of Industry employment. It will be recalled that one of Mitchell's main points about cyclical fluctuations stressed their relation to the "business economy." [8]

To sum up, we should expect to find larger cyclical fluctuations in output and employment in the Industry sector than in services. This sector differential should be greater for employment than for output, and should be more noticeable for durable than for nondurable goods. If employment is very stable relative to output in services, it is possible that productivity might fluctuate more in services than in the Industry sector.

Employment

This section discusses the amplitude of fluctuation of employment in the nine nonagricultural major industrial groups. The employment concept used is comprehensive. It includes part-time as well as full-time workers, supervisory as well as production workers, self-employed as well as employees. It does not, however, include unpaid family workers. Data on wage and salary earners, based on establishment reports, were obtained

[8] Wesley C. Mitchell, *Business Cycles, The Problems and Its Setting,* New York, NBER, 1927, pp. 458 and 468.

from the Bureau of Labor Statistics.[9] Estimates of the self-employed by industry were provided by the Bureau of Labor Statistics from unpublished work sheets of the Current Population Survey.

Chart 12 shows monthly series for the period 1947 through 1965 adjusted for seasonal fluctuations. Table 58 shows the average annual rate of change of each series during business cycle expansions and contractions and the net difference between rates of change in expansions and contractions. The net difference may be regarded as a measure of the cyclical amplitude of the series, net of trend. The larger the difference in rates of change between expansions and contractions, the greater the cyclical volatility of the series. The figures in parentheses indicate the average deviation of each phase or cycle from the mean of all the phases or cycles. A brief explanation of how these measures were calculated follows.

For the years covered by these time series, the National Bureau has identified seven business cycle turning points covering four contractions and three expansions. They are: Peak—November, 1948; Trough—October, 1949; Peak—July, 1953; Trough—August, 1954; Peak—July, 1957; Trough—April, 1958; Peak—May, 1960; Trough—February, 1961. These are known as reference cycle dates. The period between a peak and the following trough is called a contraction; the period between a trough and the following peak is called an expansion.[10] One contraction or one expansion is known as a phase, and a cycle consists of two successive phases. The cycle can be defined from trough to trough or from peak to peak; the choice is largely a matter of convention.[11]

The rates of change for each expansion are measured from a three-month average centered on a trough to a three-month average centered on the following peak. Rates of change in contractions are measured in a similar way from peak to trough. These rates are affected by the trend

[9] A description of the sources for the employment series and all the other series presented in this chapter can be found in Appendix J.

[10] For a description of the NBER method of dating business cycle turns see Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, New York, National Bureau of Economic Research, 1946, Chapter 4. See also, Geoffrey Moore, "What Is a Recession," *American Statistician*, October 1967.

[11] One argument for the trough to trough view of the cycle is that the forces leading to a contraction often develop as an integral part of the preceding expansion, whereas the forces leading to an expansion are more often exogenous. An argument for the peak to peak view is that the amplitude of an expansion (particularly with respect to physical production and related variables) depends in considerable degree on the amplitude of the previous contraction, whereas the amplitude of a contraction is not similarly dependent upon that of the previous expansion. The measures used in this study are based on an average of both approaches.

of the series as well as its cyclical behavior. For instance, government employment shows a positive rate of growth during contractions of 2.2 per cent per annum because of the strong underlying upward trend. Since this trend is also present during expansions, the net difference between rates of change in two adjacent phases indicates the magnitude of the cyclical component net of trend. The final figure, 1.4 per cent per annum, is the average of the net difference between all possible adjacent phase comparisons.[12]

This measure shows the cyclical volatility of each series when the cycle is defined by the NBER reference dates for the general business cycle. If the time series conforms to the general business cycle in the timing of peaks and troughs, these are clearly the appropriate dates to use. To the extent that a series has substantially different cyclical peaks and troughs, the present measure tends to understate the amount of cyclical fluctuation. Most of the cyclical movements in the series examined in this chapter conform reasonably well to the general business cycle. One exception is the series for construction employment; its cyclical volatility

[12] Assume the value of X at time i is composed of a trend component T and a cycle component C. Also assume that the relationship is multiplicative. Then

$$X_i = T_i C_i \tag{1}$$

and

$$\ln X_i = \ln T_i + \ln C_i. \tag{2}$$

Differentiate (2) with respect to time.

$$\frac{dX_i}{dt}\frac{1}{X_i} = \frac{dT_i}{dt}\frac{1}{T_i} + \frac{dC_i}{dt}\frac{1}{C_i}. \tag{3}$$

Rewrite (3) as

$$m = r + c. \tag{4}$$

This defines the monthly rate of growth of the series assuming continuous compounding. The cyclical component will be positive in expansions and negative in contractions. Therefore

$$m_e = r + c_e \tag{5}$$

$$m_c = r - c_c. \tag{6}$$

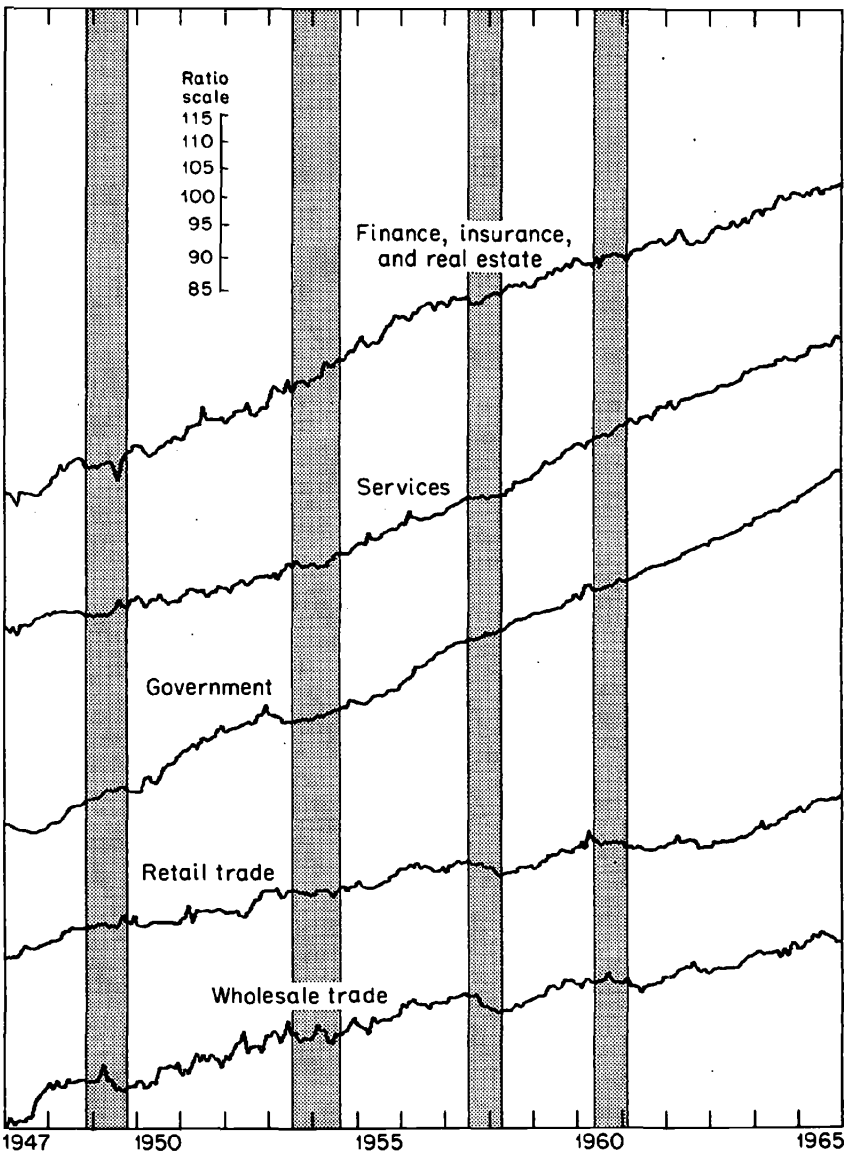
Subtract (6) from (5) to get

$$m_e - m_c = c_e + c_c. \tag{7}$$

Multiply (7) by 12 to get the annual rate of change net of trend. Then average for all cycles.

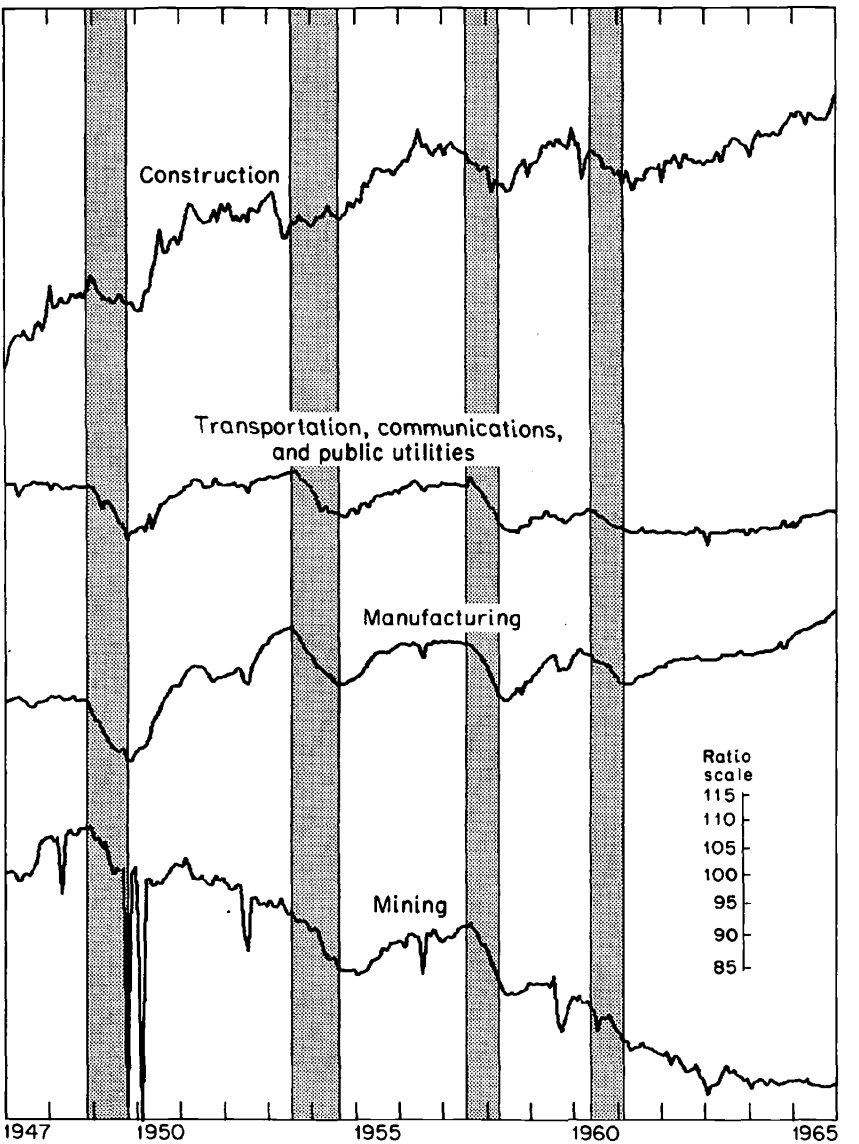
CHART 12

Employment, Industry Groups, 1947–65



(continued)

CHART 12 (concluded)



Note: The seasonal adjustments were made by the X-11 version of the Census method II seasonal adjustment program.

TABLE 58

Average Rates of Change of Employment During Business Cycles, Nine Nonagricultural Major Industry Groups, 1947–65 [a]
(per cent per annum)

Industry	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
Finance, insurance, and real estate	3.1(0.5)	2.4(1.0)	0.7(0.8)
Government	3.6(0.4)	2.2(0.1)	1.4(0.4)
Services [b]	3.4(1.0)	1.8(0.8)	1.6(1.3)
Retail trade	2.0(0.7)	−0.8(1.7)	2.8(2.3)
Wholesale trade	2.5(0.1)	−1.7(1.4)	4.2(1.3)
Construction	3.1(0.5)	−2.6(3.0)	5.7(2.6)
Transportation, communications, and public utilities	1.9(0.6)	−7.6(1.3)	9.5(1.4)
Mining	0.5(1.8)	−12.0(4.3)	12.5(4.6)
Manufacturing	3.8(1.4)	−9.5(1.4)	13.3(2.0)

Source: See Appendix J.

[a] Numbers shown in parentheses are average deviations defined as

$$\frac{\sum_{i=1}^{n} |X_i - \bar{X}|}{n}$$

[b] Professional, personal, business and repair services. Domestic servants are excluded.

is much greater when measured over expansions and contractions in the specific series.[13]

Inspection of Table 58 reveals that the service industries are all characterized by small cyclical swings in employment. The smallest move-

[13] The average rates of change are: expansions, +5.9 per cent; contractions, −13.1 per cent; and cyclical change net of trend, 19.0 per cent. The dates of peaks and troughs for construction employment and other specific series are given in Appendix Table J-2. I am grateful to Sophie Sakowitz of the National Bureau's business cycle unit for the identification of these turning points by the methods described in *Measuring Business Cycles*, Chapter 4. It should be noted that some of the series, notably government; finance, insurance and real estate; and services have such strong upward trends that no true contractions can be observed. Nevertheless, even in these series there is evidence of conformity to the business cycle; the rates of growth are more rapid during periods of general business expansion than during general business contractions.

TABLE 59

Average Rates of Change of Employment During Business Cycles, Sector Aggregates, 1947–65
(per cent per annum)

Sector	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
Total nonagricultural employment	3.0(0.2)	−3.4(1.0)	6.4(1.0)
Nonagricultural self-employment	0.7(1.6)	0.8(2.0)	−0.1(3.0)
Nonagricultural wage and salary employment	3.4(0.5)	−3.8(1.0)	7.2(0.1)
Service sector (total employment)	2.9(0.5)	0.7(0.7)	2.2(0.1)
Industry sector (total employment)	3.2(1.1)	−8.3(1.6)	11.5(1.8)
Service sector (wage and salary employment)	3.2(0.2)	0.5(0.6)	2.7(0.6)
Industry sector (wage and salary employment)	3.4(1.2)	−8.6(1.4)	12.0(1.8)

Note: Numbers shown in parentheses are average deviations. For definition see notes to Table 58.
Source: See Appendix J.

ments are found for finance, insurance and real estate; government; and the services proper. Retail employment shows slightly more cyclical sensitivity, and wholesaling slightly more than retailing, but still far less than the four major groups classified in the Industry sector.

The sector differential is confirmed and developed further in Table 59 where similar measures are presented for various sector aggregates. We see that self-employment does not conform to the business cycle, but this explains only a minor part of the cyclical stability of service employment. There is a significant sector differential for wage and salary employment alone. Industry employment fluctuated more than four times as much as did Service employment during the post-World War II business cycles. Furthermore, the very small average deviations (shown in parentheses) indicate that this sector differential is consistent from cycle to cycle and is highly significant in a statistical sense.[14]

[14] Similar calculations were made with transportation, communication, and public utilities classified in the Service sector; the Industry-Service difference was unaffected by this change. However, if freight transportation is treated separately, it shows considerable cyclical volatility.

TABLE 60

Mean Percentage Deviations from Trend of Employment, Major Industry Groups and Sectors, 1947–65

Industry	Mean Percentage Deviation (in Absolute Terms)	
	Logarithmic Trend	75-Month Moving Average
Retail trade	1.0	1.0
Government	1.1	1.1
Wholesale trade	1.1	1.1
Finance, insurance, and real estate	1.6	0.9
Services	2.0	0.7
Transportation, communications, and public utilities	2.1	1.9
Mining	3.0	3.0
Manufacturing	3.1	2.6
Construction	3.9	2.9
Service sector	0.6	0.6
Industry sector	2.8	2.3

Source: See Appendix J.

As a check on these findings, two entirely different measures of fluctuations were calculated. The first is the average deviation of the smoothed monthly observations from a logarithmic trend fitted to all observations, 1947 through 1965.[15] Such a measure is independent of such concepts as cycles and turning points. The second is the average percentage deviation from a 75-month moving average.[16] This provides an alternative approach to eliminating the trend. The results, presented in Table 60,

[15] Smoothing is done by the "MCD span" moving average, defined as the number of months necessary for the ratio $\bar{I}/\bar{C}$ to fall below 1. $\bar{I}$ denotes average percentage change in the irregular component of a series without regard to sign, and $\bar{C}$ denotes average percentage changes in the trend-cycle component. The MCD is calculated by the X-11 variant of the Census method II seasonal adjustment program.

[16] These calculations were made at the National Bureau by Dennis Thornton, using a program he had written for Ilse Mintz's study of turning points in foreign business cycles.

TABLE 61

Average Rates of Change of Employment During Business Cycles, Selected Industries, 1947–65
(per cent per annum)

Industry	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
Food stores	1.1(1.0)	1.2(1.7)	−0.1(2.5) [a]
Apparel stores	1.7(1.1)	−2.8(1.2)	4.5(1.8)
Auto dealers	2.3(0.5)	−2.9(3.2)	5.2(3.1)
Nondurable manufacturing	1.4(0.5)	−3.6(0.7)	5.0(0.5)
Durable manufacturing	5.6(2.4)	−14.2(2.3)	19.8(3.2)

Note: Numbers shown in parentheses are average deviations. For definitions see notes to Table 58.

Source: See Appendix J.

[a] Based on turning points in deflated retail sales, the average rates of change for food stores are: expansions, +1.6 per cent; contractions, +0.4 per cent; and cyclical change, 1.2 per cent.

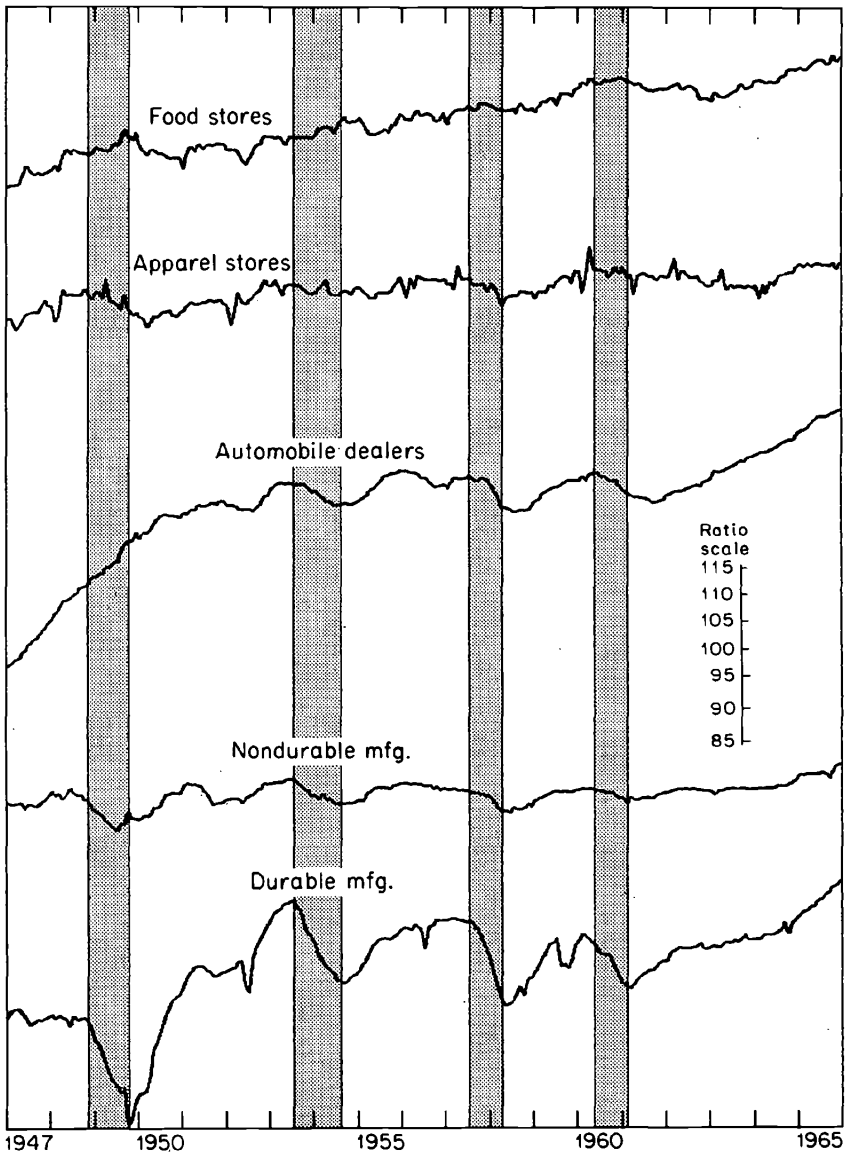
provide substantial confirmation of the results based on cyclical analysis. The ranking of the industries differs somewhat between the two measures based on deviations from trend, but both are very highly correlated with the results based on cyclical analysis. Even more important in the present context is the finding that every group in the Service sector shows less deviation from trend than every group in the Industry sector.

It may be noted that the differentials are relatively smaller for the deviations from trend than for the cyclical changes shown in Table 58. This is probably because the deviations from trend consist of three components: (a) difference between the true trend and the trends actually fitted, (b) irregular movements, and (c) cyclical movements. There may be no systematic difference between industries in the two sectors with respect to the first two components. If there is none, the deviations from trend understate the differential attributable to cyclical differences alone.

The role of durability is explored in Chart 13 and Table 61, where measures of cyclical change are presented for durable and nondurable manufacturing, separately, and for three different types of retail stores. Food retailing involves mostly highly perishable commodities, apparel is

CHART 13

Employment, Selected Industries, 1947–65



more durable, and automobiles still more durable. We find that the cyclical swings correspond closely to the degree of durability in both manufacturing and retailing. Indeed, employment in food stores is almost completely insensitive to the business cycle.

Output

The difficulties encountered in measuring real output in the service industries have been discussed in the preceding chapters. Few satisfactory measures are available on an annual basis, and even fewer are available in the form of the monthly or quarterly series needed to analyze cyclical movements. This section, therefore, is limited to monthly series for wholesaling and retailing. The output measures are the conventional ones of deflated sales; changes in the quality or quantity of service associated with a constant dollar's worth of sales are not reflected in output.[17]

Comparisons are made with manufacturing output as measured by the Federal Reserve Board index of manufacturing production. In this case also there are shortcomings; some components of output are estimated from man-hour series. Therefore, a series of deflated manufacturing sales is also used.

Given the problems of measurement, not much confidence should be placed in minor differences in cyclical amplitude. The gross differences that emerge, however, probably reflect underlying economic realities rather than defects in the data.

Movements in output of manufacturing, wholesaling, and retailing, are compared in Chart 14 and the first part of Table 62. We see that, for all industries, there is considerably more fluctuation in output than in employment, and that manufacturing output shows more cyclical volatility than does output in wholesale or retail trade. Wholesaling shows greater fluctuations than retailing over the NBER dates.[18] There is a close correspondence between manufacturing output as measured by the FRB index and that measured by deflated sales, but the latter series shows less cyclical fluctuation.[19]

[17] Conceptually it is preferable to deflate sales by each store type separately and then average the results using margins as weights. Some experimentation revealed that the difference between a series obtained in this manner and the one actually used is negligible for cyclical analysis.

[18] Very similar results are obtained when changes for each series are based on turning points in that series. See Appendix Table J-3.

[19] Analysis of deviations from trend, 1947–65, reveals a similar pattern. The mean percentage deviation for the FRB index is 4.5; it is 4.0 for deflated manufacturing sales, and 2.5 for retailing.

CHART 14

Output, Industry Groups, 1947–65

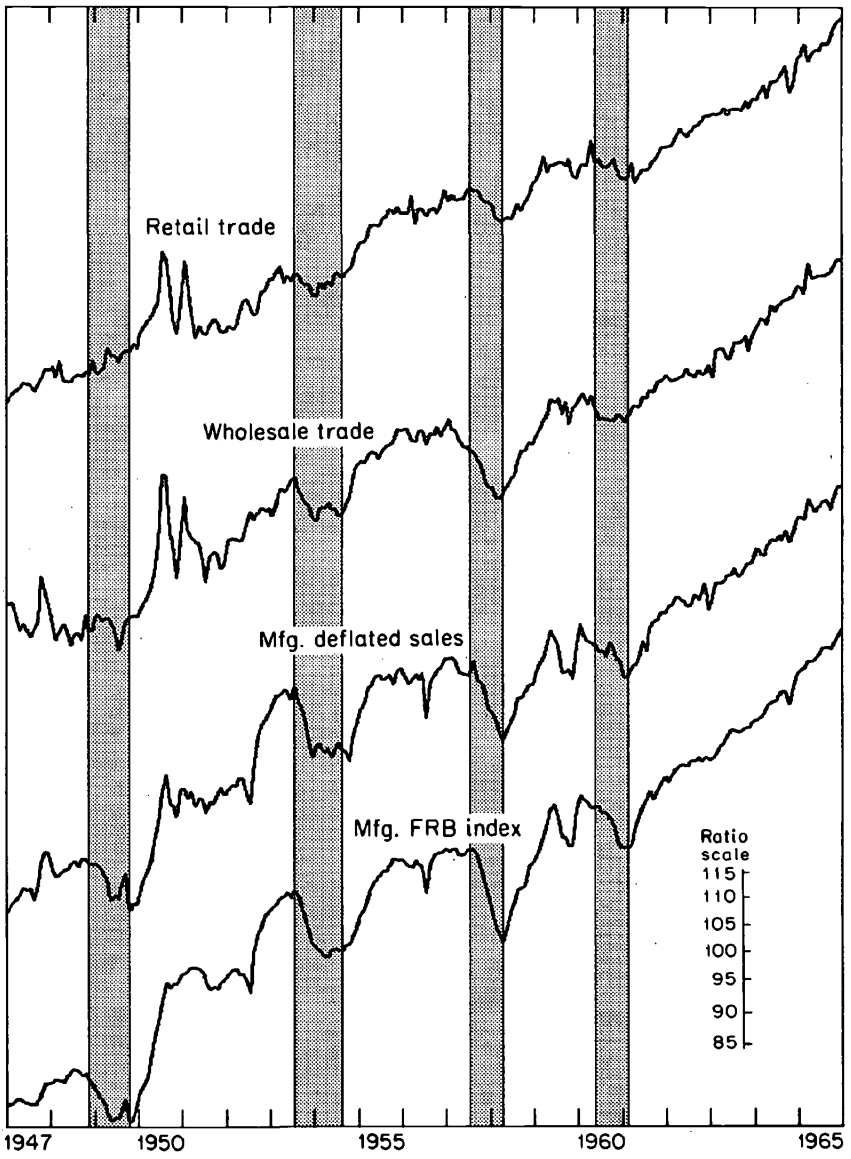


TABLE 62

Average Rates of Change of Output During Business Cycles, Selected Industries, 1947–65
(per cent per annum)

Industry	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
Retail trade	4.6(0.8)	−2.3(3.7)	6.9(4.4)
Wholesale trade	5.5(1.4)	−4.7(3.1)	10.2(3.1)
Manufacturing (FRB index)	8.7(1.9)	−11.8(4.9)	20.5(4.6)
Manufacturing (deflated sales)	7.0(1.6)	−9.7(3.2)	16.7(3.0)
Nondurable manufacturing (FRB)	5.9(1.3)	−2.3(2.5)	8.2(3.5)
Durable manufacturing (FRB)	11.1(3.1)	−19.5(6.9)	30.6(5.8)
Food stores	4.4(0.6)	1.1(1.8)	3.4(2.0)
Apparel stores	4.1(2.0)	−1.2(1.2)	5.3(2.6)
Auto dealers	5.1(1.8)	−7.9(12.6)	13.0(14.3)

Note: Numbers shown in parentheses are average deviations. For definition see notes to Table 58.
Source: See Appendix J.

The second part of Table 62 and Chart 15 shows the relation between cyclical fluctuations of output and durability. The cyclical change, net of trend, of durable manufacturing is almost four times as great as nondurable manufacturing. The cyclical change of output in auto retailing is more than double that of apparel retailing, which, in turn, is almost double that of food retailing. This confirms our expectations concerning the role of durability.

Output Per Man-Hour

This section presents amplitude measures of output per man-hour for the same series presented in the output section. Output per man-hour is calculated by dividing the output series by a man-hour series. (Neither series is adjusted for seasonal fluctuations.) The latter is obtained by multiplying the employment series of the first section by an average hours series obtained from the Bureau of Labor Statistics and the Current Population Survey.[20]

[20] See Appendix J for a full description.

CHART 15

Output, Selected Industries, 1947–65

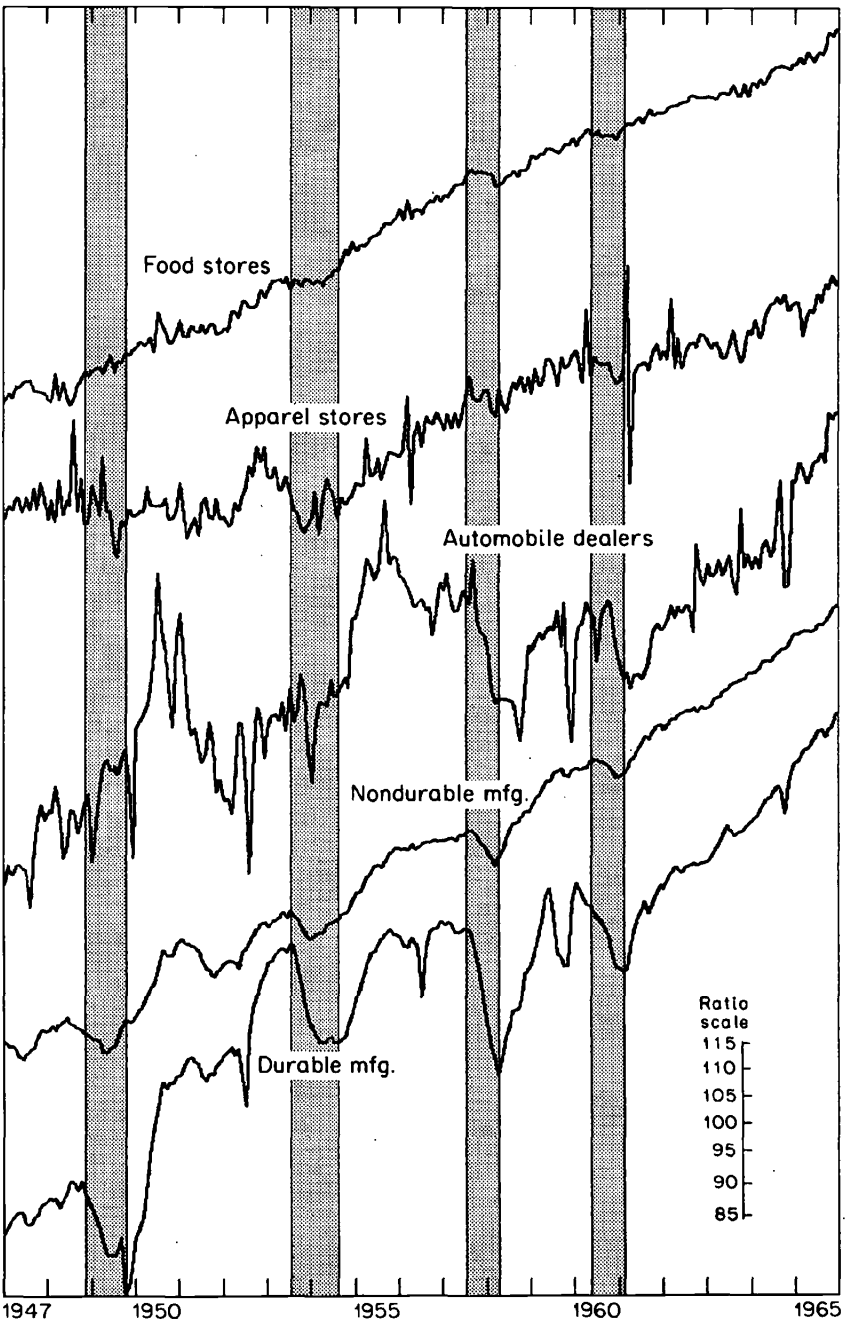
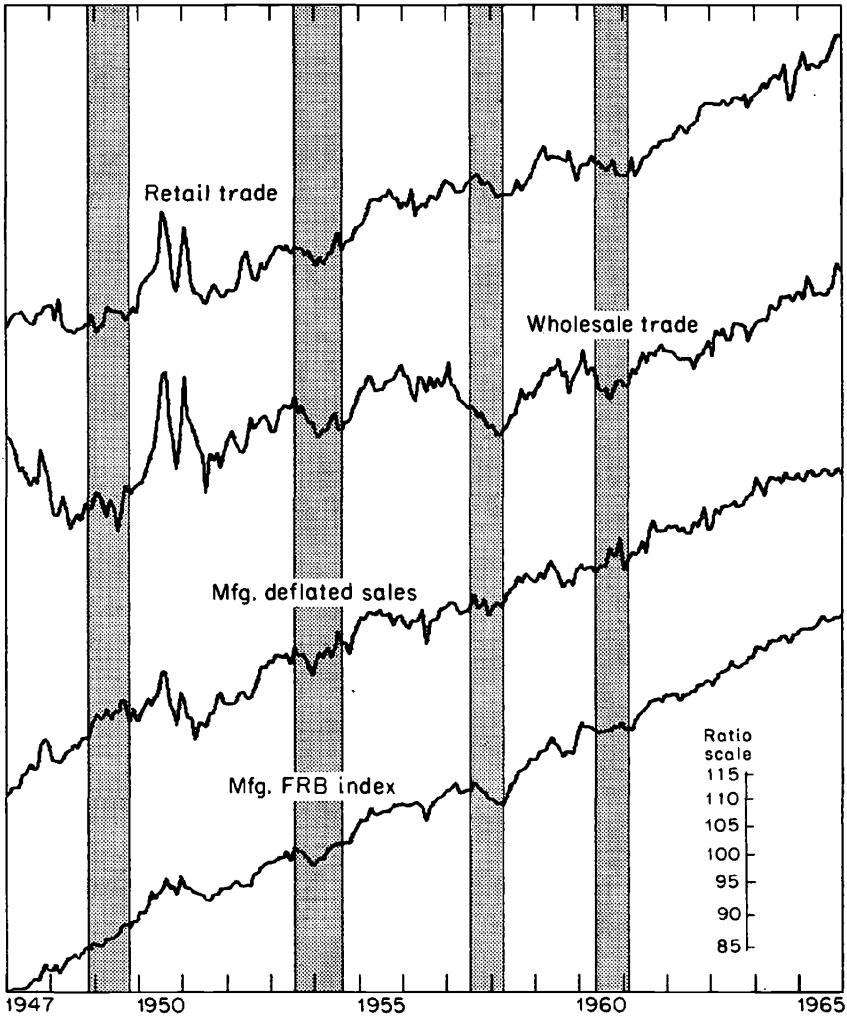


CHART 16

Output Per Man-Hour, Industry Groups, 1947–65



After output per man-hour was calculated, it was seasonally adjusted; the results are presented in Charts 16 and 17. The measures of cyclical volatility shown in Table 63 indicate some important differences between output per man-hour and employment and output. In particular, cyclical fluctuations of output per man-hour are greater in wholesaling than in manufacturing. The cyclical change in retailing is greater than in manu-

CHART 17

Output Per Man-Hour, Selected Industries, 1947–65

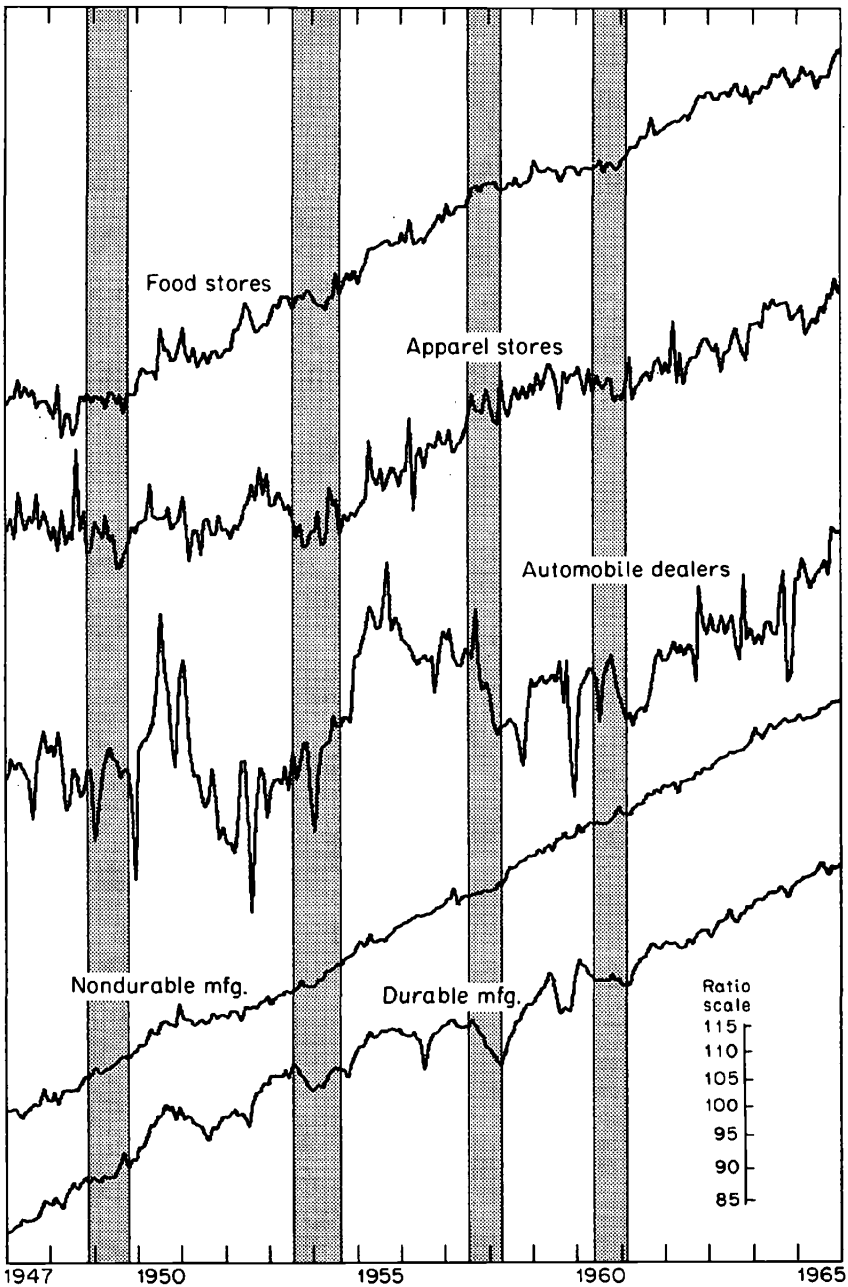


TABLE 63

Average Rates of Change of Output Per Man-Hour During Business Cycles, Selected Industries, 1947–65
(per cent per annum)

Industry	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
Retail trade	3.1(0.3)	−0.7(2.1)	3.8(2.0)
Wholesale trade	3.0(1.3)	−2.4(2.3)	5.4(2.0)
Manufacturing (FRB index)	4.2(1.2)	0.3(2.3)	3.9(2.8)
Manufacturing (deflated sales)	2.4(0.8)	2.1(0.7)	0.3(1.2)
Nondurable manufacturing (FRB)	4.0(0.7)	3.4(0.9)	0.6(1.4)
Durable manufacturing (FRB)	4.5(1.4)	−2.5(3.9)	7.0(4.3)
Food stores	3.8(1.3)	2.2(0.9)	1.6(1.8)
Apparel stores	3.0(2.1)	0.9(1.3)	2.1(1.6)
Auto dealers	2.9(1.8)	−4.7(9.8)	7.6(11.2)

Note: Numbers shown in parentheses are average deviations. For definition see notes to Table 58.
Source: Appendix J.

facturing when output is measured by deflated sales and is approximately equal when the FRB index is used to measure output.[21]

Calculation of percentage deviations from trend confirms this conclusion. The average deviation for retailing is 2.3 per cent; it is 1.3 or 1.5 per cent for manufacturing depending upon the output series used. Chart 18 compares the trend deviations for retailing and manufacturing (FRB index) and the greater cyclical movements of retailing can be observed.

One of the factors accounting for the greater cyclical variability of output per man-hour in retailing than in manufacturing is the different timing of cyclical changes in output and employment in the two industries. Chart 19 shows that in manufacturing, output and employment tend to move together over the cycle. In retailing, however, the peaks and troughs of employment tend to lag behind those of output. (See Chart 20.) This lack of coincidence in timing accentuates the cyclical changes in productivity.

[21] When specific cycle turning points are used, the gap between trade and manufacturing is even larger. See Appendix Table J-4.

CHART 18

Percentage Deviations From Trend, Output Per Man-Hour, Retail Trade and Manufacturing, 1947–65

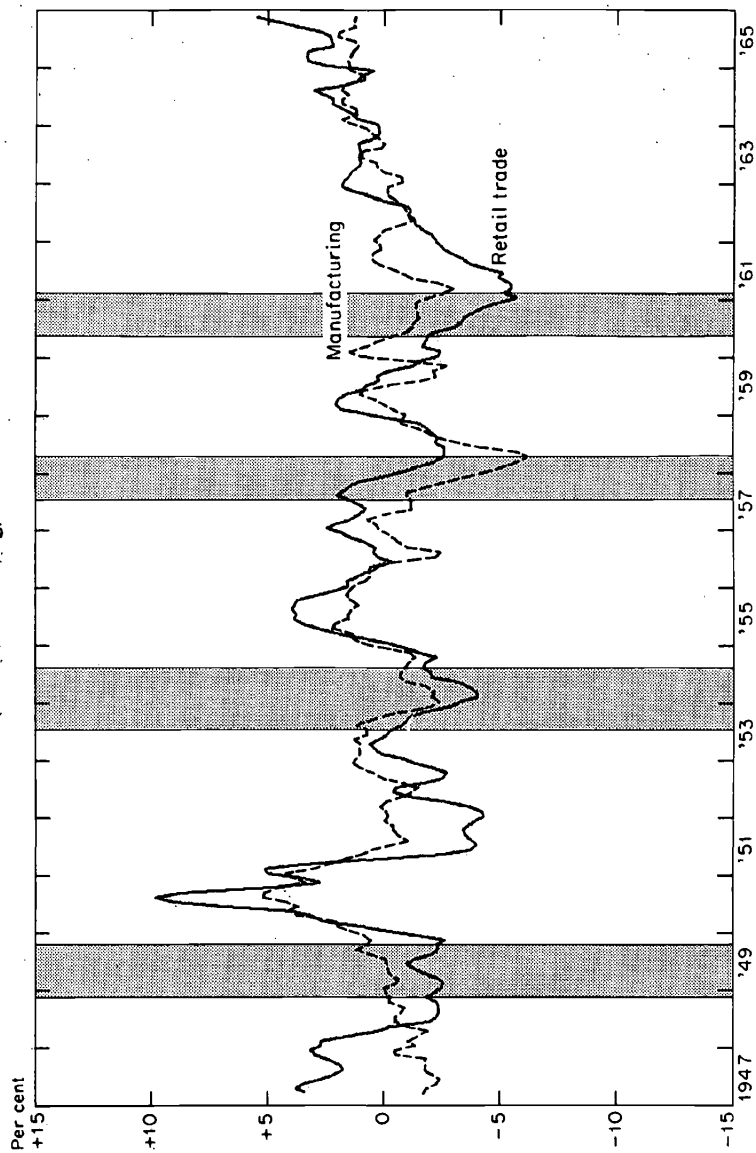


CHART 19

Percentage Deviations From Trend, Manufacturing, Output, and Employment, 1947–65

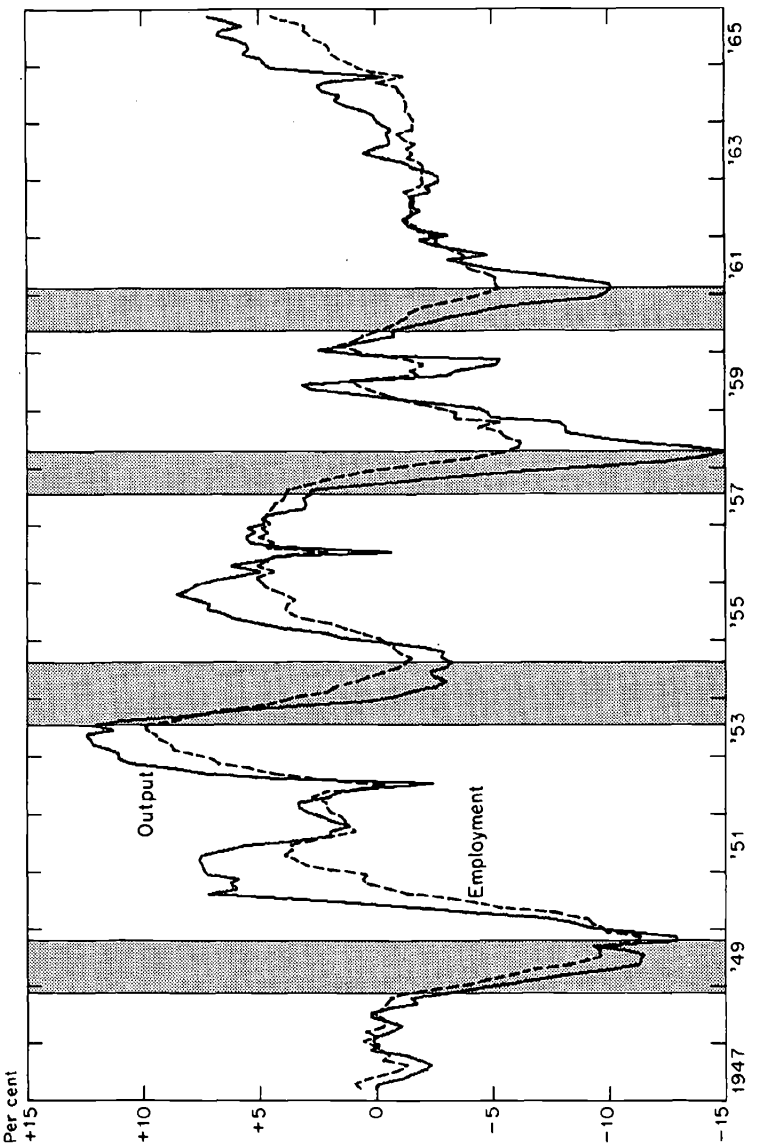


CHART 20

Percentage Deviations From Trend, Retail Trade, Output and Employment, 1947–65

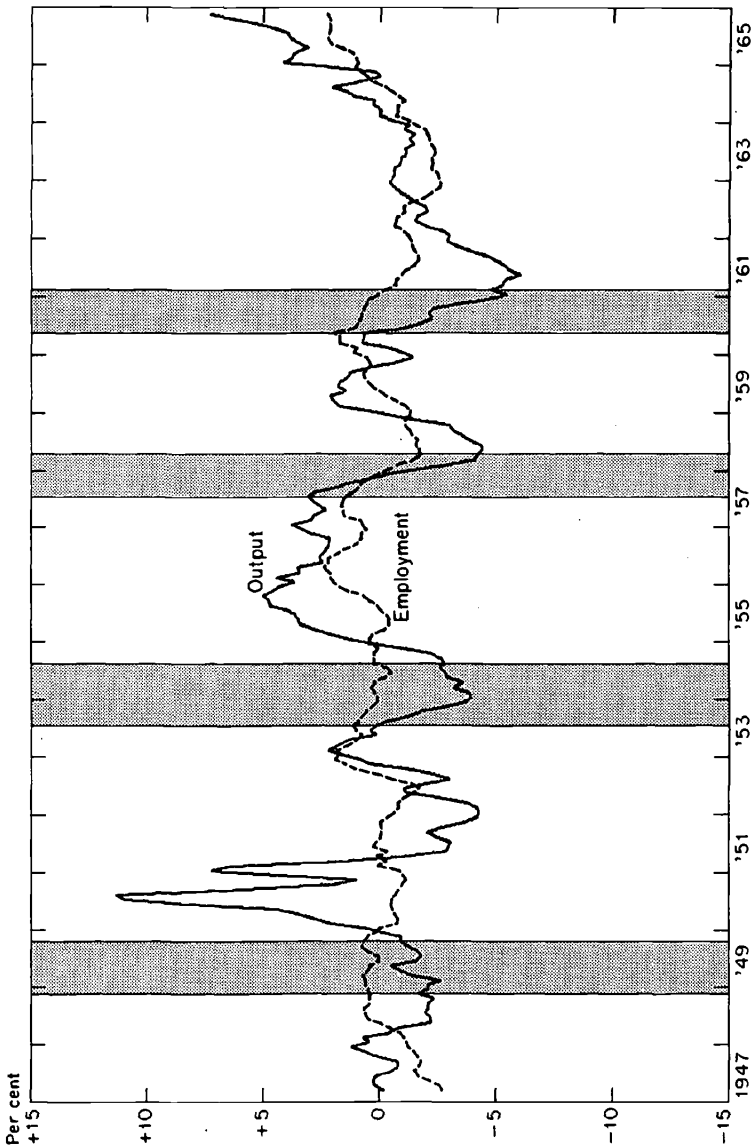


TABLE 64

Effect of Changing Distribution of Employment on Average Cyclical Volatility of Total Nonagricultural Employment, 1929–65
(per cent per annum)

Weight Base	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
1929	2.96	−4.05	7.01
1947	3.04	−3.82	6.86
1956	3.08	−3.57	6.65
1965	3.12	−3.03	6.15

Note: Cyclical measures for each major group (Table 58) are weighted by the distribution of persons engaged in each year.

Implications for Cyclical Stability

Given the greater cyclical stability of service industry employment, and given the trend toward greater employment in services, it is interesting to ask what are the implications for over-all stability of employment. We have taken the average cyclical volatility measures of Table 58 for the nine major industry groups and weighted them by the distribution of total nonagricultural employment in 1929, 1947, 1956, and 1965. (See Table 64.) This yields a hypothetical measure of changes in the cyclical amplitude of employment that could be attributed solely to the changes in the industrial distribution of employment. The average cyclical change net of trend shows a decrease from 7.01 per cent per annum in 1929 to 6.15 per cent in 1965, purely as a result of the changes in weights. Thus, the change in industrial distribution of employment between 1929 and 1965 may be said to account for a 15 per cent decrease in the cyclical volatility of total nonagricultural employment, if the volatility of each industry group remained unchanged.[22]

Table 65 presents a similar calculation for output per man. In this case, the shift in weights increases over-all sensitivity to the business cycle, from 5.3 per cent per annum to 6.4 per cent. The cyclical volatility measures of output and employment in manufacturing are taken as proxies

[22] This is, of course, only one way that structural change affects cyclical stability. For a discussion of other implications, including the effect of structural shifts on investment demand, see Bert G. Hickman, *Growth and Stability of the Postwar Economy*, Washington, D.C., 1960, pp. 182–203, 274–276.

TABLE 65

Effect of Changing Distribution of Output and Employment on Average Cyclical Volatility of Output Per Man, Nonagricultural Economy, 1929–65 (per cent per annum)

Weight Base	Average Rate of Change in		Average Cyclical Change Net of Trend
	Expansions	Contractions	
1929	3.6	−1.7	5.3
1947	3.7	−2.1	5.8
1956	3.8	−2.4	6.2
1965	3.8	−2.6	6.4

Note: Weighted average rate of change in expansions or contractions given by

$$(\dot{O}_g O_g + \dot{O}_s O_s) - (\dot{E}_g E_g + \dot{E}_s E_s)$$

where $\dot{O}_g$ and $\dot{E}_g$ equal rates of change of output and employment in manufacturing; $\dot{O}_s$ and $\dot{E}_s$ equal same in retail trade taken from Tables 58 and 62; O_g, E_g, O_s, E_s equal shares of output and employment in Industry and Service sectors in each year.

for the Industry sector; the cyclical volatility measures for retail trade are taken as proxies for the Service sector. The weights are based on the sector shares of output and employment in each of the four years. The volatility measures are for reference cycle dates for all series.

Unlike the case of employment, in this instance the shift in weights results in a steady increase in cyclical sensitivity since 1929. The last column shows that, if the specific cyclical volatility of output per man remained unchanged, we could expect a 20 per cent increase in over-all volatility because of the growing importance of the Service sector.