Volume Title: Seasonal Variations in Industry and Trade

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Volume Publisher: NBER

Volume ISBN: 0-87014-021-3

Volume URL: http://www.nber.org/books/kuzn33-1

Publication Date: 1933

Chapter Title: Economic Elements Other Than Production and Trade

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Chapter URL: http://www.nber.org/chapters/c2198

Chapter pages in book: (p. 184 - 218)

CHAPTER VII

ECONOMIC ELEMENTS OTHER THAN PRODUCTION AND TRADE

GENERAL CHARACTERISTICS

Preceding chapters deal almost exclusively with seasonal variations in the flow of commodities. This flow was measured in quantity volume except in respect of the distributive trades, where for lack of data on quantity volume recourse was had to data measuring the dollar volume of activity. But a vast area that is also pervaded by periodic swings, in part because of the integration of the economic system, was left unexplored. It is clear, for example, that if the flow of raw materials to the market is uneven, not only stocks but also the prices paid for the materials and the volume of credit necessary to sustain the flow from one economic stage to the next will reflect these fluctuations in supply. It is evident, further, that seasonal variations in manufacturing activity induce corresponding swings in employment and in the volume of wages paid. Moreover, fluctuations in these other economic processes may arise from seasonal factors of their own. Such series as dividend and interest disbursements, volume of speculation on security exchanges and some banking statistics reflect persistent seasonal swings arising from the custom of terminating financial operations on certain dates, setting aside the summer months for vacations, etc.

This chapter is a brief survey of seasonal variations in the numerous elements of our economic system other than production and trade. It draws primarily upon seasonal measures computed in the analysis carried on at the National Bureau of Economic Research in preparation for Professor Mitchell's forth-coming volume on Business Cycles, supplementing them with indexes found in other published studies. The discussion touches upon the seasonality of wholesale and retail prices, deals with a few general indexes of production, trade, credit

and speculation, presents measures of seasonality in the flow and distribution of incomes from property, and ends with a detailed consideration of seasonal variations in employment and payrolls in manufacturing industries.

Such a brief survey reveals the pervasiveness of seasonal variations and indicates that not only industry and trade but also almost all other aspects of economic activity are affected by these periodic disturbances. Prices, volumes of credit, savings and speculation, failures and earnings of commercial enterprises, employees' incomes and their opportunities for work—all show traces of the recurrent influence of climate and convention. In some of these aspects of activity the effect of seasonal factors is direct; in others it is imposed by the presence of seasonal variations in some related economic process. The integrative ties of the economic system pass on the seasonal disturbances from the point of their origin, but the similarity in seasonal pattern and amplitude that could consequently be expected is qualified by the differences in the conditions that determine and modify the rate of change in the various types of economic activity.

DETAILED COMMENTS

1. Prices

In a market that affords no possibility of advance buying in periods of abundant supply to prevent a price rise in periods of reduced supply, prices fluctuate violently with variations in the supply of commodities. This is generally the situation in the markets of perishable goods. Since most fruits and vegetables cannot be kept in stock they must be sold at once. Their prices consequently show marked seasonal swings.

Most raw materials, however, can be stocked. Seasonal fluctuations in current supply are therefore discounted in the knowledge that the excessive amount flowing in during a given month will be absorbed by continued consumption in the face of a reduced supply during the succeeding months. Moreover, stock-carrying is facilitated by the presence of produce markets. All seasonal raw materials that can be sufficiently well graded to admit of being handled in homogenous units—wheat, corn, cotton, to name the most conspicuous examples—

have commodity exchanges, on which industrial consumers and distributors share with speculators the risk involved in keeping the commodity in stock or of deferring actual purchase into the future. While, owing to the cost of maintaining stocks, seasonal variations occur also in the price of raw materials so held, they are much milder than variations in the current supply. The seasonal swings in prices tend to be largest at the stage at which the sellers are least able to carry stocks, that is, in prices paid to farmers.[1]

In the numerous finished products subject to seasonal demand, seasonal variations in price undoubtedly occur, as is shown by the ' after-season bargains ' in retail trade. But statistical information concerning prices of finished commodities, especially at retail, is not easily available, and what may be found does not reflect with sufficient sensitiveness the actual price movements.

However, average seasonal variations of some magnitude, of which a few are presented on Chart 34,[2] can be established in both wholesale and retail prices. These variations in prices may be compared with the seasonal swings characterizing the supply of the commodity, represented by output or shipments; and the seasonality of wholesale and retail prices for the same commodities may be compared.

a. *Supply and Prices*

The comparison of seasonal variations in wholesale prices with those in output or shipments indicates a negative correlation of pattern. Thus the seasonal peak in wheat prices is in May, a month after the trough in receipts at primary markets. The trough in prices is in the month when fresh wheat flows abundantly from the fields. The same inverse correlation pre-

[1] Where the total supply tends to fall short of total demand, relatively little stocking is done even in the months of seasonally active supply. Prices consequently exhibit marked seasonal variations. A striking illustration in this connection is the conspicuous seasonality of the *free* prices for agricultural products in Soviet Russia. These seasonal swings are much wider than were those for the same prices in pre-War Russia. See A. J. Grintser, Commodity Prices, pp. 255-61, in *Seasonality and Seasonal Variations in Industry and the National Economy*, by the Bureau of Economic Analysis of the Supreme Economic Council and of the Soviet of Syndicates of the U. S. S. R. (Moscow 1930).

[2] Since the first draft of this chapter was completed, seasonal measures for prices of several commodities have been computed. They are given in Appendix I but could not be added to Chart 34. The following discussion and Tables XI and XII are based upon the seasonal indexes for all the price series analyzed.

CHART 34

SEASONAL MOVEMENT OF COMMODITY PRICES, WHOLESALE AND RETAIL

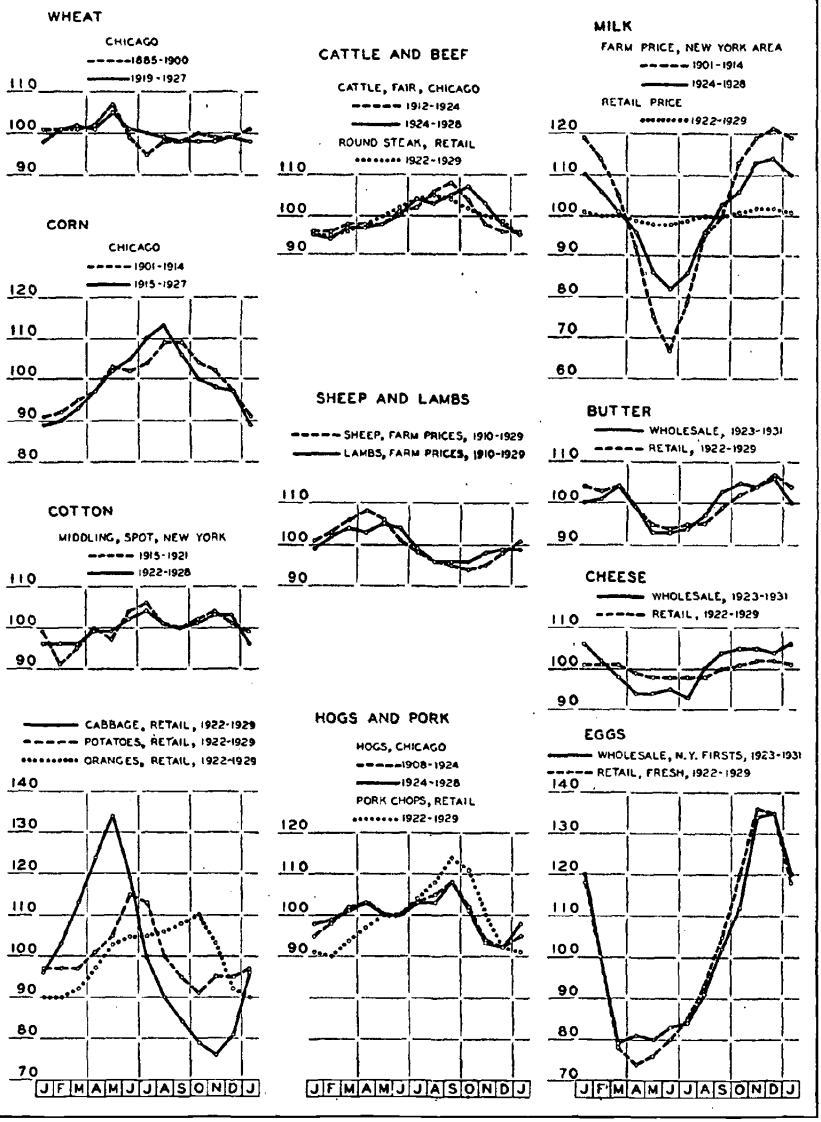


TABLE XI

AMPLITUDE OF SEASONAL VARIATIONS

SUPPLY AND PRICES OF SELECTED COMMODITIES

Commodity	Period Covered by Index	Average Deviation	Range
Wheat, Receipts at Primary Markets	1920-24	36.8	138
	1925-31	51.7	181
Wholesale Price, Chicago	1918-27	1.7	7
Flour, Production	1924-31	7.8	29
Wholesale Price, Minneapolis	1924-31	1.2	6
Corn, Receipts at Primary Markets	1920-30	22.7	81
Wholesale Price, Chicago	1915-27	6.0	24
Cotton, Receipts into Sight	1925-31	75.9	281
Price, Spot, Middling, N. Y.	1922-28	2.3	8
Cattle and Calves, Receipts at Primary Markets	1923-31	13.2	63
Wholesale Price, Chicago (per 100 lbs.)	1924-28	3.6	13
Sheep and Lambs, Receipts at Primary Markets	1923-31	21.6	97
Farm Prices of Sheep	1910-29	4.1	14
Farm Prices of Lambs	1910-29	2.9	9
Hogs, Receipts at Primary Markets	1923-31	13.3	58
Wholesale Price, Chicago (per 100 lbs.)	1924-28	3.1	16
Wholesale Price of Lard, Chicago	1922-30	2.5	9
Daily Deliveries per Dairy, N. Y. District	1922-30	15.3	58
Prices Paid to Farmers, N. Y.	1924-28	8.9	32
Butter, Factory Production	1923-31	21.2	74
Wholesale Price, Chicago	1922-29	6.8	22
Cheese, Factory Production	1920-31	23.1	86
Wholesale Price, Chicago	1923-31	4.3	13
Eggs, Receipts at Primary Markets	1925-31	41.9	149
Wholesale Price, N. Y., Firsts	1923-31	17.1	56
Oranges, Carlot Shipments	1924-26	39.3	118
Wholesale Price, Chicago	1920-30	13.5	46
Potatoes, Carlot Shipments	1920-31	16.3	102
Wholesale Price, Chicago	1918-30	10.9	42
Cabbage, Harvest	.....	96.5	485
Carlot Shipments	1924-26	30.7	167
Retail Price	1920-29	15.6	58
Coffee, Imports	1920-30	8.3	28
Wholesale Price, N. Y.	1921-31	1.7	9

TABLE XI (CONTINUED)

Commodity	Period Covered by Index	Average Deviation	Range
Anthracite Coal Output [a]	1925-31	3.1	...
Composite Wholesale Price	1927-31	1.5	5
Bituminous Coal Output [a]	1925-31	6.1	...
Composite Wholesale Price	1924-30	3.2	9

[a] The arithmetic mean of average deviations of the moving seasonal index computed by the Federal Reserve Board.

vails in respect of corn, cotton, livestock, dairy products, eggs, poultry and vegetables.

The apparent exception in the case of the retail price of potatoes, which reaches its seasonal peak in June and July coincident with the peak in shipments of early white potatoes, seems obviously to be due to the difference between grades of a commodity. Early white potatoes sell at much higher prices than late potatoes, whose shipments are at peak in October and November (winter white potatoes are preponderant). Similarly, the existence of several grades of meat may account for the exceptional movement of the price of cattle, the stock marketed immediately after the close of the grazing season being priced higher than that marketed at the end of the winter.

In respect of amplitude supply is characterized by much wider seasonal swings than price. This is true without exception of all commodities for which Table XI assembles the appropriate measures. The difference is especially conspicuous in respect of durable raw materials but is present even in such perishable raw materials as fresh milk, eggs and cabbage.

The wider amplitude of the seasonal swing in supply is partly attributable to the fact that the series analyzed reflect only output or shipments, while actual market supply includes also the available stocks of the commodity. Previous seasonal analysis of commodity stocks would lead us to expect that the variation in total supply would be smaller than that in production or shipments only, since stocks are likely to be at seasonal trough by the time the peak in output or shipments is reached. But the swing even in total supply must be of wider amplitude

than in prices, in view of the discounting on the market of the temporary surpluses and deficiencies in commodities that are described by seasonal variations.

b. *Wholesale and Retail Prices*

The patterns of seasonal variations in wholesale and retail prices of the same commodity are essentially similar (see comparisons on Chart 34). Of thirteen commodities for which such comparisons are possible (see Table XII) only one, bananas, shows essential divergence of pattern in the two types of prices. In some commodities, like lard and anthracite

TABLE XII

AMPLITUDE OF SEASONAL VARIATIONS

WHOLESALE AND RETAIL PRICES OF SELECTED COMMODITIES

Commodity	Period Covered by Index	Average Deviation	Range
Flour			
Wholesale, Minneapolis	1913-23	4.0	18
	1924-31	1.2	6
Retail, Minneapolis	1914-23	2.8	10
	1924-30	2.0	7
Beef			
Wholesale, Cattle, Chicago	1924-28	3.6	13
Retail, Round Steak, Selected Cities	1922-29	2.8	10
Pork			
Wholesale, Hogs, Chicago	1924-28	3.1	16
Retail, Pork Chops, Selected Cities	1922-29	6.1	24
Lard			
Wholesale, N. Y. C.	1911-15	1.8	8
	1916-21	4.5	19
	1922-31	2.5	9
Retail, N. Y. C.	1911-15	1.5	7
	1916-21	3.0	11
	1922-30	1.7	6
Bacon			
Wholesale, Chicago	no seasonal variation		
Retail, Sliced, Chicago	1912-16	1.8	7
	1919-26	2.3	9
	1927-30	1.7	5
Milk			
Prices Paid to Farmers, N. Y. District	1924-28	8.9	32
Retail, Selected Cities	1922-29	1.1	4

TABLE XII (CONTINUED)

Commodity	Period Covered by Index	Average Deviation	Range
Butter			
Wholesale, N. Y. C.	1911-15	7.9	29
Chicago	1916-21	6.8	22
	1922-29	6.8	22
Retail, Chicago	1911-15	6.0	21
	1916-21	5.8	21
	1922-30	4.8	17
Cheese			
Wholesale, Chicago	1923-31	4.3	13
Retail, Selected Cities	1922-29	1.4	4
Eggs			
Wholesale, N. Y. C.	1923-31	17.1	56
Retail, Selected Cities	1922-29	19.1	62
Oranges			
Wholesale, California, Chicago	1920-30	13.5	46
Retail, Chicago	1919-30	5.1	23
Bananas			
Wholesale, Jamaica No. 9, N. Y. C.	1921-26	7.8	30
Retail, N. Y. C.	1920-30	2.2	8
Prunes			
Wholesale	no seasonal variation		
Retail, N. Y. C.	1921-29	1.0	3
Potatoes			
Wholesale, Chicago	1913-17	8.8	34
	1918-30	10.9	42
Retail, Chicago	1913-21	11.1	41
	1922-30	9.2	41
Coffee			
Wholesale, Rio No. 7, N. Y. C.	1913-17	4.8	18
	1921-31	1.7	9
Retail	no seasonal variation		
Anthracite Coal			
Wholesale, N. Y. Harbor	1921-28	1.9	5
Composite	1927-31	1.5	5
Retail, N. Y. C.	1923-31	2.2	7
Composite	1927-31	1.4	5
Bituminous Coal			
Wholesale, Composite	1924-30	3.2	9
Retail, Composite	1924-31	2.7	8

coal, there is a slight tendency for the pattern in retail prices to lag behind that in wholesale, but in the others the correlation is synchronous. It should be noted, however, that for one commodity, coffee, wholesale prices showed a significant seasonal swing while retail prices did not, and in two others, bacon and prunes, retail but not wholesale prices evidenced seasonal variations. The comparative amplitude of seasonal variations in the two types of prices is brought out clearly in Table XII.

In most commodities the seasonal swing in wholesale prices is of wider amplitude than in retail. This difference is most marked in raw milk, oranges, bananas and coffee, commodities in which the retail price is subject to a considerable inertia and is not likely to change unless under pressure from a marked shift in the supply-demand relationship. On the other hand, in a few commodities the retail price is most sensitive to seasonal disturbances (pork, bacon, prunes), while in others the difference in amplitude does not appear significant (potatoes, eggs, flour, anthracite coal).

Since most commodities do show a wider swing in wholesale than in retail prices, and since the patterns of the two are essentially similar for almost all commodities analyzed, we may infer that middlemen's margins are also subject to seasonal variations, of a pattern inverted to that of prices. This inference is predicated upon the assumption, which is not a great departure from reality, that middlemen's operating expenses are quite constant seasonally. That similar variations are characteristic of distributors' margins in several other commodities is suggested by the discussion.

2. Volume of Business Activity

Chapters III through VI deal with seasonal variations in separate branches of industry and trade. Before studying the seasonality of the volume of credit it is important to consider seasonal disturbances in production and trade, each taken as a whole.

Manufacturing production, as represented by the Federal Reserve Board indexes, shows a peak in the spring and autumn (March and October), and troughs in July and Decem-

ber (Chart 35).[3] The seasonal movement in the production of minerals is substantially different. Activity is at a high level during the summer and autumn, reaches a peak in September and October, and is at a low level from December through March. Since bituminous and anthracite coal together have a weight of 48 per cent in the total index, the pattern reflects the high level of activity in coal mining during the summer and autumn in preparation for winter demand. Total industrial production, which combines manufacturing production and the output of minerals, reflects primarily the seasonal variations in the former since it is much more important.

Just as there are spring and autumn peaks in manufacturing activity, so there are spring and winter peaks in consumers' demand. The considerable swing in demand is reflected in the seasonal index of retail trade. The influence of the Christmas holiday is especially conspicuous.

The pattern of the seasonal swing in sales by wholesalers follows that of manufacturing activity, but the pattern suggests that changes in sales at wholesale are preparatory to the seasons in consumers' buying. For this reason the autumn peak in sales by wholesalers is much more conspicuous than the spring peak.

The foreign trade of the United States traces seasonal patterns very different from those of domestic trade. Imports reach their peak in late winter and early spring, reflecting principally the seasonal pattern of crude rubber and cane sugar imports. Exports reach a peak in the autumn, reflecting primarily the movement of the agricultural crops out of the country. The difference between the seasonal patterns in imports and exports reveals an appreciable seasonal variation in the balance of trade. Both imports and exports are low in midsummer, their seasonal patterns resembling in this respect those of manufacturing activity and domestic trade.

Series on bank debits form the most comprehensive index of the total dollar volume of business activity, reflecting not only a large fraction of domestic and foreign trade, of sales by manufacturers and mining companies, but also wage and

[3] This, and the following seasonal indexes for mineral and total industrial production, were obtained by dividing the uncorrected index of production for 1925 by the corrected index.

salary payments, movements from hand to hand of agricultural raw materials, rent payments, speculative activity, flow of payments to governments, and many other specific streams. The series, separated into two groups, one for New York City and the other for all cities outside New York, serve as evidence of the persistent and appreciable seasonal variations in business activity at large.

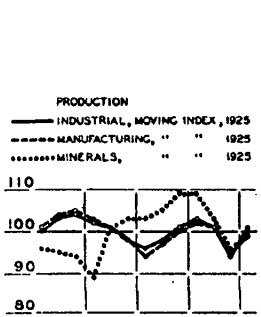
The indexes on Chart 35 show a definite recurrent swing in bank debits, and as the two indexes for New York City indicate, the pattern persists from one period to the next. There are in both series clearly defined troughs in mid-summer and in February, and peaks in the spring and at the end of the year. The seasonal indexes for debits in New York City and in the cities outside are so similar that the correspondence can be traced from month to month. The amplitudes of the seasonal indexes are not very wide, but since the series combine so many divergent streams and the opportunity for cancellation of different seasonal patterns is so great, these amplitudes appear significant.

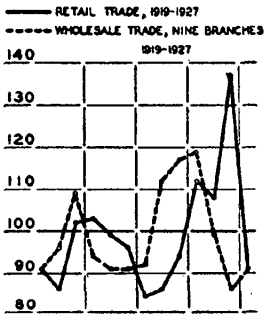
The other indexes on Chart 35 also cover data that reflect business at large. Postal receipts are a good index of personal and business activity in so far as they reflect changes in communication, and to a smaller extent, in transportation (parcel post). The resulting seasonal pattern is very similar to that observed in bank clearings, retail and wholesale trade, and most of the manufacturing activities—a spring peak in March and a winter peak in December, together with a pronounced trough in July. The indexes for the three periods show a remarkable persistence of pattern.

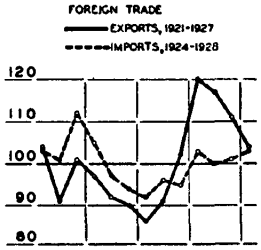
Cars loaded with revenue freight, like postal receipts, measure changes in business activity at large as these are reflected in changes in transportation activity. However, they show much slighter traces than postal receipts of the influence of such conventional factors as determine seasonal peaks and troughs in retail trade. Manufactured goods constitute the largest part of the important groups of miscellaneous freight and merchandise in less than car lots. Since these groups, as well as agricultural crops, show high levels in the autumn, the single prominent seasonal peak in car loadings that occurs in October seems understandable. The trough occurs in

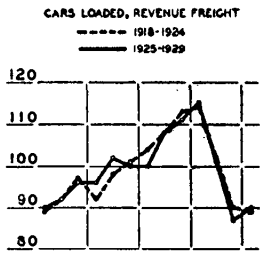
CHART 35

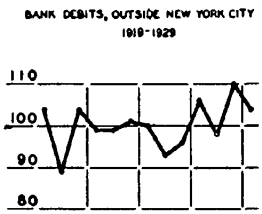
SEASONAL MOVEMENT OF PRODUCTION AND TRADE

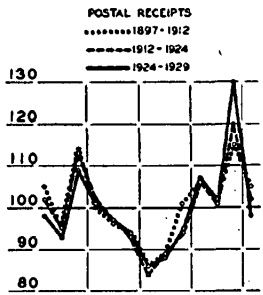


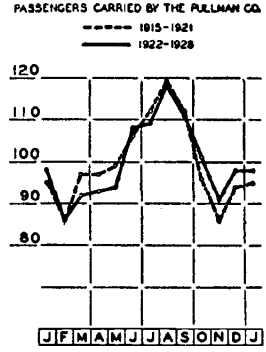


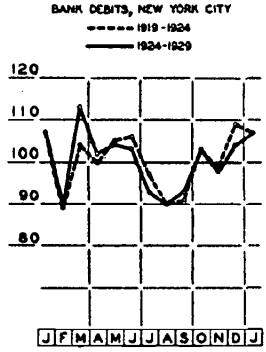


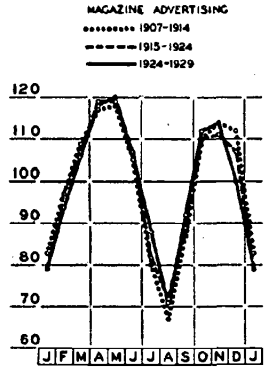












January, after the peak movement of goods to wholesalers and retailers, and after the crops have been moved.

Passenger transportation, as reflected in Pullman Company records, shows a seasonal peak in August. This is an interesting and significant coincidence with the seasonal pattern of gasoline consumption (see Chapter V) which also rises to a peak then. Obviously people on vacation travel mostly in August and in the immediately preceding and succeeding months. The troughs in November and February are largely accounted for by the secondary vacation and holiday movement in December and January. Were it not for the holidays in these two months, passenger transportation would fall off gradually to a long plateau-trough during the winter.[4] In both car loadings and passenger transportation the indexes for the successive periods show a clear persistence of seasonal pattern.

Magazine advertising shows the two-peak pattern characteristic of trade and manufacturing activity in general. But both the spring and the autumn peaks are later than usual, the former occurring in May, the latter in November. The spring peak in advertising may be attributable to the combined influence of the automobile and summer goods seasons. The autumn peak in advertising comes exactly midway between the October peak in wholesale trade and manufacturing and the December peak in retail trade. This midway pattern may be accounted for either by the influence on advertising of wholesale trade, manufacturing and retail trade, or by the dominance of retail trade. In the latter case the peak in advertising might be expected to precede somewhat, as it does, the actual peak in sales, since advertising is used in preparation for the expected upturn in consumers' demand in December.

At any rate, the seasonal swing in magazine advertising is quite appreciable, as are the swings in all the other series. Thus, for the recent period, roughly 1922 to 1929, the average deviation of the index is 8.2 for postal receipts, 12.7 for magazine advertising, 6.3 for cars loaded and 7.9 for passengers carried, measures which are larger than those in many branches of manufacturing activity.

[4] See discussion in The Stability of Railway Operations, by Julius H. Parmelee in *Business Cycles and Unemployment* (National Bureau of Economic Research 1923) pp. 213-17.

3. Credit, Currency and Speculation

Seasonal variations in the volume of credit and currency are small, partly because the seasonal indexes are percentages of huge totals, partly because of the addition in these totals of many different seasonal movements. But though small in amplitude, the seasonal swings are so similar from series to series that little doubt need be entertained as to the significance of the indexes.

Total loans by reporting member banks afford the best estimate of the volume of commercial credit. The seasonal index shows low levels during the first half of the year, high levels in the autumn and winter, with a peak in November and December (Chart 36).

The total volume of money held by the Federal Treasury, the banks and the public, shows a similar pattern with high levels during the autumn and winter, a peak in December and low levels during the first half of the year. Of this total volume of currency in circulation Federal Reserve notes form the most elastic part. Their seasonal index repeats the pattern traced by total money in circulation but has an appreciably wider amplitude and defines more clearly the exact date of the seasonal peak, which occurs in December, and of the trough, which falls in June.

These swings in credit and currency are determined primarily by seasonal variations in the distributive trades and industry, especially in the former, and they cause like fluctuations in the volume of credit advanced by the Federal Reserve system.

> The more fluctuating of . . . . currency demands arise out of (1) retail trade, where hand-to-hand money is extensively used both by the public in making purchases and by merchants in furnishing change; (2) payroll requirements; and (3) agricultural prosperity in those sections of the country where banking facilities are limited, or the banking habit has not become fully developed. The public demand for currency varies, accordingly, with the activity of retail trade and fluctuations in retail prices, with the state of industrial employment and the level of wage rates, and with the prosperity of those regions, largely agricultural, where the banking habit is not fully developed.
>
> These several sources develop a characteristic seasonal movement in currency demand. During the late spring and early summer when retail trade is inactive, and industrial employment is seasonally low, currency returns from the public to the banks, since a smaller amount in the

aggregate is required for pocket money, for till money in retail establishments, and to provide for industrial payrolls. As the banks have no use for excess currency above their own till money needs, they deposit this return flow of currency in their reserve balances at the reserve banks where it adds to the supply of reserve funds and becomes available for reduction of borrowing at the reserve banks. During the fall and winter, on the other hand, from late harvesting time on, when both retail trade and industry are more active, a larger volume of currency is withdrawn from our banking institutions to meet wage payments in harvesting, industrial payrolls, and the till and pocket money requirements of retail trade. This movement draws an increasing amount of currency into circulation from August until the year-end holidays. To obtain this currency non-member banks draw on their member bank correspondents, and member banks draw on the reserve banks where the withdrawal is charged against their reserve balances, and, in the absence of new supplies of reserve funds from other quarters, results in an increase in borrowing at the reserve banks. This borrowing is usually liquidated in January when the demand for currency slackens as industry and retail trade in that month become relatively inactive.[5]

How the Federal Reserve system assists in providing funds that can be used by commercial banks in meeting the seasonal peak in the demand for currency is revealed not only by the index for the volume of Federal Reserve notes in circulation but still more clearly by the changes in the volume of bills discounted and of bills bought in the open market. Bills discounted show seasonally high levels throughout the second half of the year, declining sharply from December to February, that is, during the months when the demand for currency falls off rapidly (Chart 36). The rise in bills bought in the open market during the second half of the year is explained by the greater volume of bills in the market, reflecting additional agricultural and commercial transactions. It is usually the policy of the Reserve banks to buy all bills offered, and so to adjust their rates to market rates as to assure sales to themselves in fairly large volume. Then as the supply of bills falls off after December, holdings decline drastically to a trough in August.

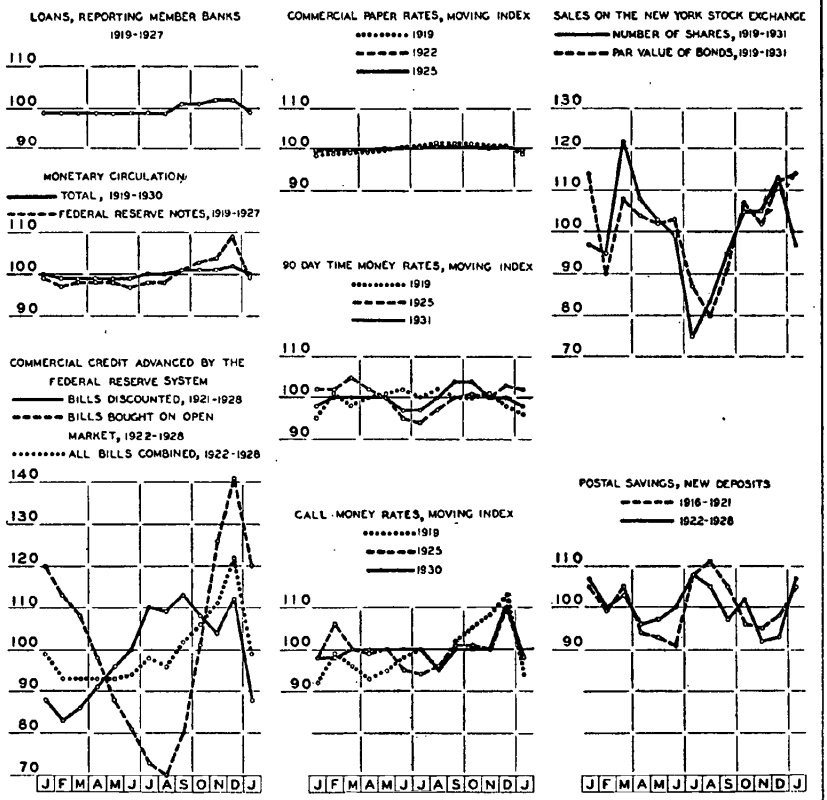
How closely the credit activity of the Reserve system follows the seasonal demands for currency is revealed by the combined seasonal index of bills discounted and bills bought (the former with a weight of 2, the latter with a weight of 1). While this combined index still omits purchases of govern-

[5] Winfield W. Riefler, *Money Rates and Money Markets in the United States* (New York 1930) pp. 137-8.

ment securities (a third form of Reserve bank financing), it represents the bulk of the system's credit. Its seasonal pattern is almost an exact replica of that in monetary circulation,

CHART 36

SEASONAL MOVEMENT OF CREDIT, INTEREST RATES AND SPECULATION



characterized by low levels during the first half of the calendar year, a peak in December and rapid decline thereafter. The seasonal amplitude is, naturally, more appreciable, if only for the reason that it measures relative changes in a much smaller absolute amount than is formed by money in circulation.

In view of this close adjustment of seasonal variations in Federal Reserve credit to those in business demand for currency, it is not surprising to find that the price of commercial credit in the private market has usually varied very little seasonally and recently not at all. Moving seasonal indexes computed by Dr. Frederick R. Macaulay for commercial paper rates (60 to 90 day, prime, one or two signature) show no seasonal changes after 1925 and very mild variations between 1919 and 1925. The seasonal pattern, when visible, shows the expected low levels during the first half of the calendar year and high levels during the second half.

While rates on commercial paper evince no seasonal changes after 1925, rates on 90 day time paper (collateral) continue to have marked seasonal variations. Dr. Macaulay's moving seasonal indexes, presented on Chart 36, indicate a peak in the spring and in the autumn. The reason for this persistence of the seasonal element in rates on time loans may be twofold: collateral time paper is not discountable at the Federal Reserve banks, and with the general growth in the volume of security collateral paper between 1924 and 1930 the seasonal peaks in the general demand for credit exercise a pressure on the supply that is not entirely cancelled by the Reserve banks' credit policy.

The seasonal indexes in call loan rates reflect activity on the stock market as well as general seasonal changes in supply and demand on the credit market. The rates are low in midsummer and in January, and high in December. But while the March and April levels of stock sales are higher than those of November and December, call money rates are higher in winter than in spring, obviously because of the greater general demand for credit during the winter and the greater relative supply of credit during the spring.[6]

The other indexes on Chart 36 present an interesting contrast between seasonal patterns in speculative activity and those in investment by small savers. The data on speculative activity are the number of shares and the par value of bonds sold on the New York Stock Exchange. In these, in spite of a very sharp cyclical swing and very prominent minor move-

[6] For an extensive discussion of the seasonal variations in call money rates, number of shares sold and stock prices, see Richard N. Owens and Charles O. Hardy, *Interest Rates and Stock Speculation* (New York 1925) Chapter II, pp. 18-41.

ments, the seasonal patterns are definite. Both indexes show the mid-summer lull which is characteristic of so many aspects of business activity and is obviously a reflection of vacations and the dull state of general business. In bond sales the most prominent peak is in January, while in stock sales there are two peaks, one in March, the other in December, the latter probably due to liquidation sales for income tax reports. The reasons for the former and for a January peak in bond sales are not clear.

The seasonal pattern in new deposits on postal savings accounts is strikingly different. Persistent from period to period, it may be taken to be representative in spite of its small amplitude. The two troughs in this seasonal pattern, one in April and the other in November-December, correspond to the peaks in retail sales. The greater expenditures entailed during these months obviously prevent any accumulation of savings. Similarly, the mid-summer peak occurs when trade is dullest. The winter peak in January and partly in March appears to be a result of greater earnings during winter months unaccompanied by greater expenditures.

Thus in the various aspects of financial activity, in the volume of credit and open market operations of the Reserve banks, in speculative activity, in the surplus available for savings deposits, distinct, and in most instances, highly persistent seasonal patterns reflect primarily the short-time swings in trade and production as a whole. Other types of swings, however, result rather from conventional terminal dates in accounting and discharge of claims and are most manifest in series relating to disbursements of incomes from property and to profits and losses in business enterprises.

4. Disbursement and Flow of Incomes from Property

Both in dividend and interest payments the quarter months stand out prominently as four peaks: January, April, July and October (Chart 37). In dividend disbursements January is by far the highest peak, especially during the period 1922-30, and while July is somewhat higher than the other two quarter months, there is not the same difference between them as there is between these three quarters and January. In interest payments January and July are almost equally high, this feature being especially marked in the recent period.

These seasonal patterns obviously result from the conventional practice of paying dividends and interest quarterly or semi-annually and have little connection with any seasonal swings in the production of these incomes. It is not surprising to find then that these conventions exercise some influence upon the seasonal patterns in bank debits. The reason that for the latter, in contrast to production and trade, the low month is August instead of July and that January is so high may lie in the custom of satisfying claims and disbursing certain types of income in July and January.

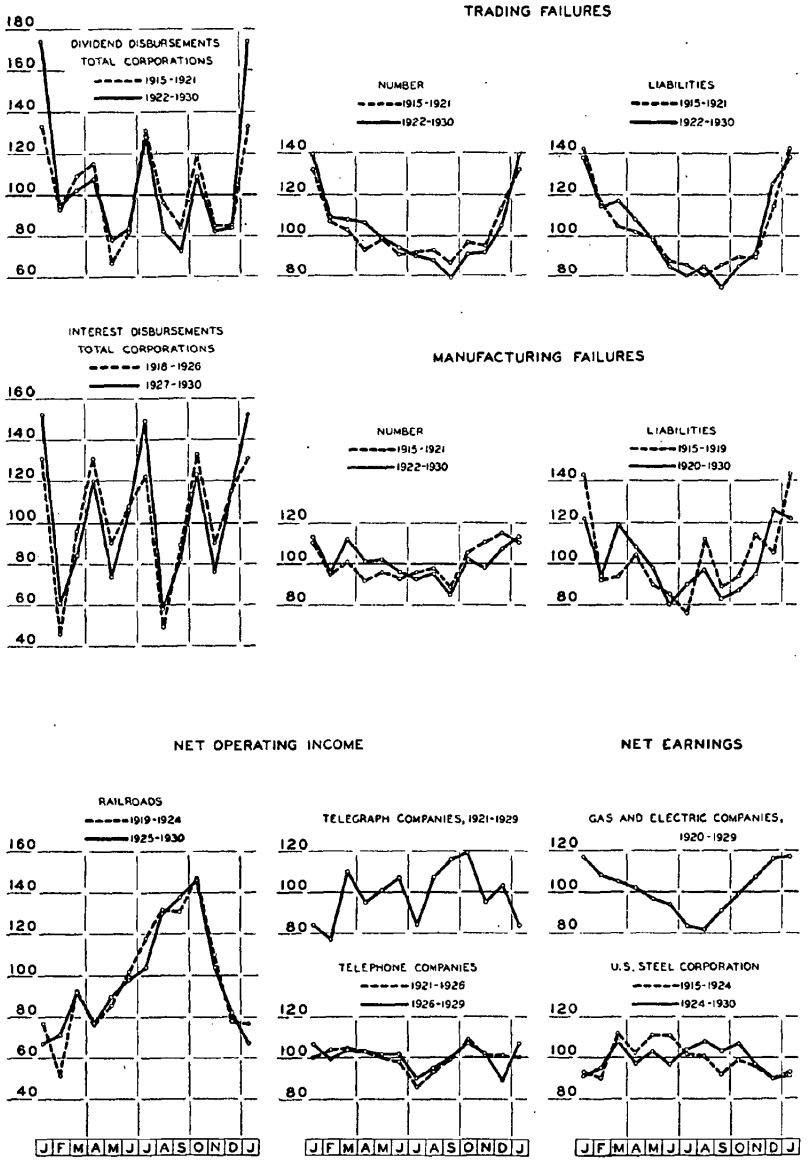
Similar conventional factors largely determine seasonal changes in business failures. The indexes for the number of failures, both in manufacturing and trading concerns, have their peak in January, the month in which the balance is struck and in which many corporations have to satisfy creditors' claims. For trading concerns the number of failures is also high during the preceding and succeeding months, December and February, while for manufacturing concerns the level is about the same throughout the year, except in September, when the seasonal trough occurs in both series, probably because it is not a claim month but occurs during the busy season when enterprises may profit from an increased volume of business.

It is probable that the swing in the number of failures in manufacturing is much less appreciable than that in trading because of the greater seasonal synchronism of various branches of trade and greater similarity of their conventional settling dates. As greater variety of branches and of trading habits may be expected among manufacturing concerns, the large amount of cancellation of divergent seasonal movements may produce a milder swing in the total.

This difference in seasonal amplitude between manufacturing and trade is smaller in respect of liabilities of failed concerns. Apparently the average volume of liabilities per failing concern is greater during the months when many failures occur than during the months when fewer concerns fail. Smaller concerns fail during months which do not coincide with fixed settling dates perhaps because the larger concerns obtain credit in the form of bonds or other settled obligation with fixed dates for discharging claims. This is especially true of manufacturing concerns, in which for that reason the

CHART 37

SEASONAL MOVEMENT OF DISBURSEMENTS, FAILURES AND INCOME



seasonal swing in liabilities is much wider than the seasonal swing in the number of failures.

That seasonal changes in the payment of dividends and interest, and in failures, are not determined by the effects on net earnings of swings in actual volume of economic activity seems obvious from a direct comparison of the two. Moreover a direct proof of the statement is afforded where data on actual monthly net earnings are available. Seasonal swings in these net earnings correspond very well to those in the volume of activity although they sometimes lag slightly. They show no similarity, however, to the variations in the disbursements of dividends (or interest) and in failures.

Thus the series for net operating revenue of railroads yields a seasonal index which is an almost exact copy of the patterns in car loadings of revenue freight (compare Charts 35 and 37). For each the peak occurs in October and the trough in January. The amplitude is considerably wider in operating revenue than in car loadings because the average base to which these seasonal changes are related is much smaller in the former than in the latter. But the similarity of movement is a clear indication of the influence of the original swing in volume of activity.

The same would be true of the other indexes, were data available on the volume of activity. For telegraph companies the index of net operating revenue suggests the two-peak pattern characteristic of wholesale business and manufacturing: a peak in the spring, a trough in July and a higher peak in October. This is a pattern that might be expected in an industry whose services are used primarily for business purposes. The conventional elements have little influence, except possibly on the June peak which may be caused partly by wedding and graduation seasons.

For telephone companies the pattern is materially different. Here the mid-summer trough is more pronounced, probably owing to the absence of people on vacation. Similarly, the December trough seems to be a complement of the travel peak during December, just as the summer trough is the complement of the peak in the movement of passengers. The peak in October may reflect the peak in regular business or the moving season and charges for new installations. The latter may

also explain to a certain extent the high levels during May and June. By and large, seasonal variations in net revenues of telephone companies are quite mild and are in accord with the presumable fluctuations in the total volume of business.

Climatic rather than conventional factors affect gas and electric companies. During the summer the need for lighting is obviously small; also, on account of the general mid-season lull in activity, the power supply for industrial purposes is less in demand. Moreover, less gas is used in heating and cooking, for cold foods are more generally consumed and many city dwellers move beyond the limits of gas range installation. Exactly the opposite happens in winter. The pattern in net operating revenues of gas and electric companies thus appears to be in close correlation with the probable influence of climatic factors. It has a considerable seasonal swing, whose pattern might be expected to show a rather high degree of persistence.

The seasonal pattern in the net earnings of the United States Steel Corporation during 1915-24 is similar to that for ingot production between 1926 and 1931. The change in the pattern in earnings during the later years may possibly be due to a decline in the relative importance of such materials as automobile or structural steel among the products of the company. If this conjecture is true, it would help to explain the reappearance of the autumn peak in earnings and the dwindling importance of the spring peak.

5. Employment and Payrolls

To measure seasonality in employment and payrolls in order to observe the effect of short-time fluctuations in volume of activity upon the stability of opportunity to work and enjoy income, data are, fortunately, easily available. In its study of employment in manufacturing industries the Federal Reserve Board computes seasonal indexes for a number of industries. The data which it assembles on payrolls had to be analyzed to enable us to determine the characteristic seasonal patterns. Of the many measurable branches of industrial activity, only those were selected for which measurements of the seasonal swing in production were available.

CHART 38

SEASONAL MOVEMENT OF EMPLOYMENT, PAYROLLS AND PRODUCTION IN FOOD PRODUCTS

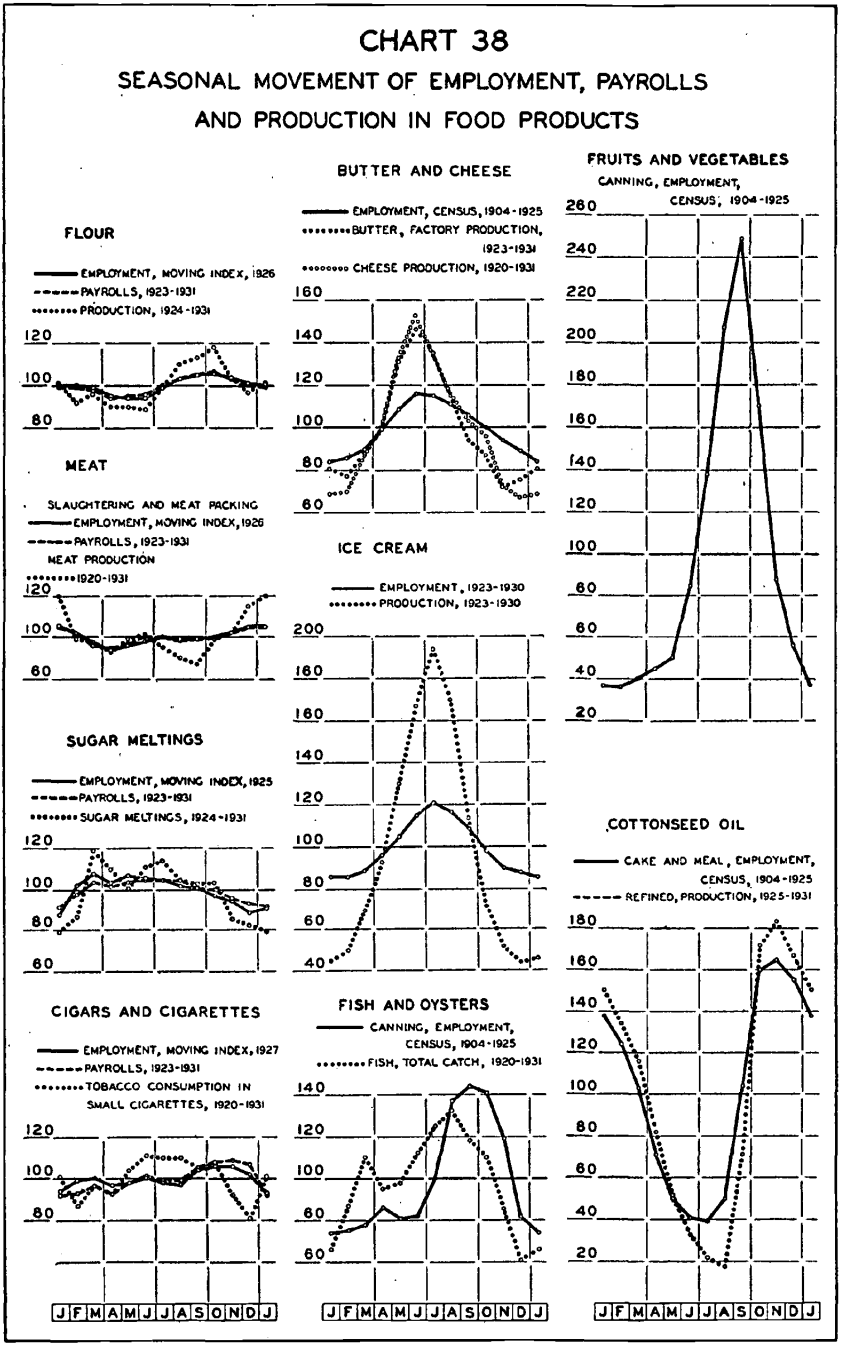
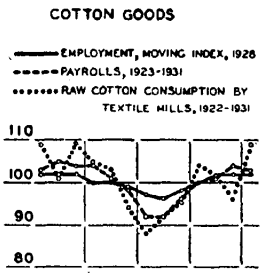


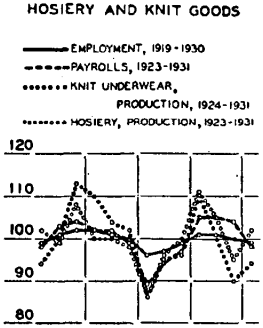
CHART 39

SEASONAL MOVEMENT OF EMPLOYMENT, PAYROLLS AND PRODUCTION IN TEXTILES

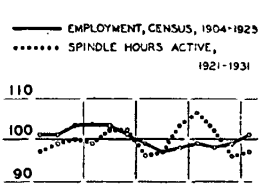
COTTON GOODS



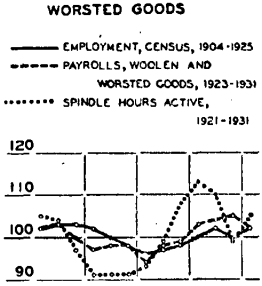
HOSIERY AND KNIT GOODS



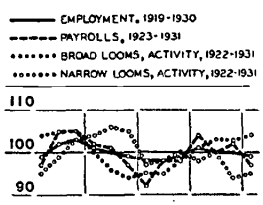
WOOLEN GOODS



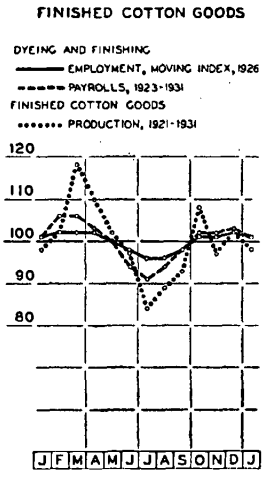
WORSTED GOODS



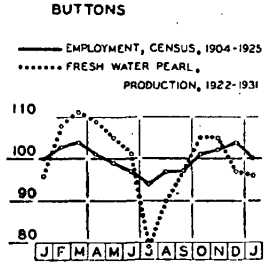
SILK



FINISHED COTTON GOODS



BUTTONS



CARPETS AND RUGS

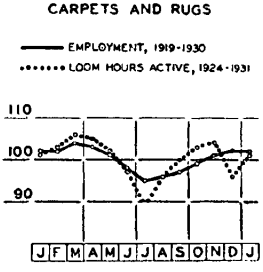


CHART 40

SEASONAL MOVEMENT OF EMPLOYMENT, PAYROLLS, PRODUCTION AND SALES IN CLOTHING, SHOES AND MISCELLANEOUS

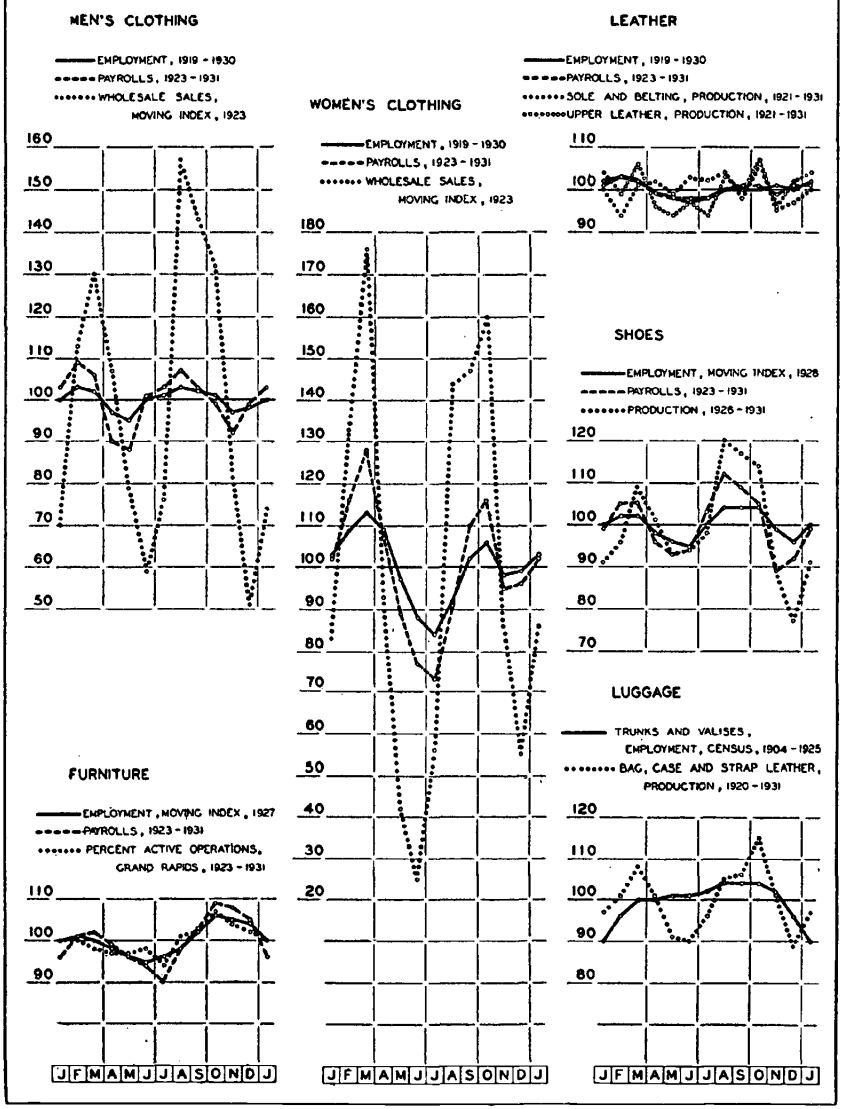


TABLE XIII

Amplitude of Seasonal Variations

Manufacturing Production, Employment and Payrolls

		Average Deviation	Range
FOOD PRODUCTS			
Flour	production, 1924-31	7.8	29
	employment, 1923-30	3.1	12
	payrolls, 1923-31	3.1	13
Meat	total production, 1920-31	6.5	33
	employment, 1923-30	2.4	10
	payrolls, 1923-31	2.4	10
Sugar	meltings, 1924-31	11.2	40
	employment, 1923-30	4.6	17
	payrolls, 1923-31	4.0	14
Tobacco	mfd. and snuff consumption, 1920-30	5.6	28
	employment, 1923-30	2.2	11
Tobacco	cigarette consumption, 1920-31	8.2	30
	employment, 1923-30	2.7	12
	payrolls, 1923-31	4.9	17
Butter	factory production, 1923-31	21.2	74
	employment (butter, cheese and dairy), Census	9.6	32
Ice Cream	production, 1923-30	45.8	150
	employment, 1923-30	11.2	35
Fish	total catch, 1920-31	17.8	71
	canning (fish and oysters) employment, Census	23.6	70
Fruits and Vegetables	carlot shipments		
	apples, 1920-31	81.5	408
	peaches, 1918-31	131.0	422
	tomatoes, 1918-31	68.7	277
	string beans, 1924-26	85.6	329
	canning, employment, Census	60.5	212
Cottonseed, Refined Oil	production, 1925-31	53.7	165
	employment, cottonseed oil meal and cake, Census	41.5	126
TEXTILES AND LEATHER PRODUCTS			
Cotton	consumption, 1922-31	5.7	21
	employment, cotton goods, 1923-30	2.3	9
	payrolls, 1923-31	3.7	13
Finishing and Dyeing	billings, 1921-31	7.0	34
	employment, 1923-30	2.0	7
	payrolls, 1923-31	3.8	15

TABLE XIII (CONTINUED)

		Average Deviation	Range
Knit Goods	underwear production, 1924-31	6.6	27
	hosiery production, 1923-31	4.3	25
	employment, 1923-30	1.5	6
	payrolls, 1923-31	4.0	16
Buttons	fresh water pearl production, 1922-31	7.1	32
	employment, Census	2.5	10
Woolen Goods	spindle activity, 1921-31	2.6	10
	employment, Census	1.8	6
Worsted Goods	spindle activity, 1921-31	6.6	22
	employment, Census	2.0	7
	employment, woolen and worsted, 1923-30	2.3	9
	payrolls, woolen and worsted, 1923-31	2.8	11
Carpets and rugs	loom activity, 1924-31	3.8	17
	employment, 1923-30	2.6	9
Silk	broad loom activity, 1922-31	3.6	11
	narrow loom activity, 1922-31	3.1	12
	employment, 1919-30	1.1	5
	payrolls, 1923-31	3.1	13
Leather	production, sole and belting, 1921-31	2.9	12
	production, upper, 1921-31	3.8	13
	employment, 1919-30	1.3	6
	payrolls, 1923-31	1.4	5
Shoes	production, 1926-31	10.2	43
	employment, 1923-30	2.6	10
	payrolls, 1923-31	6.3	23
Men's Clothing	wholesale sales, 1923	30.3	106
	employment, 1919-30	2.1	8
	payrolls, 1923-31	5.3	21
Women's Clothing	wholesale sales, 1923	43.3	151
	employment, 1919-30	7.0	29
	payrolls, 1923-31	13.2	55
Bag, Case and Strap Leather	production, 1921-31	6.2	26
	employment, trunks and valises, Census.	3.1	14
	AUTOMOBILES AND RELATED PRODUCTS		
Automobiles	passenger car production, 1919-25	13.2	42
	employment, 1919-24	3.8	15
	passenger car production, 1925-31	21.9	81
	employment, 1925-30	4.1	18
	payrolls, 1923-31	8.6	35

TABLE XIII (CONTINUED)

		Average Deviation	Range
Tires	consumption of rubber, 1921-31	9.0	36
	employment, 1923-30	2.5	9
	payrolls, 1923-31	5.3	23
Glass	polished plate glass production, 1923-31.	4.8	24
	employment, 1923-30	2.6	10
	payrolls, 1923-31	3.2	12
Gasoline	production, 1924-30	2.2	12
	employment, 1923-30	1.1	4
	payrolls, 1923-31	1.2	5
	CONSTRUCTION MATERIALS		
Lumber	total production, 1920-29	5.6	21
	employment, sawmills, 1923-30	2.4	8
	employment, mill work, 1923-30	1.2	4
	payrolls, sawmills, 1923-31	3.8	15
	payrolls, mill work, 1923-31	2.4	11
Portland Cement	production, 1919-24	17.6	55
	employment, 1919-24	5.2	18
	production, 1924-30	21.2	69
	employment, 1925-30	4.8	16
	payrolls, 1923-31	6.8	25
Brick and Tile	common brick production, 1924-31	27.2	94
	face brick production, 1923-31	12.2	50
	floor and wall tile, production, 1924-31	5.2	22
	employment, 1923-30	6.4	21
	payrolls, clay products, 1923-31	4.8	20
Structural Steel and Iron	shipments, structural steel, 1924-31	7.3	28
	employment, structural iron, 1923-30	1.9	6
	payrolls, structural iron, 1923-31	2.6	11
Paving Materials	asphalt (petroleum) production, 1925-31.	21.3	59
	paving materials, employment, Census.	16.8	48
Steam Fittings	radiators, production, 1925-31	9.0	39
	boilers (round and square) production, 1925-31	9.8	61
	employment, 1923-30	1.8	7
	payrolls, 1923-31	3.4	19
Steel Ingots	production, 1919-31	5.9	23
	employment, 1923-30	1.2	4
	payrolls, 1923-31	4.2	14
Furniture	per cent active plants, Grand Rapids district, 1923-31	2.7	13
	employment, 1923-30	2.8	11
	payrolls, 1923-31	4.6	19

Charts 38 through 42 present the numerous comparisons thus made possible. For each industry one or two indexes of seasonal variation in production, employment and payrolls are given. For some industries not covered in the Federal Reserve Board's analysis seasonal indexes of employment were taken from a study of Census data by Dr. Parker J. Bursk.[7]

We may consider in detail a few sections of Chart 38, on which the indexes for the various groups of food products are assembled, to indicate the type of results obtained. In flour, clearly, the swing in both employment and payrolls follows closely that in flour production. For each the trough occurs in the late spring and the peak in October. Each has an amplitude distinctly smaller than that in production. The two measures of amplitude in production are 7.8 and 29; in employment (the Federal Reserve Board computes a moving seasonal and we are taking the mean average deviation and the mean range for 1923-30) they are 3.1 and 12; for payrolls, they are 3.1 and 13.

A somewhat similar showing may be observed in slaughtering and meat packing, in which the index of production is for total meat (pork, mutton, lamb, beef and veal). For this series also, the Federal Reserve Board computed moving seasonal indexes of employment; and again we have computed the seasonal index of payrolls for 1923-31. As in the case of flour the particular employment index taken for graphical comparison is for a year which in its seasonal amplitude may be considered typical for the entire period. Again the pattern of production is quite similar to those of employment and payrolls, the only difference being that the latter do not show as clearly as does production a trough in August and September. But here again the seasonal amplitudes of employment and of payrolls are substantially smaller than that of production.

This similarity of pattern and marked difference in amplitude may be observed in most of the comparisons presented on the charts. As to the similarity in pattern only two exceptions appear to be significant: (1) for manufactured tobacco and snuff the seasonal pattern in employment does not follow that of production; (2) employment and payrolls in

[7] *Seasonal Variations in Employment in Manufacturing Industries,* Study XIV in the series of Research Studies (Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia 1931).

the total glass industry have an autumn peak in October-November while production of plate glass has its peak in August. This, however, may be due to the difference in the coverage of the series (Chart 41).

In respect of seasonal amplitude an exact comparison can easily be made. For the series whose seasonal indexes are presented on the charts Table XIII presents the average deviations of the seasonal indexes and the ranges.

The testimony of this long table is quite unequivocal; in respect of all industries except two: fish canning and furniture, the seasonal amplitude of production is wider than that of payrolls; and in all industries except flour, meat, sugar and clay products, the seasonal amplitude of payrolls is wider than that of employment. Since thirty-five industries are studied, it is evident that the exceptions are few.

The reason that seasonal variations in employment appear milder than those in production seems rather clear. Since the data on employment measure the number of people on the payroll, they reflect changes in total employment only. As long as a man is employed by an enterprise, even though he may be absent on vacation, or on sick leave, or not working full time, his name is retained on the payroll. On the other hand, overtime work is not reflected in the data. Hence, series on employment are likely to under-estimate short-time fluctuations in the labor of the working force and therefore tend to show milder seasonal swings than actually characterize its activity.

This argument is based upon the assumption that seasonal variations in the number of hours worked are associated positively with those in total employment. That this is actually so may be seen from the similarity of seasonal pattern in employment and in payrolls, the latter reflecting not only the number of people employed but also the number of hours they work. This relation holds with one interesting qualification. In several industries December payrolls often tend to rise while employment declines.[8] And in other industries payrolls do not show such a decline in December as is evident in employment. Obviously, the dispensation of bonuses or holiday pay may be of some influence in causing a discrepancy between

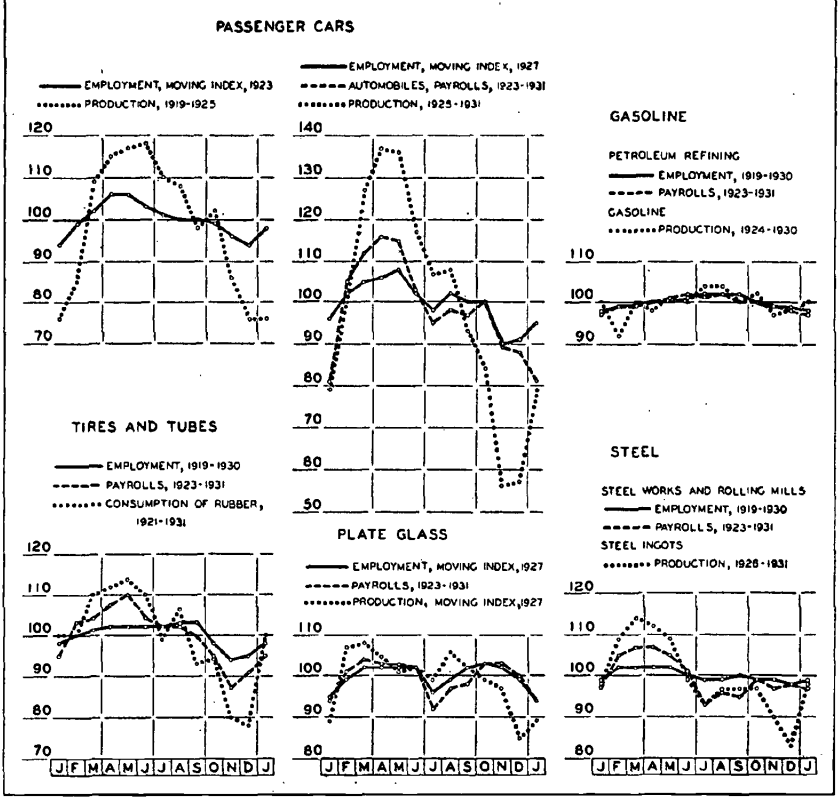
[8] See, *e.g.*, the indexes for knit goods, worsted goods and leather on Chart 40, and for structural iron on Chart 42.

payrolls and employment, a discrepancy which is due not only to the generally larger amplitude of the former.

But if payrolls do reflect rather precisely the actual amount of activity of the industry's working personnel, why should

CHART 41

SEASONAL MOVEMENT OF EMPLOYMENT, PAYROLLS AND PRODUCTION IN AUTOMOBILES AND RELATED PRODUCTS

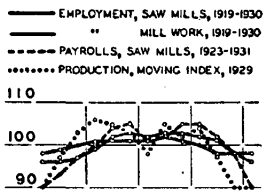


they show a milder seasonal swing than production? How is it possible to produce much more in one month than in another and not have labor cost rise proportionately? The difference may arise partly from the fact that payrolls are reported for shorter periods than production—the payroll period ending nearest the 15th of the month, while production is reported for

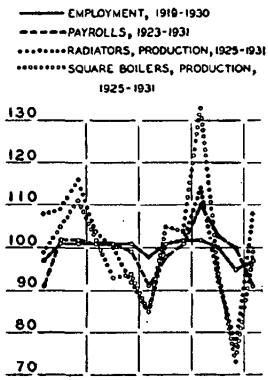
CHART 42

SEASONAL MOVEMENT OF EMPLOYMENT, PAYROLLS AND PRODUCTION IN CONSTRUCTION MATERIALS

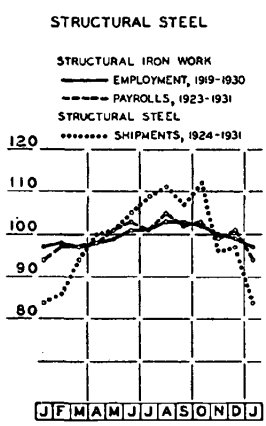
LUMBER



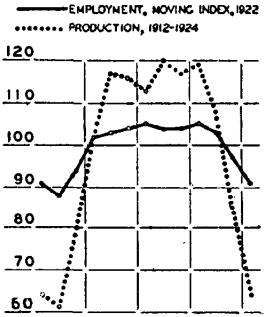
STEAM FITTINGS

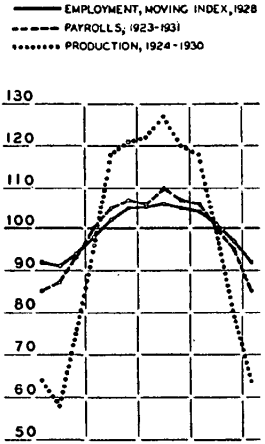


STRUCTURAL STEEL

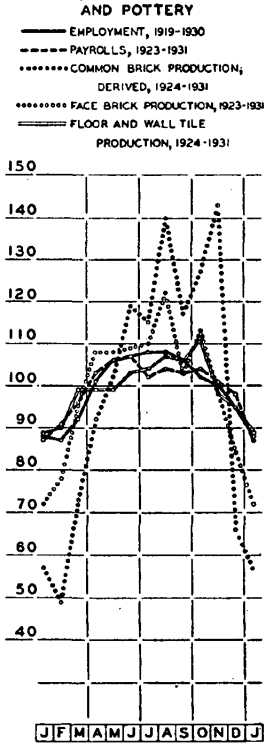


PORTLAND CEMENT

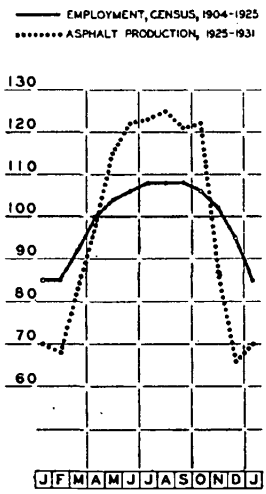




BRICK, TILE, TERRA COTTA AND POTTERY



PAVING MATERIALS



the entire month. The following factors, however, appear more important: (1) in the seasonally slack months the workers may be less actively engaged even during the hours when they are on the job; vice versa, in the seasonally busy months the workers may be more actively and productively engaged during the hours when they are on the job; (2) some parts of the finished commodities may be produced more steadily throughout the year than are the completed units themselves; or various subsidiary jobs, not directly related to the final product, may be performed primarily in the seasonally slack months, while in the seasonally busy months all energies are concentrated on turning out the finished product.

The actual situation is probably a combination of both possibilities. There is little doubt that pressure for completion of work must be more intense in the seasonally busy months and that there is less tendency to waste time. Also, many enterprises, either as a far-sighted policy or as a matter of month-to-month adaptation, concentrate some work that has little direct relation to final output during the months of slack demand and slack production. The ascertainment of the exact form assumed by such stabilization of work would involve a study of individual establishments that is outside the scope of the present analysis.[9]

Moreover, while the series cover wage-earners, exclusive of salaried employees, it is highly probable that a few white collar workers are actually included, unknown to the Bureau of Labor Statistics, which, with several state agencies, collects the original data. Although the number of white collar employees so reported must be very small, as compared with the number of wage-earners, that is, plant operatives and maintenance men, still, the inclusion of their salaries tends to dampen the seasonal swing in payrolls.

Looking at the exceptions to the generalizations suggested by the table, we find that in two series the seasonal swing in production was milder than the corresponding swings in employment and payrolls: fish canning and furniture. In canning, this may be the consequence of the series compared. Comparison is made not between fluctuations in labor activity and fluctuations in the output of that labor, but between fluc-

[9] Such an analysis is given in Edwin S. Smith, *Reducing Seasonal Unemployment* (New York 1931).

tuations in labor activity and in the supply of the raw material which goes only in part into canning and has many other uses. In furniture the production series covers only a part of the Grand Rapids district, while the indexes of employment and payrolls are supposed to be representative of the country as a whole.

In four industries the seasonal amplitude of employment appears to be larger or at least equal to that of payrolls: flour, meat, sugar and clay products. Also, in glancing over Table XIII we find several industries: gasoline, leather, glass, structural iron and worsted goods, in which, while payrolls do show a wider seasonal amplitude than employment, the difference is rather small. In steel ingots, most textiles, clothing, shoes, furniture and automobiles, on the contrary, the greater seasonal variability of payrolls as compared with employment is rather conspicuous.

Two possible explanations of this different showing of industries may be suggested: (1) In some industries the seasonal patterns in total employment and in hours worked may differ. Thus, for example, if the summer peak in industry is concomitant with a tendency to allow vacations or with a recurrent competitive pull of other industries, the period of seasonally smaller employment will overlap with periods during which more hours are worked. Whether this is the case in such industries as flour production or sugar meltings could be established only from a more intensive study of the working calendar of these branches of productive activity. (2) In many industries operation is continuous, that is, is carried on through the twenty-four hours of the day. In other industries, while operation is not carried on continuously day and night, only one shift, of rigidly fixed duration, is possible. As a result, the number of hours worked will be equal to the number of people employed multiplied by a certain constant factor, and the seasonal swings in employment and in payrolls should be of the same amplitude. Thus, sugar meltings, gasoline production and structural iron might fall under this category. On the other hand, in textiles and automobiles overtime work can be introduced with facility.