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CHAPTER IX

SEASONAL SIMILARITIES AND DIFFERENCES AMONG INDUSTRIES

GENERAL CHARACTERISTICS

It has been pointed out that in respect of a single industry the burden of seasonality cannot be determined from a seasonal index for the industry as a whole. If regional differences exist, the total index will, in the absence of complete mobility of the productive factors, tend to under-estimate the seasonal burden. Similarly, differences in seasonality in individual plants are concealed in the seasonal variation characteristic of the industry, and the seasonal variability of a group of industries differs from that found in any of the industries making up the group. As in the case of a swing which is a combination of seasonal variations in different regions of the country a combined index is significant only if the productive factors may be assumed to move freely between branches of an industry or between industries.

It is clear that capital may flow not only from the East to the Southwest within a single branch of production but also from one industry, such as moving wheat crops, to another, such as moving the cotton crop. Labor may shift from one industry to another, and a number of essential raw materials are used by more than one branch of the productive system. Moreover, such auxiliary branches of the productive system as trade and transportation serve not one industry but many and thus exemplify a mobility of resources at the other end of the industrial chain. But since such mobility cannot be assumed to be perfect, it would seem to be essential to a measure of the complete burden imposed by seasonality upon industry that industrial units be studied.

To divide an industry into units, however, is impossible because data are lacking. The only seasonally affected

branches of production for which such detailed figures are available are the automobile companies and, to a smaller extent, retail trade. In the former (see Chapter V) the variations in the seasonal production patterns of different companies are determined largely by the type of car produced; in the latter quite often by the type of goods carried. This aspect of the seasonal problem had, therefore, to be omitted from consideration.

A study of seasonal variations in an area of production or trade that embraces more than a single group of commodities is relatively easy. Upon the assumption of perfect mobility among the constituent parts, the addition of seasonal indexes for specific industries or trades in various combinations would give the total seasonal swing. This, however, would be an experiment of limited interest. It is more important to ascertain similarities and differences in seasonal movements among various industries than to merge them into a total index.

Accordingly, we now compare the dates of seasonal peaks and troughs in the various industries. Such a seasonal calendar for the movement and stocks of raw materials, manufacturing production and stocks of manufactured goods reveals the extent to which peaks and troughs occur in the same month in the various branches of productive activity. If the calendar discloses substantial synchronism there is obviously little chance of a cancellation of seasonal swings when for some purpose the productive system is to be treated as a whole.

The calendar is supplemented by an analysis of data on transportation and trade which were already easily available in significant economic groupings. Freight car loadings are reported for seven groups and the comparison of seasonal behavior in them throws light upon the variation from one group to another. Exports and imports are classified in five groups. Data on sales are collected for nine lines of wholesale trade and several retail chain stores in eight fields. For a limited group of department stores in New England seasonal indexes of sales by a number of separate departments are available. The comparisons thus made possible provide a good illustration of the industrial aspects of the problem and enable us to observe the

presence or absence of synchronism in the seasonal movement in various groups of commodities.

The survey indicates much more synchronism than would at first be expected. If all branches of industry and trade are considered together, without any distinction between the various stages of fabrication, timing of seasonal swings is most diverse. The flow of agricultural commodities is at peak during the autumn and winter, the production of many finished and semi-finished commodities in March, of dairy products and some of the automobile and construction goods in mid- and late summer, of another group of finished goods in October and so on. If all the numerous raw materials, semi-finished goods and finished goods are viewed together and their flow at the various stages, from manufacturers, wholesalers, retailers, are added, there is not a month but marks a seasonal peak for one group of commodities and a seasonal trough for another.

But if the broad units are separated, if raw materials are set off from finished goods, the flow from manufacturers from the flow from retailers, then within each group, in spite of the diversity of commodities included, considerable synchronism characterizes the seasonal swings. General reflection would suggest that it is these broad groups that are significant rather than the chaotic total of all commodities, no matter what stage of fabrication they represent or at what link of the productive and distributive system they are taken. The possible mobility of productive and auxiliary factors is much more easily assumed to operate within these groups than among them. We can assume much more easily that labor, for example, shifts from one branch of retail trade to another than that it shifts from retail trade to the harvesting of crops. We may assume that banking credit is transferred with greater facility from one branch of wholesale trade to another than from wholesale trade into financing such longer term operations as are involved in many branches of manufacture and agriculture. Since this is so, it seems more significant to stress the synchronism of seasonal swings within these broad groups of raw materials, semi-finished and finished goods, and distinguish their flow in the primary markets from their movements through the hands of wholesalers and retailers. Such

synchronism means that for the economy as it is separated into these broad divisions the seasonal problem still persists to a considerable degree, even if there is complete mobility among the productive factors involved.

This conclusion is strengthened by the similarity in the timing of seasonal variations at both ends of the chain that leads from raw materials to final consumers, namely, at the point of inflow of raw materials to primary markets and at the outflow of finished goods into the hands of domestic consumers. It is these two stages that are characterized by the most conspicuous seasonal variations, and it is, therefore, in them that the lack of synchronism would, upon the assumption of the mobility of the factors involved, result in the greatest cancellation of burdens imposed by the seasonal problem. What happens is quite the contrary. At each of these two stages, whenever the violent seasonal swings arise from climatic, organic and conventional elements there is a most conspicuous synchronism of seasonal movement, obviously because the groups of basic factors are the same for the different commodities. The natural laws that cause wheat to mature only once a year in the temperate zone impose the same inexorable limitations upon corn, tobacco, most fruits and the more important vegetables, and impose them within the same calendar limits. The conventional factors that prompt final consumers to buy more during the Christmas and Easter seasons exercise their influence upon demand for many diverse commodities.

Because of the synchronism of seasonal swings at the stages where they are most conspicuous, the series that reflect the total movement of commodities in the economic system (such, for example, as car loadings) and add algebraically the varying swings on the implicit assumption of complete mobility, still reflect clear-cut seasonal movements. It is true, of course, that such variations as are present in these series are mild, since they are reduced by the lack of precise synchronism in the seasonal swings of the component parts. But the conclusion is undeniably suggested that even under the most optimistic assumption of complete fluidity of the productive factors that bear the seasonal burden in various branches of the industrial and distributive system, these burdens are still present to an appreciable degree.

DETAILED COMMENTS

1. Dating of Seasonal Peaks and Troughs in Industry

A complete account of the comparative timing of seasonal patterns in various industries and trades would be possible only upon an exhaustive analysis of all available monthly series on the flow of commodities in the United States. But from the seasonal indexes computed in this study, supplemented by those found in other sources, a few tentative generalizations may be formulated.

One way to compare the timing of seasonal swings is to survey briefly the indexes that characterize the various channels of commodity flow. Of the indexes available from the present and from other studies a considerable number have been selected to represent as fully as possible the various branches of industry in this country. The dating of the seasonal peak (or peaks, when there is more than one high month) and trough for these indexes have been assembled into comparative tables.

In order to facilitate comparison, the series were subdivided into five groups. First, raw materials, semi-finished manufactured goods and finished manufactured goods were segregated. Semi-finished commodities, the only group concerning which there may be a question as to definition, include those goods which serve directly as raw materials for some other industry but have at the same time undergone some fabrication or processing.

Within these groups production was separated from stocks. This cross-grouping yielded originally six divisions, but as the data on stocks of semi-finished goods are very scanty it was considered advisable to group them with the stocks of finished manufactured goods.

a. *Raw Materials*

Table XX, the first of these seasonal calendar tables, presents the dating of seasonal peaks and troughs in the movement of raw materials, covering receipts at primary markets, imports and carlot shipments. The commodities included fall naturally into two categories: agricultural products and other, primarily mineral, raw materials.

In agricultural raw materials there is a definite concentra-

tion of seasonal peaks in autumn and early winter. Wheat receipts are at peak in August, cotton, cattle and sheep, potatoes and apples in October, corn and hogs in January, and so on. Altogether, thirteen of the nineteen agricultural raw materials show their respective peaks between August and January, and among these are series with the widest seasonal swings.

The other prominent peak among agricultural raw materials is in March-April (eggs, citrus fruits, coffee, raw sugar). With the exception of eggs this group is made up of tropical and semi-tropical goods. Obviously the climatic factors affecting these commodities are essentially different from those affecting livestock, grains and cotton.

In agricultural commodities the trough dates show much less tendency to cluster about a single month. For three series the trough occurs in September, for another three in April, for two or three in July, for two in February. Of the many series with autumn or winter peaks some show troughs in April (wheat), others in December (potatoes), still others in July (cotton).

The reasons for such a showing are quite obvious. Peak dates are concentrated because most of the organic raw materials ripen after the summer and are harvested in the autumn. This is true of such important agricultural products as wheat, corn and cotton, of such animal products as livestock and of most fruits and vegetables except citrus fruits. The climatic difference that makes for the spring peak in citrus fruits accounts also for the occurrence of peaks in the supply of such products as coffee and raw sugar in spring instead of in autumn.

But while the basic climatic factors of the temperate zone produce a considerable synchronism of peaks, they do not exercise a similar influence on the troughs. In none of these commodities is there really one sharply defined trough. Instead, a low plateau prevails over several months. It is thus to a large degree a matter of chance in which particular month the lowest point occurs. Since low levels characterize several months, the limits within which troughs in various raw materials may differ in timing are fairly wide.

The non-agricultural raw materials form a rather miscellaneous subgroup. There is some tendency for the seasonal

TABLE XX

DATING OF SEASONAL PEAKS AND TROUGHS IN THE MOVEMENT OF RAW MATERIALS [a]

Agricultural Raw Materials	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Wheat, Receipts at Primary Markets	August		April	
Corn, Receipts at Primary Markets	January		April	
Cotton, Receipts into Sight	October		July	
Cottonseed, Receipts by Mills	October		July	
Cattle and Calves, Receipts at Primary Markets	October		February	
Sheep and Lambs, Receipts at Primary Markets	October		February	
Hogs, Receipts at Primary Markets	January		August	
Poultry, Receipts at 5 Markets	December		April	
Eggs, Receipts at 5 Markets	April		November	
Raw Milk Production, Minneapolis area	May		September	
Potatoes, Carlot Shipments	October	June	December	August
Apples, Carlot Shipments	October		June	
Citrus Fruits, Carlot Shipments	March		September	
Tobacco Sales, Loose Leaf at Warehouses	November		June-July	
Raw Wool Receipts at Boston	July	March	October	May
Raw Silk Imports	August		March	
Raw Sugar Receipts at Refinery Ports	March		December	
Coffee Imports	March		September	
Rubber Imports	January	April	August	February

[a] Most of the indexes utilized in this and subsequent tables have been computed in this study. Additional indexes have been taken from the records of the Business Cycles study or from the releases of the Research Division of the Federal Reserve Board. The dates in this and following tables have been chosen from the seasonal indexes for all periods, if more than one have been covered. In case of disagreement between indexes for different periods, the index for the latest was taken.

TABLE XX (CONTINUED)

Mineral and Other Raw Materials	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Bituminous Coal Production	October-November		April	
Anthracite Coal Production	October	January	March	July
Petroleum, Crude, Production	May-July		February	
Copper Mined	February-April		July	
Iron-ore Shipments	August		December-April	
Loadings of Stone, Gravel and Sand	August		February	
Woodpulp, Mechanical, Production	April-May		August	

peaks to cluster in late summer and early autumn, synchronizing with those in agricultural raw materials. Thus, in four of the seven commodities listed the peak occurs in August or October. This dating of the peaks may be attributed partly to the favorable conditions for mining and transportation (stone, sand and gravel, iron ore and coal) in summer, and partly to an attempt to prepare for winter demand (coal). There is considerable diversity of timing in the seasonal troughs, again a situation analogous to that in the case of agricultural raw materials.

For raw material stocks (Table XXI) the data available concern almost entirely agricultural products. In timing the swing in stocks follows those characteristic of production and receipts.

Among domestic raw materials such as wheat and cotton stocks reach a peak some time after the peak in receipts. Among imported raw materials, on the contrary, the peaks in stocks and in imports tend to be synchronous. As a result, stocks of both domestic and foreign raw materials tend to be at peak almost at the same time. Thus, between November and April stocks are at peak for corn, poultry, tobacco, coffee, cotton, silk, rubber, Portland cement and cottonseed—altogether nine of the thirteen commodities that show seasonal variations.

There is more concentration of troughs in stocks than in receipts because in the former the climatic factor causes a

TABLE XXI

DATING OF SEASONAL PEAKS AND TROUGHS IN STOCKS OF RAW MATERIALS

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Wheat, Visible Supply	October		June	
Corn, Visible Supply	March		August	
Cottonseed, at Mills	November		July	
Poultry, Cold Storage Holdings	December-January		July-August	
Eggs, Cold Storage Holdings	July		February	
Raw Sugar, Stocks at Refinery Ports	June		February	
Coffee, Visible Supply	February-March	August	May	October
Tobacco, Stocks with Manufacturers and Dealers, Quarterly				
Cigar Type	I		IV	
Non-Cigar	I		III	
Raw Cotton,				
In Warehouses	December		July	
At Mills	January-March		August	
Wool, Quarterly				
With Dealers	II		I	
With Manufacturers	I, III		IV	
Raw Silk				
In Warehouses	December		April	
At Manufacturing Plants	January		July	
Rubber Stocks				
Total	March		September-October	
Afloat	December		July	
With Dealers	February		August	
With Manufacturers	March		September	
Petroleum	None	None	None	None
Portland Cement, Clinker	April		October	

sharp trough; depletion of stocks of raw materials by consumption continues until the new crop becomes available. Thus the trough occurs between June and August in seven of the fourteen commodities—wheat, corn, poultry, tobacco (non-cigar), cotton, silk at manufacturing plants, cottonseed—the most important domestic raw materials.

b. *Semi-Finished Goods*

A much more diversified picture is presented by the production of semi-finished goods.

The first impression of Table XXII is the much greater number of secondary peaks and troughs, as compared with Tables XX and XXI. The inference that a two-peak seasonal pattern prevails appreciably more often among semi-finished goods than among raw materials is amply supported by the discussion in the preceding chapters.

The peaks cluster about two months: March and October. Thus March is the month of the seasonal peak for six commodities: sugar, steel ingots, steel sheets, malleable castings, silver, plate glass; together with January: cotton consumption and silk deliveries; and together with January or February for three more. October is the primary peak for seven commodities and a secondary peak for three or four others. Production is high in February for four series, probably because the indexes, taken from the study of the Federal Reserve Board, have all been adjusted for the number of working days in each month.

The seasonal troughs are concentrated about July, December and February. Production is most frequently low in July and among highly diverse commodities. December appears as the secondary trough in six commodities.

The industries listed in Table XXII are not equivalent units. Nevertheless, a tabular comparison of the distribution of peaks and troughs by months is not without interest. Allowing for the obvious differences in importance of the commodities and in the conspicuousness of their seasonal peaks and troughs, we can still infer the essential synchronism of the seasonal pattern from the frequency distribution presented in Table XXIII.

Clearly a spring peak in March, an autumn peak in October and November, and troughs in July are most common. There are two other less conspicuous trough months, December and

TABLE XXII

DATING OF SEASONAL PEAKS AND TROUGHS IN THE PRODUCTION OF SEMI-FINISHED GOODS

(including consumption of raw materials)

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Cattle Slaughtered	October		February	
Calves Slaughtered	May	October	February	August
Sheep and Lambs Slaughtered	October		April	
Hogs Slaughtered	January	June	September	April
Sugar Meltings	March		January	
Cotton Consumption, Textile Mills	January, March	October	July	December
Wool Consumption	October	March	July	December
Silk Deliveries	January, March	August	December	June-July
Upper Leather, Total	October	March	May	November
Leather, Calf and Kip	October		May	
Sole and Belting Leather	October		February	
Newsprint Production	April-June		July-August	
Book Paper	February		July	
Fine Paper	February		July	
Pig Iron	April	November	July	December
Steel Ingots	March	October	July	December
Steel Sheets	March	October	July	December
Malleable Castings	March		November	
Copper Smelted	February	October-November	July	December
Zinc	February		July-August	
Lead	November		September	
Silver	March	November	July	December, January
Coke, By-Product	February-March		July-August	
Lumber, Softwood	May		December	
Lumber, Hardwood	September	February-March	December	July
Portland Cement	August		February	
Petroleum Asphalt	August		December	
Common Brick	November		February	
Floor and Wall Tile	October		January	
Plate Glass	March	August	December	July

February. Identification of the series in this frequency distribution table reveals that were some specifically different groups such as paper and the non-ferrous metals eliminated, the concentration of peaks and troughs would be still more appreciable.

The factors that determine the concentration of seasonal peaks and troughs in the production of semi-finished goods

TABLE XXIII

FREQUENCY DISTRIBUTION OF SEASONAL PEAKS AND TROUGHS BY MONTHS[a]

PRODUCTION OF SEMI-FINISHED GOODS

	Number of Series Having			
	Primary Peak	Secondary Peak	Primary Trough	Secondary Trough
January	2	0	2	½
February	4½	½	5	0
March	7½	2½	0	0
April	1½	0	1	1
May	2	0	2	0
June	½	1	0	½
July	0	0	10½	2½
August	2	2	1½	1
September	1	0	2	0
October	7	4½	0	0
November	2	2½	1	1
December	0	0	5	6½
Total	30	13	30	13

[a] Whenever a peak or a trough occurs in two months, half of the frequency is given to each.

(or consumption of raw materials) are different from those accounting for the synchronization of flow and stocks of raw materials. The latter are influenced primarily by climatic and organic forces; the former primarily by conventional and only indirectly by natural factors. One reason why February appears often as a trough is that it is short, with fewer working days than any other month. Low levels tend to prevail in July and August not only because high temperatures make difficult some types of productive activity but also because of summer vacations. Only in the case of lumber, hardwoods and sugar does the December trough seem to be definitely associated with climatic conditions.

c. *Finished Goods*

Among the finished manufactured goods is found an even greater variety of series than among the semi-finished. Table XXIV begins with food products, in some of which the direct effects of climatic factors are still conspicuous (dairy goods); then come textiles, in which the seasonal variations are largely

TABLE XXIV

DATING OF SEASONAL PEAKS AND TROUGHS IN THE PRODUCTION OF FINISHED GOODS

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Wheat Flour	October		June	
Beef	October		February	
Lamb	October	January	June-July	November
Pork	January	June	September	April
Cottonseed Oil, Refined	November		August	
Evaporated Milk				
Bulk	June		December	
Case	June		November	
Condensed Milk				
Bulk	June		November	
Case	May		September	
Butter, Factory	June		November	
Oleomargarine	October		July	
Cheese				
Total	June		December	
American	June		December	
All Other	June		January, February	
Ice Cream	July		December	
Tobacco, Consumption				
In Mfd. Tobacco and Snuff	August, October		December	
In Small Cigarettes	June		December	
In Cigars	October		January	
Finished Cotton Goods	March	October	July	November
Fine Cotton Goods, New Bedford	March	December	July	February
Cotton Textiles	March	December	July	February
Knit Underwear	March	October	July	December
Working Clothes	October	March	December	July
Hosiery	October	March	July	December
Fresh Water Pearl Buttons	March	October-November	July	January
Shoes, Total	October	March	December	June-July
Rubber Heels	May		November	
Gloves, Total	October	March	December	July

TABLE XXIV (CONTINUED)

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Automobiles				
Passenger Cars	May		December	
Trucks	March, May		December	
Taxicabs	December		July, September	
Tires				
Inner Tubes	August	March	December	July
Pneumatic Casings	May	August	November	July
Solid and Cushion	June	August	November	July
Radiators	March	October	December	July
Cast Iron Boilers				
Square	October	March	December	July
Round	October	April	December	July
Baths (derived)	March	August	December	May
Lavatories (derived)	March	October	January	September
Sinks (derived)	March	October	November	September
Locomotives	August	March	January	April
Shipbuilding	August		January	
Paper Boxes	February	September	December	July

in preparation for conventional seasons, durable consumers' goods, construction materials and finally even such machinery series as the output of locomotives and ships. But in spite of this diversity peaks and troughs apparently cluster about certain months.

As in the output of semi-finished goods activity appears to be at peak in March and October, slightly more often in the latter. Of the forty-three series recorded in Table XXIV these two months mark primary peaks in twenty-one. Other months of considerable concentration of peaks are June and May. But these peaks are found primarily in the series covering output of dairy products (eight out of the total nine). March and October also appear as prominent secondary peak months, being recorded for 12½ of the twenty-two series for which secondary peaks could be distinguished.

Seasonal troughs are again concentrated in July and December, but February appears only once as a trough month and December dates the seasonal low in many more instances than July. This preponderance of December troughs among finished products is largely accounted for by the coincidence

of troughs in dairy products, construction materials and automobiles. All are lowest at the end of the year, and, because of the stimulating influence of the warm weather on the demand for their products or supply of their raw materials, none tends to have a mid-summer low. The weight of these three groups in the table for semi-finished commodities is much smaller than in Table XXIV and for this reason the December trough does not appear as important.

The degree of concentration of the seasonal peaks and troughs in the various months appears in the frequency distribution in Table XXV. Again, warning must be given that the forty-three series in the group are far from being equivalent units.

TABLE XXV

FREQUENCY DISTRIBUTION OF SEASONAL PEAKS AND TROUGHS BY MONTHS

PRODUCTION OF FINISHED GOODS

	Number of Series Having			
	Primary Peak	Secondary Peak	Primary Trough	Secondary Trough
January	1	1	4½	1
February	1	0	1½	2
March	9½	7	0	0
April	0	1	0	2
May	4½	0	0	1
June	9	1	1½	½
July	1	0	8	9½
August	3½	3	1	0
September	0	1	2½	2
October	11½	5½	0	0
November	1	½	7	2
December	1	2	17	2
Total	43	22	43	22

If we combine Tables XXIII and XXV, the preponderance of March and October as seasonal peaks and of July and December as seasonal troughs becomes quite conspicuous. This synchronism means, of course, that when the seasonal movements in the diverse branches of industrial activity are combined in a total of productive activity, seasonal movements with spring and autumn peaks and mid-summer and mid-winter troughs are still clearly outlined.

This conclusion is largely confirmed by Babson's Calendar of Manufacturing Activity which is based upon questionnaires and contacts with the industries (Table XXVI).

TABLE XXVI

FREQUENCY DISTRIBUTION OF SEASONALLY ACTIVE AND INACTIVE PERIODS BY MONTHS

TWO HUNDRED AND FOURTEEN MANUFACTURING INDUSTRIES

	Number of Industries Showing Manufacturing Activity		
	Greater than Average (*1*)	Less than Average (*2*)	Col. (*1*) minus Col. (*2*)
January	99	115	— 16
February	129½	84½	45
March	157	57	100
April	134½	79½	55
May	94½	119½	— 25
June	59½	154½	— 95
July	43	171	— 128
August	59½	154½	— 95
September	109½	104½	5
October	136½	77½	59
November	114½	99½	15
December	85½	118½	— 33

Clearly, the month in which most industries are characterized by levels of activity above the average are March and October, the number being slightly larger in the former. July is again in general unmistakably the month of subaverage activity. In contrast to former tables, however, Table XXVI reveals that June and August are more generally low months than December. But Babson's Calendar does not distinguish an actual trough from activity below the average. Similarly, the failure to distinguish between actual peak and activity above the average may account for the showing of March rather than October as the predominant peak.

d. *Stocks of Manufactured Goods*

The timing of seasonal variations in the stocks of manufactured goods is given in Table XXVII. Here timing varies much more. Many commodity stocks are at peak at the end of the year (meats and some cotton goods in December); others during the spring (construction materials) and still another

TABLE XXVII

DATING OF SEASONAL PEAKS AND TROUGHS IN STOCKS OF FINISHED GOODS

(including a few semi-finished commodities)

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Wheat Flour				
All Positions	September-October		May	
At Mills, Quarterly	III		II	
Beef, Cold Storage	December		August	
Lamb, Cold Storage	December		August	
Pork Products, Cold Storage	June		November	
Evaporated Milk				
Case Goods, Total	July		February-March	
Case Goods, Unsold	August		February	
Condensed Milk				
Case Goods, Total	July		March	
Bulk Goods, Total	June-July		February	
Butter, Cold Storage	August		April	
Cheese, Cold Storage				
Total	August		April	
American	August		April	
All Other	August		March-April	
Cottonseed Oil, Crude	January		July	
Cottonseed Oil, Refined	March-April		September	
Finished Cotton Goods	December	June-July	February	September
Cotton Textiles	December	June	September	March
Knit Underwear	July		November	
Overalls	April		August-September	
Hosiery	July		December	
Fresh Water Pearl Buttons	June		August	
Rubber Heels	May		November	
Rubber Tires				
Inner Tubes	May		September	
Pneumatic Casings	May		September	
Solid and Cushion Tires	June		October-November	
Gasoline	April		October	
Portland Cement	March		October	
Petroleum Asphalt	May		October	
Common Brick, Burned	November		May	
Floor and Wall Tile	March		September	
Southern Yellow Pine	February-March		November	

TABLE XXVII (CONTINUED)

	Peak		Trough	
	Primary	Secondary	Primary	Secondary
Maple Flooring	March		September-October	
Radiators	June		December	
Boilers				
Round	June		December	
Square	June		December	
Baths	March		September	
Lavatories	March		October	
Sinks	March		October	

group, dairy products, in mid-summer. Nor are the seasonal troughs any more concentrated in a single month. Some occur in February, others in September, October and December.

This showing may arise partly from the small number of series in the table, but a more significant explanation suggests itself. Most series measure the holdings of stocks of finished and semi-finished goods by producers. Preceding discussion has indicated that while producers carry large stocks of raw materials, they do not, as a rule, carry large stocks of finished commodities. In only a few industries, notably some of the construction goods, do producers carry stocks in order themselves to meet the discrepancy that arises from the difference between the rate of their production and the seasonality in consumers' demand for their products. Of other commodities producers hold only small stocks and in these seasonal variations are rather mild and patterns none too clearly outlined.

Moreover, stocks of finished commodities, if measured at different stages of the sequence from producer to consumer, are likely to reflect diverse types of seasonal factors. Thus the stocks that are reported as cold storage holdings are affected by the seasonality of both supply and domestic and foreign demand. Such stocks as those of wheat flour at mills are primarily the reflection of the seasonal in production only, a feature that is characteristic of several other stocks of finished goods held by producers. In view of the diversity of types of influence on the various measures of stock holdings, little synchronism in their seasonal swings may be expected.

The general results of this brief survey of seasonal timing in industry may be summarized as follows:

1. In respect of both flow and stocks of raw materials there is considerable synchronism of seasonal peaks and troughs owing to the similarity in the climatic and organic factors determining them. Crops and livestock mature in early autumn, and all through the autumn and early winter the supply of the chief domestic raw materials is large. The seasonal minerals, coal, iron ore and stone, are also at peak at the end of the summer and in the autumn. Their stocks reach a peak a few months after the peak in raw materials. And while the troughs in the flow of these products are not well synchronized, the troughs in stocks are.

Two notable exceptions in timing appear in this group: (a) imported colonial raw materials, in so far as they are subject to an appreciable seasonal swing, are likely to show peaks and troughs in months other than those characteristic of domestic raw materials; (b) dairy products, in contrast with all other, are at peak in early summer, not after the summer is over.

2. In production of both semi-finished and finished goods seasonal peaks concentrate in March or October or in both. This seems to be due primarily to conventional factors, although, as will be seen in the inspection of retail and wholesale trade, these two peaks may be interpreted as peaks of preparedness for the high months in consumers' purchases, April and December. There are notable exceptions. The group of dairy products again and some of the construction materials tend to have peaks in mid-summer. Troughs tend to occur in February, July and December, again primarily because of conventional seasonal factors.

3. In stocks of both semi-finished and finished goods seasonal variations are rather mild. The tables indicate considerable diversity in the timing of seasonal peaks and troughs, owing partly to the paucity of series, partly to the lack of measures of stocks at the various stages of the industrial process.

2. Car Loadings

The data available on car loadings by groups of commodities enable us to see whether or not the seasonal patterns observed in the flow of raw materials, semi-finished and

finished goods are impressed upon the volume of railroad transportation. The figures are classified in only seven groups, of which one is miscellaneous. But even among such broad divisions interesting similarities and differences appear.

Table XXVIII and Chart 47 present at a glance the main results of the seasonal analysis. The largest seasonal swing is in ore, with a peak in July and generally high levels during the summer. Since iron ore is the most important commodity in this group, the index reflects the season in navigation on the Great Lakes which opens in April or May and closes in November or December.

TABLE XXVIII

CAR LOADINGS, BY GROUPS OF COMMODITIES

AMPLITUDE OF SEASONAL VARIATIONS IN EACH GROUP [a]

Groups of Freight	Average Deviation	Range
Ore	63.5	157
Coal	9.8	29
Coke	6.0	23
Livestock	12.0	48
Forest Products	4.8	22
Grains and Grain Products	12.5	44
Merchandise L. C. L.	2.8	12
Miscellaneous	9.3	35
Total	6.8	24

[a] Moving seasonal index computed by the Research Division of the Federal Reserve Board, *Federal Reserve Bulletin,* February 1931, p. 110. Index for 1928 taken for the table above. Total index is an arithmetic mean of indexes of separate groups weighted by average volume for 1928.

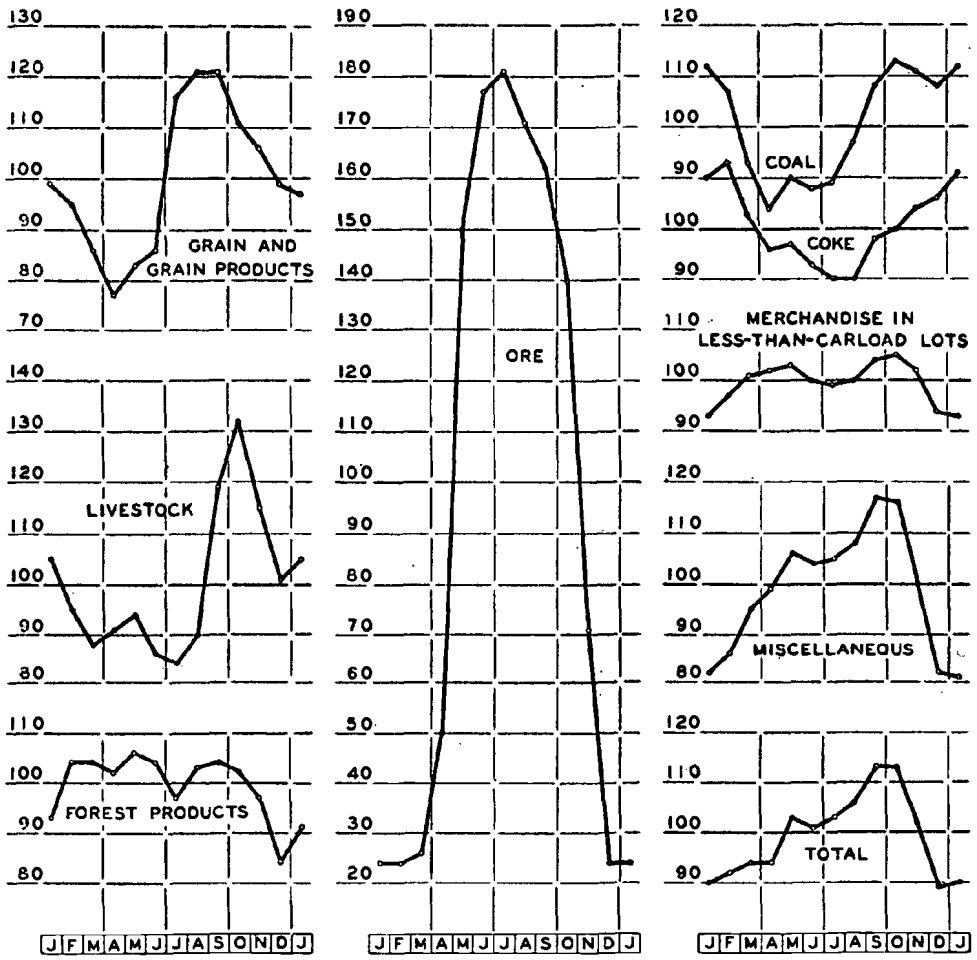
The seasonal swings in grain and livestock are also fairly substantial. Their pattern is clearly traceable to the harvest cycle in grains and the feeding cycle in livestock and has been discussed above in connection with the series covering the production and shipments of these two groups of commodities. In contrast to the much wider swing encountered in the series on marketing and shipments of the individual grains or groups of livestock, the seasonal swing in car loadings is mild. The reason is obvious: car loadings combine the seasonal swings for various commodities, somewhat diverse in pattern.

The index for forest products confirms both by its amplitude and pattern the results of the seasonal analysis of lumber (Chapter VI). The two peaks may be attributed to the combination of softwood and hardwood; the former tends to

CHART 47

SEASONAL MOVEMENT OF CAR LOADINGS, BY GROUPS OF COMMODITIES

MOVING INDEXES FOR 1928



show a primary peak in spring and the latter in autumn, although some groups of softwood also tend to be at peak in the autumn.

The miscellaneous group appears to be a combination of agricultural products and manufactured goods, including cot-

ton, all the fruits and vegetables and all the manufactured products sent in carlots. The pattern, with a September peak, suggests the predominance of manufactured goods.

Coal and coke, the most homogeneous divisions, show plausible seasonal patterns, with large shipments during the winter and small shipments in summer. In this respect these are almost the exact opposite of the pattern in ore loadings. However, the seasonal swings in coal and coke are much milder than those in ore loadings.

Merchandise in less than carlots is composed primarily of manufactured finished goods. The seasonal pattern, therefore, is one most typical of industrial goods at large: a peak in the spring (May), a peak in the autumn (October) and a trough in July and in January. Owing both to the diversity of commodities included and to the generally mild seasonal swing in the flow of the dominating group of manufactured commodities, the seasonal index for the total group shows the mildest amplitude.

Although the timing of the seasonal peaks and troughs of these eight divisions of car loadings is characterized by considerable diversity, still there is some synchronism. Thus at least six of the eight groups tend to show high levels in autumn (grains, livestock and miscellaneous, forest products, coal and merchandise l. c. l.). As the miscellaneous group outweighs all others, total car loadings retain a very definite seasonal pattern, with a marked peak in September-October and a marked trough in December.

However, the seasonal swing in total car loadings is rather mild. Three of the eight groups show a milder amplitude and only one other group shows a similar amplitude. The other four groups are subject to a seasonal swing much wider than that of the total. This is but another illustration of the general statement that with seasonal variations, as with cyclical fluctuations, the total often tends to understate the size of the swings which characterize the component parts.

3. Foreign Trade

The available monthly data on exports and imports are classified as: (1) crude materials, (2) crude foodstuffs, (3) manufactured foodstuffs, (4) semi-manufactured goods, (5) fin-

ished manufactured goods. This division by the mixed principles of stage of fabrication and of foods—non-foods enables us to distinguish the seasonal behavior of various commodity groups. The main characteristics of their seasonal variations appear in Table XXIX and Chart 48.

TABLE XXIX

FOREIGN TRADE OF THE UNITED STATES, BY COMMODITY GROUPS

AMPLITUDE OF SEASONAL VARIATIONS IN EACH GROUP

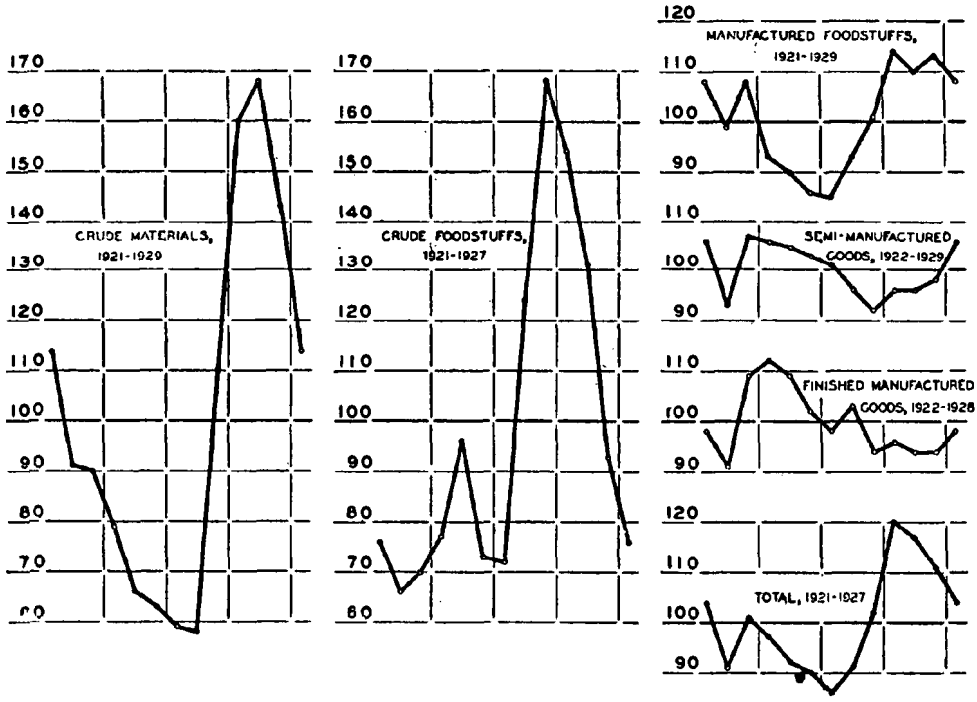
	Average Deviation	Range
Imports		
Total	4.2	20
Crude Materials	7.8	26
Crude Foodstuffs	7.8	33
Manufactured Foodstuffs	13.1	53
Semi-manufactured Goods	4.5	16
Finished Manufactured Goods	4.8	21
Exports		
Total	9.0	34
Crude Materials	32.4	110
Crude Foodstuffs	29.5	102
Manufactured Foodstuffs	9.0	29
Semi-manufactured Goods	4.8	15
Finished Manufactured Goods	5.8	21

In imports the seasonal movement is quite mild because the most important goods imported during recent years come from a rather wide area and are not subject to violent changes of seasons. Thus in crude materials the two most important commodities are silk and rubber, followed at a considerable interval by hides and skins. For none of these is there any violent seasonal swing in supply. The same is true of the group of crude foodstuffs which is dominated by coffee. Only in manufactured foodstuffs is there an appreciable seasonal swing, and it arises from the importance in this group of cane sugar which comes primarily from one source, Cuba. And, as might be expected, the seasonal swings in the semi-manufactured goods (primarily metals such as tin, copper and brass, and such other products as paper-base stock and leather), and in manufactured goods (newsprint paper, manufactured jute, art work) are very mild.

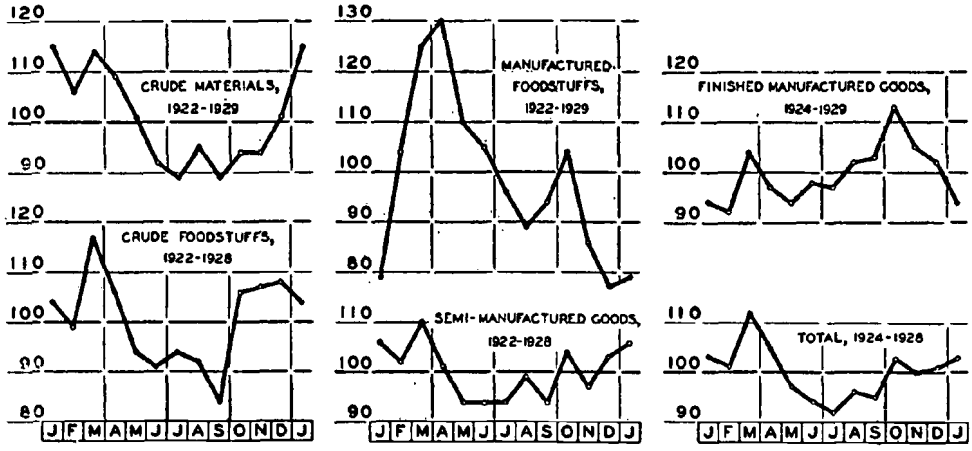
CHART 48

SEASONAL MOVEMENT OF FOREIGN TRADE, BY GROUPS OF COMMODITIES

EXPORTS



IMPORTS



As they are, the various groups of imports show little synchronism in seasonal swing. Crude materials and crude foodstuffs show some similarity, the prevalence of high levels in winter and low levels during the summer being common to both. But in manufactured foodstuffs the pattern is quite different. The peak occurs in spring and low levels prevail during the winter months up to February. In the last two groups there is the usual two-peak seasonal swing characteristic of most manufacturing activity: peak in spring and autumn or winter, trough in mid-summer. The movement in the total index is accounted for by the combination of the first and last two groups, the pattern being most similar to that in crude materials.

The seasonal swings in exports are much wider, primarily because the country exports to such an appreciable extent raw materials whose supply is greatly influenced by climatic and organic factors. Thus in the group of raw materials cotton has a preponderant weight, constituting about 70 per cent of the group, with tobacco next. It is not surprising, then, that there is a large seasonal swing with the peak in November. Grains are the most important crude foodstuffs exported, fruits the next; hence another appreciable seasonal swing with a peak in September. Even in manufactured foodstuffs the seasonal pattern is considerable because of the constitution of the group: grain preparations (for the most part, flour), lard, fruits and meats, all branches of productive activity that still retain some of the seasonal swing which characterizes the supply of their raw materials. Only in the group of semi-manufactures (metal, leather and lumber) and the group of finished manufactures (machinery, vehicles and gasoline) does the seasonal swing diminish appreciably.

In direction groups of exports show as little synchronism in seasonal movement as imports. The patterns in the crude materials and crude foodstuffs are somewhat similar, both showing low levels during the summer and high levels in the autumn and early winter. The same is true to a limited extent of manufactured foodstuffs. But in semi-finished and finished manufactured goods the pattern is quite different, spring being characterized by peak levels, autumn and early winter by low levels. For this reason the total index, while reflecting the autumn peaks of the crude materials and foodstuffs group, has a rather mild swing.

Foreign trade manifests a considerable cancellation of seasonal swings because of the lack of synchronization in the movements of raw materials and of manufactured commodities. But it is doubtful whether the picture presented by foreign trade truly reflects the flow of commodities in the movement of domestic trade. Certainly in the distributive trades within the country there is a much greater synchronization in the seasonal flow of goods, as is clearly revealed by the analysis of data on wholesale and retail trade.

4. Wholesale and Retail Trade

The main characteristics of the indexes for nine lines of wholesale trade computed by the Research Division of the Federal Reserve Board are given in Table XXX and Chart 49.

In spite of the diversity of lines included there is substantial similarity of seasonal pattern. In all lines except clothing the primary peak is either in October or in the preceding month. In most lines there is a definite secondary peak in March. Similarly, two troughs occur in most lines: one in mid-summer (July or June) and the other in December, January or February.

This similarity of seasonal pattern is the more remarkable since the differences in amplitude are striking. The narrowest swing is in meats, a perishable commodity, subject to regular consumption. But the variations are small also in the two other lines dealing with perishable consumers' goods, groceries and drugs. At the other extreme are the lines that handle clothing, for which demand by final consumers is subject to such definite conventional and climatic seasonal variations. Between the two extremes are furniture and hardware, both durable consumers' goods. The steady business demand for the latter probably accounts for the narrow seasonal swing in its sales, while the variations in the demand for the former are connected primarily with the conventional moving dates.

The reason that, in contrast to foreign trade, domestic wholesale trade in such diverse types of goods follows similar seasonal patterns lies undoubtedly in the fact that these series reflect variations at one stage nearer the demand of final consumers. Data on foreign trade picture sales at all stages from

the supply of the raw material to the passing of the finished products to ultimate consumers. Domestic wholesale trade, being much more definitely in the nature of a direct preparation for consumers' demand, reflects the seasonal habits of final buyers, whose purchases are, on the whole, synchronous for diverse groups of goods.

TABLE XXX

SALES BY WHOLESALERS, NINE LINES OF WHOLESALE TRADE

AMPLITUDE OF SEASONAL VARIATIONS IN EACH LINE

	Average Deviation	Range
Groceries	5.5	26
Meats	4.2	18
Drugs	5.8	23
Furniture	8.8	37
Hardware	5.7	24
Men's Clothing [a]	30.3	106
Women's Clothing [a]	43.3	151
Dry Goods	11.5	45
Boots and Shoes	14.0	46
Total for Nine Lines [b]	9.8	33

[a] Moving Seasonal Index. Index for 1923 taken.

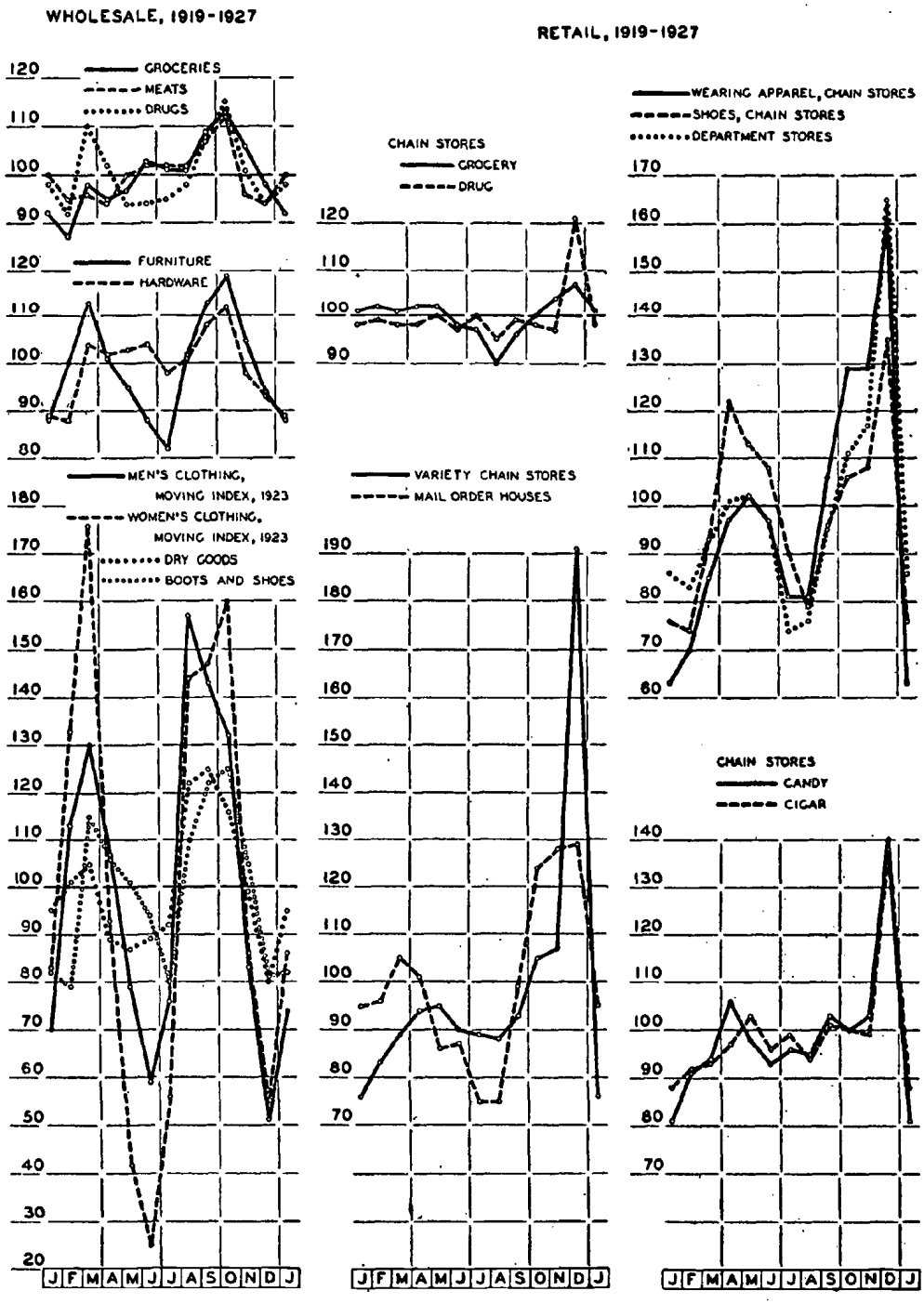
[b] Computed as a weighted arithmetic mean of the seasonal indexes for the nine lines. Weights used are those employed by the Federal Reserve Board to obtain an index of total sales at wholesale. See *Federal Reserve Bulletin*, December 1927, pp. 827-8.

This last statement is substantiated by an inspection of the seasonal swings characterizing sales in various groups of chain stores (Table XXXI and Chart 49). There is little reason to suppose that the seasonal variations in chain store sales are materially different from those in independent stores carrying the same commodities.

The close synchronism of the seasonal movements in retail trade is clear on Chart 49. All lines of trade have their primary peaks in December, their secondary peaks in spring, March, April or May. The early occurrence of the spring peak in mail order houses indicates a significant difference in timing between the purchases of the rural population, which are largest before the beginning of spring activity in the fields, and the

CHART 49

SEASONAL MOVEMENT OF SALES, SELECTED LINES OF WHOLESALE AND RETAIL TRADE



demand of the urban population, which tends to be large in several branches before the beginning of summer. Similarly, all lines have a trough in January-February and in July-August.

The differences in seasonal amplitude are clearly connected with the character of the goods involved. The seasonal swing

TABLE XXXI

SALES IN NINE LINES OF RETAIL TRADE [a]

AMPLITUDE OF SEASONAL VARIATIONS IN EACH LINE

	Average Deviation	Range
Grocery Chains	3.2	17
Drug Chains	3.5	26
Candy Chains	8.7	59
Cigar Chains	7.0	50
Wearing Apparel	21.0	97
Shoe Chains	15.3	61
Department Stores	16.0	91
5 and 10 Cent Stores	17.2	115
Mail Order Houses	14.5	54
M. Copeland's Index of Retail Trade, 1919-27	10.5	53

[a] As in the wholesale series, we are using the indexes computed for the period 1919-27 by the Research Division of the Federal Reserve Board. *Federal Reserve Bulletin,* April 1928, p. 235.

of perishable necessaries, which are sold chiefly by grocery and drug chains, is of course rather mild. In semi-luxuries, such as candies and tobacco, for which demand increases during holidays but for which there is a steady volume of demand throughout the year, the seasonal swing is appreciably wider. It is very wide in clothing and shoes, for holidays accentuate fashion and climatic seasons. In department stores and variety chains the range is amplified by the concentration of demand on the two holiday periods. But the variety of goods handled, as compared with such more limited groups of commodities as are sold in wearing apparel stores, helps to mitigate the seasonal swing. Finally, in mail order houses the variations are appreciable because they are determined

by very marked seasons in the degree of absorption in productive activity and in the income flow of the farmers who are their main customers.

Thus the various lines of trade in the stages nearest to the passing of the goods into the hands of private consumers (as distinct from industrial consumers) are subject to conspicuous and synchronous seasonal swings. Hence there is little chance of cancellation of the variations if for some reason the field of trade is to be considered as a whole. Of course, it must be remembered that not all the areas of retail sales have been covered in the comparison. Thus, sales of gasoline, which are quite high during the summer, show a pattern inverted to the spring- and winter-peak pattern of the retail lines we have considered so far. But even the most comprehensive monthly index of retail trade considered in Chapter VII (which includes gasoline sales) still shows marked seasonal swings (Chart 35).

5. Department Store Sales by Departments

Seasonal variations in the retail sales of a larger number of groups of commodities may be observed in data available on sales in New England stores by departments. While these stores do not cover all branches of retail trade, they do present sales for more groups than have been considered heretofore. It is possible, of course, that department store sales of a certain commodity, such as luggage, tend to have a seasonal pattern unlike that shown by sales in special luggage stores. But the difference between the two should not be appreciable.

Covering a sample of department and specialty stores in the Boston Federal Reserve district during the years 1926-30, the data used in the analysis are the same as were discussed in Chapter IV. Owing to the large number of departments it is difficult to present the resulting indexes graphically. Table XXXII shows, however, their most important characteristics.

The departments are grouped according to the type of their seasonal pattern. In the first group are all the departments that show a preponderant spring or early summer peak and where the secondary peak, if present, is much lower. This group is composed of departments that sell primarily summer clothes, dresses, their materials and accessories. Naturally, the six departments included tend to show synchronism of sea-

sonal swing. In four the peak is in June and in another four the trough is in August. The seasonal amplitude of sales in these six departments is of fairly wide range but it is on the whole milder than in most of the other departments.

The second and largest group includes departments whose sales are subject to a spring and an autumn or winter peak, both prominent. With the exception of two (house furnishings

TABLE XXXII

DEPARTMENT STORE SALES, NEW ENGLAND, BY SEPARATE DEPARTMENTS

TIMING AND AMPLITUDE OF SEASONAL VARIATIONS IN EACH DEPARTMENT

Departments	Timing				Amplitude	
	Primary Peak	Secondary Peak	Primary Trough	Secondary Trough	Avg. Dev.	Range
GROUP I						
Silks and Velvets, Dress Goods	March		August		17.2	73
Cotton Dress Goods	June		September		24.8	92
Women's Dresses	June		August		21.7	91
Misses' Dresses	June	October	August	February	17.4	73
Millinery	April	October	February	July	32.4	104
Corsets and Brassieres	June		August		10.3	43
GROUP II						
Woolen Dress Goods	October	March	July	February	32.7	145
Laces, Trimming Embroidery	December	April	July	February	21.5	96
Ribbons	December	June	August	February	26.7	153
Notions	December	June	August	February	10.8	56
Men's Clothing	November	April	August	February	17.3	69
Boys' Wear	December	April	July, August	February	30.0	133
Infants' Wear	December	April	July	February	27.4	136
Neckwear and Veiling	December	April	August	February	30.9	213
Women's Coats	October	April	July	February	33.0	128
Misses' Coats	October	April	July	February	32.1	147
Juniors' and Girls' Ready-to-Wear	December	April	July	February	27.7	98
Waists, Blouses and Sweaters	December	May	February	August	18.4	85
Women's and Children's Hosiery	December	June	February	August	22.2	133

TABLE XXXII (CONTINUED)

Departments	Timing				Amplitude	
	Primary Peak	Secondary Peak	Primary Trough	Secondary Trough	Avg. Dev.	Range
Silk and Muslin Underwear	December	June	September	February	30.0	185
Aprons and Housedresses	December	June	August	February	27.9	111
Women's and Children's Shoes	December	April	February	August	18.6	79
Men's and Boys' Shoes	December	June	August	February	22.2	157
House Furnishings	December	May	July	February	17.5	106
Luggage	December	June	February	October	34.7	208
GROUP III						
Linens	December		April		26.6	111
Domestics	January		April		24.2	108
Art Goods and Needlework	December		July		28.2	140
Furs	January		June		64.8	192
Knit Underwear	December		August		32.2	185
Furniture,Beds,Mattresses, Springs	August	January	July	December	21.8	106
Draperies, Lamps	October	May	July	February	20.7	92
Floor Coverings	October	January	July	December	19.5	80
Musical Instruments and Radios	January		June		54.2	269
GROUP IV						
Toilet Articles and Drugs	December		August		21.6	151
Handkerchiefs	December		July		70.5	454
Silverwear and Jewels	December	June	July	March	36.8	244
Leather Goods	December		February		38.6	268
Umbrellas, Parasols, Canes	December		February		51.2	336
Men's Furnishings	December	June	February	August	35.5	234
Women's and Children's Gloves	December	April	July	February	46.1	258
Toys and Sport Goods	December		January, February		80.8	530
Books and Stationery	December		July		58.2	365

and luggage) all departments in this group sell shoes or clothing. But the articles of clothing sold are such as to be subject to both summer and winter demand. In some departments, for example, women's and misses' coats, spring demand is more conspicuous than winter, while in others the reverse is true.

There is considerable synchronism of seasonal swing in this group also. In fifteen departments out of nineteen the primary peak is in December and the secondary peak in either April (nine departments) or June (seven departments). In fourteen departments the primary trough is in either July or August while the secondary trough is preponderantly in February. There are considerable differences in seasonal amplitude but most of the average deviations are below 30.

In the third group are all departments that show one peak in the winter but no concentration in December. This group is the winter-peak group as against the summer-peak group, in a way a counterpart of Group I. It includes furniture and the heavier types of house furnishings, some special winter clothing (furs, winter underwear) and the textiles that are a part of house equipment (linen, domestics, draperies).

There is not as much synchronism in Group III as in the other groups. While most of the peaks occur during the winter, they are distributed over December, January, October and in one instance a peak occurs even in August. The troughs occur in April, in June or in July. The seasonal amplitude is measured by an average deviation of between 20 and 30.

Group IV is the most distinctive and interesting. It may be designated as the group of Christmas goods, including commodities that are bought mainly in connection with the holidays: toilet articles and drugs, handkerchiefs, ornaments, leather goods, canes, some men's furnishings, gloves, toys, books and stationery. In all these departments the peak is, of course, in December, and there are few conspicuous secondary peaks. The trough occurs in February or July. With one exception, the department of toilet articles and drugs, all show very wide seasonal swings. The average deviations of the indexes are above 30 and the ranges especially are very much larger than those observed for the departments in the other groups.

Thus total sales of department stores are a composite of at least four distinct groups of commodities: one with a summer peak, one with high levels during the winter, one with both spring and autumn or winter peaks, and one with the Christmas peak. This grouping implies considerable divergence in the seasonal pattern characteristic of each department.

Upon the assumption of mobility among the various departments, the index for total sales in which the divergent seasonal movements are allowed to cancel themselves was computed as a straight arithmetic mean of the indexes for the forty-three departments listed in Table XXXII:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
+1.7	−28.3	−11.7	−3.1	−2.5	−2.5	−34.8	−27.9	−11.3	+11.5	+13.9	+95.2

Average 20.4

The same deviations from 100 upon the assumption of lack of mobility are:

26.5	29.6	17.6	23.3	18.6	22.1	35.5	36.3	18.7	22.0	19.9	99.1

Average 30.8

It may be seen that the average disturbance in the level of sales due to seasonal variations is much greater when we assume lack of mobility among the departments. In the index based upon such lack of mobility the average deviation is one and a half times as large as in the other index.