

CYCLICAL FLUCTUATIONS

CHAPTER I

CYCLICAL MOVEMENTS IN THE DOLLAR VOLUME OF SALES BY RETAILERS AND WHOLESALERS

(U. S., 1919-1925)

PERIODIC statistical data on retail and wholesale trade in the United States are collected by the Division of Analysis and Research of the Federal Reserve Board. The *Federal Reserve Bulletin* publishes over nine series on the dollar volume of sales, by as many groups of retailers, monthly, beginning with January, 1919, and over five series of similar data on sales by wholesalers. It is our task at present to survey these indices in order to learn whatever we can of the topic of our interest, the problem of cyclical fluctuations in the distributive trades.

With this specific problem in view one is likely to approach the survey of the data with the following questions: (1) Are there any cyclical fluctuations in the volume of business activity carried on by retailers and wholesalers? (2) If there are, how do these movements in retail sales compare with those in sales by wholesalers and in other branches of economic activity? In the comparison called for by the second question two points must be covered: (a) the comparison as to simultaneity, lag, or precedence; (b) the question of the comparative amplitude of the fluctuations.

The data at our disposal are index series representing the dollar volume of sales by months in a varying number of business enterprises. In their original form these monthly indices described not only the cyclical fluctuations, but also

the changes due to the long-time growth of the enterprises reporting, the variations due to the influence of seasons, and changes of a random character. It was advisable then to apply some method of statistical analysis to the series in order to separate them and adjust for fluctuations other than cyclical. Such an adjustment was particularly desirable in view of the fact that in the series under consideration the seasonal and the long-time elements were comparatively substantial.

Detailed explanation of methods of analysis used and of reasons for their choice is given in an appendix.¹ A brief mention will suffice here. The secular trend, i.e., the formula describing the long-time changes, was in all cases taken as a straight line, that is, as an equation of the first degree. It was fitted by the method of least squares, and eliminated through expressing every showing of the original index in terms of the corresponding showing of the secular trend, the latter being taken as one hundred. The index of seasonal variations for sales in retail trade was computed by the Division of Analysis and Research of the Federal Reserve Board by the method of link-relatives, and the series were corrected for the seasonal element by dividing the original data by the index. The index of seasonal variations in sales by wholesalers was determined by the method of ratio-ordinates.

These computations when completed were for series covering 67 months, the period from January, 1919, to July, 1924. In order to take account of the new data, a separate trend was computed for the 17 months, August, 1924, to December, 1925. (For details, see appendix to this chapter.) Thus the indices as given below allow of exact comparisons only within each of the two periods. In most cases, however, a rough comparison can be made through the whole period covered.

The series given below are supposed to represent only the

¹ See *infra*, pp. 79-86.

cyclical and the random fluctuations in the volume of sales by retailers and wholesalers. It is obvious, however, that with the short period of time covered by the data used one would be more than careless to assume that the series after the adjustment do not contain any elements of a seasonal or growth character. We must interpret the final showings cautiously and avoid making use of too nice distinctions, since the accuracy or rather inaccuracy of every individual item of the series does not warrant them. With this warning in mind let us survey the different indices.

Groceries

For this most important branch of retail trade the Federal Reserve Board collects and publishes data on the dollar volume of sales by months in 28 chain store systems, which operated about 17,000 single unit stores in 1923 and had total sales for this year to the extent of 637 millions of dollars.² By taking the average monthly sales for 1919 as 100, and adjusting the series as described above, we get the index on page 4.

It will be easier to study the index if its fluctuations are represented graphically. On the chart on the following page the same series is represented by the heavy black line.

It is interesting to compare these movements in retail sales of grocery products with the changes in the volume of sales by wholesale grocers. These are being given in index form by the Federal Reserve Board for 303 wholesale firms whose volume of sales in 1923 was about 560 millions of dollars.³ The series runs as follows (see page 5):

* The original data are from the revised index by the Federal Reserve Board, not published fully but available on request. Number of chain systems after July, 1924-27.

* The original index of this and all other following series of sales by wholesalers were taken from the following sources: Jan., 1919-June, 1922, *Federal Reserve Bulletin*; April, 1923. July, 1922-July, 1924, from the same source, as the series appeared with the final corrections.

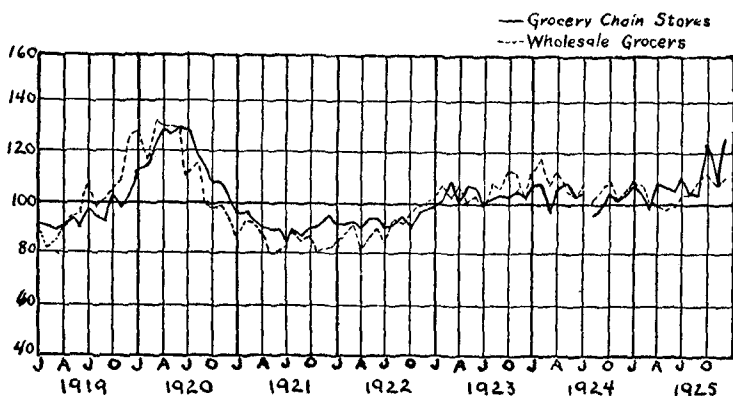
CYCLICAL FLUCTUATIONS

1. SALES IN 28 GROCERY CHAIN SYSTEMS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 92 | 112 | 96 | 92 | 99 | 106 | 107 |
| February | 91 | 114 | 96 | 92 | 102 | 108 | 104 |
| March | 90 | 118 | 92 | 93 | 110 | 96 | 99 |
| April | 91 | 129 | 89 | 91 | 100 | 105 | 107 |
| May | 95 | 128 | 89 | 93 | 108 | 109 | 106 |
| June | 90 | 130 | 89 | 94 | 106 | 103 | 105 |
| July | 97 | 129 | 83 | 90 | 100 | 104 | 110 |
| August | 94 | 117 | 89 | 92 | 101 | 95 | 104 |
| September | 93 | 115 | 87 | 94 | 102 | 99 | 104 |
| October | 102 | 109 | 89 | 90 | 102 | 104 | 123 |
| November | 99 | 107 | 90 | 97 | 105 | 101 | 107 |
| December | 103 | 102 | 95 | 98 | 101 | 105 | 125 |



1. Sales by Retail Grocery Chain Stores and by Grocery Wholesalers, Dollar Volume, 1919-1925.

Summarizing briefly the evidence of the data surveyed, we can say that:

(1) For the period covered there were definite cyclical fluctuations in the dollar volume of sales by both retailers and wholesalers in the grocery trade.

2. SALES BY WHOLESALE GROCERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 89 | 127 | 87 | 83 | 101 | 112 | 110 |
| February | 81 | 117 | 94 | 85 | 107 | 118 | 108 |
| March | 84 | 133 | 93 | 91 | 103 | 107 | 101 |
| April | 90 | 133 | 87 | 81 | 105 | 112 | 100 |
| May | 96 | 131 | 80 | 85 | 100 | 106 | 98 |
| June | 97 | 131 | 80 | 90 | 103 | 103 | 99 |
| July | 107 | 131 | 82 | 84 | 98 | 107 | 103 |
| August | 98 | 111 | 90 | 94 | 108 | 100 | 104 |
| September | 101 | 116 | 85 | 92 | 107 | 106 | 109 |
| October | 104 | 100 | 86 | 96 | 113 | 109 | 112 |
| November | 109 | 99 | 80 | 99 | 112 | 102 | 107 |
| December | 125 | 95 | 81 | 100 | 102 | 106 | 110 |

(2) There was a close correspondence between the movements of the two, in some of the cases perfect simultaneity, in some a lag of one month by the retail sales behind the wholesale.

(3) The fluctuations in wholesale sales were greater than in the retail. The standard deviations for the 84 months are 13.2 and 10.5 respectively (14.4 and 10.7 for the first 67 months).

Department Stores

According to the survey by the Comptrollers Congress of the National Retail Dry Goods Association of sales in 300 department stores for 1923, the sales of the apparel departments in 44 of the most representative stores formed about 70 per cent. of the total dollar volume of net sales, the remainder being divided among house furnishings, musical instruments, drugs and toilet articles, jewels and jewelry, groceries (a very insignificant percentage), and other articles.⁴

⁴ *National Retail Dry Goods Asso. Confidential Bulletin*, Dec., 1924, p. 25.

In the case of department stores we have a demand for goods entirely different from those of grocery chains. The latter sell food, the object of a regularly recurring daily demand which does not allow of substantial variations. But a department store is visited only from time to time by an act of deliberate "shopping," and sells goods whose purchase is made only several times during the year, the demand for which is variable. An article of apparel is uncertain in its wear, can be made to last longer or again may be discarded quickly for a new one.

How then did the sales in department stores move as compared to sales in groceries? The Federal Reserve Board publishes an index of the dollar volume of sales by months in 359 department stores located all over the country, having the total volume of sales for 1923 as of 1,487 millions of dollars.⁵ This series runs as follows:

3. SALES BY 359 DEPARTMENT STORES

(Dollar Volume)

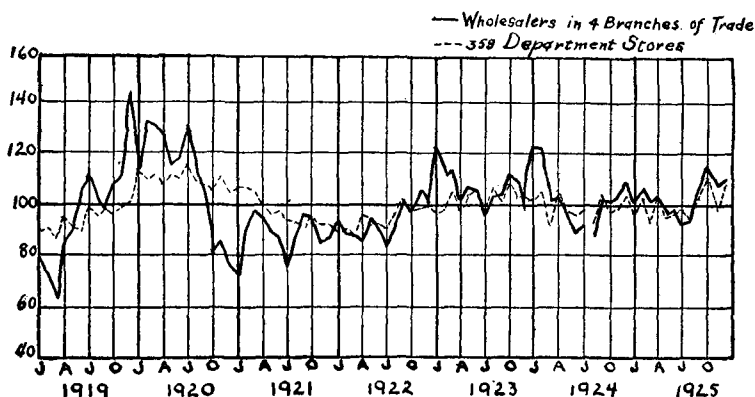
Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 90 | 114 | 106 | 90 | 98 | 102 | 97 |
| February | 91 | 110 | 106 | 91 | 98 | 104 | 102 |
| March | 87 | 112 | 104 | 88 | 104 | 93 | 94 |
| April | 95 | 109 | 100 | 96 | 98 | 105 | 103 |
| May | 91 | 112 | 97 | 96 | 103 | 99 | 96 |
| June | 90 | 111 | 98 | 94 | 105 | 97 | 97 |
| July | 99 | 116 | 96 | 92 | 99 | 98 | 99 |
| August | 96 | 110 | 95 | 97 | 106 | 94 | 96 |
| September | 99 | 109 | 92 | 102 | 102 | 104 | 103 |
| October | 97 | 105 | 96 | 98 | 107 | 98 | 111 |
| November | 100 | 111 | 94 | 99 | 103 | 99 | 99 |
| December | 101 | 104 | 94 | 100 | 103 | 103 | 107 |

On the chart on page 7, this index is represented by the solid black line.

⁵ The original index used is the latest revised by the Federal Reserve Board, not published fully anywhere, but available on request.

While these cyclical changes are fairly similar (r for 59 mos. + 838) there seems to be one significant difference between the movements of the sales in department stores and those in groceries. The fluctuations in these latter have been much greater than in the former, especially so during the years 1919-1920. The standard deviation of the department



2. Sales by 359 Department Stores and by Wholesalers in 4 Branches of Trade, Dollar Volume, 1919-1925

store sales index is 6.3 as compared to 10.6 for the grocery series.

A cause of this latter difference might be looked for in the different character of consumers' demand in these two branches of retail trade. The demand is probably more variable in the case of department stores, and when the prices go up a substantial decline in the physical volume of goods bought might result. Low prices would have an opposite effect. With this movement of prices and physical volume of sales in opposite directions, the dollar volume of sales during prosperity will not rise too high, or on the decline will not fall too low. In groceries on the other hand the rise of prices does not serve to check so much the physical volume of goods bought, nor does a decline of prices make

for a greatly increased purchasing, and thus there is no check upon the rise and decline in the dollar volume of sales. How true this explanation is could be ascertained later in the study of fluctuations in the physical volume of sales.⁶

It is interesting to compare the movement of sales in department stores with the movements in the volume of sales by wholesalers. For the purpose of this comparison we combined the series of sales by dry goods, drugs, hardware and shoe wholesalers, giving each of them a weight corresponding to the percentage of net sales which the respective product assumes in the department store sales totals.⁷ The weights used were: dry goods, 82; hardware, 7; shoes, 7; drugs, 4. The index thus computed follows:

4. SALES BY WHOLESALERS IN 4 BRANCHES OF TRADE

(Dollar Volume)

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 79 | 158 | 73 | 93 | 122 | 122 | 101 |
| February | 71 | 134 | 89 | 90 | 113 | 121 | 106 |
| March | 63 | 130 | 98 | 89 | 114 | 101 | 101 |
| April | 84 | 126 | 96 | 86 | 103 | 103 | 102 |
| May | 91 | 115 | 90 | 95 | 106 | 96 | 97 |
| June | 104 | 118 | 88 | 90 | 106 | 89 | 98 |
| July | 114 | 131 | 76 | 84 | 97 | 91 | 93 |
| August | 103 | 113 | 86 | 93 | 103 | 88 | 94 |
| September | 98 | 101 | 96 | 101 | 103 | 102 | 103 |
| October | 109 | 80 | 95 | 97 | 113 | 101 | 116 |
| November | 112 | 84 | 84 | 105 | 110 | 103 | 109 |
| December | 144 | 77 | 87 | 100 | 99 | 110 | 109 |

This index is a combination of four indices, each one of them already adjusted for the secular trend and the seasonal element.

Here again we see that:

(1) The movements in the index of sales by wholesalers either precede or are simultaneous with the movements in the sales by retailers. The former is conspicuously the case in the decline of 1920 and the recovery of 1921.

⁶ See *infra*, Chapter 2.

⁷ Data from the same survey by the National Retail Dry Goods Association. See note 5.

(2) The index of sales by wholesalers is subject to greater fluctuations than the index of sales of retailers. In the second half of 1919 and the first of 1920 the former rises far above the latter, and then declines far below it. The standard deviation of the series of wholesale sales in this case is 15.8 as compared to 6.3 for that of the retail sales index (17.3 and 6.7 for the first 67 months).

Dry Goods

Sales by dry goods chain stores are being published for four chain systems having 576 single stores (June, 1924). The distinctive characteristics of the kind of goods sold in these stores is the listing of most of them at fairly low prices. It includes little of the higher priced ready-made goods or materials sold in department stores or shops of a more exclusive character.

The series of sales runs as follows:

5. SALES IN DRY GOODS CHAIN STORES

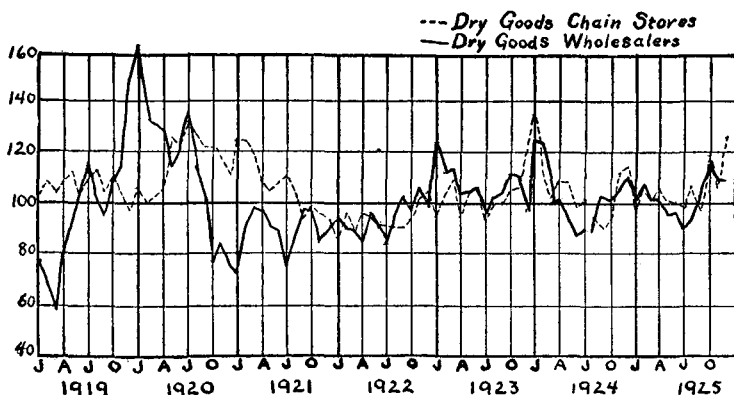
(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 103 | 105 | 123 | 86 | 95 | 135 | 98 |
| February | 108 | 100 | 123 | 97 | 102 | 114 | 105 |
| March | 103 | 102 | 119 | 89 | 109 | 102 | 101 |
| April | 107 | 104 | 108 | 97 | 95 | 109 | 106 |
| May | 112 | 125 | 104 | 95 | 104 | 109 | 101 |
| June | 103 | 122 | 107 | 92 | 105 | 99 | 100 |
| July | 106 | 132 | 111 | 91 | 94 | 101 | 99 |
| August | 113 | 126 | 104 | 90 | 100 | 96 | 106 |
| September | 103 | 121 | 93 | 90 | 100 | 90 | 97 |
| October | 108 | 121 | 99 | 94 | 105 | 95 | 119 |
| November | 104 | 118 | 96 | 101 | 107 | 112 | 106 |
| December | 97 | 112 | 94 | 105 | 120 | 114 | 125 |

The month-to-month breaks and changes in retail sales appear so haphazard that an observer might suspect them to be a result of statistical manipulations of the original data,

rather than a reflection of the real situation. But one is led to have more confidence in the data when it is seen that most



3. Sales by Dry Goods Chain Stores and by Dry Goods Wholesalers, Dollar Volume, 1919-1925

6. SALES BY DRY GOODS WHOLESALERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variation

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 77 | 163 | 72 | 96 | 123 | 124 | 101 |
| February | 67 | 134 | 90 | 92 | 114 | 123 | 107 |
| March | 59 | 131 | 99 | 90 | 115 | 100 | 102 |
| April | 80 | 128 | 98 | 86 | 103 | 101 | 101 |
| May | 90 | 115 | 91 | 96 | 104 | 94 | 97 |
| June | 105 | 120 | 89 | 90 | 105 | 87 | 97 |
| July | 114 | 135 | 76 | 83 | 95 | 89 | 91 |
| August | 102 | 114 | 86 | 94 | 102 | 88 | 93 |
| September | 95 | 100 | 98 | 102 | 103 | 103 | 102 |
| October | 108 | 77 | 97 | 98 | 113 | 101 | 117 |
| November | 114 | 83 | 83 | 106 | 110 | 104 | 109 |
| December | 149 | 76 | 88 | 99 | 97 | 110 | 107 |

of the ups and downs shown are repeated in a series of sales by wholesalers, a series collected independently and analyzed statistically without any bias as to a future comparison. The

reference here is made to the index of sales by 101 dry goods wholesale firms, which had total sales in 1923 of 287 millions of dollars. This series is shown in Table 6.

Here again as in the comparisons made heretofore the wholesale index either preceded the retail by a varying amount of time, or at most was simultaneous with it.

Another observation is true in the case of dry goods. The index of sales by wholesalers was again subject to greater fluctuations than the index of retail sales. This observation seems especially applicable to the first two years and a half, i.e., to the first post-war business cycle. The standard deviation for the retail series is 11.5 as compared to 16.5 for the index of sales by wholesalers (12.2 and 18.5 for the first 67 months).

Shoes

The case of shoes is peculiar in that the stores which sell shoes confine themselves almost exclusively to this single commodity and its auxiliaries. In the cases before surveyed we had stores selling a great variety of products. Aside from this peculiarity of concentration there is no reason to expect a different picture for the case of shoes, since the demand for the commodity seems to be of the same nature as that for other articles of apparel.

The series published by the Federal Reserve Board describes the dollar volume of sales in 6 chain systems which had 365 single stores in operation in January, 1924, and total sales for 1923 to the amount of 35 millions of dollars.⁸ When corrected in the usual way the index presents the picture as shown on page 12.

It should be noted that large changes of a seasonal char-

⁸ This and all the following indices of retail sales were taken in their original form (corrected for seasonal variations only) from the following sources: Jan., 1919-Dec., 1922, *Federal Reserve Bulletin*, Jan., 1921, p. 20; Jan., 1923-Dec., 1923, *Federal Reserve Bulletin*, July, 1923, p. 580; Jan., 1924-July, 1924, *Federal Reserve Bulletin*, Dec., 1924, p. 956; Aug., 1924-Dec., 1925, *Federal Reserve Bulletin*, February, 1926, p. 114.

7. SALES IN SHOE CHAIN STORES

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 89 | 112 | 105 | 94 | 93 | 104 | 108 |
| February | 86 | 104 | 108 | 101 | 88 | 105 | 112 |
| March | 77 | 116 | 125 | 88 | 119 | 93 | 95 |
| April | 87 | 102 | 99 | 106 | 88 | 121 | 113 |
| May | 86 | 112 | 100 | 90 | 101 | 102 | 96 |
| June | 84 | 108 | 102 | 95 | 110 | 104 | 105 |
| July | 88 | 116 | 87 | 92 | 91 | 96 | 99 |
| August | 121 | 107 | 90 | 90 | 98 | 105 | 113 |
| September | 108 | 106 | 91 | 105 | 107 | 98 | 99 |
| October | 103 | 112 | 98 | 89 | 99 | 93 | 106 |
| November | 107 | 108 | 90 | 92 | 97 | 101 | 92 |
| December | 97 | 103 | 95 | 104 | 104 | 107 | 104 |

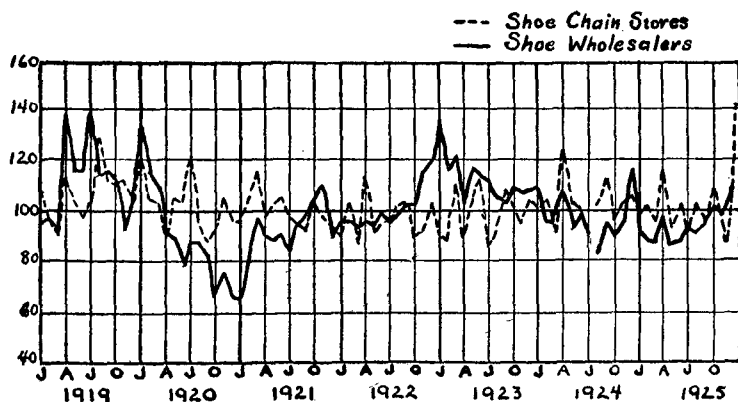
acter are still contained in the data. This is due to the fact that Easter Sunday shifts from March to April and therefore its influence is not eliminated by the fixed index of seasonal variations. Hence whenever Easter falls in March, the index showing for March is excessively high with the showing for April correspondingly low. For the years covered by the series Easter Sunday distributed itself between the two months as follows:

| | | |
|------------|-------|----|
| 1919 | April | 20 |
| 1920 | April | 4 |
| 1921 | March | 27 |
| 1922 | April | 16 |
| 1923 | April | 1 |
| 1924 | April | 20 |
| 1925 | April | 12 |

With the aid of this small table, one looking at the chart (on page 13) can locate easily the ups and downs due to this accidental factor in the smooth run of the index.

We are able to compare the movement in the retail sales of shoes with the movements in the wholesale sales of the same commodity. Data on these latter are given by the

Federal Reserve Board in an index covering sales by 58 wholesale firms located in six Federal Reserve Districts and



4. Sales by Shoe Chain Stores and by Shoe Wholesalers, Dollar Volume, 1919-1925

having sales for 1923 to the amount of 107 million dollars. The series runs as follows:

8. SALES BY SHOE WHOLESALERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 71 | 143 | 64 | 80 | 126 | 116 | 99 |
| February | 77 | 147 | 80 | 88 | 117 | 110 | 100 |
| March | 70 | 134 | 97 | 83 | 119 | 103 | 96 |
| April | 108 | 117 | 87 | 83 | 102 | 122 | 109 |
| May | 95 | 115 | 82 | 85 | 120 | 107 | 99 |
| June | 107 | 94 | 84 | 90 | 118 | 104 | 102 |
| July | 133 | 99 | 73 | 83 | 109 | 100 | 101 |
| August | 125 | 99 | 84 | 88 | 109 | 82 | 105 |
| September | 135 | 89 | 89 | 93 | 106 | 94 | 110 |
| October | 129 | 73 | 90 | 94 | 114 | 92 | 116 |
| November | 106 | 75 | 97 | 107 | 114 | 101 | 115 |
| December | 121 | 66 | 77 | 112 | 114 | 123 | 128 |

The observation made in other cases also holds true here. In its peaks, troughs and the general movements the index of volume of wholesale sales tended to precede the index of sales by retailers. But it must be noticed that while the sales by wholesalers reflect the cycles clearly, the retail sales do not show any definite cyclical fluctuations after 1921.

The standard deviation for the series of wholesale sales is 18.1, while that for the retail series is 9.6 (19.4 and 10.1 for the first 67 months). An inspection of the chart shows that on the rise the dash line rose above the heavy one, and the decline fell below it. Thus again the cyclical fluctuations in sales by wholesalers were more marked than those in the retail sales. The difference was greater for the years 1919-1921 than for the subsequent two and a half years.

Drugs

The drug chains are really a type of department store. A modern drug store sells not only drugs, patent medicines, and all kinds of instruments for medicinal use, but also candies, stationery, toilet articles, cigarettes, soda-fountain goods, and sometimes lunch-counter products. The demand for all these commodities is somewhat different in nature from the demand for food and apparel. It is either an emergency demand, as in case of the drugs and medical articles, or a demand for goods which, although not strictly necessary, form a permanent part of the consumer's fixed habits of life. In both cases the demand is not very variable. A man could hardly be prevented from buying the necessary medicine because of a rise in price. Nor could one expect customers to be responsive in the physical volume of their demand for sodas, tooth paste, shaving cream, or face powder to a change in price, since each of the many articles is of small money value but of great importance in the daily routine.

This fixed character of demand should not be understood

to mean that cut prices have no appeal to the patrons of drug stores. They may be effective in causing the consumer to prefer one particular store to another, but only in a few cases will it make him buy an additional number of units. True, drug stores carry quite a number of articles of luxury, as expensive perfumes and the like, but the bulk of the goods is either of the emergency or of the fixed, ordinary convenience type, the demand for which does not vary to any considerable extent.

The Federal Reserve Board publishes an index of the dollar volume of sales in 10 drug store systems, which operated 520 stores in January, 1924, and had total sales in 1923 to the amount of 6.8 million dollars. The series runs as follows:

9. SALES BY DRUG CHAIN STORES

(Dollar Volume)

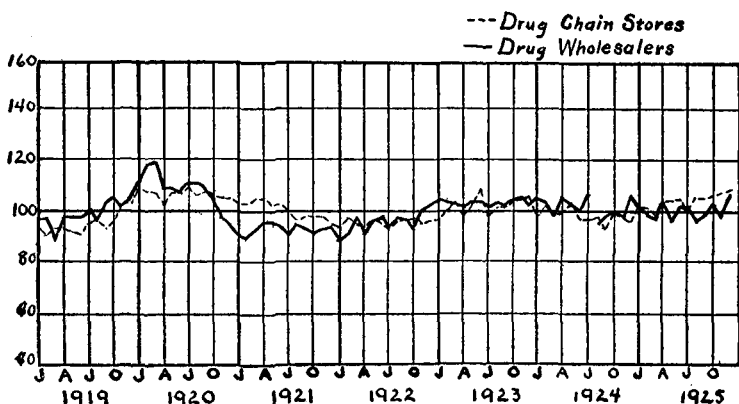
Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 95 | 109 | 103 | 94 | 97 | 99 | 102 |
| February | 91 | 108 | 103 | 98 | 100 | 101 | 101 |
| March | 95 | 107 | 105 | 96 | 103 | 99 | 99 |
| April | 95 | 102 | 105 | 95 | 99 | 100 | 102 |
| May | 93 | 107 | 102 | 97 | 102 | 102 | 103 |
| June | 92 | 107 | 102 | 96 | 107 | 97 | 104 |
| July | 96 | 109 | 100 | 94 | 98 | 97 | 100 |
| August | 97 | 106 | 97 | 96 | 101 | 98 | 104 |
| September | 94 | 107 | 98 | 97 | 101 | 95 | 104 |
| October | 96 | 106 | 98 | 97 | 103 | 100 | 105 |
| November | 103 | 105 | 98 | 96 | 103 | 98 | 106 |
| December | 103 | 105 | 95 | 97 | 104 | 97 | 108 |

This table is illustrated by the chart on the following page.

The chart reveals the fact that cyclical fluctuations are present in the series only in a very attenuated form. The standard deviation for the drug chain sales is 4.4, the smallest we have yet encountered. The cause of this evenness of movements may lie, first, in the fixed character of demand, i.e., in the evenness of the physical volume of goods

demand; secondly, in the comparative stability of the prices of articles sold in drug stores. The widely advertised patented medicines and toilet articles, and the soda-fountain goods are being sold at approximately the same prices in times of prosperity and depression. At any rate we do not find the same variability of prices as in cases of groceries and apparel. This circumstance, combined with a stable physical volume of de-



5. Sales by Drug Chain Stores and by Drug Wholesalers, Dollar Volume, 1919-1925

mand, accounts for an even run of the dollar volume of sales.

The movements of sales by retail drug stores are now compared with those of sales by drug wholesalers. The index of these latter, given also by the Federal Reserve Board, covers 58 wholesale firms located in seven Federal Reserve Districts and having total sales for 1923 to the amount of 105 million dollars. In the table on page 17 we quote the index.

In the comparison of the retail and wholesale sales series we find again substantiated the observations made in the preceding cases. The movements of the wholesale series developed before those of the retail sales index. Although it is hard to establish the case here by comparing peaks and troughs, a glance at the chart will reveal that the rise in

10. SALES BY DRUG WHOLESALERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 97 | 112 | 90 | 88 | 105 | 106 | 102 |
| February | 97 | 118 | 89 | 92 | 103 | 104 | 99 |
| March | 88 | 118 | 93 | 98 | 103 | 99 | 97 |
| April | 97 | 108 | 96 | 91 | 101 | 107 | 103 |
| May | 98 | 108 | 94 | 96 | 104 | 105 | 96 |
| June | 97 | 106 | 94 | 98 | 104 | 100 | 101 |
| July | 100 | 110 | 91 | 93 | 102 | 106 | 101 |
| August | 96 | 110 | 96 | 97 | 103 | 95 | 94 |
| September | 103 | 107 | 94 | 94 | 102 | 99 | 99 |
| October | 107 | 105 | 90 | 92 | 105 | 100 | 103 |
| November | 101 | 98 | 92 | 100 | 106 | 99 | 98 |
| December | 106 | 96 | 93 | 103 | 101 | 107 | 106 |

1919-20 began in the wholesale sales series much earlier than in the retail; that the former started to decline in 1920 before the latter. Similarly, the revival first took place in the series of sales by wholesalers. The sequence in the rise of 1923 is not clear, the sales by wholesalers not showing any definite peak.

The greater susceptibility of the wholesale sales index to cyclical fluctuations is also observable in the present case. The standard deviation of the wholesale series is 6.2 as compared to 4.4 for the retail sales (6.7 and 4.5 for the first 67 months). And again this difference in the amplitude of fluctuations is true more for the first post-war cycle than for the years 1922-25 following.

Candy

The consumers' demand satisfied by candy stores goods may be supposed to be partly similar to that in the drug stores, if for the only reason that both kinds of stores are selling candies and operating soda fountains. What is the

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exact nature of the demand for these latter commodities is a matter of conjecture. As to the soda-fountain goods, we can reasonably guess that the physical volume of demand for them does not vary much with a change in price or in "times," the money value of the goods being a standard fixed amount and rather small per unit. The demand for these goods is influenced by the weather, and seasonable conditions being favorable, their utility becomes large as compared to their money value. The case of candies is somewhat different, these being more of a luxury and not directly dependent upon the weather. It may be supposed that the physical volume of demand for candies does vary within certain narrow limits in connection with the change from "good" to "bad" times or with the price.

The statistical data consist of an index covering sales in four candy chain systems, which operated 114 stores in January, 1924, and had total sales in 1923 of about 20 million dollars. This index runs as follows:

11. SALES IN CANDY CHAIN STORES

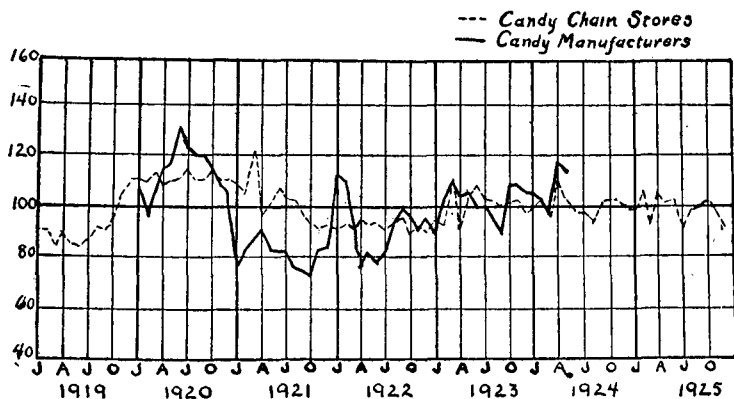
(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 91 | 111 | 109 | 92 | 95 | 100 | 99 |
| February | 91 | 110 | 104 | 94 | 94 | 102 | 106 |
| March | 83 | 114 | 121 | 92 | 110 | 96 | 94 |
| April | 90 | 108 | 97 | 96 | 93 | 111 | 106 |
| May | 85 | 110 | 101 | 95 | 103 | 104 | 101 |
| June | 83 | 111 | 107 | 95 | 109 | 99 | 102 |
| July | 86 | 115 | 103 | 91 | 103 | 98 | 91 |
| August | 92 | 111 | 102 | 94 | 102 | 95 | 99 |
| September | 91 | 111 | 97 | 96 | 100 | 101 | 100 |
| October | 96 | 114 | 94 | 90 | 101 | 102 | 101 |
| November | 104 | 110 | 92 | 93 | 102 | 102 | 99 |
| December | 111 | 110 | 93 | 90 | 98 | 100 | 91 |

The chart on page 19 illustrates this table:

The chart shows here again some conspicuous cases of accidental fluctuations caused by the shifting of Easter Sunday from March to April. Thus the jump in the retail sales in March, 1921, and probably in March, 1923, is a result of the holiday falling in these years on March 27th and April 1st, respectively.



6. Sales by Candy Chain Stores and by Candy Manufacturers, Dollar Volume, 1919-1925

The nature of the demand satisfied by candy stores makes for close correspondence between the movements of candy and drug store sales. It is not surprising that the coefficient of correlation between the two series is very high, $+ .908$. But in the sales of candy stores we do not observe any definite cycle fluctuations after 1921. This is already the second series of retail sales for which we notice this absence of marked cyclical changes.

The standard deviation for the series is 7.9 (8.6 for the first 67 months), indicating an amplitude of fluctuations greater than in the case of the drug chains and department stores but smaller than that in groceries, dry goods, and shoes.

We do not possess any data on sales by candy wholesalers,

but the *Survey of Current Business* publishes an index of sales by candy manufacturers based on the reports of these latter in the payment of a sales tax to the Bureau of Internal Revenue. This index runs by months for the period January, 1920-May, 1924. Manufacturing confectioners sell to both wholesalers and retailers. Estimates as to the proportions of the direct and indirect sales vary.⁹ In the case of candy chain stores we can reasonably suppose that the proportion of goods bought directly from manufacturers is higher than the average in the trade. There are then grounds to compare the retail sales series with this index of sales by candy manufacturers. This latter is presented in the following table:

12. SALES BY CANDY MANUFACTURERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1920 | 1921 | 1922 | 1923 | 1924 |
|-----------------|------|------|------|------|------|
| January | 109 | 77 | 113 | 90 | 104 |
| February | 96 | 81 | 110 | 101 | 102 |
| March | 108 | 86 | 84 | 111 | 97 |
| April | 115 | 93 | 75 | 104 | 118 |
| May | 116 | 82 | 81 | 106 | 115 |
| June | 131 | 81 | 76 | 100 | |
| July | 123 | 81 | 81 | 100 | |
| August | 120 | 76 | 93 | 95 | |
| September | 120 | 74 | 100 | 89 | |
| October | 115 | 73 | 95 | 107 | |
| November | 109 | 83 | 90 | 108 | |
| December | 104 | 84 | 96 | 105 | |

no data
available

On the whole there is a good correspondence between the two series (see chart above), with one conspicuous exception, that of the rise in manufacturers' sales in January-February, 1922. The cause of this rise lies probably in the tax reduction which became effective January 1, 1922, the rate having been reduced from 5 to 3 per cent. of the sales value. Either the manufacturers withheld impending sales at the end of 1921 and deferred them to the first months of the next year or

⁹ See *Federal Reserve Bulletin*, December, 1919, p. 1133.

it was due to the desire of the buyers to enjoy the benefit of lower taxes, i.e., of lower prices. This might account for the swelling sales during the first two months of 1922.

The index of sales by candy manufacturers moved either simultaneously with the retail sales or preceded the latter in its movements. Thus the peak of the manufacturers' sales was in June, 1920, a month earlier than in the retail series. Likewise the trough in the wholesale series occurred in October, 1921, in the retail in November.

The chart substantiates also a second general observation, that the sales by manufacturers were subject to greater fluctuations than the sales by retailers. The standard deviation for the 53 months for which comparison of the series is possible is 14.7 for the sales by manufacturers, and 8.0 for the retail sales, a very substantial difference in the variability. And again here as in nearly all other cases, the difference was much more apparent for the years 1919-21 than for the years following.

Tobacco and Cigars

Tobacco and cigar chain stores appear to belong to the same group as the drug and candy stores, the group that sells for the most part convenience goods which are a matter of fixed habit but which allow for fluctuations of demand within narrow limits. The index quoted on page 22 covers the sales by three chain systems which operated 2,770 single stores in January, 1924, and had total sales for 1923 to the amount of 96 million dollars.

The movements in the sales by cigar chain stores seem to be very similar to those in sales by drug chains. It is interesting that for the five years 1919-23 the highest r of the index is with drug sales .795 and candy sales .790. Like the latter series, the tobacco and cigar chain sales do not exhibit any definite cyclical fluctuations after 1921.

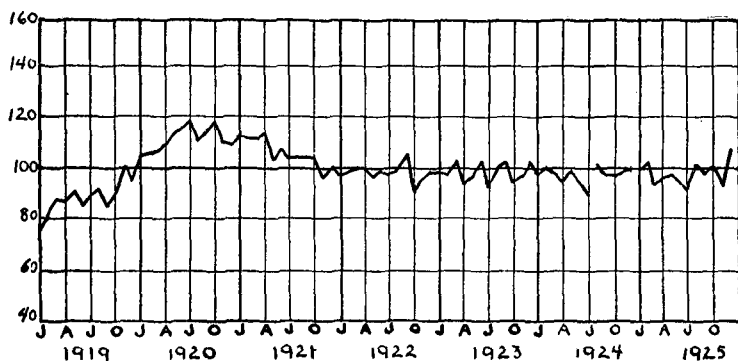
13. SALES BY TOBACCO AND CIGAR CHAIN STORES

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 77 | 105 | 112 | 98 | 99 | 98 | 100 |
| February | 81 | 106 | 111 | 99 | 97 | 100 | 101 |
| March | 87 | 107 | 111 | 100 | 103 | 99 | 95 |
| April | 86 | 109 | 113 | 100 | 96 | 96 | 97 |
| May | 90 | 113 | 103 | 98 | 98 | 99 | 98 |
| June | 85 | 115 | 107 | 99 | 102 | 94 | 96 |
| July | 87 | 117 | 104 | 98 | 94 | 90 | 95 |
| August | 91 | 111 | 104 | 99 | 100 | 101 | 101 |
| September | 85 | 115 | 103 | 104 | 101 | 98 | 98 |
| October | 90 | 118 | 103 | 90 | 95 | 97 | 100 |
| November | 100 | 110 | 97 | 95 | 97 | 99 | 95 |
| December | 95 | 109 | 100 | 99 | 102 | 100 | 108 |

The index is represented by the heavy black line in the chart below:



7. Sales by Tobacco Chain Stores, Dollar Volume, 1919-1925

The standard deviation of the series is 7.9 (8.6 for the period January, 1919-July, 1925), i.e., exactly the same as that of the candy sales.

5 and 10¢ Chains

The 5 and 10¢ stores are department stores within certain price limits. They sell the same innumerable array of candy, stationery, toilet articles, household utensils, notions, small dry goods, gimcracks, toys, etc., in short everything (except groceries) which can be sold with profit within the fixed price limits. The exclusion of groceries and food articles, in general, is characteristic of 5 and 10¢ stores. A variety store does not purport to supply the regular everyday needs of the consumers. It sells articles which strictly speaking can be dispensed with, but which are convenient and yield comfort at a low price. You could not call those articles luxuries, but the toys, candies, perfumes, the Christmas and Easter goods are of this category in spite of their inexpensiveness. The bulk of goods in the variety stores are not bought in the spirit of shopping for something absolutely essential. There are no data on the average size of a single purchase in a variety store, but it may be guessed to be much over a price of a single article. The patron comes to the store in most of the cases with the vague intention of picking out a "bargain," and even when he has a definite article in mind, he finally buys many more because of their utility and the appeal of a low price. It seems to be a peculiar kind of demand, partly fixed because of the small size of every particular price, partly variable because it is a demand for trifling semi-luxuries.

It would be reasonable to suppose that the prices in the 5 and 10¢ stores are more or less stable. Possibly in time of a general rise of prices some of the articles are transferred from one price division into another, or others may be withdrawn from sales altogether. There are, however, considerable technical difficulties in doing so, and this shifting would not make possible a pricing as elastic as in the case of department stores or groceries, where there are no cus-

tomary price units of 5 cents and no maximum price limits. We ought to expect then that the fluctuations in the dollar volume of sales by the variety stores would be smaller than in other cases, since the element of price fluctuations is absent to a large extent.

The index published by the Federal Reserve Board shows the movements in the dollar volume of sales by 5 chains, which operated 1,893 single stores in January, 1924, and had sales for 1923 amounting to 338 million dollars. The adjusted series runs as follows:

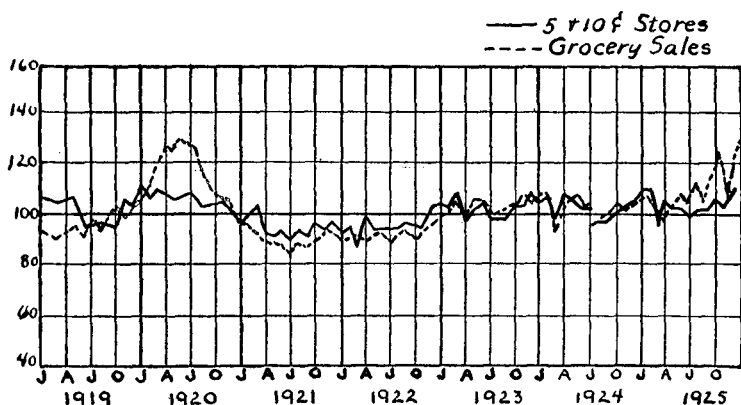
14. SALES BY 5 & 10¢ CHAIN STORES

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 105 | 113 | 97 | 94 | 103 | 102 | 108 |
| February | 103 | 104 | 100 | 96 | 101 | 105 | 108 |
| March | 102 | 109 | 103 | 88 | 108 | 99 | 95 |
| April | 103 | 107 | 93 | 100 | 97 | 110 | 106 |
| May | 104 | 106 | 91 | 94 | 102 | 105 | 102 |
| June | 96 | 106 | 92 | 94 | 105 | 101 | 102 |
| July | 97 | 108 | 90 | 94 | 98 | 101 | 100 |
| August | 99 | 102 | 92 | 93 | 99 | 98 | 101 |
| September | 98 | 103 | 91 | 97 | 99 | 98 | 101 |
| October | 98 | 103 | 98 | 96 | 101 | 100 | 107 |
| November | 106 | 103 | 95 | 96 | 101 | 101 | 102 |
| December | 103 | 100 | 97 | 101 | 107 | 104 | 111 |

In the chart on the following page the index described is compared to the series of grocery sales, as the one to which it most closely corresponds. In the movements, the sales by 5 and 10¢ stores show the closest correspondence to the sales by grocery chain stores (r for 1919-1923 + .703). But the former does not show cyclical fluctuations of the same marked type as the latter. The standard deviation for the series is 5.1 (5.2 for the first 67 months), the next smallest to that of the drug sales index, and considerably smaller than those of the other retail sales indices.



8. Sales by 5 and 10¢ Chain Stores, Dollar Volume, 1919-1925

Musical Instruments

The music chain stores present a new kind of consumers' demand. There are no data on the importance of the different musical instruments in the total sales of music stores, but it would be a reasonable guess to say that the talking machines during 1919-21 and of late the radio sets formed the bulk of the sales. Demand for these goods is in most cases like a demand for a furniture article of a quality above the average, a display luxury, an appurtenance and sign of a certain standard of living. True, the music chains have a good percentage of demand for the sake of the article itself, but it is hardly responsible for the bulk of the sales. Hence we can expect that in time of prosperity the music chains will enjoy a heavy volume of demand, which in depression will fall off appreciably.

The index published by the Federal Reserve Board shows movements in sales by four music chain store systems, which operated 59 single stores in January, 1924, with sales for

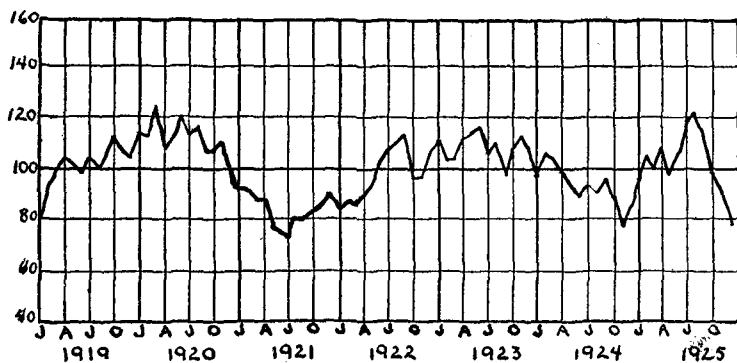
1923 amounting to 12 million dollars. The corrected series run as follows:

15. SALES BY MUSIC CHAINS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 80 | 114 | 93 | 84 | 112 | 97 | 97 |
| February | 94 | 113 | 92 | 86 | 103 | 106 | 104 |
| March | 99 | 123 | 87 | 85 | 103 | 104 | 100 |
| April | 103 | 107 | 87 | 90 | 112 | 99 | 108 |
| May | 101 | 112 | 78 | 95 | 115 | 94 | 99 |
| June | 99 | 120 | 75 | 101 | 117 | 89 | 107 |
| July | 103 | 114 | 73 | 108 | 106 | 92 | 119 |
| August | 100 | 116 | 80 | 110 | 110 | 90 | 121 |
| September | 105 | 106 | 80 | 112 | 98 | 97 | 115 |
| October | 113 | 106 | 82 | 97 | 108 | 89 | 99 |
| November | 106 | 108 | 86 | 97 | 114 | 78 | 93 |
| December | 104 | 95 | 90 | 105 | 108 | 85 | 88 |



9. Sales by Music Chain Stores, Dollar Volume, 1919-1925

Most conspicuous in the movements of these music chain stores sales is the clear cut, well-defined character of the cyclical fluctuations. Both the first and the second post-war cycles can be clearly traced.

The movement of this series does not show any particularly high correlation with any series considered heretofore. The

correlation coefficients of the series are with grocery sales—.682; department stores—.611; and the 5 and 10¢ stores—.588. The correlation with department stores and the variety chains is not surprising, both selling goods somewhat similar in nature. But the correlation with grocery stores is puzzling. It results from the fact that both indices have similar periods of rise and fall. The similarity may have been produced by various causes. In one case (groceries) we might have had a steady volume of demand (in physical units) and a highly fluctuating price level, while in another (music chain) the price may have been much more stable but the physical volume of demand more variable. This, however, is a matter of pure conjecture.

The standard deviation for the series described is 11.8, (11.7 for the first 67 months) greater than for any other reviewed so far.

Mail-Order Houses

The movement of sales by mail-order houses is a matter of great interest because the bulk of these sales represent purchases by farmers and inhabitants of small villages. The mail-order houses sell pretty nearly everything except fresh food and coal. Articles of apparel, furniture, house-furnishings, toys, hardware, painting materials, etc., are among their innumerable goods.

The index published by the Federal Reserve Board covers sales by four mail-order houses, namely—Sears, Roebuck & Co., Montgomery, Ward & Co., National Cloak and Suit Co., and Larkin & Co., the four having had total sales for 1923 to the amount of 433 million dollars. The series runs as shown on page 28.

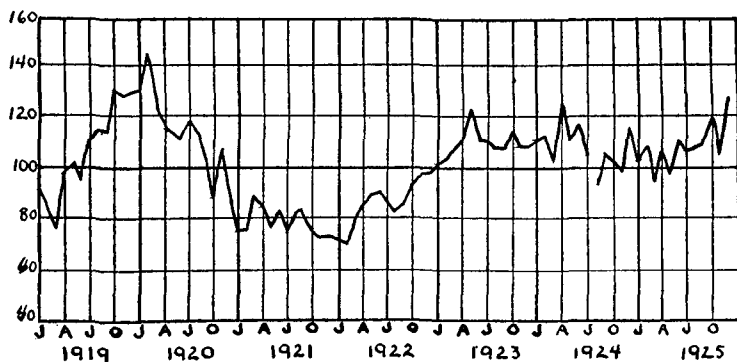
Here again, as in the case of the music chains only in a still stronger form, the sales showed very marked cyclical fluctuations.

16. SALES BY MAIL-ORDER HOUSES

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 93 | 130 | 76 | 72 | 101 | 112 | 103 |
| February | 85 | 144 | 77 | 71 | 102 | 113 | 108 |
| March | 77 | 122 | 89 | 79 | 108 | 102 | 96 |
| April | 97 | 115 | 84 | 85 | 111 | 124 | 106 |
| May | 101 | 113 | 76 | 89 | 122 | 112 | 98 |
| June | 95 | 112 | 81 | 90 | 112 | 117 | 111 |
| July | 110 | 118 | 73 | 87 | 111 | 104 | 107 |
| August | 115 | 114 | 81 | 83 | 108 | 93 | 108 |
| September | 114 | 102 | 82 | 86 | 108 | 106 | 110 |
| October | 130 | 88 | 75 | 94 | 116 | 103 | 119 |
| November | 127 | 108 | 72 | 97 | 109 | 99 | 105 |
| December | 129 | 87 | 72 | 98 | 109 | 115 | 126 |



10. Sales by Mail-Order Stores, Dollar Volume, 1919-1925

It is interesting to note that the series of sales by mail-order houses has its highest coefficient of correlation with music chain sales (+.779), its next highest with the sales by groceries (+.618). Concerning the former correlation could we say that the demand by farmers, patrons of mail-order houses, is of the same kind as the demand by the customers of the music stores? That both make the purchases only when they are well off and the times prosperous, so that a consider-

able sum can be spent on things which might be dispensed with if the times were worse? That in bad times the sales by both mail-order houses and music stores will be slack because in both cases the consumers will cut down on new purchases of these durable, expensive semi-luxuries? I wonder. Or, perhaps, as Dr. W. C. Mitchell commented, the close correspondence for this period was fortuitous. Extremely bad times may have forced the farmer during these years to act in his ordinary purchasing as the bulk of the population acted in buying semi-luxuries.

As to the correlation with grocery sales the following suggestion can be offered. The dollar volume of sales in groceries rises largely because of the rise in the prices of food products. A consistent rise in the prices of food products either precedes or follows a rise in the prices of farm products, since these latter are the raw materials for the food products. But high prices for farm products mean prosperity for the farmers and heavier purchases from the mail-order houses. Thus, through this roundabout connection, the movements in the dollar volume of sales in groceries run together with the movements in the volume of sales by the mail-order houses.

The standard deviation for the series in question is 16.4 (17.6 for the first 67 months) which shows it to be the retail sales series most susceptible to large fluctuations. One should also note that these fluctuations were more clearly marked in the years 1919-21 than later on.

Let us now summarize the results of our survey in the following order of topics:

(1) The direction of the movements in retail sales; (2) the comparison between one retail trade branch and another in point of (a) similarity or difference in periods of rise and decline, (b) amplitude of fluctuations. Then going over to the corresponding wholesale series (3) the run of the movements in sales by wholesalers; (4) the comparison with the

respective retail series in point of (a) similarity in the periods of rise and decline in both with an emphasis on the question of lag or precedence, (b) amplitude of fluctuations.

For the purpose of determining the run of cyclical fluctuations in the retail trade as a whole, the best method would be to compile a general index from the separate ones. But there are great difficulties in the way. First of all, there are no proper weights which can be used in weighing the separate indices. The one possible way is to weigh by the number of retail dealers in the separate branches of trade as reported by the Census of Occupations of 1920. But this would not give the proper weights for the mail-order houses, department stores, and 5 and 10¢ stores. Also, the number of retail dealers cannot be said to be equal to the number of stores, even if managers are included. Moreover, even the number of unit stores in the branch of trade would not be the proper weight, since in different branches, stores have a different average volume of sales. The total annual sales of a grocery store are, on the average, different from the annual sales of a candy or shoe store. In short, an index if compiled with these weights, and these seem to be alone available, would be of such dubious value that one would have to refer back continually to the separate series, and only confusion would arise.

Instead of that an attempt might be made to summarize the results in tabloid form so that the identity of each separate index is not lost, but at the same time the individual indices are placed together in a form that facilitates the comparison. Let us first tabulate the conspicuous high and low points of the series, noting their dates (see page 31).

With this table before us, we can give some uniform description of the movements in the retail trade as a whole.

As the table and charts indicate, in only three cases out of ten did the rise of sales begin immediately in January, 1919.

CYCLICAL FLUCTUATIONS

31

| | <i>Trough, 1919</i>March, June | <i>Peak, 1920</i> June | <i>Trough, 1921-22</i> July, 21 | <i>Peak, 1923</i> Mar., May | <i>Trough, 1924</i> August |
|------------------------|---|---------------------------|------------------------------------|--------------------------------|-------------------------------|
| Groceries | March, June | July | March, 22 | October | August |
| Department Stores .. | March, June | July | January, 22 | Mar., May | July-September |
| Dry Goods | December | July | July, 21 | Uncertain | Uncertain |
| Shoes | March | Mar., July | Jan., July, 22 | June | September |
| Drugs | Feb., June | Jan., July | Oct., Dec., 22 | Uncertain | Uncertain |
| Candies | March, June | July, Mar. | October, 22 | Uncertain | Uncertain |
| Tobacco, Cigars | January | July, Oct. | July, 21, March, 22 | Mar., June | Uncertain |
| 5 & 10¢ Stores | June | January | July, 21 | June | June (?) |
| Music Stores | January | March | February, 22 | April | July |
| Mail-Order Houses | March | February | | | |

But even the showings of these three are doubtful. In the case of dry goods the sales though beginning to rise that early, declined again to much lower levels in December, 1919. In the second case, that of tobacco chains, the rise stopped in March and was not resumed until after September, 1919. And in the third, the music chains, the sales rose up to April and then declined to and through August, 1919. In other words, in none of these three cases could the 1919-20 rise of sales be said to have properly begun until late in 1919.

In five other cases table states directly that the low point was in June or in both March and June, which means that the rise started definitely only in the second half of the year. In the ninth case, that of shoe sales, the March showing was lower than that of June, but June and even July were lower than January, 1919, and the March item is under suspicion as having been affected by the late Easter. In only one case, that of the mail-order houses sales, can it be said definitely that the sales began to rise after March, 1919. With this one exception, the following general statement seems to be true: the definite rise in the dollar volume of sales in the different branches of retail trade did not begin before the second half of 1919.

How long did this rise continue? In one case the peak was in June, 1920. In six cases it was either in July or later. In only three cases out of the ten does it seem to have been earlier than June-July. Those are the instances of mail-order houses, music chains, and 5 and 10¢ stores. We have just seen that the first of these series was also an exception in the rise in 1919. In respect to variety stores, this early decline could be accounted for by the absence of the price element, the rise of which could not serve to keep up the dollar volume of sales, as it probably did in the other series. In the case of music chains we have a demand for quasi-luxuries which differs from that represented in all other series. With these three exceptions in mind, we can accept the following gen-

eral statement: the decline or recession in the dollar volume of sales in the different branches of retail trade did not begin until after the first half of 1920.

On the other hand, although the recession started only then, the rise in sales was checked a considerable time before the decline proper started, so that in nearly all cases we have preceding the peak three months or more of relatively stable high levels. These periods were: in groceries, April-June, 1920; in department stores, January-July; in shoes, January-July; in drugs, the same; in candies, December, 1919-July, 1920; in tobacco, July-October, 1920.

Thus the decline actually began in the second half of 1920. When did it stop? The table indicates that in most of the cases the trough came in 1922 and in only 3 or 4 can it be dated in July, 1921. In these latter, however, there is no appreciable rise in sales after this early trough, but only a slow growth. This is true in the case of groceries, with the corresponding period August, 1921-October, 1922; in the case of shoes (August, 1921-February, 1923). Only the music chain series and possibly that of the 5 and 10¢ stores are exceptions, in these cases there having been an appreciable rise in sales at this early period. But the peculiar nature of these two series has been already commented upon. On the whole the following general statement can be made: the volume of retail sales did not begin to rise definitely again until after the end of 1921.

The developments of 1923-25 are much less definite. With regard to three series, there seems to be no definite cyclical fluctuations whatever. In the others they are rather vaguely outlined. However, as the table shows, in no case does the peak come before March, 1923, and in all cases where it happens to fall within the month of March there is the possibility of the influence of the early Easter. The dating of the trough of 1924 is also rather arbitrary, since in four out of the 10 series the lowest point cannot be definitely indicated.

Out of the other six series, only one shows its trough in June, one in July, and the others either in August or September.

So much for any general statements which could be made on the run of fluctuations in the dollar volume of sales in the different branches of retail trade. A more detailed account could be evolved only from a study of the most important single indices.

In the comparison of the different branches of retail trade as to the similarity of their movements, we can use a more definite tool, the coefficient of correlation. In the table below are quoted the coefficients computed on the basis of data covering 59 months, through November, 1923, as extant in January, 1924.

17. CORRELATION OF CYCLICAL MOVEMENTS IN THE DOLLAR VOLUME OF SALES IN 10 BRANCHES OF RETAIL TRADE

(Jan., 1919-November, 1923, U. S.)

| | <i>Department Stores</i> | <i>Drugs</i> | <i>Groceries</i> | <i>Candies</i> | <i>Shoes</i> | <i>Tobacco</i> | <i>5 & 10¢ Store</i> | <i>Music</i> | <i>M. O. Houses</i> | <i>Dry Goods</i> |
|----------------------|------------------------------|--------------|------------------|----------------|--------------|----------------|--------------------------|--------------|---------------------|------------------|
| Department Stores .. | * | .868 | .838 | .831 | .679 | .669 | .657 | .611 | .598 | .523 |
| Drugs | .868 | * | .733 | .908 | .674 | .795 | .539 | .394 | .442 | .481 |
| Groceries | .838 | .733 | * | .678 | .546 | .588 | .703 | .662 | .618 | .414 |
| Candies | .831 | .908 | .678 | * | .756 | .790 | .543 | .285 | .381 | .418 |
| Shoes | .679 | .674 | .546 | .756 | * | .624 | .560 | .291 | .407 | .451 |
| Tobacco | .669 | .795 | .588 | .790 | .624 | * | .262 | .095 | .021 | .447 |
| 5 & 10¢ | .657 | .539 | .703 | .543 | .560 | .262 | * | .588 | .584 | .314 |
| Music | .611 | .394 | .662 | .285 | .291 | .095 | .588 | * | .779 | .145 |
| Mail-order Houses .. | .598 | .442 | .618 | .381 | .407 | .021 | .584 | .779 | * | .130 |
| Dry Goods | .523 | .481 | .414 | .418 | .451 | .447 | .314 | .145 | .130 | * |

The different high points of this table were commented upon in describing the separate indices. Before making any general comment, let us note that the dry goods sales show low coefficients with all other series. This, in absence of any reasons to explain this fact and with plenty of reasons to

expect in some of the relations coefficients higher than many others, makes us regard with suspicion this series. At any rate it seems advisable to leave it out of the general consideration, noting that it does not tally with the general run of the table.

The general observations to be made then are as follows:

(1) Of the different series those of sales by department stores and grocery chains show consistently the highest correlation coefficients with all others. The lowest in the case of department stores is .598, in the case of groceries, .546. This means that whatever causes lay back of the fluctuations in the volume of retail sales in the different branches, they found the fullest reflection in the two series mentioned. The reasons for this fact are not obvious. Shall we say that in the case of groceries the movements of prices was sensitive to the price changes in other branches, or that the physical volume of demand changed in the same way as in all other cases? Or shall we consider any other combinations of the price and the commodity elements in the series which might account for the fact? We are in the dark until it becomes possible to differentiate the two component factors of the dollar-volume index. As to the department store sales, the cause of the high coefficients of correlation is partly accounted for by the fact that all the products of the other branches were being sold in department stores as well.

(2) Taking the first seven branches of retail trade, thus excluding the music chains and the mail-order houses, one can see that they all show a fairly close intercorrelation. With the exception of one coefficient (that for tobacco chains and the 5 and 10¢ stores), all the correlation coefficients are above .500 and most of them well above it. But again we are baffled in the explanation of this close correlation. It might mean that in spite of the difference in the kinds of goods represented by the indices, the run of the physical volume of demand for each of them was pretty similar in all cases,

these necessities and convenience goods forming a kind of integral unit of consumption. That would presume that the movements in the dollar volume of sales reflected properly the movements in the commodity volume of demand. On the other hand, the physical volume of demand may be the dissimilar factor, and it is the correlation of prices that the coefficients are measuring. This problem is subject to further investigation in a later chapter.

Still this correspondence in the dollar volume of sales means something taken by itself. If the volume of sales in terms of money is a vital consideration in business life, the similarity of its movements in the different branches of trade is of importance. It seems that in business life, in the activity of the business men the dollar volume of sales is assigned great importance, small volume being taken to mean depression, large volume prosperity. The basis of this attitude is in the fact that the amount of profits made is on the whole proportional to the volume of business done. True, sometimes a large volume of sales is achieved through price reduction, but this is rarely the case, lower prices generally being accompanied by lower dollar volume of sales. As to special "sales," if successful they do not result in an appreciable loss to the enterprise. As a rule, rising dollar volume of sales means a rising volume of profits, a declining volume—diminishing profits. And the movement of profits means prosperity or depression. Thus the close inter-relation of the movements of sales in different branches of trade gives a realistic basis to such statements as "prosperity in retail trade" or analogous general phrases. In other words, it permits generalizations, if so far only on the plane of the series itself, without further differentiation of the component elements of the dollar volume measure.

(3) As the table indicates, the music chains and the mail-order houses formed a group by themselves. While they are fairly well correlated with the department stores, groceries,

and the 5 and 10¢ stores, they do not tally with all the others.

While the retail trade series are on the whole similar in their movements they differ widely in the amplitude of their fluctuations. In the table below the size of the standard deviations for each is cited, and may be taken as a measure of the variability of the series, after the secular trend and the seasonal variations have been eliminated.

18. STANDARD DEVIATIONS OF THE ADJUSTED INDICES OF
DOLLAR SALES IN DIFFERENT BRANCHES OF RETAIL
TRADE

(1919-1925 by Months)

| | | | |
|-------------------------|------|--------------------------|-----|
| Mail-order Houses | 16.4 | Tobacco and Cigars | 7.9 |
| Music Chains | 11.8 | Candy | 7.9 |
| Dry Goods | 11.5 | Department Stores | 6.3 |
| Groceries | 10.6 | 5 & 10¢ Stores | 5.1 |
| Shoes | 9.6 | Drugs | 4.4 |

We see then that in one case the average fluctuation is 4.4% of the secular trend and the seasonal variation, and in another case it is 16.4%, with all other series distributed between these extreme limits. If we presume that the casual factor is of approximately equal importance in all the series (this is roughly true except perhaps with shoes), the comparative size of the standard deviations becomes the measure of the susceptibility of the series to cyclical fluctuations. In this latter respect, in the way the dollar volume of sales reflected the cyclical movements of business life, the different branches of retail trade differed widely. But again it must be remembered that both the coefficients of correlation and the standard deviations refer to series covering only seven years.

Heretofore, we have taken up the wholesale trade series only in comparison to the retail indices and it may be that the picture of the movements in the former is a little blurred. But at present we have the opportunity to describe clearly these movements for the wholesale trade as a whole, since the Federal Reserve Board compiles a general index of this kind.

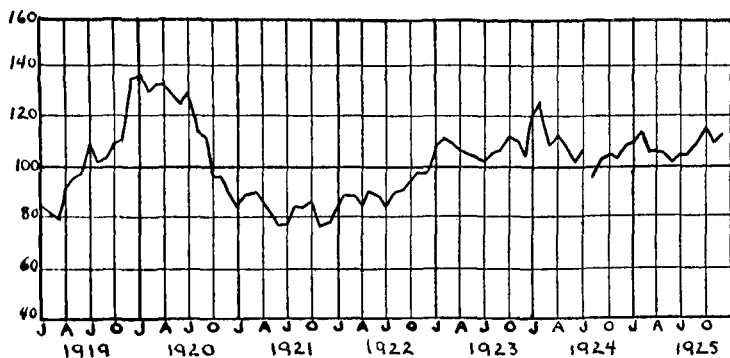
This index includes six branches of wholesale trade (groceries, dry goods, shoes, drugs, hardware, and meats, the latter from 1921), each weighted by the total value of production for each class of goods.¹⁰ This series covering 700 firms located in 10 reserve districts runs as follows:

19. SALES BY COMBINED WHOLESALERS

(Dollar Volume)

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 84 | 137 | 83 | 83 | 109 | 120 | 110 |
| February | 82 | 129 | 89 | 88 | 113 | 126 | 114 |
| March | 79 | 131 | 90 | 88 | 110 | 109 | 106 |
| April | 91 | 131 | 87 | 83 | 107 | 113 | 106 |
| May | 95 | 127 | 81 | 90 | 106 | 108 | 104 |
| June | 97 | 124 | 78 | 88 | 104 | 101 | 101 |
| July | 108 | 128 | 78 | 84 | 101 | 107 | 103 |
| August | 101 | 114 | 83 | 90 | 106 | 94 | 103 |
| September | 102 | 111 | 83 | 93 | 108 | 102 | 107 |
| October | 108 | 96 | 85 | 96 | 114 | 104 | 116 |
| November | 110 | 96 | 76 | 98 | 111 | 103 | 110 |
| December | 136 | 88 | 78 | 98 | 105 | 108 | 113 |



11. Sales by Combined Wholesalers, Dollar Volume, 1919-1925

The chart reveals clear-cut cyclical fluctuations in the volume of sales. The latter declined through the first quarter

¹⁰ For details, see the *Federal Reserve Bulletin*, April, 1923, pp. 439-442.

of 1919, but then rose rapidly 29 points to July, 1919. In August a break occurred but the volume of sales rose again, reaching the peak in December, 1919-January, 1920. After that the sales began to decline. The falling off was slow to and through July, 1920, but then became very abrupt. Low levels were hit about January, 1921, but the recession did not stop there, going on to a trough in November of the same year. The subsequent developments were uncertain, since one does not know whether or not to take the period of December, 1921-February, 1924, as one period of rise. By taking smaller periods, one can trace the movements more clearly. The volume of sales rose slowly during December, 1921-August, 1922, but then increased more rapidly to a high point in February, 1923. During March-July, 1923, the sales declined, but in the second half of the year and through the first two months of 1924 there was a rise again, the sales reaching a peak in February, 1924, higher than any of the high points of the preceding year. From March, 1924, there was a decided tendency for the volume of sales to decline. The trough of 1924 and thus of the second post-war cycle came definitely in June. After that the volume of sales started to rise once again, on the whole all through 1925. There was, however, a break during the second quarter of that latter year.

It is interesting to note that the correspondence in movements among the different branches of wholesale trade seems to be closer than among the same branches of retail trade. Coefficients of correlation were computed for four branches of wholesale trade for which there are counterparts in the retail series. The correlation coefficients (based on 61 months) were found to be as shown on page 40.

Referring to the table above on p. 34 one can see that in every comparable case the coefficient for the wholesale series is higher than for the retail. In the case of dry goods it might be due to the character of the data, but in all other cases it is probably to be attributed to the nature of the economic

20. CORRELATION OF CYCLICAL MOVEMENTS IN THE DOLLAR VOLUME OF SALES BY WHOLESALERS

(January, 1919-January, 1924, U. S.)

| | <i>Groceries</i> | <i>Drugs</i> | <i>Dry Goods</i> | <i>Shoes</i> |
|-----------------|------------------|--------------|------------------|--------------|
| Groceries | * | .840 | .797 | .620 |
| Drugs | .840 | * | .717 | .643 |
| Dry Goods | .797 | .717 | * | .776 |
| Shoes | .620 | .643 | .776 | * |

process. The uniformity and the interrelation of prices and of physical volume of sales in the different branches of wholesale trade is probably greater than that of prices and of physical volume in retail lines. Since purchases from wholesalers are made for the purpose of subsequent resale with profit, while the purchases from retailers are made by the ultimate consumers for the immediate satisfaction of their wants, we can suppose that the causes making for the fluctuations of the cyclical character will reflect themselves more uniformly, and wholly by the more sensitive wholesale series instead of the less businesslike retail indices.

We come now to the comparison of cyclical movements in the retail and wholesale trade in so far as these branches of business activity are represented by the dollar volume of sales. Here the general conclusions are of the most definite character. They refer: first, to the precedence in time of the wholesale indices; second, to the greater amplitude of fluctuations in these latter.

In each comparison between the movements in the volume of sales by retailers and those in the sales by wholesalers (in one case by manufacturers) the former tended to lag behind the latter, the duration of the lag being variable. The same can be seen by comparing the movement of the indices for the two fields as a whole. While the retail sales began to rise definitely only in the second half of 1919, the volume of sales by wholesalers increased rapidly after the first quarter

of that year. While the retail sales began to decline only in the second half of 1920, wholesale sales started to decline in February of the same year. While the recovery in retail sales commenced on the whole only in 1922, that in the volume of wholesale sales started not later than December, 1921. Similarly the two high points of 1923 were in February and October in the wholesale trade, in March or May, and October in the retail lines.

The trough of 1924 came in the wholesale series in June, while most of the retail indices were at the lowest either in July or later. The statement about the lag of the retail sales behind the wholesale seems reasonably true for the period covered.

The other general conclusion seems no less certain. In every one of the six cases where comparison could be drawn it was found that the cyclical fluctuations in the wholesale sales were greater than in the retail trade indices. Taking again the standard deviations as the measures of the amplitude of cyclical fluctuations we can tabulate the comparison as follows:

21. STANDARD DEVIATIONS OF INDICES OF RETAIL AND
WHOLESALE SALES (DOLLAR VOLUME) COMPARED

(1919-1925)

| | <i>Retail</i> | <i>Wholesale</i> |
|--------------------|---------------|------------------|
| Groceries | 10.6 | 14.4 |
| Dept. Stores | 6.3 | 15.8 |
| Shoes | 9.6 | 18.1 |
| Candy | 8.0 | 14.7 |
| Dry Goods | 11.5 | 16.5 |
| Drugs | 4.4 | 6.2 |

It is interesting to note that the difference in the size of the standard deviation is not the same in the various branches. The character of the measure does not warrant a great reliance upon the size of the particular difference discovered.

To qualify the higher variability of the wholesale trade series it can be stated that the difference in the amplitude of fluctuations is much more marked for the period 1919-21, than for the years following. This was observed in nearly all the cases.

So much for the general conclusions to be reached from the inspection of the series. Before we go any further in an attempt to trace the bearings and implications of some of these conclusions, we must answer one crucial question: What are the value and limitations of the data surveyed? How far can one go in his reasoning from the general statements without ascribing to them too much validity? An attempt to clear up this point is unavoidable if one would tread on sure ground.

The limitations of the data seem to be as follows:

(1) The series on sales cover only (a) a small number of business enterprises; (b) in the retail trade only stores operated by chain systems.

(2) The series extend only over seven years which fact makes for (a) uncertainty of the results of the statistical analysis; (b) the general character of the conclusions to be affected by the peculiar conditions of the short period described.

Let us consider first, the point 1(a), the small number of enterprises covered by the series. If one takes the number of retail dealers in every branch of trade (store managers included) reported by the Census, as roughly equal to the number of single stores in existence in 1923 (the Census figures are for 1920) we can see that the indices cover the following percentage of the stores in the field. (See page 43.)

In only two cases the 5 and 10¢ stores and tobacco, fields where the development of chains is very strong, does the sample used exceed 10%. In all other cases it is appallingly

| | <i>Census Figures</i> | <i>Number of Stores Covered by Series</i> | <i>%</i> |
|----------------------|-----------------------|---|----------|
| Groceries | 239,236 | 16,998 | 7.1 |
| Boots and Shoes | 22,544 | 340 | 1.5 |
| Candy | 40,091 | 119 | 0.3 |
| Cigars and Tobacco . | 19,141 | 2,740 | 14.3 |
| Department Stores .. | 11,752 | 359 | 3.1 |
| Drugs and Medicine . | 80,157 | 500 | 0.6 |
| Dry Goods | 63,909 | 500 | 0.8 |
| 5 and 10¢ | 5,968 | 1,800 | 30.2 |
| Music | 7,909 | 59 | 0.7 |

small. Could we then accept the description presented by the data as of any bearing upon the respective branch of trade as a whole? In case of wholesale trade, we are unable to draw the comparison by branches. But according to the Census there were in 1920 73,574 wholesale dealers, exporters and importers. All six wholesale series cover 700 firms, or about 10% of the total number.

It seems to me that in spite of the small size of the sample the description given by the indices could be accepted as of practically great general validity. The case is somewhat analogous to that of price statistics. In collecting data on prices we get only a very small percentage of the total number of transactions consummated in the given market. The number of deals covered is just big enough to eliminate accidents of a singular kind, and the deals are selected so that there should be no qualitative bias. The data thus found are considered as representative, the hypothesis of the uniformity of prices being relied upon. Is it not an analogous situation here? Though the sample is small, it is in every case large enough to exclude accidental circumstances of an individual kind. At the same time the competitive process working toward uniformity of prices makes for uniformity of all the business units of a given field in the relative movement of their sales. In absence of any qualitative bias, and

of individual variations which might be present in a small sample, there is no reason to suppose that the data would not reflect movements common to the field as a whole. On the count that the sample forms a very small percentage of the field we cannot indict the data, since they describe an activity where the leveling process of competition and the price system is in force.

But is our sample collected without any qualitative bias? This question brings us to the point 1(b) that the series on retail sales cover only stores operated by chain systems.

For the data in question the following points of difference between chain stores and single stores are important: (1) as a rule the stores operated by chain systems are picked carefully and enjoy the monopoly of location, an important factor in retail trade; (2) the price policy of the chain stores may be different from the single stores, a chain system being able to sell at lower prices than the latter; (3) in branches of trade where credit to consumers is customary, as, e.g., groceries, the chain stores seem to be managed mostly on the cash and carry basis. How do these points affect the showing of the data? As to the advantage of location, it could hardly affect the relative changes in the volume of sales. Possibly only in a time of feverish prosperity the physical limits of the store might not permit the volume of the sales to reach the high limits it otherwise would, a factor of no great certainty. If anything then, a well-situated store will have smaller fluctuations, its possible peak being cut down, and the depression not reaching its deepest possible trough. The price policy seems to be a variable factor and thus more important. One could suppose that during depression the chain stores are able to undersell the single stores by offering goods at lower prices. If this is true then the data given underestimate to a certain extent the depth of depression in the dollar volume of sales. On the other hand, the single stores might be expected to have more personal patronage and

thus unlikely to lose much to their competitors. Indeed, it is hard to say whether the price policy, except in special and much advertised sales, serves to shift custom and patronage very greatly between good and bad times. The cash and carry policy might cause the chain stores to lose part of their custom in times of severe depression, when lack of purchasing power compels some part of the population to ask credit.

In the case of department stores the sample seems to be biased by an unduly large number of the bigger enterprises. The average sales of the reporting department stores was over 4 million dollars in 1923. If one counts about 10,000 department stores in the country then their total sales would be approximately 40 billions of dollars. But the value of the whole retail trade in the year of high prices, 1920, was estimated as 42 billion dollars.¹¹ The inclusion for the most part of the biggest department stores constitutes the same type of bias as caused by taking the chain stores. Possibly the price policy factor is of greater importance with the former, since the big department stores use the means of advertising and "special sales" to a greater extent in pushing their goods. In this instance there is, however, one more factor added. A certain prestige is attached to buying in one of the big, established department stores, a prestige of social distinction combined with the consciousness of more luxurious surroundings. In prosperous times a certain type of consumer goes shopping out of the usual limits of his neighborhood center, and patronizes the more impressive stores, enjoying the fact that his goods are delivered in a luxurious delivery truck. If this is true, it would make for accentuated fluctuations of sales in our data, the movements in the whole field being more even.

What is the balance of all these factors? Do the series indicate correctly the periods of rise and fall in the

¹¹ See article by L. Mann, *American Economic Review*, December, 1923, p. 614.

whole field? Do they exaggerate or underestimate the amplitude of the fluctuations? This could be known only if additional data were collected for a number of single stores in the same branches of trade. The need for these statistics is pressing since they would give additional value to the data already available. In merely speculating on the subject, one must balance the force of habit and personal patronage over against the price appeal, a balance which would be different in various branches representing dissimilar demands. It seems on the whole that, with the exception of department stores and possibly music chains, there ought to be no essential difference between the movement of sales in chain stores and in single stores (taking the relative changes). In department stores and in music chain stores the rise is accentuated by the presence of a luxury demand, but the fall is probably underestimated by cut-price sales. It is impossible to determine the net result in the variability of the series. In the main it seems that the forces of consumers' demand are of too heavy and ponderous a character in the branches covered by the data to respond greatly to different price policies, and this gives assurance of a rather general validity to the description presented by the figures.¹²

So much for the limitations by number and kind; now for the limitations of time. In the appendix on the statistical methods used, the possibility of errors due to the short time covered by the series was discussed and there is no need to take them up again. The peculiar features of business con-

¹² The data on wholesale sales seem to be also a biased sample, giving undue proportion to the bigger firms. Thus, the average annual sales in 1923 of the firms reporting are: groceries, 1.8 million dollars; dry goods, 2.8 million dollars; shoes, 1.8 million dollars; drugs, 1.8 million dollars; averages that seem too high to be representative of the trade as a whole. The significance this bias has on the final conclusion is impossible to say with certainty. It is fairly probable that it makes for accentuated cyclical fluctuations in the volume of sales. The exaggeration, however, would not seem large enough to invalidate the comparison above of the different amplitude of fluctuations in retail and wholesale sales.

ditions during the period covered by the data were treated briefly elsewhere.¹³ Those peculiarities which bear on our conclusions are few. The fluctuations as shown in 1919-21 were probably above the average, being exaggerated by the process of extreme price inflation which took place during that period. On the other hand, the movements in 1922-25 were probably too much attenuated because of the extreme cautiousness of the business community fresh from the bitter experience of 1920-21. Thus if one looks for the elusive "normal" type of movements, he would probably have to look for it somewhere between the kind which developed in the first part of the period considered and those of the second part.

We are for the time being through with this painful process of considering the limitations of the data used. For the time being only, because the question will come up again every time any new use is made of the indices. It goes without saying that this recital cannot be considered as exhausting the subject, although the attempt was to make the cataloguing of defects as full as possible. But even at present the balance is uncertain, the limits not clear, much being left to the personal discretion of the person who is going to utilize them. This means that all further discussion and reasoning starting from the general conclusions arrived at above are conclusive only conditionally, the condition being that further statistical studies will prove the typical character of the data. It is my personal opinion that in the conclusions which will be studied, namely, the different variability of the volume of sales by retailers and wholesalers, the data are reliable in their showing of the difference, even though the quantitative measure of the difference might be changed, in case fuller data were available. Similar reliability can be ascribed to the conclusion as to the time precedence of wholesale sales movements, and to the suggestions in connection with the correlation of the various branches in either field.

¹³ See *supra*, pp. 1-4.

Of the conclusions reached one seems to be worth considering more fully. The fact that the dollar volume of sales by wholesalers rises higher and falls lower than the volume of sales by retailers seems to be important. At present it can be considered only in its bearing upon the movement of stocks and of means of payment.

If at any given moment the volume of sales by the retailers were equal to the volume of purchases he makes from the wholesalers, his stocks would remain stable. In the long run these two flows of purchases and sales are equal in absolute volume, provided we disregard the element of long-time growth. Hence in comparing the relative changes we can say that a discrepancy in the run of the latter will be reflected as an absolute and relative change in stocks. If during the rise the volume of sales by wholesalers increases more than the sales by retailers we ought to expect an increase in stocks, while during depression the stocks will correspondingly decrease.

There are no data for the volume of stocks in the various branches of retail trade, except one valuable index which gives the monthly change in the value of stocks for 318 department stores located in 10 reserve districts.¹⁴ The data follow on page 49.

In the chart on page 50 the comparison is being drawn with cumulative differences between the index of sales by the combined wholesalers (see p. 8) and sales by department stores (see p. 6). For every month the index showing of the latter was subtracted from the corresponding item of the former, thus presumably giving a showing for a change in the value of stocks. The differences thus obtained were cumulated, i.e., the item for a given month was taken as an arithmetical sum of all the preceding changes. (See

¹⁴ The original data used was the revised index of stocks, compiled by the Federal Reserve Board, not published fully anywhere, but available on request.

22. VALUE OF STOCKS IN DEPARTMENT STORES

Adjusted for the Secular Trend and the Seasonal Variations

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 88 | 113 | 98 | 97 | 97 | 101 | 101 |
| February | 84 | 117 | 97 | 98 | 101 | 104 | 101 |
| March | 83 | 119 | 96 | 98 | 101 | 105 | 103 |
| April | 87 | 120 | 96 | 96 | 102 | 104 | 102 |
| May | 85 | 120 | 97 | 95 | 103 | 103 | 102 |
| June | 85 | 121 | 99 | 95 | 101 | 101 | 100 |
| July | 89 | 123 | 98 | 94 | 101 | 99 | 99 |
| August | 93 | 122 | 99 | 93 | 102 | 96 | 97 |
| September | 97 | 120 | 99 | 93 | 102 | 97 | 97 |
| October | 99 | 118 | 98 | 92 | 102 | 100 | 99 |
| November | 101 | 111 | 98 | 94 | 104 | 100 | 101 |
| December | 105 | 105 | 97 | 95 | 102 | 100 | 102 |

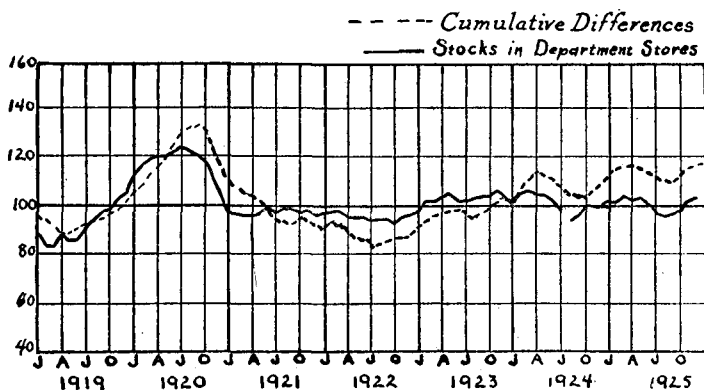
the results in the table.) On the chart the dash line represents this cumulative difference, the line of "normal" representing zero, and the scale being magnified five times for the purpose of better comparison.

23. CUMULATIVE DIFFERENCES BETWEEN RETAILERS' PURCHASES AND RETAILERS' SALES

(Department Stores)

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|-------|------|------|------|------|------|
| January | - 11 | + 80 | + 47 | - 37 | - 36 | + 23 | + 40 |
| February | - 31 | + 104 | + 30 | - 38 | - 21 | + 40 | + 44 |
| March | - 55 | + 122 | + 24 | - 37 | - 11 | + 48 | + 51 |
| April | - 66 | + 139 | + 20 | - 47 | - 6 | + 46 | + 50 |
| May | - 66 | + 142 | + 13 | - 48 | - 3 | + 43 | + 49 |
| June | - 52 | + 149 | + 3 | - 52 | - 2 | + 34 | + 48 |
| July | - 37 | + 164 | - 17 | - 60 | - 4 | + 30 | + 42 |
| August | - 30 | + 167 | - 26 | - 64 | - 7 | + 24 | + 40 |
| September | - 31 | + 159 | - 22 | - 65 | - 6 | + 22 | + 40 |
| October | - 19 | + 134 | - 23 | - 66 | 0 | + 25 | + 45 |
| November | - 7 | + 107 | - 33 | - 60 | + 7 | + 29 | + 55 |
| December | + 36 | + 80 | - 40 | - 60 | + 3 | + 36 | + 58 |

The standard deviation for the index of stocks is 8.5 as compared to the one for sales of 6.3. The comparison is, however, misleading, since a change of 1% in stocks is equiva-



12. Index of Stocks in 318 Department Stores, Dollar Value, 1919-1925

lent to a change of 4% in sales, if we suppose that the turn-over of stocks in a department store takes place in general three times a year. Thus the standard deviation for the index of stocks of 8.5 is equivalent to a mean deviation for sales of 34. The comparison of the chart reveals that one of the indices exaggerates the fluctuations, since even a division by five gives somewhat greater fluctuations than those shown in the stock series. The fault is probably with the index of wholesale sales which covers not nearly all the branches of wholesale trade from which department stores are buying. Moreover, the big department stores buy heavily direct from the manufacturers.

But aside from that difference in amplitude, the comparison is perfect. The movements of the index of stocks collected and analyzed independently show close correspondence in their changes with those in the cumulative differences, the latter being a derived series based on two others. The agreement exceeds one's expectation and illustrates perfectly an argument almost obvious in itself.

What does this cumulation of stocks and the underlying discrepancy in the movement of sales mean from the point

of view of circulation of media of payment and of the movements in the volume of credit?

If at any given moment the retailer took in from his sales a number of money units equal to those he distributes in the expenses of his store and in payment for the merchandise bought from the wholesalers, his operations would balance and no additional amount of money or credit instruments would be required. Or rather though an additional absolute amount would be needed, the activity of the retailer will not produce any relative changes in the volume of media of circulation, either of money or credit instruments. This is not, however, the case. Although the payments to the wholesalers (or manufacturers) for the merchandise form about 75% of retailers' total net sales or more, and the other 25% consisting of wages of sales force, rent, etc., are much more stable than the volume of purchases from the wholesalers, still there remains a substantial discrepancy between the retailers' receipts and his expenditures. In the period of rise the latter are consistently above the former, in the period of decline below them.

In other words, the discrepancy resulting in accumulation of stocks ties up a substantial volume of circulating media or gives rise to an additional volume of credit. If the retailers use their own hoarded capital for the purpose of procuring these ever-increasing stocks, their accumulation means a tie-up of a volume of money which before deposited in a bank was employed elsewhere. If the retailers purchase on credit or apply for credit to the banks, they give rise to an additional volume of credit which cannot be liquidated until the volume of sales by the wholesalers begins to run below the volume of sales by retailers, and the stocks of the latter begin to be liquidated. Whether the retailer borrows from the bank or from the wholesaler, his borrowing tends to increase the volume of loans outstanding.

This gives rise to the suggestion that changes in the volume

of pure commercial short-time credit must be in close correspondence, not to the movement of prices, but to the run of these cumulative differences between sales and purchases in the various branches of business activity, in other words, to the movements of stocks. It is interesting in this respect to look over the series of the volume of loans and discounts by the member banks reporting to their Federal Reserve Banks (somewhat over 800 in number). In the table below the index is quoted (without any changes) covering for the years 1919-1920 the movements in the volume of "total loans, discounts, and investments," and beginning with January, 1921, the "total loans and discounts" only. Since the investments form a comparatively small per cent. of the total, the error involved in the change of the series is not significant.

24. VOLUME OF LOANS AND DISCOUNTS

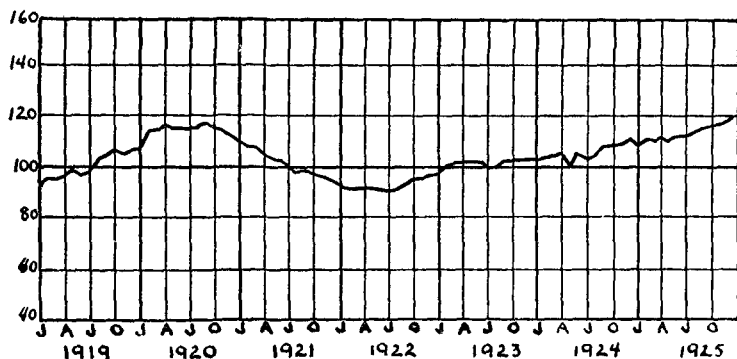
(By Reporting Member Banks)

1919 Average Month = 100

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|-----------------|------|------|------|------|------|------|------|
| January | 94 | 107 | 110 | 94 | 98 | 102 | 109 |
| February | 96 | 114 | 109 | 93 | 100 | 102 | 110 |
| March | 96 | 115 | 108 | 93 | 101 | 103 | 110 |
| April | 97 | 116 | 105 | 93 | 101 | 104 | 111 |
| May | 99 | 115 | 103 | 93 | 101 | 100 | 110 |
| June | 97 | 115 | 102 | 92 | 101 | 104 | 111 |
| July | 98 | 115 | 100 | 92 | 100 | 103 | 111 |
| August | 102 | 115 | 98 | 92 | 100 | 104 | 112 |
| September | 104 | 116 | 99 | 94 | 102 | 106 | 115 |
| October | 106 | 115 | 98 | 96 | 102 | 107 | 117 |
| November | 105 | 113 | 97 | 96 | 102 | 108 | 117 |
| December | 106 | 111 | 96 | 97 | 102 | 110 | 119 |

It is interesting to note the lag of this series as compared with the movement of wholesale prices. The latter started to decline at the latest in June, 1920, and began to recover at the latest in May, 1922. The volume of loans and discounts moves, however, more simultaneously with the movement of the dash line of cumulative differences (see p. 50). This cor-

responsiveness is only another expression of the old truth that the "frozen" assets of the banks begin to be converted only when the debtors are able to liquidate the stocks. The movements of bank credits can be expected then to move with



13. Volume of Loans and Discounts (Member Banks), Monthly Index, 1919-1925

the movements of the sum total of the discrepancies between disbursements and receipts in all those branches of business activity which resort to banks in order to bridge over the gap.

There are grounds to suppose that not only do the wholesalers' sales fluctuate more than the retailers', but that also the money volume of sales by manufacturers rises above and falls below the sales by respective wholesalers, and that the same relation exists between the manufacturers of consumers' goods and the producers of producers' goods. In another place we shall have the opportunity to show that the commodity volume of sales by wholesalers fluctuates less than the volume of manufacturing output. If the prices move in fair correlation with the volume of output, it is reasonable to suppose that the money sales by manufacturers are subject to greater fluctuations than the dollar volume of sales by wholesalers. The same relation exists between the two big branches

of production. The farther we go from the ultimate consumers, the more fluctuating we find the volume of business activity as expressed in the money value of sales. The circle is completed when we identify the ultimate consumer, the patron of retail stores, as himself a seller and study the movements in the volume of *his* sales as compared with the changes in the volume of *his* purchases. With this circle completed, the movements in the volume of circulating media and of bank credit have to be conceived as generated by the differences in the flow of sales and purchases which form the functioning of the money economy.

This indicates, if vaguely, the fact that the difference in the movement of sales noted first as a technical characteristic of the series compared is really an important element in the whole problem of cyclical fluctuations in business activity. It is in a further analysis of this difference that we can advance to its explanation and the full grasp of its implications. And the first step in this further analysis is the description of the movements in the commodity volume of sales and purchases, a separation as far as possible of the money element from the commodity element in the comparison itself. This is a necessary step in the explanation of the problem. Time and again above we were at a loss to understand why it was that the sales moved more evenly or less so, finding every time the dollar volume to be a product of two factors—the price and the commodity volume. To the study of the flow of goods from one branch of trade to another and to the consumers the next chapter will be devoted.

APPENDIX A

THE STATISTICAL ANALYSIS OF THE DOLLAR VOLUME OF SALES INDICES

THE main difficulty in analyzing statistically the series in hand lay in the comparative brevity of the period covered by

the data. At the time of the final computation the indices extended over 67 months, a period for which the computation of the secular trend and the seasonal variations might seem presumptuous.

But both the seasonal and the long-time changes are present in the series to a marked degree, and in varying measure in the different branches of retail and wholesale trade. This makes the elimination through statistical analysis both necessary and feasible. Without such a preliminary adjustment the comparison of cyclical fluctuations is almost impossible. At the same time the size of the seasonal and secular elements makes the application of even the crudest methods of elimination worth while.

Secular Trend

For a series of six years the lower the order of the formula for the secular trend, the surer we are of not having eliminated alongside with the long-time changes some which might better be classified as cyclical. Thus in composing his new index of business conditions (of six series starting with January, 1919), Professor Persons determines the secular trend, using the horizontal line at the 1919-1922 average for most of the series.¹⁵

This method, although having the advantage of extreme simplicity, is too crude in case of a series which shows secular trends of a comparatively large magnitude. It is good enough for series where the long-time changes are so insignificant that the taking of a straight horizontal line for the trend would not imply a too great underestimation of the residual fluctuations in the first half of the series as compared with the same in the second half. But in cases like these of the data in hand, the element of growth is too significant to per-

¹⁵ See *Harvard Economic Service*. Advance letter of May 19, 1923.

mit ignoring the progressive character of the rise or fall from one-time limit to the other.

The next lowest order of a formula for a secular trend is a straight line of the form $y = ax + b$. The choice really lay between such a straight line trend and a parabolic trend of the form $y = ax^2 + bx + c$. The preference of the simpler form was based on the following considerations: (a) It was easier to compute; (b) the simpler one was less liable to reflect the cyclical element of the series.

The straight line trends were fitted by the method of least squares. At the time the work was completed, the series included 67 months, covering the period January, 1919-July, 1924. But the chance of printing the essay presented itself much later, and during that time new current data have accumulated. In order to take care of the latter I fitted separate trends to the seventeen months August, 1924-December, 1925, by the method of semi-averages. Each of the averages was for 42 months and thus the whole length of the series was used to compute the new trend, but the trends thus computed were taken only for the last 17 months.

The trends fitted by the method of least squares are good descriptions of the long-time movements, since they extend over two complete cycles. The trends fitted by the method of semi-averages cover a period of two and a half cycles (approximately) and thus may be misleading. But they are the best available for the period for which they are used.

In some cases the readings of the first trend extrapolated come very near or coincide with the readings of the second trend, and there the adjusted series is comparable all through the 84 months described. But in most cases (especially in the indices of sales by wholesalers) the readings of the two trends differ, and only a rough comparison of deviations for the two separate periods is justified.

The equations of these trends for the retail series are given

below. The starting points are January, 1919, and August, 1924, respectively. The x is in units of months.

NO. 25

| | <i>Trends for the Period January, 1919- July, 1924</i> | <i>Trends for the Period August, 1924- December, 1925</i> |
|------------------------------|--|---|
| Department Store Sales | $y = 103.32 + .32x$ | $y = 125.8 + .34x$ |
| Mail-order Houses | $y = 93.71 - .07x$ | $y = 105.2 + .33x$ |
| Grocery Chains | $y = 96.58 + 1.58x$ | $y^* = 221.9 + 2.03x$ |
| 5 & 10¢ Chains | $y = 91.00 + 1.30x$ | $y = 184.9 + 1.47x$ |
| Dry Goods Chains | $y = 80.55 + 2.45x$ | $y = 270.5 + 2.84x$ |
| Drug Chains | $y = 99.63 + .79x$ | $y = 154.5 + .83x$ |
| Cigars and Tobacco Chains .. | $y = 110.20 + .50x$ | $y = 139.9 + .35x$ |
| Shoe Chains | $y = 103.92 + .36x$ | $y = 131.0 + .42x$ |
| Music Chains | $y = 97.84 + .12x$ | $y = 113.6 + .34x$ |
| Candy Chains | $y = 99.33 + 1.39x$ | $y = 188.1 + 1.28x$ |
| Department Stores Stocks .. | $y = 107.46 + .38x$ | $y = 131.2 + .33x$ |

* A new index altogether.

It is interesting to note that the largest changes in the gradient of the trend line occurred in those series which exhibited the most marked cyclical fluctuations, such as the music chains sales, the mail-order houses sales, and the dry goods sales.

Analogous computations were made in the determination of secular trends in the indices of sales by wholesalers. The equations are as follows:

NO. 26

| | <i>Trends for the Period January, 1919- July, 1924</i> | <i>Trends for the Period August, 1924- December, 1925</i> |
|-----------------------|--|---|
| Groceries | $y = 103.85 - .45x$ | $y = 82.0 - .25x$ |
| Dry Goods | $y = 106.06 - .32x$ | $y = 91.0 - .16x$ |
| Drugs | $y = 100.61 + .13x$ | $y = 112.1 + .21x$ |
| Shoes | $y = 96.97 - .69x$ | $y = 59.6 - .45x$ |
| Hardware | $y = 100.63 - .11x$ | $y = 100.7 + .11x$ |
| General Index | $y = 103.90 - .50x$ | $y = 80.8 - .24x$ |
| Candy (1920-24) | $y = 89.99 - .23x$ | |

In these series of wholesale sales the change in the trends is generally larger than the same changes in the trends of retail sales. This can be attributed to the greater size of cyclical fluctuations in the volume of sales by wholesalers.

With the secular trends thus determined, each item of the

series was divided by the corresponding showing of the secular trend and the quotient multiplied by 100.

Seasonal Variations

The index of seasonal variations for the different branches of retail trade was computed by the Division of Analysis and Research of the Federal Reserve Board. The method of link relatives was used on data covering only four years. Although this method presupposes a compound interest curve trend, the index would not be significantly different if an equal absolute size of the growth increment had been assumed (see *Harvard Review of Economic Statistics*, 1919, p. 31, note). The adjustment for the seasonal element thus made was taken over, and the trends were fitted to already corrected data.

27. SEASONAL VARIATIONS IN RETAIL SALES¹⁶

| | Jan. | Feb. | March | April | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------|------|------|-------|-------|-----|------|------|------|------|------|------|------|
| Dept. Stores | 87 | 77 | 100 | 104 | 103 | 100 | 75 | 78 | 91 | 112 | 113 | 160 |
| Mail-order Houses. . . | 99 | 91 | 115 | 100 | 87 | 84 | 74 | 77 | 97 | 128 | 126 | 122 |
| Grocery Chain | 100 | 95 | 106 | 101 | 98 | 96 | 98 | 97 | 97 | 105 | 102 | 105 |
| 5 & 10¢ Chain | 72 | 75 | 95 | 95 | 96 | 92 | 92 | 96 | 94 | 108 | 104 | 181 |
| Drug Chain | 97 | 91 | 100 | 98 | 98 | 98 | 101 | 100 | 99 | 102 | 94 | 122 |
| Cigar Chain | 88 | 86 | 96 | 96 | 101 | 96 | 99 | 97 | 99 | 107 | 100 | 135 |
| Shoe Chain | 75 | 68 | 96 | 121 | 116 | 106 | 95 | 79 | 92 | 113 | 110 | 129 |
| Music Chain | 84 | 85 | 93 | 86 | 82 | 78 | 75 | 88 | 102 | 119 | 121 | 187 |
| Candy Chain | 84 | 85 | 96 | 102 | 97 | 92 | 98 | 101 | 100 | 103 | 95 | 117 |
| Dry Goods | 66 | 64 | 88 | 99 | 101 | 100 | 82 | 84 | 112 | 134 | 123 | 145 |

For the wholesale trade series the index of seasonal variations was computed by the method of ratio-ordinates series. It gives approximately the same results as the link-relative method, but requires much less computation.¹⁷ This method

¹⁶ *Federal Reserve Bulletin*, Jan., 1924, p. 17.

¹⁷ *Journal of the American Statistical Association*, June, 1924, article by Miss Falkner.

was used in both the first and second computation of the series. The indices arrived at are presented in the following table:

28. SEASONAL VARIATIONS IN SALES BY WHOLESALERS

| | <i>Groceries</i> | <i>Dry Goods</i> | <i>Drugs</i> | <i>Hard- ware</i> | <i>Shoes</i> | <i>Meats</i> | <i>Candy</i> |
|-----------------|------------------|----------------------|--------------|-----------------------|--------------|--------------|--------------|
| January | 90 | 90 | 101 | 85 | 76 | 90 | 138 |
| February | 84 | 92 | 97 | 81 | 81 | 84 | 98 |
| March | 97 | 104 | 110 | 105 | 116 | 99 | 91 |
| April | 94 | 93 | 98 | 107 | 106 | 94 | 92 |
| May | 101 | 89 | 96 | 108 | 99 | 97 | 91 |
| June | 107 | 94 | 96 | 108 | 96 | 105 | 89 |
| July | 104 | 104 | 96 | 97 | 86 | 103 | 81 |
| August | 101 | 127 | 100 | 103 | 115 | 109 | 76 |
| September | 107 | 123 | 105 | 105 | 123 | 112 | 76 |
| October | 112 | 113 | 113 | 109 | 124 | 113 | 109 |
| November | 107 | 94 | 97 | 101 | 97 | 102 | 117 |
| December | 96 | 78 | 90 | 91 | 80 | 92 | 140 |

The seasonal element in the wholesale trade branches was adjusted for through dividing again the series already corrected for the secular trend by the index of seasonal variation and multiplying the quotient by 100.