

Estimating changes in the volume of retail trade

Monthly estimates of changes in the value of retail trade in Great Britain, based on the Board of Trade's sample inquiry, have been published for a number of years. They have been given in the form of index numbers of the value of sales per week and percentage changes on the corresponding month a year earlier, and, since the beginning of 1960, in the form of seasonally adjusted index numbers. Changes in the value of sales reflect both changes in the quantity of goods sold and in the prices at which sales take place. Until September 1961, however, no systematic attempt was made to separate these two factors and in commenting on the trend of sales only broad indications of the effect of price changes were given in showing how the volume of retail sales was changing. In September 1961 new series were introduced in the form of index numbers of the value of sales per week measured at constant prices—the average prices of the year 1957. These new series, which are also available in seasonally adjusted form, show directly changes in the volume of retail sales, by eliminating the effect of price changes in the value series; they are therefore a guide to changes in the amount of goods which are being bought in retail shops. This article describes the methods used to construct these new series.

A basic difficulty in estimating changes in the volume of retail trade is that retail sales figures are collected and analysed in terms of the total turnover of shops, and not in terms of the commodities that shops sell. Traders contributing to the retail trade inquiry return a single figure each month of their total turnover and the returns, classified according to the main activity of retailers, are used to estimate trends in trading by each of the main kinds of retail business—grocers, butchers, men's wear shops, chemists, and so on. Information about price changes relates to individual commodities, or groups of commodities, and the problem is to combine this information to match as appropriately as possible the commodity composition of the sales of each kind of business, and form index numbers that can be used to adjust the value estimates of turnover to constant prices. Sales in the kinds of business for which separate retail sales estimates are made cover a wide range of commodities. The sales of grocers, for example, include significant amounts of cigarettes and tobacco, soap, bread and meat in addition to groceries; and variety and department stores sell a very wide range of goods.

Commodity composition of retail trade

The commodity composition of the sales of each kind of business, each month, should be used to weight the indicators of price changes to obtain a price index appropriate for adjusting the estimate of the value of sales for that month. Information of this sort is not available and in building up price series to adjust the value of retail sales use has been made of the com-

modity analysis of the sales of each kind of retail business provided by the latest census of distribution, that relating to 1957, for which results are available. The commodity analysis of shops' sales provided by the census is as detailed as it is practicable to collect from shopkeepers but it is not as fine as one would like for the purpose of constructing a volume series, nor as detailed as the price information described below made available by the Ministry of Labour. While, therefore, the broad weighting pattern used to compile price indices to adjust the value of turnover was that derived from the census for 1957 it was necessary to use some other method to weight a finer analysis of commodity price changes within these broad groups. For example the broad commodity heading 'Provisions (including cooked meats), groceries and soft drinks' provided by the census results covers a wide range of items for which separate price series were available. It was decided in general that the relative weights for these individual items used in constructing the Ministry of Labour retail price index would be used in constructing price indicators for these broad commodity groups. Thus, the weights given to price indicators for butter, tea, sugar, bacon, etc., in arriving at a combined index for 'Provisions, etc.' were in the same proportion as their weights in the Ministry of Labour index.

This is not entirely satisfactory for two reasons. First, the weights in the Ministry of Labour index reflect consumption by the households covered by the index. The pattern of sales through retail shops may differ somewhat from this but it is not thought to be a serious defect in the construction of the volume index. In a few cases where the relative weights given in the Ministry of Labour index were thought to be substantially different from the pattern of sales through shops some rough adjustments were made. Thus, it was thought that off-licences sell a proportionately higher amount of wines and spirits to beer than is indicated by the weights used in the Ministry of Labour index (which includes sales through public houses) and an adjustment was made for this.

Secondly, a number of the broad commodity headings into which sales were analysed in the 1957 Census occurred in a number of different kinds of business. For example, the 'Provisions, etc.' heading referred to above occurs in the sales analysis of grocers and provision merchants, dairymen, other food shops, department stores, etc., and 'Menswear' is sold in significant amounts by womenswear shops, department stores, and so on as well as menswear shops. In most cases the detailed commodity composition of each of these broad headings, based, as described above, on the relative weights used in the Ministry of Labour index is taken to be appropriate for each of the kinds of business in which the heading occurs. It is recognised that the composition of the items returned against this heading will not be the same in each kind of business.

Very little information is, however, available about the appropriate composition and only rough adjustments can be made for one or two kinds of business where the items included are likely to be significantly different from the pattern deriving from the Ministry of Labour's household budget inquiries. Thus, the items included in the heading 'Provisions, etc.' by 'Other food shops' is thought to contain a higher proportion of cooked meats and those included by 'Greengrocers, fruiterers, etc.' to contain a higher proportion of tinned fruit and vegetables.

Some small adjustments have also been made to correct roughly for some misreporting that is suspected in shopkeepers' returns to the census of distribution. Although the headings into which shopkeepers are asked to analyse their sales are broad, they do, nevertheless cause difficulties to some respondents whose records do not allow them conveniently to segregate some items of their sales and enter them in the correct heading. The most important example in the construction of the price series for the volume calculations is that a certain amount of sales of soap and detergents is thought to have been returned incorrectly by grocers against the heading 'Provisions, etc.'

Price indicators

The price indices to which the commodity pattern of retail sales thus determined are applied are provided by the Ministry of Labour from information used in the construction of the Index of Retail Prices. These relate to prices at the middle of each month. It would be preferable, were the figures available, to take an average of prices relating to several dates during a month so that the indicators would more nearly represent the prices at which transactions take place. Mid-month price quotations are however in most cases not likely to be seriously defective for this purpose although in two kinds of circumstances they can be.

The first arises when prices of an important item of expenditure change nationally at a more or less fixed point in time. Examples of this are changes in the price of national newspapers, cigarettes, milk and price changes caused by changes in the rates of purchase tax or customs and excise duties. Where such changes occur exactly at the beginning or end of a month they do not invalidate the mid-month quotations as a reasonable

indication of transactions during the month but when they occur towards the middle of the month some adjustment is desirable. A rough adjustment is made by weighting the price indicators for the current month and an adjacent month by the proportions of the month during which the old and new prices apply. For example, if the price of cigarettes is raised on the 10th of a month, a new price indicator is obtained by combining that for the past month and that for the current month with weights of one-third and two-thirds.

The other circumstance where mid-month quotations are not entirely satisfactory is where prices are volatile. The most important example of this is the prices of fresh vegetables and fruit which often fluctuate quite widely during the course of a month. In the absence of representative quotations of the retail prices of fresh fruit and vegetables more frequently than monthly, there is no entirely satisfactory solution to the problem. In order, however, to make the quotations used for these items perhaps a little more representative of the prices at which transactions take place, and to smooth out violent fluctuations to some extent, the prices used for any month are an average of those for the past, current and following months. The assumption is that prices move smoothly between the mid-month indicators provided by the Ministry of Labour. This assumption leads to the weighting of price indicators for past, current, and future months with weights of 1 : 6 : 1 respectively to obtain an indicator for the current month⁽¹⁾. While this method is not entirely satisfactory it is likely to provide better indicators of the movements in prices than using just the price for the current month and is the best that it seems possible to do with the available data.

Calculation of the volume series

The price indicators provided by the Ministry of Labour are combined, using weights obtained as described above, to obtain price indices suitable for adjusting the value of turnover in each kind of business for which the retail trade statistics are compiled. These price indices are at this stage on the base used by the Ministry of Labour, 17 January 1956 = 100⁽²⁾. In order that the volume series is on the same base as the monthly value series of retail trade these price indices are converted to average 1957 = 100. The monthly

(¹) The following example illustrates how the weights for the price indicators are derived. (For simplicity months are taken to have four weeks). Let P_c = price in current month, P_p = price in previous month, and P_f = price in following month.

Price applicable to each of the weeks of current month are taken to be:

$$\begin{array}{l} \text{1st week } \frac{P_p + P_c}{2} \\ \text{2nd week } P_c \\ \text{3rd week } P_c \\ \text{4th week } \frac{P_c + P_f}{2} \end{array}$$

Indicator for the current month is thus:

$$\frac{1}{4} \left(\frac{P_p + P_c}{2} + P_c + P_c + \frac{P_c + P_f}{2} \right) = \frac{1}{8}(P_p + 6P_c + P_f)$$

(²) Since February 1961 the Ministry of Labour price indices based on 16 January 1962 = 100 have been linked to the old series in the volume calculations.

pattern of retail trade is highly seasonal and in estimating the average level of prices in 1957 the price indices for each kind of retail business, obtained as described above, are weighted by the value of sales in each month of the year. Price indices based on average 1957 = 100 are then applied to figures of the values of sales each month to obtain, for each kind of business, estimates of the value of sales at average 1957 prices which are combined to give estimates for total retail trade and for food and non-food shops. These estimates are then expressed in index number form. As the published index numbers are built up in this way from separate constant price value figures for each retail trade kind of business they reflect any month to month changes in the relative importance of each kind of business and an element of current weighting is introduced into the series. This is an advantage not only because of differing rates of growth over time of different kinds of business but also because the seasonal patterns of the various kinds of business differ to some extent.

The indices of the volume of retail trade are seasonally adjusted by the same method used to adjust the value indices; this was described in the Board of Trade Journal of 9 June 1961. As however the information about price changes goes back, in its present form, only as far as the beginning of 1956, the seasonal pattern for the volume series was based on data for the five years 1956 to 1960 and not the six years 1955 to 1960 which were used for seasonally adjusting the value series.

Conclusion

The construction of volume or constant price series

is always a difficult operation the results of which are usually subject to fairly wide margins of error. The main drawback to the new series is that the commodity pattern of sales used to weight price indicators is fixed. The relative importance of sales of different commodities by shops in a given kind of business is liable to change. In most kinds of business there will be some degree of variation with the seasons, for example, greengrocers' sales of different fruits and vegetables will change with the seasons and radio and electrical goods shops may have a higher proportion of television sets in their sales at some times in the year and at other times a higher proportion of refrigerators. In addition to these seasonal variations, there are changes in the longer term due to changes in tastes, the introduction of new products (and the decline of existing ones) and the tendency of shops in a particular kind of business to sell a wider or narrower range of goods. The volume indices, as they are derived from price indices obtained by a fixed commodity pattern, do not reflect these changes. Only to the extent that the volume indices are built up from estimates made for each kind of retail business, and thus reflect seasonal and longer term variations in the proportions of trade done by each kind of business, is there an element of current weighting in the estimates. The difference in the price index obtained for a given kind of business using fixed weights and that which would be obtained by using current weights (if these were available) depends, among other things, on the dispersion of price changes of the different commodities concerned, but there are unlikely to be serious errors, particularly in the total figures.

Board of Trade