Retail Sales Index Development

Pam Davies
Retail Sales Index Division
Office for National Statistics
Room 1.464 Government Buildings
Cardiff Road
Newport, NP10 8XG
Tel: 01633 812600
E-mail: pam.davies@ons.gov.uk

Summary

A number of aspects of the methods and systems used to produce the Retail Sales Index (RSI) are under review. This development and investigatory work covers a number of areas:

- to rebase the RSI from 1995=100 to 2000=100;
- review of the survey methods used for the Retail Sales Inquiry (the survey that underlies the RSI);
- development of a new index construction system;
- seasonal and calendar adjustment methods.

This development work will move the RSI onto the standard methods and systems used for other economic statistics. This development work is being considered for implementation in October 2003 at the earliest. An update of the development work will be provided in a further article.

Introduction

As explained in an article ‘Interpreting Retail Sales Data’ published in April 2003 Economic Trends (Davies and Hopwood 2003), the Retail Sales Index (RSI) is currently being rebased onto 2000=100. The Retail Sales Inquiry is also subject to a triennial review. This article gives a brief overview of the RSI and describes the development and investigatory work currently underway for the RSI. Each of the topics under investigation is explained in turn. The final section sets out next steps for the development work. The article is in seven parts:

Part 1 – Overview of the RSI

Part 2 – Developments
Part 3 – Rebasing
Part 4 – Review of survey methods
Part 5 – Index construction
Part 6 – Seasonal and calendar adjustment
Part 7 – Next steps

The RSI and the Retail Sales Inquiry are explained in an article ‘Interpreting Retail Sales Data’ published in April 2003 Economic Trends.

The Retail Sales Index (RSI) is a base-weighted (Laspeyres) index measuring monthly movements in the average weekly retail turnover of retailers in Great Britain. Headline data are presented in constant prices (volume) seasonally adjusted. The seasonally adjusted series are also adjusted for calendar effects introduced because the RSI is based on a pattern of four, four, five week standard periods within a quarter.

The RSI is compiled from data collected in the Retail Sales Inquiry; the inquiry goes out to a sample of almost 5,000 retailers of all sizes every month. All of the largest 900 retailers are included in the sample, together with a sample of smaller retailers.
The Retail Sales Inquiry collects total retail turnover from retailers for the standard periods of four, four, five weeks within each quarter. Around three-quarters of respondents provide data for these standard periods. Some retailers are unable to report on the standard four or five week basis. Where this is the case, the data is adjusted to bring it into line.

Part 2 – Developments

Between now and October 2003 we will be carrying out the routine rebasing of the RSI from 1995=100 to 2000=100. Rebasing is likely to lead to revisions from January 2000 onwards. We are also conducting a triennial review of the Retail Sales Inquiry, which will include a review of the survey estimation.

The computer system to produce the retail sales index works only with the matched-pairs methods so if we update our estimation method we will need a new index construction system. A new system would have minimal impact on the numbers.

We are also taking the opportunity of rebasing and the review of estimation to look at some other aspects of the Retail Sales Index, such as calendar and seasonal adjustment.

Part 3 – Rebasing

We are planning to rebase the RSI from 1995=100 to 2000=100 and to publish the results in October 2003. This is a routine five-yearly process. For the RSI, the main stages in the rebasing exercise are:

- re-weight the deflators from the current base year (1995) to the new base year (2000);
- re-reference the index onto 2000=100.

The rebasing exercise is also an opportunity to introduce some other associated improvements. The EU have recently produced a European wide classification of commodities – COICOP (Classification of Individual Consumption by Purpose). The re-based RSI will use the COICOP classification for deflators from 2000 onwards. We are also considering whether to move from using an arithmetic mean to a harmonic mean for combining the detailed commodity deflators.

As in previous rebasings we will also:

- Rework turnover estimates for each month from the base year to date (to take account of the new turnover levels in the base year and latest data from retailers).
- Link the 2000=100 series to the existing 1995=100 indices. This will maintain the 1995 based growth rates prior to 2000, resulting in a loss of additivity in the historical estimates.

For this rebasing exercise, we are considering:

- Redefining our size strata for estimation based on employment size rather than turnover.
- This would mean we would re-define ‘small’ and ‘large’ retailers. At the moment large retailers are defined as those with a turnover of at least £5 million in the base year (1995), it is likely that we would define large retailers as those with employment greater than or equal to 100. The difference between these two definitions is likely to be small.
- Taking on changes in industrial classification and size of firms as they happen, rather than periodic updating at the time of rebasing.

Although we eventually aim to chain-link the RSI, we do not expect to be able to do this to the same timetable as for the National Accounts (the plan is to publish chain-linked National Accounts in the 2003 Blue Book). However, when National Accounts chain-linking is introduced, the National Accounts will be chain-linked up to 2000, and will be on a 2000=100 base for the period from 2000. The National Accounts and RSI will thus be on the same basis for the most recent periods.

Part 4 – Review of survey methods

We are carrying out a triennial review of the Retail Sales Inquiry (the survey which underlies the Retail Sales Index) as required under the Prime Minister’s instruction on the control of statistical surveys. These reviews of surveys are to assure us that surveys are still required, that they continue to meet their customer needs and impose the minimum burden on contributors subject to meeting user needs.

Updating the sample allocation

The total sample size for the retail sales inquiry is 5,000; this sample is allocated to industry by sizeband strata or ‘cells’. We have recently implemented the following changes:

- the allocation has been designed to minimise the standard error of the monthly change in retail sales;
- retailers with between 10 and 99 employment will remain in the survey for 27 months;
small retailers with large turnover (annual turnover at least £40 million) will always be included in the sample.

The changes were implemented in three stages between September 2002 and January 2003.

Survey estimation

As part of the current triennial review we are taking forward a recommendation from the last triennial review. The last review recommended that ‘the retail sales index should move … to a system based on grossing to the register each month’ – i.e. to use ratio estimation, the standard business survey method of estimation. The Retail Sales Inquiry currently uses a matched-pairs approach for the sampled part of the survey (about 30 per cent of the total retail turnover), rather than ‘ratio estimation’ that is more commonly used for business surveys. Table 1 compares the main features of matched-pairs and ratio estimation.

<table>
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<tr>
<th>Table 1</th>
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<tr>
<td><strong>Matched pairs</strong></td>
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<td>Designed to estimate month on month changes</td>
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<tr>
<td>Uses data from respondents who have returned for current and previous periods</td>
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<tr>
<td>Therefore, stable over two consecutive months</td>
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<td>Measures changes only in the sample chosen</td>
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The review will consider the feasibility of introducing ratio estimation for the Retail Sales Inquiry, and the likely impact.

Other survey processes under review

We are considering whether other survey processes need to be changed to work with ratio estimation. The areas being considered for change are:

- Imputation for non-response;
- Outlier detection and treatment.

**Imputation for non-response**

We routinely response chase retailers who fail to respond to the survey. Even so, some large retailers (those with employment of at least 100) fail to respond in time to be included in provisional survey results. For these large non-responding retailers, figures are manually imputed based on the individual histories of the retailer concerned. Smaller retailers who do not respond are assumed to move in the same way as small responding retailers. We are considering whether we can use the standard ONS business survey method for imputing for non-respondents for the retail sales inquiry. This standard method calculates, within each industry, the average monthly movements for those retailers who have returned. It then applies that average monthly movement to the previous (returned or imputed) value for non-responding retailers. This produces an imputed turnover figure for the retailer for the current month. The performance of this standard method will be tested for the RSI.

**Outliers (contributors with atypical returns)**

Unusually high or low turnover returns from retailers can distort the turnover estimates produced. The current approach:

- Completely excludes a retailer’s data if the ratio of the current month’s sales to the previous month’s sales is less than 0.2 or greater than 5; experience has shown that data outside these limits is usually incorrect. Retailers with data which is less extreme but atypical may be excluded from the calculation of the month on month movement but their data will be added back to produce the final totals. These less extreme, atypical retailers are currently identified manually.

We are considering whether a commonly used standard method (‘winsorisation’) should be introduced for identifying and treating outliers.

**Part 5 – Index construction**

The current computer system to produce the Retail Sales Index works only with the matched-pairs methods so any move to ratio estimation would need a new index construction system. A new system would have minimal impact on the numbers, but would move the RSI onto a more modern system. We are considering a system based on that being developed for the Index of Production (Fletcher and Williams 2002). A new system would deliver the following benefits:

- Improved flexibility – to respond to future developments and improvements to methods.
- Improved consistency and coherence – the RSI would move to the ONS standard computing system and environment, as used for other economic statistics. As a result, the RSI would be able to take advantage of standard functionality. For example, we would be able to more easily chain link the RSI (although chain linking is unlikely to be implemented before October 2003).
- Opportunity for more analyses.
Part 6 – Seasonal and calendar adjustment

Figure 1 illustrates the profound seasonality exhibited by retail sales each year. Sales build up heavily towards Christmas and then fall away very sharply in January. There is a modest build up in the summer and fallback in the autumn. Sometimes there is a more modest build up to Easter and fall back afterwards. However, while the broad sweep of these patterns are similar from year to year, many complications can occur that distort the seasonal patterns.

Overview of RSI seasonal and calendar adjustment

- The RSI is seasonally adjusted using X11ARIMA, the standard program for seasonal adjustment in ONS.

- Special measures are in place to deal with the moving bank holidays and the phase-shift effect (see below) – this is known as calendar adjustment.

- Moving bank holidays: when working with calendar month based data, the only holiday that moves between months is Easter. However, when data is compiled on a four, four, five week basis the late May Bank Holiday and the August Bank Holiday also become moving holidays, since they do not always occur in the same standard RSI period.

- The phase shift-effect: RSI data are presented for four, four, five week standard periods within a quarter and so are not subject to trading day variation (for example, in a calendar month there are sometimes four Saturdays and sometimes five). However, the standard periods do introduce a ‘phase-shift’ effect, associated with the fact that the standard periods do not match calendar months and move slightly each year relative to the calendar month. In a typical year, the standard periods total 52 weeks or 364 days compared to 365 (366 in a leap year) in a calendar year. As a result, the standard periods ‘slip back’ one (or two) days every year. The reporting year is brought back into line with the calendar year by adding an extra week, normally to January, every five or six years. Adjusting for the phase-shift moves the estimate based on the standard period onto an ‘average’ month.

- Calendar adjustment is applied within X11ARIMA (as permanent prior adjustment factors).
We are taking the opportunity of rebasing and the review of estimation to review seasonal and calendar adjustment.

The basic approach to calendar and seasonal adjustment will remain unchanged. The seasonal adjustment parameters need to be reviewed periodically; any changes to the parameters will take account of the recent data, including any revisions from January 2000 as a result of rebasing and the review of estimation.

**Reviewing calendar adjustment**

The current approach to calendar adjustment is based on fitting a regression model to estimate the impact of moving bank holidays and the phase-shift effect. The current model was derived using data up to the mid 1990s. We are reviewing the regression model using data up to the end of 2002, which might lead to a revised regression model.

Any changes to seasonal or calendar adjustment will possibly lead to changes from January 2000 onwards. Any changes will be considered for implementation in October 2003 at the earliest.

**Part 7 – Next Steps**

We will continue with our work to rebase the RSI onto 2000=100 and to publish a rebased dataset in October 2003. The rebasing exercise is likely to introduce revisions to published data from January 2000. These revisions will affect all published series. We will continue to evaluate the methods and systems being considered. An article explaining the likely impact on the RSI will accompany any changes. Implementation will be in October 2003 at the earliest and is unlikely to lead to revisions prior to January 2000.

For further information please contact Pam Davies, e-mail pam.davies@ons.gov.uk

**References**
