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Changes to the retail sales methodology

SUMMARY

This article is based on a previously published information article which was released on 15 May 2009. It outlines methodological and publication changes in the calculation of the value and volume retail sales estimates from the ONS Retail Sales Inquiry that were introduced in the April 2009 retail sales estimates, which were published on 21 May 2009. A comparison between the previously published estimates and the estimates including all the methodological changes is provided for the 'All retailing' estimate.

Introduction

The Office for National Statistics (ONS) compiles and publishes each month the Retail Sales Index (RSI) based on a comprehensive and broad based survey of around 5000 different types of retail businesses. The RSI is a key economic indicator and one of the earliest short-term measures of economic activity. It is used to estimate consumer spending on retail goods and the output of the retail sector, both of which are used in the compilation of the National Accounts.

The main output measures include value and volume estimates, in both seasonally adjusted and non-seasonally adjusted forms. The value estimates reflect the total turnover that businesses have collected over a standard period, while the volume estimates are calculated by taking the value estimates and adjusting to remove the impact of price changes. The value and volume measures of retail sales estimates are widely used in private and public sector institutions, particularly by the Bank of England (BoE) and Her Majesty's Treasury (HMT), to assist in informed decision and policy making.

User review and consultation

It is important that the ONS retail sales estimates continue to be produced according to internationally recognised best practice and standards. This requires regular review and updating of outputs and methods used to calculate the final retail sales estimates, to ensure they are produced to the highest possible quality, while also meeting changing user needs and demands. The previous major change to the methodology and production processes for the retail sales estimates occurred in 2003 (see ONS, 2003). ONS staff recently assessed these methods and systems processes thoroughly and concluded that they continued to reflect correctly the methods implemented in 2003.

As part of the ONS continuous improvement process, a recent comprehensive user consultation and review was conducted from July 2007 to February 2008 (see ONS, 2008a). This user consultation highlighted potential areas of change for the methods used and publication material of the retail sales estimates. Feedback was obtained from a wide range of respondents, including key users such as the BoE, HMT and the Department for Business, Enterprise and Regulatory Reform (DBERR). As a result of this user feedback, changes to methods and release material were proposed, such as the introduction of annual chain-linking and improving the clarity of the retail sales publication.

A summary of the changes to the ONS retail sales estimates which were published on 21 May 2009 are:

1. Re-referencing of the index for both value and volume estimates to 2005 = 100
2. Use of commodity indices from the Consumer Prices Index (CPI) rather than from the Retail Prices Index (RPI) for the calculation of RSI industry deflators

3. Use of chain-linking for the calculation of volume estimates

4. Availability of seasonally adjusted estimates at a greater level of industry detail

5. Streamlining the presentation of the published estimates

6. Reducing the focus on non-seasonally adjusted estimates within the statistical release

7. Continued development and publication of a separate internet retail sales estimate

All the implemented method changes were thoroughly assessed and quality assured, including an additional review of the methodology by ONS' Methodology Directorate in conjunction with Southampton University. As part of the Code of Practice for Official Statistics, there was further consultation of the proposed changes with key users including the BoE, HMT, and DBERR.

The changes to methods and publication material described in this article were introduced in the April 2009 publication of the Retail Sales Inquiry release which was published on 21 May 2009.

Re-referencing the index to 2005

The reference period is the year for which the index is scaled to equal 100. The RSI was previously published in index form with a reference year of 2000 equal to 100.

The RSI is now re-referenced to 2005 equal to 100 for the value and volume indices. The change to the reference year is a simple calculation and does not impact on the movements in the series.

As part of this process, congruence checks were conducted for all businesses reporting to both the Annual Business Inquiry (ABI) and the monthly Retail Sales Inquiry. This ensures that business information, such as turnover and employment, is up to date, accurate and consistent across these two different sources.

Using price indices from the CPI in calculating RSI industry deflators

To calculate RSI volume measures for each industry, price deflators are applied to the RSI sales values to remove the effect of changes in prices. A separate price deflator is used for each RSI industry.

Industry price deflators are calculated from commodity price indices using weights appropriate to the relevant industry

derived from ABI data on the value of turnover. Previously, commodity weights from the year 2000 ABI were used; now, weights for the year 2005 ABI are used.

The previous approach used commodity price indices calculated from price indices derived from the RPI but aggregated using weights from the CPI. The reason for using weights from the CPI is that they better reflect total retail expenditure in the UK, which is the most appropriate source of weights for RSI. CPI weights are derived from National Accounts household expenditure, which includes the expenditure of all private households in the UK, foreign visitors to the UK and people living in other accommodation such as nursing homes, retirement homes and university halls. In comparison, the RPI weights are largely based on the Expenditure and Food Survey, which only includes private households in the UK, and exclude the contributions to total expenditure from the top four per cent of households by income and from pensioner households that derive at least three quarters of their income from state benefits.

The approach now uses commodity price indices calculated from price indices derived from the CPI and aggregated using weights from the CPI.

As well as the scope differences described above, the calculation of the initial price indices within the RPI and CPI use different mathematical formulae to combine prices collected within each item in the retail basket. The CPI uses a formula that takes some account of substitution between similar products within each item, while the RPI uses a formula which does not allow for substitution between products within each item. Substitution between products arises as consumers change their patterns of expenditure towards those products whose prices are rising most slowly. For RSI, it is important that these substitution effects are accounted for by the price indices. The use of CPI rather than RPI for the commodity price indices ensures that the RSI volume indices are not adversely affected by the substitution effect. For detailed information on the methodological differences between the CPI and RPI see the Consumer Price Indices Technical Manual (ONS, 2007).

The initial price indices derived from the CPI are generally less than or equal to the corresponding initial price indices derived from the RPI due to the differences in formula.

The impact of using price indices from the CPI is higher rates of growth for the volume estimates, as a result of that change on its own. This change does not affect the value estimates.

Creating a chain-linked index

Previously, RSI volume indices were based on the assumption of fixed prices for a base period of the year 2000. Over a long time period, a fixed base index, will generate what is known as substitution bias. When consumers switch their spending away from goods with rising prices towards those with falling (or less rapidly rising) prices, goods with high price increases tend to have lower increases in volume than goods with low price increases. In a fixed base index, use of the lower base prices for goods with high price increases means that the economic importance of their low increases in volume is understated because the index does not take account of the higher current prices for these goods. In a similar way, the economic importance of the higher increases in volume for goods with low price increases is overstated. The combined impact of these effects is that fixed base indices tend, over a long period, to overstate growth in the volume of sales.

This problem was previously addressed by regular five-yearly rebasing where the base year is changed every five years, so that base prices are not too different from current prices. At rebasing, the indices for different base years are linked together by scaling one index up or down so that the indices from the different base years match at some defined link period. This linking process effectively absorbed the substitution effect into the RSI volume index but in a way that maintained the integrity of the index as a measure of volume change.

However, in a rapidly changing economy, even five-yearly rebasing is not sufficiently frequent to reduce substitution bias to an acceptable level. In response to user requests, supported by the review of methodology, the RSI is now rebased every year. This annual rebasing is usually referred to as annual chain-linking. Annual chain-linking is an internationally recognised approach and is recommended by Eurostat and used by most EU Member States. ONS National Accounts use chain-linking in the compilation of high profile estimates such as Gross Domestic Product. RSI will use chain-linking methods consistent with the standard National Accounts method, as described in Tuke and Reed (2001).

As already noted, volume indices calculated using annual chain-linking will

generally show lower growth than fixed base indices, as a result of that change on its own. Chain-linking does not affect value estimates.

The following main steps are undertaken to create chain-linked estimates for the RSI:

1. For each year, relative proportions, i.e. weights for sales values, of each industry within all retailing are calculated using actual data from the RSI. ONS (2009b) gives a table of the industry weights by category, for the most recent year available (2008). Previously, the RSI used industry weights derived from data for the year 2000 ABI. Annually revised weights based on the RSI will be more timely and up to date.

2. Each year's index estimates are linked together using a three month average as opposed to a single month, in order to reduce volatility. The period used is from October to December each year. This is standard practice within ONS for National Accounts outputs.

3. Chain-linking starts at the lowest possible level of aggregation. For the RSI this means that aggregation uses the small and medium businesses combined with the large businesses for each industry within each retail sector. These estimates are used to create a chain-linked estimate for all businesses for each industry. Higher level chain-linked aggregates are then derived in a similar way.

4. Chain-linking requires knowledge of the previous year prices so the data can be linked together over time. Data is now published from January 1988 for value and volume for both non-seasonally adjusted and seasonally adjusted estimates.

The introduction and use of chain-linking addresses one of the main user requests, particularly from the BoE, from the recent user review in 2007.

Change in the level of seasonal adjustment

The methodological changes that have been introduced, such as chain-linking and the use of price indices from the CPI, mean that the estimates for the value and volume non-seasonally adjusted time series have been revised along the length of the series.

The non-seasonally adjusted value and volume estimates are now calculated for twenty one different industries, for small and medium businesses and for

large businesses separately. Higher level aggregates are then derived from the lower level estimates. Data for the non-seasonally adjusted estimates, subject to confidentiality assessments, is still available in the Retail Sales Statistical Data Monitor.

Because the non-seasonally adjusted estimates have been revised, a thorough re-assessment of time series properties has been performed on the new chain-linked non-seasonally adjusted estimates. As part of this process, seasonal adjustment parameters have been re-assessed and updated as necessary. These include appropriate adjustments for: outliers, level shifts, Easter, standard reporting periods, bank holidays and accounting for the timing of Christmas Day. These adjustments are series dependent.

Seasonally adjusted value and volume estimates are now calculated for twenty one different industries rather than for the nine series currently analysed. This allows users to analyse seasonally adjusted series at a more detailed level. For example, seasonally adjusted estimates will be calculated for electrical stores, furniture and hardware, whereas it was only previously available for Household goods in total.

Higher level seasonally adjusted aggregates are constructed using the same process used for the chain-linked non-seasonally adjusted estimates. Seasonally adjusted estimates are still published for the main aggregates, with the opportunity to publish seasonally adjusted estimates at a greater level of detail.

An increased level of detail for the seasonally adjusted estimates contributed to revisions to previously published higher level seasonally adjusted aggregates.

Changes to published information

The retail sales estimates were previously published each month in the Retail Sales First Release, Retail Sales Statistical Data Monitor, briefing note, a separate experimental Internet Sales First Release and a news release.

A revised Statistical Bulletin format was introduced on 21 May 2009 to streamline the release of the retail sales material. The Retail Sales Statistical Data Monitor, which includes detailed information for detailed industries and different types of businesses, continues to be published separately.

Previously published material included a range of information based on the non-seasonally adjusted and seasonally adjusted series, and indicators derived from the seasonally adjusted estimates.

Each estimate provided a complementary view of the activity within a particular retail sector. The Statistical Bulletin uses a selected combination of previously published information and includes changes to the presentation by focusing on the year-on-year percentage change as the headline indicator for both the value and volume seasonally adjusted estimates. A detailed sector summary is now included, focusing on the three main aggregates: predominantly food; predominantly non-food; and non-store retailing and repair. Information on the implied price deflators will also be included. The experimental Internet sales release is now included in the Statistical Bulletin and is not published separately.

Some analysis of the raw data continues to be included in the Statistical Bulletin to demonstrate the wide range of experiences by size of business and type of industry. The aggregate non-seasonally adjusted estimates continue to be available, along with other indicators, in the Retail Sales Business Monitor and on the ONS website. Note that the non-seasonally adjusted estimates still contain calendar effects. In practice this can lead to a distortion depending on the timing of the reporting period in relation to calendar months, previous reporting periods and how weekly activity changes over time. The use of the non-seasonally adjusted estimates for analysis will give a misleading indication of activity over time. For most purposes, it is best to focus on the seasonally adjusted estimates, which have the calendar related component removed.

Continued development of the experimental Internet sales estimate

Sales made over the Internet are an important and rapidly evolving part of the retail sector. Internet retail sales are already included within the monthly RSI. To improve the understanding of this sector, a separate experimental Internet retail sales estimate has already been produced on a monthly basis since December 2008. For a full description of the current methods see 'An experimental measure of Internet retail sales' (ONS, 2008b).

As part of continued development, a dedicated question relating to Internet retail sales, that is applicable for all businesses within the RSI, has been included on the RSI questionnaire since March 2009. In the coming months, the information collected from all businesses will be used to update the proportion of retail sales that relate to Internet sales for small, medium and large

businesses. Even though this estimate is designated as experimental, it is derived primarily from information collected through the Retail Sales Inquiry, with the experimental label relating to the use of proportions of internet sales for small and medium businesses rather than the quality of the actual data. The use of a dedicated question collecting actual data for all businesses in the sample will ensure that this indicator reflects the dynamic and rapid nature of this sector across different sizes of business. Until all development work is completed, the Internet retail sales estimate will continue to remain an experimental estimate and will not be designated a National Statistic.

To improve the coherence of the retail sales release, the separate experimental Internet sales release has been discontinued and this information included in the Retail Sales Statistical Bulletin. This particular statistic is clearly labelled as experimental.

Example: Impact of changes based on March 2009 data

To understand the impact of the introduction of the methodological changes, it is necessary to compare the previously published estimates against the estimates which include the methodological changes. Analysis of the 'All retailing' estimates has been provided. The methodological changes may have different impacts for lower level time series.

To assist in the comparison the previously published estimates have been re-referenced to a base year of 2005 equal to 100 to ensure the comparison is made with the two series at the same level. Re-referencing does not change the movements in a time series. The estimates currently produced now combine the separate method changes set out above and are available up to April 2009 as published on 21 May 2009. The previously published estimates use data available up to March 2009.

Figure 1 shows that differences between previously published estimates and new estimates for the value seasonally adjusted estimates are minimal. This is expected as the methodological changes primarily affect the calculation of volumes. **Figure 2** shows that the year-on-year percentage changes for the value seasonally adjusted estimates are broadly similar under both methods.

Figure 3 and **Figure 4** show the volume seasonally adjusted estimates. Figure 4 shows that the year-on-year percentage changes for the new volume estimates are lower for the most recent months.
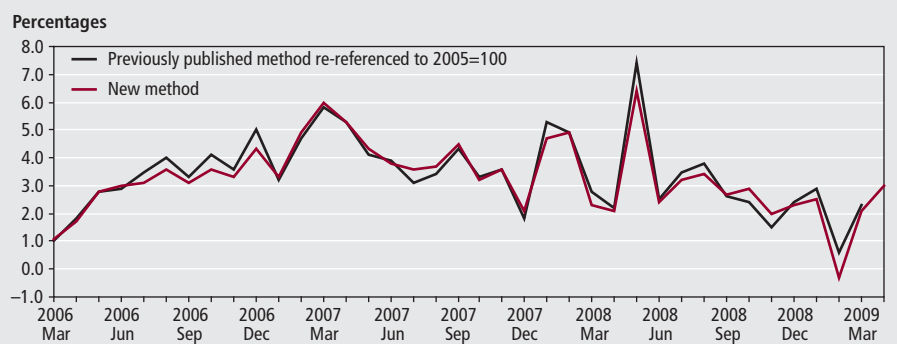
Table 1 gives summaries of year-on-year

Figure 1
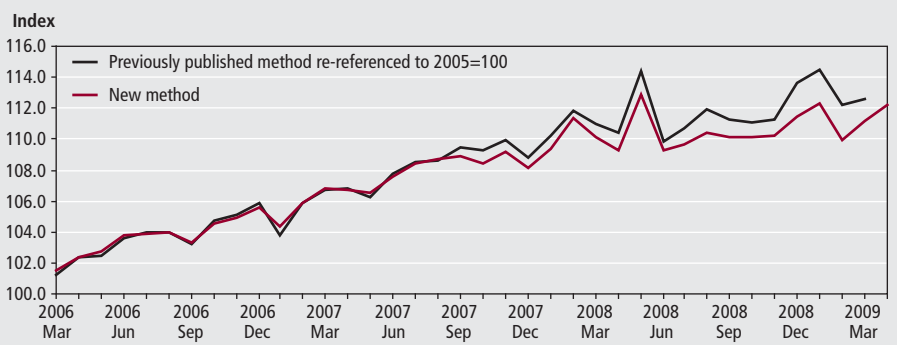### All Retailing for value, seasonally adjusted, 2006 to 2009
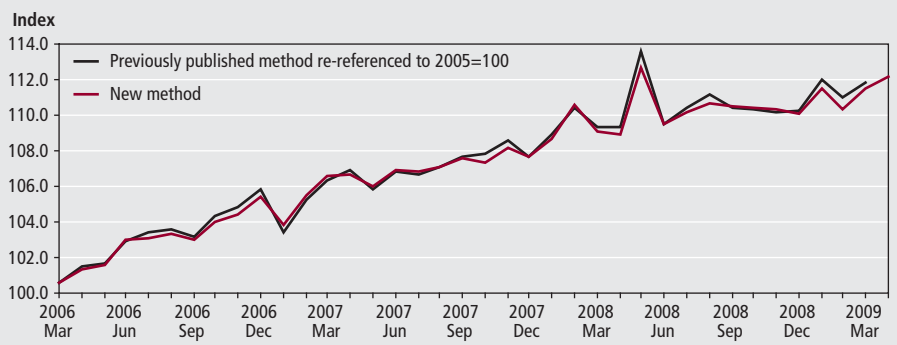
Source: ONS Retail Sales inquiry

Figure 2
All Retailing for value, seasonally adjusted year-on-year percentage change, 2006 to 2009

Source: ONS Retail Sales inquiry

Figure 3
All Retailing for volume, seasonally adjusted, 2006 to 2009

Source: ONS Retail Sales inquiry

Figure 4
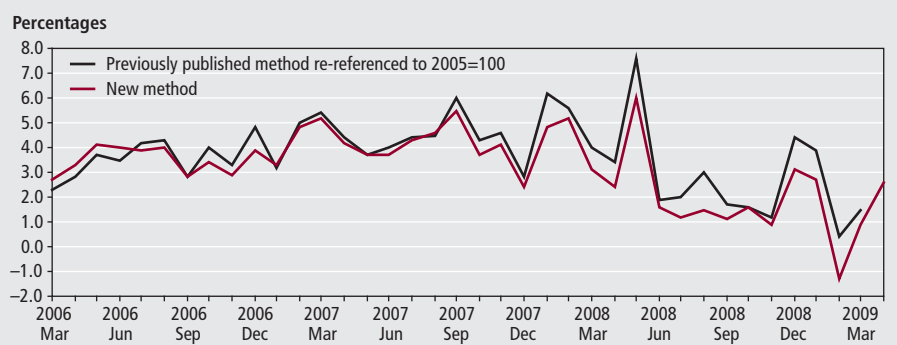### All Retailing for volume, seasonally adjusted year-on-year percentage change, 2006 to 2009

Source: ONS Retail Sales inquiry

Table 1

All retailing year-on-year percentage movements, for value and volume, seasonally adjusted estimates

Percentages

		Value		Volume	
		Previous method re-referenced to 2005	New method	Previous method re-referenced to 2005	New method
2008	Mar	2.8	2.3	4.0	3.1
	Apr	2.2	2.1	3.4	2.4
	May	7.4	6.4	7.6	6.0
	Jun	2.5	2.4	1.9	1.6
	Jul	3.5	3.2	2.0	1.2
	Aug	3.8	3.4	3.0	1.5
	Sep	2.6	2.7	1.7	1.1
	Oct	2.4	2.9	1.6	1.6
	Nov	1.5	2.0	1.2	0.9
	Dec	2.4	2.3	4.4	3.1
2009	Jan	2.9	2.5	3.9	2.7
	Feb	0.6	−0.3	0.4	−1.3
	Mar	2.3	2.1	1.5	0.9
	Apr	n.a.	3.0	n.a.	2.6

Source: ONS Retail Sales inquiry

percentage movements for the previous method, re-referenced to 2005, and the new method, for the All retailing series. Impacts will be different for different series.

Conclusion

The RSI is an important early indicator which gives an understanding of the current state of the economy. The changes that have been introduced into the production and publication of the retail sales estimates respond directly to user feedback made as part of the regular review process, and follow international best practice.

The impact of recent method changes has lowered the growth in the volume of retail sales from 10.1 per cent to 8.7 per cent over the last three years, calculated using data from March 2006 to March 2009. The value estimates are relatively unchanged.

These changes described in this article were introduced in the April 2009 Retail Sales Statistical Bulletin which was released on 21 May 2009. The information in this article is based on a previously published information article which was released on 15 May 2009.

Additionally, further changes to the Retail Sales Inquiry will be made in 2010 with the introduction of a new Standard Industrial Classification (SIC 2007). This is a coordinated change across ONS, and is taking place in line with the major revision of the industrial classification system agreed by the United Nations and used by European Union (EU) Member States. An article describing the impact on the retail sales estimates will be published before the changes are introduced.

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