

Statistics New Zealand - Te Tari Tatau

Retail Trade Survey - Redesign September 2003

Article:

Changes to the Monthly Retail Trade Survey

1. Introduction

The Monthly Retail Trade Survey (RTS) has been redesigned. The previous design operated from the May 1995 to the October 2003 month. Sample surveys require periodic redesign to ensure that the sample adequately represents the contemporary composition of the population.

The redesign of the RTS incorporates a number of methodological enhancements aimed at improving the reliability and quality of the results of the survey, while reducing the overall respondent load.

The existing previous RTS time series terminated at the October 2003 month. To assist users in moving to the redesigned survey, Statistics New Zealand has produced an analytical series, back from the October 2003 month to the May 1995 month. To provide the information necessary to produce this analytical series, a dual run of the August, September and October 2003 months was undertaken, whereby the survey was conducted on both the old and new designs.

The back-casting method incorporates a graduated shift accounting for the level differences identified between the old and new level estimates over the linking months. This assumes that the differences between the new and old series observed at the linking months have occurred gradually over the life of the previous survey. These differences have been smoothed back by a method that has ensured, where possible, the direction of quarterly changes of the historical series has been maintained.

The back-cast series are provided in an Excel spreadsheet attached to this article (see section 7).

2. Summary of changes

The previous RTS series was based on a statistical sample that was first surveyed in the May 1995 month. The last month of the old RTS was the October 2003 month. The RTS was a panel survey. Businesses had one chance of selection at their birth, and those that were introduced then remained in the sample until either they ceased operation in the retail industry or the panel was reselected. If a business changed owner but stayed within the retail industry then this business stayed within the sample.

Over time, sample designs become less effective in representing the current population. While the original samples are maintained to include a representative selection of new businesses, periodically, panel samples need to be refreshed to reflect changes in the composition of the population.

The RTS has been redesigned to provide better and more up-to-date coverage of the retail population. The new RTS design will, over time, allow changes in the composition of the population to be better represented in the survey.

Changes to the RTS (which will be discussed in more detail in section 5 below) include:

- a redesign of the survey questionnaire
- additional industry detail as the basis for the sample design
- the use of administrative (tax) data for small to medium-sized businesses in place of direct surveying
- the adoption of periodic re-selection of the survey sample population
- the use of bi-variate stratification in the sample design
- improvements in non-response imputation methodologies.

These changes have been made to ensure that the future estimates produced from the RTS continue to accurately reflect activity in the retail sector of the New Zealand economy.

During the August, September and October 2003 months the RTS was calculated on both the old and new basis. The primary purpose of this 'dual run' was to enable the comparison of the surveys run under the previous and redesigned methods, so that the two series could be linked at a single point in time. This facilitated the production of an analytical back series for the redefined output industries. Another important function of the dual run was to measure level shifts in the results coming from the two different designs, so that the results can be verified and explained.

The dual run exercise highlighted the importance of undertaking regular reselection of panel surveys in order to maintain their representativeness of the contemporary population.

3. Dual run and linking

For the August, September and October 2003 months the RTS was run on both the old and new basis, providing an overlap to allow for linking the old and new survey estimates.

There are a number of factors that have contributed to the difference in level estimates between the old and new surveys for the linking months. These include:

- sampling error
- non-sampling error
- the previous sample becoming less effective, over time, in representing the current retailing population.

Sampling error is a measure of the variability that occurs by chance because a sample rather than an entire population is surveyed.

Non-sampling errors in the survey data may result from errors in the sample frame, respondent error, mistakes made during processing survey results, and non-response imputation. Statistics New Zealand adopts procedures to detect and minimise these types of errors, but they may still occur and where not detected are not quantifiable.

The old RTS sample was designed to give statistics at the following levels of accuracy (at the 95 percent confidence interval limit):

- 2 percent for total sales and total stocks
- 1 percent for inter-period movement in total sales and total stocks
- 15 percent maximum for storetype sales.

The new RTS sample was designed to give statistics at the following levels of accuracy (at the 95 percent confidence interval limit):

- 2 percent for total sales and 3 percent for total stocks
- 10 percent total sales and 10 to 15 percent for total stocks at the detailed industry level, depending on industry size.

4. The back-cast series

The following graphs provide a comparison of the back-cast series from the new survey, along with data derived from the old survey.

The series labelled "Original" reflect the estimates that came from the old RTS design. In some instances the new published industries are more detailed than those that were originally published. In these cases, the new survey data has been re-compiled on the old storetype basis for presentation.

The series labelled "Linked" represent the final analytical back series for the new RTS. The difference between the "Original" and "Linked" series at the October 2003 month represents the aging of the sample that has occurred over the life of the old survey, and possible sample and non-sample error. This difference has been smoothed back over the historical back series. The smoothing methodology employed has ensured that where possible the inter-period direction of the movement in the "Original" quarterly series is preserved.

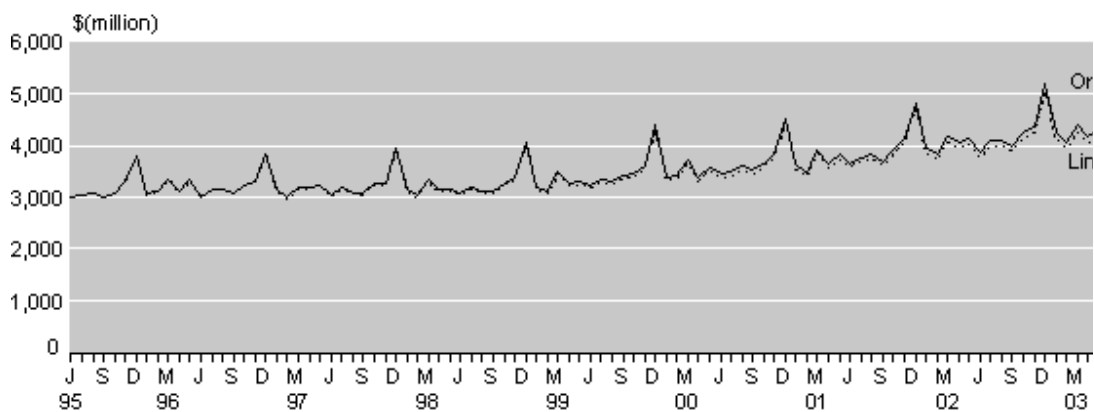
Link factors were calculated explicitly for each of the variables for which an analytical back series was produced. The link factors are calculated as the ratio of the new survey estimate for the variable to the "Original" estimate for the old series. A link factor of greater than one represents an estimated under-coverage in the old survey estimate.

The link factors for the sales variable at the linking period for each of the new published industries are summarised in the table below.

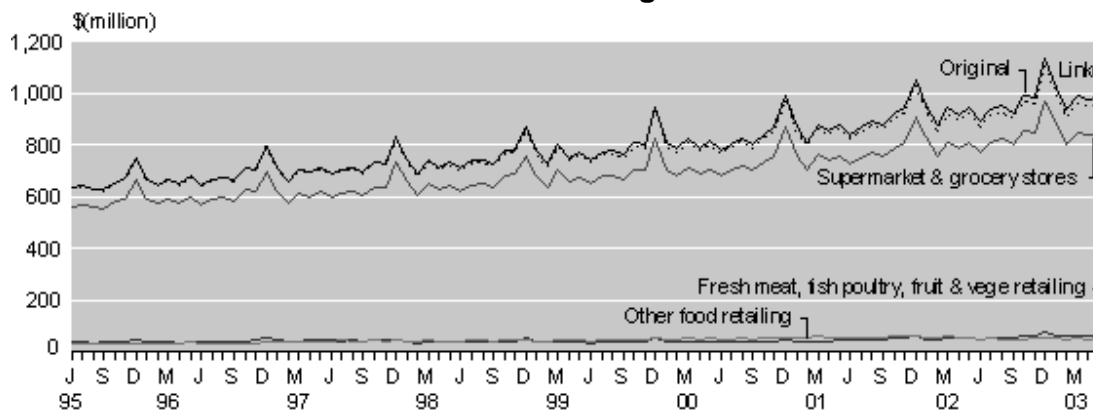
Link Factors for Sales	
Industry	Link factor
Supermarket and grocery stores	0.96
Fresh meat, poultry, fruit and vegetable retailing	1.08
Liquor retailing	0.83
Other food retailing	1.07
Takeaway food retailing	0.86
Department stores	1.00
Furniture and floor coverings retailing	0.89
Hardware retailing	0.98
Appliance retailing	1.17
Recreational goods retailing	0.94
Clothing and softgoods retailing	1.04
Footwear retailing	0.87

Chemist retailing	0.86
Household equipment repair retailing	1.08
Other retailing	1.01
Motor vehicle retailing	1.02
Automotive fuel retailing	0.79
Automotive electrical services, smash repairing and tyre retailing	0.85
Automotive repair and services nec	1.15
Accommodation	1.08
Bars and clubs	0.90
Cafes and restaurants	0.97
Personal and household goods hiring	1.06
Other personal services	1.04
Total Retail Trade	0.97

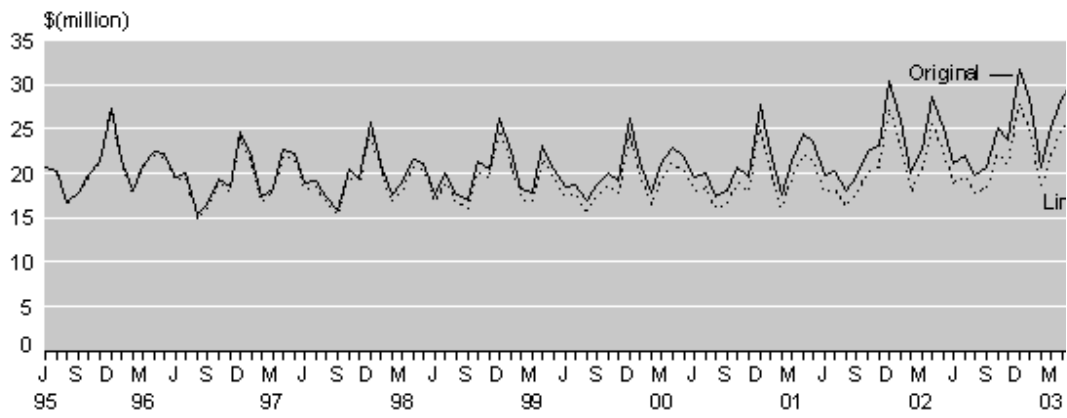
Total Retail Trade Sales



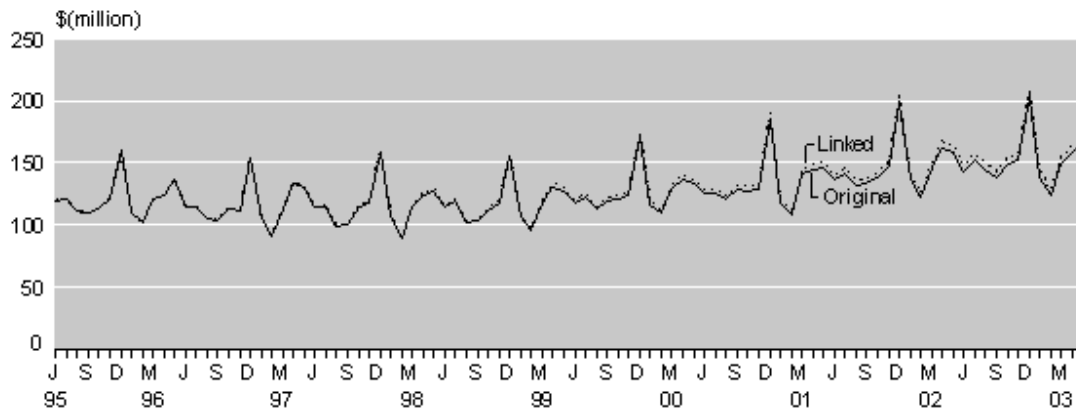
Food Retailing



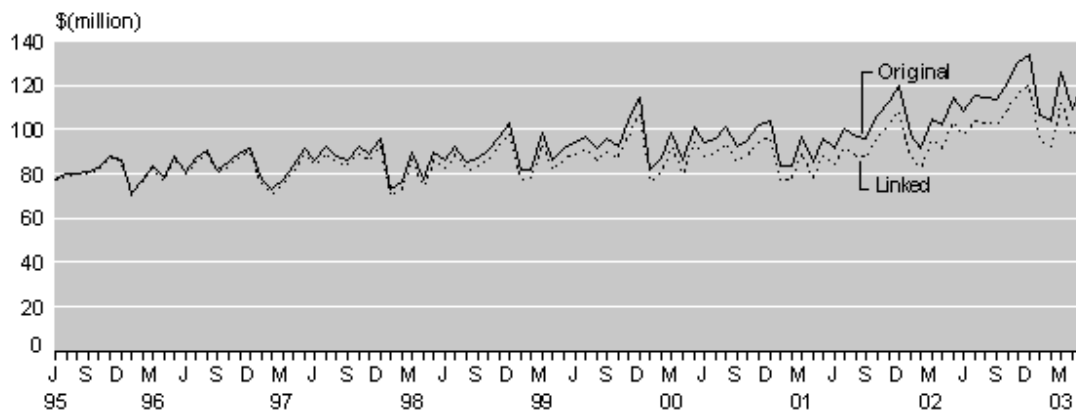
Footwear Retailing



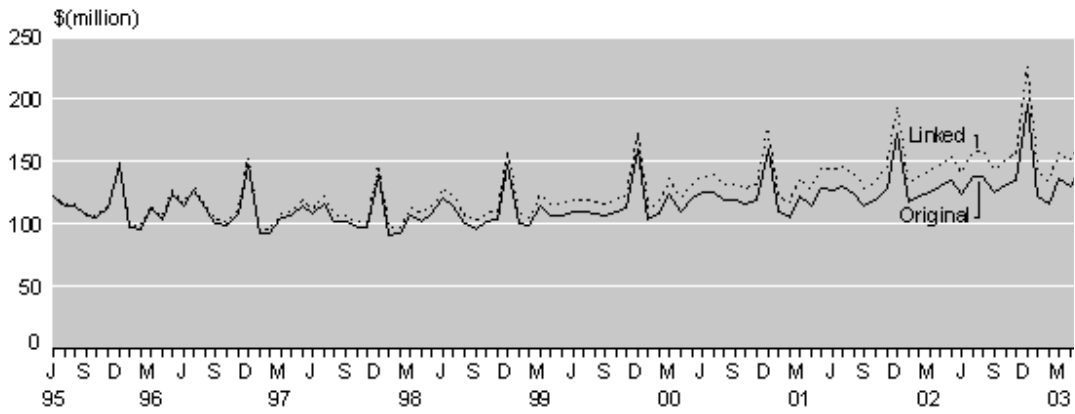
Clothing and Softgoods Retailing



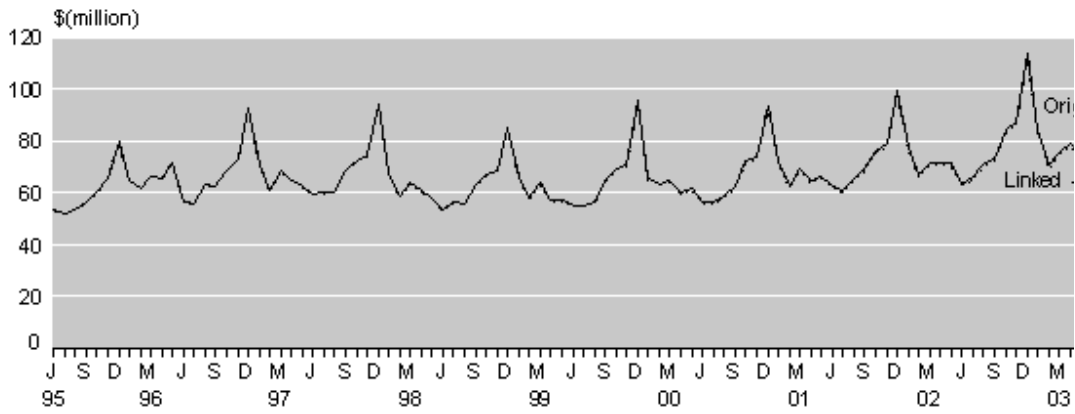
Furniture and Floorcoverings Retailing



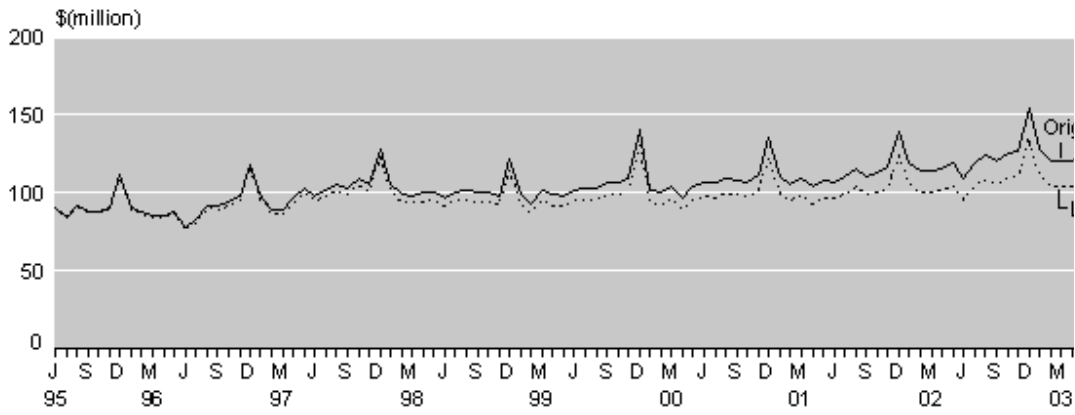
Appliance Retailing



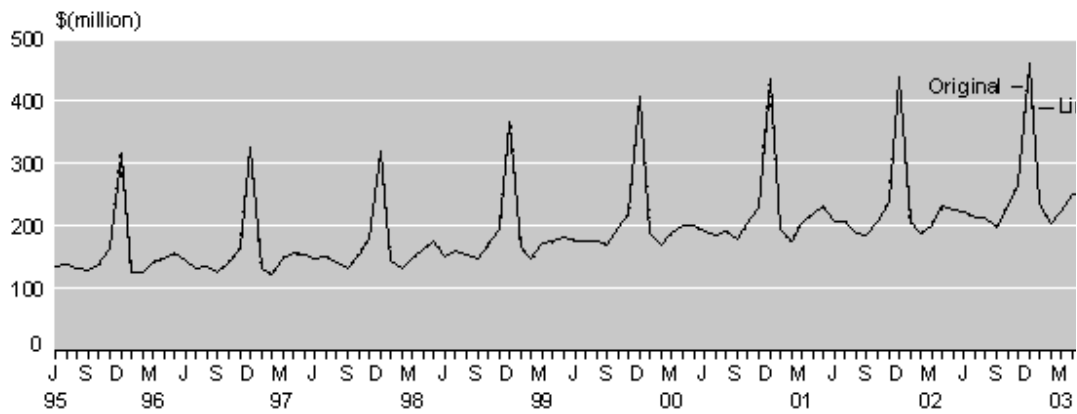
Hardware Retailing



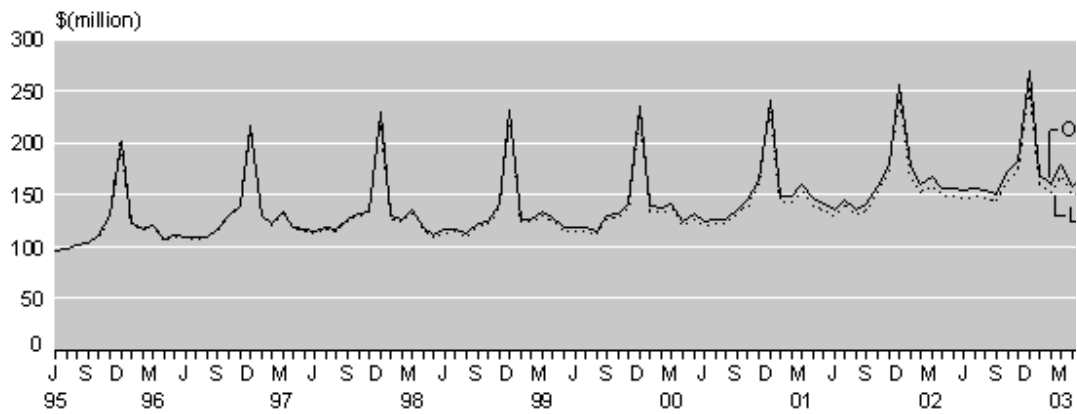
Chemist Retailing



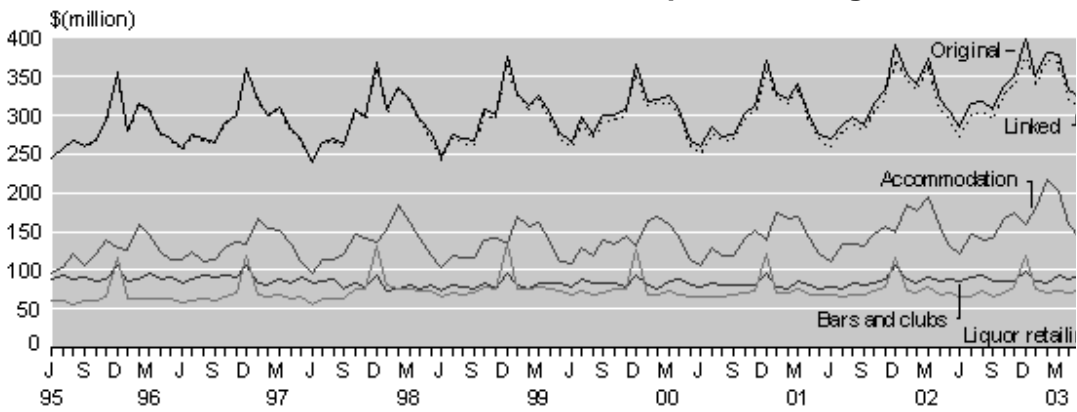
Department Stores



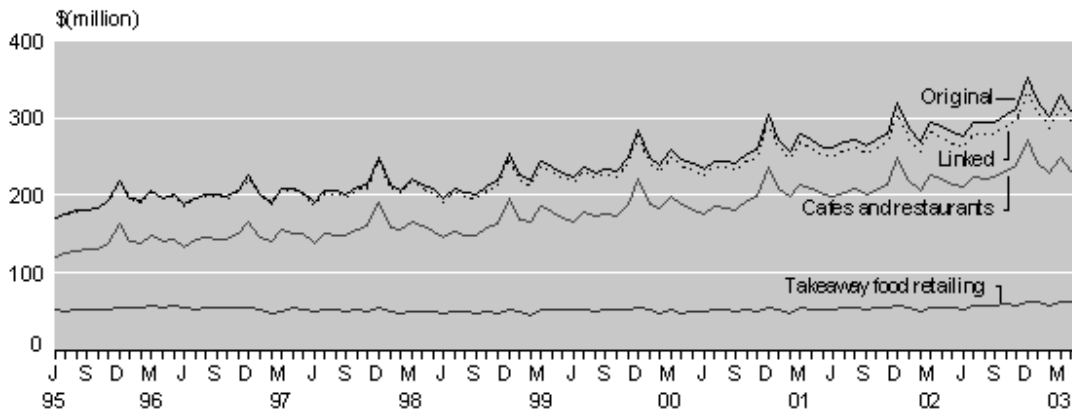
Recreational Goods Retailing



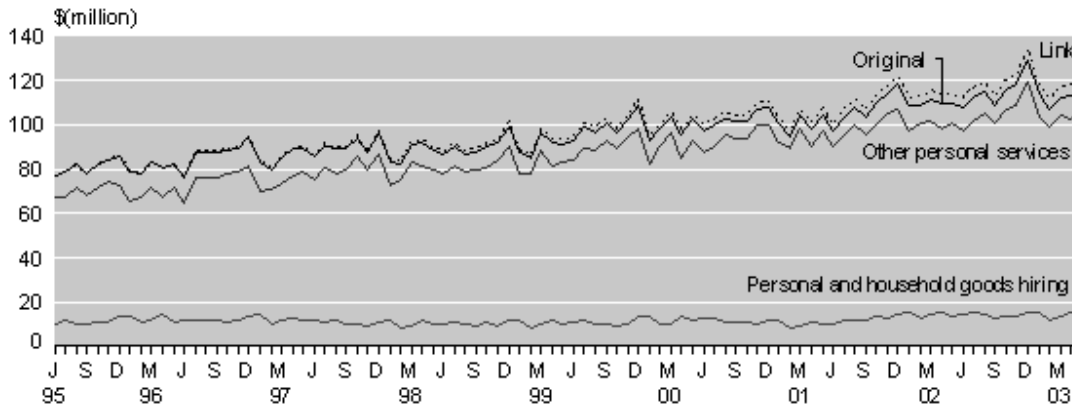
Accommodation, Hotels and Liquor Retailing



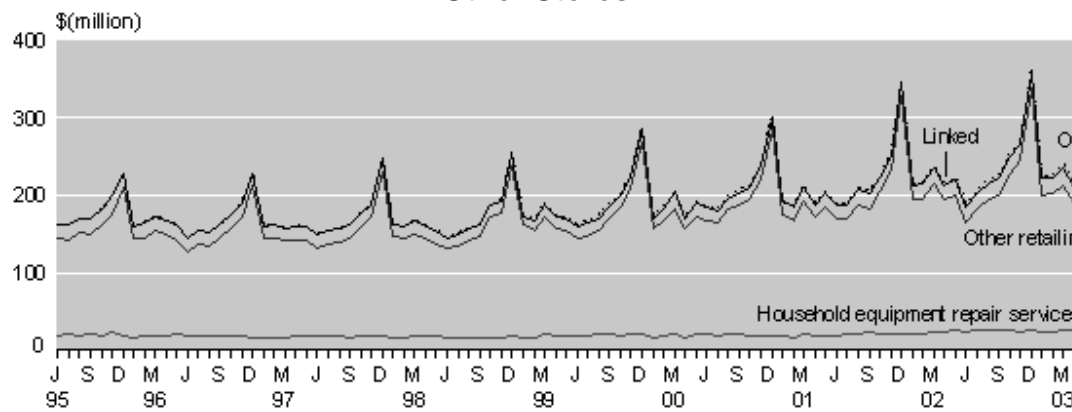
Cafes, Restaurants and Takeaways



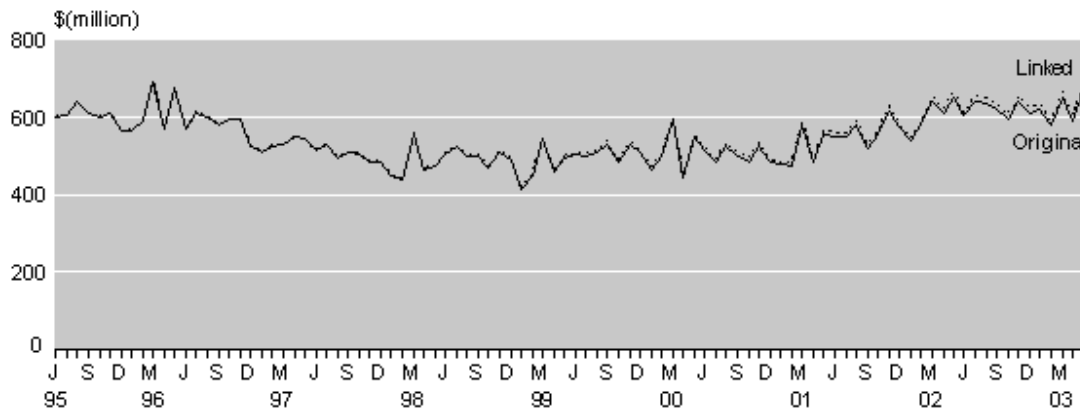
Personal and Household Services



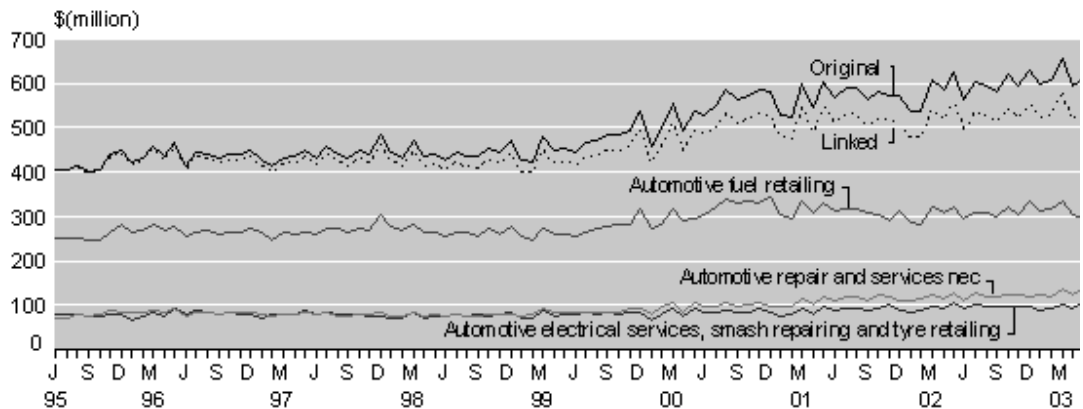
Other Stores



Motor Vehicle Retailing



Motor Vehicle Services



5. Details of changes

There were a number of distinct changes made to the RTS during the redesign process. These are detailed as follows:

5.1 Questionnaire redesign

Following consultation with key users of the RTS and extensive pilot testing of the questionnaire with respondents, both the content and the format of the questionnaire have been revised.

The content of the questionnaire was reviewed with a focus on meeting the core data requirements of users, while being mindful of the burden that such collection places on respondents. Initial testing had the following variables of interest included in the questionnaire:

- sales
- closing stocks (quarterly).

The content of the questionnaire and the format have also been updated to

allow for variable inclusions/exclusions to be more clearly specified. The questionnaire was also designed to allow for scanning to be used as a data capture mechanism in the future.

5.2 Chemists prescriptions

In the previous RTS design, chemists were asked to separate their income from prescriptions from their income from total retail sales.

There is no longer a need to separately identify prescription income as this information can be obtained from administrative data sources. In future chemists who are in the survey sample will be required to provide total sales only, which should reduce their response burden.

5.3 Change to ANZSIC design level

The previous RTS had been designed to provide estimates for 15 ANZSIC storetypes. While ANZSIC has again been used as the basis for the industry definitions, the redesigned RTS has used the 24 industry definitions which Statistics New Zealand uses in the production of estimates of the gross domestic product. In most instances, the new industries are either a one-to-one match with the previously published storetypes or a direct disaggregation of those storetypes.

The table below presents a concordance between the old storetypes and the new industries.

ANZSIC	Previous Storetype	Redesigned Industries
Food Retailing		
5110	Supermarket and grocery stores	G0111 – Supermarket and grocery stores
5121	Fresh meat, fish and poultry	G0121 – Fresh meat, poultry, fruit and vegetable retailing
5122	Fruit and vegetable	
5124	Bread and cake	G0123 – Other food retailing
5126	Milk vending	
5129	Specialised food retailing nec	
Footwear		
5222	Footwear	G0152 – Footwear
Clothing and softgoods		
5221	Clothing	G0151 – Clothing and softgoods retailing
5223	Fabrics and other softgoods	
Furniture and floorcoverings		

5231	Furniture	G0141 – Furniture and floor coverings retailing
5232	Floor coverings	
Appliance retailing		
5234	Domestic appliance	G0143 – Appliance retailing
5235	Recorded music	
Hardware		
5233	Domestic hardware and houseware	G0142 – Hardware retailing
Chemist		
5251	Pharmaceutical, cosmetic and toiletry	G0153 – Chemist retailing
Department stores		
5210	Department stores	G0131 – Department stores
Cafes, restaurants and takeaways		
5730	Cafes and restaurants	H0122 – Cafes and restaurants
5125	Takeaway food	G0124 Takeaway food retailing
Accommodation, hotels and liquor		
5710	Accommodation	H0111 – Accommodation
5720	Pubs, taverns and bars	H0121 – Bars and clubs
5740	Clubs (hospitality)	
5123	Liquor	G0122 – Liquor retailing
Motor vehicle retailing		
5311	Car retailing	G0161 – Motor vehicle retailing
5312	Motor cycle dealing	
5313	Trailer and caravan dealing	
Motor vehicle services		
5321	Automotive fuel	G0162 – Automotive fuel retailing

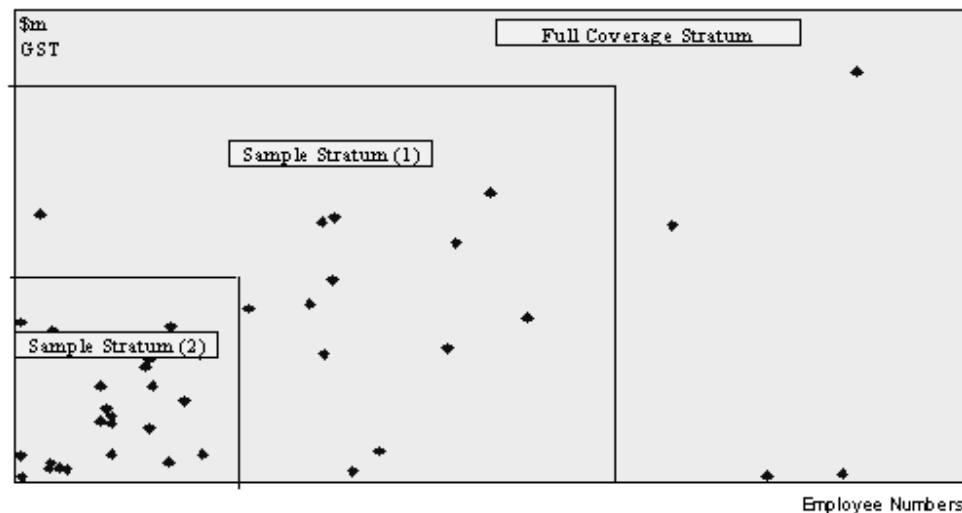
5322	Automotive electrical services	G0163 – Automotive electrical services, smash repairing and tyre retailing
5323	Smash retailing	
5324	Tyre retailing	
5329	Automotive repairs and services nec	G0164 – Automotive repair and services nec
Other stores		
5252	Antique and used goods	G0159 – Other retailing
5253	Garden supplies	
5254	Flowers	
5255	Watch and jewellery	
5259	Retailing nec	
5261	Household equipment repairs (electrical)	G0154 – Household equipment repair services
5269	Household equipment repairs nec	
Personal and household services		
9511	Video hire outlets	Q0111 – Personal and household goods hiring
9519	Personal and household goods hiring nec	
9521	Laundries and drycleaners	Q0112 – Other personal services
9522	Photographic film processing	
9523	Photographic studios	
9524	Funeral directors, crematoria and cemeteries	
9525	Gardening services	
9526	Hairdressing and beauty salons	
9529	Personal services nec	
Recreational goods		
5241	Sport and camping equipment	G0144 – Recreational goods retailing
5242	Toys and games	
5243	Newspaper, book and stationery	
5244	Photographic equipment	
5245	Marine equipment	

5.4 Bi-variate stratification

The previous RTS design used full-time equivalent employees (FTEs) as the sole stratification variable in specifying the sample strata boundaries.

The 2003 RTS redesign has made use of both rolling mean employment (RME) and annualised GST sales data in specifying the sample strata boundaries. Bi-variate stratification has been used in the Annual Enterprise Survey in recent years, as well as in the Economic Survey of Manufacturing (QMS) redesign in 2001 and the Quarterly Wholesale Trade Survey (WTS) redesign in 2002. Bivariate stratification has enabled sample design and selection to be more efficient.

A diagrammatic representation of bi-variate stratification appears below.



5.5 The use of administrative data

One of the challenges facing Statistics New Zealand is the desire to reduce compliance costs, particularly for small and medium-sized businesses. With this in mind, the redesign of the RTS included a thorough investigation into the potential use of existing administrative data sources in place of collecting data by direct survey. This follows a similar investigations with respect to the redesigns of QMS in 2001 and WTS in 2002.

As a result of this research, the 2003 RTS redesign has resulted in a survey design that makes extensive use of taxation data sourced from Inland Revenue. It should be noted that while Statistics New Zealand has been given access to taxation data for statistical purposes, there is no reciprocal flow of respondent information from Statistics New Zealand to Inland Revenue.

The first use of administrative data has been in the bi-variate stratification as previously mentioned. GST data has also been used in place of directly surveying for small businesses in the retailing population. Using this approach, the GST data is used to model the variables, which would otherwise have been collected by a postal questionnaire.

For each of the units that fall within the tax stratum, their GST data is used to provide the variables that are contained in the postal questionnaire. For each variable a different approach is used, as summarised in the following table.

Method of Modelling Variables for Tax Stratum	
Variable	Modelling method
Sales	Ratio of sales to forecasted GST sales from surveyed units within the same detailed industry is applied to forecasted GST sales.
Closing stocks	Ratio of closing stocks to forecasted GST purchases from surveyed units within the same detailed industry is applied to forecasted GST purchases.

Within each of the 24 published industries, the contribution of the tax stratum to the industry total varies. The contribution was targeted at 10 percent, however, it depends upon such things as the size of the industry participants, as well as their distribution and concentration within the various strata defined for that industry. The contribution of administrative data to the RTS sales results for the October 2003 month is provided in the following table.

Contribution of Tax Strata to Industry Sales – October 2003 month	
Industry	% Contribution
Supermarket and grocery stores	6.87
Fresh meat, poultry, fruit and vegetable retailing	8.79
Liquor retailing	9.09
Other food retailing	13.44
Takeaway food retailing	13.38
Department stores	0.04
Furniture and floor coverings retailing	10.96
Hardware retailing	8.41
Appliance retailing	11.51
Recreational goods retailing	9.63
Clothing and softgoods retailing	11.01
Footwear retailing	8.33
Chemist retailing	8.50
Household equipment repair retailing	10.52
Other retailing	10.80

Motor vehicle retailing	9.37
Automotive fuel retailing	8.59
Automotive electrical services, smash repairing and tyre retailing	12.30
Automotive repair and services nec	12.76
Accommodation	11.55
Bars and clubs	10.73
Cafes and restaurants	12.02
Personal and household goods hiring	14.28
Other personal services	15.22
Total Retail Trade	9.12

It is interesting to note that while the tax stratum contributes only 9.12 percent of the total retail trade sales, it accounts for 55.7 percent of the enterprises in the retail trade population, as shown in the table below. The tax stratum accounts for a slightly lower proportion of the number of geographic units in the retail trade population (49.9 percent) due to the fact that many of the enterprises included in the postal sample have multiple locations.

Units in the Retail Trade Population – October 2003 month		
Treatment in RTS	Enterprises (%)	Geographic Units (%)
Sampled (ie received a questionnaire)	5.9	12.9
Non-sample	34.8	37.2
Tax	55.7	49.9
	100.0	100.0

5.6 Periodic reselection

Statistics New Zealand conducts panel surveys to provide the best estimates of movements between periods. This is because, where possible, the same businesses are reporting from period to period.

One of the acknowledged drawbacks of a panel sample survey is that over time the initial selection of units will become less representative of the contemporary population. This means that the results from the survey can become similarly less representative.

A study was undertaken by Statistics New Zealand to assess a range of options to overcome this issue, and hence improve the ongoing quality of the

survey estimates from the QMS that was redesigned for the June 2001 quarter. This investigation recommended that, as part of the 2001 QMS redesign, a periodic reselection policy be adopted. The investigation and its recommendation were peer reviewed and approved by the methodology unit of the Australian Bureau of Statistics. This approach has also been applied to the RTS redesign.

Under periodic reselection, the underlying strata boundary definitions remain unchanged, while the units in the population of interest are re-assigned within these strata based on their current values for the stratification variables. The weights applied to sampled units are then re-calculated.

Reselection is beneficial because units that are growing (or shrinking) can be promoted or demoted between the appropriate strata, and move in or out of postout as required. This ensures representative coverage of units growing faster than average, especially for births, and is expected to reduce potential bias.

In the case of the RTS, reselection will be done every month, rather than less frequently (eg annually) to reduce the level of discontinuities that occur when different units are selected or not selected.

5.7 Imputation and estimation methodology changes

As part of the 2003 RTS redesign the opportunity has been taken to introduce an enhancement to the range of non-response imputation methods.

Previously, the RTS used either historical or mean imputation in the event of non-response. It is now possible to make use of the tax data for non-response imputation using regression techniques. In many instances, this has been found to produce superior imputation results to the traditional historical and mean methods.

The following table provides an indication of the degree and nature of the imputation that took place for the October 2003 month.

Total Weighted Retail Trade Sales – October 2003 month		
	\$(million)	% of total
Medium to large businesses		
Actual responses	3,313.4	75.2
Regression imputation	531.9	12.1
Historical imputation	155.8	3.5
Mean imputation	4.4	0.1
Small businesses		

Administrative data	402.0	9.1
	4,407.5	100.0

6. Series available on request

The analytical back series for the new survey are available either as downloadable files on the Statistics New Zealand website or can be supplied in hard copy on request.

7. Attachments

The following spreadsheet contains the analytical back series from the May 1995 month.



Retail Analytical Back Series - final.xls

These attachments can be downloaded from our website www.stats.govt.nz.

Alternatively, contact Rochelle Barrow (details below).

For technical information contact:

Rochelle Barrow
Christchurch 03 964 8982

Email: rochelle.barrow@stats.govt.nz

<http://www2.stats.govt.nz/domino/external/pasfull/pasfull.nsf/7cf46ae26dcb6800cc256a62000a2248/4c2567ef00247c6acc256e2000751fe3?OpenDocument>

20 January 2004

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– 108