Australian Retail Trade Margin Index

25th Voorburg Group
Vienna, Austria
20-24 September 2010

Caley Forrest

Australian Bureau of Statistics

Retail Trade Margin Index – Australia

Introduction

1. This paper outlines the Australian Bureau of Statistics' (ABS) experimental Retail Trade Margin Index (RTMI). The index was compiled quarterly between 2003 and 2007 with the aim of improving coverage of services in Producer Price Indexes (PPI) and the quality of the retail industry volume estimates in the Australian National Accounts (ANA). Collections ceased due to constraints in the 2008/09 budget. Following feedback from key stakeholders regarding the high priority of RTMI data, funding was reinstated in the 2009/10 budget. The index will be published following a review of the processes.

2. Capturing information on retail margins will assist users in identifying; whether upstream price pressures are absorbed into margins; whether retail margin increases contribute to final inflation; the relationship between prices and volumes in the retail market; and, levels of price competition.

Definition of the service being provided

3. Retailers provide a service to consumers when they engage in the activity of purchasing goods and reselling them to consumers with no, or minimal, processing. This intermediation between wholesalers and consumers is viewed as supplying a distribution service rather than goods to their customers. An attempt to measure the service would need to consider characteristics such as opening hours, numbers of checkouts, floor space, range of goods on offer, staff numbers, quality of staff, ease of parking, and so on. While it is difficult to put a value on these characteristics, they are clearly linked to the quality of service perceived by consumers.

4. Direct measurement of this service is not practical. The 2008 System of National Accounts (SNA08) recommends a proxy measurement of the output of retailers as the value of the trade margins realised on the goods they purchased for resale.

Pricing unit of measure

5. The term 'trade margin' is used to refer to the value of the service provided by businesses when they engage in the activity of purchasing goods for resale to consumers. The SNA08 describes the conceptual basis for the measurement of the output of wholesale and retail distribution as follows:

> "Although wholesalers and retailers actually buy and sell goods, the goods purchased are not treated as part of their intermediate consumption when they are resold with only minimal processing such as grading, cleaning, packaging etc. Wholesalers and retailers are treated as supplying services to their customers by storing and displaying a selection of goods in convenient locations and making them easily available for customers to buy. Their output is measured by the total value of the trade margins realized on the goods they purchase for resale. A trade margin is defined as the difference between the actual or imputed price realized on a good purchased for resale and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise disposed of."[1]

6. As an output PPI the experimental RTMI was designed to measure the rate of change in the price of the distribution service retailers provided by product group. The scope was businesses engaged in the purchase and on-selling of products to the public. Businesses were selected for pricing on the basis of their market influence and the individual items they retail or sell.

7. The trade margin price is derived as the difference between the price at which the good is sold and the cost, to the retailer, of the good sold. While collecting information on the prices at which

[1] System of National Accounts 2008, section 6.146 page 113.

goods are sold is relatively straightforward, the collection of information on the Cost of Goods Sold (COGS) is less so, as conceptually they should be valued at their replacement cost at the time of sale. Although most businesses are able to report COGS, the pricing basis for the sampled units was generally based on the purchase price rather than the current replacement cost. The extent to which a measure based on purchase price will deviate from the conceptually preferred measure will depend on the length of time goods are held in inventory and the rate at which their purchase price changes. In a contemporary Australian context, these two issues are not considered to be significant due to typically rapid turnover of inventories and relatively low rates of inflation.

8. The quarterly price index was constructed using an 'outlet value' type approach to derive the percent margin in adjacent periods. This entails asking businesses to report aggregate sales and COGS for selected product categories for each sampled outlet. The dollar value of the retail margin is then obtained by subtracting COGS from sales and a percentage retail margin is derived as the ratio of the retail margin to sales. The percent retail margin estimate is then applied to sales which have been indexed to the relevant component of the CPI to achieve fixed quantities. The outlet index is derived by the ratio of two periods resulting dollar estimates. The calculations are then repeated for the total business data, using the outlet index to inflate sales data instead of the CPI. Refer to Appendix One for a worked example of the calculation.

Market conditions and constraints

a) Size of industry

9. The retail and wholesale industries are important contributors to the Australian economy. In 2008/09 the Australian National Accounts[2] showed retail gross value added of $54.3 billion. Combined with wholesale gross value added of $53.7 billion this represents 9% of Australia's Gross Domestic Product ($1,196 billion). In the same year Household Final Consumption Expenditure was $661.0 billion, the majority of which attracted a retail margin.

b) Special conditions or restrictions

10. Information gathered from an early pilot study revealed that in assessing the feasibility of undertaking a RTMI collection it is not possible to assume that the ability to collect data for some product categories will equate to the ability to collect data for all. Each category has its own distinct issues and considerations as well as overriding issues that need to be considered for all. Although all retailing activity was in scope the ABS was not able, or did not attempt, to construct measures for every Supply and Use Product Classification (SUPC). Indexes were constructed for 20 SUPCs out of a total of 98. However, these 20 SUPCs accounted for 59% of total retail margins (refer to Appendix Two).

11. Of the non-covered SUPCs, one area warrants special mention. In seeking data from supermarkets it was found that a number of SUPCs were grouped into a broad 'groceries' category (please refer to Appendix 2 for a list of SUPCs in this category) in their internal accounting systems and it would be prohibitive to disaggregate this data on a quarterly basis. Although the precise coverage of groceries varied from retailer to retailer, it generally corresponds to some 15 SUPCs accounting for approximately 14% of total retail margins. Given the diversity of items covered, the price measure was influenced by shifts in sales between items that have naturally different margins, that is, it suffered from compositional shifts. Accordingly the ABS ceased collecting data on this product category.

12. Provider responses to the experimental index were mixed. By the end of the experimental RTMI in 2007, 86 businesses were enrolled into the collection with an average of a 97.5% response rate per quarter. This number does not include a number of businesses who were

[2] Catalogue number 5204.0 www.abs.gov.au

investigated but not approached due to concerns about provider load or an inability to provide information due to the structure of their organisation. The burden (cost) was considered too high for a number of small to medium businesses to participate in the experimental index, after early investigations showed the information would need to be obtained from a tax agent who would charge the business for their time.

13. Where businesses indicated they were busy and already completing a number of ABS survey forms, the significance of the collection and investigations were expressed and if there were still strong signs of resistance then businesses were not pushed to take part in the experimental index. Some of these businesses indicated that if the index was to go ahead in the future they would provide data. There were also some businesses that were concerned about the sensitive nature of the data, though this was not as many as expected.

Standard classification structure and detail related to the area

a) Output The main variables used to measure this service industry are:

- **Location dollar sales** outlets which are deemed to be representative of the business provided the value of their quarterly sales related to the SUPC. Sales are reported as nominal data; similar to the Nominal GDP it is total dollar value or, P_tQ_t, where P refers to price, Q to quantity and t as the time period.
- **Location dollar COGS** the purchase price, to the retailer, of the goods which have been sold during the quarter. This is also reported as nominal data.
- **Location dollar margin** sales less COGS for the quarter.
- **Location percent margin** location dollar margin as a ratio of location dollar sales.
- **Constant quantity sales data** the relevant CPI component is applied to the nominal sales data to achieve constant quantity in the 2 time periods being compared. For example, in the Laspeyres index calculations the t quarter sales data, P_tQ_t, is inflated by the change in the relevant CPI component from t to t+1 to obtain $P_{t+1}Q_t$.
- **Constant quantity dollar margin** the location percent margin is applied to the constant quantity sales data.
- **Location sum level** the above sets of data are calculated for the aggregate of the sampled outlets representing a business.
- **Business level data** the above sets of data are obtained for the business as a whole, which may or may not be more than the sampled outlets.
- **CPI component** CPI data which corresponds the closest to the SUPC in question.
- **Business specific Fisher SUPC index** a Fisher index is calculated from business level constant quantity dollar margins data for each SUPC for each business.

- **SUPC Fisher index** business specific Fisher SUPC indexes are used as weights to obtain an overall Fisher index for the SUPC.

- **RTMI** the SUPC Fisher indexes are aggregated together using a Laspeyres formula to obtain a global RTMI. Weights related to non-sampled SUPCs are applied to sampled SUPCs on an assessment of similarity.

b) Main classification

14. The RTMI is based on collecting sales and COGS data for SUPCs rather than for specific items (e.g. instead of measuring 1 kilogram of green apples, the index collects data at the fruit and vegetable level). By pricing groups of items it is hoped it will reduce the influence of periodic heavy discounting which could make at least some selling prices highly volatile. Also, it is not uncommon for individual items to record negative margin prices. This would be the case where retailers use certain products as 'loss leaders' or are prepared to temporarily meet competition with unsustainably low prices. Negative prices are particularly problematic for index construction. In a typical price index the selection of narrowly defined items for pricing is designed to aid in pricing to constant quality. The quality of the items produced or purchased can be seen to be embodied in their physical characteristics, preserving these characteristics over time serves to ensure that measures of price change are based on comparisons of like with like. The argument for following this approach is less compelling when the objective is to measure the price of the distribution service. It can be argued that the quality of the distribution service is more closely related to the range of similar goods provided for sale. In other words, the distribution service associated with the provision of fresh fruit and vegetables as a whole is a more meaningful concept than the distribution service associated with green apples. This view also appeared to align better with the pricing practices of businesses which tend to set selling prices of individual items with the objective of maximising a margin across a range of items.

15. This 'range of items' view underpins the RTMI developed by the ABS. The problem then becomes how to define the various 'item categories'. If the level of item aggregation is too broad, the price measures is likely to be influenced by any shifts in sales between items that have naturally different margins, that is, it would suffer from compositional shift. For example, the measured margin for a commodity grouping that includes both dairy products and fresh fruit and vegetables is likely to vary depending on the relative value of sales of dairy products compared to fresh fruit and vegetables. This means that the measured aggregate margin price could vary from period to period due to changes in the relative volume of sales rather than any change in individual margins. The challenge is to define item categories that are self explanatory in terms of coverage while minimising the risk of compositional shift. For this purpose the ABS has settled on the SUPC used in compiling the supply use tables underpinning the annual Australian national accounts.

16. The SUPC is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC), which is the classification underpinning PPI. Using this classification will facilitate a high level of coherence between the indexes.

17. The international standard classification is the International Standard Industrial Classification of All Economic Activities (ISIC). Australia and New Zealand have for many years endeavoured to align their industrial classifications with the ISIC as far as possible. However, the degree of alignment able to be achieved is sometimes adversely affected by competing classification principles e.g. a different organisation or structure of Australia or New Zealand industry, or a lack of significance of some internationally recognised economic activities in the two economies. ANZSIC 2006 achieved international comparability to a greater extent than with earlier industrial classifications.[3]

[3] Please refer to the ABS website www.abs.gov.au catalogue number 1292.0 for a concordance to ISIC.

Evaluation of standard vs. definition and market conditions

18. The ABS has diverged from the SNA08 definition of COGS as it is more practical in the Australian context to value COGS as the cost of purchase rather than the current cost of replacement. Using this figure may distort the results as the sale price could also include a holding gain[4]. It was decided in the case of Australia that the turnover of goods was relatively quick and inflation is typically low making the holding gain negligible.

19. Businesses also generally make adjustments for wastage and shrinkage in their COGS and include the cost of freight to their warehouse but not to their individual stores. There are however exceptions to this practice. Some businesses also include transport costs to their stores, the costs associated with loss prevention methods, the cost of interest free deals, credit card charges, settlement discounts and fixed rates of commission to sales staff. When asked whether these measures could be excluded the response received was not positive. It would require significant additional effort on the business behalf when they only constitute a very small percentage of the value of COGS.

20. Investigations also uncovered that not all businesses are able to account for wastage and shrinkage at the individual product category level but instead apportion a percentage to each category or simply do not account for it in their COGS. Most businesses have a provision for shrinkage that is reviewed every 6-12 months and is applied down to the product category level. Analysis of the results of the RTMI has found significant dispersions in % margins between, and within product groups. This coupled with; the size of the trade margin industries; their contribution to household final consumption expenditure; and, the important role that margins play in ANA input-output strategy has lead key stakeholders to rate this index as a high priority.

National accounts concepts and measurement issues for the area related to GDP measurement

a) Output

21. National Accounts require data on trade margins by product in order to calculate Supply and Use (SU) tables. The main focus is on annual SU tables which are used for benchmarking the annual production accounts. The tables present a detailed analysis of the process of production and the use of goods and services of that production at basic as well as producer prices, along with details on various trade margins among other things.

22. Most output statistics are on an ex-plant or similar basis but input statistics are normally available at the price paid by the user. Trade margins are required to value the flows in the Input-Output (I-O) tables in various ways. Essentially:

Purchaser prices = basic prices + margins + net taxes

23. The supply table is calculated by aggregating the values of imports and domestic supply for each of the Input Output Product Classification (IOPC) products from source data at basic prices. The basic prices are then converted to purchasers' prices through a data intensive process of adding estimates of 15 separate margins including retail and wholesale margins.

24. In order for this conversion of basic prices to purchaser prices, wholesale and retail margins in dollar values are needed. These margins are currently obtained from the Retail Industry Survey (RIS) and Wholesale Industry Survey (WIS). These surveys are conducted every 5 to 7 years. The percent margins are held constant between surveys. The dollar margin changes as the percent margin is applied to annual dollar sales. These annual sales are obtained from the

[4] Holding gains (losses) can be thought of as the increases (decreases) in the market value of the products held during a given period.

Economic Activity Survey. Assuming constant industry and market structure between RIS surveys is an obvious flaw in the current methodology. Retail margins are included in most items that consumers purchase; as such they contribute significantly to Household Final Consumption Expenditure (HFCE) on goods in the ANA.

b) Deflating

25. The trade margins are incorporated in the Production approach of the Gross Domestic Product (GDP). This approach is derived as the sum of gross value added for each industry at basic prices, plus taxes less subsidies on products.

26. The gross value added of an industry is calculated by the double deflation method. Volume (constant prices) estimates of wholesale and retail margins are derived on the assumption that they have the same growth rate as the sales of commodities they relate to.

27. Quarterly retail trade margin price indexes would provide superior means for national accounts to calculate quarterly chain volume estimate of gross value added for the retail trade industries. The current methodology involves the use of output indicators based on revaluing retail turnover using the CPIs which assumes that percent margins are constant quarter-on-quarter within a financial year. A better alternative would be to deflate retail industry value added directly with quarterly retail margin price indexes.

Pricing methods and criteria for choosing various pricing methods

Sampling

28. The RTMI used purposive sampling focusing on large businesses but including medium businesses where industry concentration was not sufficient to exclude them and/or when the margins of large units were not sufficiently representative of those of medium businesses. The experimental index was designed to exclude small businesses.

29. This approach was deemed to be the most efficient for the experimental index because Australia's retail industry is dominated by several large businesses. Large businesses proved more likely to have well established record keeping practices on hand which made it easier for them to provide the data.

Definition

30. Generally businesses follow accounting standards for defining COGS. This in itself poses problems, as the Australian Accounting Standards allow a number of different approaches for valuing COGS. Most companies have defined their COGS on a First-In First-Out (FIFO) basis with margins defined as the difference between historical COGS and the final selling price. This is characteristic of those businesses that either have easily differentiable products (generally high value products that are held at relatively small inventory levels) or powerful inventory management systems where they can identify products at a detailed level. This differs to those businesses that employ the Retail Inventory Method in calculating their stock and COGS. In this instance the COGS are based upon the average of their buying price. When the selling price is adjusted (e.g. in the case of a sale or clearance) the percent margin is maintained and the change in COGS required to keep this level of margin is written off at a later time. Businesses that have massive stock levels that are very difficult to keep account of (e.g. through a stock take) or those that have more simple management systems will employ this method. We have attempted derive the COGS figure, taking into account their adjustments. From the pilot study the businesses that utilise the Retail Inventory Method are in the minority.

31. Using the difference between historical COGS and selling price may distort the results as the sale price could also include a holding gain/loss. It was decided in the case of Australia that the

turnover of goods is relatively quick and inflation is typically low making the holding gain/loss negligible. This deviation from the conceptually preferred measure was deemed acceptable to reduce ABS and respondent burden.

Alternative pricing strategies:

Method A: Direct specification pricing of percent margins from retailers' head offices.

32. Two thirds of the businesses interviewed and all of the very large businesses interviewed maintained detailed product line percent margin data on which they could readily report. However, unless data are transferred electronically to the ABS directly from the retailers' data bases, provider burden would be high because of the need to sample large numbers of individual product lines. Similarly, ABS costs would be high because of the large volume of data – perhaps equivalent to the resources on the goods component of the CPI.

33. Some of the advantages of this approach are that it provides the potential to price the goods purchased and sold to constant quality through controlling the quality of the goods. If the margin data collected related to the same specifications as priced for the CPI, quality adjustment relationships could be applied to the margin data.

34. However, given that the margins collections would be undertaken from administrative head offices (at least for the large businesses), there would be very limited opportunity to control the quality of actual retail service provided by individual stores (e.g. opening hours, delivery service, lighting, number and quality of staff, floor space, variety of products, etc).

35. This method requires the percent margin changes to be indexed by the CPI as changes in the dollar price of retail margin are a function of both the percent margin rate and the retail selling price of the product.

Method B: Collection of percent margin unit values from retailers' head offices

36. This method would essentially involve implementing the annual percent margin collection recommended for national accounts purposes on a quarterly basis. The main advantage would be the methodological compatibility between the national accounts and PPI approaches and the obvious efficiencies of a single collection. The provider and ABS burden would be relatively low since data volumes associated with collecting at a higher level of aggregation would be much smaller than under Method A. However, there would be no potential to control quality (of either the goods or the retail service) to ensure pricing was to constant quality.

37. Further, compositional shifts within the fairly broad product categories of the IOPC could result in significant noise. While percent margin shifts attributable to changes in product composition are appropriate for the I-O work (on the assumption that there are similar impacts of compositional shifts on the product supply and usage value data being manipulated), they are not pure price changes as required for inflation analysis. This approach would also require indexation by the CPI, as for method A.

Method C: Matching of wholesalers' and retailers' selling prices

38. This approach would involve establishing a new collection, from the wholesale trade industry, of wholesale selling prices relating to the sample of goods specifications covered by the CPI. Then, product by product dollar margin prices would be calculated by deducting the wholesale price from the retail price. A margin price index could then be constructed using conventional price index techniques.

39. This approach would have the potential to control the quality of the goods priced (again from the CPI system) but would not provide control of the quality of the retail service (unless extra data were collected store by store during the CPI price gathering process).

40. The main disadvantage would be that provider and ABS costs would be very high because of the need to establish a completely new price collection from the wholesale trade industry. In addition, there is a risk that there could be errors in the derived dollar margins because of time lags between wholesalers' and retailers' sales and because of the distorting affects of wholesalers' bulk discounts, rebates etc applied at an aggregate level, and on an infrequent basis.

Method D: Comparing wholesale and retail price indexes

41. This approach would involve establishing a separate price collection from the wholesale trade industry and compiling a separate aggregate Wholesale Price Index (WPI). The WPI construct could potentially be established completely independently of the CPI; however this would reduce the opportunities for sharing quality change information about the goods.

42. While this method would not provide a direct retail trade margin measure, it would be possible to infer one by comparing movements in the CPI and WPI series. If the index hierarchical structures of the two indexes were comparable, comparisons could be undertaken at lower levels of aggregation such as groups, sub-groups, etc.

43. Again, this would be a high cost exercise for both the ABS and providers because of the need to establish a new WPI collection. Also, there would be a significant risk of inaccurate inferences being drawn about retail trade margin changes because of the sensitivity of the differencing to small errors (or timing differences) in the respective index levels. Also, some differences between the movements in the two indexes could be associated with freight costs in moving the goods from the wholesaler to the retailer. A significant advantage is that there would be an additional member of the family of inflation measures, helping to provide a bridge between PPIs and the CPI.

Summary assessment

The table below provides a broad assessment of the alternative pricing methods (A-D) outlined above.

Method	**A**	**B**	**C**	**D**
Type of price	Specification	Unit Value	Specification	Specification
Advantages				
Control quality of goods	Yes	No	Yes	Yes
Control quality of service	No	No	No	No
National accounts synergy	No	Yes	No	No
Disadvantages				
Provider burden	Medium	Low	High	High
ABS burden	High	Low	High	High

Timing problems	Low	Low	Medium	Medium
Compositional mix	Low	High	Low	Low
Sensitivity to error	Low	Low	Medium	High

44. The approach actually adopted is an 'outlet value' type approach which is an adaption of method A outlined above. The total business level data is the data used in stage three to compute the fixed Laspeyres RTMI. In order to fix the quality and quantity for the entire business data, the sampled outlets data is used in the calculations of the intermediary indexes (i.e. stages one and two). The data is indexed to the CPI to set quality and quantity at the goods level. Please refer to Appendix One for a worked example of the calculations.

Weighting

45. As coverage will inevitably be less than 100 percent, it is important to address the issue of how these indexes are to be presented. One option would be to simply publish the indexes for those individual SUPCs for which series have been constructed with a 'total' as the (self) weighted average of the components. The ABS did not publish these micro (SUPC level) indexes due to limited experience with their compilation over the business cycle and the small samples from which they are compiled.

46. There are two main options to aggregate the sampled margins into a single estimate of the retail trade margins in the Australian economy. The micro indexes could be aggregated with weights based solely on their respective shares of total retail margins (the self weighting option) or the contributions of the non-sampled SUPCs could be explicitly allocated across the sampled SUPCs based on some sort of assessment of similarity. The first of these options is the easiest to implement. The differences in outcomes between the two depends on the level of coverage of the micro indexes (the higher the coverage the less discretionary allocation) and the degree of dispersion in the movements of the micro indexes (the smaller the dispersion the less the role played by weights).

47. The approach to weighting in the RTMI was to allocate the residual weight corresponding to non-sampled SUPCs across sampled SUPCs based on an assessment of similarity. The top level retail margin index was thus calculated based on weights corresponding to the total value of retail margins obtained from the SU tables.

Choice of index methodology

48. The retail margins project collection is unique in comparison to other price indexes given that we are able to collect real time weighting information (business dollar margins) for each of the SUPC indexes. Most indexes produced by PPI are done using the fixed base or chained Laspeyres methods as they only have access to historical weights. The up to date weighting information enables this index to be aggregated with a Fisher index in stages 1 and 2 (see Appendix One).

49. Another benefit of having frequently chained indexes is that it is easier to add or remove providers as required. Hence this series will not have to be physically re-weighted. Using a Unit Value approach was considered, however, for conceptual purity the retail service must be held constant over time for a price index to price to constant quality. In the absence of this a unit value index will show changes in prices that are in fact changes in the structural composition of the business rather than a change in the retail service. Therefore a chained Fisher index is still considered preferable in producing a quarterly RTMI.

Quality adjustment methodology

50. In order to achieve comparability over time in a price index it is necessary to price commodities at a constant quality. The quality of the retail service can be considered unique to each outlet, therefore to measure the distribution service the conditions at the sampled outlets should be constant from one period to the next. To assist in identifying any changes in outlet specific quality characteristics the ABS maintains a close relationship with all data providers. An attempt to measure quality would need to consider characteristics such as opening hours, numbers of checkouts, floor space, general ambience, ease of parking, range of goods on offer, proximity to other stores etc. While these characteristics may not lend themselves to ready measurement, it is clear that they are linked to the specific outlet providing the goods. When a quality change is identified, the results for the specific location are excluded from that period's calculation (with price change for that outlet being imputed from the remaining outlets in the sample).

51. The RTMI collects nominal data of sales and COGS from businesses. As the CPI is calculated to constant quality and quantity it only measures the pure price change at the goods level. The nominal data is indexed to the CPI to establish constant quality at the goods level; this gives the price change in margins.

Evaluation of comparability with turnover/output measures

52. The RTMI is intended to improve both deflating of the retail industry in the national accounts and coverage of services in PPI.

53. Data for the experimental RTMI was being collected at the SUPC level which is used in the SU tables which underpins the ANA. ANA require data on 15 different margins at the SUPC level to move basic prices to purchasers' prices. The methodology outlined in this paper is also considered to be fit for purpose for wholesale margins.

54. At the suspension of the project, data was collected for 20 of the 98 SUPCs. This represented approximately 59% of total margins. Extending coverage beyond this level was considered unlikely at the time due to data collection difficulties for some SUPCs or their relative insignificance. Although the experimental RTMI does not meet all of ANA needs, it is considered to be an improvement on current data.

55. The experimental RTMI used quasi-scientific sampling to target the dominant businesses. The service price is the margin per SUPC group. The quality of service is monitored at outlets and the reported nominal data is indexed by the CPI in order to achieve a constant quality price index for use in PPI.

Summary

56. The retail trade industry is significant to the Australian economy. Having regular, systematic monitoring of retail margins will provide users with insight into the industry as well as more information on the progression of inflation through the economy.

57. In 2008 the RTMI project was removed from the ABS work program due to budgetary constraints. At the time of cessation the experimental index was considered robust and fit for purpose, however, its recent reinstatement is being taken as an opportunity to reassess all aspects of the project. The review is being undertaken in two phases. Phase one will involve consultations with users, to assess their needs, and with data providers, to undertake data feasibility studies. Phase two will consider the conceptual and compilation issues. This review will assess a number of aspects of the project, including:

- Data collection – the amount of detail required and the overlap of the collection with the retail industry components of other ABS business surveys.

- Compilation method – in particular, the multiple step structure of the index. During the experimental phase the index was compiled using spreadsheet software but this method proved to be unsustainable. Among other things, this method introduced the potential for human error risk in compilation and made it difficult to perform routine quality assurance procedures. It is currently believed that a significant (and costly) enhancement to the prices compilation system will be needed to implement the multi-step structure with appropriate quality assurance checkpoints.

- User needs – National Accounts is a key user of this index and they require more coverage of the sector than what was achieved in the experimental project, even if this is achieved with a more simplified index structure such as a frequently rebased Laspeyres. They also require information on other margins such as wholesale and transport margins.

The ABS welcomes any comments on these issues or on any other aspect of the index.

- **Appendix One: Worked example of RTMI calculations**

The ABS experimental index used three stages to construct the index. In the first stage business specific SUPC indexes were constructed from the sampled data. In stage two, the business specific SUPC indexes were combined to produce aggregate SUPC indexes. In the third and final stage, these aggregate SUPC indexes were combined to produce the RTMI.

Stage One: Calculation of a business specific SUPC index

Data for a business with two sampled locations (outlets) is presented below. An explanation of the calculation follows.

Table 1: Collected data; Current price business activity.

	Period t-1				Period t			
	Sales $	COGS $	Margin $	Margin %	Sales $	COGS $	Margin $	Margin %
Location 1	3696	3579	117	3.17	3715	3596	119	3.20
Location 2	2096	2027	69	3.29	1805	1726	79	4.38
Location sum	5792	5606	186	3.21	5520	5322	198	3.59
Enterprise total	10537	10149	388	3.68	10049	9541	508	5.06

Table 2: CPI data corresponding to SUPC

Period t-1	Period t
210.5	203.3

Table 3: Computed using Paasche index formula from Table 1, Period t.

	Period t-1			
	Sales $	COGS $	Margin $	Margin %
Location 1	3847		122	3.17
Location 2	1869		62	3.29
Location sum	5716		183	

Table 4: Computed using Laspeyres index formula from Table 1, Period t-1.

	Period t			
	Sales $	COGS $	Margin $	Margin %
Location 1	3570		114	3.20
Location 2	2024		89	4.38
Location sum	5594		203	

Table 5: Index calculation

Index	Calculation	Answer
Laspeyres	(203/186)x100	109.1
Paasche	(198/183)x100	108.0
Fisher	(109.1x108.2)^(1/2)	108.6

Table 1 is the data that respondents have reported for their nominal (i.e. P_tQ_t where P refers to price, Q to quantity and t to time) sales and COGS for a SUPC at specific outlets. For large businesses this may be several locations, in this example it's two outlets. In addition to the outlet information they also report for the business as a whole. From the reported information the % and $ margins are calculated for the locations, the aggregate of the sampled locations and the business as a whole.

Table 2 depicts CPI data which corresponds best to the SUPC group.

The objective of the computed data in Table 3 is to calculate the data necessary for the Paasche index. In order to calculate indexes from the reported data any changes in quantity over time need to be removed. To do this we index the data to a relevant component of the CPI. As the CPI is calculated to a constant quality and quantity, it measures pure price change. Thus if we take P_tQ_t and apply the proportionate change in the CPI from t to t-1 time periods we obtain $P_{t-1}Q_t$. This corresponds to the second column Sales $ in Table 3 which is used in the construction of the Paasche index. The Paasche index answers the question "How much would a basket of goods bought today have cost me in a previous time period's price levels?" This can be represented as:

$$\mathbf{I_P = \sum(P_tQ_t) / \sum(P_{t-1}Q_t)}$$

The value of the 'basket of goods' bought in period t is shown in table 1 period t Sales $. In order to then calculate how much this same basket of goods would have been valued in time t-1, the figures are moved by the change in the CPI over the time period (from t to t-1). As the CPI is calculated on fixed quantities this removes any volume effects included in the change in the nominal data from period t to t-1 in Table 1. The good sold in time t at t-1 prices for location1 is calculated as:

3715 x (210.5/203.3) = 3847

Then to obtain the $ margin which will give the 3.17% margin (this was the actual % margin the respondent had for period t-1 in table 1):

3847 x (3.17/100) = 122

Hence, the data in table 3 period t-1 calculates the dollar value of margins that would have been received in period t-1 based on the volume of sales in period t and the % margin in period t-1. The calculation for the location sum is as follows:

[3715 x (210.5/203.3) x (3.17/100)] + [1805 x (210.5/203.3) x (3.29/100)] = 183

The Paasche index is then derived for the location sum by the ratio of actual margins in period t (198) to computed data margins in period t-1 (183) multiplied by 100, as shown in table 5.
Table 4 depicts the calculations necessary for the Laspeyres index.

The Laspeyres index answers the question: "How much would a basket of goods bought in the last time period cost me to purchase at today's price levels?" We obtain this by taking the $P_{t-1}Q_{t-1}$ data and applying the CPI change from the time period t-1 to t which results in P_tQ_{t-1}. We can then put this into the Laspeyres formula which may be depicted as:

$I_L = \sum(P_tQ_{t-1}) / \sum(P_{t-1}Q_{t-1})$

The value of the "basket of goods bought in the past" is depicted in table 1, period t-1 (i.e. for location 1 nominal sale $ this is 3696). To compute the current value of this basket of goods we apply the change in the CPI over this time. For location 1 the current value is shown in table 3 period t as $3570. The calculation of this figure is:

3696 x (203.3/210.5) = 3570

Then to obtain the $ margin which will give the 3.20% margin:

3507 x (3.2/100) = 114

Table 4 computed data for period t is intended to answer the question "what would the dollar margins have been in period t based on the sales volumes in period t-1 and % margin in period t?" For the location sum $ margin this is shown mathematically as:

[3696 x (203.3/210.5) x (3.2/100)] + [2096 x (203.3/210.5) x (4.38/100)] = 203

The Laspeyres index for the location sum $ margin (shown in Table 4) is derived by the ratio of computed margins for period t (203) to actual margins in period t-1 (186) multiplied by 100.

The Fisher index is then constructed for the location sum data by taking a geometric mean of the Laspeyres and Paasche indexes and this is also depicted in Table 5.

By maintaining a close relationship with outlets the ABS ensure that outlet data is only used when quality is constant in both time periods.

We now have business specific SUPC index in a chained Fisher index with fixed quantity and quality.

Stage Two: Business specific SUPC indexes are combined to produce a SUPC index

Stage two is similar to the first stage except here the business level actual dollar margins are used as weights. For clarity, business 1 corresponds to the business used in stage one processes.

Table 6: Input data

	Period t-1		Period t	
	Margin $	Index	Margin $	Index
Enterprise 1	388	100	508	108.6
Enterprise 2	763	100	1276	115.6
Total	1151		1784	

Table 7: Computed $ margin

	Period t-1	Period t
Enterprise 1	468	421
Enterprise 2	1104	882
Total	1572	1303

Table 8: Index calculation

Index	Calculation	Answer
Laspeyres	(1303/1151)x100	113.2
Paasche	(1784/1572)x100	113.5
Fisher	(113.2x113.5)^(1/2)	113.3

Table 6 $ margin is again the data reported by respondents. For business 1 this data can also be found in the last row in Table 1. The 'index' column of Table 5 shows the Fisher SUPC indexes calculated for each business (business 1 was calculated in Table 5). This example assumes period t-1 is the base period.

Table 7 shows the computed $ margins. Similar to stage one this is the constant quantity data, except the business specific Fisher SUPC indexes was used instead of CPI data. By maintaining the quality in the sampled data of the businesses, the 'location sum' data fixes the quality of the business as a whole. The sampled outlets of a business is used to proxy the total business $ margin movement over time. That is, by applying the location sum data, it removes the quality change component from any fluctuation in business $ margin, leaving just the price change. Since the location sum index has been fixed in quantity in much the same manner by being indexed to the CPI, the resulting computed business $ margins are fixed in both quantity and quality.

If only total business data was collected, it may be difficult to ascertain if any of the outlets under that business had experienced changes in the distribution service the provided. Even if it was known that one of the outlets had, say, expanded their shop to cover more floor space and in doing so increased the range of items for sale and the number of checkouts, it would put a large hole in the sample if the entire business data had to be omitted for the period.

The figures in Table 7 period t-1 are calculated by using Table 6 period t as the reference. Thus by moving the Table 6 period t data by the proportionate change in the Fisher SUPC indexes for each business we obtain Table 6 period t-1. For example, business 1 is calculated as:

508x (100 / 108.8) = 468

The Paasche index for the SUPC indexes is the ratio of the nominal $ margin in period t (Table 5 period t) to the constant quantity $ margin in period t-1 (Table 6 period t-1). This is displayed in Table 8.

Table 7 period t, which is necessary for the Laspeyres index, uses Table 6 period t-1 for the reference volumes. The calculation to move business 1 from period t-1 to period t is:

388 x (108.6 / 100) = 421

As described earlier, the Laspeyres index is the comparison of the value of a basket of goods bought previously to the same basket of goods bought at today's prices. Hence the reported figure depicted in Table 6 period t-1 is compared to the figure calculated in Table 7 period t. again this is represented in Table 8. In this way the sampled data of businesses is used to fix the quality and quantity of the total business data. From this aggregate SUPC indexes are calculated in the chained Fisher format. Stage three is just the combination of these aggregate SUPC indexes to give a Laspeyres RTMI. The margin weights are obtained from the SU tables.

Appendix Two: 2002-03 Supply-use product categories and weights

Table 8: SUPC and weights, 2002-03

Abbreviated product descriptor	Retail margin $m	Percentage of total retail margin %	Cumulative total %
SUPCs for which experimental indexes were produced			
Alcoholic beverages	1048	2.0	
Clothing and footwear	7042	13.4	
Computers	2569	4.9	
Dairy products	899	1.7	
Edible meat, offal and meat products	1545	2.9	
Fresh fruit and vegetables	920	1.8	
Furniture	2182	4.2	
Household appliances (excluding compressors; solar, gas and other non-electric hot water systems)	2031	3.9	
Jewellery, silverware and watches	692	1.3	
Liquefied petroleum gas	42	0.1	
Motor cars	2176	4.1	
Motor vehicle parts and accessories	410	0.8	
Other petroleum and coal	1069	2.0	
Photographic, telecommunication and audio visual equipment	2390	4.6	
Pneumatic tyres	931	1.8	
Printing and newspaper, magazine and book publishing	1693	3.2	
Recorded media and publishing	431	0.8	
Textiles, fabrics and yarns; textile products nec	850	1.6	
Tobacco products	845	1.6	
Toys and sporting	1199	2.3	59.0
SUPCS for which experimental indexes were not produced			
Grocery items			
Baby napkins and sanitary products; soap; perfumes	1515	2.9	
Confectionery	728	1.4	
Eggs, honey and other agricultural food products	70	0.1	
Fish; crustaceans and molluscs	257	0.5	
Fruit and vegetable products	960	1.8	
Glass and ceramic containers and tableware	178	0.3	
Grain mill products; pasta	275	0.5	
Non-alcoholic beverages	376	0.7	
Other chemicals and chemical products	735	1.4	
Other food products	683	1.3	
Other rubber and plastic products	584	1.1	
Plastic tableware and utensils	503	1.0	
Prepared animal and bird feed	115	0.2	
Refined animal oil and fats; vegetable oils and fats	98	0.2	
Toiletry papers, towels and tissues	474	0.9	73.3

Non-grocery items			
Aluminium foil	17	0.0	
Automotive wet cell batteries (excl motorcycle)	36	0.1	
Bags, sacks and packets of textile or canvas	215	0.4	
Bakery products	1803	3.4	
Bark and wood chips; other wood products	74	0.1	
Blood meal and inedible meat	12	0.0	
Capitalised machinery and equipment	495	0.9	
Caravans; trailers; boats; and aircraft	168	0.3	
Carpets and textile floor coverings	310	0.6	
Cotton, ginned; other services to agriculture	149	0.3	
Electric lights (including torches); cables and batteries (excluding automotive)	171	0.3	
Fabricated metal hand tools; fire extinguishers	19	0.0	
Fertilizers	342	0.6	
Firearms (incl parts)	3	0.0	
Forestry and logging	1	0.0	
Gas (natural and LPG)	222	0.4	
Glass and glass products (excluding glass containers and rear view mirrors); ceramic products (excluding tableware)	105	0.2	
Glycerol and candles	17	0.0	
Industrial gases (excluding acetylene); synthetic resins	207	0.4	
Inks	51	0.1	
Insecticides, pesticides and seed dressings	157	0.3	
Kerosene (incl kerosene type jet fuel)	2	0.0	
Knitted or crocheted fabrics and products (excluding wearing apparel)	168	0.3	
Knitted or crocheted wearing apparel	766	1.4	
Leather	67	0.1	
Leather products nec	2	0.0	
Leather travelling products (including purses and wallets)	175	0.3	
Liquefied petroleum gas products at refineries	42	0.1	
Livestock	957	1.8	
Medical aids and therapeutic appliances (incl spectacles and hearing aids)	890	1.7	
Metal cutlery and sheet metal non-electric tableware	71	0.1	
Munitions and ammunitions (incl cartridges)	194	0.4	
Musical instruments (incl parts and accessories)	4	0.0	
Other agriculture	556	1.0	
Other basic metals and products	52	0.1	
Other grains	4	0.0	
Other manufacturing	31	0.1	
Other meat and dairy products	20	0.0	
Other medicinal and pharmaceutical products and pesticides	2667	5.1	
Other mining	242	0.5	
Other paper and paperboard products	67	0.1	

Other sheet metal and fabricated metal household goods	314	0.6	
Paint brushes; precious metal products (excluding jewellery)	8	0.0	
Paper and paperboard	392	0.7	
Paper and paperboard trays, dishes, plates, cups, cones, egg containers and box files	14	0.0	
Paperboard containers and paper bags	335	0.6	
Pens, pencils, crayons and typewriter ribbons	22	0.0	
Pets; fodder and grass	82	0.2	
Plant and flowers	137	0.3	
Plastic floor coverings and tiles	42	0.1	
Pulp, newsprint and paper stock	20	0.0	
Raw hides and skins	61	0.1	
Sawmill products (excluding bark and woodchips); fabricated wood products; wooden tools, frames, boxes and parquetry strips	281	0.5	
Scientific equipment; electrical equipment parts; garden tools and equipment (powered)	307	0.5	
Sterilised gut surgical sutures	8	0.0	
Structured metal products; sheet and fabricated metal products nec	200	0.4	
Television antenna parts	19	0.0	
Textile tarpaulins (incl canvas), sails, tents, pneumatic mattresses and motor vehicle covers; rope, cable and products thereof (incl netting)	19	0.0	
Veterinary products	113	0.2	
Wadding, cotton wool, gauze and bandages	57	0.1	
Welded wire fabric (excl reinforcing)	9	0.0	
Wool, scoured and carbonised	5	0.0	
Total	**52495**	**100.0**	**100.0**