Australian Bureau of Statistics

Information Paper

Experimental Producer Price Index for the Output of the Retail Trade Industry

Australia

2013

6427.0.55.007

AUSTRALIAN BUREAU OF STATISTICS

EMBARGO: 11.30AM (CANBERRA TIME) FRIDAY 4 OCTOBER 2013

ABS Catalogue No. 6427.0.55.007

Produced by the Australian Bureau of Statistics.

INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Michael Morgan on Canberra, Australia, 61 2 6252 5121.

CONTENTS

ACKNOWLEDGEMENT

The Australian Bureau of Statistics acknowledges the cooperation and assistance received from the Australian business community in the development of these important economic indicators, the Producer Price Indexes for the output of the retail trade industry.

PREFACE

This information paper presents the concepts, data sources and methods used by the Australian Bureau of Statistics (ABS) to compile Producer Price Indexes (PPIs) for the output of the retail trade industry.

The ABS PPIs measure the change in the prices of goods and services as they leave the place of production and enter the production process. The distribution service provided by retailers is the output of the retail trade industry and is within scope of the PPIs. The distribution service is defined as "*the difference between the actual or imputed price realised 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].

Recent reviews of the ABS PPIs, including the 2012 PPI Review, as described in *The Outcome of the Review of the Producer and International Trade Price Indexes, 2012* (cat. no. 6427.0.55.004), highlighted under-coverage of the current suite of Australian PPIs. The reviews identified that the coverage of goods is broader than the coverage of services. This coverage imbalance is primarily due to the difficulty in measuring price change in services.

The ABS has implemented strategies to address this under-coverage by expanding services price measurement. User consultation over recent years, and during the PPI Review 2012, identified the measurement of price change for the output of the retail trade industry as a high priority.

Unlike goods and many services, the price of a retailer's distribution service is not directly observable. For some time National Statistical Organisations (NSOs) worldwide have attempted to measure this retail service though progress has been constrained by the complexity of this topic. The ABS, building upon earlier work in this area[2], has now sufficiently resolved methodological and data issues to be able to produce robust PPIs for the output of the retail trade industry.

Comments or requests for further information should be addressed to:

Mr Michael Morgan
Director
Producer Price Indexes Section
Australian Bureau of Statistics
PO Box 10
BELCONNEN ACT 2616
Telephone: (02) 6252 5121
Email: <michael.morgan@abs.gov.au>

[1] 2008 System of National Accounts, p113, paras 6.146 – 6.147.
[2] Information Paper: Experimental Price Index for Retail Trade Margins Australia 2003 to 2006, cat. no. 6402.0.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industry Classification
ANZSIC93	Australian and New Zealand Standard Industry Classification 1993
ANZSIC06	Australian and New Zealand Standard Industry Classification 2006
ASAC	Australian Statistics Advisory Council
ASNA	Australian System of National Accounts
cat. no.	Catalogue number
COGS	Cost of goods sold
CPI	Consumer Price Index
CVM	Chain volume measure
DQAF	Data Quality Assessment Framework
GDP	Gross Domestic Product
GSP	Gross State Product
GVA	Gross Value Added
HES	Household Expenditure Survey
HFCE	Household Final Consumption Expenditure
IMF	International Monetary Fund
I–O	Input–Output
IOPC	Input–Output Product Classification
ITPI	International Trade Price Index
NSO	National Statistics Office
PPI	Producer Price Index
RTMS	Retail Trade Margins Survey
ROSC	Report on Observance of Standards and Codes
RPPI	Residential Property Price Indexes
RTPI	Producer Price Index for the output of the retail trade industry
SDDS	Special Data Dissemination Standard
SNA	System of National Accounts
2008 SNA	System of National Accounts 2008
SOP	Stage of Production

S–U	Supply and Use
SUPC	Supply and Use Product Classification
WPI	Wage Price Index

CHAPTER 1: BACKGROUND

INTRODUCTION

1.1 The ABS has a long history of compiling and publishing price indexes that inform the community of price changes over time. A range of indexes is produced, including, the Consumer Price Index (CPI), Producer Price Indexes (PPIs), International Trade Price Indexes (ITPIs), Wage Price Indexes (WPIs), Residential Property Price Indexes (RPPIs) as well as a range of analytical indexes.

1.2 The PPIs measure the rate of change in the prices of goods and services bought and sold by producers and service providers. An *output* PPI measures the rate of change in the prices received by producers for their output. An *input* PPI measures the rate of change in the prices paid by producers for the goods and services they purchase.

1.3 The ABS has determined that the principal purpose of the PPIs and ITPIs is to measure inflation by industry to support the compilation of the Australian National Accounts and Balance of Payments. PPIs are used in the compilation of the Australian National Accounts to produce chain volume measures (CVMs). Gross Domestic Product (GDP), the headline statistic of the National Accounts, and its components are expressed as CVMs and are presented as dollar amounts to enable comparison across products and industries. The secondary purpose of the PPIs and ITPIs is to aid the monitoring of inflation and the understanding of the transmission of inflation throughout the economy.

1.4 Economic transactions are usually recorded as the value of the transaction. This value reflects the volume of the product produced or consumed multiplied by the price per unit of volume. These volumes and prices are indistinguishable in the observed transaction and therefore need to be separated. In economic statistics, volumes are typically derived by dividing an observed transaction value by a price index.

AN ASSESSMENT OF PPI COVERAGE

1.5 Prompted by structural change in the Australian economy and encouraged by both user demand and the recommendations of the International Monetary Fund, the ABS has implemented a strategy to address under-coverage.

International Monetary Fund's *Australia: Report on the Observance of Standards and Codes 2010 (ROSC report Australia 2010)*

1.6 According to the ROSC report:

> "The Report on the Observance of Standards and Codes (ROSC)—Data Module provides an evaluation of Australia's macroeconomic statistics against the *Special Data Dissemination Standard (SDDS)* complemented by an assessment of data quality based on the International Monetary Fund's (IMF) Data Quality Assessment Framework (DQAF) July 2003. The DQAF lays out internationally accepted practices in statistics, ranging from good governance in data–producing agencies to practices specific to datasets. The datasets covered in the ROSC report are national accounts, consumer and producer price indexes, government finance, monetary, and balance of payments and international investment position statistics"[3].

[3] IMF, Australia: Report on the Observance of Standards and Codes—Data Module – http://www.imf.org/external/pubs/ft/scr/2010/cr10343.pdf

1.7 The most recent ROSC report by the IMF for Australia was published in 2010. The ROSC report on PPI coverage found that "The PPIs produced by the ABS cover the minimum requirements of manufacturing and mining and currently about 37 per cent of all services are covered (based on 2001–2002 Input–Output data)"[4]. The ROSC report Australia 2010 went on to recommend that the ABS "Examine the costs and benefits of producing the outstanding PPIs for services, taking into account the added value from the gain in coverage, the methodological and data issues that would arise from developing PPIs for each service industry, and user needs"[5]. The ABS committed to accord this recommendation a high priority[6].

REVIEW OF THE PRODUCER AND INTERNATIONAL TRADE PRICE INDEXES 2012

1.8 The ABS conducted an analysis of PPI coverage which is reported in the *Outcome of the Review of the Producer and International Trade Price Indexes, 2012*[7]. The current PPI coverage is determined by overlaying the 2008 System of National Accounts (2008 SNA) Input–Output (I–O) tables with currently available PPIs[8].

1.9 The review noted the requirement to improve coverage of the 2008 SNA Input–Output framework by progressively developing new price indexes. The PPI Review also prioritised a selection of areas for action by the ABS.

1.10 A measure of the output of the retail trade industry was identified as a high priority within this development program. Refer to table 1.19 below.

TABLE 1.1 – Services Producer Price Indexes Priorities identified in the PPI Review

Priority	*Services PPI*
1	Retail Trade Margins
2	Construction products
3	Information Media and Telecommunications products
4	Transport, Postal and Warehousing products
5	International Trade in Services

[4] Ibid, p88.
[5] Ibid, p22.
[6] The outcome of the 16th Series CPI Review was published in cat. no. 6469.0 on 6 December 2010.
[7] *Information Paper: Outcome of the Review of the Producer and International Trade Price Indexes, 2012*, cat. no. 6427.0.55.004. ch 4, [4.8] – [4.13]; and Appendix 2.
[8] Ibid. ch 4, [4.8].
[9] cat.no. 6427.0.55.004, [4.9], Table 4.1

PREVIOUS WORK BY THE ABS TO PRODUCE RTPIs

1.11 Between 2002 and 2007 the ABS conducted an experimental retail trade margins survey.

1.12 An experimental national quarterly price index was produced and published on 20 February 2007 in the information paper *Experimental Price Index for Retail Trade Margins, Australia, 2003 to 2006,* ABS cat. no. 6402.0.

1.13 The experimental RTPI collection ceased in early 2008 due to budgetary constraints.

1.14 Following feedback from key stakeholders regarding the high priority of a RTPI, funding was made available in the 2009 Budget enabling the reinstatement of the index and supporting data collection.

1.15 Before proceeding with data collection and index production work for the new RTPI, the ABS reviewed the original RTPI program. The review of the original RTPI considered the concepts, methods, and data sources to support the production of a high quality, relevant, RTPI.

1.16 It became clear during the course of this review that operational costs and levels of provider burden associated with the original RTPI were high. This was primarily caused by the index methodology used. The experimental RTPIs were constructed as Fisher indexes[10].

1.17 Following a consideration of the various index compilation methods available, the ABS determined that the new RTPI would be constructed using a Lowe index formula with weights updated and indexes chained annually[11]. The Lowe index formula was chosen as it is a variation of the Laspeyres formula which allows more flexibility in the use of weighting information.

1.18 Following the receipt of additional funding, work commenced on the reinstatement of the index in 2010.

[10] The detailed criteria used to select an index type can be found in the Information Paper, *Consumer Price Index: Concepts, Sources and Methods*, cat. no. 6461.0. In summary, all index types possess characteristics that make each of them more or less desirable in certain circumstances. For example, the Paasche type index benefits from an up-to-date weighting structure but suffers from an inability to produce results in a cost effective and timely manner. The Fisher index possesses several theoretically desirable characteristics (like factor reversal and time reversal) but is considered difficult to produce in a timely and cost effective manner due to its use of the Paasche index. The Laspeyres type index can be produced in a timely and cost effective manner. The main theoretical concern is that the Laspeyres type index can suffer from not having an up-to-date weighting structure. This can be overcome by frequently updating the weights, for example - annually.

[11] Chapter 3 of this paper provides detailed methodological information to compile the RTPI

CHAPTER 2: THE APPLICATION OF A RTPI

INTRODUCTION

2.1 The ABS determined during the PPI Review that the principal purpose of the PPIs is to measure inflation by industry to support the calculation of chain volume measures for both the quarterly and annual Australian National Accounts. This requires the PPIs to be compiled on a basis consistent with the 2008 SNA statistical framework and on a gross industry basis. The RTPIs have been developed in this context.

PRINCIPAL PURPOSE : SUPPORT FOR THE COMPILATION OF THE NATIONAL ACCOUNTS

2.2 The SNA describes its main objective as follows "to provide a comprehensive conceptual and accounting framework that can be used to create a macroeconomic database suitable for analysing and evaluating the performance of an economy[12]." The most widely known and used aggregate statistic within the SNA is the volume measure of GDP. The SNA provides specific guidance on the compilation of an integrated set of volume measures.

2.3 The two basic approaches for producing consistent volume measures are price deflation and quantity revaluation. Price deflation is the more commonly used approach and involves dividing a current price value of sales or turnover by a price index movement to obtain a constant price indicator.

2.4 The PPIs for the output of the retail trade industry will be utilised in a number of areas to compile the Australian National Accounts. These include: (a) the Supply and Use tables; (b) the annual State Accounts; and (c) the quarterly and annual Australian National Accounts.

SUPPLY AND USE TABLES COMPILATION[13]

2.5 The annual Supply and Use tables (S–U tables) underpin the *Australian System of National Accounts* (ABS cat. no. 5204.0). Annual S–U table benchmarking ensures that the three approaches to measuring gross domestic product (production, income and expenditure) have equal annual values for a given reference period.

2.6 S–U tables also provide the basic information for the derivation of detailed Input–Output (I–O) tables that may be used for the purposes of economic analysis and projections. These are published in *National Accounts: Input-Output tables* (ABS cat. no. 5209.0.55.001).

2.7 The compilation of the S–U tables and the PPI output indexes at basic prices enables the use of PPIs to calculate chain volume measures by product.

2.8 The PPIs for the output of the retail trade industry will be used to deflate the current price value of the retail trade margins of various SUPCs. For this to occur, data are required at the Supply and Use Product Classification (SUPC) level. The SUPC is an aggregation of products to product groups as classified by the Input–Output Product Classification (IOPC). The IOPC is used in the preparation of I–O tables.

[12] 2008 SNA, p4, [1.27].
[13] For a detailed description of Supply and Use Tables see 2008 SNA, Chapter 14.

2.9 The volume movements derived from the S–U tables are used to benchmark the volume movements published in the annual and quarterly GDP accounts.

NATIONAL AND STATE ACCOUNTS COMPILATION

2.10 Currently the ABS uses Consumer Price Indexes (CPIs) to deflate the retail trade industry current price estimates to compile chain volume measures (CVMs) of gross domestic product[14]. The availability of a PPI for the output of the retail trade industry will enable a more conceptually correct estimate of retail trade industry output CVMs. PPIs for output of the retail trade industry will be compiled at the state and territory level, on a quarterly and annual basis to support the compilation of the National and State Accounts.

OTHER USES OF RTPI

2.11 The PPIs for the output of the retail trade industry are also of use to monitor retail service price inflation and to improve the understanding of the transmission of inflation throughout the economy.

STAGE OF PRODUCTION INDEXES

2.12 PPIs reflecting the supply of products (goods and services) to the Australian economy in a Stage of Production (SOP) framework are published in *Producer Price Indexes, Australia* (ABS Cat. No. 6427.0). The SOP framework is based on an economic categorisation of transactions according to their sequencing in the production chain.

2.13 The RTPIs fit within the SOP framework, with the greatest impact on the Final Demand[15] indexes which cover goods and services flowing to domestic final consumption with no further processing. The inclusion of the RTPIs in the SOP framework will improve the SOP's analytical power and representativeness of the economy. The implementation of RTPIs in the SOP framework will be communicated ahead of time in the publication *Producer Price Indexes Australia* (cat.no. 6427.0).

INFLATION MONITORING AND ANALYSIS OF THE ECONOMY

2.14 The availability of RTPIs increases the potential to understand the inflationary processes by better understanding the ability of retailers to respond to changing economic conditions by expanding and contracting their retail margins.

[14] Except for new car sales which are quantity re-valued.

[15] The ABS has, as of the September quarter 2012, re–labelled the SOP indexes in an effort to better reflect the relationship of the stages of production to final demand. Accordingly, the ABS will use the following terminology:

- Stage 3 (Final) has become Final Demand – Products consumed as Final Demand;
- Stage 2 (Intermediate) has become Intermediate Demand – Products consumed as inputs into the production of Final Demand; and
- Stage 1 (Preliminary) has become Preliminary Demand – Products consumed as inputs into the production of Intermediate Demand.

CHAPTER 3: CONCEPTS, SOURCES AND METHODS

3.1 This chapter describes the retail trade margins concept as well as the data sources and methods employed to construct PPIs for the output of the retail trade industry.

THE RETAIL TRADE MARGINS CONCEPT

3.2 The SNA describes wholesale and retail margins 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 realised 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.* The margins realised on some goods may be negative if their prices have to be marked down. They must also be negative on goods that are never sold because, for example, they go to waste or are stolen.
>
> The standard formula for measuring output has to be modified for wholesalers or retailers by deducting from the value of the goods sold or otherwise used the value of the goods that would need to be purchased to replace them. The latter includes the additional goods needed to make good recurrent losses due to normal wastage, theft or accidental damage. In practice, the output of a wholesaler or retailer is given by the following identity:
>
> the value of output = the value of sales,
>
> *plus* the value of goods purchased for resale and used for intermediate consumption, compensation of employees, etc.,
>
> *minus* the value of goods purchased for resale,
>
> *plus* the value of additions to inventories of goods for resale,
>
> *minus* the value of goods withdrawn from inventories of goods for resale,
>
> *minus* the value of recurrent losses due to normal rates of wastage, theft or accidental damage."[16]

3.3 Or put more simply, Output = Sales – Cost of Goods Sold.

[16] 2008 SNA, p113, [6.146 – 6.147]

MEASURING PRICE CHANGE

3.4 A price index is a measure of the proportionate, or percentage, changes in a set of prices over time. In constructing a price index to be used to deflate observed transactions the objective is to measure pure price change which abstracts from any change in the quality of the products that are priced. This is referred to as pricing to constant quality. The starting point is to measure price change for specific individual products to constant quality and then to weight these measures together in terms of their relative economic importance with respect to one another to arrive at an aggregate or summary measure of price change. These objectives present a number of practical challenges when producing RTPIs.

PRICING BASIS FOR THE COMPILATION OF A RTPI[17]

3.5 The unobservable retail trade margins price is derived as the difference between the price at which the product is sold and the current replacement cost, to the retailer, of the product sold.

3.6 While collecting information on the prices at which products are sold is relatively straightforward, the collection of information on the replacement cost of goods sold is less so, as in concept they should be valued at their replacement cost at the time of sale. This is difficult to achieve in practice. Although most businesses are able to report the cost of goods sold, the pricing basis is almost universally 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.

3.7 Typically, price indexes are based on prices for a sample of very narrowly specified products (e.g. 1 kilogram of Granny Smith apples). The use of narrowly specified products is not necessary for the purpose of measuring retail trade margin prices. In a typical price index the selection of narrowly defined products for pricing is designed to achieve the objective of pricing to constant quality. The quality of the products produced or purchased can be seen to be embodied in their physical characteristics, so 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 of the RTPIs is to measure the price of the distribution service. While there must exist a retail trade margin for each product (positive or negative), it is less clear that the distribution service itself can be meaningfully disaggregated to this level. The view of the ABS is that the quality of the distribution service is more closely related to the range of similar products 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 Granny Smith apples. This view would also appear to align better with the pricing practices of businesses which tend to set selling prices of individual products with the objective of maximising a retail trade margin across a range of products.

3.8 This 'range of products' view underpins the RTPIs developed by the ABS. Accordingly, these indexes are based on sales and cost of goods sold data collected for categories of products rather than for specific products. The problem then becomes how to define the various 'product categories'. If the level of product aggregation is too broad, the price measure is likely to be overly influenced by any shifts in sales between products that have naturally different retail trade margins. For example, the measured retail trade margin for a product 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 – that is, the measured aggregate retail trade margin price could vary from period to period due to changes in the relative volume of sales rather than any change in individual retail trade margins. An index displaying this characteristic is referred to in the price index literature as suffering from compositional shift. The challenge is to clearly define product categories in terms of product coverage while minimising the risk of

[17] This section is largely a reproduction of text found in cat. no. 6402.0 published on 20 Feb 2007.

compositional shift. The ABS has selected the Supply and Use Product Classification (SUPC), used in compiling the S–U tables which underpin the annual Australian National Accounts, for this purpose. The product groups are not specific to the retail trade industry, but represent product groups across the broader economy.

3.9 Therefore, aggregate retail margins data for the product groups represented by each SUPC are collected from retailers. These aggregate data reflect the price of the retailer's service.

PRICING TO A CONSTANT QUALITY[18]

3.10 The quality of the distribution service provided by a retailer is difficult to measure. Any attempt to measure the distribution service needs to consider characteristics such as outlet opening hours, numbers of checkouts, floor space, general ambience, temperament of staff, ease of parking, range of products 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 products. Therefore, although it may not be possible to make explicit adjustments for any changes in the quality of the service, steps can be taken to minimise or control for quality change.

3.11 Given that the quality of the service can be considered to be unique to each outlet, it follows that the measurement of retail trade margins prices is best done at the outlet level. In the case of multi–location businesses, aggregated data for products represented by selected SUPCs are requested for the selected outlets in each state and territory in which the business operates.

3.12 To assist in identifying any changes in outlet specific quality characteristics, the ABS maintains a close relationship with all data providers. When a quality change is identified at an outlet then the results for that outlet are adjusted to accommodate for the change in quality. Such adjustment includes the imputation of retail trade margins for that outlet from other similar outlets in the sample.

DATA SOURCES AND COLLECTION

3.13 The ABS assessed the availability and suitability of various data sources for the production of RTPIs. This included a search for administrative data as well as utilising data currently collected by the ABS from retail trade businesses. It was determined that the detailed data required to produce the RTPIs was not available and that a separate data collection would need to be implemented. A Retail Trade Margins Survey (RTMS) was then developed.

3.14 The data items collected are;

- Business level total Sales and COGS, by state/territory of operation, for product groups as classified by SUPC.
- For each business, outlet level total Sales and COGS, for each of a selection of outlets within each state/territory of operation, for product groups as classified by SUPC.

[18] This section is largely a reproduction of text found in cat. no. 6402.0 published on 20 Feb 2007.

SCOPE AND COVERAGE

3.15 Retail trade margins data are collected by the ABS for those SUPCs with the highest contribution[19] to total retail trade margins, and where data collection is feasible. A sample of businesses are selected from those classified to ANZSIC06 Division G Retail Trade, i.e. "those units engaged in the purchase and on–selling of goods to the general public"[20]. Individual businesses are selected for the survey on the basis of market influence and the individual products they sell.

3.16 The RTMS collects retail trade sales and COGS data from, primarily, large retail businesses. A partial coverage collection approach is used where large businesses represent the retail trade margins of all sizes of retail business. Medium sized businesses are included only where industry concentration is not sufficient to exclude them and/or when the retail trade margins of large businesses are not sufficiently representative of those of medium sized businesses. The RTMS excludes small businesses, except where they are a part of a franchise operation.

3.17 Where possible, businesses selected in the RTMS were enrolled via personal visit. This is an active strategy to address provider concerns relating to the confidentiality of retail trade margins data. This strategy ensures a high level of cooperation from providers and assists in the control of data quality. The ABS has implemented an electronic data collection using a web form for this survey.

3.18 The most significant challenge faced by the ABS during the enrolment phase for the RTMS was obtaining historical data back to the March Quarter 2008. These data are required for linking the current RTPIs with those indexes created in the experimental program conducted from the December Quarter 2003 to the December Quarter 2007.

3.19 The ABS has initially limited data collection to 27 SUPCs out of a total of 119 SUPCs corresponding with ANZSIC06. The ABS will investigate extending the collection of data on SUPCs beyond current coverage and will do so where retail trade margins share is significant and data collection is feasible.

METHODS USED FOR THE COMPILATION OF A RTPI

Index Number Formulae

3.20 Various methods are available to compile price indexes. While NSOs may prefer conceptually superior index formulae, such as the Fisher index, decisions about index compilation methods need to consider key issues such as index compilation costs, data availability, provider burden, timeliness, and end use/purpose.

3.21 Following a review of the original RTPI and consideration of the various index compilation methods available, the ABS determined that the RTPI would be constructed using a Lowe index formula[21] with weights updated and indexes chained annually. The Lowe class of price index is defined as measuring the proportionate change between two periods in the total value for a specific fixed basket of goods. The ABS, like most NSOs, makes use of the Lowe index approach to compile their PPIs and CPIs.

[19] Weights are based on the unpublished 2008–09 S–U tables.

[20] *ANZSIC 2006*, cat.no. 1292.0, p244.

[21] The original RTMPI 2002 to 2007 used a Fisher index formula in stages 1 and 2 of the index construction process. Owing to compilation costs and data availability the new RTPI construction process uses a Lowe index formula.

3.22 The formula for the Lowe index is presented below. Let there be n products in the basket with prices P_i and quantities Q_i, and let the two periods being compared be *0* and t while b is the quantity reference period. The Lowe index, *PLo*, is defined as:

$$PLo = \frac{\sum_i^n P_i^t Q_i^b}{\sum_i^n P_i^0 Q_i^b}$$

The RTPI Construction Process[22]

3.23 A price index is constructed by measuring the proportionate changes in the prices of many products over time and combining these measures using weights to form aggregate indexes. For the RTPIs, the aggregation process is in three stages.

3.24 In the first stage, final margin prices and final margin price relatives are calculated from reported outlet sales and COGS data against SUPCs. The final margin price relatives are then aggregated to form the state/territory level SUPC indexes.

3.25 In a second stage of processing, national SUPC indexes are constructed by aggregating the state/territory SUPC indexes.

3.26 The third and final stage of processing combines the national SUPC indexes to produce the national RTPI. The weights used during aggregation in each of the three stages of processing are updated on an annual basis.

Stage 1: Aggregating Over Outlets to Form SUPC Specific State/Territory Level Indexes

3.27 Stage 1 involves the creation of state/territory indexes by SUPC. These state/territory level SUPC indexes are calculated by first determining the final price (dollar retail trade margin) for the SUPCs at the outlet level. This is achieved by applying the current period percentage retail trade margin by outlet to a reference period 'preserved volume measure of sales' as explained below.

3.28 The 'preserved volume measure of sales' is determined by adjusting the reference period sales data by the movement in the component of the CPI which most closely matches the product coverage of the index SUPC. The purpose of this transformation is to maintain the reference volume of sales from which current period retail trade margins data are calculated. The outcome of this process is the determination of the dollar retail trade margins in period *t* based on the sale volumes in period *0*.

3.29 A final margin price relative at the outlet level is obtained from the ratio of the final margin price in the current period, *t*, to the final margin price in the price reference period, *0*. The SUPC state/territory index is then calculated as a weighted sum of these outlet price relatives.

3.30 The outlet weight at an SUPC level is calculated by multiplying the outlet's contribution to the outlet sample retail trade margin for that SUPC, by the business's contribution to the state/territory retail trade margin for that SUPC.

[22] A detailed description of the RTPIs construction process can be found in Appendix 1 of this publication.

Stage 2 and 3: Calculating National SUPC Indexes and a RTPI

3.31 Stage 2 involves the creation of national margin indexes representing the products grouped by SUPCs. These national SUPC indexes are created by weighted aggregation of the state/territory level SUPC indexes. Weights used at this stage are 'SUPC retail trade margin shares by state/territory'.

3.32 Stage 3 involves the creation of the national RTPI by weighted aggregation of the national SUPC indexes. Weights used in this stage are unpublished national SUPC retail trade margin shares. SUPC retail trade margin shares by state/territory are determined from unpublished national SUPC retail trade margin values obtained from the national S–U tables. National S–U tables are compiled on an annual basis.

3.33 See Appendix 1 for a detailed explanation of the compilation process for the RTPIs.

CHAPTER 4: THE NEW EXPERIMENTAL RTPI

4.1 This chapter outlines the publication strategy for the PPIs for the output of the retail trade industry.

INDEXES PRODUCED TO SUPPORT THE PURPOSE AND USES OF A RTPI

4.2 The ABS has initially limited data collection to 27 SUPCs out of a total of 119 SUPCs corresponding with the National Accounts S–U tables. However, the retail trade margins represented by these 27 SUPCs account for approximately two–thirds of total retail trade margins across the ANZSIC06 Retail Trade industry.

4.3 Total sales and cost of goods sold are collected for the SUPCs listed below in Table 4.1. For confidentiality reasons it may not be possible to publish all RTPIs by individual SUPCs. Where confidentiality concerns exist, related product groups will be aggregated using retail trade margin shares from unpublished S–U tables as weights to form groups of selected product groups for publication.

TABLE 4.1 – Product Groups included in Retail Trade Margins Survey

Selected Product Group	SUPC codes	Description
A. Clothing, footwear and textiles	13010	Textile fabrics, yarns, threads and fibres
	13040	Textile products nec
	13070	Clothing (excl knitted or crocheted)
	13075	Footwear
B. Selected foods and alcohol	01035	Fruits, nuts and vegetables
	11005	Edible meat, offal and meat products
	11025	Dairy products
	11055	Bakery products
	12010	Alcoholic beverages (not bought and consumed on licensed premises)
C. Furniture	25005	Furniture (excl plastic)
D. Motor vehicles, parts and tyres	19015	Pneumatic tyres (motor car and motor cycles) and tubes
	23005	Motor cars
	23015	Second hand motor vehicles
	23060	Motor vehicle parts (excl engines and panels) and accessories
E. Telecommunications, computers, audio visual equipment and photographic goods	24005	Photographic goods (incl optical fibres) and ophthalmic equipment (excl spectacles)
	24025	Computers
	24030	Telecommunication and audio visual equipment
	24050	Household appliances
F. Automotive fuel products	17005	Liquefied petroleum gas produced at refineries
	17015	Automotive petroleum and coal products
G. Watches and jewellery	24015	Watches (incl metal watch straps), watch cases, clocks and parts
	25025	Jewellery and silverware
H. Other	12015	Tobacco products
	16005	Printing
	25010	Toys and sporting equipment and parts
	54005	Newspaper, magazine and book publishing
	55020	Music publishing; music and other sound recording activities

PUBLICATION SCHEDULE FOR RTPI

4.4 PPIs for the output of the retail trade industry cannot be compiled with the same timeliness as the other PPIs[23]. The basic data required for the construction of the PPIs for output of the retail trade industry are quarterly sales and cost of goods sold. These economic flow data cannot be collected until some time after the end of the reference quarter. By comparison, price indexes for goods and some services are based on point in time prices prevailing at selected dates during the quarter. Further, calculation of the RTPIs requires the latest period CPI data to be available for price updating purposes.

4.5 Because of these constraints, the ABS will publish RTPIs as stand–alone indexes. This will occur until the necessary systems and processes are in place to enable RTPIs to be incorporated into the SOP framework. The implementation of RTPIs in the SOP indexes will be communicated ahead of time in the publication *Producer Price Indexes Australia* (cat.no. 6427.0).

4.6 The ABS will:

i. Publish quarterly PPIs for the Output of the Retail Trade Industry (RTPIs) as standalone indexes in the period following the release of the Producer Price Index, Australia publication (ABS cat. no.6427.0) and prior to the quarterly National Accounts (ABS cat.no. 5206.0). The RTPIs will be released on the ABS website in electronic format only. The indexes will be available as an additional data cube under the PPI publication (ABS cat. no. 6427.0) approximately 3 weeks after the date of the initial release. The ABS will advise users of the additional data in the 'changes to this issue' section of the PPI publication.

ii. Subject to further review, retain the experimental label on RTPIs.

[23] The ABS has delayed the release of the PPI publication by nine working days from the September quarter 2012. However, even with this delay, the RTPI cannot be compiled in time to meet the PPI (SOP) publication deadline. Note – this delay to the PPIs was announced on the 6th March 2012 as part of the Information Paper: Outcome of the *Review of the Producer and International Trade Price Indexes, 2012* (cat. no. 6427.0.55.004)

4.7 The RTPIs to be produced and their availability to users are listed below in Table 4.2.

Table 4.2 Producer Price Indexes for the Output of the Retail Trade Industry (RTPIs)

Index	Availability	Comments
National total RTPI (index number and annual/quarterly % change).	2003 onwards	Index linked to original series per Table 3 in 6402.0.
National aggregation of products represented by selected SUPC s– total RTPI (index number and annual/quarterly % change).	2008 onwards	Outputs available subject to confidentiality.
State/territory total RTPI (index number and annual/quarterly % change).	2008 onwards.	Outputs available subject to confidentiality.
National SUPC level – total RTPI (index number and annual/quarterly % change).	Internal use only - for use in the compilation of the National Accounts.	Outputs unlikely to be available external to ABS due to confidentiality constraints.
State/territory SUPC level – total RTPI (index number and annual/quarterly % change).	Internal use only - for use in the compilation of the National Accounts.	Outputs unlikely to be available external to ABS due to confidentiality constraints.

APPENDIX 1: TECHNICAL APPENDIX TO CHAPTER 3

INTRODUCTION

1. This appendix provides a detailed explanation of the new compilation process for the producer price index for the output of the retail trade industry. Details of the original retail trade margins index can be found in ABS *Experimental Price Index for Retail Trade Margins, 2003 to 2006: Information Paper* (cat.no. 6402.0).

THE NEW EXPERIMENTAL RTPI CONSTRUCTION PROCESS

2. The ABS RTPI is constructed using a Lowe index formula applied at each stage of the index aggregation process. The calculation of the new RTPIs is carried out in three stages as described below.

3. Stage 1 of the process calculates the state/territory level margin indexes for SUPCs. For each SUPC, the outlet weight in period *0*, $w^0_{supc,state,i}$, is calculated as the product of the outlet retail trade margin share and the business retail trade margin share as shown by the formula below.

$$w^0_{supc,state,i} = \frac{\bar{M}^0_{supc,state,i}}{\sum_i^{n_{state,E}} \bar{M}^0_{supc,state,i}} \times \frac{\bar{M}^0_{supc,state,E}}{\sum_E^{N_{state}} \bar{M}^0_{supc,state,E}} \quad (1)$$

Where:
- $\bar{M}^0_{supc,state,i}$ is the four quarter average retail trade margin (the difference between the total sales and cost of goods sold) at outlet *i,* in the state/territory, in period *0;*

- $\bar{M}^0_{supc,state,E}$ is the four quarter average retail trade margin for business *E* in the state/territory, in period *0;*

- $n_{state,E}$ is the number of outlets sampled in the state/territory, for business *E;* and

- N_{state} is the number of businesses sampled in the state/territory.

Note: The four quarter average margins are calculated from period *0* and the prior three quarters.

4. For each SUPC the outlet prices, $v^t_{supc,state,i}$, are then calculated as follows.

$$v^t_{supc,state,i} = \left(S^0_{supc,state,i} \frac{CPI^t_{supc,state}}{CPI^0_{supc,state}}\right) \frac{M^t_{supc,state,i}}{S^t_{supc,state,i}} \quad (2)$$

Where:

- $v^t_{supc,state,i}$ is the final retail trade margin price at outlet *i* in period *t*;

- $S^0_{supc,state,i}$ is the total sales for the *SUPC* at outlet *i* in period *0;*

- $S^t_{supc,state,i}$ is the total sales for the *SUPC* at outlet *i* in period *t;*

- $M^t_{supc,state,i}$ is the retail trade margin for the *SUPC* at outlet *i* in period *t;*

- $\frac{M^t_{supc,state,i}}{S^t_{supc,state,i}}$ is the relative margin for the *SUPC* at outlet *i* in period *t;* and

- $\left(S^0_{supc,state,i}\frac{CPI^t_{supc,state}}{CPI^0_{supc,state}}\right)$ is the sales on the 'preserved volume' for the *SUPC* at outlet *i* in period *t*.

5. The estimation of the margin price on the sales that would be realised on the 'preserved volume' is an important element of the stage 1 calculation. The purpose of this adjustment is to maintain a consistent volume of sales, across periods, from which final retail trade margin prices are then calculated. This ensures that the RTPIs are not influenced by changes in sales caused by price inflation.

6. The state/territory SUPC index, $I^t_{supc,state}$, is then calculated as;

$$I^t_{supc,state} = I^0_{supc,state}\sum_i^{n_{supc,state}}\frac{v^t_{supc,state,i}}{v^0_{supc,state,i}}\ w^0_{supc,state,i} \quad (3)$$

Where:

- $n_{supc,state}$ is the number of outlets in the state/territory reporting on the selected SUPC;

- $\frac{v^t_{supc,state,i}}{v^0_{supc,state,i}}$ is the final price relative between periods *t* and *0* for each outlet.

STAGES 2 AND 3, CALCULATION OF THE NATIONAL SUPC INDEXES AND THE RTPI

7. Stage 2 of this process calculates the national margin indexes for SUPC, I^t_{supc}. These indexes are calculated as a weighted sum of state/territory indexes as shown below;

$$I^t_{supc} = I^0_{supc}\sum_{state}^{8}\frac{I^t_{supc,state}}{I^0_{supc,state}}\ w^0_{supc,state} \quad (4)$$

The weights, $w^0_{supc,state}$, are state/territory retail trade margin shares given by,

$$w^0_{supc,state} = \frac{M^0_{supc,state}}{\sum_{state}M^0_{supc,state}} \quad (5)$$

8. Stage 3 of this process calculates the national RTPI as a weighted sum of national SUPC indexes, as shown below;

$$RTPI^t = RTPI^0\sum_{supc}\frac{I^t_{supc}}{I^0_{supc}}w^0_{supc} \quad (6)$$

Where,w^0_{supc}, is the national retail trade margin share weights obtained from the S–U table, given by,

$$w^0_{supc} = \frac{M^0_{supc}}{\sum_{supc}M^0_{supc}} \quad (7)$$

9. Stages 2 and 3 utilise national retail trade margins SUPC data sourced from the unpublished annual S–U table. Retail trade margins data by state/territory (used in equation 5) are calculated from the national SUPC data and dis-aggregated using the Household Expenditure Survey (HES) data.

NUMERICAL EXAMPLE FOR THE NEW EXPERIMENTAL RTPI CONSTRUCTION PROCESS

10. This example illustrates the three stages to calculate the experimental PPIs for the output of the retail trade industry. For the purpose of simplicity, this example does not use a four quarter average retail trade margin in the calculation of the outlet weights, as described in paragraph 3 above.

11. A retail business trading in products represented by the SUPC, Clothing (excluding knitted or crocheted) is used. The business has three outlets, all of which are located in the state of NSW. Tables A1.1 and A1.2 show the survey data (Sales $ and COGS $) collected from this business at the enterprise level and at the outlet level for the price reference period *0* and period *t* respectively along with the derived items, Margin $ and Relative Margin.

12. In Stage 1 of the calculation process we restrict the scope of the example to show the calculation of the contribution made by a business to the state/territory SUPC Index.

13. Dollar margins are calculated as the difference between the Sales and the COGS, relative margins are calculated as the ratio of dollar margin to sales.

14. Table A1.1, survey data and derived items for Clothing (excluding knitted or crocheted) received for the business at the outlet level and the enterprise level for NSW in price reference period 0.

TABLE A1.1 – Price reference period *0* data for a Clothing business

NSW	Sales $	COGS $	Margin $	Relative Margin
Outlet1 Total	20,000	15,000	5,000	0.25
Outlet2 Total	30,000	21,000	9,000	0.30
Outlet3 Total	40,000	32,000	8,000	0.20
Business Total	120,000	90,000	30,000	0.25

15. The CPI for Clothing (excluding knitted or crocheted) for this period is 110.2.

16. Table A1.2, Survey data and derived items for Clothing (excluding knitted or crocheted) received for the business at the outlet level and the enterprise level for NSW. Period, *t*.

TABLE A1.2 – Period *t* Survey data collected and derived data for a Clothing business

NSW	Sales $	COGS $	Margin $	Relative Margin
Outlet 1 Total	25,000	17,500	7,500	0.30
Outlet 2 Total	35,000	24,500	10,500	0.30
Outlet 3 Total	45,000	33,750	11,250	0.25
Business Total	130,000	91,000	39,000	0.30

17. The CPI for Clothing (excluding knitted or crocheted) for this period is 109.9.

18. Stage 1, the calculation of state/territory SUPC indexes proceeds as follows.

19. This business contributes 10% to the retail trade margins for Clothing (excluding knitted or crocheted) within the state of NSW. The weight assigned to each outlet for period *0* is as follows:

    Outlet margin sum = $5,000 + $9,000 + $8,000 = $22,000

    Weight Outlet 1 = 5000/22,000 * 0.10 = 0.0227
    Weight Outlet 2 = 9,000/22,000 * 0.10 = 0.0409
    Weight Outlet 3 = 8,000/22,000 * 0.10 = 0.0364

    (Refer to equation 1)

20. The 'preserved volume of sales' for each outlet for period *t* are calculated as follows from period *0* sales data and the relevant CPI figures (rounded to whole dollars);

    Volume of sales Outlet 1 = (20,000 * 109.9/110.2) = $19,946
    Volume of sales Outlet 2 = (30,000 * 109.9/110.2) = $29,918
    Volume of sales Outlet 3 = (40,000 * 109.9/110.2) = $39,891

    (Refer to equation 2)

21. A final retail trade margin price for each outlet is then calculated from the 'preserved volume of sales' and the relative margin at the outlet for period *t* as;

    Final margin price Outlet 1 = 19,946 * 0.30 = $5,984
    Final margin price Outlet 2 = 29,918 * 0.30 = $8,975
    Final margin price Outlet 3 = 39,891 * 0.25 = $9,973

    (Refer to equation 2)

22. The contribution to the state/territory Clothing (excluding knitted or crocheted) Index for NSW made by this business is then given by the weighted sum of final retail trade margin price relatives as shown below;

    Business contribution to index = 5,984/5,000 * 0.0227 +
    8,975/9,000 * 0.0409 +
    9,973/8,000 * 0.0364
    = 0.1133

    (Refer to equation 3)

23. State/territory SUPC indexes are formed from the aggregation of these business contributions. This aggregation is then multiplied by the price reference period state/territory SUPC index. In this example, the derived index values are shown in Table A1.3.

24. Stage 2, the calculation of national SUPC indexes proceeds as follows.

25. Incorporating Stage 1 calculations for the businesses participating in the RTMS we have the following state/territory Clothing (excluding knitted or crocheted) Indexes presented in Table A1.3. Table A1.4 presents period *0* state/territory retail trade margins and margin shares.

TABLE A1.3, State/Territory, Clothing (excluding knitted or crocheted), Indexes calculated in stage 1 for periods *0* and *t*.

State/Territory	Index for Clothing (excluding knitted or crocheted) Period 0	Index for Clothing (excluding knitted or crocheted) Period t
NSW	101.1	100.0
Vic	102.3	101.4
Qld	100.5	99.5
SA	99.7	98.8
WA	98.0	99.2
Tas	99.9	99.9
NT	103.4	102.1
ACT	105.5	106.2

TABLE A1.4, State/Territory, Clothing (excluding knitted or crocheted), retail trade margins and margin shares for period *0*.

State/Territory	Margin $'Millions Period 0	Margin Share Period 0
NSW	2,559	0.332
Vic	2,109	0.274
Qld	1,327	0.172
SA	513	0.067
WA	823	0.107
Tas	160	0.021
NT	59	0.008
ACT	160	0.021
Total Australia	7710	1.000

26. The national value of retail trade margins for Clothing (excluding knitted or crocheted) in period *0* is $7,710 Million. The state/territory retail trade margins share is the ratio of the state/territory retail trade margin to the national retail trade margin value.

27. The national Clothing (excluding knitted or crocheted) index is calculated as follows;

Aggregation for Clothing (excluding knitted or crocheted) = 100.0/101.1 * 0.332 +
101.4/102.3 * 0.274 +
99.5/100.5 * 0.172 +
98.8/ 99.7 * 0.067 +
99.2/ 98.0 * 0.107 +
99.9/ 99.9 * 0.021 +
102.1/103.4 * 0.008 +
106.2/105.5 * 0.021
= 0.993

(Refer to equations 4 and 5).

28. This aggregation is then multiplied by the price reference period national SUPC index to obtain the period *t* national SUPC index for Clothing (excluding knitted or crocheted).

29. Stage 3, the calculation of the national RTPI is a simple weighted aggregation of the state/territory SUPC indexes. The weights used in this aggregation process are retail trade margin shares calculated from the national S–U table.

BIBLIOGRAPHY

Australian Bureau of Statistics 2006, *Australian and New Zealand Standard Industrial Classification 2006 (ANZSIC06)* cat. no. 1292.0, ABS, Canberra.

Australian Bureau of Statistics 2007*, Experimental Price Index for Retail Trade Margins, 2003 to 2006: Information Paper* cat. no. 6402.0, ABS, Canberra.

Australian Bureau of Statistics 2010, *Outcome of the 16th Series Australian Consumer Price Index Review* cat. no. 6469.0, ABS, Canberra.

Australian Bureau of Statistics 2012, *Producer Price Indexes, Australia* cat. no. 6427.0, ABS, Canberra.

Australian Bureau of Statistics 2012, *Information Paper: Outcome of the Review of the Producer and International Trade Price Indexes, 2012* cat. no. 6427.0.55.004, ABS, Canberra.

Australian Bureau of Statistics 2012, *Information Paper: Implementation of the Review of the Producer and International Trade Price Indexes, 2012* cat. no. 6427.0.55.005, ABS, Canberra.

International Monetary Fund 2010b, *Australia: Report on the Observance of Standards and Codes–Data Module,* IMF Country Report No. 10/343.

<http://www.imf.org/external/pubs/ft/scr/2010/cr10343.pdf>

United Nations, International Monetary Fund, Organisation for Economic Co–operation and Development, World Bank and Commission of the European Communities*,* Brussels/Luxembourg, New York, Paris, Washington D.C., 2008, *System of National Accounts*

FOR MORE INFORMATION . . .

www.abs.gov.au the ABS website is the best place for data from our publications and information about the ABS.

INFORMATION AND REFERRAL SERVICE

Our consultants can help you access the full range of information published by the ABS that is available free of charge from our website. Information tailored to your needs can also be requested as a 'user pays' service. Specialists are on hand to help you with analytical or methodological advice.

POST Client Services, ABS, GPO Box 796, Sydney NSW 2001

FAX 1300 135 211

EMAIL client.services@abs.gov.au

PHONE 1300 135 070

FREE ACCESS TO STATISTICS

All ABS statistics can be downloaded free of charge from the ABS web site.

WEB ADDRESS www.abs.gov.au