6440.0

Australian Bureau of Statistics

A Guide to the Consumer Price Index: 16th Series

Australia

2011

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AUSTRALIAN BUREAU OF STATISTICS

EMBARGO: 11.30AM (CANBERRA TIME) FRI 7 SEP 2012

ABS Catalogue No. 6440.0

Produced by the Australian Bureau of Statistics

INQUIRIES

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CHAPTER 1 INTRODUCTION

CPI – A WIDELY USED ECONOMIC INDICATOR RELEASED QUARTERLY

1.1 The Consumer Price Index (CPI) is an important economic indicator. It provides a general measure of changes in prices of consumer goods and services purchased by Australian households. The CPI is used for a variety of purposes, such as in the development and analysis of government economic policy, the adjustment of some government benefits and in individual contracts. Because of this, the CPI directly or indirectly affects all Australians.

1.2 CPI figures are produced by the Australian Bureau of Statistics (ABS) for each quarter (three months ending March, June, September and December) and are released on the fourth Wednesday after the end of the reference period. They appear in the publication *Consumer Price Index, Australia* (cat. no. 6401.0). In addition, all CPI results appear on the ABS website *http://www.abs.gov.au*.

CPI NOW COMPRISES 16 LINKED SERIES

1.3 The CPI was first compiled in 1960 with series extending back to the September quarter 1948. The CPI was preceded by five series of retail price indexes compiled by the (then) Commonwealth Bureau of Census and Statistics as far back as 1901. These series were titled the A, B, C, and D Series, and the Interim Retail Price Index respectively. The C Series Index, which began in 1921, was the principal retail price index in Australia prior to the introduction of the CPI in 1960.

1.4 The introduction of the CPI heralded a change in the approach to measuring retail price movements. Rather than compiling a set of discrete fixed–weighted indexes, the objective became to produce a series of short–term fixed–weighted indexes that were to be regularly linked together to provide a single continuous measure of price change. This strategy was adopted to ensure that, at any point in time, the weighting patterns and item coverage of the CPI were relevant to user requirements and reflected contemporary economic conditions as well as possible. The CPI now comprises sixteen linked indexes. The CPI originally consisted of weights from 1948. Weights were updated in 1952 and subsequently in 1956, 1960, 1963, 1968, 1973, 1974, 1976, 1982, 1987, 1992, 1998, 2000, 2005 and 2011.

THE GUIDE

1.5 The purpose of this guide is to provide a broad overview of the CPI; how to use the CPI and how the CPI is calculated. It takes into account changes made with the introduction of the 16th series CPI in the September quarter 2011 and is suitable for general users.

WHAT IS THE CPI?

Australian Bureau of Statistics

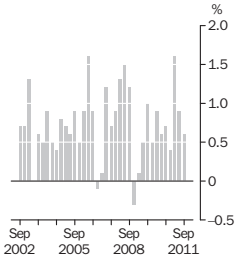
SEPTEMBER QUARTER 2011 **6401.0**

CONSUMER PRICE INDEX *AUSTRALIA*

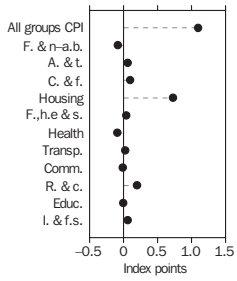
EMBARGO: 11.30AM (CANBERRA TIME) WED 26 OCT 2011

NOTE: 16th Series CPI commences this quarter. See page 2 for details.

All Groups CPI
Quarterly change



Contribution to quarterly change



KEY FIGURES

WEIGHTED AVERAGE OF EIGHT CAPITAL CITIES	*Jun Qtr 2011 to Sep Qtr 2011* *% change*	*Sep Qtr 2010 to Sep Qtr 2011* *% change*
All groups CPI	**0.6**	**3.5**
Food and non-alcoholic beverages	–0.2	6.4
Alcohol and tobacco	0.5	3.0
Clothing and footwear	1.5	1.2
Housing	1.9	4.2
Furnishings, household equipment and services	0.2	–0.5
Health	–1.0	3.7
Transport	0.1	4.3
Communication	0.0	0.6
Recreation and culture	0.9	–0.1
Education	0.1	5.8
Insurance and financial services	0.7	4.5
CPI analytical series		
All groups CPI, seasonally adjusted	0.4	3.5
Trimmed mean	0.3	2.3
Weighted median	0.3	2.6

KEY POINTS

THE ALL GROUPS CPI

- rose 0.6% in the September quarter 2011, compared with a rise of 0.9% in the June quarter 2011.
- rose 3.5% through the year to the September quarter 2011, compared with a rise of 3.6% through the year to the June quarter 2011.

OVERVIEW OF CPI MOVEMENTS

- The most significant price rises this quarter were for electricity (+7.8%), international holiday travel and accommodation (+5.1%), rents (+1.2%), water and sewerage (+8.6%) and property rates and charges (+5.2%).
- The most significant price falls this quarter were for pharmaceutical products (–5.0%), audio, visual and computing equipment (–3.3%), automotive fuel (–1.4%), vegetables (–2.5%), motor vehicles (–1.0%) and fruit (–1.2%).

INQUIRIES

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OVERVIEW OF THE 16TH SERIES CPI

2.1 The 16th series Consumer Price Index, Australia (CPI), consistent with the 13th, 14th and 15th series, has been designed as a general measure of price inflation for the household sector as a whole. The CPI measures changes in the price of a fixed basket of goods and services acquired by consumers in metropolitan private households.

CPI measures price change of a fixed basket of goods and services

2.2 The simplest way of thinking about the CPI is to imagine a basket of goods and services comprising items bought by Australian households. Now imagine the basket is purchased each quarter. As prices change from one quarter to the next, so too will the total price of the basket. The CPI is simply a measure of the changes in the price of this fixed basket as the prices of items in it change.

CPI reference population is all metropolitan private households

2.3 The CPI measures price changes relating to the spending pattern of all metropolitan private households. This group is termed 'the CPI population group', and includes a wide variety of sub–groups such as wage and salary earners, the self–employed, self–funded retirees, age pensioners, and social welfare beneficiaries. The term 'metropolitan' means the six State capital cities, Darwin and Canberra. The current series CPI population group represents about 64% of all Australian private households.

2.4 Ideally the CPI population group should encompass all Australian households, but this is not possible due to the substantial additional resources that would be required to collect prices outside the capital cities. ABS research has shown that, in general, price movements (as distinct from price levels) are similar across regions. An outcome of the 16th series review was that the ABS will continue to explore cost effective options to expand CPI coverage beyond capital cities. However, this must be considered in the context of competing priorities within the ABS work program.

Base period index number is 100.0

2.5 The price of the CPI basket in the index reference base period is expressed as an index by assigning it a value of 100.0 and the prices in other periods are expressed as percentages of the price in the base period. For example, if the price of the basket had increased by 35% since the base period, then the index would be 135.0; similarly, if the price had fallen by 5% since the base period, the index would stand at 95.0. The current index reference base period for the CPI is 1989–90, although some component series have a base period other than 1989–90.

CPI does not measure price levels

2.6 It is important to remember that the CPI measures price movements (i.e. percentage changes) and not actual price levels (dollar amounts). For instance, the index for Breakfast cereals of 161.7 and the index for Bread of 242.9 in the September quarter 2011 does not mean that Bread is more expensive than Breakfast cereals. It simply means that the price of Bread has risen by more than the price of Breakfast cereals since the base period.

Is the CPI a cost of living index?

2.7 The CPI frequently is called a cost–of–living index, but it differs in important ways from a complete cost–of–living measure. Both the CPI and a cost–of–living index measure the changes in prices of goods and services that are purchased by households. The Australian CPI measures the changes in price of a fixed basket of goods and services whereas a cost–of–living index measures the change in the minimum expenditure needed to maintain a certain standard of living.

2.8 In practice, no statistical agencies compile true cost–of–living or purchasing power measures as it is too difficult to do. A cost–of–living index requires access to both price and current household consumption each period as well as an assessment of households' welfare which depends on a variety of physical and social factors that have no connection with prices. As the CPI is intended to measure the overall inflation in

Is the CPI a cost of living index? continued

prices of goods and services acquired by Australian households, it is sometimes used as a proxy measure of cost–of–living or purchasing power.

2.9 As a single index cannot be expected to adequately fulfill all purposes, and in recognition of the widespread interest in the extent to which the impact of price change varies across different groups in the community, the ABS compiles and publishes *Analytical Living Cost Indexes for Selected Australian Household Types* (cat. no. 6463.0) and the *Pensioner and Beneficiary Living Cost Index* (cat. no. 6467.0), specifically designed to measure changes in living costs for selected population sub–groups. They are particularly suited for assessing whether or not the disposable incomes of households have kept pace with price changes. The employee households living cost index is calculated on a similar basis as the CPI prior to the September quarter 1998.

2.10 The most notable difference between these indexes and the CPI is that the living cost indexes include interest charges but do not include new house purchases, while the CPI includes new house purchases but does not include interest charges. Households have been categorised based on the principal source of household income, derived from the 2009–10 Household Expenditure Survey (HES). The four household types in the scope of the HES account for just over 90% of Australian households. The four household types that have been identified as being appropriate for the construction of these indexes, are:

- employee households (i.e. those households whose principal source of income is from wages and salaries);
- age pensioner households (i.e. those households whose principal source of income is the age pension or veterans affairs pension);
- other government transfer recipient households (i.e. those households whose principal source of income is a government pension or benefit other than the age pension or veterans affairs pension) and,
- self–funded retiree households (i.e. those households whose principal source of income is superannuation or property income and where the HES defined reference person is 'retired' (not in the labour force and over 55 years of age).

HOW IS THE CPI USED?

The CPI is used as a macroeconomic indicator and for adjusting dollar values

2.11 The CPI affects almost all Australians because of the many ways in which it is used. The two most common uses of the CPI are:

- as a macroeconomic indicator. The CPI, and other index series derived from CPI data, are used by the Government and economists to monitor and evaluate levels of inflation in the Australian economy. Inflation and inflationary expectations play a major role in determining various aspects of Government economic policy, and in the business and investment decisions of private firms and individuals.
- as a means of maintaining dollar values. The value of many types of fixed payments such as social welfare benefits can be reduced over time when prices rise. The CPI is often used to adjust these payments to counter the effects of inflation. This process is referred to as 'indexation'. Indexation arrangements are also often applied to such things as rental agreements, insurance cover and child support payments.

There are many different price indexes available

2.12 Although the CPI is the best known price index, it is but one of many produced by the ABS. Examples of other price indexes include:

- analytical living cost indexes for selected household types;

There are many different price indexes available continued

- producer price indexes;
- labour price indexes;
- house price indexes; and
- chained price indexes produced in conjunction with the Australian national accounts.

2.13 Having determined that a price index is required for a particular application it is important to carefully consider the range of available indexes and select the index which best meets the specific requirement. While the ABS can provide technical and statistical guidance, it does not provide advice on indexation practices and it cannot tell users which index they should use. These are matters for users to determine.

2.14 For a general description of the range of issues that should be taken into account by parties considering an indexation clause see 'Use of Price Indexes in Contracts' at

http://www.abs.gov.au/websitedbs/c311215.nsf/web/Inflation+and+Price+Indexes.

THE CPI BASKET OF GOODS AND SERVICES

CPI basket based on 2009–10 HES data

2.15 The composition of the CPI basket is based on the pattern of household expenditure in the 'weighting base period', which is 2009–10 for the 16th series CPI. Information on the spending habits of Australian households during 2009–10 was obtained from the Household Expenditure Survey (HES) conducted by the ABS. The HES results provide the starting point for selecting the basket of goods and services to be priced for the CPI.

CPI basket includes items representative of all consumer goods and services

2.16 For practical reasons, the basket cannot include every item bought by households but it does include the most significant items. It is not necessary to include all the items people buy since many related items are subject to similar price changes. The idea is to select representative items so that the index reflects price changes for a much wider range of goods and services than is actually priced. Examples of the types of items included in the CPI basket are shown in **Appendix 2**.

2.17 When determining what items are to be priced for the CPI basket, various factors are taken into consideration. Items:

- must be representative of purchases made by the CPI population group;
- must have prices which can be associated with an identifiable and specific commodity or service (e.g. a 420g can of baked beans, or adult general admission to a club football game);
- are not excluded on the basis of moral or social judgements. For example, some people may regard the use of tobacco or alcohol as socially undesirable, but both are included in the CPI basket because they are significant items of household expenditure and their prices can be accurately measured.

2.18 Income–based taxes, however, are not included in the CPI because they cannot be clearly associated with the purchase or use of a specific good or service.

Deposit and loan facilities

2.19 The Deposit and loans facilities index was introduced into the 15th series Australian CPI in the September quarter 2005. It included both direct and indirect charges of financial institutions. Direct charges include a range of financial transactions used by households including fees for internet transactions, credit card fees, charges for using Automatic Teller Machines (ATMs) and overdraft charges.

Deposit and loan facilities continued

2.20 Indirect charges are the interest rate margins calculated on household loans and deposits with financial institutions.

2.21 In the 16th series CPI the deposit and loan facilities (indirect charges) was removed from the headline CPI from the September quarter 2011. The deposit and loan facilities index now includes direct fees and charges only and is named 'Deposit and loan facilities (direct charges)'. A new analytical series, comprising the 'All groups CPI including deposit and loan facilities (indirect charges)' is published in the quarterly CPI publication from the September quarter 2011 issue. For further information see **Appendix 4** in the *Information Paper: Outcome of the 16th Series Australian Consumer Price Index Review, Australia, December 2010* (cat. no. 6469.0).

The CPI groups

2.22 The total basket is divided into 11 major groups, each representing a specific set of commodities:

- Food and non–alcoholic beverages
- Alcohol and tobacco
- Clothing and footwear
- Housing
- Furnishings, household equipment and services
- Health
- Transport
- Communication
- Recreation and culture
- Education
- Insurance and financial services

2.23 These groups are divided in turn into 33 sub–groups, and the sub–groups into 87 expenditure classes. An expenditure class is a grouping of similar items, such as various types of motor vehicles. See **Appendix 1** for a full list of groups, sub–groups and expenditure classes and the figure at 4.1 for an illustration of the CPI structure.

THE RELATIVE IMPORTANCE OF CPI ITEMS

2.24 The overall (or All groups) CPI provides a measure of the average rate of price change. In calculating an average measure of this type it is necessary to recognise that some items are more important than others. Price changes for the more important items should have a greater influence on the average rate of price change than price changes for less important items. The relative importance of the goods and services in the CPI is determined by the relative household expenditure on each product. For example, how much more households spend on rent than automotive fuel on average.

CPI weights

2.25 Measures of expenditure on each of the CPI groups, sub–groups and expenditure classes are obtained primarily from the HES. However, some adjustments are made to HES data to account for known instances of underreporting (the most notable being for alcohol and tobacco) and any other anomalies. The adjusted HES data are then used to derive a 'weight' for each expenditure class.

CPI weights continued

2.26 The CPI weights reflect the relative expenditures of the CPI population group as a whole and not those of any particular type or size of household. The weights reflect average expenditure of households and not the expenditure of an 'average household'. The household average weekly expenditure and corresponding 16th series CPI relative weights for the CPI groups are shown in **Appendix 1**.

Basket is fixed in terms of underlying quantities at the expenditure class

2.27 Although the weights are expressed in terms of expenditure shares, it is not the expenditure shares (where expenditure is given by the product of quantity and price) that are held constant (or fixed) from period to period. What are held constant are the quantities of products underpinning these expenditures such as the number of litres of petrol purchase each period on average by households. Weights are presented in expenditure terms because it is not possible to present quantity weights in a meaningful way e.g. the quantity of health services. The relative expenditure shares of items will change over time in response to changes in relative prices.

Weights below the expenditure class can be varied

2.28 While the implicit quantity weights are held constant at the expenditure class level, the weights of items within an expenditure class (e.g. different types of bread) can be varied between periodic reviews to reflect changed purchasing patterns. Any weight changes are introduced into the CPI in such a way as to not affect the level of the index.

Update of fixed weights

2.29 The average household weekly expenditure and weights for the CPI expenditure classes are updated at six–yearly intervals with the timing generally linked to the availability of HES data. The introduction of new weights resulting from these updates is released as a new CPI series (e.g. the 16th series CPI was introduced in the September quarter 2011 following the release of the 2009–10 HES data). Updating the weights is a key objective of the overall CPI review process. CPI reviews are discussed below (2.40–2.44).

COLLECTING PRICES FOR THE CPI

2.30 The collection of prices in each capital city is largely carried out by trained field staff operating out of the various State and Territory offices of the ABS, while some prices are collected as administrative datasets or special surveys.

CPI goods and services priced at many different types of outlets

2.31 Prices are collected in the kinds of retail outlets and other places where metropolitan households purchase goods and services. This involves collecting prices from many sources such as supermarkets, restaurants, department stores, schools and on–line websites. Prices are collected via personal visit, telephone or internet as appropriate.

CPI based on 100,000 price quotations each quarter

2.32 Prices for items such as rail transport services, electricity and gas supply and telephone services are collected from the authorities concerned. Information on rents is obtained from property management companies and from public housing authorities, In total, around 100,000 separate price quotations are collected each quarter.

2.33 The frequency of price collection by item varies as necessary to obtain reliable price measures. Prices of some items are volatile (i.e. their prices may vary many times each quarter) and for these prices frequent price observations are necessary to estimate a reliable average quarterly price. Each month prices are collected at regular intervals for

CPI based on 100,000 price quotations each quarter continued

goods such as petrol, fresh meat, fruit and vegetables, domestic and overseas airline tickets and telephone and internet services.

2.34 For most other items price volatility is not a problem and prices are collected once a quarter. There are a few items where prices are changed at infrequent intervals, for example education services where prices are set once a year. In these cases the frequency of price collection is modified accordingly.

Prices collected are what people actually pay

2.35 The prices used in the CPI are those that any member of the public would have to pay to purchase the specified good or service. Any taxes levied on goods or services (such as the GST) are included in the CPI price. Similarly, prices include any subsidy or assistance provided directly by the government (e.g. Child Care Benefit, Medicare). Sale prices, discount prices and 'specials' are reflected in the CPI so long as the items concerned are of normal quality (i.e. not damaged or shopsoiled), and are offered for sale in reasonable quantities. Any concessions available to particular groups of the population (such as age pensioners) are also taken into account where significant. Where an item is priced over the internet, any delivery or processing charges payable are included in the price.

2.36 To ensure that price movements are representative of the experiences of metropolitan households, the brands and varieties of the goods and services which are priced are generally those which sell in greatest volume.

CHANGES IN QUALITY

2.37 In concept, quality embraces all the attributes of an item which consumers would consider before making a purchase. For example in the case of tinned tomato soup it would include the volume or weight of the contents as well as the concentration and flavour.

Prices adjusted for changes in quality

2.38 As the CPI aims to measure price changes for a fixed basket of goods and services over time, identical or equivalent items must be priced in successive periods. However, products do change; their components or ingredients may change resulting in an improvement or degradation in quality. As the characteristics of products are altered, the statisticians responsible for the price index attempt to separate the effects of a quality change from any underlying price changes so that the CPI measures 'pure' price change. A simple example of quality adjustment is shown below (2.51 to 2.53).

Quality change can be difficult to measure

2.39 The requirement to take account of changes in quality, to ensure that the index reflects only pure price change, often poses difficult measurement problems and in some cases is impossible in practice. For example, while it is fairly easy to monitor changes in rail or bus ticket prices, it is difficult to attach a dollar value to changes in the quality (e.g. frequency or punctuality of the service).

PERIODIC REVIEWS OF THE CPI

CPI reviewed at six–yearly intervals

2.40 Like any other long–standing and important statistical series, the CPI is reviewed from time to time to ensure that it continues to meet community needs. The ABS undertakes these reviews at six–yearly intervals with timing generally (though not necessarily) linked to the availability of results from the HES.

CPI reviewed at six–yearly intervals continued

2.41 An important objective of these reviews is to update item weights to reflect changes in the range of available goods and services and changes in household spending patterns. They also provide an opportunity to reassess the scope and coverage of the index and other methodological issues.

2.42 Following these reviews, the new CPI series is linked to the old to form a continuous series. This linking is carried out in such a way that the resulting continuous series reflects only pure price change and not differences in the cost of the old and new baskets.

2.43 The index reference base period for the CPI is also updated, but at less frequent intervals. Changes in reference base periods have no effect (other than rounding) on percentage changes, which are calculated from the index numbers.

Major review conducted in 2010

2.44 The last significant review of the CPI was conducted in 2010, prior to the introduction of the 16th series from the September quarter 2011. Major outcomes of the review were to retain the principal purpose of the CPI as a general measure of household inflation, to remove the indirectly measured component of the Deposit and loan facilities index from the headline CPI and to include a range of additional analytical measures including All groups CPI, seasonally adjusted. For more information see *Information Paper: Outcome of the 16th Series Australian Consumer Price Index Review, Australia, December 2010* (cat. no. 6469.0).

2.45 Prior to the 16th series review, the previous major review of the CPI was the 13th series review conducted during 1997 and 1998 introduced in respect of the September quarter 1998. A major outcome of that review was the decision that the CPI would change from a measure of the change in living costs of employee households to a general measure of price inflation for the household sector. Consequently the population coverage was expanded from wage and salary earner households to include all metropolitan households.

HOW DOES THE CPI RELATE TO ME?

CPI unlikely to reflect the price experience of individual households

2.46 The CPI is designed to measure changes in retail prices experienced by metropolitan private households in aggregate. The composition of the basket and the relative importance of items in it relate to this population group as a whole – it represents the expenditures of all inscope households, not the expenditure pattern of the average household or of any particular household type or size. The basket comprises all consumer goods and services acquired over a twelve month period. It includes items acquired infrequently by an individual household (e.g. major electrical appliances, new motor vehicles), items that are acquired almost daily by all households (e.g. bread and milk) and items that are only available at certain times of the year. The basket includes, for example, both rent payments of renting households and the amounts paid by owner–occupier households for the purchase of their principal residence – clearly no individual household can incur both expenses at the same time. Therefore, changes in the CPI are unlikely to reflect exactly the price experience of any particular household.

2.47 The CPI does not measure those changes in living costs which may be experienced by individual households as a direct consequence of their progression through the life cycle. For example younger households may incur a higher proportion of their expenditure on housing and child care while those households entering the older age

CPI unlikely to reflect the price experience of individual households continued

groups may incur increasing expenditure on medical services. However, changes in the demographic make–up of households in aggregate and differences in expenditure patterns will affect the pattern of total household expenditure recorded in the HES. In turn, these changes will be incorporated in the weighting pattern in the CPI.

CPI cannot be used to measure price levels

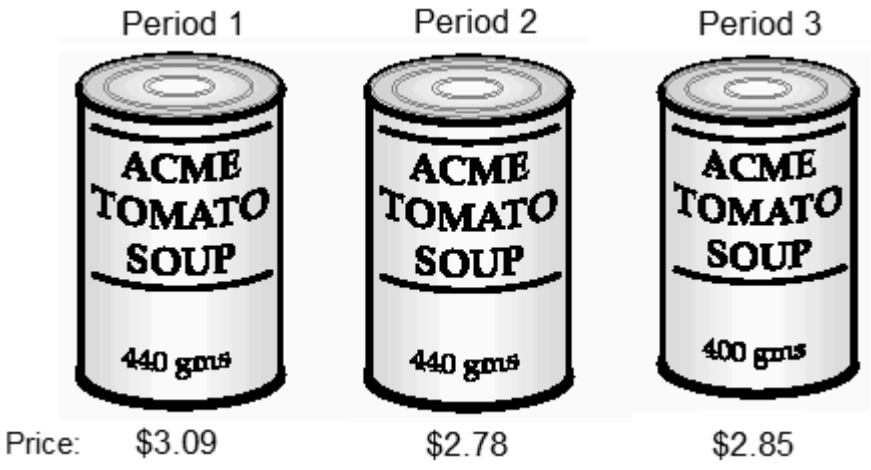
2.48 The CPI is not designed to measure price levels; rather its purpose is to measure changes in prices over time. While price levels in country regions often differ from those in metropolitan areas (some higher and others lower), the factors influencing price movements generally tend to be similar. Therefore the CPI can be expected to provide a reasonable indication of the changes in prices in Australia as a whole in the longer term.

2.49 Similarly, the CPI cannot be used to compare price levels between capital cities. For example, the fact that the CPI All groups index in the September quarter 2011 for Adelaide (183.6) was higher than in Perth (178.8) does not indicate that Adelaide was more expensive to live in than Perth. Rather, it indicates that prices in Adelaide have risen more than in Perth since 1989–90.

2.50 At the end of the day, the CPI is most useful as an indicator of price movements, whether it be for specific items, a particular city, or the economy as a whole. The CPI is not a precise measure of individual household price experiences.

EXAMPLE: ADJUSTING FOR QUALITY

2.51 To illustrate the process used to adjust for changes in the quality of items priced in the CPI, consider the case of a change in the size of a can of tomato soup. In this example, Acme brand tomato soup is priced in three periods (1, 2 and 3) and the size of the can is reduced from 440gms to 400gms between period 2 and period 3:



Using the observed prices produces the following measures of price change:

Percentage change from period 1 to period 2 = (2.78 – 3.09)/3.09 x 100 = –10.0%
Percentage change from period 2 to period 3 = (2.85 – 2.78)/2.78 x 100 = 2.5%
Percentage change from period 1 to period 3 = (2.85 – 3.09)/3.09 x 100 = –7.8%.

2.52 However, this does not provide a measure of 'pure price' change because the item priced in period 3 is not identical to the item priced in the previous periods. What is required for period 3 is the 'price that would have been paid for the item that was priced in period 2'. This price can be estimated by adjusting the period 3 price by the ratio of

EXAMPLE: ADJUSTING FOR QUALITY *continued*

the item's weight in period 2 to its weight in period 3, giving a quality adjusted price of $3.14 ($2.85 x 440/400).

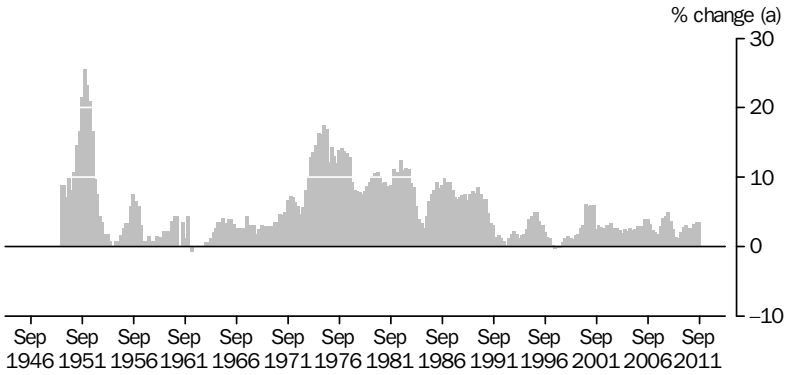
Using this adjusted price in period 3 results in the following correct measures of price change:

Percentage change from period 1 to period 2 = (2.78 – 3.09)/3.09 x 100 = –10.0%
Percentage change from period 2 to period 3 = (3.14 – 2.78)/2.78 x 100 = 12.9%
Percentage change from period 1 to period 3 = (3.14 – 3.09)/3.09 x 100 = 1.6%.

2.53 After adjusting for the reduction in quality between periods 2 and 3, the rise in the observed price of 2.5% has been translated into a pure price increase of 12.9%. Similarly, the measure of price change between periods 1 and 3 has been changed from a fall of 7.8% to a rise of 1.6%.

USING THE CPI

CPI MOVEMENTS OVER THE PAST 60 YEARS



Note: (a) Percentage change from corresponding quarter of previous year

Source: Consumer Price Index, Australia (cat. no. 6401.0)

INTERPRETING INDEX NUMBERS

Why use index numbers?

3.1 Deriving useful price measures for single, specific items such as Granny Smith apples is a relatively straightforward exercise. An estimate of the average price per kilogram in each period is sufficient for all applications. Price change between any two periods would simply be calculated by direct reference to the respective average prices.

3.2 However, if the requirement is for a price measure that covers a number of diverse items, the calculation of a 'true' average price is both complicated and of little real meaning. For example, consider the problem of calculating and interpreting an average price for two commodities as diverse as apples and motor vehicles. Because of this, price measures such as the CPI are typically presented in index number form.

Description of a price index

3.3 Price indexes provide a convenient and consistent way of presenting price information that overcomes problems associated with averaging across diverse items. The index number for a particular period represents the average price in that period relative to the average price in some base period for which, by convention, the average price has been set to equal 100.0.

3.4 A price index number on its own has little meaning. For example, the CPI All groups index number of 179.4 in the September quarter 2011 says nothing more than the average price in the September quarter 2011 was 79.4% higher than the average price in the base year 1989–90 (when the index was set to 100.0). The value of index numbers stems from the fact that index numbers for any two periods can be used to directly calculate price change between the two periods.

Percentage change is different to a change in index points

3.5 Movements in indexes from one period to any other period can be expressed either as changes in index points or as percentage changes. The following example illustrates these calculations for the All groups CPI (weighted average of the eight capital cities) between the September quarter 2010 and the September quarter 2011. The same procedure is applicable for any two periods.

Percentage change is different to a change in index points continued

	Index number
September quarter 2011	179.4
less September quarter 2010	173.3
Change in index points	6.1
Percentage change	6.1/173.3 x 100 = 3.5%

Movements in the CPI best measured using percentage changes

3.6 For most applications, movements in price indexes are best calculated and presented in terms of percentage change. Percentage change allows comparisons in movements that are independent of the level of the index. For example, a change of 2 index points when the index number is 120 is equivalent to a percentage change of 1.7%, but if the index number was 80 a change of 2 index points would be equivalent to a percentage change of 2.5% – a significantly different rate of price change. Only when evaluating change from the base period of the index will the points change be numerically identical to the percentage change.

Percentage changes are not additive

3.7 The percentage change between any two periods must be calculated, as in the example above, by direct reference to the index numbers for the two periods. Adding the individual quarterly percentage changes will not result in the correct measure of longer–term percentage change. That is, the percentage change between say the June quarter one year and the June quarter of the following year typically will not equal the sum of the four quarterly percentage changes. The error becomes more noticeable the longer the period covered and the greater the rate of change in the index. This can readily be verified by starting with an index of 100 and increasing it by 10% (multiplying by 1.1) each period. After four periods, the index will equal 146.4 delivering an annual percentage change of 46.4%, not the 40% given by adding the four quarterly changes of 10%.

Calculating index numbers for periods longer than quarters

3.8 Although the CPI is compiled and published as a series of quarterly index numbers, its use is not restricted to the measurement of price change between particular quarters. Because a quarterly index number can be interpreted as representing the average price during the quarter, index numbers for periods spanning more than one quarter can be calculated as the simple (arithmetic) average of the relevant quarterly indexes. For example, an index number for the year 2010 would be calculated as the arithmetic average of the index numbers for the March, June, September and December quarters of 2010.

	Index number
March quarter 2010	171.0
June quarter 2010	172.1
September quarter 2010	173.3
December quarter 2010	174.0
Divided by	4.0
equals CPI Index 2010	**172.6**

Calculating index numbers for periods longer than quarters continued

This characteristic of index numbers is particularly useful. It allows for comparison of average prices in one year (calendar or financial) with those in any other year. It also enables prices in say the current quarter to be compared with the average prevailing in some prior year.

ANALYSING THE CPI

3.9 The quarterly change in the All groups CPI represents the weighted average price change of all the items included in the CPI. While publication of index numbers and percentage changes for components of the CPI are useful in their own right, these data are often not sufficient to enable important contributors to overall price change to be reliably identified. What is required is some measure that encapsulates both an item's price change and its relative importance in the index.

Points contribution and points contribution change

3.10 If the All groups index number is thought of as being derived as the weighted average of indexes for all its component items, the index number for a component multiplied by its weight to the All groups index results in what is called its 'points contribution'. It follows that the change in a component item's points contribution from one period to the next provides a direct measure of the contribution to the change in the All groups index resulting from the change in that component's price.

3.11 Information on points contribution and points contribution change (or points change) is of immense value when analysing sources of price change and for answering 'what if' type questions. Consider the following data extracted from the September quarter 2011 CPI publication:

	INDEX NUMBER		PERCENTAGE CHANGE	POINTS CONTRIBUTION		POINTS CHANGE
Item	*June qtr 2011*	*Sept qtr 2011*		*June qtr 2011*	*Sept qtr 2011*	
All groups	178.3	179.4	0.6	178.3	179.4	1.1
Electricity	248.4	267.7	7.8	3.55	3.83	0.28

Using points contributions

3.12 Using only the index numbers themselves, the most that can be said is that between the June and September quarters 2011, the price of Electricity increased by more than the overall CPI (by 7.8% compared with an increase in the All groups of 0.6%). The additional information on points contribution and points change can be used to:

a) Calculate the effective weight for Electricity in the June and the September quarters (given by the points contribution for Electricity divided by the All groups index). For the June quarter, the weight is calculated as 3.55/178.3 x 100 = 2.0% and for the September quarter is 3.83/179.4 x 100 = 2.1%. Although the underlying quantities are held fixed, the effective weight in expenditure terms has increased due to the price of Electricity increasing by more than the prices of all other items in the CPI basket (on average).

Using points contributions continued

b) Calculate the percentage increase that would have been observed in the CPI if all prices other than those for Electricity had remained unchanged (given by the points change for Electricity divided by the All groups index number in the previous period). For the September quarter 2011 this is calculated as 0.28/178.3 x 100 = 0.16%. In other words, a 7.8% increase in Electricity prices in September quarter 2011 would have resulted in an increase in the overall CPI of 0.2%.

c) Calculate the average percentage change in all other items excluding Electricity (given by subtracting the points contribution for Electricity from the All groups index in both quarters and then calculating the percentage change between the resulting numbers which represents the points contribution of the 'other' items). For the above example, the numbers for All groups excluding Electricity are: June quarter 2011, 178.3–3.55 = 174.8; September quarter 2011, 179.4–3.83 = 175.6; and the percentage change (175.6–174.8)/174.8 x 100 = 0.5%. In other words, prices of all items other than Electricity increased by 0.5% on average between the June and September quarters 2011.

d) Estimate the effect on the All groups CPI of a forecast change in the prices of one of the items (given by applying the forecast percentage change to the item's points contribution and expressing the result as a percentage of the All groups index number). For example, if the price of Electricity was forecast to increase by 25% in the December quarter 2011, then the points change for Electricity would be 3.83 x 0.25 = 1.0, which would deliver an increase in the All groups index of 1.0/179.4 x 100 = 0.6% . In other words, a 25% increase in the Electricity price in the December quarter 2011 would have the effect of increasing the CPI by 0.6%. Another way commonly used to express this impact is 'Electricity' would contribute 0.6 percentage points to the change in the CPI.

ABS rounding conventions

3.13 To ensure consistency in the data produced from the CPI, it is necessary for the ABS to adopt a set of consistent rounding conventions or rules for the calculation and presentation of data. The conventions strike a balance between maximising the usefulness of the data for analytical purposes and retaining a sense of the underlying precision of the estimates. These conventions need to be taken into account when using CPI data for analytical or other special purposes.

3.14 Index numbers are always published to a reference base of 100.0. Index numbers and percentage changes are always published to one decimal place, with the percentage changes being calculated from the rounded index numbers. Points contributions are published to two decimal places, with points contributions change being calculated from the rounded points contributions. Index numbers for periods longer than a single quarter (e.g. for financial years) are calculated as the simple arithmetic average of the relevant rounded quarterly index numbers.

SOME EXAMPLES OF USING THE CPI

The following questions and answers illustrate the uses that can be made of the CPI. For more information about which index to use in contracts see 'Use of Price Indexes in Contracts' at

http://www.abs.gov.au/websitedbs/c311215.nsf/web/Inflation+and+Price+Indexes.

CPI can be used to compare money values over time

3.15 Question 1: What would $200 in 2005 be worth in the September quarter 2011?

3.16 Response 1: This question is best interpreted as asking 'How much would need to be spent in the September quarter 2011 to purchase what could be purchased in 2005 for $200?' As no specific commodity is mentioned, what is required is a measure comparing the general level of prices in the September quarter 2011 with the general level of prices in the calendar year 2005. The All groups CPI would be an appropriate choice.

3.17 Because CPI index numbers are not published for calendar years, two steps are required to answer this question. The first is to derive an index for the calendar year 2005. The second is to multiply the initial dollar amount by the ratio of the index for September quarter 2011 to the index for 2005.

3.18 The index for the calendar year 2005 is obtained as the simple arithmetic average of the quarterly indexes for March (147.5), June (148.4), September (149.8) and December (150.6) 2005 giving 149.1 rounded to one decimal place. The index for the September quarter 2011 is 179.4.

The answer is then given by:

$200 x 179.4/149.1 = $240.64

Forecasting impact of price changes on the CPI

3.19 Question 2: What would be the impact of a 10% increase in vegetable prices on the All groups CPI in the December quarter 2011?

3.20 Response 2: Two pieces of information are required to answer this question; the All groups index number for the September quarter 2011 (179.4), and the September quarter 2011 points contribution for Vegetables (2.33).

3.21 An increase in vegetable prices of 10% would increase vegetables points contribution by 2.33 x 10/100 = 0.23 index points which would result in an All groups index number of 179.6 for the December quarter 2011, an increase of 0.2%.

Indexes used should be representative of specific items

3.22 Question 3: How does the CPI reflect changes in electricity prices?

3.23 Response 3: The All groups CPI measures price change for all goods and services. In Table 4 of *Consumer Price Index, Australia* (cat. no. 6401.0) there is a range of component indexes by capital city which can be used. The example below sets out the price change for electricity compared to the All groups CPI over the last 10 years. This shows that the price of electricity has increased faster than the headline number.

	All groups CPI index number	*Electricity index number*
September Quarter 2001	134.2	133.8
September Quarter 2010	173.3	237.9
September Quarter 2011	179.4	267.7
Percentage change – 1 year ago	(179.4-173.3)/173.3 x 100 = 3.5%	(267.7-237.9)/237.9 x 100 = 12.5%
Percentage change – 10 years ago	(179.4-134.2)/134.2 x 100 = 33.7%	(267.7-133.8)/133.8 x 100 = 100.1%

Price indexes can be used to estimate changes in volumes

3.24 **Question 4:** Household Expenditure Survey data show that average weekly expenditure per household on Food and non–alcoholic beverages increased from $158.58 in 2003–04 to $216.40 in 2009–10 (i.e. an increase of 36.5%). Does this mean that households, on average, purchased 36.5% more Food and non–alcoholic beverages in 2009–10 than they did in 2003–04?

3.25 **Response 4:** This is an example of one of the most valuable uses that can be made of price indexes. Often the only viable method of collecting and presenting information about economic activity is in the form of expenditure or income in monetary units (e.g. dollars). While monetary aggregates are useful in their own right, economists and other analysts are frequently concerned with questions related to volumes, for example, whether more goods and services have been produced in one period compared with another period. Comparing monetary aggregates alone is not sufficient for this purpose as dollar values can change from one period to another due to either changes in quantities or changes in prices (most often a combination).

3.26 To illustrate this, consider a simple example of expenditure on oranges in two periods. The product of the quantity and the price gives the expenditure in any period. Suppose that in the first period 10 oranges were purchased at a price of $1.00 each and in the second period 15 oranges were purchased at a price of $1.50 each. Expenditure in period one would be $10.00 and in period two $22.50. Expenditure has increased by 125%, yet the volume (number of oranges) has only increased by 50% with the difference being accounted for by a price increase of 50%. In this example all the price and quantity data are known, so volumes can be compared directly. Similarly, if prices and expenditures are known, quantities can be derived.

3.27 But what if the actual prices and quantities are not known? If expenditures are known and a price index for oranges is available, the index numbers for the two periods can be used as if they were prices to adjust the expenditure for one period to remove the effect of price change. If the price index for oranges was equal to 100.0 in the first period, the index for the second period would equal 150.0. Dividing expenditure in the second period by the index number for the second period and multiplying this result by the index number for the first period provides an estimate of the expenditure that would have been observed in the second period had the prices remained as they were in the first period. This can easily be demonstrated by reference to the oranges example:

$22.50/150.0 x 100.0 = $15.00 = 15 x $1.00

3.28 So, without ever knowing the actual volumes (quantities) in the two periods, the adjusted second period expenditure ($15.00), can be compared with the expenditure in the first period ($10.00) to derive a measure of the proportional change in volumes $15/$10 = 1.50, which equals the ratio obtained directly from the comparison of the known quantities.

3.29 We now return to the question on expenditure on Food and non–alcoholic beverages recorded in the HES in 2003–04 and 2009–10. As the HES data relates to the average expenditure of Australian households, the ideal price index would be one that covers the retail prices of Food and non–alcoholic beverages for Australia as a whole. The price index which comes closest to meeting this ideal is the index for the Food and non–alcoholic beverages of the CPI for the weighted average of the eight capital cities.

Price indexes can be used to estimate changes in volumes continued

The Food and non–alcoholic beverages index number for 2003–04 is (149.3+152.0+154.7+153.3)/4 = 152.3 and for 2009–10 it is (186.6+189.9+191.3+190.7)/4 = 189.6. Using these index numbers, recorded expenditure in 2009–10 ($216.40) can be adjusted to 2003–04 prices as follows:

$216.40/189.6 x 152.3 = $173.82

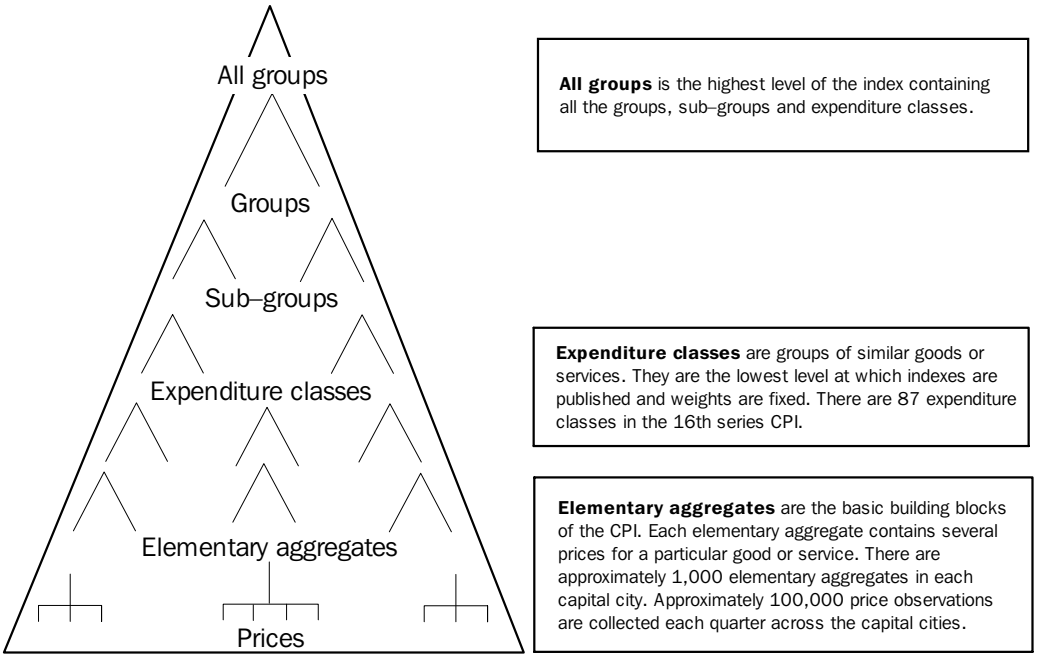
FOOD AND NON–ALCOHOLIC BEVERAGES

	2003–04	*2009–10*
HES expenditure	$158.58	$216.40
Food and non–alcoholic beverages price index number	152.3	189.6
revalued 2009–10 quantities at 2003–04 prices	$158.58	$173.83
Volume change ($173.83 – $158.58)/$158.58 x 100		**9.6%**

3.30 The revalued 2009–10 quantities at 2003–04 prices of $173.82 can then be compared to the expenditure recorded in 2003–04 ($158.58) to deliver an estimate of the change in volumes. This indicates a volume increase of 9.6% between 2003–04 and 2009–10. Over the same period food prices increased (189.6 – 152.3)/152.3 x100 = 24.5% and total expenditure (($216.40 – $158.58)/$158.58 x 100) increased 36.5%.

CALCULATING THE CPI

CONSUMER PRICE INDEX STRUCTURE



OVERVIEW

4.1 The CPI has previously been described in terms of a basket of goods and services which is 'purchased' each quarter. As prices change from one quarter to the next so too will the total cost (or price) of the basket. Of the various ways in which a CPI could be described, this description conforms most closely with the procedures actually followed. Using this description, the construction of the CPI can be thought of as being done in four major steps:

1. subdividing the total expenditure into individual items for which price samples can be selected
2. collecting price data
3. estimating price movements for individual items
4. calculating the current period cost of the basket.

SUBDIVIDING THE BASKET

Expenditure aggregates

4.2 Based mainly on the HES, estimates are obtained for total annual expenditure of private households in each capital city for each of the 87 expenditure classes in the CPI. As these estimates relate to the expenditure of households in aggregate, they are referred to as 'expenditure aggregates'.

4.3 While these expenditure aggregates are derived for well defined categories of household expenditure (e.g. bread), they are still too broad to be of direct use in selecting price samples. For this purpose, expenditure aggregates need to be subdivided into as fine a level of commodity detail as possible. As the HES is generally not designed to provide such fine level estimates, it is necessary to supplement the HES data with information from other sources such as other official data collections and industry data. The processes involved are illustrated below by reference to a stylised example for the Bread expenditure class of the CPI.

Expenditure aggregates continued

4.4 Based on information reported in the 2009–10 HES, the annual expenditure on bread by all private households in Sydney in the June quarter 2011 is estimated at $740m (average weekly household expenditure $8.45 x 1,679,000 households x 52.143 week). Suppose there exists separately some industry data on the market shares of various types of bread. In combination these two data sources can be used to derive expenditure aggregates at a much finer level of detail than that available from the HES alone. The results are shown in the following table.

		Market share	*HES data*	*Derived expenditure aggregates*
		%	$'000	
	Type of bread			
1	White, sandwich, sliced	30		222,000
2	White, sandwich, unsliced	2		14,800
3	White high fibre	15		111,000
4	White high top	3		22,200
5	Wholemeal	20		148,000
6	Multigrain	15		111,000
7	Bread rolls	10		74,000
8	Specialty	5		37,000
	Total Bread	**100**	**740,000**	**740,000**

4.5 The next stage in the process involves determining the types of bread for which price samples should be constructed. This is not as simple an exercise as might be imagined and relies heavily on the judgement of the prices statisticians. In reaching decisions about precisely which items to include in price samples, the prices statisticians need to strike a balance between the cost of data collection (and processing) and the accuracy of the index. Factors taken into account include the relative significance of individual items, the extent to which different items are likely to exhibit similar price behaviour, and any practical problems associated with measuring prices to constant quality.

4.6 In this example, a reasonable outcome would be to decide to construct price samples for items 1, 3, 5 and 6. Separate price samples would not be constructed for items 2 and 4 due to their relatively small market share. Price samples would also not be constructed for items 7 and 8 (bread rolls and specialty breads) as they would prove difficult to price to constant quality due to the tendency for these items to be sold by number rather than weight.

Elementary aggregates must have a price sample

4.7 The items for which it is decided to construct specific price samples are referred to as 'elementary aggregates'. (There are approximately 1,000 elementary aggregates for each of the eight capital cities, or approximately 8,000 price samples at the national level.) The expenditure aggregates for the items that are not to be explicitly priced are reallocated across the elementary aggregates in such a way as to best preserve the representativeness of the price samples. In this example, this would be done in two stages. First, the expenditure aggregate for item 2 would be allocated to item 1 and the expenditure aggregate for item 4 would be allocated to item 3. In the second stage, the expenditure aggregates for items 7 and 8 would be allocated, on a proportional basis, across the four elementary aggregates. This process is illustrated in the following table.

Elementary aggregates must have a price sample continued

		EXPENDITURE AGGREGATES			
		Initial	*Stage 1*	*Stage 2*	
	Type of bread				**Elementary aggregate**
1	White, sandwich, sliced	222,000	236,800	278,588	White sandwich
2	White, sandwich, unsliced	14,800			
3	White high fibre	111,000	133,200	156,706	White high fibre
4	White high top	22,200			
5	Wholemeal	148,000	148,000	174,118	Wholemeal
6	Multigrain	111,000	111,000	130,588	Multigrain
7	Bread rolls	74,000	74,000		
8	Specialty	37,000	37,000		
		740,000	**740,000**	**740,000**	

4.8 The rationale for this allocation is as follows. The price behaviour of item 2 (white, sandwich, unsliced) is likely to be best represented by the price behaviour of item 1 (white, sandwich, sliced). Similarly for items 4 and 3. The price behaviour for items 7 and 8 (bread rolls and specialty bread) is likely to be best represented by the average price behaviour of all other breads.

Determining outlet types

4.9 Having settled on the items for which price samples are to be constructed, the next step is to determine the outlet types (respondents) from which prices will be collected. In order to accurately reflect changes in prices paid by households for bread, prices need to be collected from the various types of outlets from which households purchase bread. Data are unlikely to be available on the expenditure at the individual elementary aggregate level by type of outlet. It is more likely that data will be available for expenditure on bread in total by type of outlet. Suppose industry data indicates that supermarkets accounted for about 80% of bread sales and specialist bakeries the remainder. A simple way to construct the price sample for each elementary aggregate that is representative of household shopping patterns is to have a ratio of four prices from supermarkets to every specialist bakery price.

COLLECTING PRICE DATA

Selecting respondents

4.10 When price samples have been determined, ABS field staff determine from which individual supermarkets and specialist bakeries the prices will be collected. The individual outlets are chosen to be representative of the two types of outlets taking into account many perspectives. For example, the outlets should be representative of the socio–economic characteristics of the city. The prices are collected each quarter from the same respondents for the same items.

Selecting items to price

4.11 When a respondent is first enrolled in the collection process the field staff will determine, in conjunction with the outlet management, which specific items are best representative of each elementary aggregate. For example, at one outlet it might be decided that the 680gm sliced white sandwich loaf is best representative of white sandwich bread; at another outlet it might be a 700gm white toast sliced sandwich loaf.

4.12 An important part of the ongoing price collection process is the monitoring of the items for quality change. In the stylised bread example quality change could occur in various ways. A possible quality change would be a change in the size (weight) of the loaf of bread. In this case prices would be adjusted to derive a pure price for the item along

Selecting items to price continued

the lines illustrated in the example in 2.51 above. Individual item prices are also compared with prices collected in the previous period to check their accuracy and to verify any large movements.

ESTIMATION OF PRICE MOVEMENTS FOR ELEMENTARY AGGREGATES

4.13 Price samples are constructed for the sole purpose of estimating price movements for each elementary aggregate. These estimates of price movements are required to revalue the expenditure aggregates to current period prices in much the same way as illustrated in the example on using price indexes (see 3.16–3.18 above). This is achieved by applying the period to period price movement to the previous period's expenditure aggregate for each elementary aggregate. It provides an estimate of the cost of acquiring the base period quantity of the elementary aggregate in the current quarter.

Four options for calculating price movement

4.14 There is no single correct method for calculating the price movement for a sample of observations. Four commonly used methods are described below, using as an example, the price observations from two periods for multigrain bread.

	PRICE OBSERVATIONS IN	
	Period 1	*Period 2*
	$	$
Outlet		
Supermarket A	4.83	4.59
Supermarket B	5.29	4.99
Supermarket C	3.29	3.89
Supermarket D	3.59	3.89
Specialist bakery	3.70	3.50

4.15 The differences between the four methods involve choices as to:

- whether the price movement for the sample is calculated as the average of each period's prices or as the average of price movements between periods for each item;
- the type of average used.

4.16 The two commonly used forms of average are the arithmetic mean and the geometric mean. For a sample of n price observations, the arithmetic mean is the sum of the individual prices divided by the number of observations, while the geometric mean is the nth root of the product of the prices. For example, the arithmetic mean of 4 and 9 is 6.5, while the geometric mean is 6 (the geometric mean is always less than or equal to the arithmetic mean).

Relative of arithmetic mean of prices

4.17 Based on these options, one method is to construct a ratio of the arithmetic mean prices in the two periods. In the example below the arithmetic mean of prices in period 1 is $4.14 and in period 2 it is $4.17, giving a relative of 1.007 (4.17/4.14) or a percentage change of 0.7%. This method is called the 'relative of arithmetic mean prices' (RAP), sometimes referred to as the 'Dutot' index formula.

Relative of arithmetic mean of prices continued

	PRICE OBSERVATIONS IN		
	Period 1 (P1)	*Period 2 (P2)*	*RAP/Dutot*
Outlet			
Supermarket A	4.83	4.59	
Supermarket B	5.29	4.99	
Supermarket C	3.29	3.89	
Supermarket D	3.59	3.89	
Specialist bakery	3.70	3.50	
Average prices			
Arithmetic mean	4.14	4.17	1.007

Arithmetic mean of price relatives

4.18 A second method is to calculate the price movement between periods for each individual item and then take the arithmetic average of these movements. The price movement for each item must be expressed in relative terms (i.e. period 2 price divided by period 1 price as shown in the 'Price relative' column). In the example below the arithmetic average of the price relatives is 1.021, a price change of 2.1%. This method is called the 'arithmetic mean of price relatives' (APR), sometimes referred to as the 'Carli' index formula.

	PRICE OBSERVATIONS IN			
	Period 1 (P1)	*Period 2 (P2)*	*Price Relative (P2/P1)*	*APR/Carli*
	$	$		
Outlet				
Supermarket A	4.83	4.59	0.95	
Supermarket B	5.29	4.99	0.943	
Supermarket C	3.29	3.89	1.182	
Supermarket D	3.59	3.89	1.084	
Specialist bakery	3.70	3.50	0.946	
			1.021	**1.021**

Geometric mean

4.19 A third method is to construct a ratio of the geometric mean of prices in each period. The geometric mean of the sample prices in period 1 is $4.14 and in period 2 it is $4.070 giving a relative of 1.017 (4.070/4.14) or a percentage change of 1.7%.

	PRICE OBSERVATIONS IN		
	Period 1 (P1)	*Period 2 (P2)*	*GM/Jevons*
	$	$	
Outlet			
Supermarket A	4.83	4.59	
Supermarket B	5.29	4.99	
Supermarket C	3.29	3.89	
Supermarket D	3.59	3.89	
Specialist bakery	3.70	3.50	
Geometric mean	4.07	4.14	1.017

Geometric mean continued

4.20 The fourth method is to calculate the geometric mean of the price movements for each individual item. Again, the price movements must be in the form of price relatives. In the example below, the geometric mean of the price relatives is 1.017, indicating a price increase of 1.7%, the same as using the ratio of the geometric mean of prices in each period.

	PRICE OBSERVATIONS IN			
	Period 1 (P1)	*Period 2 (P2)*	*Price relative (P2/P1)*	*GM/Jevons*
	$	$		
Outlet				
Supermarket A	4.83	4.59	0.95	
Supermarket B	5.29	4.99	0.943	
Supermarket C	3.29	3.89	1.182	
Supermarket D	3.59	3.89	1.084	
Specialist bakery	3.70	3.50	0.946	
Geometric mean	4.07	4.14	1.017	1.017

4.21 In fact the geometric mean will always produce the same result whether the relative of mean prices or the mean of relative prices is used. These methods are simply referred to as the geometric mean (GM), sometimes called the 'Jevons' index formula.

	Percentage change
RAP/Dutot	0.7%
APR/Carli	2.1%
GM/Jevons	1.7%

Geometric mean is the preferred method

4.22 The method of calculating price change at the elementary aggregate level is important to the accuracy of the price index. The arithmetic average of price relatives (APR) approach has been shown to be more prone to (upward) bias than the other two methods. In line with various overseas countries, the ABS is using the geometric mean formula for calculating elementary aggregate index numbers where practical in the 16th series of the CPI. Where the geometric mean is not appropriate the relative of arithmetic mean prices (RAP) is used. The reasoning behind using geometric means is outlined below.

Geometric mean allows for substitution

4.23 At the elementary aggregate level of the index it is usually impractical to assign a specific weight to each individual price observation. The three formulas described above implicitly apply equal weights to each observation, although the bases of the weights differ. The geometric mean applies weights such that the expenditure shares of each observation are the same in each period. In other words the geometric mean formula implicitly assumes households buy less (more) of items that become more (less) expensive relative to the other items in the sample. The other formulas assume equal quantities in both periods (RAP) or equal expenditures in the first period (APR), with quantities being inversely proportional to first period prices. The geometric mean

Geometric mean allows for substitution continued

therefore appears to provide a better representation of household purchasing behaviour than the alternative formula in those elementary aggregates where there is likely to be high substitutability in consumption within the price sample.

Geometric mean not appropriate for all elementary aggregates

4.24 The geometric mean cannot be used to calculate the average price in all elementary aggregates. It cannot be used in cases where the price could be zero (i.e. the cost of a good or service is fully subsidised by the government). It is also not appropriate to use geometric means in elementary aggregates covering items between which consumers are unable to substitute. An example of this is local government rates where it is not possible to switch from a high rate area to a low rate area without physically moving location.

CALCULATING THE CURRENT COST OF THE BASKET

4.25 Once price movements are calculated for each elementary aggregate, they can be used to derive the expenditure aggregates that are then summed to derive the current cost of the basket. It is from the expenditure aggregates that index numbers are calculated at any level of the index. The stylised example above is continued to show the process for the Bread expenditure class.

	EXPENDITURE AGGREGATE	PRICE MOVEMENT	EXPENDITURE AGGREGATE
	Period 1	*Period 1 to Period 2*(a)	*Period 2*
	$'000		$'000
Elementary aggregate			
White sandwich	296,000	1.025	303,400
White high fibre	212,750	1.015	215,941
Wholemeal	92,500	1.020	94,350
Multigrain	138,750	1.017	141,109
Total	**740,000**		**754,800**

(a) Geometric mean of price relatives

4.26 The expenditure aggregates are revalued to period 2 prices by applying the movements between period 1 and period 2. The expenditure aggregate for the expenditure class Bread is the sum of the expenditure aggregates for the elementary aggregates comprising the expenditure class. Summing the elementary aggregates says that in period 2 it would cost $754.8m to buy the volume of Bread in period 1 that cost $740m. The price change for Bread between period 1 and 2 is simply the ratio of these expenditure aggregates, that is, a price increase of 2.0% (754.8/740). Thus if the price index for Bread was 100.0 in period 1, it would be 102.0 in period 2.

4.27 The derivation of the expenditure class movement as shown above is mathematically equivalent to a weighted average of the price movements for the individual elementary aggregates, that is, a weighted version of the mean of price relatives formula discussed above. In this case period 1 expenditure aggregates are the weights. The same formula is used at higher levels of the index.

4.28 Similar procedures are used to derive price movements at higher levels of the CPI. For example, the current period cost of purchasing items in the Bread and cereal products sub–group of the CPI is obtained by summing the current period expenditure aggregates of the expenditure classes Bread, Cakes and biscuits, Breakfast cereals and

CALCULATING THE CURRENT COST OF THE BASKET *continued*

Other cereal products. The ratio of the current and previous period expenditure aggregates for the Bread and cereal products sub–group gives the price movement for the sub–group.

4.29 Points contributions (see 3.10–3.12 above) are also calculated using the expenditure aggregates. The current period points contribution of a CPI component, for example the expenditure class Bread, is the current period expenditure aggregate for Bread relative to the expenditure aggregate for the All groups CPI multiplied by the current period All Groups index number.

4.30 The CPI publication does not show the expenditure aggregates, but rather the index numbers derived from the expenditure aggregates. Expenditure aggregates vary considerably in size and showing them would make the publication difficult to read and interpret. The published index numbers and points contributions are a convenient presentation of the information.

16TH SERIES CPI, Average weekly expenditure and weights(a)

Group, Sub–group, Expenditure class	AVERAGE WEEKLY EXPENDITURE FOR THE WEIGHTED AVERAGE OF EIGHT CAPITAL CITIES IN JUNE QUARTER 2011			PERCENTAGE CONTRIBUTION TO THE ALL GROUPS CPI IN JUNE QUARTER 2011		
	$	$	$	%	%	%
FOOD AND NON-ALCOHOLIC BEVERAGES	**230.87**			**16.84**		
Bread and cereal products		***23.41***			***1.71***	
Bread			7.95			0.58
Cakes and biscuits			10.17			0.74
Breakfast cereals			2.41			0.18
Other cereal products			2.88			0.21
Meat and seafoods		***31.43***			***2.29***	
Beef and veal			5.35			0.39
Pork			4.98			0.36
Lamb and goat			3.55			0.26
Poultry			6.77			0.49
Other meats			5.22			0.38
Fish and other seafood			5.57			0.41
Dairy and related products		***15.72***			***1.15***	
Milk			5.81			0.42
Cheese			4.63			0.34
Ice cream and other dairy products			5.29			0.39
Fruit and vegetables		***40.39***			***2.95***	
Fruit			21.97			1.60
Vegetables			18.42			1.34
Other food		***29.77***			***2.17***	
Eggs			1.48			0.11
Jams, honey and spreads			1.98			0.14
Food additives and condiments			4.18			0.30
Oils and fats			2.38			0.17
Snacks and confectionery			13.34			0.97
Other food products n.e.c.			6.42			0.47
Non-alcoholic beverages		***15.63***			***1.14***	
Coffee, tea and cocoa			3.76			0.27
Waters, soft drinks and juices			11.87			0.87
Meals out and take away foods		***74.51***			***5.43***	
Restaurant meals			38.55			2.81
Take away and fast foods			35.97			2.62
ALCOHOL AND TOBACCO	**96.87**			**7.06**		
Alcoholic beverages		***65.11***			***4.75***	
Spirits			12.44			0.91
Wine			22.47			1.64
Beer			30.19			2.20
Tobacco		***31.77***			***2.32***	
Tobacco			31.77			2.32
CLOTHING AND FOOTWEAR	**54.58**			**3.98**		
Garments		***34.52***			***2.52***	
Garments for men			10.21			0.74
Garments for women			20.09			1.47
Garments for infants and children			4.21			0.31
Footwear		***8.32***			***0.61***	
Footwear for men			1.93			0.14
Footwear for women			4.67			0.34
Footwear for infants and children			1.72			0.13
Accessories and clothing services		***11.74***			***0.86***	
Accessories			10.11			0.74
Cleaning, repair and hire of clothing and footwear			1.63			0.12

(a) Any discrepancies between totals and sums of components in this Appendix are due to rounding.

16TH SERIES CPI, Average weekly expenditure and weights(a) *continued*

Group, Sub–group, Expenditure class	AVERAGE WEEKLY EXPENDITURE FOR THE WEIGHTED AVERAGE OF EIGHT CAPITAL CITIES IN JUNE QUARTER 2011			PERCENTAGE CONTRIBUTION TO THE ALL GROUPS CPI IN JUNE QUARTER 2011		
	$	$	$	%	%	%
HOUSING	**305.75**			**22.30**		
Rents		***92.01***			***6.71***	
Rents			92.01			6.71
New dwelling purchase by owner-occupiers		***118.86***			***8.67***	
New dwelling purchase by owner-occupiers			118.86			8.67
Other housing		***45.43***			***3.31***	
Maintenance and repair of the dwelling			28.10			2.05
Property rates and charges			17.33			1.26
Utilities		***49.45***			***3.61***	
Water and sewerage			12.31			0.90
Electricity			27.31			1.99
Gas and other household fuels			9.83			0.72
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	**124.79**			**9.10**		
Furniture and furnishings		***26.23***			***1.91***	
Furniture			22.42			1.63
Carpets and other floor coverings			3.81			0.28
Household textiles		***8.42***			***0.61***	
Household textiles			8.42			0.61
Household appliances, utensils and tools		***19.57***			***1.43***	
Major household appliances			6.85			0.50
Small electric household appliances			3.25			0.24
Glassware, tableware and household utensils			5.87			0.43
Tools and equipment for house and garden			3.60			0.26
Non-durable household goods		***39.18***			***2.86***	
Cleaning and maintenance products			3.98			0.29
Personal care products			15.15			1.11
Other non-durable household products			20.04			1.46
Domestic and household services		***31.39***			***2.29***	
Child care			9.47			0.69
Hairdressing and personal grooming services			12.39			0.90
Other household services			9.52			0.69
HEALTH	**72.56**			**5.29**		
Medical products, appliances and equipment		***18.08***			***1.32***	
Pharmaceutical products			16.09			1.17
Therapeutic appliances and equipment			1.99			0.14
Medical, dental and hospital services		***54.47***			***3.97***	
Medical and hospital services			46.85			3.42
Dental services			7.62			0.56
TRANSPORT	**158.39**			**11.55**		
Private motoring		***148.25***			***10.81***	
Motor vehicles			44.56			3.25
Spare parts and accessories for motor vehicles			13.61			0.99
Automotive fuel			48.67			3.55
Maintenance and repair of motor vehicles			22.90			1.67
Other services in respect of motor vehicles			18.52			1.35
Urban transport fares		***10.14***			***0.74***	
Urban transport fares			10.14			0.74

(a) Any discrepancies between totals and sums of components in this Appendix are due to rounding.

16TH SERIES CPI, Average weekly expenditure and weights(a) *continued*

Group, Sub–group, Expenditure class	AVERAGE WEEKLY EXPENDITURE FOR THE WEIGHTED AVERAGE OF EIGHT CAPITAL CITIES IN JUNE QUARTER 2011			PERCENTAGE CONTRIBUTION TO THE ALL GROUPS CPI IN JUNE QUARTER 2011		
	$	$	$	%	%	%
COMMUNICATION	**41.81**			**3.05**		
Communication		***41.81***			***3.05***	
Postal services			1.69			0.12
Telecommunication equipment and services			40.12			2.93
RECREATION AND CULTURE	**172.30**			**12.56**		
Audio, visual and computing equipment and services		***34.76***			***2.53***	
Audio, visual and computing equipment			21.33			1.56
Audio, visual and computing media and services			13.43			0.98
Newspapers, books and stationery		***14.75***			***1.08***	
Books			5.42			0.40
Newspapers, magazines and stationery			9.33			0.68
Holiday travel and accommodation		***65.26***			***4.76***	
Domestic holiday travel and accommodation			33.83			2.47
International holiday travel and accommodation			31.42			2.29
Other recreation, sport and culture		***57.54***			***4.20***	
Equipment for sports, camping and open-air recreation			8.34			0.61
Games, toys and hobbies			10.73			0.78
Pets and related products			5.17			0.38
Veterinary and other services for pets			5.47			0.40
Sports participation			12.89			0.94
Other recreational, sporting and cultural services			14.94			1.09
EDUCATION	**43.67**			**3.18**		
Education		***43.67***			***3.18***	
Preschool and primary education			7.18			0.52
Secondary education			17.24			1.26
Tertiary education			19.25			1.40
INSURANCE AND FINANCIAL SERVICES	**69.71**			**5.08**		
Insurance		***19.25***			***1.40***	
Insurance			19.25			1.40
Financial services		***50.46***			***3.68***	
Deposit and loan facilities (direct charges)			10.37			0.76
Other financial services			40.09			2.92
ALL GROUPS	**1371.30**	**1371.30**	**1371.30**	**100.00**	**100.00**	**100.00**

(a) Any discrepancies between totals and sums of components in this Appendix are due to rounding.

APPENDIX 2 TYPES OF GOODS AND SERVICES

TYPES OF GOODS AND SERVICES PRICED IN THE 16TH SERIES CPI

The following table gives an indication of the types of items that are priced and where particular items are classified in the CPI structure (e.g. soy milk is classified as belonging to the expenditure class Milk).

The mention of an item in the table does not necessarily mean that there is a specific price sample for that item, nor does it mean that all the price samples are specifically listed.

LIST OF GOODS AND SERVICES PRICED FOR THE CPI

Group, Sub–group, Expenditure class	*Examples of item coverage*
FOOD AND NON–ALCOHOLIC BEVERAGES	
Bread and cereal products	
Bread	Bread fresh or packaged
Cakes and biscuits	Biscuits, gingerbread, wafers, waffles, crumpets, muffins, croissants, cakes and tarts
Breakfast cereals	Cornflakes and muesli
Other cereal products	Rice in all forms, including rice flour; maize, wheat, barley, oats, rye and other cereals in the form of grain; pasta products in all forms
Meat and seafoods	
Beef and veal	Fresh, chilled or frozen beef and veal meat
Pork	Fresh, chilled or frozen meat of swine; bacon and ham
Lamb and goat	Fresh, chilled or frozen meat of lamb and goat
Poultry	Fresh, chilled or frozen meat of poultry (chicken, duck, goose, turkey, guinea fowl)
Other meats	Dried, salted or smoked meat and edible offal (sausages, salami); minced meat
Fish and other seafood	Fresh, chilled or frozen fish and seafood (crustaceans and other shell fish); dried, smoked or salted fish and seafood
Dairy and related products	
Milk	Pasteurized or sterilized milk; condensed, evaporated or powered milk
Cheese	Cheese and curd
Ice cream and other dairy products	Ice–cream, yoghurt, cream, milk–based desserts and beverages
Fruit and vegetables	
Fruit	Fresh, chilled or frozen fruit; dried and canned fruit
Vegetables	Fresh, chilled, frozen or dried vegetables; preserved or processed vegetables
Other Food	
Eggs	Egg and egg products made wholly from eggs
Jams, honey and spreads	Jams, marmalades, fruit purees and pastes; natural and artificial honey
Food additives and condiments	Sugar (unrefined, refined, powdered or cane sugar), artificial sugar substitutes; salt; spices, culinary herbs; sauces, condiments and seasonings
Oils and fats	Butter and butter products; margarine and other vegetable fats; edible oils; edible animal fats
Snacks and confectionery	Corn and potato chips; nuts; chocolates, lollies; gum; water based ice confectionery
Other food products n.e.c.	Baby food; prepared meals (tinned food, frozen food or meals); prepared baking powders, baker's yeast, soups, broths and stocks.
Non–alcoholic beverages	
Coffee, tea and cocoa	Coffee including decaffeinated and instant coffee, roasted or ground; tea; cocoa and chocolate–based powder
Waters, soft drinks and juices	Mineral or spring waters; soft drinks; fruit and vegetable juices
Meals out and take away foods	
Restaurant meals	Meals eaten in restaurants, hotels and cafes offering full table service
Take away and fast foods	Take away, delivered meals and fast food suitable for immediate consumption

LIST OF GOODS AND SERVICES PRICED FOR THE CPI *continued*

Group, Sub–group, Expenditure class	*Examples of item coverage*
ALCOHOL AND TOBACCO	
Alcoholic beverages	
Spirits	Spirits and liqueurs including pre–mixed spirits purchased in a bar, club, bottle shop or restaurant
Wine	Wine from grapes, wine from other fruits and fortified wines purchased in a bar, club, bottle shop or restaurant
Beer	All kinds of beer such as ale and lager including low–alcoholic beer purchased in a bar, club, bottle shop or restaurant
Tobacco	
Tobacco	Cigarettes, cigarette tobacco and cigars
CLOTHING AND FOOTWEAR	
Garments	
Garments for men	Garments for men in all materials for everyday wear, sport or work including men's suits, jumpers, jeans, business and casual shirts, t–shirts and swimwear; men's briefs, pyjamas and socks
Garments for women	Garments for women in all materials for everyday wear, sport or work including dresses, blouses, suits, jeans and coats; women's bras, briefs, nightwear, lingerie and hosiery
Garments for infants and children	Garments for infants and children in all materials for everyday wear or sport including baby clothes, children's jeans, shorts, t–shirts, socks and underwear
Footwear	
Footwear for men	All footwear for men including sports footwear for everyday leisure wear; includes shoelaces, parts of footwear such as heels, soles etc.; excludes game specific footwear such as ski boots or football boots
Footwear for women	All footwear for women including sports footwear for everyday leisure wear; includes shoelaces, parts of footwear such as heels, soles etc.; excludes game specific footwear such as ski boots or football boots
Footwear for infants and children	All footwear for children and infants including sports footwear for everyday leisure wear; includes shoelaces, parts of footwear such as heels, soles etc.; excludes game specific footwear such as ski boots or football boots
Accessories and clothing services	
Accessories	Items complementary to clothing including hats, wallets, non–prescription sunglasses, watches, luggage and jewellery
Cleaning, repair and hire of clothing and footwear	Clothing and footwear services including dry cleaning, shoe repairs and dressmaking
HOUSING	
Rents	
Rents	Rentals actually paid to private or government landlords, including housing authorities, by tenants or subtenants occupying unfurnished or furnished premises as their main residence
New dwelling purchase by owner–occupiers	
New dwelling purchase by owner–occupiers	New homes (excluding land) and major improvement to existing homes and fixed appliances such as ducted heating, hot water systems and ovens
Other housing	
Maintenance and repair of the dwelling	Products and materials, such as paints and varnishes, renderings, plaster etc., purchased for minor maintenance and repair of the dwelling; services of plumbers, electricians, carpenters, painters etc. engaged for minor maintenance and repair of the dwelling
Property rates and charges	State and local council property based rates and charges except water and sewerage
Utilities	
Water and sewerage	Water supply and sewerage charges
Electricity	Electricity charges and connection fees
Gas and other household fuels	Mains and bottled gas, including connection fees and other household fuels such as firewood, briquettes, heating oil and solid fuels

LIST OF GOODS AND SERVICES PRICED FOR THE CPI *continued*

Group, Sub–group, Expenditure class	*Examples of item coverage*
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	
Furniture and furnishings	
Furniture	Sofas, couches, tables, chairs, beds, mattresses, chests of drawers, bookshelves, wardrobes
Carpets and other floor coverings	Loose carpets, fitted carpets, linoleum; excludes bathroom mats, rush mats and door mats
Household textiles	
Household textiles	Furnishing fabrics, curtains, fabric blinds; bed linen such as sheets, pillowcases, blankets and table linen and bathroom linen, such as tablecloths and towels
Household appliances, utensils and tools	
Major household appliances	Purchase, hire and repair of all major household appliances not permanently fixed such as refrigerators, freezers, washing machines and dryers.
Small electric household appliances	Purchase, hire and repair of all smaller household appliances such as food processing appliances, coffee machine, kettles, irons, toasters and grills, juice extractors and deep dryers
Glassware, tableware and household utensils	Glassware, crystal ware, ceramic ware and china ware; cutlery; non–electric utensils (saucepans, frying pans, pressure cookers); non–electric household articles such as containers, waste bins and laundry baskets
Tools and equipment for house and garden	Motorized and hand tools such as electric drills, saws, lawnmowers, screwdrivers, wrenches and spanners; garden tools such as wheelbarrows, spades, shovels; ladders; door fittings (hinges, handles and locks)
Non–durable household products	
Cleaning and maintenance products	Detergents, dishwashing detergents and tablets, disinfectant, bleaches, softeners, stain remover; floor wash and polishes; general purpose cleanser
Personal care products	Non–electric appliances such as razors, nail files, combs, hairbrushes, toothbrushes; products for personal hygiene including soap, shampoo and bathing products, toilet paper, nappies and body deodorants; beauty products such as makeup and nail varnish
Other non–durable household products	Dustpans, dusters; cloths; kitchen paper, baking parchment roll, aluminium foil; garbage bags; matches; clothes pegs and clothes hangers
Domestic and household services	
Child care	Full–time and part–time care of children by either community, private or family based day care
Hairdressing and personal grooming services	Services of hairdressing salons, barbers; facial beauty treatments, manicures, pedicures, saunas; tattoo and piercing services
Other household services	Domestic services supplied by paid staff such as butlers, cooks, maids, drivers and gardeners; household services such as window cleaning, disinfecting and pest extermination; hire of furniture, furnishings, carpet, household equipment and household linen
HEALTH	
Medical products, appliances and equipment	
Pharmaceutical products	Prescription medicines, vaccines and treatments, cold–relief products, vitamins, band–aids, antiseptic, sunscreen and skin treatment
Therapeutic appliances and equipment	Corrective eyeglasses and contact lenses, hearing aids, neck braces, crutches and electronic and other devices for monitoring blood pressure etc.; repair of such articles; includes dentures but not fitting costs
Medical, dental and hospital services	
Medical and hospital services	Consultations of physicians in general or specialist practice and hospital charges; medical insurance
Dental services	Services of dentists, oral hygienists and other dental auxiliaries including fitting costs of dentures

LIST OF GOODS AND SERVICES PRICED FOR THE CPI *continued*

Group, Sub–group, Expenditure class	*Examples of item coverage*
TRANSPORT	
Private motoring	
Motor vehicles	Purchase of long term hire/lease of new cars and motor cycles; transfer of used cars to the household sector; service fee for the transfer of second hand cars
Spare parts and accessories for motor vehicles	Tyres (new or used), inner tubes, spark plugs, batteries, shock absorbers, filters, pumps and other spare parts or accessories purchased separately
Automotive fuel	Unleaded petrol, lead replacement petrol, diesel and LPG
Maintenance and repair of motor vehicles	Services purchased for the maintenance and repair of motor vehicles (includes the cost of labour and the cost of materials)
Other services in respect of motor vehicles	Motor vehicle registration, roadworthiness tests, driver licence fees, parking fees, driving lessons and tollway charges
Urban transport fares	
Urban transport fares	Bus, train, ferry, tram and taxi fares, not for holiday travel
COMMUNICATION	
Communication	
Postal services	Payments for the delivery of letters, postcards and parcels; private mail and parcel delivery (includes stamps and prepaid postage envelopes)
Telecommunication equipment and services	Purchases and repair of telephones, telephone–answering machines; mobile phones; devices with several functions but mainly used for telephone functionalities; installation and subscription costs of telephone equipment; local, regional, national and international calls from fixed and mobile telephones (includes voice, video calls, written and image messages); internet and broadband services
RECREATION AND CULTURE	
Audio, visual and computing equipment and services	
Audio, visual and computing equipment	Television sets; video recorder; DVD player; home theatre systems; radios, CD players, portable sound and vision devices, E–book reader; cameras; optical instruments; desktop and laptop computers, printers; calculators
Audio, visual and computing media and services	Media including blank and pre–recorded DVDs, CDs, Blu ray discs; memory cards and sticks; unexposed films and discs for photographic use; computer software; video tape and DVD rental; pay television; repair of audio, visual and computer equipment
Newspapers, books and stationery	
Books	Fiction, non–fiction, hardback, paperback and electronic books
Newspapers, magazines and stationery	Newspapers; magazines; printed matter such as posters and greeting cards; stationery and drawing materials
Holiday travel and accommodation	
Domestic holiday travel and accommodation	Air, sea and rail travel, car hire, hotel and motel accommodation and package charges for holidays in Australia
International holiday travel and accommodation	Air, sea and rail travel, car hire, hotel and motel accommodation and package charges for holidays overseas
Other recreation, sport and culture	
Equipment for sports, camping and open–air recreation	Gymnastic, physical education and sport equipment such as balls, rackets and golf clubs; fishing rods and other equipment for fishing; equipment for beach and open–air games; camping equipment
Games, toys and hobbies	Console games, musical instruments, toys, board games and hobby materials
Pets and related products	Pets, pet foods, aquariums and other items for the housing and care of pets
Veterinary and other services for pets	Services to care for animals, including veterinary, kennel and stable fees
Sports participation	Fees and charges for playing sport including lessons, ground gees, gym fees and equipment hire
Other recreational, sporting and cultural services	Admission fees to cinemas, theatres, concerts, museums, amusement parks and sporting events

LIST OF GOODS AND SERVICES PRICED FOR THE CPI *continued*

Group, Sub–group, Expenditure class	*Examples of item coverage*
EDUCATION	
Education	
Preschool and primary education	Private and government preschool and primary education fees
Secondary education	Private and government secondary education fees
Tertiary education	Private and government tertiary education fees
INSURANCE AND FINANCIAL SERVICES	
Insurance	
Insurance	Comprehensive insurance for dwellings and motor vehicles, compulsory third party motor vehicle insurance services
Financial services	
Deposit and loan facilities (direct charges)	Actual charges for the financial services of banks and similar financial institutions; includes ATM fees, account keeping fees
Other financial services	Commissions or fees charged by stockbrokers and real estate agents; taxes on transfers for real estate; fees for legal services

GLOSSARY

Aggregation

The process of combining lower level price indexes to produce higher level indexes.

All groups

This is commonly known as the 'headline' CPI and is the highest level of the CPI, containing all the groups, sub–groups and expenditure classes.

APR

Arithmetic mean of price relatives – refer to 4.18 for the formula.

Cost–of–living index

A measure of the change in household income required to maintain a constant level of utility.

CPI

Consumer Price Index – a general indicator of the rate of change in prices paid by households for consumer goods and services.

CPI basket

A commonly used term for the goods and services priced for the purpose of compiling the CPI.

CPI population group

The subset of the Australian population to which the CPI specifically relates. For the 16th series CPI this is all metropolitan private households.

Elementary aggregate

The lowest level of commodity classification in the CPI and the only level for which index numbers are constructed by direct reference to price data.

Expenditure aggregate

The current cost in dollars per year of purchasing the same quantity of goods or services as was purchased in the weighting base period by the CPI population group.

Expenditure class

A group of similar goods or services. The level at which weights are fixed for the life of an index series and the lowest level for which indexes are regularly published. There are 87 expenditure classes in the 16th series CPI.

GM

Geometric mean – refer to 4.19–4.21 for the formula.

Goods and Services Tax (GST)

An ad valorem tax applied to supplies (goods and services produced or delivered) by registered suppliers engaged in taxable activity. The GST is effectively only paid by final consumers. The legislated rate of GST is 10%.

Group

The first level of disaggregation of the CPI. There are 11 groups in the 16th series CPI.

Household Expenditure Survey (HES)

A sample survey conducted by the ABS to determine the expenditure patterns of private households. Data from the 2009–10 HES was the primary source of information for the expenditure weights for the 16th series CPI.

Indexation

The periodic adjustment of a money value according to changes in a price index.

Inflation (deflation)

A term commonly used to refer to changes in price levels. A rise in prices is called inflation, while a fall is called deflation.

Link factor

A ratio used to join a new index series to an old index series to form a continuous series.

Matched sample

In a matched sample, items that are priced from period to period are identical in all respects.

Metropolitan

For purposes of the CPI, 'metropolitan' refers to the six State capital cities, Darwin and Canberra.

Price index

A composite measure of the prices of items expressed relative to a defined base period.

Price levels

Actual money values in a particular period of time.

Price movements

Changes in price levels between two or more periods. Movements can be expressed in money values, as price relatives or as percentage changes.

Price relative

A measure of price movements; the ratio of the price level in one period to the price level in another.

Private households

Households living in private dwellings. Private dwellings exclude prisons, non self–care units for the aged, defence establishments, hospitals and other communal dwellings.

Quality adjustment

The elimination of the effect that changes in the quality or composition of an item have on the price of that item in order to isolate the pure price change.

RAP

Relative of arithmetic mean of prices – refer to 4.17 for the formula.

Reference base

The period in which the CPI is given a value of 100.0. The CPI is currently on a reference base of 1989–90.

Regimen

The selected goods and services priced for the purpose of compiling a price index.

Splicing

A technique used to introduce new items or respondents into the index calculations so that the level of the index is not affected.

Sub–group

A collection of related expenditure classes. There are 33 sub–groups in the 16th series CPI.

Transaction prices

The prices actually paid by consumers to acquire goods or services.

Utility

Often defined as the satisfaction derived from consumption of a good or service.

Weight

The measure of the relative importance of an item in the index regimen. Weights can be expressed in either quantity or value terms. Value weights are used in the CPI.

Weighting base period

The period to which the fixed quantity weights relate. The weighting base period for the 16th series CPI is 2009–10.

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