



**6351.0.55.001**

# **Labour Price Index Concepts, Sources and Methods**

**2004**



# **Labour Price Index Concepts, Sources and Methods**

**2004**

**Dennis Trewin  
Australian Statistician**

AUSTRALIAN BUREAU OF STATISTICS

EMBARGO: 11.30AM (CANBERRA TIME) WED 17 NOV 2004

ABS Catalogue No. 6351.0.55.001

© Commonwealth of Australia 2004

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission from the Commonwealth. Requests and inquiries concerning reproduction and rights in this publication should be addressed to The Manager, Intermediary Management, Australian Bureau of Statistics, Locked Bag 10, Belconnen ACT 2616, by telephone (02) 6252 6998, fax (02) 6252 7102, or email: <intermediary.management@abs.gov.au>.

In all cases the ABS must be acknowledged as the source when reproducing or quoting any part of an ABS publication or other product.

Produced by the Australian Bureau of Statistics

## INQUIRIES

- For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Antoinette Beckwith on Perth (08) 9360 5187.

# CONTENTS

---

|  | <i>page</i> |
|--|-------------|
| Preface . . . . .  | v           |
| <b>Chapter 1</b> Overview of the LPI . . . . .                         | 1           |
| <b>Chapter 2</b> Price Index Theory . . . . .                          | 5           |
| <b>Chapter 3</b> The Labour Price Index . . . . .                      | 11          |
| <b>Chapter 4</b> Wage Price Indexes . . . . .                          | 16          |
| <b>Chapter 5</b> Non-wage Price Indexes . . . . .                      | 24          |
| <b>Chapter 6</b> Compiling the Indexes of the LPI . . . . .            | 34          |
| <b>Chapter 7</b> Outputs . . . . .                                     | 37          |
| <b>Appendix</b> Treatment of Businesses as Statistical Units . . . . . | 44          |
| Glossary . . . . .   | 46          |



## PREFACE

---

### AIM OF THIS PUBLICATION

This publication provides a comprehensive description of the concepts, sources and methodology used in the compilation of the Labour Price Index (LPI). It also provides information about the conceptual and practical issues that have to be resolved in compiling the data, and how the Australian Bureau of Statistics (ABS) deals with these challenges.

The ABS intends to update this document periodically. The ABS would welcome reactions from users to the information in this publication and the issues covered in this release.

### RELEASE OF LPI DATA

The LPI publication is compiled by the ABS for the quarters ending in March, June, September and December each year. The information is released about seven weeks after the end of the quarter in the publication *Labour Price Index, Australia* (cat. no. 6345.0).

The main features and explanatory notes from the latest publication are available free from the ABS website: <<http://www.abs.gov.au>>

### ABS CONTACTS

Comments and requests for more information about the topics covered in this publication should be sent to

Antoinette Beckwith  
Director, Labour Price Index Section.  
Australian Bureau of Statistics  
GPO Box K881  
Perth WA 6842  
Email: [antoinette.beckwith@abs.gov.au](mailto:antoinette.beckwith@abs.gov.au)

To obtain a copy of the *Labour Price Index, Australia* (cat. no. 6345.0) publication or find out about what data is available on request please contact Tim Landrigan on (08) 9360 5151 or by email [tim.landrigan@abs.gov.au](mailto:tim.landrigan@abs.gov.au).

Dennis Trewin  
Australian Statistician





## CHAPTER 1 OVERVIEW OF THE LPI

### INTRODUCTION

**1.1** The LPI was developed to provide a measure of changes in the price of labour. It replaced the award rates of pay index (ARPI), which had become less relevant in that it related to a rapidly decreasing proportion of employees. This chapter provides information about what the LPI is, why it was developed, and the history of pay setting arrangements in Australia.

### ABS INFORMATION ABOUT PAY RATES

**1.2** From the early 1950s to June 1997 the ABS produced the award rates of pay indexes (ARPI) series, published in cat. no. 6312.0. By the early 1990s this series no longer provided a reliable measure of movements in wages and salaries, due to the changing industrial relations environment which saw a move away from pay setting based on awards.

**1.3** As awards became less dominant in setting wages and salaries, the arpi series applied to a diminishing proportion of the labour market. The ARPI series was discontinued with the June quarter 1997 release. In its place the ABS commenced the quarterly wage price index series (originally known as the wage cost index) to measure changes in wage and salary costs for employee jobs. The index follows pay movements in jobs, regardless of whether remuneration is set by award or through some form of non-award agreement. In 2004, the ABS published non-wage price indexes and labour price indexes for the first time.

### OVERVIEW OF THE LPI

**1.4** The LPI is one of the key quarterly economic indicators produced by the ABS. It measures change in the price of labour services resulting from market pressures, and is unaffected by changes in the quality and quantity of work performed. Wages and salaries account for the majority of expenditure on labour costs. These costs are outlined in the System of National Accounts (SNA93) concept *Compensation of Employees*. The *Compensation of Employees* is defined as 'the total remuneration, in cash or kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period' (source SNA93, paragraph 7.21).

**1.5** The ABS conducts a number of sample surveys of businesses which provide measures of changes in wages and salaries over time, e.g. the average weekly earnings series which is designed to provide estimates of the level of average weekly earnings and the quarterly change in the average. However, these types of surveys can be affected by a number of factors including compositional shifts in the labour market and changes to the hours worked by employees, as well as changes in the survey sample selected each quarter from the ABS Business Register.

**1.6** The LPI was developed to provide a measure of changes over time in the price to an employer of employing labour services but which would not be affected by changes in the quality or quantity of work performed. i.e. it is unaffected by changes in the composition of the labour force, hours worked, or changes in characteristics of employees (e.g. work performance).

**1.7** The LPI is a Laspeyres-type index covering wage and salary and selected non-wage costs. It measures the change in the price between the current period and the price at a given base period with the quantity and quality of labour services being held constant.

### OVERVIEW OF THE LPI *continued*

**1.8** The methodology used to construct the LPI is similar to that used for other price indexes such as the Consumer Price Index. In the LPI, index numbers are compiled for a range of wage and non-wage costs relevant to a representative sample of employee jobs within a sample of employing organisations.

**1.9** Information about the wage price indexes has been released for each quarter since September 1997 in the Labour Price Index publication, initially with the title, *Wage Cost Index, Australia* (cat. no. 6345.0).

**1.10** The wage price indexes measure changes over time in wage and salary rates of pay for employee jobs. Four sets of indexes are compiled:

- ordinary time hourly rates of pay excluding bonuses
- ordinary time hourly rates of pay including bonuses
- total hourly rates of pay excluding bonuses
- total hourly rates of pay including bonuses.

**1.11** The non-wage price indexes measure changes over time in various non-wage costs. These are compiled on a financial year basis, and were first compiled for the 2001-02 financial year. The four non-wage price indexes available are for:

- annual and public holiday leave
- employer funded superannuation
- payroll tax
- workers' compensation.

**1.12** From the individual wage and non-wage components a labour price index can be constructed. Two versions of the labour price index are produced (one excluding bonuses and one including them) and, like the non-wage price indexes, they are financial year indexes (first compiled for 2001-02).

**1.13** The LPI was developed by the ABS in response to the changing labour market conditions which are described below.

### AUSTRALIAN INDUSTRIAL RELATIONS AND PAY SETTING ENVIRONMENT

**1.14** Governments have regulated the Australian labour market since colonial times. An awards system was originally introduced in the late 1800s to prevent and settle disputes arising between employers and employees who could not reach agreement on terms of employment. Under the awards system, the interests of employees could only be represented by trade unions. Awards are collective agreements i.e. they relate to groups of employees and may be specific to an industry, occupation or enterprise, or may have a common law effect.

**1.15** During the Constitutional Conventions in the 1890s, it was agreed to establish a body with powers of conciliation and arbitration for the prevention and settlement of industrial disputes that extended beyond the limits of any one State. For most of the twentieth century, highly centralised Commonwealth and State tribunal-based systems of conciliation and arbitration shaped labour-employer relationships. The *Conciliation and Arbitration Act 1904*, established the Commonwealth Court of Conciliation and Arbitration, the forerunner of the Australian Industrial Relations Commission.

**1.16** The *Excise Tariff Act 1906*, under which employers were granted tariff protection, provided that a fair and reasonable wage was paid to their workers, was supported by both unions and employers. The first attempt to define a fair and reasonable wage was made in the Harvester case (1907). This case established the concept of a 'basic wage'. It also established the principle that a fair and reasonable wage should be based on 'the normal needs of the average employee, regarded as a human being living in a civilised community'. The Harvester standard was used in making other awards, and the basic wage, with margins for skill, became the foundation wage rate.

**1.17** The Federal system, with jurisdiction over matters extending beyond State borders, gradually became dominant over the individual State systems. By 1976 nearly 90% of the workforce had come under awards, of which 40% were under Federal jurisdiction. By the mid 1980s there were over 9,000 separate awards with over 250,000 individual award classifications.

**1.18** The nexus between tariff protection and the fair wage was weakened in 1973 when the Commonwealth government oversaw a reduction in overall tariff protection, in an attempt to open up the Australian economy to international competition.

**1.19** Opening up the Australian economy to international competition has continued since then. This in turn has resulted in greater emphasis being placed upon increases in productivity, improvements in work performance, the abolition of rules of demarcation, and workplace restructuring.

**1.20** Coinciding with these developments was an increased emphasis on agreement making and decentralised bargaining. Decentralisation related to movements away from centralised arbitration and conciliation arrangements, such as awards. These changes occurred in both the Commonwealth and State jurisdictions, although the timing and nature of industrial reforms have varied.

**1.21** From the 1980s onwards, the Australian industrial relations system has become characterised by more decentralised arrangements for labour-employer bargaining.

**1.22** In 1991 the Australian Industrial Relations Commission introduced a series of bargaining principles (the Restructuring and Efficiency Principle, the Structural Efficiency Principle, and the Enterprise Bargaining Principle) which provided a framework for decentralised bargaining and workplace reform.

**1.23** Two key pieces of Federal legislation were introduced in the 1990s. The *Industrial Relations Reform Act 1993* encompassed provisions to better allow enterprise bargaining in non-unionised workplaces. The opening up of collective bargaining to workers not represented by unions meant that wages and employment conditions could be changed without unions being directly involved in negotiations. Further labour market reforms were undertaken through the *Workplace Relations Act 1996* which allowed the development of individual worker agreements (Australian Workplace Agreements) as well as continuing collective worker agreements (Certified Agreements) and prohibited unions intervening in non-union agreements. The legislation also facilitated the simplification of awards. At the same time, industrial reform took place at the State level aimed at encouraging decentralised bargaining and workplace reform.

AUSTRALIAN INDUSTRIAL  
RELATIONS AND PAY  
SETTING ENVIRONMENT  
*continued*

**1.24** In the 1990s, the method of wage determination moved away from industry-based awards whereby all employees in a particular industry were covered by the same wages and employment conditions. In place of these awards, more diverse agreements have been set up to cover the pay and conditions under which employees work.

**1.25** By May 2002, 20.5% of employees had their pay set at exactly the applicable award rate of pay, 38.2% had their pay set in a collective agreement, and 41.3% had their pay set in an unregistered individual agreement (*Employee Earnings and Hours, 2002* (cat. no. 6306.0)).

## CHAPTER 2 PRICE INDEX THEORY

### THE CONCEPT OF A PRICE INDEX

#### *Comparing prices*

**2.1** There are many situations where there is a need to compare two (or more) sets of observations on prices. For example, a household might want to compare prices today with some earlier period. A manufacturer could be interested in comparing product price movements with movements in his production costs. Economists and market analysts may need to compare prices between countries and over time to assess and forecast a country's economic performance.

**2.2** In some situations the price comparisons might only involve a single item. Here it is simply a matter of directly comparing the two price observations. In other circumstances the required comparison is of prices across a range of items. In this instance a method is required for combining the prices allowing for the fact that they have many different units or quantities of measurement. This is where price indexes play an extremely useful role.

#### *The basic concept*

**2.3** Price indexes such as the LPI enable prices for a common item or group of items to be compared at different points in time. In order to compare the sets of prices it is necessary to designate one set the 'reference' set and the other the 'comparison' set. By convention, the reference price set is used as the base (or first) period for constructing the index and is given an index value of 100. For example, suppose for a single item the average of prices in set 1 was \$15 and for set 2 it was \$30. Then designating set 1 as the reference set gives an index of 200.0 ( $30/15 \times 100$ ) for the comparison set while designating set 2 as the reference set gives an index of 50.0 ( $15/30 \times 100$ ) for the comparison set.

**2.4** The most common comparison is between sets of prices at two points in time (temporal indexes). The points in time can be adjacent (this quarter and the previous quarter) or many periods apart (this year and ten years earlier). Typically the method is to nominate one set of prices as the reference prices and to revalue the quantities of items purchased in the base period by prices in the second (or comparison) period. The ratio of the revalued comparison period to the value of the reference period provides a measure of the price change between the two periods.

**2.5** The handling of quantity changes that occur in response to changes in relative prices is fundamental to price index construction. Changes in the relative importance of items being priced can have a significant effect on index movements.

### MAJOR INDEX FORMULAS

**2.6** In presenting index number formulas a simple starting point is to compare two sets of prices. Consider price movements between two time periods, where the first period is denoted as period 0 and the second period as period t (period 0 occurs before period t). In order to calculate the price index, the quantities need to be held fixed at some point in time. The initial question is what period should be used to determine the quantities. The options are to use:

(i) *The quantities of the first (i.e. earlier) period.* This approach answers the question 'how much would it cost in the second period, relative to the first period, to purchase the same quantities of goods and services as purchased in the first period.' Estimating the cost in the second period's prices simply requires multiplying the quantities of items purchased in the first period by the prices that prevailed in the second period. A price index is obtained from the ratio of the revalued cost using the second period prices to

MAJOR INDEX FORMULAS  
*continued*

the cost in the first period. This approach was proposed by Laspeyres in 1871 and is referred to as a Laspeyres price index. It may be represented, with a base of 100.0, as:

(2.1)

$$I_{Ll} = \frac{\sum p_{it} q_{i0}}{\sum p_{i0} q_{i0}} \times 100$$

(ii) *The quantities of the second (or more recent) period.* This approach answers the question 'how much would it have cost in the first period, relative to the second period, to purchase the same quantities of goods and services as purchased in the second period'. Estimating the cost in the first period simply requires multiplying the quantities of items purchased in the second period by the prices prevailing in the first period. A price index is obtained from the ratio of the cost in the second period to the revalued cost using the first period's prices. This approach was proposed by Paasche in 1874 and is referred to as a Paasche price index. It may be represented, with a base of 100.0, as:

(2.2)

$$I_{Pl} = \frac{\sum p_{it} q_{i0}}{\sum p_{i0} q_{i0}} \times 100$$

(iii) *A combination (or average) of quantities in both periods.* This approach tries to overcome some of the inherent difficulties of using quantities of goods and services fixed at either point in time. In the absence of any firm indication that either period is the better to use as the base or reference, then a combination of the two is a sensible compromise. In practice this approach is most frequent in:

- a) the Fisher Ideal price index, which is the geometric mean of the Laspeyres and Paasche indexes:

(2.3)

$$I_{Fl} = (I_{Ll} I_{Pl})^{\frac{1}{2}}$$

- b) the Törnqvist price index, which is a weighted geometric mean of the price relatives where the weights are the average shares of total values in the two periods, that is:

(2.4)

$$I_{Tl} = \prod_i \left( \frac{p_{it}}{p_{i0}} \right)^{s_i}$$

where  $s_i = \frac{1}{2} (e_{i0} / \sum e_{i0} + e_{i1} / \sum e_{i1})$  is the average of the expenditure shares for the *i*th item in the two periods.

**2.7** The Fisher Ideal and Törnqvist indexes are often described as 'symmetrically weighted indexes' because they treat the weights from the two periods equally.

MAJOR INDEX FORMULAS  
*continued*

**2.8** All price indexes in the ABS use the Laspeyres price index formula. This is largely because the weights used are held fixed at some earlier base period. On the other hand the Paasche, Fisher Ideal and Törnqvist formulas all require current period weights. Timely information of this nature is often very difficult to obtain.

**2.9** It should be noted that the different index formulas produce different index numbers and thus different estimates of price movement. Typically the Laspeyres formula will produce a higher index number than the Paasche formula, with the Fisher Ideal and the Törnqvist index numbers falling between the two. In other words the Laspeyres index will generally produce a higher measure of price increase (or lower decrease) than the other formulas and the Paasche index a lower measure of price increase (or larger decrease). These differences are demonstrated in table 2.1.

**2.10** Only the Laspeyres price index formula will be considered from this point. Further information regarding price index theory can be found in *Australian Consumer Price Index, Concepts, Sources and Methods* (cat. no. 6461.0.80.001).

**2.11** The Laspeyres formula above is expressed in terms of quantities and prices. In practice, quantities might not be observable or meaningful. Thus in practice the Laspeyres formula is typically estimated using expenditure shares to weight price relatives - this is numerically equivalent to the formula (2.1) above.

**2.12** To derive the price relatives form of the Laspeyres index, multiply the numerator of equation (2.1) by  $\frac{p_{i0}}{p_{i0}}$  and rearrange to obtain:

(2.5)

$$I_{it} = \sum \frac{p_{it}}{p_{i0}} \left( \frac{p_{i0}q_{i0}}{\sum p_{i0}q_{i0}} \right) \times 100$$

where the term in parentheses represents the expenditure share of item i in the reference (or, more commonly labelled, base) period. Let:

(2.6)

$$w_{i0} = \frac{p_{i0}q_{i0}}{\sum p_{i0}q_{i0}}$$

then the Laspeyres formula may be expressed as:

(2.7)

$$I_{it} = \sum w_{i0} \left( \frac{p_{it}}{p_{i0}} \right) \times 100$$

where  $\frac{p_{it}}{p_{i0}}$  is the price relative for the ith item.

**2.13** The important point to note here is that if price relatives are used then value (or expenditure) weights must also be used. On the other hand, if prices are used directly rather than in their relative form, then the weights used must be quantities.

## CHAPTER 2 PRICE INDEX THEORY *continued*

TABLE 2.1: COMPILING PRICE INDEXES OVER TWO PERIODS

|             | PRICE <sub>0</sub> | QUANTITY <sub>0</sub> | EXPENDITURE <sub>0</sub> | EXPENDITURE SHARES <sub>0</sub> | PRICE RELATIVES |
|-------------|--------------------|-----------------------|--------------------------|---------------------------------|-----------------|
| <i>Item</i> | $p_{i0}$           | $q_{i0}$              | $e_{i0}$                 | $w_{i0}$                        | $p_{i0}/p_{i0}$ |
| 1           | 2.50               | 2 000                 | 5 000                    | 0.4310                          | 1.0000          |
| 2           | 3.00               | 500                   | 1 500                    | 0.1293                          | 1.0000          |
| 3           | 4.50               | 200                   | 900                      | 0.0776                          | 1.0000          |
| 4           | 1 500.00           | 2                     | 3 000                    | 0.2586                          | 1.0000          |
| 5           | 30.00              | 40                    | 1 200                    | 0.1035                          | 1.0000          |
| Total       |                    |                       | 11 600                   | 1.0000                          |                 |

|             | PRICE <sub>t</sub> | QUANTITY <sub>t</sub> | EXPENDITURE <sub>t</sub> | EXPENDITURE SHARES <sub>t</sub> | PRICE RELATIVES |
|-------------|--------------------|-----------------------|--------------------------|---------------------------------|-----------------|
| <i>Item</i> | $p_{it}$           | $q_{it}$              | $e_{it}$                 | $w_{it}$                        | $p_{it}/p_{i0}$ |
| 1           | 2.75               | 2 000                 | 5 500                    | 0.4532                          | 1.1000          |
| 2           | 4.00               | 450                   | 1 800                    | 0.1483                          | 1.3333          |
| 3           | 6.50               | 130                   | 845                      | 0.0696                          | 1.4444          |
| 4           | 1 000.00           | 3                     | 3 000                    | 0.2472                          | 0.6667          |
| 5           | 33.00              | 30                    | 990                      | 0.0817                          | 1.1000          |
| Total       |                    |                       | 12 135                   | 1.0000                          |                 |

### INDEX NUMBERS

| <i>Index formula</i> | <i>Period 0</i> | <i>Period t</i> |
|----------------------|-----------------|-----------------|
| Laspeyres            | 100.0           | 104.5           |
| Paasche              | 100.0           | 98.4            |
| Fisher               | 100.0           | 101.4           |
| Törnqvist            | 100.0           | 101.6           |

The following illustrate the index number calculations:

$$\text{Laspeyres} = (0.4310 \times 1.1000) + (0.1293 \times 1.3333) + (0.0776 \times 1.4444) + (0.2586 \times 0.6667) + (0.1035 \times 1.1000)$$

$$\text{Paasche} = \frac{1}{(0.4532/1.1000) + (0.1483/1.3333) + (0.0696/1.4444) + (0.2472/0.6667) + (0.0817/1.1000)}$$

$$\text{Fisher} = (104.500 \times 98.400)^{1/2}$$

Törnqvist = best calculated by first taking the logs of the index formula

$$\begin{aligned} & (1/2) \times (0.4310 + 0.4532) \times \ln(1.1000) \\ & + (1/2) \times (0.1293 + 0.1483) \times \ln(1.3333) \\ & + (1/2) \times (0.0776 + 0.0696) \times \ln(1.4444) \\ & + (1/2) \times (0.2586 + 0.2472) \times \ln(0.6667) \\ & + (1/2) \times (0.1035 + 0.0817) \times \ln(1.1000) \end{aligned}$$

$$= 0.015422$$

and then taking the exponent multiplied by 100.



## CHAPTER 2 PRICE INDEX THEORY *continued*

### GENERATING INDEX SERIES OVER MORE THAN TWO TIME PERIODS

**2.14** Most users of price indexes require a continuous series of index numbers at specific time intervals. There are two options for applying the Laspeyres formula when compiling a price index series:

- (i) select one period as the base and separately calculate the movement between that period and the required period, which is called a 'fixed base' or 'direct' index.
- (ii) calculate the period to period movements and 'chain' these (i.e. calculate the movement from the first period to the second, the second to the third with the movement from the first period to the third obtained as the product of these two movements).

**2.15** The calculation of direct and chained indexes over three periods (0, 1, and 2) using observations on three items, is shown in table 2.2. The procedures can be extended to cover many periods.

**TABLE 2.2: CONSTRUCTING PRICE INDEX SERIES**

| <i>Item</i> | <i>Period 0</i> | <i>Period 1</i> | <i>Period 2</i> |
|-------------|-----------------|-----------------|-----------------|
| PRICE (\$)  |                 |                 |                 |
| 1           | 10              | 12              | 15              |
| 2           | 12              | 13              | 14              |
| 3           | 15              | 17              | 18              |
| QUANTITY    |                 |                 |                 |
| 1           | 20              | 17              | 12              |
| 2           | 15              | 15              | 16              |
| 3           | 10              | 12              | 8               |

| <i>Index formula</i> | <i>Period 0</i> | <i>Period 1</i> | <i>Period 2</i> |
|----------------------|-----------------|-----------------|-----------------|
| <b>Laspeyres</b>     |                 |                 |                 |
| period 0 to 1        | 100.0           | 114.2           |                 |
| period 1 to 2        |                 | 100.0           | 112.9           |
| chain                | 100.0           | 114.2           | 128.9           |
| direct               | 100.0           | 114.2           | 130.2           |
| <b>Paasche</b>       |                 |                 |                 |
| period 0 to 1        | 100.0           | 113.8           |                 |
| period 1 to 2        |                 | 100.0           | 112.3           |
| chain                | 100.0           | 113.8           | 127.8           |
| direct               | 100.0           | 113.8           | 126.9           |
| <b>Fisher</b>        |                 |                 |                 |
| period 0 to 1        | 100.0           | 114.0           |                 |
| period 1 to 2        |                 | 100.0           | 122.6           |
| chain                | 100.0           | 114.0           | 128.3           |
| direct               | 100.0           | 114.0           | 128.5           |

### CHAINING INDEXES

**2.16** The use of fixed weights over an extended period of time is obviously not a sound index construction practice. Changes in consumption patterns occur in response to longer-term movements in relative prices, changes in preference orderings and the introduction of new items (and the displacement of other items). Weights need to be updated to reflect these changes.

### CHAINING INDEXES

*continued*

**2.17** There are two options in these situations if a fixed-weight index is used. One is to hold the weights constant over as long a period as seems reasonable, starting a new index each time the weights are changed. This means that a longer-term series is not available. The second is to update the weights more frequently and to chain, as outlined above, to produce a long-term series. The latter is the most common practice.

**2.18** However, this situation poses a quandary for prices statisticians when using a fixed-weight index. There are obvious attractions in frequent chaining. However, chaining in a fixed-weight index can sometimes lead to biased estimates. This can occur if there is seasonality or cycles in the price and chaining coincides with the top or bottom of each cycle. For this reason it is generally accepted that indexes should not be chained at intervals less than annual.

**2.19** The weights in the LPI are updated annually and the index is calculated as a Laspeyres chain index.

### QUALITY CHANGE

**2.20** A price index by definition measures what can be described as 'pure' price change, that is, it is not distorted by changes in 'quality'. Under the usual index compilation practices, if the change in price of the item fully or partly reflects a change in quality, then for index purposes an adjustment is necessary to account for that quality change.

## CHAPTER 3 THE LABOUR PRICE INDEX

### INTRODUCTION

**3.1** This chapter provides an overview of the LPI, largely in the context of the theoretical and methodological issues outlined in chapter 2. More detailed information on practical matters is provided in subsequent chapters.

### MAIN FEATURES OF THE LPI

**3.2** The LPI is a Laspeyres type price index which measures changes in the price of labour in the Australian labour market, unaffected by changes in quality or quantity of work performed. As outlined in chapter 2, a Laspeyres price index measures the change in price between a given base period and the current period.

**3.3** In compiling the indexes of the LPI, price movements for different segments of the labour market (defined by state, sector, industry and occupation) are combined using weights which represent each segment's proportion of the total expenditure on labour by employers in Australia in the weighting base period. These weights, referred to as expenditure weights, are kept constant between successive weighting base periods.

**3.4** To enable the LPI to measure price changes over time, data are collected for a sample of individual jobs common between consecutive quarters. Only those jobs that have a price derived in both the current and previous quarters (i.e. matched jobs) contribute to index calculations. In addition, any price changes reflected are 'pure' price changes. That is, no change is shown as a result of shifts in the quality or quantity of work performed.

**3.5** A specification pricing methodology is employed to measure the price underlying each job in the sample. It involves identifying all the price influencing characteristics of each sampled job and incorporating them in fully defined and fixed pricing specifications.

**3.6** Payroll tax and workers' compensation are levied at the employer level, so these indexes are calculated using a matched sample of employers rather than jobs. Specific details about these indexes are outlined in Chapter 5.

**3.7** In the LPI, the wages data are based on actual wage and salary payments made to job occupants in the survey reference period rather than nominal or list rates (e.g. awards or book rates) for the job concerned.

**3.8** The LPI is an input price (or purchaser price) index designed to measure changes over time in the cost to businesses of purchasing a fixed quantity and quality of labour input, irrespective of the output produced. Consequently, when considering price movements for jobs, no adjustment is made for productivity changes within the production process that arise from factors such as capital investment, technological change, more efficient organisational arrangements, and entrepreneurial activities.

### CONSTANT QUALITY PRICING IN THE LPI

**3.9** Effective construction of price indexes requires the application of specification pricing, which involves the use of fixed pricing specifications. In the LPI, these pricing specifications include a job identifier as well as characteristics of the job being priced, such as job title, grade or level, location and tasks, so the employer can uniquely identify the selected employee job.

### CONSTANT QUALITY PRICING IN THE LPI *continued*

**3.10** Most importantly, pricing specifications also outline the price determining characteristics of each selected job. Pricing to constant quality is achieved by considering any changes in relation to these characteristics, and by removing any changes in labour payments which relate to these changes. Essentially, pricing to constant quality in the LPI ensures that price changes from the following are not reflected in the index series:

- changes in the nature of work performed (e.g. different tasks or responsibilities)
- changes in the quantity of work performed (e.g. the number of hours worked)
- changes in the characteristics of the job occupant (e.g. age, apprenticeship year, successful completion of training or a qualification, grade or level, experience, etc.)
- changes in other price determining characteristics which may exist (e.g. the site where the work is performed, the presence of other components of pay or labour costs which have been rolled in, changes in work schedules).

**3.11** In the LPI, a range of procedures have been developed to identify and measure quantity and quality changes and to ensure only pure price changes are reflected in the indexes.

**3.12** As mentioned earlier, only matched jobs contribute to the index calculation each quarter. If one or more characteristics of a matched job change from one quarter to the next then the impact of the change in quality (see paragraph 3.10) is removed from the price change for the job prior to index calculation. A constant quantity is maintained for each individual job from one quarter to the next by pricing the hourly rate of pay.

**3.13** Sometimes, significant changes in job specifications fundamentally alter the nature of the job, to the point where the job priced in the previous quarter essentially no longer exists. In this situation it is not possible to continue pricing the job originally selected, and a new job is selected to take its place in the sample.

### COMPILING THE INDEXES OF THE LPI

**3.14** The indexes of the LPI are compiled by weighting price movements (or relatives) between the base and current period, by their shares of labour expenditure in the base period. As described in paragraphs 2.11 and 2.12 this is simply an alternative way of calculating a Laspeyres index. In this alternative view, the weights used are expenditure shares rather than actual quantities.

**3.15** This weighting of price relatives occurs at the elementary aggregate (EA) level. EAs represent groups of jobs with the same state/territory, sector (private/public), industry and occupation characteristics. EAs are the finest aggregations of jobs for which expenditure shares (referred to in the LPI as expenditure weights) are available. Each selected job in the sample is assigned to a specific EA based on the occupation code of the job and the characteristics of the employing organisation (state/territory, sector and industry).

**3.16** Being a Laspeyres-type index the LPI has fixed weights. However, some qualification is required. It is not realistic to hold the weights of groups of jobs (elementary aggregates) permanently fixed. If held constant on a permanent basis, the further the series moved away from the base period, the more likely it would be that the weights are no longer representative of the relative importance of jobs. To overcome this problem the weights are updated annually. The series calculated using the new weights is linked to the series calculated using the previous weights to ensure a continuous series exists over time.

### EXPENDITURE WEIGHTS

**3.17** LPI expenditure weights are a measure of the relative importance of each elementary aggregate, based on employers' expenditure on labour. These weights are derived from the Survey of Employment and Earnings (SEE), the Major Labour Costs Survey (MLC), the Employee Earnings and Hours (EEH) survey and the Census of Population and Housing. Separate expenditure weights are derived for each of the components of the LPI; wages and salaries (including overtime and bonuses), superannuation, annual and public holiday leave, payroll tax and workers' compensation. The actual expenditure weights used depend on the index being constructed.

**3.18** The Laspeyres index methodology requires that prices in each period are compared to those in a given base period. To ensure the index remains relevant, expenditure weights need to be updated to reflect changes in expenditure patterns. Once updated, the weights are fixed again, and a new weighting base is created. In the following quarters, prices will be compared using this new weighting base. This process is referred to as reweighting. The LPI is reweighted annually.

**3.19** When the expenditure weights are updated, it does not follow that the published index numbers will recommence at 100.0. Instead, the series based on the old expenditure weights and that based on the new weights are linked to form a continuous series via an arithmetic calculation, which is referred to as chaining (see paragraph 2.16 to 2.18).

**3.20** New estimates from the independent data sources used to create the LPI expenditure weights are not available each year. When this is the case, updated weights are calculated by revaluing the previous expenditure weights using current annual price movement data. In effect, this process maintains the quantities underlying the weights from the earlier period.

### DATA COLLECTION

**3.21** Information for the LPI is collected using quarterly mail questionnaires. Data for the wage price indexes are collected each quarter. Annual leave and superannuation data are collected annually as part of the June quarter LPI survey. Data used to construct the payroll tax and workers' compensation indexes, as well as the public holiday component of the annual and public holiday leave index, are obtained from ABS and non-ABS data sources, rather than being directly collected from employers.

**3.22** When a business is first selected in the survey, detailed pricing specifications are collected for each of the randomly selected jobs. These specifications (i.e. job position number, title, tasks, grade, location, etc.) enable the same jobs to be identified in subsequent quarters. Other information relating to the jobs is also collected including details about pay change mechanisms (i.e. awards or agreements), details of overtime provisions, and any additional information about jobs that have unusual pay or working arrangements. This additional information assists survey staff to understand the nature of pay changes as they occur and to ensure that only pure price changes are reflected in the index.

**3.23** Sometimes it is not possible to collect data for all of the selected jobs. Some jobs may be temporarily vacant or the required information is simply not provided by the employer (although this is rare). In these situations data are imputed based on similar jobs.

### SCOPE AND COVERAGE

**3.24** The target population of businesses for the LPI is all employing organisations in Australia (private and public sectors) excluding:

- enterprises primarily engaged in agriculture, forestry or fishing
- private households employing staff
- foreign embassies, consulates, etc.

**3.25** The first group above is excluded primarily because a very high proportion of agricultural enterprises have no employees. It would be disproportionately costly to survey a sufficient number of these enterprises to obtain a sample of jobs that is large enough to adequately represent this industry. In addition, the highly seasonal nature of activities in this industry would make it difficult to track jobs over time. The other groups cannot be included because they are out of scope of the ABS Business Register from which the LPI sample of businesses is selected.

**3.26** For details on the ABS treatment of businesses as statistical units see Appendix 1.

**3.27** All employee jobs in the target population of businesses are in scope of the LPI, with the exception of the following:

- Australian permanent defence force jobs
- non-maintainable jobs (i.e. jobs that are expected to be occupied for less than six months of a year)
- jobs for which wages and salaries are not determined by the Australian labour market (e.g. working proprietors of small incorporated enterprises, most employees of Community Development Employment Programs, and jobs where the remuneration is set in a foreign country).

**3.28** As such, full-time, part-time, permanent, casual, managerial and non-managerial jobs are in scope of the LPI. Costs incurred by businesses for work undertaken by self-employed persons such as consultants and subcontractors are out of scope of the LPI, as they do not relate to employee jobs. Workers paid commission without a retainer are also excluded, as a large number of such workers operate in a similar fashion to self-employed persons.

### SAMPLE DESIGN AND MAINTENANCE

**3.29** A two-stage sampling procedure is used to generate a sample of employee jobs for the LPI: a sample of businesses; and a sample of employee jobs from within those selected businesses. Probability sampling is used in the selection of both businesses and jobs to ensure that the sample of jobs used in the compilation of the indexes is representative of all jobs in the labour market.

**3.30** In the first stage of sampling, approximately 4,800 private and public sector businesses are selected from the ABS Business Register. These businesses are selected by stratifying the target population of businesses by state/territory, sector (private/public), industry group and business size and selecting a random sample from each stratum. For a number of large complex organisations, a subsample of locations is selected to simplify reporting arrangements.

### SAMPLE DESIGN AND MAINTENANCE *continued*

**3.31** In the second stage of sampling, businesses selected in the first stage are asked to select a random sample of up to ten employees from their payrolls using instructions provided by the ABS. The number of selections depends on the total number of employees in the business. The provider then identifies the jobs occupied by these employees. Approximately 20,000 jobs are selected.

**3.32** For effective and efficient ongoing index construction, it is important that a high proportion of the initial sample of businesses is retained in subsequent quarters, and that the same jobs within those businesses stay in the sample where possible. However, with annual reweighting of the index to ensure its continued relevance, it is also necessary to update or refresh the survey sample annually. Refreshing the sample also allows the ABS to control the length of time that small businesses, in particular, are included in the sample. By controlling the length of time businesses are included in the survey the ABS can ensure that the reporting load placed on businesses is kept to a minimum.

**3.33** The sample selection methodology used to refresh the sample of businesses in the survey is referred to as the 'Rotating Panel Methodology'. In this methodology, the survey population is initially broken into five equal population panels. The sample is refreshed from within only one population panel for each annual update. All new businesses commencing operations during the course of a year are included in the next population panel to be refreshed, and therefore have a chance of being selected at the next annual update, ensuring the index reflects changes to the population of businesses.

**3.34** Between each annual refresh of the business sample, a small number of employee jobs will be lost from the survey sample because of the closure of some businesses. In addition, some jobs in continuing businesses will be replaced in the sample because of restructuring and other job changes. These small sample losses do not affect the index as the jobs lost from the sample are represented by other similar jobs in the sample through adjustments to the sampling weights.

**3.35** Sampling weights are calculated for each contributing matched job. The sampling weight for a job reflects the overall probability of selection as well as the extent and type of non-response.

## CHAPTER 4 WAGE PRICE INDEXES

### WAGE PRICE INDEXES

**4.1** Wages and salaries account for the majority of expenditure on labour costs. They are estimated to represent 86.6% of total labour costs according to the survey results available in *Labour Costs, Australia* (cat. no. 6348.0.55.001).

**4.2** The wage price indexes encompass cash payments to employees and include ordinary time earnings, overtime earnings, and bonus, commission and incentive payments, together with the value of any salary sacrificed.

**4.3** Price indexes are compiled for the following four wage series:

- ordinary time hourly rates of pay excluding bonuses
- ordinary time hourly rates of pay including bonuses
- total hourly rates of pay excluding bonuses
- total hourly rates of pay including bonuses.

**4.4** The "headline measure" of the wage price indexes is the index of total hourly rates of pay excluding bonuses.

**4.5** The methodology to derive prices for input into the construction of each of the four wage price indexes is outlined in this chapter. The process of constructing the indexes is outlined in chapter 6.

### INDEX OF ORDINARY TIME HOURLY RATES OF PAY EXCLUDING BONUSES

**4.6** Ordinary time hourly rates of pay data are collected quarterly in the Labour Price Index survey. Ordinary time payments are collected for each sampled job and include the following:

- Award, agreed or overaward payments
- Casual loadings
- Value of any salary sacrificed
- Retainers
- Piecework payments
- Higher duties allowances which relate to the selected jobs.

**4.7** The following are specifically excluded from ordinary time payments:

- Shift allowances and shift penalty payments
- Taxable allowances
- Reimbursement and non-taxable allowances
- Leave loading
- Severance, termination and redundancy payments
- Employer contributions to superannuation funds (included in the superannuation index)
- Value of payments in kind that cannot be salary sacrificed.

**4.8** Employers providing data for the LPI have the option of reporting either the ordinary time hourly rate of pay or the annual salary for each selected job. Where an annual salary is reported, information about the usual or standard weekly hours for the job is used to convert it into an hourly rate of pay.

**4.9** When a job is paid by piece rates, i.e. paid a set amount per unit produced, an hourly rate is determined after consultation with the business contact based on the rate per piece and the average number of pieces per hour. The average hourly rate is calculated when the job is first selected and it becomes part of the pricing specifications for the job and is priced from quarter to quarter. In subsequent quarters, any changes to



## CHAPTER 4 WAGE PRICE INDEXES *continued*

INDEX OF ORDINARY TIME  
HOURLY RATES OF PAY  
EXCLUDING BONUSES  
*continued*

*Price of ordinary time  
hourly rates of pay  
excluding bonuses*

the piece rate are collected, so that the percentage change is calculated and applied to the previous quarter's hourly rate.

**4.10** The price of ordinary time hourly rates of pay for each job is simply the base hourly rate.

**4.11** The price for a job is combined with the prices for other jobs to determine the ordinary time hourly rate of pay for each elementary aggregate (EA). EAs are the basic building block of the LPI (see paragraph 3.15). They represent a group of jobs with the same state, sector, industry and occupation characteristics. An EA ordinary time hourly rate of pay is calculated by taking a weighted average of prices for the jobs in the EA. These are referred to as the weighted average prices. The weights used take account of both the sampling weight (the population represented by the job) and weekly standard hours for each job.

(4.1)

$$\text{WtdAvP}_a = \frac{\sum_a (\text{HBse}_i \times \text{StdHrs}_i \times \text{Sampwt}_i)}{\sum_a (\text{StdHrs}_i \times \text{Sampwt}_i)}$$

where:

WtdAvP<sub>a</sub> is the weighted average price for EA a

HBse<sub>i</sub> is the base hourly rate for job i

StdHrs<sub>i</sub> is the weekly standard ordinary time hours for job i

Sampwt<sub>i</sub> is the sample weight for job i.

**4.12** Consider an example EA, which is made up of the following jobs.

|       | <i>HBseP</i> | <i>StdHrs</i> | <i>Sampwt</i> |
|-------|--------------|---------------|---------------|
| Job 1 | \$18         | 40            | 200           |
| Job 2 | \$15         | 20            | 300           |
| Job 3 | \$25         | 38            | 150           |

**4.13** Substituting the values into the above equation:

(4.2)

$$\begin{aligned} \text{WtdAvP}_a &= \frac{(\$18 \times 40 \times 200) + (\$15 \times 20 \times 300) + (\$25 \times 38 \times 150)}{(40 \times 200) + (20 \times 300) + (38 \times 150)} \\ &= \$19.11 \end{aligned}$$

*Price movements*

**4.14** Movements in the price of ordinary time hourly rates included in the index are those due to inflation, cost of living, enterprise or agency agreements, award rises, safety net rises, individual contracts (both formal and informal) and salary reviews, etc..

### *Price movements continued*

**4.15** Elements of the average hourly rate that are excluded from changes in the price are those that relate to changes in the quality or quantity of work performed. A range of procedures has been developed to quality adjust the data collected to ensure only pure price changes are reflected in the indexes.

**4.16** Only those jobs that exist in both the current and the previous quarter (ie matched jobs) contribute to the index calculations. Jobs are matched by collecting detailed job specifications and by including new (or replacement) jobs in the LPI only after the average hourly rates for each job can be calculated for two successive quarters.

#### SALARY SACRIFICE

**4.17** A feature of the labour market which is becoming more common is the use of salary sacrificing. Salary sacrifice arrangements are voluntary agreements in which the employee agrees to forego part of their salary or wages in return for benefits of a similar cost to the employer. The amount sacrificed can vary at the employee's discretion within guidelines set by the employer. The arrangement is generally intended to be cost neutral to the employer and advantageous to the employee. Salary sacrifice arrangements can change and the cash component of the salary for a job may fluctuate between adjacent quarters even when there has been no change in the cost to the employer.

**4.18** In deriving the price of ordinary time hourly rates both the cash and non-cash elements of flexible salary packages are included. The price movements in wage and salary rates would be distorted if just the cash component was included and if the relationship between the cash and non-cash components changed.

#### SUBSTITUTION EFFECTS

**4.19** With the introduction of enterprise bargaining in Australia it has become common for benefits such as allowances, leave entitlements or fringe benefits, to be traded off to obtain greater pay increases by rolling them into ordinary time or base pay. These trade-offs are generally price neutral to the employer and therefore do not reflect changes in the price of the job in the labour market. Accordingly changes of this nature do not affect the ordinary time hourly rates of pay indexes. For example, an employee may choose to trade-off a non-cash component of their salary package (e.g. annual leave) for an increased cash component. In such a case, there would be no change recorded in the wage price index.

**4.20** One exception to this is the shift of payments from overtime to ordinary time. The ordinary time rates of pay index shows the impact of these changes. However, they exclude all other 'roll-ins' which are not related to the value of the job in the labour market.

Price movements  
*continued*

PERFORMANCE RELATED PAY CHANGES

**4.21** Occasionally pay rate changes are partially the result of an individual's work performance i.e. the pay change reflects more than pure price change in the labour market. For a small proportion of such jobs, it may not be possible to completely quantify the effect work performance has had on remuneration.

**4.22** When the quality (i.e. performance related) and pure price components of the pay changes cannot be separately identified, the entire increase is allowed to contribute to the wage price indexes. It is expected that over time the job occupant will change, resulting in a subsequent fall in the price of the job due the lower quality (i.e. performance/experience) of the new employee. This decrease in the price of the job will also contribute to the index, counterbalancing the increase shown earlier, and in effect removing the performance component over time. While there may be some upward bias in the price rise during the tenure of a given employee, this treatment should minimise any bias in the long term. Given the small number of jobs where quality cannot be separately identified, this treatment is considered preferable to the alternative of removing all pay movements where there is a quality component which would create a downward bias in the index.

**4.23** Jobs where individual work performance is a factor in remuneration generally have unstructured or informal pay setting mechanisms i.e. an unregistered individual agreement. Remuneration is usually the result of negotiation between the employer and the employee with the level of pay generally being reviewed annually.

INDEX OF TOTAL HOURLY  
RATES OF PAY  
EXCLUDING BONUSES

**4.24** The difference between the price for ordinary time hourly rates of pay excluding bonuses and that for total hourly rates of pay excluding bonuses is overtime.

*Overtime*

**4.25** Overtime relates to payment for hours worked in excess of standard or usual hours. Often, but not always, overtime attracts a higher rate of pay, or penalty rate, than ordinary time. This penalty rate is generally defined as some multiple of the ordinary time hourly rate of pay (e.g. 1.5 times the ordinary time hourly rate).

**4.26** Overtime tends not to be worked on a standard or regular basis. Different hours of overtime will be worked in different jobs each week. Not all job occupants will be eligible to work overtime and not all occupants who are eligible will have been paid overtime in any particular period. For those who do, there is a broad range of scenarios and arrangements under which overtime might be paid. These arrangements are usually based on peaks and troughs in the operations of a business. Therefore, overtime is often worked irregularly and may be infrequent.

**4.27** Furthermore, different overtime rates may apply depending on the time and the length of overtime worked (e.g. 1.5 times the ordinary rate for the first three hours of overtime worked Monday to Friday, and 2.0 times the ordinary rate for hours in excess of three hours or for overtime worked on weekends). The details of these rates applying to different hours of overtime worked are referred to as *overtime provisions*.

*Price of total hourly rates of pay excluding bonuses*

**4.28** Ideally, overtime weekly standard hours would be the usual or average overtime standard hours paid for in an average week. However, this information is not readily available from employers, as overtime does not tend to be worked on a standard or regular basis.

**4.29** To overcome the problem of irregular or fluctuating overtime hours and to enable overtime to be priced to a constant quantity and quality, standard overtime hours for a job are defined as the number of overtime hours actually paid for in the reference week of the first quarter the job is included in the survey. Therefore not all jobs where the occupant is eligible for overtime will have overtime priced in the total hourly rates of pay indexes. This reflects the fact that overtime is not worked by all job occupants who are eligible to work overtime in a given week.

**4.30** In addition to deriving the standard overtime hours for the job, an overtime provision factor is derived from data collected in the first quarter. This factor is used to derive an average penalty rate for overtime hours worked and it represents the relationship between the hourly rates for overtime worked and ordinary time. For jobs where the occupant is not eligible to work overtime or where overtime is not being priced (i.e. overtime was not worked in the first quarter the job was included in the survey), the standard overtime hours and overtime provision factor are both set to zero. The following example illustrates how the overtime provision factor is derived.

4 hours @ \$15 (time and a half) = \$60  
 4 hours @ \$20 (double time) = \$80  
 Total overtime paid = \$60 + \$80 = \$140  
 Total overtime hours = 4 + 4 = 8  
 Overtime hourly price = \$140/8 = \$17.50  
 Ordinary time hourly rate of pay = \$10  
 Overtime provision factor = \$17.50 / \$10.00 = 1.75

**4.31** The total hourly rate of pay is calculated by combining the overtime hourly rate with the ordinary time hourly rate. To do this, the standard weekly ordinary time and overtime hours are used to weight the wages and salary components.

(4.3)

$$\text{Ordinary time weight} = \text{StdHrs}/(\text{StdHrs} + \text{VStdHrs})$$

$$\text{Overtime weight} = \text{VStdHrs}/(\text{StdHrs} + \text{VStdHrs})$$

where:

StdHrs is the weekly standard ordinary time hours

VStdHrs is the weekly standard overtime hours.

## CHAPTER 4 WAGE PRICE INDEXES *continued*

*Price of total hourly rates of pay excluding bonuses continued*

**4.32** The total hourly rate of pay excluding bonuses (THRPEB) is calculated as:

$$(4.4)$$

$$\text{THRPEB} = (\text{HBse} \times \text{Ordinary time weight}) + (\text{HVBse} \times \text{Overtime weight})$$

where:

HBse is the Base(ordinary time) hourly rate of pay

HVBse is the Overtime hourly rate of pay.

**4.33** Using the example above and assuming a weekly ordinary time standard hours of 38 and a weekly overtime standard hours of 2, the total hourly rate of pay would be:

$$(\$10 \times 38/40) + (\$17.5 \times 2/40) = \$10.38$$

**4.34** An EA price is calculated by taking a weighted average of all the job prices in the EA. Note that for total hourly rates of pay, the weight relating to standard hours includes both the ordinary time and overtime standard hours.

$$(4.5)$$

$$\text{WtdAvP}_a = \frac{\sum_a [\text{THRPEB}_i \times (\text{StdHrs}_i + \text{VStdHrs}_i) \times \text{Sampwt}_i]}{\sum_a [(\text{StdHrs}_i + \text{VStdHrs}_i) \times \text{Sampwt}_i]}$$

where:

WtdAvP<sub>a</sub> is the weighted average price for EA a

THRPEB<sub>i</sub> is the total hourly rate of pay excluding bonuses for job i.

*Price movements*

**4.35** Generally, the overtime provision factor is only derived in the first quarter a job is included in the survey. In subsequent quarters, if there has been no change in the eligibility of the occupant to work overtime and there has been no change to the overtime provisions, then neither the standard overtime hours nor the overtime provision factor will be changed.

**4.36** Hence any change in the overtime hourly price would be due to a change in the ordinary time hourly price, as the overtime hourly price is derived from the ordinary time hourly price and the overtime provision factor, as illustrated in the example below.

**EXAMPLE**

|                           | <i>Quarter 1</i>         | <i>Quarter 2</i>         | <i>% increase</i> |
|---------------------------|--------------------------|--------------------------|-------------------|
| Overtime hourly price     | \$10.00                  | \$10.50                  | 5.0               |
| Overtime provision factor | 1.75                     | 1.75                     | . .               |
| Overtime hourly price     | \$10.00 x 1.75 = \$17.50 | \$10.50 x 1.75 = \$18.38 | 5.0               |

. . . not applicable

*Price movements continued*

**4.37** Overtime provisions or eligibility may change when pay is reviewed for a job, for example when new individual contracts or collective agreements are struck. In such cases, the overtime provision factor and the overtime weekly standard hours are updated to reflect this change, which flows into the calculation of total hourly rates of pay.

### SUBSTITUTION EFFECTS

**4.38** The treatment of substitute price changes in the LPI was outlined in 4.19 and 4.20. When there are substitutions in remuneration between overtime and ordinary time payments, the total hourly rates of pay index only shows any net changes resulting from this substitution.

INDEXES OF HOURLY  
RATES OF PAY  
INCLUDING BONUSES

*Bonuses*

**4.39** Bonuses, commissions and incentive payments may be paid to employees in addition to regular wage or salary payments. They may relate to the performance of the employee or the organisation, and may be paid on a regular basis e.g. weekly, quarterly or annually, or on an ad hoc basis (e.g. staff suggestion bonuses). For ease of reference in this section the term 'bonuses' encompasses bonuses, commissions and incentive payments.

**4.40** Bonuses fluctuate from quarter to quarter, as they generally relate to the productivity of either the individual in the job or the organisation as a whole. The hourly price for bonuses is derived from the total of such payments, without separating quality changes from pure price changes. Therefore, the indexes which include bonuses comprise a combination of a pure price index and a form of unit value (i.e. total value divided by quantity). Changes in quality or quantity affect the bonus component and hence the indexes that include bonuses.

**4.41** Bonuses exclude the cost of retainers and piece work payments which are included in the calculation of the ordinary time hourly rate (see paragraph 4.6).

**4.42** Data on bonuses are collected on the following basis:

- where the bonuses are paid with a weekly, fortnightly, monthly, or quarterly frequency - the most recent payment to the employee is collected
- where the bonuses are paid biannually, annually or with other frequency - the full amount paid in the quarter is collected (ie the total paid since the previous quarter's survey reference date).

*Price of hourly rates of  
pay including bonuses*

**4.43** Hourly prices for bonuses are derived from the bonus payment, the frequency of the bonus payment and standard ordinary time hours (unless the frequency of the bonus is the same as the wage and salary payments in which case ordinary time hours for the period are used). For bonuses paid less frequently than quarterly, e.g. annual bonuses, the hourly price is carried forward to subsequent quarters until the next such payment is due.

**4.44** Two wage price indexes are produced which include bonuses: ordinary time hourly rates of pay including bonuses, and total hourly rates of pay including bonuses. These are the two indexes discussed above but with the inclusion of bonuses.

*Price of hourly rates of pay including bonuses continued*

**4.45** To calculate a price inclusive of bonuses, the derived hourly price of bonuses is added to the ordinary time hourly rate of pay.

ORDINARY TIME HOURLY RATE OF PAY INCLUDING BONUSES (OTHRPIB)

(4.6)

$$\text{OTHRPIB} = \text{HBse} + \text{HBon}$$

where HBon is the hourly price of bonuses.

TOTAL HOURLY RATES OF PAY INCLUDING BONUSES (THRPIB)

(4.7)

$$\text{THRPIB} = ((\text{HBse} + \text{HBon}) \times \text{Ordinary time weight}) + (\text{HVBse} \times \text{Overtime weight})$$

**4.46** Again, a weighted average price for each EA is then calculated. The weighted average will either exclude or include the overtime standard hours depending on whether it is the ordinary time or total time price being calculated.

*Price movements*

**4.47** With the exception of commissions no attempt is made to remove quality from the price of bonuses, hence indexes which include bonuses are not pure price indexes. An attempt is made to quality adjust commissions by removing changes in the price reported of commissions.

**4.48** The ABS is investigating the treatment of bonuses and reviewing the methodology for deriving the price change for bonuses. The aim of these investigations will be to develop a more refined measure of bonuses with respect to pricing to constant quality.

## CHAPTER 5 NON-WAGE PRICE INDEXES

### NON-WAGE PRICE INDEXES

**5.1** Although a large proportion of the change in the price of labour services is accounted for by changes in wages and salaries, non-wage costs are of interest in their own right and as a means of more accurately measuring changes in the total price paid for labour services.

**5.2** Four non-wage price indexes are constructed:

- annual and public holiday leave index
- superannuation index
- payroll tax index
- workers' compensation index.

**5.3** The methodology to derive a price for input into the construction of each of these four indexes is outlined in this chapter. The process of constructing the indexes is outlined in chapter 6.

### ANNUAL AND PUBLIC HOLIDAY LEAVE INDEX

#### *Annual leave*

**5.4** Entitlements to paid annual leave have been legislated for many years. With the exception of casual employees, who in general have no entitlement to annual leave, the minimum entitlement is four weeks, although this can vary depending on the jurisdiction. It is also possible that employers provide annual leave in excess of the minimum entitlement.

**5.5** Annual leave data are directly collected from employers in the Labour Price Index survey for the June quarter each year. This survey collects the number of weeks of paid annual leave that the occupant of the selected job is entitled to receive. Note that it is not the actual amount of leave taken that is collected as this reflects employee choices regarding when they take their leave.

**5.6** Leave loading is an additional payment sometimes associated with annual leave. It is a premium (e.g. 17.5%) that is added to the employee's wage and salary during hours of annual leave. Although the payment of leave loading is not as common as it once was, it is still paid in numerous industries and occupations. However, analysis has shown that leave loading has only a limited impact on changes in the price of annual leave. Additionally, the payment of leave loading as part of ordinary time gross earnings is becoming increasingly common. This 'rolling-in' of the leave loading payment is considered to be a substitute price change, and does not impact on the individual indexes of the LPI (see paragraph 4.19). For these reasons, leave loading has been excluded from the annual and public holiday leave index.

**5.7** A recent trend in paid annual leave has been the ability for employees to either sell or purchase additional annual leave. In the case of selling annual leave, an employee may elect to receive a lump sum in lieu of a specified leave entitlement. When purchasing annual leave, the employee forgoes the income they would have received if these 'purchased' hours had been worked. Both of these arrangements are driven by employee preference and are price neutral to the employer. For these reasons the LPI considers the paid leave entitlement prior to any 'cashed in' or 'purchased' amounts.



*Public holiday leave*

**5.8** In addition to annual leave, paid leave can also be provided for public holidays proclaimed under state/territory legislation. The typical entitlement to paid public holiday leave is ten days per year, although this can vary depending on the state/territory, sector and industry. Again, most legislation provides casual employees with no minimum entitlement to paid public holiday leave.

**5.9** The collection of public holiday data is complicated by the fact that the number of, and reasons for, public holidays vary significantly across states/territories, sector and industry. For this reason, data are obtained directly from state/territory public holiday declarations, rather than from survey providers. These declarations, available from various government websites, describe the public holidays provided in the various jurisdictions.

**5.10** Rather than directly collecting data for each selected job, a per year amount of public holiday leave is allocated to each job based on the characteristics of that job (e.g. casual or non-casual) and the appropriate public holiday information. To do this, a number of assumptions are made, including that only non-casual jobs receive paid public holiday leave, and that these jobs provide labour services over Monday to Friday. As a result, no paid leave is provided for public holidays that fall on a Saturday or Sunday, unless an additional day is provided in lieu.

**5.11** For example, ANZAC Day (April 25) is recognised as a public holiday by all states. However, in 2004 ANZAC Day fell on a Sunday. In Victoria the holiday was observed on the Sunday, while in New South Wales the public holiday was observed on the following Monday (April 26). In this situation, a Monday to Friday job in New South Wales would show no change in the amount of public holiday leave provided by an employer (as ANZAC Day fell on a Friday in 2003). However, the identical job in Victoria will show a fall in the amount of public holiday leave, as the employer provides paid leave for one less public holiday compared to the previous year.

**5.12** To be consistent with the annual leave data collected, the amount of public holiday leave is converted to a weekly amount by dividing by five.

*Price of annual and public holiday leave*

**5.13** The price of annual and public holiday leave reflects the amount paid per hour of labour service purchased. This is calculated for each job by dividing the total per year cost of annual and public holiday leave by the quantity of labour services purchased or 'paid hours worked' during that period.

TOTAL COST OF ANNUAL AND PUBLIC HOLIDAY LEAVE

(5.1)

$$TCAPL_i = WL_i \times StdHrs_i \times HBse_i$$

where:

TCAPL<sub>i</sub> is the total cost of annual and public holiday leave for job i

WL<sub>i</sub> is the amount (weeks per year) of annual and public holiday leave for job i

StdHrs<sub>i</sub> is the weekly standard ordinary time hours for job i

HBse<sub>i</sub> is the ordinary time hourly rate of pay for job i.

*Price of annual and public holiday leave continued*

**5.14** For example, consider a job which is paid \$18 per hour for 40 ordinary time hours per week. The job holder is entitled to 4 weeks of paid annual leave and 10 days (2 weeks) of public holiday leave. The total cost to the employer of these leave entitlements is:

$$\begin{aligned} \text{TCAPL}_i &= (4 + 2) \times 40 \times 18 \\ &= \$4,320 \end{aligned}$$

**PAID HOURS WORKED**

**5.15** Paid hours worked reflects the number of paid hours for which the occupant of the job provides labour services. It is equivalent to the standard hours worked in the job per week multiplied by the number of weeks worked in the year (i.e. 52 weeks less the amount of annual and public holiday leave).

(5.2)

$$\text{PHW}_i = (52 - \text{WL}_i) \times \text{StdHrs}_i$$

where:

$\text{PHW}_i$  is the paid hours worked for job *i*.

**5.16** Using our example job above, paid hours worked equals:

$$\begin{aligned} \text{PHW}_i &= (52 - 6) \times 40 \\ &= 46 \times 40 \\ &= 1,840 \text{ hours per year} \end{aligned}$$

**PRICE OF ANNUAL AND PUBLIC HOLIDAY LEAVE**

(5.3)

$$\text{PL}_i = \text{TCAPL}_i / \text{PHW}_i$$

where:

$\text{PL}_i$  is the price of annual and public holiday leave for job *i*.

For our example job:

$$\begin{aligned} \text{PL}_i &= \$4,320 / 1,840 \\ &= \$2.35 \text{ per hour} \end{aligned}$$

**5.17** The job level information above has been included for illustrative purposes only. The calculation of the price of annual and public holiday leave actually occurs at the Elementary Aggregate (EA) level. The price equation remains identical to that above, but the variables refer to a weighted average of all the jobs in the EA. The weights used take

*Price of annual and public holiday leave continued* account of both the sampling weight and the weekly standard ordinary time hours for each job.

*Price movements* **5.18** Movements in the price of annual and public holiday leave will result from either actual changes in the weighted average price of ordinary time hourly rates of pay and/or the weighted average weeks of annual and public holiday leave. Other changes in these variables, such as those related to the characteristics of the individual job occupant, are removed.

*Other types of paid leave* SICK LEAVE

**5.19** Paid sick leave, like paid annual leave, is a legislated requirement. However, in the case of paid sick leave a business is not usually required to provide the full entitlement of sick leave. As a result, a job's entitlement to sick leave can not simply be used as the amount of sick leave provided by an employer.

**5.20** Instead, it is necessary to estimate the quantity of paid sick leave which has been taken by an 'average' employee during the year. The notion of an 'average' employee is required to ensure that the LPI is pricing labour services to constant quality. It removes differences in the amount of sick leave provided due solely to the attributes of the job occupant.

**5.21** Numerous attempts have been made to construct the annual quantity of sick leave taken by the 'average' job holder. These attempts have failed to generate data of sufficient quality. Therefore, although a legitimate part of total labour costs, paid sick leave is not included within the LPI.

OTHER PAID LEAVE

**5.22** Other types of paid leave such as maternity/paternity leave and long service leave will not be included as part of the LPI. They are excluded due to the difficulty associated with linking them to one hour of labour service purchased, and the fact that they account for only a small portion of total labour cost.

SUPERANNUATION INDEX

**5.23** Superannuation is one of the largest non-wage items to be considered in the LPI. The Superannuation Guarantee Act 1992 requires that employers provide a minimum amount of superannuation for their employees. This minimum amount is specified as a percentage of an employee's salary or earnings base. The percentage has gradually increased since 1992 and reached 9% in 2002. The legislation generally covers all employees who are paid \$450 or more per month and are between 18 and 70 years of age, or who are under 18 years of age and working more than 30 hours per week.

*Types of superannuation funds*

**5.24** For Accumulation (Defined Contribution) schemes all contributions are invested, with returns credited to the employee's account as interest. The retirement benefit paid to the employee consists of the account's balance, after tax and any fees have been deducted. The majority of employees in Australia are in schemes of this type.

**5.25** Defined Benefit schemes pay a retirement benefit dependent on employee characteristics such as length of service, final salary and history of employee contributions. Some employers elect to make periodic contributions to avoid making large payments when employees retire (fully funded). Other employers, mainly public

*Types of superannuation funds continued*      sector organisations, elect to pay their contributions as benefits fall due (unfunded). No attempt is made to account for the different funding arrangements. Instead a rate/percentage of superannuation that the employer pays is determined in relation to the full retirement benefit accruing to the job occupant as specified by the scheme.

*Superannuation payments*      **5.26** There are many payments made in respect of superannuation. Some of these, along with their treatment in the superannuation index, are discussed below.

- Employer contributions are made to comply with the Superannuation Guarantee legislation. While this specifies the minimum amount an employer is required to pay, it does not prevent employers paying above this amount. Many agreements provide employees with superannuation above the legislated minimum. All payments made, whether equal to or above the legislated minimum, are included as part of the superannuation index.
- Employee contributions are payments made by employees in addition to those made by the employer. They include both pre-tax (salary sacrifice) and post-tax contributions. Both of these are already included as part of the wage price indexes and therefore are not included again as part of the superannuation index.
- Financial penalties paid by the employer for not meeting the legislated superannuation requirements are not included as part of the superannuation index.

*Data collection*      **5.27** Superannuation data are directly collected from employers in the Labour Price Index survey for the June quarter each year. This survey collects the rate (percentage) of superannuation that the occupant of the selected job receives.

*Price of superannuation*      **5.28** The per hour price of superannuation is determined by multiplying the rate of superannuation by the hourly price of wages and salaries. Additionally, as superannuation is also paid while a job occupant is on leave, the rate of superannuation is also applied to the price of annual and public holiday leave.

PRICE OF SUPERANNUATION

(5.4)

$$PS_i = RS_i \times (HBse_i + PL_i)$$

where:

PS<sub>i</sub> is the price of superannuation for job i

RS<sub>i</sub> is the rate of superannuation for job i

HBse<sub>i</sub> is the ordinary time hourly rate of pay for job i

PL<sub>i</sub> is the price of annual and public holiday leave for job i.

*Price of superannuation  
continued*

**5.29** Continuing the example from annual and public holiday leave, and assuming a rate of superannuation of 9% of the ordinary time hourly rate of pay, the price of superannuation would be:

$$PS_i = 9\% \times (\$18 + \$2.35) \\ = \$1.83 \text{ per hour}$$

**5.30** As was the case for the annual and public holiday leave index (see paragraph 5.17), the above calculations are actually performed using weighted averages at the elementary aggregate level.

*Price movements*

**5.31** As is clear from the equation above, movements in the price of superannuation will result from actual changes in the weighted average rate of superannuation, the weighted average price of the ordinary time hourly rate of pay and/or the weighted average price of annual and public holiday leave. Quality changes in these variables, such as those related to the characteristics of the individual job occupant, are removed.

PAYROLL TAX INDEX

**5.32** Payroll Tax is a levy imposed on employers in direct proportion to the size of their wage and salary bill (payroll). The administration of payroll tax is a state/territory responsibility. All states/territories essentially administer the same type of payroll tax scheme. That is, an employer pays a specified rate of taxation on all wages and salaries above a certain threshold.

**5.33** With the exception of Queensland, all states/territories apply a specific rate of tax and a fixed dollar threshold. For Queensland, the threshold is reduced ('clawed-back') as the size of the payroll increases. The following table includes the thresholds and rates of each of the schemes for the 2003–04 financial year.

TABLE 5.1: 2003–04 PAYROLL TAX RATES AND THRESHOLDS

| <i>state/territory</i>       | <i>Threshold</i><br>\$ per quarter | <i>Rate</i><br>% |
|------------------------------|------------------------------------|------------------|
| New South Wales              | 150 000                            | 6.00             |
| Victoria                     | 137 500                            | 5.25             |
| Queensland                   | (a) 212 500                        | 4.75             |
| South Australia              | 126 000                            | 5.67             |
| Western Australia (b)        | 187 500                            | 6.00             |
| Tasmania                     | 252 500                            | 6.10             |
| Northern Territory           | 150 000                            | 6.20             |
| Australian Capital Territory | 312 500                            | 6.85             |

(a) Threshold is reduced by \$1 for every \$3 of wages and salaries over the threshold

(b) Prior to 2003–04, Western Australia operated a progressive payroll tax scheme with different tax rates applying to different portions of an employer's payroll. The scheme also reduced the size of the threshold as per the Queensland scheme.

PAYROLL TAX INDEX  
*continued*

**5.34** Some businesses that are related to each other may be considered a 'group' for payroll tax purposes. If this is the case, the payroll tax threshold is not able to be claimed by each employer in the group, but is instead applied to the total payroll of the group. As a result, an individual employer within the group, must pay payroll tax on a larger portion of their payroll than an otherwise identical employer.

**5.35** The payments considered to be part of an employer's payroll for the purposes of payroll tax can vary between states/territories. However, in general it includes the following items: wages and salaries, bonuses, commissions, allowances, employer superannuation contributions, fringe benefits and directors' fees.

**5.36** Specific employers are exempt from paying payroll tax. These include;

- religious institutions
- public hospitals
- non-profit hospitals
- non-profit, non government schools providing education at or below secondary level
- municipalities (excluding wages paid to employees engaged in certain prescribed activities)
- public benevolent institutions
- charitable bodies.

*Pricing Payroll Tax*

**5.37** Payroll tax is not incurred with respect to a particular job but rather a group of labour services purchased by an employer. As a result, it is necessary to redefine the unit of labour services being priced from the job (used to price wages and salaries, annual and public holiday leave, and superannuation) to a group of jobs (employer's payroll). The price of payroll tax is calculated by applying the appropriate rates and thresholds to each employer's payroll.

(5.5)

$$PPT_i = (PR_i - Thold_i) \times Rate_i$$

where:

$PPT_i$  is the price of payroll tax for employer i

$PR_i$  is the payroll for employer i

$Thold_i$  is the applicable payroll tax threshold for employer i

$Rate_i$  is the applicable payroll tax rate for employer i.

**5.38** Consider a Victorian employer, with a quarterly payroll of \$250,000. The price of payroll tax for this employer would be;

$$\begin{aligned} PPT_i &= (\$250,00 - \$137,500) \times 0.0525 \\ &= \$5,906.25 \end{aligned}$$

*Price collection*

**5.39** Unlike wages, superannuation and annual leave, price data for payroll tax are not directly collected from survey providers. Instead the price is derived using a variety of ABS and non-ABS data sources. The payroll tax rate and threshold information is obtained from various State government websites. Employer payroll information is modelled using ABS data from the Labour Price Index survey and the Average Weekly Earnings survey.

*Price movements*

**5.40** The price of payroll tax for each employer is adjusted to ensure that price comparisons are made on a constant quantity and quality basis. This adjustment removes quantity and quality influences such as changes in the number and experience of the staff employed. This ensures that the payroll tax price is determined using a consistent set of labour services.

WORKERS'  
COMPENSATION INDEX

**5.41** When a job holder is injured at work, legislation requires the employer to provide rehabilitation and suitable compensation. Given this legal obligation, employers are required to purchase insurance against the large costs that can arise from this liability.

**5.42** The operation of workers' compensation is determined by the jurisdictions within which an employer falls. The jurisdictions include the eight state/territories and the Australian Government. Each jurisdiction is responsible for setting the rules and regulations governing workers' compensation. In New South Wales, Victoria, South Australia and Western Australia the State Governments set the formula for workers' compensation insurance, with approved insurance companies actually providing the insurance. Queensland and Australian Government employees are covered by government managed schemes and private insurers are excluded from offering insurance. Tasmania, the Northern Territory, and the Australian Capital Territory operate privatised schemes where a number of approved companies are able to provide insurance.

**5.43** The cost of workers' compensation insurance is determined in direct proportion to the size of an employer's payroll. However, when a job holder is injured, the workers' compensation insurer will not always meet the full costs of compensation and rehabilitation. Often, the employer must pay an 'excess', which is generally expressed as a period of compensation and can range from the day of injury to the first two weeks. In certain jurisdictions employers are able to pay an increased workers' compensation premium to avoid the requirement to pay any excess. This is usually set at a certain percentage of the premium and is referred to as 'buy-out'.

**5.44** The payments considered to be part of an employer's payroll for the purposes of workers' compensation vary between states/territories. However, in general it includes the following items: wages and salaries, bonuses, commissions, allowances, fringe benefits and directors' fees. Employer superannuation contributions are also included in New South Wales, Victoria, and South Australia.

*Pricing workers' compensation*

**5.45** Like payroll tax, workers' compensation is not incurred with respect to a particular job but rather a group of labour services purchased by an employer. Again, it is necessary to consider the employer's payroll as the unit of labour service to be priced. The price is calculated by applying the appropriate workers' compensation rates to an employer's payroll and then adding an amount for any excess.

(5.6)

$$PWC_i = WCPremium_i + Excess_i$$

where:

$PWC_i$  is the price of workers' compensation for employer  $i$

$WCPremium_i$  is the workers' compensation premium for employer  $i$ .

PRICING WORKERS' COMPENSATION PREMIUM

(5.7)

$$\begin{aligned} WCPremium_i &= Standard\ Premium_i + Buyout_i \\ &= (WCRate_i \times PR_i) + [BOR_i \times (WCRate_i \times PR_i) \times BOP_i] \end{aligned}$$

where:

$WCRate_i$  is the the applicable workers' compensation premium rate for employer  $i$

$PR_i$  is the payroll for employer  $i$

$BOR_i$  is the additional premium rate to buy-out excess liability

$BOP_i$  is the proportion of employers within the jurisdiction and industry that buy-out excess liability.

PRICING EXCESS

(5.8)

$$Excess_i = NOI_i \times (POE_i \times AWE_i) \times EP_i$$

where:

$NOI_i$  is the number of injuries per employer by jurisdiction and industry

$POE_i$  is the excess period for the jurisdiction

$AWE_i$  is the average weekly earnings for the employees of employer  $i$

$EP_i$  is the proportion of employers within the jurisdiction and industry that pay excess i.e. do not buy-out.

**5.46** Consider an employer with the following details: quarterly payroll of \$100,000 ( $AWE = \$600$ ), workers' compensation premium rate of 5%, buy-out rate of 12%, and excess period of two weeks. Also assume that for the jurisdiction and industry the employer is in, the proportion of employers that buy out is 20% (therefore the proportion that do not is 80%), and the number of injuries per employer is 0.7.



*Pricing workers' compensation continued*

$$\begin{aligned} PWC_i &= [\{0.05 \times \$100,000\} + \{0.12 \times (0.05 \times \$100,000) \times 0.2\}] \\ &\quad + [0.7 \times \{2 \times \$600\} \times 0.8] \\ &= \$5,120 + \$672 \\ &= \$5,792 \end{aligned}$$

*Price collection*

**5.47** Price data for workers' compensation are not directly collected from survey providers. Instead the price is derived using a variety of ABS and non-ABS data sources. Workers' compensation information is obtained from the various Workers' Compensation Authorities. Employer payroll information is modelled using ABS data from the Labour Price Index survey and the Average Weekly Earnings survey.

**5.48** Certain employers can opt to self-insure against workers' compensation liability. That is, they choose to fully fund all compensation and rehabilitation expenses as a result of employee injuries. Before becoming a self-insuring employer, several conditions must be satisfied to gain approval from the relevant State or Territory authority. Developing an appropriate pricing model for the small number of employers that self insure would not only be difficult but would also have a negligible impact on the final index numbers. Instead, these employers have simply been priced as if they were non self-insurers.

*Price movements*

**5.49** The workers' compensation premium for an employer is calculated using the base insurance rate for the jurisdiction and industry in which it operates. The base insurance rate is the average rate of premium that is required to cover the costs of all claims in a given industry (based on the claims history and risk associated with that industry). Therefore, the actual premium paid by an employer may differ from the base industry rate. This arises as insurers take into account other factors (e.g. claims history, workplace inspections) when determining the actual insurance rate an employer is charged. However, using the base insurance rate is considered to be more consistent with the notion of pricing to constant quality, as individual employer attributes are excluded.

**5.50** Base insurance rates are not available for the Northern Territory. Instead, average industry premium rates, calculated from gross premiums and wages data are used as a substitute. Base insurance rates are unavailable for the Australian Capital Territory and there are also quality concerns about the average premium data. Until these concerns are resolved, the Australian Capital Territory data will be imputed based on industry averages across Australia.

**5.51** The price of workers' compensation for each employer is adjusted to ensure that price comparisons are made on a constant quantity and quality basis. This adjustment removes quantity and quality influences, such as changes in the number and experience of the staff employed. This ensures that the workers' compensation price is determined using a consistent set of labour services.

*Price movements continued*

**5.52** Average injury incidence rates are updated as new data become available. However, it is considered that changes in these rates are outside the scope of a pure price index as they reflect a change in the quality of the employer or the labour services employed. When these rates are updated, constant quality is maintained by recalculating the base period price using the latest incidence rates data.

# CHAPTER 6 COMPILING THE INDEXES OF THE LPI

## INTRODUCTION

6.1 The LPI provides a measure of changes in the price of labour services purchased by employers across the various segments of the labour market and between two or more time periods.

6.2 This chapter provides details on how the various indexes of the LPI are constructed. The first step in the process, collecting price data, has already been covered in previous sections. Therefore, the starting point for this chapter is that weighted average prices for elementary aggregates have been calculated. The chapter provides information on the calculation of price relatives and how these are combined with expenditure weights to construct index numbers. It concludes with information on the construction of the labour price index.

## PRICE RELATIVES FOR ELEMENTARY AGGREGATES

6.3 When calculating the LPI, a Laspeyres-type price index, prices are compared between the current period and the base period. The process involves calculating the current to base period price relative  $P_t / P_B$  where  $P_t$  is the price in the current period and  $P_B$  is the price in the base period. A price relative ( $P_t / P_B$ ) is calculated for each segment of the labour market (elementary aggregate) which compares the weighted average EA price in the current period with the weighted average EA price in the base period.

6.4 Price relatives are calculated at the EA level for each of the wage and non-wage price indexes.

6.5 Tables 6.1 below demonstrates the calculation of price relatives for total hourly rates of pay for three elementary aggregates.

TABLE 6.1: CALCULATION OF PRICE RELATIVES

| <i>Elementary Aggregates</i> | WEIGHTED AVERAGE PRICES |       |       | PRICE RELATIVES (R) |        |
|------------------------------|-------------------------|-------|-------|---------------------|--------|
|                              | $P_0$                   | $P_1$ | $P_2$ | $R_1$               | $R_2$  |
| 1                            | 13.65                   | 14.36 | 15.12 | 1.0520              | 1.1077 |
| 2                            | 12.89                   | 15.54 | 15.63 | 1.2056              | 1.2126 |
| 3                            | 11.45                   | 11.62 | 12.98 | 1.0148              | 1.1336 |

6.6 It is possible that a price relative might not be able to be calculated for all EAs. Although rare, this can arise when there are no matched jobs in an EA. In this situation a price relative is estimated using the price relatives of other closely related EAs.

## EXPENDITURE WEIGHTS

6.7 The LPI provides a measure of the average rate of price change across all labour services purchased by employers in Australia. In calculating an average of price changes across these labour services it needs to be recognised that some employers are significantly larger than others and so are more important in terms of their share of overall employer expenditure. The aggregate indexes need to be compiled by weighting price movements relative to their importance in the overall expenditure levels of employers.

**EXPENDITURE WEIGHTS**  
*continued*

**6.8** As outlined in 3.14, the indexes of the LPI are compiled using an alternative method of calculating a Laspeyres price index. Under this approach price relatives between the current period and the base are weighted by their shares of labour expenditure in the base period.

**6.9** The calculation of these expenditure shares for LPI are discussed in more detail in Chapter 3.

*Annual reweight*

**6.10** To ensure the index remains relevant, the expenditure shares need to be regularly updated to reflect changes in the expenditure patterns of employers. Once updated, the weights are fixed again, and a new weighting base is created. In the following periods, prices will be compared using this new weighting base. The LPI has been reweighted annually since its inception.

**6.11** When the expenditure weights are updated, it does not follow that the published index numbers will recommence at 100.0, as the reference base (as opposed to the weighting base) which is currently the financial year 2003-04, may not be updated. Instead, the series based on the old expenditure weights and that based on the new expenditure weights are linked to form a continuous series via an arithmetic calculation, in a process referred to as chaining (see paragraph 2.16 to 2.18).

**INDEX NUMBERS**

**6.12** In the LPI, index numbers are created by combining price relatives using expenditure shares. This is represented by the following formula

(6.1)

$$I_t = I_B \times \sum_{EA} W_B \times P_t / P_B$$

where the summation is across all EAs,

$I_t$  is the index value for the current period

$I_B$  is the index value for the base period

$W_B$  is the base period expenditure share for each EA

$P_t$  is the current period weighted average price for each EA

$P_B$  is the base period weighted average price for each EA.

**6.13** Each index (e.g. Australia, states/territories, sector etc.) represents the amalgamation of a number of EA price relatives. All of the various wage and non-wage price indexes are calculated in this manner. Obviously, the combination of EAs and their expenditure shares varies depending on the index being compiled.

**6.14** The table below demonstrates the index calculation process. If we assume that the NSW, private sector is split into 3 EAs (EA1, 2 and 3), the table outlines the calculation of the total hourly rates of pay index for the NSW private sector.

## CHAPTER 6 COMPILING THE INDEXES OF THE LPI *continued*

INDEX NUMBERS *continued*

TABLE 6.2: AGGREGATION OF ELEMENTARY AGGREGATES TO FORM AN INDEX

| Elementary<br>Aggregate | Expenditure<br>Weight | PRICE RELATIVE |        |        | INDEX |       |       |
|-------------------------|-----------------------|----------------|--------|--------|-------|-------|-------|
|                         |                       | $R_B$          | $R_1$  | $R_2$  | $I_B$ | $I_1$ | $I_2$ |
| 1                       | 36 000                | 1.0000         | 1.0520 | 1.1077 | -     | -     | -     |
| 2                       | 25 000                | 1.0000         | 1.2056 | 1.2126 | -     | -     | -     |
| 3                       | 21 000                | 1.0000         | 1.0148 | 1.1336 | -     | -     | -     |
| Index                   |                       |                |        |        | 100.0 | 108.9 | 114.6 |

**6.15** As noted above, indexes can be calculated for various combinations of state/territory, sector, industry and occupation. However, occupation indexes are only available for wage price indexes. The specific outputs available are discussed further in chapter 7.

CONSTRUCTION OF THE  
LABOUR PRICE INDEX

**6.16** The labour price index is constructed from the individual wage and non-wage components. Two versions of the labour price index are produced, differentiated by the exclusion or inclusion of bonuses. Only those indexes that exclude bonuses are pure price indexes. Bonus payments can reflect changes in the quality of work performed (see paragraph 4.40).

**6.17** The same formula as that above is used to calculate the labour price indexes. However, rather than weighting together the EA price relatives for one specific wage or non-wage component, the EA price relatives for the total hourly rates of pay (either excluding or including bonuses) are combined with the EA price relatives for all of the non-wage components.

## CHAPTER 7 OUTPUTS

---

### LPI OUTPUTS

**7.1** LPI outputs are published in *Labour Price Index, Australia* (cat. no. 6345.0), previously called *Wage Cost Index, Australia* (cat. no. 6345.0). The publication was renamed from September quarter 2004. The name change provided clearer links between the survey and the data produced, and also reflected the inclusion of non-wage outputs in the publication.

**7.2** The first issue of the quarterly publication *Wage Cost Index, Australia* (cat. no. 6345.0) was released on 26 March 1998. This issue showed wage rate movements between September quarter and December quarter 1997. From this issue onwards, the wage price index, previously referred to as the wage cost index, has been published quarterly.

**7.3** The non-wage and labour price indexes are only released in respect of financial years. These series are published in an expanded September quarter edition of the LPI publication.

**7.4** Data for the non-wage and labour price indexes are only available for financial years from 2001–02 onwards. The first release of these series was in the September quarter 2004 issue of the LPI publication.

### WAGE PRICE INDEXES

**7.5** Four sets of wage price indexes are compiled:

- ordinary time hourly rates of pay excluding bonuses
- ordinary time hourly rates of pay including bonuses
- total hourly rates of pay excluding bonuses index
- total hourly rates of pay including bonuses.

**7.6** The “headline measure” of the wage price index is the index for total hourly rates of pay excluding bonuses. Separate indexes are released for each of the above series for various combinations of state/territory, sector (private/public), broad industry and broad occupation groups. Estimates are published quarterly and more detailed data are available on request. Seasonally adjusted and trend data are produced for the index of total hourly rates of pay excluding bonuses for Australia, for the private sector and for the public sector.

**7.7** Users have expressed interest in separate male and female indexes, usually with the intention of measuring wage parity for the genders. However, separate gender indexes are not available for a number of reasons. First, direct comparison between index numbers is not possible in the LPI. If separate indexes were created, comparisons could only be made in relation to the rate of change in male versus female pay and not the actual levels of pay. Second, the creation of gender indexes would require an unreasonable increase in sample size, significantly increasing provider load. Finally, gender is not considered to be an attribute of a job, but rather a characteristic of the job occupant.

**7.8** Full-time and part-time sub-indexes are also not available, for similar reasons to those described above. Movements in pay rates per hour for full-time and part-time employees generally do not differ significantly.

### NON-WAGE PRICE INDEXES

**7.9** Four non-wage price indexes are constructed:

- annual and public holiday leave
- superannuation
- payroll tax
- workers' compensation.

**7.10** These indexes are compiled on a financial year basis, and were first compiled for the 2001–02 financial year.

### LABOUR PRICE INDEXES

**7.11** A labour price index can be constructed by combining the individual wage and non-wage components. Two versions of the labour price index are produced and, like the non-wage price indexes, they are financial year indexes and were first compiled for 2001–02:

- labour price index excluding bonuses
- labour price index including bonuses.

**7.12** Like the wage price indexes, non-wage and labour price indexes are available for various combinations of state/territory, sector and industry. However, no occupation data are available for these indexes because some of the components (payroll tax and workers' compensation) can be estimated only at the level of each business rather than for individual jobs within the business.

### INTERPRETING INDEX NUMBERS

**7.13** The LPI measures changes in the price of labour over time (i.e. between any two periods within the series). It does not enable comparisons to be made between relative wage levels between states/territories or industries or sectors or occupations. For example, the fact that the index number for any particular state is higher than that for another state in a specific quarter does not mean that wages in the first state are higher than in the second. Rather, it means that since the base year, wages in the first state have risen more than wages in the second.

**7.14** The usefulness of the LPI stems from the fact that the index numbers for any two periods can be used to directly calculate the change in the LPI between the two periods. These movements can be compared across states/territories, sectors, industries, or occupations.

**7.15** The published index numbers are rounded to one decimal place, and the percentage changes (also rounded to one decimal place) are calculated from the rounded index numbers. In some cases, this can result in the percentage change for the total level of a group of indexes being outside the range of the percentage changes for the component level indexes. Seasonally adjusted and trend estimates are calculated from unrounded original indexes and then rounded to one decimal place.

### INDEX MOVEMENTS

**7.16** Movements in indexes from one period to another can be expressed either as changes in index points or as percentage changes. In the LPI publication (cat. no. 6345.0), percentage changes are calculated to illustrate three different kinds of movements in indexes:

- movements between consecutive quarters
- movements between corresponding quarters of consecutive years
- movements between consecutive financial years.

## CHAPTER 7 OUTPUTS *continued*

### INDEX MOVEMENTS

*continued*

**7.17** The following example illustrates the method of calculating changes in index points and percentage changes between any two periods:

*Total hourly rates of pay excluding bonuses, Australia*

|                                   | Index numbers                   |
|-----------------------------------|---------------------------------|
| December quarter 2003             | 99.7                            |
| <i>less</i> December quarter 2002 | 96.1                            |
| Change in index points            | 3.6                             |
| Percentage change                 | $3.6 / 96.1 \times 100 = 3.7\%$ |

### FINANCIAL YEAR INDEXES

**7.18** Index numbers for financial years are calculated as simple (arithmetic) averages of the four quarterly index numbers for the financial year. As the wage price index was first published for September quarter 1997, the first financial year index number that can be calculated is for 1997–98. Consequently, the first percentage change between financial years that can be calculated is between 1997–98 and 1998–99. The following example illustrates the method of calculating the most recent financial year index numbers:

*Total hourly rates of pay excluding bonuses, Australia*

|                                   | Index numbers    |
|-----------------------------------|------------------|
| September quarter 2002            | 95.4             |
| <i>plus</i> December quarter 2002 | 96.1             |
| <i>plus</i> March quarter 2003    | 97.0             |
| <i>plus</i> June quarter 2003     | 97.6             |
| Financial year 2002–03            | $386.1/4 = 96.5$ |

**7.19** Percentage changes in the index numbers between any two financial years can be calculated using the method outlined in paragraph 7.17 above.

### SEASONALLY ADJUSTED INDEXES

**7.20** Seasonally adjusted estimates are derived by estimating and removing systematic calendar related effects from the original series. In most economic data these calendar related effects are a combination of the classical seasonal influences (e.g. the effect of the weather, social traditions or administrative practices) plus other kinds of calendar related variation, such as trading day, Easter or the proximity of significant days in the year (e.g. Christmas). In the seasonal adjustment process, both seasonal and other calendar related factors evolve over time to reflect changes in activity patterns. The seasonally adjusted estimates still reflect the sampling and non-sampling errors to which the original estimates are subject.

**7.21** The total hourly rates of pay excluding bonuses index is the only index of the LPI that is seasonally adjusted. Institutional effects largely drive the seasonality of this index. Important factors in determining this seasonality are the timing of effect of Australian workplace agreements and certified agreements, the length of these agreements, and the timing of significant centralised wage hearings that impact on award rates of pay such as the "Safety Net Review" conducted by the Australian Industrial Relations Commission. A significant future change in wage setting arrangements, such as that which occurred during the mid to late 1990s, could affect the seasonality of the wage price indexes. The ABS does monitor the effects of any such change and will advise users of the reliability of the seasonally adjusted series during any transition period.



SEASONALLY ADJUSTED  
INDEXES *continued*

**7.22** The LPI uses a concurrent seasonal adjustment methodology to derive the adjustment factors. This method uses the original time series available at each reference period to estimate seasonal factors for the current and previous quarters. Concurrent seasonal adjustment is technically superior to the more traditional method of reanalysing seasonal patterns once each year because it uses all available data to fine tune the estimates of the seasonal component each quarter. With concurrent analysis, the seasonally adjusted series are subject to revision each quarter as the estimates of the seasonal factors are improved. It eliminates the need to use projected seasonal factors, and results in substantial gains in accuracy and consistency of the seasonally adjusted series. In most instances, the only noticeable revisions will be to the previous quarter and for the same quarter in the preceding year as the current quarter (i.e. if the latest quarter is  $Q_t$  then the most significant revisions will be to  $Q_{t-1}$  and  $Q_{t-4}$ ).

TREND ESTIMATES

**7.23** Trend is a measure of the underlying direction of a series. The ABS trend estimates are derived by applying a 7-term Henderson-weighted moving average to all quarters of the respective seasonally adjusted indexes except the first three and last three quarters. Trend estimates are created for these quarters by applying surrogates of the 7-term Henderson weighted moving average to the seasonally adjusted indexes, tailored to each time series. In general, trend estimates give a better indication of underlying behaviour than the seasonally adjusted estimates. Please refer to the ABS information paper, *A Guide to Interpreting Time Series - Monitoring Trends* (cat.no.1349.0).

REFERENCE BASE PERIOD

**7.24** The reference base period of an index series is that period for which the value of the index is set to 100.0. It is most commonly a year but can also be a different length of time, ranging from two or three years down to a single quarter. It often coincides with the weighting base for the series, but this is not essential. The September quarter 1997 was used as the original reference base for the wage price indexes as it was the first quarter for which data was available. With the introduction of the non-wage price indexes, all indexes are presented on a reference base of 2003–04.

RELIABILITY OF THE  
INDEXES

*Sampling error*

**7.25** Since the index numbers of the LPI are based on information relating to a sample of employee jobs, they are subject to sampling error. That is, they may differ from figures that would have resulted had all relevant employee jobs in the labour market been included in the collection. The ABS has not published any estimates of sampling error for the LPI. While it is reasonably straightforward to calculate sampling errors for a level estimate such as the total number of employee jobs estimated via a sample survey, it is not so straightforward a process for the LPI which is a product of sampling and index methodologies.

### *Non-sampling error*

**7.26** Inaccuracies in the data may also occur because of imperfections in reporting by businesses or in processing by the ABS. Inaccuracies of this kind are referred to as non-sampling errors. Every effort has been made to reduce non-sampling error, for example:

- by careful design and testing of questionnaires and processing systems
- by providing instructions to businesses on how to select a sample of employee jobs
- by detailed checking of completed survey forms
- by instituting a range of procedures for ensuring that jobs are priced to constant quality.

**7.27** The impact of non-sampling errors has not been estimated for the LPI.

### OTHER ABS DATA SERIES

#### *Price indexes*

**7.28** The LPI is one group of indexes amongst a range of price indexes produced by the ABS. Like the LPI, the other price indexes aim to measure changes over time, but they specifically relate to the average price of goods and/or services for particular markets.

#### THE CONSUMER PRICE INDEX (CPI)

**7.29** The CPI (cat. no. 6401.01) measures quarterly changes in the price of a 'basket' of goods and services typically acquired by Australian households (specifically capital city households). The composition of the basket of goods and services is wide ranging and aims to cover a high proportion of the expenditures by in-scope households in the period.

**7.30** To be included in the basket, goods and services must be representative of purchases made by the CPI target population and have prices that can be associated with and are identifiable with a specific commodity.

**7.31** The composition and weighting pattern for the CPI are reviewed at approximately five-yearly intervals to take account of changes in household spending patterns. Information for these reviews is provided by the ABS Household Expenditure Survey and other sources.

**7.32** Detailed information about the CPI can be found in *Australian Consumer Price Index Concepts, Sources and Methods* (cat. no. 6461.0), which is available on the ABS website ([www.abs.gov.au](http://www.abs.gov.au)).

#### PRODUCER PRICE INDEXES (PPIs)

**7.33** The ABS produces a range of PPIs (cat. no. 6427.0) including a selection of economy-wide indexes and indexes relating to specific industries (selected manufacturing, construction, mining and service industries). In general terms a PPI can be described as an index designed to measure either the change in the price of goods and services as they leave the place of production, or as they enter the production process. Thus, producer price indexes can be constructed as either output measures or input measures. Output indexes measure changes in the prices of sales by a defined sector of the economy while input indexes measure changes in the prices of purchases by a particular economic sector.

### *Price indexes continued*

#### CPI AND PPI SAMPLING

**7.34** Both the CPI and PPI indexes use judgmental or purposive samples, where the sample is selected on the basis of the knowledge and judgement of staff compiling the index. Interviews with businesses, various market reports, international trade, retail trade, manufacturing data and other information also help to form the basis for the selection and ongoing maintenance of samples of respondents and items (specifications) for pricing.

### *Employer surveys*

**7.35** The ABS collects labour cost information in a number of surveys including the Survey of Average Weekly Earnings (AWE), the Employee Earnings and Hours survey (EEH) and the Survey of Employment and Earnings (SEE). These surveys are similar in methodology to LPI in terms of using probability sampling and that selections are made from the ABS Business Register. The scope of the three surveys is also similar to but slightly wider than that of LPI. The LPI has more restrictions on scope mainly due to the longitudinal nature of the survey associated with the aim of measuring changes in wages paid.

**7.36** More detailed information about these and other related employer surveys can be found on the ABS website in *Labour Statistics Concepts, Sources and Methods* (cat. no. 6102.0.55.001) and *Australian Labour Market Statistics* (cat. no. 6105.0).

#### SURVEY OF AVERAGE WEEKLY EARNINGS (AWE)

**7.37** The purpose of the survey is to measure average gross weekly earnings associated with employee jobs in Australia. Estimates of average weekly earnings, and changes in average weekly earnings, are produced each quarter. Estimates are used in commercial contracts, and in Commonwealth, State and Territory legislation. The quarterly measure of change in average earnings levels is often used as an indicator of change in underlying wage rates, for economic policy analysis. However, the ABS considers the LPI to be the preferred indicator of changes in wage rates as AWE estimates are affected by changes in the both the price of labour and changes in the composition of the labour market.

Changes in the composition of the labour market include:

- variations in the proportion of full-time, part-time, casual, and junior employees
- variations in the proportion of male and female employees
- variations in the occupational distribution within and across industries (including changes in the proportion of higher and lower paid jobs);
- changes in average skill levels within occupations
- variations in the distribution of employment between industries.

**7.38** The population of interest is civilian employee jobs, for which payments were made in the survey reference period, excluding employee jobs based outside Australia.

Three main series are published:

- Average weekly total earnings (comprising ordinary time earnings plus overtime) for full-time adult employee jobs
- Average weekly total earnings for all employee jobs
- Average weekly ordinary time earnings for full-time adult employee jobs (commonly referred to as AWOTE).

### *Employer surveys continued*

#### **SURVEY OF AVERAGE WEEKLY EARNINGS (AWE) *continued***

**7.39** Details of numbers of employees (full-time adults and other employees), total gross weekly earnings (for full-time adults and other employees), and weekly overtime earnings of full-time adults are obtained on a quarterly basis from selected businesses, using a mail-out/mail-back collection methodology. Data for some Australian and Territory Government organisations are collected electronically on a fortnightly basis from a centralised pay system. A small number of large private businesses also provide data electronically. Data are available in *Average Weekly Earnings, Australia* (cat. no. 6302.0).

#### THE EMPLOYEE EARNINGS AND HOURS SURVEY (EEH)

**7.40** EEH has been conducted since 1974. It is currently conducted biennially. The survey produces estimates of the composition and distribution of employee earnings and hours, as well as estimates of the proportion of employees whose pay is set by awards, by collective agreements and by individual agreements. Estimates from the survey are used in developing and reviewing wages and labour market policies, in the wage negotiating process, and in research into various aspects of the labour market.

**7.41** Estimates are published initially in *Employee Earnings and Hours, Australia, Preliminary* (cat. no. 6305.0, with 2004 data being published electronically, in cat. no. 6305.0.55.001) and later in the more detailed publication *Employee Earnings and Hours, Australia* (cat. no. 6306.0).

**7.42** Detailed information is obtained about a sample of employees from each selected business using a mail-out/mail-back collection methodology.

**7.43** Like LPI, the sample of employees is obtained using a stratified two stage selection approach which involves first, the ABS selecting a sample of businesses from the ABS Business Register and second, each selected business selecting a sample of employees from their payroll(s).

#### SURVEY OF EMPLOYMENT AND EARNINGS

**7.44** The Survey of Employment and Earnings (SEE) has been conducted on a quarterly basis since 1983. The purpose of the survey is to measure both the number of public sector wage and salary earners employed in the middle month of each quarter, and their total gross quarterly earnings. Prior to March quarter 2002 the SEE have been collected these data for the private sector. From March quarter 2002 private sector data are collected in the *Quarterly Business Indicators Survey* and are published in *Business Indicators, Australia* (cat. no. 5676.0).

**7.45** Data from SEE are available in *Wage and Salary Earners, Public Sector, Australia* (cat. no. 6248.0.55.001).

## APPENDIX TREATMENT OF BUSINESSES AS STATISTICAL UNITS

### STATISTICAL UNITS/TAU

The ABS uses an economic statistics units model on the ABS Business Register to describe the characteristics of businesses, and the structural relationships between related businesses. The units model is also used to break groups of related businesses into relatively homogeneous components that can provide data to the ABS.

The units model allocates businesses to one of two sub-populations. The vast majority of businesses are in what is called the Australian Tax Office (ATO) Maintained Population, while the remaining businesses are in the ABS Maintained Population. Together, these two sub-populations make up the ABS Business Register population.

### ATO MAINTAINED POPULATION

Most businesses and organisations in Australia need to obtain an ABN, and are then included on the ATO's Australian Business Register. Most of these businesses have simple structures and in such cases the unit registered for an ABN will satisfy ABS statistical requirements. For these businesses, the ABS has aligned its statistical units structure with the ABN unit. The businesses with simple structures constitute the 'ATO Maintained Population'.

### ABS MAINTAINED POPULATION

For the population of businesses where the ABN unit is not suitable for ABS statistical requirements, the ABS maintains its own units structure through direct contact with each business. These businesses constitute the 'ABS Maintained Population'. This population consists typically of large, complex and diverse businesses. The statistical units model described below has been introduced to cover such businesses.

**Enterprise Group:** This is a unit covering all the operations in Australia of one or more legal entities under common ownership and/or control. It covers all the operations in Australia of legal entities which are related in terms of the current Corporations Law (as amended by the Corporations Legislation Amendment Act 1991), including legal entities such as companies, trusts, and partnerships. Majority ownership is not required for control to be exercised.

**Enterprise:** The enterprise is an institutional unit comprising (i) a single legal entity or business entity, or (ii) more than one legal entity or business entity within the same Enterprise Group and in the same institutional sub-sector (i.e. they are all classified to a single Standard Institutional Sector Classification of Australia sub-sector). For more details refer to *Standard Economic Sector Classifications of Australia (SESCA), 2002* (cat. no. 1218.0).

**Type of Activity Unit (TAU):** The TAU is comprised of one or more business entities, sub-entities or branches of a business entity within an Enterprise Group that can report production and employment data for similar economic activities. When a minimum set of data items are available, a TAU is created which covers all the operations within an industry sub-division and the TAU is classified to the relevant sub-division of the ANZSIC i.e. industry classification (see *Australian and New Zealand Standard Industrial Classification* (cat. no. 1292.0)). Where a business cannot supply adequate data for each industry, a TAU is formed which contains activity in more than one industry sub-division.

For more information on the economic statistics units model, refer to *Information Paper: Improvements in ABS Economic Statistics [Arising from the New Tax System]* (cat. no. 1372.0).

The statistical unit in the LPI is the ABN unit for businesses with simple structures, and the TAU for businesses with complex structures for each state of operation of the ABN unit/TAU. Where organisations are unable to provide data at the TAU/state level, special reporting units are created to collect information from the level within the organisation structure at which it is available. These special reporting units comprise either an aggregation of TAU/state units into larger units or a disaggregation into smaller units. In cases where a TAU/state unit is disaggregated into a large number of similar small units,

**APPENDIX** TREATMENT OF BUSINESSES AS STATISTICAL UNITS  
*continued*

ABS MAINTAINED  
POPULATION *continued*

a sub-sample of these units is selected in order to reduce the reporting load on the providers.

## GLOSSARY

|                                   |  |
|-----------------------------------|--|
| <b>ABS Business Register</b>      | The ABS maintained register of businesses and other organisations (government departments, non-profit organisations etc.) operating in Australia. This is used to determine the population for many ABS surveys.   |
| <b>Chaining</b>                   | The process by which an index series based on one set of expenditure weights is 'linked' to another index series based on a different set of weights, in such a way that the change in weights does not, in itself, alter the level of the index.  |
| <b>CPI</b>                        | Consumer Price Index - a general indicator of the rate of change in prices paid by households for consumer goods and services.   |
| <b>EA</b>                         | Elementary Aggregate - Groups of jobs with the same state/territory, sector (private/public), industry and occupation characteristics.   |
| <b>Expenditure weights</b>        | A measure of the relative importance of each elementary aggregate, based on employers' expenditures on labour.   |
| <b>Labour price index</b>         | Measures changes in the price of labour. Includes wages and salaries, overtime, bonuses (only in the labour price index including bonuses), annual and public holiday leave, superannuation, payroll tax, and workers' compensation.   |
| <b>Non-wage price index</b>       | Measures change in the price of non-wage costs. The four non-wage indexes relate to superannuation, annual and public holiday leave, payroll tax, and workers' compensation.   |
| <b>Price index</b>                | A composite measure of the prices of a pre-defined set of items expressed relative to a defined base period.   |
| <b>Price movement</b>             | Changes in price levels between two or more periods. Movements can be expressed in money values, as price relatives or as percentage changes.  |
| <b>Price relative</b>             | A measure of price movements. The ratio of the price level in one period to the price level in another.  |
| <b>Pure price change</b>          | A price change unaffected by changes in the quantity and quality of labour services.   |
| <b>Quality adjustment</b>         | The elimination of the effect that changes in the quality has on price in order to isolate the pure price change.  |
| <b>Reference base period</b>      | The period for which an index is given a value of 100.0.   |
| <b>Rotating panel methodology</b> | The sample selection methodology used to refresh the sample of businesses in the LPI survey.   |
| <b>Sampling weight</b>            | The sampling weight reflects the overall probability of selection for a job as well as the extent and type of non-response.  |
| <b>Wage price indexes.</b>        | Measure changes in the price of wage costs. The four wage price indexes include; ordinary time hourly rates of pay excluding bonuses, ordinary time hourly rates of pay including bonuses, total hourly rates of pay excluding bonuses, and total hourly rates of pay including bonuses. |
| <b>WCI</b>                        | Wage cost index - previous name for the wage price index.  |

## FOR MORE INFORMATION...

- INTERNET* **www.abs.gov.au** the ABS web site is the best place to start for access to summary data from our latest publications, information about the ABS, advice about upcoming releases, our catalogue, and Australia Now.
- LIBRARY* A range of ABS publications is available from public and tertiary libraries Australia-wide. Contact your nearest library to determine whether it has the ABS statistics you require, or visit our web site for a list of libraries.
- CPI INFOLINE* For current and historical Consumer Price Index data, call 1902 981 074 (call cost 77c per minute).
- DIAL-A-STATISTIC* For the latest figures for the Consumer Price Index call 1900 986 400 (call cost 77c per minute).

### INFORMATION SERVICE

Data which have been published and can be provided within five minutes are free of charge. Our information consultants can also help you to access the full range of ABS information—ABS user-pays services can be tailored to your needs, time frame and budget. Publications may be purchased. Specialists are on hand to help you with analytical or methodological advice.

- PHONE* **1300 135 070**
- EMAIL* **client.services@abs.gov.au**
- FAX* 1300 135 211
- POST* Client Services, ABS, GPO Box 796, Sydney 2001

## WHY NOT SUBSCRIBE?

ABS subscription services provide regular, convenient and prompt deliveries of ABS publications and products as they are released. Email delivery of monthly and quarterly publications is available.

- PHONE* 1300 366 323
- EMAIL* subscriptions@abs.gov.au
- FAX* 03 9615 7848
- POST* Subscription Services, ABS, GPO Box 2796Y, Melbourne 3001



2000001470466