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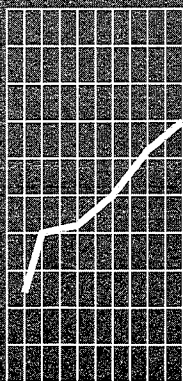
1997

EMBARGO: 11:30 AM (CANBERRA TIME) MON 24 FEB 1997

Information Paper

An Analytical Framework for Price Indexes in Australia

Statistics



NOTES

ABBREVIATIONS AND
OTHER USAGES

Refer to page 6 for a list of abbreviations used in this publication.

INQUIRIES

For more details about information in this publication, please contact David Collins on Canberra (06) 252 6248.

For information about other ABS statistics and products, please refer to the back of this publication.

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PREFACE

The Australian Bureau of Statistics (ABS) has prepared this information paper as a basis for user consultation on a strategy for enhancing our statistical service in the field of price indexes.

A separate information paper, scheduled for release in April 1997, will discuss the periodic Consumer Price Index (CPI) review process and will initiate a consultation process to address, amongst other things, the issue of the principal purpose of the index.

It is timely to note that, in the United States of America, the *Final Report to the US Senate Finance Committee, from the Advisory Commission To Study The Consumer Price Index* (referred to as the Boskin report), was released in early December 1996. A specific recommendation in the report was that the objective in measuring consumer prices in that country should be to establish a cost of living index with important applications such as indexation of federal benefits. Other issues raised in the United States report, such as index bias, will also be addressed as part of Australia's CPI review process.

In recent years, there has been increasing international attention directed towards developing new approaches to the measurement of inflation. Accordingly, this paper presents a statistical framework which will enable the range of separate price index series to be drawn together and presented as a system of indexes designed to support the analysis of inflation.

The ABS has had discussions with Statistics New Zealand (SNZ) on the content of this information paper and SNZ also intends to seek views from their users on the directions contained in the paper.

The Australian Statistics Advisory Council provided in principle support to the proposals in this paper, and encouraged the ABS to consult widely with users.

The ABS would welcome reactions from users to the proposals contained in the paper. Comments should be provided, preferably in writing, by 15 April 1997 to: David Collins, Director, Producer Price Indexes Section, by facsimile on Canberra (06) 252 7060 or mail to PO Box 10, Belconnen, ACT 2616.

In addition, seminars to discuss the proposals will be held in each capital city during the period March to April 1997. Those users who wish to attend a seminar should advise David Collins (see above for contact details) as soon as possible. You will then be notified of the timing, venue and other details closer to the time.

W. McLennan
Australian Statistician

Australian Bureau of Statistics
February 1997

LIST OF ABBREVIATIONS

| | |
|--------|---------------------------------------------------------------------|
| ABARE | Australian Bureau of Agricultural and Resource Economics |
| ABS | Australian Bureau of Statistics |
| AHECC | Australian Harmonised Export Commodity Classification |
| ANA | Australian National Accounts |
| ANZSIC | Australian and New Zealand Standard Industrial Classification |
| APMI | Price Indexes of Articles Produced by Manufacturing Industry |
| ASCO | Australian Standard Classification of Occupation |
| ASIC | Australian Standard Industrial Classifications |
| c.i.f. | cost, insurance and freight |
| CPI | Consumer Price Index |
| DFD | domestic final demand |
| DFP | Domestic Final Purchases |
| EPI | Export Price Index |
| f.o.b. | free on board |
| FWI | Fixed-Weighted Price Indexes |
| GDP | gross domestic product |
| HB | Price Index of Materials Used in House Building |
| HCP | Household Consumption Purchases |
| HPI | House Price Indexes |
| IOCC | Input Output Commodity Classification |
| IPD | Implicit Price Deflators |
| IPI | Import Price Index |
| LCI | Labour Cost Index |
| MUMI | Price Indexes of Materials Used in Manufacturing Industries |
| NPISH | non-profit institutions serving households |
| OTHB | Price Index of Materials Used in Building Other than House Building |
| PPI | producer price indexes |
| SITC | Standard International Trade Classification |
| SOP | Stage of Production producer price indexes |
| SNA | System of National Accounts |
| SNA93 | System of National Accounts 1993 |
| SNZ | Statistics New Zealand |
| WCI | Wage Cost Index |

SUMMARY

The ABS currently publishes a range of separate consumer, producer and international trade price indexes, each relating to a particular segment of economic activity, as well as price measures derived from the national accounts. These measures are used for a wide variety of purposes including policy and commercial applications.

In order to help improve users' knowledge and understanding of the range of price statistics available, and help facilitate the selection of the most appropriate measure(s) for any particular application, an outline of each of the different price measures is provided and their interrelationships illustrated by reference to the Input Output framework.

Given the differing principal objectives of the various individual price measures, there is scope to enhance the analytical value of the information through the ABS drawing the series together and presenting them as a system or family of price indexes. This system would be designed around a cohesive statistical framework developed specifically to support the study of inflation. The framework would also accommodate future developments in the field of price statistics such as extensions in coverage and presentation under alternative classifications.

Recognising a number of ideal properties, an analytical framework based on a 'market transactions' approach is developed. Then, a *Domestic Final Purchases* (DFP) whole-economy price index model is presented. The DFP model embraces both an aggregate measure and component indexes. It forms part of the broader, market transactions statistical framework which provides for complementary views of the economy as measured by Stage of Production producer price indexes, the Labour Cost Index and the Export Price Index.

The ABS has recently commenced work on the periodic review and reweighting of the CPI and an ABS information paper seeking user input to the review will be published in April 1997. In parallel with that work, the ABS will be consulting with users on proposals to commence work on developing a price index corresponding to the *Household Consumption Purchases* (HCP) component of the DFP model, designed specifically to assist in the analysis of inflation. It would be based on existing CPI price collections but exclude interest rates and non-market determined prices. Its scope would include all households and it would use national accounts data for weights, probably with annual reweighting (using chain index methods). The frequency of this component could be monthly or quarterly, although a monthly index would require some additional data collection.

In recognition of the increased attention being given to measures of *underlying* inflation, alternative methods of abstracting from the effects of changes in indirect taxes and subsidies, seasonality and volatility are considered. A 'specific adjustment method', involving the development of net price indexes (at constant tax rates) and the application of seasonal adjustment and smoothing techniques, is assessed as being conceptually superior. Therefore, the ABS proposes to pursue investigations into the

measurement of underlying household inflation through the development of an experimental underlying price index of HCP, applying the specific adjustment method.

Further, the ABS proposes to undertake a comprehensive review of its strategy for the publication of price statistics, with the aim of ensuring key information is communicated effectively to users. The strategy will need to provide for the release of the results from new initiatives as they become available.

1 INTRODUCTION

1.1 A wide range of separate consumer, producer and international trade price indexes is available in Australia. These individual indexes can be considered as partial indicators as they each relate to a particular segment of economic activity. Each index was developed to meet specific requirements and is released in its own separate, specialised publication, with substantial differences in profile. Further, there is by-product price data contained in the national accounts publications.

1.2 Given that price measures are used for a wide variety of purposes including analysis of inflation, indexation, contract escalation, derivation of constant price value estimates and international studies, the selection of the most appropriate measure(s) for any given application is particularly important.

1.3 Therefore, emphasis needs to be placed on effective communication with users as to the data choices available, and the characteristics of each of the different measures, in this important field of statistics.

1.4 In terms of the analysis of inflation, the high profile CPI is the most commonly used measure, even though not specifically designed for this purpose nor necessarily conceptually well suited.

1.5 In this context, the paper develops a new, integrated, statistical framework for a system of price indexes designed to assist in the analysis of inflation. The paper also proposes enhancing the way price statistics are published.

1.6 Section 2 of the paper describes each of the available price measures; section 3 develops the new statistical framework; section 4 outlines an economy-wide price index model; section 5 describes a new household consumption index; section 6 introduces a new approach to measuring underlying household inflation; section 7 advises of proposals to review the strategy for the publication of price statistics; and section 8 outlines plans for consultation with users. A glossary of key technical terms is also presented.

2 STOCKTAKE OF AUSTRALIAN PRICE MEASURES

2.1 This section provides an outline of each of the main price measures available or under consideration, either as direct price indexes or derived from the national accounts. Their interrelationships are then illustrated by reference to the Input Output framework. The objective is to help to improve users' knowledge and understanding of the array of Australian price statistics and thus help facilitate the selection of the most appropriate measure(s) for particular applications, whether it be analysis of inflation, indexation, business contract adjustment or other purposes. Further, as explained in section 7, it is proposed to draw on the illustration within the Input Output framework in reviewing the way price statistics are presented and published. Some readers may choose to skip the rest of this section and continue reading at the beginning of section 3 where the exposition of the new developments commences.

OUTLINE OF MEASURES

2.2 The key characteristics of each of the main price measures are described below. They are categorised as:

- direct price indexes: Consumer, Producer and International Trade Price Indexes and Labour Cost Index;
- national accounts Implicit Price Deflators (IPDs); and
- national accounts Fixed-Weighted Price Indexes (FWIs).

2.3 For each measure, the valuation basis is described as either *purchasers' prices* or *basic prices*, where:

- the purchasers' price is the amount paid by the purchaser inclusive of indirect taxes (less subsidies), trade margins (wholesale and retail) and transport costs. That is, the price for commodities supplied to the purchaser; and
- the basic price is the amount received by the producer exclusive of indirect taxes (less subsidies), and transport and trade margins. That is, it is the ex-plant price.

2.4 Conceptually, the basic price equates to the purchasers' price minus indirect taxes (less subsidies) and trade and transport margins. However, it is important to note that price indexes at basic prices are output (i.e. ex-plant) measures and relate to a different pricing point, and hence different transactions, to indexes at purchasers' prices. Indexes at purchasers' prices are input measures (i.e. on a delivered to user basis) and thus the transaction prices are inclusive of indirect taxes (less subsidies) and margins associated with the application of any transport, wholesale and retail trade services.

Direct price indexes

2.5 The *Consumer Price Index* (CPI) (6401.0) relates to goods and services bought by resident household consumers. The population group for the CPI is employee households in metropolitan areas. Indexes are produced for each of the eight capital cities, for eight broad groups of goods and services and for 107 expenditure classes. The index is

produced quarterly and has fixed weights which are updated about every five years. The ABS has recently commenced work on reviewing and reweighting the CPI. An information paper, seeking user input to the review, will be published in April 1997.

2.6 As the CPI is an input index, that is it relates to the prices of goods and services bought by householders, the valuation basis is purchasers' prices and the prices are obtained by direct collection from retail outlets and other businesses, authorities, etc. from which the CPI population group buys.

2.7 The *House Price Indexes* (HPI) (6416.0) relate to the selling prices of established houses and project homes (separately) for each of the eight capital cities. The indexes are produced quarterly and have fixed weights which are updated approximately every five years. The valuation basis of the HPI is purchasers' prices.

2.8 The *Price Indexes of Materials Used in Manufacturing Industries* (MUMI) (6411.0) relate to materials used in Australian manufacturing industries. Indexes are compiled on a net sector basis for the Manufacturing Division of the Australian and New Zealand Standard Industrial Classification (ANZSIC) as a whole and separately for ANZSIC Subdivisions and/or Groups within Manufacturing. They are compiled on a net sector basis as the scope of the indexes relates to those materials which are used by establishments within the defined manufacturing sector and which have been produced by establishments outside that sector. That is, the relative weights reflect the values of materials acquired from outside the sector rather than the value of all materials used.

2.9 The indexes are produced monthly and have fixed weights which are updated approximately every five years. As MUMI is an input index, the valuation basis is purchasers' prices and the prices are obtained by direct collection, mainly from manufacturers and importers.

2.10 The *Price Indexes of Articles Produced by Manufacturing Industry* (APMI) (6412.0) relate to articles produced by Australian manufacturing industries. Indexes are compiled on a net sector basis for the Manufacturing Division of the Australian Standard Industrial Classification (ASIC) as a whole and separately for Subdivisions and/or Groups within Manufacturing. In each case, the scope of the indexes relates to articles produced by establishments within the defined manufacturing sector and which are used by establishments outside that sector.

2.11 The indexes are produced monthly and have fixed weights which are updated approximately every five years. Being an output index, the valuation basis is basic prices and the prices are obtained by direct collection, mainly from manufacturers.

2.12 The *Price Index of Materials Used in House Building* (HB) (6408.0) and *Price Index of Materials Used in Building Other than House Building* (OTHB) (6407.0) relate respectively to materials used in the construction of houses and other forms of building. Indexes are presented for selected materials and for each of the six State capital cities separately. For the OTHB index, series on an ANZSIC Group industry of origin basis (average of six State capitals) is also provided.

2.13 The indexes are produced monthly and have fixed weights which are updated approximately every five years. As the HB and OTHB are input indexes, the valuation basis is purchasers' prices and the prices are obtained by direct collection from suppliers of building materials.

2.14 The *producer price index (PPI) service industry indexes* which are currently under development relate to the selling prices of the output of particular service industries. The primary classification employed will be ANZSIC. Initial industries being targeted are transport services, property services and a selection of business services. The valuation basis of the indexes will be basic prices, though the differences between basic prices and purchasers' prices for services will generally be significantly less than for goods. Prices will be obtained mainly by direct collection from suppliers of services.

2.15 The *Export Price Index* (EPI) (6405.0) and *Import Price Index* (IPI) (6414.0) relate respectively to exports of merchandise from Australia and imports of merchandise landed in Australia. The EPI is presented under the Australian Harmonised Export Commodity Classification (AHECC), Standard International Trade Classification (SITC), and ANZSIC while the IPI is presented under the SITC, Combined Australian Customs Tariff and Statistical Nomenclature and ANZSIC classifications.

2.16 The indexes are produced monthly and have fixed weights which are updated approximately every five years. The valuation basis is f.o.b. at the main Australian ports of export for the EPI (approximating purchasers' prices) and f.o.b. country of origin for the IPI (which is at a valuation point prior to basic prices: conceptually, the c.i.f. price for imports is considered to be the basic price).

2.17 The *Stage of Production producer price indexes* (SOP) which are currently under development relate to the selling prices of the output of Australian industries. Conceptually the indexes will be economy-wide and relate to the output of all the goods and services industries, though in practice the initial scope will be restricted to goods producing industries.

2.18 The commodity flows will be categorised according to their economic destination on a sequential basis along the production chain. The basis for the categorisation is the Australian Input Output tables. The primary index classification will be into final goods (i.e. goods destined for final consumption, capital formation or export as categorised under GDP(E), the expenditure approach to measuring gross domestic product), and intermediate goods (i.e. goods that flow into

intermediate consumption for further processing). To aid analysis, the intermediate goods will be further split on a sequential basis between first stage and second stage intermediate goods, thus providing three stages of production. Note that indexes for each of the three stages are not aggregated, thus avoiding the issue of multiple counting of transactions.

2.19 Under this model, 'first stage intermediate goods' are used in the production of 'second stage intermediate goods'; in turn, 'second stage intermediate goods' flow into the production of 'final goods'. For each of the three stages, separate indexes will be presented for domestic production and imports. The 'final goods' will be further split into capital goods, consumer goods and exports.

2.20 The valuation basis of the SOP will be basic prices. The indexes will be predominantly based on a reclassification of prices collected under the existing producer and international trade price index collections from producers, importers and exporters. Since most of this information is currently collected monthly, the index could be compiled on a monthly basis.

2.21 Experimental *Tradables Price Indexes* (1351.0, issues 96/1, 97/1 (forthcoming)) relate to the prices received by domestic producers of tradable and non-tradable output. Indexes have been compiled for the importable, exportable, tradable and non-tradable sectors, and at both the 28 and 109 industry level of the Input Output Industry Classification. The weights are derived from the Input Output tables. The detailed industry price data are sourced from a range of existing ABS and Australian Bureau of Agricultural and Resource Economics (ABARE) collections. The valuation basis of these indexes is basic prices.

2.22 The proposed DFP index is the main subject of this paper. In section 4, a conceptual model for economy-wide price analysis is presented. The scope of the model relates to final purchases of goods and services in the Australian economy, whether sourced domestically or imported, with exports out of scope. The model adopts a market transactions approach and excludes both notional transactions and non-market goods and services.

2.23 The primary classification is between final consumption purchases and capital purchases; each of these categories can then be split into the relevant institutional sector, i.e. household, corporate (private and public), government and non-profit institutions serving households (NPISH) sectors. The indexes could be further disaggregated by commodity and split between imported and domestic components. The valuation basis of the index is purchasers' prices.

2.24 In the short to medium term, the ABS proposes to develop a price index relating to the HCP component of the DFP model designed for analytical purposes (see section 5). It is also proposed to pursue the development of an experimental measure of underlying household

inflation, involving adjusting for the effects on prices of changes in indirect taxes, seasonality and volatility (see section 6).

2.25 The *Labour Cost Index* (LCI), which is currently under development, relates to selected wage and non-wage labour costs incurred by employers (private and public sector), except those primarily engaged in Agriculture, forestry and fishing. The LCI will be implemented in stages. Initially, the index will be confined to wage costs only. The *Wage Cost Index* (WCI) (6345.0) will relate to wages and salaries paid in all jobs (except Australian permanent defence force jobs). At a later stage, additional information (e.g. paid leave, superannuation, workers' compensation and payroll tax) will be collected to compile the full LCI. Indexes will be compiled for Australia, States and Territories, private and public sectors, and broad ANZSIC industry and Australian Standard Classification of Occupations (ASCO) groups.

2.26 The wage costs in the WCI relate only to cash remuneration to employees in the survey reference period (i.e. payments in kind are excluded). The information will be collected quarterly by mail questionnaire from a sample of employers.

2.27 ABARE produces two main price index series, namely:

- *Prices received by Australian farmers for their produce.* Ideally the prices desired for these products are 'farm gate' prices. These are not normally available and so the next best prices are wholesale market prices: for example, livestock market prices, fruit and vegetable wholesale market prices. Indexes are aggregated using weights derived from ABS statistics on gross value of production, averaged over three years to even out volatile shifts caused by droughts, etc. For major commercial crops such as wheat, the current year's prices are based on ABARE's estimates. Other sources are major processors for produce such as milk, eggs and poultry who provide information on the average price paid to producers. The conceptual basis of the index is basic prices; therefore the weights are at basic prices. However, in practice the prices are collected at wholesale level and therefore include some margins.
- *Prices paid by farmers for their inputs.* Theoretically, these are actual prices paid by farmers for inputs delivered to the farm. Price sources for most products and services are rural supplies stores, agricultural service providers etc. Actual prices paid at the midpoint of the quarter (or quarterly average if available) are requested. Price sources are dispersed geographically among major production areas. Weights for aggregating indexes are derived from the ABS Agricultural Financial Survey, averaged over two years. In concept, the valuation basis of the index is purchasers' prices.

National accounts Implicit
Price Deflators

2.28 *Implicit Price Deflators* (IPDs) (5206.0) for aggregate expenditure items are obtained by dividing a current price value by its corresponding constant price value. IPDs are published on a quarterly and annual basis for all items of expenditure shown in the domestic production account, except for the increase in stocks and statistical discrepancy items. When derived from the major national accounting aggregates, such as gross national expenditure, IPDs relate to a broader range of goods and services in the economy than that represented by any of the individual consumer and producer price indexes published by the ABS.

2.29 IPDs provide an estimate of the price change between the base period of the relevant constant price estimate and any other period, and reflect the quantity weights of this latter period. Because the weights change from period to period, IPDs do not compare the price of a constant basket of goods and services between any two periods except when comparing the base period and any other period. Therefore, changes in the value of an IPD from one period to another (neither of which is the base period) could be due to a change in price and/or a change in composition or relative quantities. As a result, the IPDs do not provide a pure price change measure. The valuation basis underlying the IPDs is purchasers' prices.

National accounts
Fixed-Weighted Price Indexes

2.30 In addition to the IPDs published for the major national accounts aggregates, the ABS publishes *Fixed-Weighted Price Indexes* (FWIs) (5206.0) of GDP, exports of goods and services, imports of goods and services, and of domestic final demand (DFD) and its four major components. These indexes are published quarterly. The FWIs have been formed by applying fixed weights to the detailed price indexes used to derive constant price estimates. The fixed weights are updated every five years, at the time of rebasing the national accounts. Being FWIs, they are not subject to the impact of changes in the composition of the underlying components, and so provide a measure of pure price change. The detailed price components of the FWIs are drawn from ABS consumer, producer and international trade price indexes, and wage and salary rates, as well as various sources outside the ABS. The valuation basis of the FWIs is purchasers' prices.

2.31 Table 1 summarises, for each price measure, the valuation basis (where PP indicates purchasers' prices and BV signifies basic prices), its status and the main classification(s) employed. The last column provides a link to the relevant Input Output table.

1

SUMMARY OF PRICE MEASURES

| <i>Price measure</i> | <i>Valuation basis</i> | <i>Status</i> | <i>Main classification(s)</i> | <i>IO table</i> |
|------------------------|------------------------|-------------------|-----------------------------------------|-----------------|
| CPI | PP | established | commodity | 2 |
| HPI | PP | established | — | 2 |
| MUMI | PP | established | ANZSIC, IOCC | 2 |
| APMI | BV | established | ASIC, IOCC | 3 |
| HB | PP | established | material | 2 |
| OTHB | PP | established | material | 2 |
| PPI services | BV | under development | ANZSIC, IOCC | 3 |
| EPI | PP(a) | established | AHECC | 2 |
| IPI | BV(b) | established | SITC | 3 |
| SOP | BV | under development | SOP, GDP(E) categories ANZSIC, IOCC | 3 |
| Tradables | BV | experimental | importable, exportable non-tradable | 3 |
| DFP — HCP(c) | PP | proposed | GDP(E) categories, Institutional Sector | 2 |
| DFP — other | PP | proposed | GDP(E) categories, Institutional Sector | 2 |
| LCI | PP | under development | ANZSIC, ASCO | 2 |
| ABARE — received | BV | established | commodity | 3 |
| ABARE — paid | PP | established | commodity | 2 |
| National accounts IPDs | PP | established | GDP(E) categories | 2 |
| National accounts FWIs | PP | established | GDP(E) categories | 2 |

(a) EPI f.o.b. is termed 'special purchasers' price' in the System of National Accounts (SNA) (15.36). In practice, this is generally the earliest point of pricing for which manufacturers, miners, etc. can report because they export directly rather than via wholesalers or agents. Thus, for such industries, it is not possible to discern between purchasers' prices and basic prices. On the other hand, agricultural products are commonly sold via marketing authorities and attract a wholesale margin (fees, commissions, etc.). This is the pricing basis for agricultural products in the EPI and the prices would be inclusive of such margins.

(b) IPI f.o.b. is, in fact, an earlier valuation basis than basic prices. A true basic price valuation would be c.i.f. (SNA 15.35).

(c) The proposed development includes an underlying household consumption price index.

INTERRELATIONSHIPS BETWEEN PRICE MEASURES

2.32 The interrelationships between each of the above price measures can be illustrated by reference to the framework used to produce the Australian Input Output tables. An Input Output absorption (or use) table has commodities and primary inputs in its rows, and using industries and final demand categories in its columns (see tables 2 and 3). It shows the flow of goods and services and the link from production to final demand.

2.33 Input Output tables (or matrices) can be presented in either of the two valuation bases described above, i.e. basic prices or purchasers' prices.

2.34 Looking across the rows of a table in purchasers' prices, the margin elements are included in the values of the flows of all the commodities which attract the margin; on the other hand, in a table in basic prices, the margin commodity flows (e.g. retail trade, road freight, etc.) are shown separately in their own right against the appropriate sector (e.g. transport).

2.35 Further, there are two alternative treatments of imported commodities in the tables; direct allocation and indirect allocation.

2.36 Direct allocation of imports involves allocating all imports directly to the sectors which use them (in which case they are reflected in row P6 in the lower part of the table; and the top half of the table thus

refers only to the use of local products). On the other hand, indirect allocation means that imports are firstly added to the supply of the equivalent commodities produced in Australia and allocated across the corresponding row to the using sectors; the top half of the table thus contains imported and locally produced commodities aggregated together.

2.37 For a more detailed explanation of these concepts, see *Australian National Accounts: Input-Output Tables, 1992-93* (5209.0).

2.38 Table 2 is valued at purchasers' prices and has indirect allocation of imports and table 3 is valued in basic prices and has direct allocation of imports.

2.39 The last column of table 1 indicates which of the two Input Output tables to refer to for an illustration of the broad economic scope of any particular price measure. The objective is to graphically illustrate the interrelationships between the various measures. The exercise also serves to highlight major coverage gaps and will be useful for determining priorities and programs for the extension of price measures.

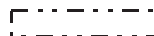
2.40 Note that, as illustrated in table 2, there would be a high degree of overlap in the scope of the DFP-HCP and CPI measures. The relationship between the two indexes is explained in section 5.

2

INPUT OUTPUT TABLE, PURCHASERS' PRICES (PP), INDIRECT ALLOCATION OF IMPORTS

| | <i>To</i> | | <i>Intermediate Demand</i> | | | | | <i>Intermediate usage (sub-total)</i> | <i>Final Demand</i> | | | | | | | <i>Final Demand (sub-total)</i> | <i>Total supply (grand total)</i> | | | | | | | | | | | |
|--------------------------------|---------------------------------|-------------------|----------------------------|---------------|---------------------------|---------------------|-----------------|---------------------------------------|-------------------------------------------------|----------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|---------------------------|--------------------------------------|---------------------------------|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| | <i>From</i> | <i>Row prefix</i> | <i>Agriculture, etc</i> | <i>Mining</i> | <i>Manufacturing, etc</i> | <i>Construction</i> | <i>Services</i> | | <i>Final consumption expenditure -- private</i> | <i>Final consumption expenditure -- government</i> | <i>Gross fixed capital expenditure -- private</i> | <i>Gross fixed capital expenditure -- public enterprises</i> | <i>Gross fixed capital expenditure -- general government</i> | <i>Increase in stocks</i> | <i>Exports of goods and services</i> | | | | | | | | | | | | | |
| | Column prefix | | 0101-0400 | 1100-1500 | 2101-3701 | 4101-4102 | 4501-9601 | Q1 | Q2 | Q3 | Q4 | Q5 | Q 6 | Q 7 | | | | | | | | | | | | | | |
| <i>Intermediate (a) inputs</i> | Agriculture | 0101 - 0400 | ABARE - Paid | | MUMI | H B | OTH | C P I | DFP Other | | | | | | | E P I | | | | | | | | | | | | |
| | Mining | 1100 - 1500 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Manufacturing etc. | 2101 - 3701 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Construction | 4101 - 4102 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Services - Market | 4501 - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - Non Market | 9601 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Intermediate inputs (sub-total) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Primary inputs</i> | Wage, salaries and supplements | P1 | LCI | | | | | | DFP - HCP | HPI | | | | | | | | | | | | | | | | | | |
| | Gross operating surplus | P2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Commodity taxes (net) | P3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Indirect taxes n.e.c. (net) | P4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sales by final buyers | P5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Australian production | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

(a) Including imports



National Accounts IPDs & FWIs

3

INPUT OUTPUT TABLE, BASIC PRICES (BP), DIRECT ALLOCATION OF IMPORTS

| | To | Row prefix | Intermediate Demand | | | | | Intermediate usage (sub-total) | Final Demand | | | | | | | Final Demand (sub-total) | Total supply (grand total) |
|---------------------------------|-----------------------------------|----------------|---------------------|-----------|--------------------|--------------|-----------|--------------------------------|-----------------------------------------|--------------------------------------------|-------------------------------------------|------------------------------------------------------|------------------------------------------------------|--------------------|-------------------------------|--------------------------|----------------------------|
| | | | Agriculture, etc | Mining | Manufacturing, etc | Construction | Services | | Final consumption expenditure — private | Final consumption expenditure — government | Gross fixed capital expenditure — private | Gross fixed capital expenditure — public enterprises | Gross fixed capital expenditure — general government | Increase in stocks | Exports of goods and services | | |
| From | Column prefix | | 0101-0400 | 1100-1500 | 2101-3701 | 4101-4102 | 4501-9601 | | Q1 | Q2 | Q3 | Q4 | Q5 | Q 6 | Q 7 | | |
| Intermediate (a) inputs | Agriculture | 0101 - 0400 | ABARE - Received | | | | | | ABARE - Received | | | | | | | | |
| | Mining | 1100 - 1500 | | | | | | | | | | | | | | | |
| | Manufacturing etc. | 2101 - 3701 | APMI | | | | | | APMI | | | | | | | | |
| | Construction | 4101 - 4102 | | | | | | | | | | | | | | | |
| | Services - Market - Non Market | 4501 - 9601 | PPI - Services | | | | | | PPI - Services | | | | | | | | |
| Intermediate inputs (sub-total) | | | | | | | | | | | | | | | | | |
| Primary inputs | Wage, salaries and supplements | P1 | | | | | | | | | | | | | | | |
| | Gross operating surplus | P2 | | | | | | | | | | | | | | | |
| | Commodity taxes (net) | P3 | | | | | | | | | | | | | | | |
| | Indirect taxes n.e.c. (net) | P4 | | | | | | | | | | | | | | | |
| | Sales by final buyers Imports | P5 P6 | SOP - Imports / IPI | | | | | | SOP - Imports / IPI | | | | | | | | |
| Australian production | | | | | | | | | | | | | | | | | |

(a) Excluding imports SOP - Domestic

3 AN ANALYTICAL FRAMEWORK FOR INFLATION MEASUREMENT

3.1 As described in section 2, there is a wide range of partial price indexes available in Australia, presented separately as specialised, stand-alone measures. This approach places a constraint on optimising the analytical use that can be made of the large volume of price data that is collected on an ongoing basis.

3.2 The analytical value of this price information could be significantly enhanced through the ABS drawing the series together and presenting them as a system or family of price indexes. This system would be designed around a cohesive statistical framework developed specifically to support the study of inflation. The use of such a framework would facilitate the examination of the relationships between different price measures and assist analysts to understand and interpret inflationary signals.

3.3 The framework would also accommodate future developments in the field of price statistics such as extensions in coverage of the economy and the presentation of data under alternative classification systems.

IDEAL PROPERTIES

3.4 Despite universal usage of the term 'inflation', there is no generally agreed definition that is sufficiently precise to support the development of a statistical framework. The measurement of inflation is a complex issue and it is generally accepted that no single price index can measure all aspects of inflation or meet the needs of all users.

3.5 Nevertheless, despite the lack of a strict macro-economic definition of inflation, there is some convergence of views as to the ideal conceptual properties that would be possessed by a system of price indexes designed for the analysis of inflation. These can be summarised as below:

- it would encompass only market transactions. That is, government services which are not marketed, and notional transactions such as those where homeowners are deemed to rent dwellings from themselves as landlords, would not be included;
- it would capture the inflationary trend in prices associated with transactions in goods and services; accordingly, it would not include interest rates;
- conceptually, the framework would embrace the entire economy and not be restricted to particular segments;
- it would provide for broad, economy-wide price indexes as well as component indexes, potentially presented under alternative classifications;
- the framework would provide for taking alternative, complementary views of the economy;
- it would relate to pure price change and incorporate very recent weighting information;

- from an analytic viewpoint, the effects of changes in government charges and taxes would be capable of separate analysis, and the effects of erratic price fluctuations would be identifiable; and
- the price indexes would be non-revisable, and provide certainty to users.

3.6 Two possible broad approaches for developing an economy-wide system of price indexes are the national accounts approach and the market transactions approach.

NATIONAL ACCOUNTS APPROACH

3.7 As described in section 2, the national accounts approach utilises price information generated during the construction of the national accounts.

3.8 The strength of the national accounts approach lies in the fact that the System of National Accounts (SNA) represents the only comprehensive and detailed framework for the systematic and integrated recording of the stocks and flows of an entire economy. As such, most users of economic statistics are familiar with its underlying principles and the major aggregates.

3.9 The national accounts approach involves two sets of price measures: IPDs and FWIs, both of which represent economy-wide price measures. However, they possess conceptual limitations as described below.

3.10 The IPDs do not compare the price of a constant basket of goods and services between any two periods (except when comparing the base period and any other period) because the weights change from period to period. As a result, period-to-period movements in the IPDs do not measure pure price change.

3.11 The FWIs of GDP, exports of goods and services, imports of goods and services, and of DFD and its four major components provide a measure of pure price change and generally conform with several of the conceptually desirable properties for an economy-wide system of price measure.

3.12 However, they do include notional transactions, they do not directly provide for the analysis of government taxes and charges and they have weights which remain fixed for a long period of time. Further, both the IPDs and FWIs are restricted to a single view of the economy, that is, from the final expenditure perspective.

3.13 Overall, the national accounts have not been designed with the specific intention of price measurement. An additional practical problem with this approach is that the price measures are subject to revisions as firmer data are included in the accounts.

3.14 A market transactions approach represents a relatively new proposal being considered by a number of international experts as a means of overcoming the perceived deficiencies of the national accounts approach to the measurement of price change.

3.15 The fundamental rationale for a market transactions approach is the view that inflation in an economy is a phenomenon peculiar to the operation of markets and thus price measures designed for the analysis of inflation should be confined to market activity; that is, non-market transactions (e.g. non-traded goods and services) have no role. The significance of this concept compared with the strict national accounting approach lies in its focus on only actual transactions and their respective prices.

3.16 The market transactions approach has been developed by considering the issue of price measurement from a micro-economic perspective. From this perspective, it can be argued that it is possible to define a price measure for each institutional unit (e.g. each household, corporation, or government body) in terms of the goods and services actually purchased by each unit in the market place. In other words, each unit's inflationary experience is determined by its own unique purchasing patterns. Individual price indexes could therefore be computed as a function of prices and quantities of the goods and services purchased by each unit. In concept, an economy-wide system of price indexes could involve aggregating all the individual measures, using weights which reflect the aggregate value of their purchases, to build up a total economy-wide price measure.

3.17 While this micro-economic perspective represents the theory underpinning the market transactions approach, the notion of actually computing measures for each institutional unit is obviously not feasible. Even if it could be done, the interpretation and usefulness of a single, summary price measure based on aggregation across the units which included both intermediate and final transaction prices would be dubious because of multiple counting.

3.18 In order to provide a better framework for the analysis of price change, the individual transactions are conceptually allocated to specific 'markets', rather than specific institutional units, to arrive at the classification presented schematically in diagram 4. The diagram provides a broad level representation of all market transactions where one or both of the parties to the transaction are located in Australia. Each of the specific markets is shown in the lower part of the diagram, with summary aggregations of the markets in the upper part.

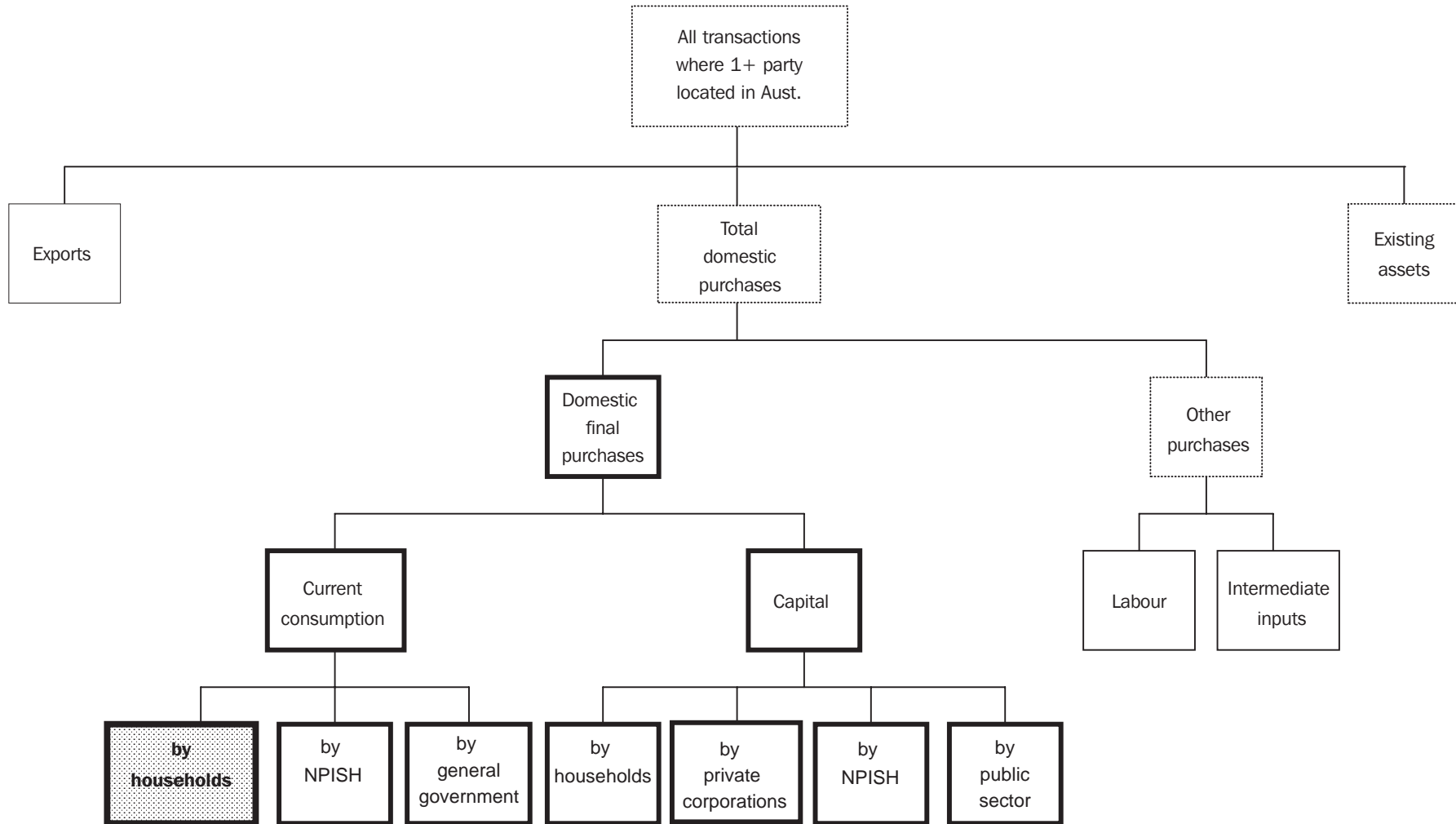
3.19 In theory, each of the markets shown on the diagram could be represented by a price index. However, the economic meaning of price indexes corresponding to such aggregations of market activity as 'Total domestic purchases' and 'All transactions' is questionable and they are shown here for illustrative purposes only.

3.20 Rather, it is more meaningful to consider the market transactions framework as providing alternative, but complementary views of the economy through different markets.

3.21 Section 4 discusses a DFP price index model corresponding to the 'Domestic final purchases' market shown in the analytical framework illustrated in diagram 4.

4

MARKET TRANSACTIONS VIEW OF THE ECONOMY



4 THE DOMESTIC FINAL PURCHASES MODEL

THE MODEL

4.1 The scope of the price indexes under the DFP model is intended to reflect purchases by Australian residents. As such, it would include prices of imported items but exclude prices of exported items. Prices of imports would be included because they directly affect each institutional unit's input prices to the extent that imports are reflected in their purchasing patterns. Similarly, prices received for exports would be excluded because, while they affect the incomes received by domestic institutional units, they do not have a direct bearing on their inflationary experiences through the prices they pay.

4.2 While the price measures could potentially reflect the prices of all domestic purchases (i.e. the 'Total domestic purchases' market in diagram 4), this would raise the issue of multiple counting involved when prices at various intermediate stages of production are included together with final transaction prices. A more meaningful aggregation would be one based only on *final* market purchases, excluding all intermediate purchases. The scope of such measures would relate to the markets represented by 'Domestic final purchases' in diagram 4.

4.3 This approach recognises that although many transformations take place in an economy (outputs of one firm become inputs of another), eventually a point can be identified where a good or service is exchanged in a market place for the last time. Therefore, if the price movements experienced by the final purchasers are recorded, it can be argued that the influences of the various price pressures experienced in earlier stages of the production process have been captured.

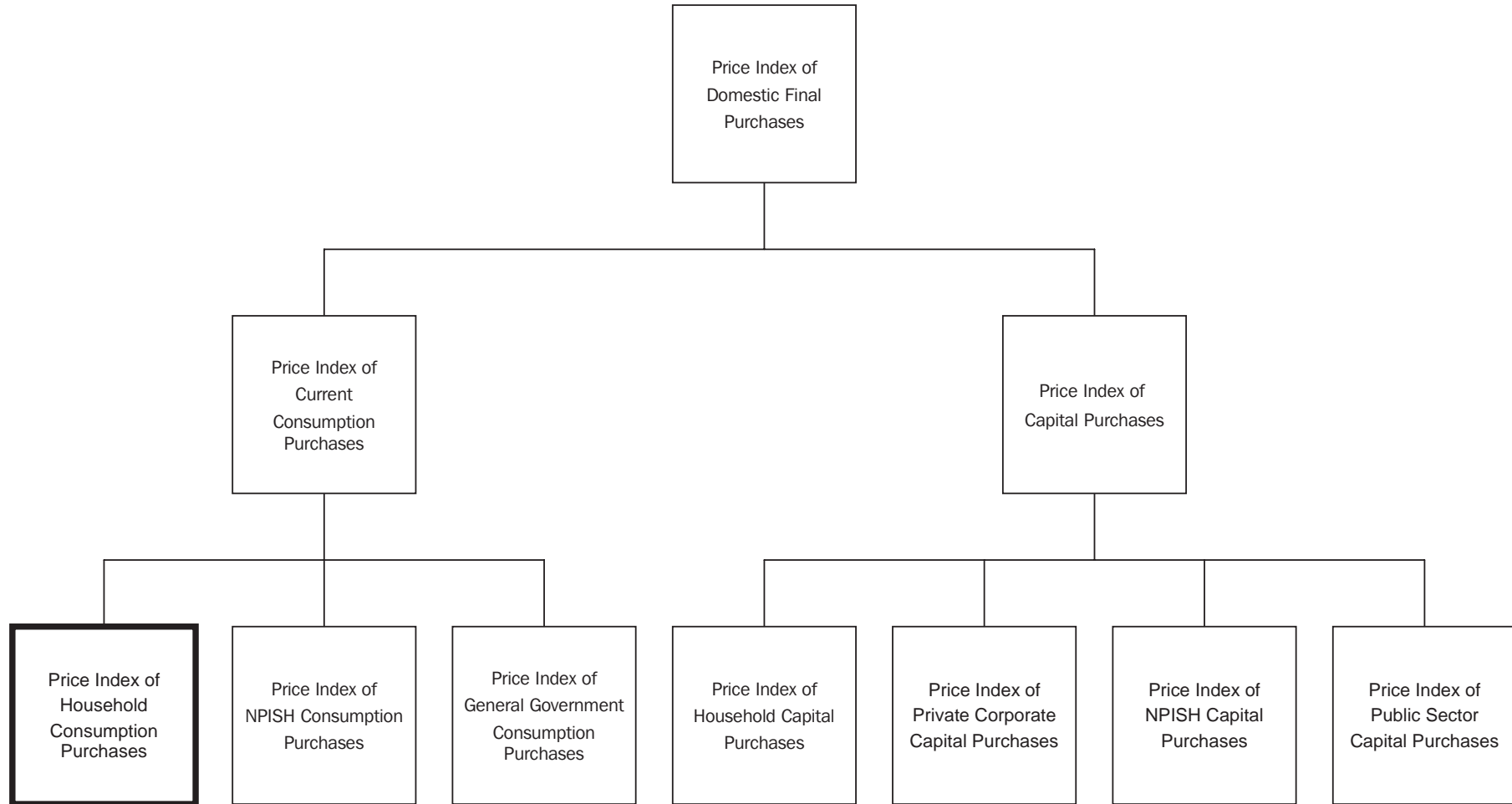
4.4 Purchases of financial assets, existing capital goods (e.g. established housing), labour and intermediate inputs would not be within the scope of the DFP model. On the other hand, purchases of newly produced and imported capital goods, which are generally treated as final transactions within the national accounts, would be within the scope of the model.

4.5 Diagram 5 illustrates the range of price indexes under the DFP model, namely the economy-wide aggregate measure, the price index of DFP, along with its component indexes relating to:

- HCP;
- NPISH Consumption Purchases;
- General Government Consumption Purchases;
- Household Capital Purchases;
- Private Corporate Capital Purchases;
- NPISH Capital Purchases; and
- General Government and Public Corporate (Public Sector) Capital Purchases.

5

PRICE INDEX OF DOMESTIC FINAL PURCHASES



4.6 Conceptually, the scope of the DFP index is most closely aligned with DFD under the national accounting framework (the most notable difference being the exclusion of notional transactions), as opposed to GDP which involves the exclusion of imports and the inclusion of exports.

4.7 The following is a summary of the characteristics that a DFP index, and its component indexes, would possess. These characteristics conform to the ideal properties identified at the beginning of section 3. The index would:

- relate to transactions in goods and services and thus not include interest rates (though in concept, interest rate margins which banks use as a substitute for direct charges for banking services, would be included for households);
- include actual market transactions only, that is, exclude:
 - changes in stocks;
 - notional transactions; and
 - non-market goods and services;
- be based on the purchaser's perspective, with the valuation basis being at purchasers' prices;
- have an economy-wide scope;
- include purchases by domestic residents only, and thus:
 - exclude exports; and
 - include imports;
- include final transactions only (that is, be free of multiple counting);
- reflect current expenditure weights using a chain index formula¹ and adopt a pure price change approach;
- contain component indexes presented under different classification systems; and
- form part of a broader statistical framework offering alternative, complementary views of the economy.

4.8 Under the DFP model, indexes would be available for consumption and capital purchases, split between the household, corporate (private and public), government and NPISH sectors. The intermediate purchases of private corporations and other institutions which produce marketed output (e.g. public corporations and some non-profit institutions) are not within the scope of the DFP index, as they do not represent final transactions. The institutional sector and transaction scope of the index is summarised in table 6.

¹ The ABS expects to release an information paper in mid-1997 which will discuss the use of chain formulae for calculating measures of volume and price change.

6

INSTITUTIONAL SECTOR AND TRANSACTION SCOPE

| <i>Institutional sector</i> | <i>Consumption purchases</i> | <i>Capital purchases</i> |
|----------------------------------------------------------------------------------------------|---------------------------------------|--------------------------|
| Households | Yes (includes consumer durables) | Yes |
| Corporations (private and public, financial and non-financial, including quasi-corporations) | No — these are intermediate purchases | Yes |
| General government | Yes | Yes |
| Non-profit institutions serving households | Yes | Yes |

4.9 Households are not included as a separate institutional sector in relation to capital expenditure in the Australian National Accounts (ANA). Instead, there is a notional private industry referred to as 'ownership of dwellings'. The DFP index differs from the ANA as it explicitly refers to Household Capital Purchases, which would be mainly composed of purchases of new dwellings (though conceptually, purchases of new valuables would also be in scope). This would not affect the measure as a whole; rather, it would simply involve a separation of private gross fixed capital expenditure into that which is undertaken by households, and that which relates to private corporations.

4.10 The proposed treatment of NPISH and General Government Consumption Purchases also differs conceptually from the national accounting framework. The difference lies primarily in the treatment of goods and services which are sold at non-market determined, or economically insignificant, prices. Where goods and services are sold to households at economically insignificant prices, the purchase price is not included in the HCP index. Rather, the associated input purchases are regarded as the final market transactions. It is the prices of the inputs purchased by general government and NPISH which would feed into the DFP price measure.

4.11 Under the DFP model, an index framework could consist of the aggregate measure, with disaggregated price indexes being presented for each of its main components (e.g. HCP, Private Corporate Capital Purchases). These components could be disaggregated further to provide price indexes for key subcomponents under alternative classifications, for example by commodity (Household purchases of food, Private corporate purchases of machinery and equipment, etc.). Alternatively, the aggregate measure could be broken down by type of transaction (e.g. Consumption purchases/Capital purchases, Dwelling purchases/Machinery and equipment purchases) and by institutional sector (e.g. Household purchases, NPISH purchases). Other categorisations could be domestically produced and imported indexes, and goods and services indexes.

4.12 Price indexes under the DFP model form part of the broader market transactions statistical framework which embraces a wider family of price indexes providing complementary views of inflation. In addition to the DFP indexes, the wider family would include the SOP, the LCI and the EPI, each of which are described in section 2. Potentially, price indexes for existing assets could also be included.

4.13 Diagram 4 in section 3 illustrates how the markets measured by these complementary sets of price indexes could be integrated with those measured by the DFP index.

4.14 The scope of the DFP model is confined to final transactions and so cannot provide a complete picture of the price experience of the economy. The prices captured by DFP price indexes would be the outcome of an entire process of transactions at earlier points in the production and distribution chain. Some users are interested in price indexes which enable identification of price pressures arising from intermediate transactions, thus potentially identifying early inflationary signals. Such a complementary view will be provided by the indexes under the SOP model.

4.15 The SOP indexes will relate to the selling prices of the output (goods) of Australian industries at basic prices. That is, they will be output indexes viewed from the producers' perspective. The aim is to augment the analytical value of the current range of partial producer and international trade price indexes through their presentation in an economy-wide framework.

4.16 In national accounting terms, the SOP model is broadly analogous to *gross output* under the production approach to the measurement of GDP (avoiding multiple counting by not aggregating the price indexes relating to each stage). The DFP model can be compared to the *expenditure* approach to GDP measurement.

4.17 A further complementary price measure is the LCI currently being developed by the ABS. Wage costs are a significant determinant of general price change, and so play a key role in any framework of price measures. A LCI for general government would be required specifically for the DFP price index.

4.18 The EPI is a further element of the statistical framework. The coverage of this index is currently limited to exports of merchandise. An extension of scope of the index to cover exports of services would be desirable. While changes in prices of exports do not figure directly in the inflationary experiences of domestic institutional units, they can have significant 'second round' effects to the extent that fluctuations in export incomes impact on the demand for domestically produced and imported goods and services. An EPI is therefore an important element of this broader framework.

4.19 Transactions relating to both existing assets (financial and non-financial) and new assets are important. The DFP price measure would reflect purchases of newly produced and imported fixed assets and net acquisitions of valuables, but not reflect purchases of second-hand fixed assets (e.g. established homes) or financial assets. In light of this, the broader prices framework would need to allow for the possible future development of price measures for existing assets, providing a further complementary view of inflation.

5 PRICE INDEX OF HOUSEHOLD CONSUMPTION PURCHASES

5.1 Section 4 developed the DFP price index model within the broader market transactions analytical framework. The DFP model is comprised of an aggregate, economy-wide DFP index along with its component indexes. The largest component index relates to HCP, estimated to account for 55–60% of the weight of the total DFP index (see Appendix 1). This component is illustrated in bold on diagram 5 in the previous section.

5.2 Under the DFP price index model, the ABS proposes to concentrate on the development of a price index of HCP designed specifically for the analysis of inflation.

5.3 Apart from the fact that HCP is the most important component of the DFP model, there are a number of other reasons for proposing this strategy, namely:

- This component is of particular interest to those policy makers who view inflation from the household perspective and regard household consumption purchase prices as representing the ‘end of the chain’, capturing the final impact of price change within the economy.
- Being based predominantly on existing CPI collections, early investigations indicate that this component would be the most viable to develop in the short to medium term. By contrast, the development of price indexes corresponding to the other consumption components and the capital components of the DFP model would be more complex. It would require data to be brought together from a number of different sources and modified, as well as involving additional data collection. An important area in which there is a lack of data is engineering construction activity, under capital purchases.
- In terms of contributing to analysts’ knowledge and understanding of the inflation process, household consumption price measures are assessed as being likely to derive the most benefit from the application of statistical techniques designed to isolate underlying inflation (see section 6).

5.4 The development of indexes for the components other than HCP would be within a longer-term time frame. Nevertheless, for completeness, Appendix 1 contains indicative weighting estimates and contains the results of initial investigations into identifying possible data sources.

5.5 Although widely used for other purposes, such as a measure of inflation, the CPI is designed primarily as a means of assessing changes in the purchasing power of wage and salary earner household incomes and, as such, has played an important role in the income adjustment process.

RELATIONSHIP TO THE
CONSUMER PRICE INDEX

5.6 In recent years, there has been recognition of conceptual deficiencies in the CPI for inflation measurement, particularly for policy purposes. This has led to the development of alternative measures such as the index of underlying inflation as defined by the Commonwealth Treasury.

5.7 The main deficiencies in the CPI as a measure of inflation are the inclusion of interest rates, potential problems associated with the use of fixed weights in index construction and its restricted scope (metropolitan employee households).

5.8 The forthcoming periodic review of the CPI will provide an opportunity for, amongst other things, a review of the principal purpose of the index. A related ABS information paper to be released in April 1997 will identify the main issues to be addressed during the CPI review process.

5.9 The HCP price index would differ from the current CPI in the following ways:

- interest rates (mortgage rates and consumer credit charges) would not be included as they do not directly represent market prices for actual transactions in goods and services;
- the scope would be extended beyond the CPI target population to include all of the household sector;
- the weights would be based on the national accounts rather than the Household Expenditure Survey;
- the index would be likely to be an annually chained index; and
- payments for goods and services which are purchased by households at non-market determined prices (e.g. public education and hospital services) would not be included.

5.10 The scope would be extended beyond the CPI target population by changing the weighting pattern so that it related to purchases by all Australian households, rather than just metropolitan wage and salary earner households (excluding the top decile). Weights corresponding to purchases by all householders would be obtained from the national accounts, with modifications to ensure consistency with the concepts of the DFP model. An index for HCP would then be calculated using appropriate disaggregated CPI price data.

5.11 Note that the HCP price index would differ from the national accounts measure, private final consumption expenditure, through the exclusion of notional transactions such as the imputed dwelling rent of owner occupiers, non-marketed goods and services provided to households and purchases by NPISH.

5.12 Below is a discussion on practical issues associated with the identification of market determined prices.

MARKET DETERMINED PRICES

5.13 As inflation is a phenomenon of markets, coverage of a HCP index should be confined to actual markets, where goods and services are exchanged at prices determined by the interaction of buyers and sellers. In comparison with private final consumption expenditure under the national accounting framework, this would require the exclusion of those transactions where, by convention, the SNA deems homeowners to rent dwellings from themselves as landlords.

5.14 Similarly goods and services which are acquired free of charge or at economically insignificant prices (generically referred to as non-market goods and services) should be excluded.

5.15 While the identification of wholly notional transactions included in the national accounts is relatively straightforward and unambiguous, the identification of non-market goods and services is more difficult. Therefore, in order to ensure consistency in treatment, a prerequisite is the development of suitably robust definitions of market and non-market determined prices. The following definitions, which concern economically significant prices within the context of market output, provide a useful starting point for assessing whether prices are market determined.

'Prices are said to be economically significant when they have a significant influence on the amounts that the producers are willing to supply and on the amounts purchasers wish to buy.' (System of National Accounts 1993, p. 128.)

'By convention, in the ESA, an economically significant price (excluding taxes on products and including subsidies on products) should generally cover at least 50% of the production costs of the product.' (Eurostat 1996, p.70.)

5.16 There are four general categories of goods and services which may not have market determined prices:

- those which are provided by general government (e.g. defence, public administration, education and hospital services);
- those whose production cost or prices are partly subsidised through government funding (e.g. pharmaceuticals);
- those which have prices regulated or affected to a large degree by government policy (e.g. motor vehicle registration); and
- those whose production costs are partly funded by unrequited donations or concessions from the private sector (in particular, goods and services produced by NPISH such as welfare services provided by charitable organisations).

5.17 The implications of differentiating between market and non-market goods and services are significant. Those non-market goods and services which are provided to households by government and NPISH would not be included in the HCP index. As the purchase of inputs to the production of non-market goods and services represents

the final point at which these products are traded at market determined prices, the providers of non-market goods and services are regarded as the *final purchasers*, and their purchases would be within the scope of NPISH and General Government Consumption Purchases indexes. This represents a significantly different treatment between the HCP index and the CPI, which includes the actual costs incurred by households for all goods and services.

5.18 There are many goods and services where subsidies have played a role but the transaction price can still be viewed as being market determined. The prices at which these goods and services are purchased by households would therefore be reflected in the HCP index.

5.19 To illustrate some of the issues and complexities involved, consider the case of education services. Prices paid for education services provided by the public education system may not be market determined due to high levels of government subsidies. The cost of inputs into the public education system would therefore be used in the DFP measure and would be categorised as *Government Consumption Purchases*. Many non-government schools are NPISH, so if the prices of their services were assessed as being non-market determined, the prices of their inputs would feed into NPISH Consumption Purchases index. Other non-government schools, although in receipt of some government funding, may charge prices for their services which are market determined. These final transactions would then be included in the HCP index.

5.20 Areas which would need to be examined closely before decisions can be made include public transport fares, medical services, pharmaceuticals, rents for government-owned dwellings, local government services, tertiary and private education, and government provided child care. In some cases, these items may need to be studied at a commodity, regional and/or enterprise level, as there could be significant variation in the rate of subsidies paid when items are disaggregated.

6 UNDERLYING PRICE INDEX OF HOUSEHOLD CONSUMPTION PURCHASES

6.1 The previous section described the new HCP price index which the ABS proposes to develop. In recognition of the increasing interest that policy makers have shown in measures of *underlying* inflation in recent years, this section considers alternative conceptual approaches to modifying the HCP index to obtain a measure of underlying household inflation.

CONCEPTUAL ISSUES

6.2 As stated at the beginning of section 3, one of the ideal properties that inflation measures would possess is that, from an analytic viewpoint, the effects of changes in government charges and taxes would be capable of separate analysis and the effects of erratic price fluctuations would be identifiable.

6.3 That is, a market-related measure of inflation which abstracts from the effects of exogenous factors should be available, providing a measure of endogenous, or underlying, inflation.

6.4 A measure of underlying inflation should exclude three types of price change, namely:

- changes which reflect the impact of monetary and fiscal policy decisions;
- changes which reflect a regular seasonal pattern; and
- changes which reflect inherent volatility rather than underlying price pressures.

6.5 A number of modifications would need to be made to the HCP price index in order to obtain a measure of underlying household inflation. There are three different methods that could be applied:

- the exclusion method;
- the specific adjustment method; and
- outlier-based methods.

6.6 The *exclusion method* can be considered in relation to the Treasury underlying rate and other measures presented in the CPI publication such as price indexes covering 'All Groups excluding interest and volatile items' and 'Private sector goods and services'. Most attempts to measure underlying inflation in Australia have been based on the exclusion method, with the difference between measures reflecting differences in the definition of an exogenous price pressure.

6.7 The Treasury underlying rate is derived by defining certain components of the CPI basket as being significantly influenced by exogenous factors (monetary and fiscal policy, seasonality and volatility). These components are then excluded from the CPI basket to derive a measure of underlying inflation. The Treasury measure of underlying inflation excludes about half of the items (by weight) included in the CPI.

6.8 The *specific adjustment method* abstracts from the effects of fiscal policy decisions by separating transaction prices into market prices and taxes and subsidies, and it also removes the effects of seasonal factors and volatility.

6.9 While the decomposition of transaction prices may be difficult to do at the point of price observation, the separation can be made through a modelling process. Several countries have developed a form of *net price index* which represents an attempt to develop a measure of underlying inflation by excluding the effects of changes in fiscal policy. The net price index has been considered a particularly useful addition to the existing set of inflation indicators in those countries.

6.10 To abstract from seasonal factors and volatility, seasonal adjustment and smoothing techniques could be applied. Current ABS techniques for deriving trend estimates are discussed later in this section.

6.11 The third approach involves applying *outlier-based methods* which give a relatively smaller weight to any price which is rising or falling in an extreme way (outliers). The weighted median and trimmed mean measures of underlying inflation are based on this approach, under which the contribution of the different sources of price change would change from quarter to quarter.

6.12 These three methods are assessed in more detail in Appendix 2 where it is concluded that the specific adjustment method is conceptually superior to the other methods.

6.13 Therefore, the ABS proposes to pursue investigations into the measurement of underlying household inflation through the development of an experimental, underlying price index of HCP. The approach proposed is to apply the specific adjustment method to the price index of HCP, to exclude the effects on prices of changes in indirect taxes and subsidies, seasonality and volatility.

6.14 This approach would overcome several limitations associated with the current exclusion-based underlying indexes, that is:

- almost all items in the CPI basket would be represented (interest rates and non-market items would be excluded under the concept of the DFP model);
- specific adjustment to remove the effects of fiscal policy, seasonality and volatility would be preferable to the total exclusion of the affected items which results in the exclusion of many valid market determined price signals;
- under the specific adjustment method, non-underlying price changes which affect included items (e.g. broad increase in sales tax, increase in tax on motor vehicles) would be specifically adjusted for, while they would not be removed under the exclusion method; and

- prices charged by public corporations for telephone and electricity services are likely to be reflected, while they are excluded from Treasury's measure on the basis that they are significantly influenced by government policy.

6.15 However, the specific adjustment method does have some practical disadvantages which are outlined in Appendix 2. These arise from the difficulty of accurately and objectively estimating the magnitude and timing of the effect on prices of changes in government policy, seasonality and volatility. In particular, it is difficult to specifically adjust for subsidies. These issues are discussed in more detail below in relation to net price indexes.

NET PRICE INDEXES

6.16 Finland, Sweden, Denmark, Netherlands, United Kingdom and Canada have at some point published net price indexes which attempt to estimate indirect tax effects on the CPI, although some of these countries no longer produce a net price index.

6.17 The potential uses of a net price index are summarised below.

6.18 'The foremost use of a Net Price Index is for purposes of analysis, such as in the assessment of the importance of taxes and tax changes in the CPI, and in price formation studies. Another important use is as a tool relating to compensation for only part of general price change, where the intention is not to compensate for tax changes. Other uses include the indexation of pensions to maintain purchasing power, and the adjustment of income taxes for the effects of inflation. Another use could be the deflation of value series, to obtain constant dollar measures that are not affected by taxes. Finally, a very important use of a Net Price Index is to provide information that is of assistance in understanding price change for consumer commodities during a period of tax reform.' (Statistics Canada 1987.)

6.19 Indirect taxes are generally defined as taxes on goods and services (rather than on incomes) while subsidies are treated as negative taxes. To estimate the first round effect of indirect taxes on the CPI it is usually assumed that indirect taxes are fully passed on to prices of household purchases and that this pass-through is instantaneous. While neither assumption is entirely realistic, any practical deviations are unlikely to significantly detract from the suitability of the proposed approach. A net price index provides a measure which helps to explain movements in measured inflation without the clouding effects of changes in taxation.

6.20 There are several alternative treatments that can be used to produce net price indexes. A net price index can be calculated as a tax free price index (by excluding indirect taxes from both base and current period prices) or as a constant tax price index (by excluding only the effect of changes in taxes since the base period). Further, the net price index may exclude only those indirect taxes levied directly on consumer goods and services purchased by households, or alternatively, indirect taxes levied on all goods and services (whether used for intermediate or

final consumption) may be excluded. The former measure can be said to remove only the first round effects of changes in the indirect tax system by, for example, removing the effects of changes in tobacco excise duties and wholesale sales tax on the price of tobacco products, whereas the latter measure would also remove the second round effects of changes in petrol excise on the price of tobacco products.

6.21 As a result, there are four alternative methods for calculating net price indexes which are shown in diagram 7. It is necessary to decide not only whether a constant tax or a tax free index is preferred, but also whether adjustments should be made for only the first round effects of a taxation change or for all effects.

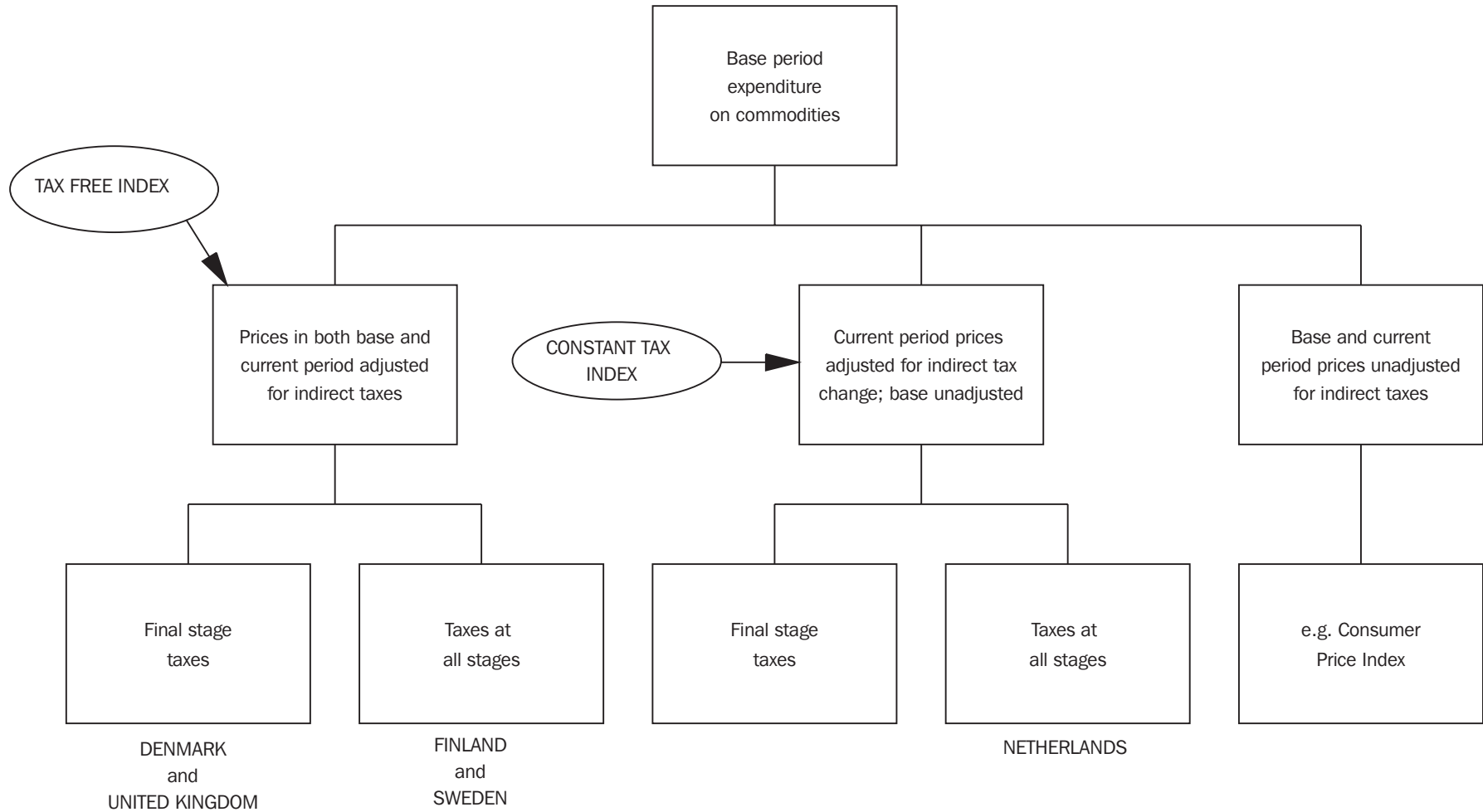
6.22 A tax free index may be calculated by excluding indirect taxes from both the current period and the base period. This has the effect of significantly altering the weighting system, with heavily taxed goods (e.g. tobacco) contributing a considerably lower weight to the net price index than to the HCP index. The interpretation of such an index, in the context of the potential applications outlined above, is not always straightforward. By contrast, a constant tax index can be directly compared to the HCP index to assess the impact of taxation changes. For example, when the HCP index shows an increase of 10%, a 5% increase in the constant tax index means that half of household inflation in that period was accounted for by changes in indirect taxation. The weighting pattern of a constant tax index is identical to that of the household index, because only changes in taxation since the base period are excluded. For these reasons, it is proposed that a constant tax net price index be developed.

6.23 The choice between whether to adjust only for first round effects or not hinges on more practical considerations. Adjusting only for taxes levied directly on consumer goods and services purchased by households is the most reliable method because data are readily available. To estimate the effects on consumer prices of taxes levied on intermediate goods and services, more information is required and the effect is most commonly estimated using Input Output analysis. Empirically, these latter round effects of a taxation change have been found to be relatively unimportant in comparison with the first round effects. On this basis, it is proposed to only exclude the first round effects of a taxation change on HCP.

6.24 As subsidies can be considered negative indirect taxes, they should be afforded symmetrical treatment in a net price index. However, unless the amount of the subsidy is directly relatable to either the quantity or the price of the product, it may not be possible to assess the impact of changes in subsidies for each product in each period. It is therefore proposed to directly exclude those residual goods and services (i.e. those not already excluded from the HCP index on the basis of having economically insignificant prices) which may be heavily affected by subsidies. Although this may be seen to be at odds with the treatment of indirect taxes, in the Australian context the effect on the index is assessed as minimal due to the expected small number of items involved.

7

METHODS OF ESTIMATING A NET PRICE INDEX



6.25 The following quotation illustrates some of the problems recently experienced by the United Kingdom when they introduced a net price version of their Retail Price Index. This index, compiled monthly, is constructed as a tax free index, removing only the first round effects of taxation change.

'Debatable issues related to (i) subsidies for which, because of practical difficulty, no adjustments were made in spite of the fact that they have the opposite effect to indirect taxes and should therefore strictly be excluded, (ii) the prices of items such as television licenses, prescription charges and rail fares which are affected by Government policy but which are different types of taxes and are elements of a payment for a service, (iii) the weighting system of a net price index which is affected by the fact that some sections of goods subject to high rates of taxes and duties, will have a much reduced weight, and (iv) the lagged effects of duty changes and genuine price rises.' (Central Statistical Office 1995, p. 8.)

6.26 The Australian proposal for a constant tax net price index (removing only first round effects) with provision for direct exclusion of residual items for which price change is largely affected by changes in subsidies or direct policy initiatives, would appear to avoid some of the problems experienced in the United Kingdom. A trend estimate of this constant tax index, adjusted for seasonal factors and volatility, would provide a measure of underlying household inflation.

SEASONAL ADJUSTMENT AND SMOOTHING

6.27 An underlying index should exclude seasonal and irregular price movements. There are a range of smoothing techniques which could potentially be used to specifically adjust for the effects of inherent volatility on prices. It is likely that standard ABS seasonal adjustment and trending techniques would be applied.

6.28 An analysis of the CPI over the period September 1980 to September 1990 showed that seasonal and irregular contributions to the CPI were small, each being about 1% of the original series (Zarb 1991). Further, both seasonal and irregular contributions to the CPI were found to be diminishing with time.

7 PUBLICATION STRATEGY

7.1 The ABS proposes to undertake a comprehensive review of its strategy for the publication of prices statistics, with the aim of ensuring key information is communicated effectively to users. The strategy will need to provide for the release of the results from new initiatives as they become available.

7.2 As described in section 2, there is a wide range of Australian price indexes currently available as well as the national accounts-based price measures. These statistics are published in a number of separate, specialised publications with varying profiles.

7.3 Given this approach, there is the potential for improving users' knowledge and understanding of the array of measures through presenting the key price aggregates in a cohesive manner, drawing on the illustration of their interrelationships provided in section 2.

7.4 It is anticipated this would assist users in the selection of the most appropriate measure(s) for any particular application, whether it be analysis of inflation, indexation, business contract adjustment, international comparisons or any other purpose.

7.5 Further, as new developments in the field of prices statistics progress, it will be important to provide for the effective and systematic communication of results. For example:

- new experimental, analytical measures (e.g. the proposed underlying household inflation measure);
- indexes from new collections (e.g. producer price indexes for service industries); and
- statistics presented under new classification frameworks (e.g. SOP).

7.6 The review of the publishing strategy will include:

- reviewing the scope and content of all the existing publications containing prices measures with a view to revamping them into a coherent suite of separate but relatable products presented within a clearly articulated framework; and
- as a companion to the separate publications, considering either:
 - developing a compendium, thematic prices publication which draws together and analyses the full range of price measures and presents the key aggregates within an integrated framework; or
 - revamping and extending the existing prices chapter of the *Australian Economic Indicators* publication (1350.0).

7.7 The review process will provide for consultation with users.

8 CONSULTATION WITH USERS

8.1 As noted in the Preface, the ABS has prepared this information paper as a basis for user consultation on a strategy for enhancing our statistical service in the field of price indexes.

8.2 The ABS would welcome reactions from users to the proposals contained in the paper. Comments should be provided, preferably in writing, by 15 April 1997 to:

David Collins
Director
Producer Price Indexes Section
Australian Bureau of Statistics
PO Box 10
BELCONNEN ACT 2616

Facsimile: Canberra (06) 252 7060.

8.3 In addition, seminars to discuss the proposals will be held in each capital city during the period March to April 1997. Those users who wish to attend a seminar should advise David Collins (see above for contact details) as soon as possible. You will then be notified of the timing, venue and other details of the seminar closer to the time.

APPENDIX 1 — INDICATIVE WEIGHTING PATTERN AND POTENTIAL DATA SOURCES FOR OTHER DOMESTIC FINAL PURCHASES COMPONENT INDEXES

As noted in section 5, the ABS proposes to focus on the development of an index relating to the HCP component of DFP. However, for completeness, this Appendix contains a summary of the results of initial investigations undertaken to derive indicative weighting estimates and identify potential data sources for the possible future development of indexes for the other DFP components, namely NPISH Consumption, General Government Consumption and Capital Purchases.

INDICATIVE WEIGHTING PATTERN

The weights for the DFP measure would be based on the share of the total value of purchases for each purchase type. They would be based primarily on national accounts data valued at purchasers' prices (i.e. including taxes, and transport and trade margins), but significant adjustments would need to be made to account for the conceptual differences between the national accounts and DFP approaches. The different treatment of notional transactions and non-market output would be particularly important.

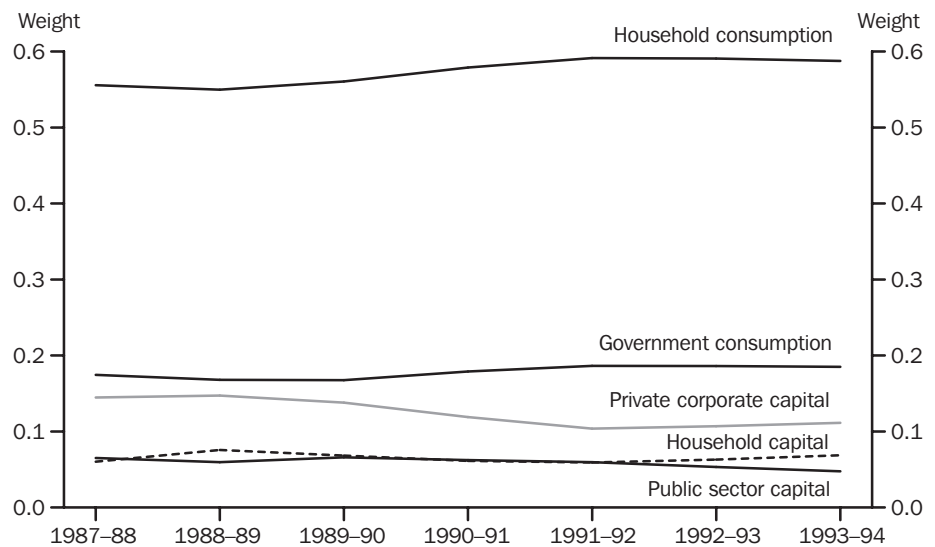
Graph 8 provides crude estimates of these weights. The estimates are based on the national accounts measures; private final consumption expenditure, government consumption expenditure, and gross fixed capital expenditure, adjusted to exclude imputed dwelling rent, imputed bank/insurance service charges and depreciation. Most significantly, the exclusion of the imputed dwelling rent of owner-occupiers reduces private final consumption expenditure by 10–15%. Note that NPISH Consumption Purchases are included as part of HCP in graph 8, in accordance with current national accounts practices. NPISH Capital Purchases are included in Private Corporate Capital Purchases.

Note that a large number of conceptual differences between the national accounts and the DFP approaches have not been accounted for in developing these weighting estimates.

It can be seen that HCP would be the most significant component of the DFP index, having a weight of 55–60%. The weight of input purchases by NPISH is very small (2–3%), while the Government Consumption Purchases component has an estimated weight of 15–20%. The Private Corporate Capital Purchases price index would have a weight of 10–15%, while Household Capital Purchases and Public Sector Capital Purchases would each have a weight of about 5%. The fluctuations in the shares of these components, especially the capital components, over the business cycle indicate that a chain index is likely to be preferable to a long-term, fixed-weighted index.

8

WEIGHTING ESTIMATES



Source: Based on published and unpublished ANA data.

As previously noted, the DFP price index would preferably incorporate weights based on very recent purchasing patterns. Determining the precise form the index should take would require further investigation, but in general terms a chained measure would be the preferred solution.

POTENTIAL DATA SOURCES FOR OTHER DFP COMPONENT INDEXES

NPISH Consumption Purchases

The second consumption component within the DFP model is the purchases of inputs by private NPISH such as charities, conservation groups, unions, churches, professional and sporting associations. NPISH provide educational, health, cultural, recreational and other social community services to households free of charge, or at prices which are not economically significant.

The market transactions measures would only cover the purchases of inputs by those non-profit institutions engaged in non-market production. Purchases by non-profit institutions controlled and mainly financed by government would be included in the Government Consumption Purchases component, while the input purchases of non-profit institutions serving businesses are intermediate purchases, not final transactions.

There are no existing price indexes designed to measure input prices for purchases by NPISH. In fact, the ABS publishes very little information about NPISH. This lack of data may be addressed in the future due to the System of National Accounts 1993 (SNA93) recommendation of a separate institutional sector for NPISH within the national accounts framework. However, there are serious practical concerns regarding both the availability of data and the likely data quality for what is a very small sector (2-3% of DFP).

In the medium term, it may be possible to develop an input price index for NPISH based on existing price indexes and the LCI, with weighting information derived from the national accounts.

General Government Consumption Purchases

A Government Consumption Purchases price index would represent all government input purchases associated with non-market goods and services. The main subcomponent would be a government LCI, while material and service input purchases (e.g. office supplies, electricity, consultancy fees) would also be covered. The national accounts could be the source of weights for this price index with modifications to ensure consistency with the market transactions approach.

While the national accounts measure of government final consumption expenditure aims to value government output, in practice it is expenditure on inputs which is measured. The coverage of the Government Consumption Purchases component would differ from that of government final consumption expenditure in that the former measure would also include inputs associated with the production of non-market capital goods by the government. Consumption of fixed capital (a depreciation allowance) would also be excluded from the Government Consumption Purchases component. Presently, the national accounts treats all defence expenditure as part of government final consumption expenditure. Ideally, and in accordance with SNA93, purchases of some durable military equipment and structures would be considered capital items.

The Government Consumption Purchases price index would be based on input price indexes similar to those used to deflate government final consumption expenditure in the national accounts. The government LCI would be the most important contributor.

Price indexes corresponding to other government input purchases could be obtained from existing consumer and producer price data. However, there is little data on the prices of services purchased by government. While the ABS has commenced developing a more comprehensive set of producer price indexes for services, this data gap will only be filled in the long term. Price movements for many service inputs would need to be imputed.

Capital Purchases

A price index covering all purchases of newly produced and imported capital goods by domestic institutional units would be an important component of the DFP measure. An existing capital item is one which has already been acquired by a domestic user and whose value has already been included as part of Capital Purchases. All other capital items are considered 'new', including purchases of second-hand imported capital goods which are being purchased by a domestic resident for the first time. Price indexes corresponding to purchases of new capital goods could be developed for the following four institutional sectors:

- Households;
- Private Corporations;
- NPISH; and
- General Government and Public Corporations (Public Sector).

National accounts capital expenditure data could be used as a weighting source with modifications to ensure the weights were in accordance with the DFP approach. It would be desirable for the Capital Purchases component to be able to be broken down by asset type, as itemised in SNA93.

The Household Capital Purchases price index would consist mainly of purchases of new dwellings. Purchases of motor vehicles, computers and other durable goods by households are treated as consumption purchases rather than capital purchases.

The Private Corporate Capital Purchases component is the most significant contributor to Capital Purchases and would include most of the asset types. The NPISH Capital Purchases component accounts for less than 1% of GDP but, like the Public Sector Capital Purchases component, would comprise a range of asset types.

The concept of a Capital Purchases measure is broader than the national accounts gross fixed capital expenditure which currently excludes net acquisitions of valuables. The Capital Purchases price index would also differ from gross fixed capital expenditure in the treatment of non-market (including own-account) capital goods production.

Even in the long term, price indexes may not be available for some types of capital purchases, and indexes may need to be imputed.

A price index for the purchases of new dwellings would be based on the Project Homes Price Index published in ABS Cat. no. 6416.0, which would be the main contributor to the Household Capital Purchases component. Price indexes derived by Australian Construction Services relating to non-house dwellings such as townhouses, duplexes and apartments could also contribute to the Household Capital Purchases price index.

The price index for purchases of new non-dwelling buildings could be based on output price indexes derived by Australian Construction Services for each State. This data is used to deflate the relevant components of the national accounts gross fixed capital expenditure.

There is a significant gap in the availability of price data for engineering construction. The ABS is undertaking a study to assess the feasibility of establishing price indexes relating to the output of this industry. In the meantime, some relevant input price indexes relating to the construction of roads, railways, dams, airports, etc. are available, and are currently used to deflate this component in the national accounts.

The price index for purchases of new machinery and equipment could be based on data from the IPI and APMI. The index would be a weighted average of the prices of domestically produced and imported machinery and equipment. Ideally, the valuation basis of the producer price data would be adjusted from basic prices to purchasers' prices. However, this would not be a simple procedure and considerable time and effort would be required before such measures could be developed, if indeed they were warranted.

APPENDIX 2 — ASSESSMENT OF METHODS FOR ESTIMATING AN UNDERLYING PRICE INDEX OF HOUSEHOLD CONSUMPTION PURCHASES

Three methods are considered in this appendix:

- the specific adjustment method;
- the exclusion method; and
- outlier-based methods.

These methods are not necessarily mutually exclusive. Each has advantages and disadvantages which are discussed after a brief description of each method.

SPECIFIC ADJUSTMENT

The specific adjustment method involves removing the estimated effects of specific types or sources of exogenous price pressure from particular components of the index for the period in which they occur. The aim is to separate transaction prices into market prices (known as net prices) and taxes and subsidies, and also remove the effect of seasonal factors and volatility. These are not simple processes. However, the net price indexes which have been developed in Canada, the United Kingdom, Sweden and several other European countries, have generally been accepted as measures of inflation which are useful for commentary and analysis.

Advantages

Once identified, contributions to price change resulting from seasonality, volatility or changes in policy can be removed while retaining any price changes attributable to actual market conditions.

Items which are affected by seasonality, volatility or tax change in one or more periods are not simply excluded for the life of the index, which would result in many valid market-determined price signals being excluded. Rather, the specific effect of the tax change/seasonality/volatility is removed, with the 'underlying' price of the item being retained in the price index.

Specific adjustment results in a more representative price index. For example, the exclusion method adopted for the Treasury underlying inflation measure means that only about 50% of the CPI basket is included. Many food items, petrol and other important items of consumer expenditure are excluded, resulting in an index with low coverage. Under the specific adjustment method, these items would be included in the index, while non-underlying price movements would be specifically removed.

Conceptually this is the preferred method when measuring underlying inflation, because of its sound economic basis. However, due to practical difficulties in specifically adjusting for the effects of taxes, seasonality and volatility, the exclusion method is often adopted as a 'second best' approach when developing measures of underlying inflation.

Commonly accepted methods such as seasonal adjustment and smoothing can be used where appropriate to remove the effects of seasonality and volatility, while retaining the residual market-determined price movement as a relevant contribution to underlying inflation.

It is possible to increase the reliability of the index through the application of modelling systems to make specific adjustments. This can also partially overcome any perceived subjectivity in the adjustments made. Such modelling techniques are used effectively in several of the European net price indexes.

Disadvantages A large amount of information is usually required regarding the timing and magnitude of shock effects before specific adjustments can be made accurately. This occurs particularly when shocks impact on only one particular price or group of prices, rather than having a general effect on all prices.

Specific adjustment can depend partly on judgement to identify supply shocks, in particular when information on policy changes and other supply shocks is inaccurate, unclear or unavailable. This may lead to the resulting index being questioned as to the adjustments made, although this can be partially overcome with improvements in the quantity, quality and timeliness of the information used to make adjustments.

The dividing line between price change resulting from government policy changes as opposed to market signals is sometimes blurred. For example, when a government body raises public transport prices, it may be unclear whether this is a result of a new policy initiative, supply and demand forces, or both (and if both, the proportion relating to each).

Subsidies have the opposite effect to indirect taxes and should therefore be treated symmetrically in any underlying measure. However, unless the amount of the subsidy is directly relatable to either the quantity or the price of the product, extreme difficulties may arise in assessing the impact of subsidies for each product in each period. For this reason, the United Kingdom net price index is not adjusted for changes in subsidies. An alternative is to exclude goods and services, such as education and medical care, which may be heavily affected by subsidies.

If the objective is to produce an index that is 'tax free' (by excluding indirect taxes from both base and current period prices), goods which are subject to significant rates of tax will have a greatly reduced weight using the specific adjustment method. The complexity of the Australian taxation system, with indirect taxes being applied at various points in the production chain, presents significant practical obstacles to the calculation of prices net of tax (i.e. the absolute amount of the final transaction price attributable to tax) due to the need to also estimate changing margins. By comparison, the production of an index at a 'constant rate of tax' is more straightforward and involves no adjustment of expenditure weights.

EXCLUSION

This is the method currently used to derive the Treasury underlying rate from the CPI. Exclusion involves the outright removal from the original index of subcomponents which have prices deemed to be unduly influenced by policy measures, seasonality or volatility. The Treasury underlying rate excludes 49% of the CPI basket by weight.

Advantages Exclusion deals unambiguously with subcomponents whose behaviour is judged to differ frequently and significantly from that implied by the concept of underlying inflation.

The exclusion method is highly visible and the results are readily verifiable through the complete pre-specification of its construction. This pre-specification also provides for ease of analysis, replication and forecasting.

Disadvantages The major disadvantage of this method is that relevant information which may be provided by the excluded components is lost. As the components are removed entirely from the index, any true market price signals which may be present in their price movement is excluded.

In comparison with the specific adjustment method, the resulting underlying measure is likely to be unrepresentative of market-determined price change for the index as a whole because of low coverage of consumer purchases.

The decision as to which components to exclude is arbitrary and may be influenced by events in particular periods. Exclusion offers no formula as to what to systematically exclude. For example, the definition of government charges is considerably broader for the Australian underlying inflation measure than for the New Zealand measure.

Exclusion is not well suited to the removal of the effects of general price disturbances, such as indirect tax regime changes, which influence goods and services not excluded from the basket.

The method is inflexible in coping with any other price disturbances, in particular price volatility, which come from unanticipated sources and affect goods and services which are included in the underlying index.

OUTLIER-BASED METHODS

A price observation with an abnormally large residual (deviation from its estimated expectation, or the sample mean) is termed an outlier. Outlier-based methods rely on the lower weighting, or in some cases removal, of these extreme subcomponent price changes. There are several methods by which this can be done, two of which are described briefly below, namely the trimmed mean and the weighted median.

The trimmed mean method excludes (i.e. assigns zero weights to) outlying subcomponent price changes. There will only be a difference between the trimmed mean and the full mean if the distribution of subcomponent price movements is skewed. If this is the case, then compared with the trimmed mean, the full mean inflation rate will be pulled in the direction of the skewness.

The weighted median inflation rate is the inflation rate for that item or group of items which is at the centre of the total distribution. In effect, the weighted median places less weight on outlier price movements than does the mean rate of inflation, without excluding them altogether.

Advantages The main advantage of outlier-based methods is that they are less subjective in nature. Fewer decisions as to what to include in, or exclude from, an underlying inflation measure need to be made as fixed statistical methodology is used.

Evidence suggests that periods in which significant deviations of the mean from the median inflation rate are observed, often coincide with periods experiencing price or supply shocks. The weighted median, and other outlier methods, may therefore be very effective in removing the volatility effects of such shocks.

Disadvantages There is less economic basis behind outlier methods compared with the exclusion or specific adjustment methods. Different components could be excluded from period to period, depending on the size of their price change relative to the entire index. Whereas the concept of underlying inflation suggests that price changes occurring as a result of government policy should be removed, outlier methods may in some cases include these while excluding (or partially excluding) significant market effects.

A related problem is that because components are likely to be included in some periods and excluded in others, it presents considerable problems in interpreting the sources of price change over time.

In the case of the trimmed mean, there remains a high degree of judgement in its pre-specification. This involves the decision regarding the point at which to trim the tails in the distribution of price movements in the original mean inflation measure. As any price movements outside this threshold are completely excluded, this decision may have considerable impact on the resulting measure of underlying inflation.

CONCLUSION

On the basis of this assessment, it is concluded that the best method for estimating underlying inflation would be the specific adjustment method, with the possible application of exclusion in some appropriate areas, such as highly subsidised services. Conceptually, specific adjustment would provide the best approach to estimation based on both economic and statistical criteria.

Specific adjustment has a significant advantage over exclusion since it retains all market-determined price changes while excluding policy-related and other non-underlying price changes. Both methods are dependent to some degree on elements of subjectivity, which is an unavoidable consequence of there being 'no uniquely correct measure of underlying inflation' (Reserve Bank of Australia 1995).

Seasonal adjustment and smoothing techniques are also considered to be superior methods for removing seasonality and reducing volatility compared with the alternative of complete exclusion of all price movements of a large proportion of goods and services.

Outlier-based methods, while having some benefits in reducing the volatility of the inflation index, are open to questioning due to their lack of economic basis and their inconsistency as to what is included in the measure. Indexes

based on outlier methods may, however, remain useful as a supplementary measure for policy analysis.

While the specific adjustment method is conceptually preferable, there may be some difficulties in its practical implementation. However, the development of net price indexes by several other countries, and their perceived usefulness, indicate that a valuable and effective measure of underlying inflation could be developed using this approach. The development of net price indexes for household inflation is discussed in section 6.

GLOSSARY

| | |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic prices | The value of a commodity at basic prices is equal to its value when it leaves the producer, before the application of indirect taxes (less subsidies) and trade and transport margins. |
| Chain index | A continuous index number series formed by linking new index series, which reflect a changed weighting pattern, to previous index series, on a regular and frequent basis (e.g. annually). |
| Corporate sector | This sector comprises corporations which may be defined as legal entities, created for the purpose of producing goods or services for the market, that may be the source of profit or other financial gain to its owner(s). Corporations may be public or private, financial or non-financial. Quasi-corporations which are unincorporated enterprises that function as if they were corporations are also included in the corporate sector. |
| Employee households | Households which obtain at least 75% of their total income from wages or salaries, but excluding the top 10% (in terms of income) of such households. The CPI population group is metropolitan employee households. |
| Fixed-weighted index | An index in which the weighting pattern is fixed for the life of each index series. |
| General government | The general government sector comprises institutional units which, in addition to fulfilling their political responsibilities and their role of economic regulation, produce principally non-market services (possibly goods) for individual or collective consumption and redistribute income or wealth. |
| Gross capital formation | A national accounts measure which equals the sum of gross fixed capital expenditure, increase in stocks and net acquisitions of valuables. |
| Gross fixed capital expenditure | A national accounts measure defined in the SNA93 as acquisitions, less disposals, of new or existing tangible fixed assets (e.g. buildings, equipment) and intangible fixed assets (e.g. mineral exploration, computer software); major improvements to tangible non-produced assets and costs associated with the transfer of ownership of non-produced assets. |
| Government final consumption expenditure | A national accounts measure which reflects current expenditure by general government bodies on services to the community. |
| Household Expenditure Survey (HES) | A sample survey conducted to determine the expenditure patterns of private households. Data from the HES is used as a primary source of information for the estimation of expenditure weights in the CPI. |
| Households | All persons in the economy, with the institutional units in the household sector consisting of one individual or a group of individuals. The household of the owner of an unincorporated enterprise in general includes the enterprise. |

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| Implicit price deflator | The relationship, expressed as an index number, between the current price values and constant price values of broad national accounting aggregates. |
| Index number series | A series of numbers measuring movement over time from a base period value. The base value is normally represented by an index number of 100.0. |
| Indirect taxes | Taxes assessed on producers, on the production, sale, purchase, or use of goods and services. |
| Institutional sectors | The sectors formed by classifying the institutional units primarily on the basis of differences in their financial role and behaviour. |
| Institutional units | Fundamental economic units which are capable of owning assets and incurring liabilities on their own behalf. They can engage in the full range of transactions. |
| Laspeyres price index | A price index in which the fixed weights used represent the relative importance of index items in the weighting base period. |
| Linking | The technique used to join a new index series which reflects a changed weighting pattern to the previous index series to form a continuous series. The technique ensures that the resultant linked index reflects only price variations (i.e. the introduction of the new items and weights does not of itself affect the level of the index). Also referred to as chaining. |
| Metropolitan households | Households located in the Statistical Divisions of the eight capital cities of Australia. |
| Net price index | A price index which represents an attempt to specifically remove the effects on prices of changes in indirect taxes and subsidies. |
| Non-profit institutions serving households (NPISH) | Institutions which are principally engaged in the production of non-market services for households and whose main resources are voluntary contributions by households. |
| Price index | An indicator used to measure the proportionate changes in the prices of a specified set of goods and services. |
| Private final consumption expenditure | A national accounts measure which reflects current expenditure by households, and producers of private non-profit services to households. It includes purchases of durable as well as non-durable goods. However, it excludes expenditure by persons on the purchase of dwellings and expenditure of a capital nature by unincorporated enterprises. |
| Project homes | Dwellings available for construction on a client's block of land. Price changes therefore relate only to the price of the dwelling (excluding land). |
| Public corporations | Institutional units, subject to the control of government units, which aim to cover their operating expenses by selling their output or by engaging in financial transactions such as borrowing and lending. |
| Public sector | The public sector comprises general government and the public sub-sector of the corporate sector. |

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| Purchasers' prices | The value of a commodity at purchasers' prices is equal to its basic price plus indirect taxes (less subsidies) and margins (e.g. wholesale, retail, freight). |
| Pure price change | The change in the price of an item after removing any variation in price attributable to a change in quality or quantity. |
| Quality change | Any change in the characteristics or attributes of a good or service. Quality adjustment isolates the pure price change by eliminating the effect of changes in quality on the price of the item. |
| Real estate transfer expenses | The various fees which are incurred by either the buyer or seller of real estate, namely legal fees on transfer, real estate sales commission, stamp duties on transfer and other government charges. |
| Scope (of a price index) | The conceptual boundaries of the price index in terms of goods and services represented, and of the population group and geographical areas to which it relates. |
| Seasonal adjustment | A statistical technique to remove the effects of seasonal and calendar influences operating on a series. Seasonal effects usually reflect the influence of the seasons themselves either directly or through production series related to them, or social conventions. Other types of calendar variation occur as a result of influences such as the number of days in the calendar period, the accounting or recording practices adopted or the incidence of moving holidays (such as Easter). |
| Smoothing techniques | The range of techniques which can be used to remove the irregular component from a seasonally adjusted time series. The standard ABS trending technique is one example. |
| Tornqvist price index | The Tornqvist index uses logarithmic change techniques to measure price change between any two periods. Items are weighted together in this formula by the arithmetic average of their relative expenditures in these periods. |
| Trend estimates | Trend estimates are derived from seasonally adjusted estimates via an averaging process which attempts to remove the irregular component of the time series. This allows the underlying direction of a time series to be identified. |

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ISBN 0 642 23295 4