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Australian Bureau of Statistics

Information Paper

Producer Price Index Developments

New
Issue

Information Paper

Producer Price Index Developments

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INQUIRIES

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CONTENTS

PREFACE

Part A of this paper introduces experimental producer and international trade price index series within a Stage of Production (SOP) framework. The SOP framework represents an important element of the strategy for the systematic analysis of inflation as outlined in the Australian Bureau of Statistics (ABS) *Information Paper: An Analytical Framework for Price Indexes in Australia* (Cat. no. 6421.0) released on 24 February 1997.

The experimental SOP indexes are intended to increase the analytical value of the established producer and international trade price indexes by presenting the information within an economy-wide framework. They are designed to supplement, rather than replace, the existing range of measures.

Part B of the paper presents experimental producer price indexes for the output of a selection of transport and storage, and property and business services industries. These series represent the first release of indexes compiled under a long-term development program which will progressively expand coverage of the services sector of the economy.

The indexes will be useful in their own right. They will also play an important role in improving the quality of the national accounts as well as contributing to inflation measurement through their incorporation within the SOP framework.

The ABS is keen to obtain user reactions to the developments described in this paper, particularly in respect of the issues raised in sections 6 and 11.

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LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial Classification
CPI	Consumer Price Index
DFP	Domestic Final Purchases
f.o.b.	free on board
GDP	Gross domestic product
GDP(P)	Gross domestic product (production based)
GOS	Gross operating surplus
mfg	manufacturing
n.e.c.	not elsewhere classified
SOP	Stage of Production
. .	not applicable
—	nil or rounded to zero

SUMMARY

For many years, the Australian Bureau of Statistics (ABS) has been compiling and publishing a range of separate producer price indexes and international trade price indexes, each relating to a particular sector of the economy.

An economy-wide Stage of Production (SOP) index model has been developed to provide a framework for bringing together the range of detailed price data contained in the separate indexes to enhance the analytical value of the data. The SOP framework is based on an economic categorisation of transactions according to their sequencing in the production chain.

SOP index series have been constructed as experimental measures, with the index structures and weighting patterns initially based on 1989–90 Input-Output tables. Once established, the SOP indexes will be based on more recent Input-Output tables and incorporate frequent reweighting and chaining.

The experimental indexes have been compiled on a quarterly and annual basis commencing with 1991–92 and are presented in part A of this paper, along with index structures and weighting patterns.

Conceptually the scope of the new framework relates to the output of all the goods and services industries in the economy. In practice the coverage of the initial experimental indexes is limited to goods producing industries, excluding construction. Further, a fully articulated data model would embrace other key aggregates from the Input-Output framework, in particular compensation of employees. A brief description of such a data model is provided in section 5 of part A.

Experimental producer price index series relating to the output of a selection of service industries are presented in part B. After reasonable coverage of the services sector of the economy is achieved, it will be possible to incorporate the new data within the price indexes compiled under the SOP model.

PART A

EXPERIMENTAL INDEX NUMBERS WITHIN A STAGE OF PRODUCTION FRAMEWORK

1—CURRENT SITUATION

1.1 The ABS publishes a range of producer price indexes as well as international trade price indexes. Each index is a stand-alone measure relating to a particular segment of economic activity. The producer price indexes are industry-based, *net sector* indexes of materials used and articles produced by major goods producing industries, while the international trade price indexes relate to merchandise imports and exports.

1.2 The indexes are on various valuation bases with the input measures at purchasers' prices and the output measures at basic prices.[1] Each of the indexes can be viewed as a partial economic indicator, rather than an economy-wide measure.

1.3 The net sector basis (as opposed to gross sector) means that transactions between establishments classified to the same industry sector are out-of-scope. For example, sales of sugar to the soft drink industry are not included in the index for the output of the Food, Beverage and Tobacco Manufacturing Subdivision because establishments producing sugar are classified to the same industry Subdivision as those producing soft drink. That is, the transactions represent intermediate usage within that Subdivision of manufacturing and are netted out of the index. Rather, the transactions that are in-scope for the index are sales of sugar to:

- establishments classified to industries other than Food, Beverage and Tobacco Manufacturing; and

- final demand (e.g. final consumption or export).

1.4 A principal advantage of the net sector approach is that it avoids any potential distorting effects that may result from multiple counting of transaction prices as commodities flow through different production processes under a *gross sector* approach. However, while conceptually valid, these net sector measures are incomplete in terms of coverage of the targeted sectors of the economy because the intra-sector (or internal) transactions are excluded.

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[1] 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 a commodity supplied to the purchaser. 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.

1—CURRENT SITUATION
continued

1.5   The existing range of producer and international trade price indexes has proven to be useful for identifying price changes sourced externally from the relevant industry sectors (e.g. the Price Indexes of Materials Used in Manufacturing Industries) or flowing from an industry sector to other parts of the economy or overseas (e.g. the Price Indexes of Articles Produced by Manufacturing Industry). They are used extensively for economic analysis, for national accounts deflation purposes and contract escalation, and it is intended to continue to compile and publish them. The available indexes are itemised below:

- *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (Cat. no. 6412.0)

- *Price Indexes of Materials Used in Manufacturing Industries, Australia* (Cat. no. 6411.0)

- *Price Index of Materials Used in House Building, Six State Capital Cities* (Cat. no. 6408.0)

- *Price Index of Materials Used in Building Other Than House Building, Six State Capital Cities* (Cat. no. 6407.0)

- *Price Indexes of Materials Used in Coal Mining, Australia* (Cat. no. 6415.0)

- *Price Indexes of Copper Materials, Australia* (Cat. no. 6410.0)

- *Export Price Index, Australia* (Cat. no. 6405.0)

- *Import Price Index, Australia* (Cat. no. 6414.0).

2—THE SOP CONCEPT

2.1   Under the SOP concept, flows of commodities (goods and services) are 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 categorisation is between final commodities (i.e. commodities destined for final consumption, capital formation or export) and non-final commodities (i.e. commodities that flow into intermediate consumption for further processing).

2.2   This initial breakdown of the commodity flows into final and non-final commodities represents a useful economic dissection of producers' transactions. However, the non-final commodities can flow into the production of both final and other non-final commodities.

2.3   Therefore, to aid analysis, the non-final commodity flows can be divided on a sequential basis between Stage 1 (or *preliminary*) commodities and Stage 2 (or *intermediate*) commodities, as illustrated below. This approach would generate three separate stages of production.

2—THE SOP CONCEPT
continued

2.4   In order to avoid a multiple counting of transactions, the three stages are not aggregated.

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┌─────────────────────────────────────────┐
│              Non-final                    │
└─────────────────────────────────────────┘


   ╭──────────╮      ╭──────────╮             ╭──────────╮
   │ Stage 1  │      │ Stage 2  │             │ Stage 3  │
   │Preliminary│ ──▶ │Intermediate│ ──────▶  │  Final   │
   ╰──────────╯      ╰──────────╯             ╰──────────╯
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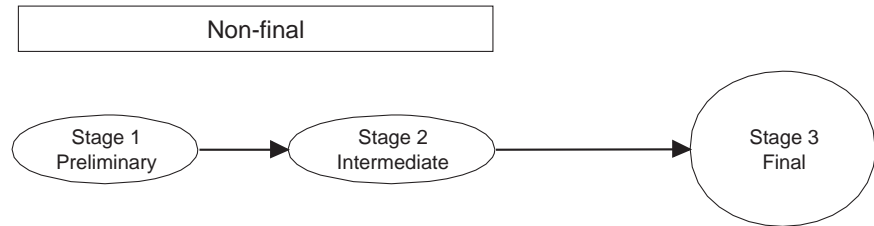
2.5   Under such a framework, preliminary (Stage 1) commodities are used in the production of intermediate (Stage 2) commodities; in turn, intermediate (Stage 2) commodities flow into the production of final (Stage 3) commodities. For each of the three stages, commodities can be categorised into domestic production and imports. The final (Stage 3) commodities can be further divided between capital, consumption and exports.

2.6   The framework allows for analyses of price change as commodities flow through production processes. Price indexes for earlier stages of production may be indicators of possible future price changes for later stages.

2.7   The scope of the SOP framework is broadly analogous with that of gross output under the production approach to the measurement of Gross domestic product (GDP(P)) in the national accounts system.

3—THE SOP INDEX MODEL

Scope and coverage

3.1   Producer price indexes conventionally relate to the output of domestic industries, at basic prices, either inclusive or exclusive of exports. In order to provide for more complete analyses, exports, as well as domestic usage, of Australia's output have been included within the scope of the SOP index model.

3.2   Imports have also been incorporated within the framework, recognising that they represent a very important potential source of inflationary pressures. The model therefore allows for the monitoring of the effects of price changes of both domestically produced and imported commodities.

3.3   Conceptually, the scope of the indexes is economy-wide relating to the output of all the goods and services industries. However, for reasons of data availability, the initial coverage is restricted to goods producing industries, excluding the construction industry. The conceptual model provides for the future extension of coverage to service industries and the construction industry as data become available.

3.4   The SOP index model consists of the major aggregates shown in diagram 1.

3.5   For some analyses, the focus would be on the domestic economy, with exports treated as a leakage. For such purposes, the relevant Final (Stage 3) goods index would be exclusive of the Exports component of Domestic goods (that is, the Domestic Consumption plus Capital goods aggregate).

1   STAGE OF PRODUCTION INDEX MODEL
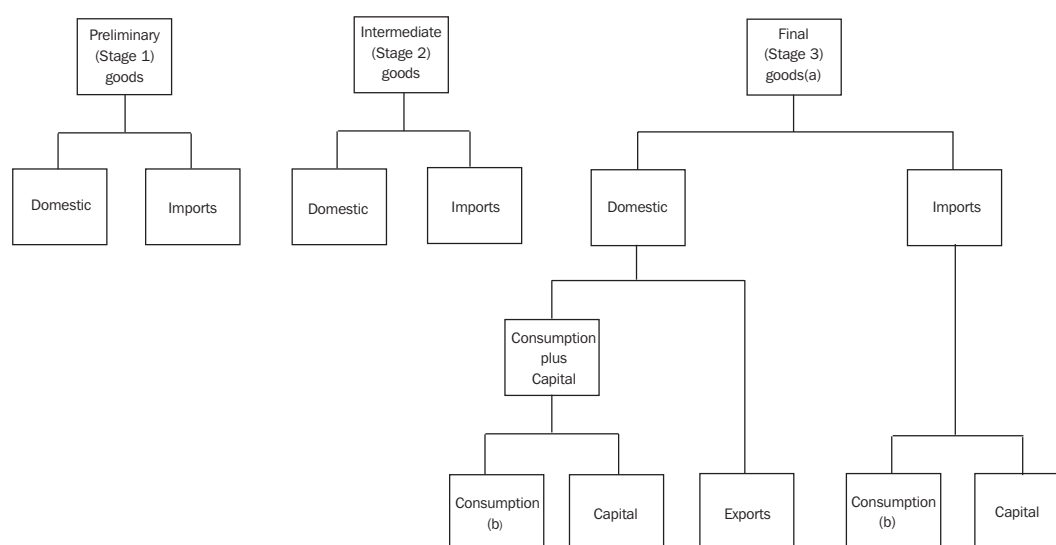
(a) Including and excluding exports
(b) Private final consumption

Scope and coverage *continued*   3.6   A major long term development program will be required to achieve significant coverage of the services and construction industries. In the meantime, restructuring the currently available producer and international trade price index component data within the framework of an integrated SOP index model has a number of advantages:

- It represents a significant step towards providing one of the important index models of the proposed family or system of price indexes described in *Information Paper: An Analytical Framework for Price Indexes in Australia* (Cat. no. 6421.0). The planned Domestic Final Purchases (DFP) Index (described in detail in that paper) will be confined to final transactions and will not cover intermediate, or non-final, transactions. As such, the DFP index cannot provide a complete picture of current price experience in the economy. The SOP initiative generates a complementary view of inflation which embraces intermediate, as well as final, transactions.

- It provides a valuable addition to the current suite of *partial* producer price indexes through the provision of a summary, economy-wide producer price index measure relating to final transactions, i.e. the index aggregate represented by 'Final (Stage 3) goods—Domestic' in diagram 1. For the first time in Australia, a broadly-based *headline* producer price index would be available to summarise the price experience at producer output level, i.e. at basic prices.

- It enables gaps in the available prices data to be identified within an integrated statistical framework.

Transaction flow approach   3.7   The ABS has adopted a *transaction flow* approach in disaggregating output into the various production stages. This approach means that the assignment of a commodity to a stage is based on the proximity of its use in final demand.

3.8   Alternative *degree of fabrication* or *principal destination* approaches are employed by statistical agencies in some other countries (which, incidentally, tend to use the term *Stage of Processing* rather than *Stage of Production* as proposed for Australia).

3.9   The degree of fabrication and principal destination approaches result in the allocation of particular commodities to one, and only one, stage. This would present particular problems for Australia because of our very open economy in which exports (and imports) measure about 20% of Gross domestic product. Commodities such as wheat, wool and iron ore are exported in large volumes as well as being further processed locally. The allocation of such commodities to a single stage would, by necessity, be very arbitrary.

3.10   While exports of agricultural and mining commodities constitute final demand from the perspective of the domestic economy, they are in fact intermediate inputs into other countries' production. Adopting the transactions flow approach means, for example, that exported wheat and domestically used wheat are effectively treated as different commodities for index construction purposes. Certainly their prices relate to different classes of transactions with different price experiences in different markets.

3.11   Under this more flexible transaction flow approach, it is the *transactions* in a given commodity that are allocated to the relevant market within the production chain. Commodity transactions can therefore be allocated to more than one stage, as illustrated by the examples below.

Preliminary (Stage 1) goods	*Intermediate (Stage 2)* goods	*Final (Stage 3)* goods	*—by destination*
Bauxite ————>	Alumina ————>	Aluminium ————>	export
		————>	final consumption
		————>	capital investment
	Bauxite ————>	Alumina ————>	export
		Bauxite ————>	export
Sugar cane ————>	Raw sugar ————>	Refined sugar ————>	final consumption
		————>	export
	————>	Beer ————>	final consumption
	Sugar cane ————>	Raw sugar ————>	export
Cattle ————>	Fresh meat ————>	Processed meat ————>	final consumption
		————>	export
	Cattle ————>	Fresh meat ————>	final consumption
		————>	export
		Cattle ————>	export

3.12   In the first example above, Bauxite as a Preliminary (Stage 1) good is an input into the production of Alumina. In turn Alumina is an Intermediate (Stage 2) good which is then used to produce Aluminium, a Final good (destined for final consumption, capital formation or the export market).

3.13   The next example shows Bauxite, as an Intermediate (Stage 2) good, used to produce Alumina which is subsequently exported as a Final (Stage 3) good.

3.14   Under the third example, Bauxite that is sold direct to the export market without further processing in Australia is a Final (Stage 3) good.

3.15   The other examples above show similar categorisations for different sugar and meat products.

Composition   4.1   The values of commodity flows, for both domestic supply and
imports, were allocated to stages based on an analysis of detailed
1989–90 Input-Output tables. Three stages of production have been
adopted.

4.2   The table below indicates that Stage 1 goods represent about
15% of the Australian output of goods and merchandise imports covered
by the SOP index model, while Stage 2 and Stage 3 goods account for
36% and 49% respectively. The increasing values of Stage 1, 2 and 3
goods respectively reflect the impact of the value added process as goods
are used along the production chain.

		Relative weight (%)	
Preliminary (Stage 1) goods	**15**		
Domestic		12	
Imports		3	
Intermediate (Stage 2) goods	**36**		
Domestic		29	
Imports		7	
Final (Stage 3) goods	**49**		
Domestic		39	
Consumption			18
Capital			6
Exports			15
Imports		10	
Consumption			5
Capital			5

Index structure and   4.3   Tables 1 and 2 contain the structure and weighting patterns for
weighting patterns   the experimental SOP indexes. Table 1 shows, for each of the three
stages, separate weighting patterns for domestic and imported goods.
Table 2 provides a decomposition of the Stage 3 weighting pattern
according to the economic destination of the goods (final consumption,
capital investment or export). The classification used to construct these
indexes is the Australian and New Zealand Standard Industrial
Classification (ANZSIC).

1 INDEX STRUCTURE AND WEIGHTING PATTERNS, BY STAGE AND SOURCE

ANZSIC	Description	Preliminary (Stage 1) goods			Intermediate (Stage 2) goods			Final (Stage 3) goods		
		Total	Domestic	Imports	Total	Domestic	Imports	Total	Domestic	Imports
01	Agriculture	8.2	9.8	1.3	9.8	11.7	1.7	6.7	8.2	0.7
011	Horticulture & fruit growing	—	—	—	0.8	1.0	—	2.2	2.5	0.7
012	Grain, sheep & beef cattle farming	4.3	5.4	—	5.0	6.2	—	4.0	4.9	—
013	Dairy cattle farming	1.6	2.0	—	1.1	1.4	—	—	—	—
014	Poultry farming	—	—	—	0.7	0.9	—	0.3	0.4	—
015	Other livestock farming	—	—	—	0.6	0.8	—	—	—	—
016	Other crop growing	2.2	2.5	1.3	1.5	1.5	1.7	0.2	0.3	—
02	Services to agriculture	—	—	—	—	—	—	0.2	0.3	—
03	Forestry & logging	0.7	0.9	—	—	—	—	—	—	—
04	Commercial fishing	0.0	—	—	0.5	0.6	—	0.3	0.4	—
11	Coal mining	1.5	1.9	—	0.7	0.8	—	3.6	4.5	—
12	Oil & gas extraction	3.7	4.0	2.4	2.6	2.8	1.7	0.5	0.7	—
13	Metal ore mining	2.5	2.8	1.3	2.4	2.7	1.3	5.3	6.6	—
14	Other mining	2.0	2.1	1.6	0.8	1.0	—	0.4	0.5	—
21	Food, beverages etc. mfg	5.0	5.8	1.6	6.0	6.9	2.1	21.1	24.6	7.0
211	Meat & meat product mfg	0.9	1.1	—	1.7	2.1	—	6.1	7.6	—
212	Dairy products mfg	1.0	1.2	0.3	1.1	1.3	—	2.3	2.8	0.4
213	Fruit & vegetable processing	—	—	—	—	—	—	1.1	1.4	—
214	Oil & fat mfg	0.3	0.3	0.5	—	—	—	0.3	0.3	—
215	Flour mill & cereal food mfg	0.4	0.5	—	0.8	1.0	—	0.8	1.0	—
216	Bakery product mfg	—	—	—	—	—	—	1.8	2.2	—
217	Other food mfg	2.0	2.4	0.6	1.9	1.9	2.1	4.6	4.6	4.6
218	Beverage & malt mfg	0.4	0.4	0.2	0.5	0.6	—	3.5	3.9	2.0
219	Tobacco product mfg	—	—	—	—	—	—	0.6	0.8	—
22	Textile, clothing etc. mfg	3.2	2.2	7.5	4.1	3.1	8.8	7.4	6.9	9.4
23	Wood & paper product mfg	7.3	6.4	11.2	5.7	5.7	5.4	1.0	1.1	0.6
24	Printing, publishing & recorded media	5.6	6.5	1.6	5.0	5.8	1.8	1.9	1.8	2.4
25	Petroleum, coal, chemical etc. mfg	18.8	15.9	30.4	14.1	12.3	21.8	6.5	6.8	5.3
26	Non metallic mineral product mfg	3.9	4.2	2.7	6.4	7.0	4.0	0.1	—	0.6
27	Metal product mfg	18.4	19.7	13.1	15.6	16.2	12.7	8.8	10.8	0.9
28	Machinery & equipment mfg	9.9	6.4	24.4	16.4	11.4	37.6	28.4	18.8	68.9
281	Motor vehicle & part mfg	3.0	2.4	5.5	5.5	3.3	15.0	9.8	8.5	15.3
282	Other transport equipment mfg	0.7	0.7	0.7	1.7	2.1	—	3.5	2.0	9.7
283	Photographic & scientific equipment mfg	0.7	0.2	2.5	1.2	0.5	4.1	1.2	0.6	3.8
284	Electronic equipment mfg	2.1	0.8	7.2	2.5	1.5	6.6	4.3	1.3	16.8
285	Electrical equipment & appliance mfg	1.5	1.1	3.2	3.0	2.3	5.8	3.1	2.6	5.5
286	Industrial machinery & equipment mfg	1.9	1.1	5.3	2.5	1.7	6.1	6.6	3.8	17.9
29	Other manufacturing	0.9	1.0	0.9	1.3	1.3	1.1	4.1	3.9	4.1
36	Electricity & gas supply	6.7	8.4	—	5.3	6.5	—	3.2	4.0	—
361	Electricity supply	5.3	6.6	—	4.5	5.5	—	2.8	3.5	—
362	Gas supply	1.4	1.8	—	0.8	1.0	—	0.5	0.6	—
37	Water, sewerage & drainage	1.6	2.0	—	3.3	4.1	—	0.1	0.1	—
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

INDEX STRUCTURE AND WEIGHTING PATTERNS, FINAL (STAGE 3) GOODS—By destination

ANZSIC	Description	Total	Consumption goods	Capital goods	Consumption + Capital goods	Exports
01	Agriculture	6.7	5.2	—	3.5	13.8
011	Horticulture & fruit growing	2.2	4.4	—	3.0	0.5
012	Grain, sheep, & beef cattle farming	4.0	—	—	—	12.7
013	Dairy cattle farming	—	—	—	—	—
014	Poultry farming	0.3	0.8	—	0.5	—
015	Other livestock farming.	—	—	—	—	—
016	Other crop growing	0.2	—	—	—	0.7
02	Services to agriculture	0.2	—	—	—	0.8
03	Forestry & logging	—	—	—	—	—
04	Commercial fishing	0.3	0.7	—	0.5	—
11	Coal mining	3.6	—	—	—	11.6
12	Oil & gas extraction	0.5	—	—	—	1.7
13	Metal ore mining	5.3	—	—	—	16.9
14	Other mining	0.4	—	—	—	1.3
21	Food, beverages etc. mfg	21.1	35.1	—	23.5	16.0
22	Textile, clothing etc. mfg	7.4	13.8	0.8	9.5	2.8
23	Wood & paper product mfg	1.0	1.0	0.5	0.8	1.3
24	Printing, publishing & recorded media	1.9	4.2	—	2.8	—
25	Petroleum, coal, chemical etc. product mfg	6.5	11.1	—	7.4	4.6
26	Non-metallic mineral product mfg	0.1	0.3	—	0.2	—
27	Metal product mfg	8.8	1.4	5.3	2.7	22.2
28	Machinery & equipment mfg	28.4	14.6	86.9	38.6	6.4
29	Other mfg	4.1	5.4	6.5	5.8	0.6
36	Electricity & gas supply	3.2	7.1	—	4.7	—
361	Electricity supply	2.8	6.1	—	4.1	—
362	Gas supply	0.5	1.0	—	0.7	—
37	Water, sewerage & drainage	0.1	0.2	—	0.2	—
Total		100.0	100.0	100.0	100.0	100.0

Compilation 4.4 In compiling the experimental indexes it has been necessary to use proxy series for certain transactions. For example, series from the Price Indexes of Materials used in Manufacturing Industries (which are at *purchasers' prices* rather than *basic prices*) have been used for the output of the Agriculture industry.

4.5 For imported capital and consumption items, *free on board* (f.o.b.) series from the Import Price Index have been incorporated, where f.o.b. is an earlier pricing point than *basic prices* (i.e. imports at basic prices would include international freight and insurance).

Index numbers 4.6 Table 3 below contains experimental quarterly and annual index series for each of the major categories of the SOP index model. The index numbers have been calculated on a reference base of 1989–90 = 100.0 and are presented for each quarter and financial year from 1991–92. Table 4 presents the corresponding annual and quarterly percentage changes.

3   EXPERIMENTAL INDEX NUMBERS, BY STAGE AND SOURCE—Base of each index: 1989–90 = 100.0

Period	Preliminary (Stage 1) goods			Intermediate (Stage 2) goods			Final (Stage 3) goods		
	Domestic	Imports	Total	Domestic	Imports	Total	Domestic	Imports	Total
Year									
1991–92	104.4	100.2	103.6	105.2	102.7	104.7	100.5	105.3	101.4
1992–93	106.4	106.5	106.4	107.4	111.5	108.2	103.8	117.4	106.4
1993–94	105.7	107.4	106.0	108.1	115.9	109.6	104.6	122.0	108.0
1994–95	109.3	108.9	109.3	110.1	116.1	111.2	106.9	120.4	109.5
1995–96	112.5	113.2	112.6	112.4	116.4	113.2	109.1	119.1	111.0
1996–97	110.3	106.3	109.5	112.3	110.1	111.9	108.3	113.0	109.2
Quarter									
1991									
Sep	104.1	99.9	103.3	104.7	101.6	104.1	99.7	102.6	100.3
Dec	104.4	99.9	103.5	105.1	102.0	104.5	99.8	104.1	100.6
1992									
Mar	104.4	101.1	103.7	105.2	103.7	104.9	101.1	107.2	102.3
Jun	104.8	100.1	103.8	105.7	103.6	105.3	101.2	107.2	102.4
Sep	106.2	104.5	105.9	107.2	108.4	107.4	102.8	113.4	104.9
Dec	106.9	106.7	106.9	107.7	111.2	108.3	103.9	117.4	106.5
1993									
Mar	106.4	107.1	106.6	107.4	112.4	108.4	104.6	118.6	107.4
Jun	105.9	107.8	106.3	107.4	114.0	108.7	103.7	120.3	107.0
Sep	106.7	109.7	107.3	108.5	117.6	110.2	105.0	124.4	108.8
Dec	105.9	109.9	106.7	108.4	118.3	110.3	105.2	124.6	109.0
1994									
Mar	104.8	105.8	105.0	107.4	114.4	108.7	104.0	119.6	107.0
Jun	105.3	104.4	105.2	108.1	113.5	109.1	104.2	119.5	107.2
Sep	106.6	105.4	106.4	108.6	113.9	109.6	104.7	119.6	107.6
Dec	108.3	106.4	107.9	109.1	114.1	110.1	105.6	117.9	108.0
1995									
Mar	110.3	108.7	110.0	110.6	115.5	111.5	107.5	119.1	109.8
Jun	112.2	115.2	112.8	112.1	120.8	113.7	109.8	125.0	112.8
Sep	113.4	115.7	113.9	112.7	119.2	114.0	109.9	122.7	112.4
Dec	112.9	114.0	113.1	112.5	116.6	113.3	109.3	120.4	111.5
1996									
Mar	112.4	113.3	112.6	112.4	116.4	113.2	109.2	118.8	111.1
Jun	111.2	109.7	110.9	112.0	113.2	112.2	107.9	114.3	109.2
Sep	110.0	107.3	109.5	111.9	110.8	111.7	107.8	113.9	109.0
Dec	110.0	106.3	109.3	112.2	110.2	111.8	107.6	113.0	108.7
1997									
Mar	110.8	106.3	109.9	112.7	110.1	112.2	108.5	112.7	109.3
Jun	110.5	105.1	109.5	112.5	109.3	111.9	109.1	112.6	109.8
Sep	110.7	106.8	110.0	113.2	111.2	112.8	109.5	115.8	110.7
Dec	111.8	107.5	111.0	113.9	115.0	114.1	110.9	120.2	112.7
1998									
Mar	110.8	107.8	110.2	113.0	115.9	113.5	110.6	121.5	112.8
Jun	110.6	108.6	110.2	113.0	117.4	113.8	111.8	123.5	114.1

4 EXPERIMENTAL INDEX NUMBERS BY STAGE AND SOURCE—Percentage change (from previous period)

Period	Preliminary (Stage 1) goods			Intermediate (Stage 2) goods			Final (Stage 3) goods		
	Domestic	Imports	Total	Domestic	Imports	Total	Domestic	Imports	Total
Year									
1992–93	1.9	6.3	2.7	2.1	8.6	3.3	3.3	11.5	4.9
1993–94	–0.7	0.8	–0.4	0.7	3.9	1.3	0.8	3.9	1.5
1994–95	3.4	1.4	3.1	1.9	0.2	1.5	2.2	–1.3	1.4
1995–96	2.9	3.9	3.0	2.1	0.3	1.8	2.1	–1.1	1.4
1996–97	–2.0	–6.1	–2.8	–0.1	–5.4	–1.1	–0.7	–5.1	–1.6
Quarter									
1991									
Dec	0.3	0.0	0.2	0.4	0.4	0.4	0.1	1.5	0.3
1992									
Mar	0.0	1.2	0.2	0.1	1.7	0.4	1.3	3.0	1.7
Jun	0.4	–1.0	0.1	0.5	–0.1	0.4	0.1	0.0	0.1
Sep	1.3	4.4	2.0	1.4	4.6	2.0	1.6	5.8	2.4
Dec	0.7	2.1	0.9	0.5	2.6	0.8	1.1	3.5	1.5
1993									
Mar	–0.5	0.4	–0.3	–0.3	1.1	0.1	0.7	1.0	0.8
Jun	–0.5	0.7	–0.3	0.0	1.4	0.3	–0.9	1.4	–0.4
Sep	0.8	1.8	0.9	1.0	3.2	1.4	1.3	3.4	1.7
Dec	–0.7	0.2	–0.6	–0.1	0.6	0.1	0.2	0.2	0.2
1994									
Mar	–1.0	–3.7	–1.6	–0.9	–3.3	–1.5	–1.1	–4.0	–1.8
Jun	0.5	–1.3	0.2	0.7	–0.8	0.4	0.2	–0.1	0.2
Sep	1.2	1.0	1.1	0.5	0.4	0.5	0.5	0.1	0.4
Dec	1.6	0.9	1.4	0.5	0.2	0.5	0.9	–1.4	0.4
1995									
Mar	1.8	2.2	1.9	1.4	1.2	1.3	1.8	1.0	1.7
Jun	1.7	6.0	2.5	1.4	4.6	2.0	2.1	5.0	2.7
Sep	1.1	0.4	1.0	0.5	–1.3	0.3	0.1	–1.8	–0.4
Dec	–0.4	–1.5	–0.7	–0.2	–2.2	–0.6	–0.5	–1.9	–0.8
1996									
Mar	–0.4	–0.6	–0.4	–0.1	–0.2	–0.1	–0.1	–1.3	–0.4
Jun	–1.1	–3.2	–1.5	–0.4	–2.7	–0.9	–1.2	–3.8	–1.7
Sep	–1.1	–2.2	–1.3	–0.1	–2.1	–0.4	–0.1	–0.3	–0.2
Dec	0.0	–0.9	–0.2	0.3	–0.5	0.1	–0.2	–0.8	–0.3
1997									
Mar	0.7	0.0	0.5	0.4	–0.1	0.4	0.8	–0.3	0.6
Jun	–0.3	–1.1	–0.4	–0.2	–0.7	–0.3	0.6	–0.1	0.5
Sep	0.2	1.6	0.5	0.6	1.7	0.8	0.4	2.8	0.8
Dec	1.0	0.7	0.9	0.6	3.4	1.2	1.3	3.8	1.8
1998									
Mar	–0.9	0.3	–0.7	–0.8	0.8	–0.5	–0.3	1.1	0.1
Jun	–0.2	0.7	0.0	0.0	1.3	0.3	1.1	1.6	1.2

Index numbers *continued*   4.7   The following table provides a summary of some key data from table 3.

EXPERIMENTAL INDEX NUMBERS FOR JUNE QUARTER 1998—
Base: 1989–90 = 100.0

	Preliminary (Stage 1) goods	*Intermediate (Stage 2) goods*	*Final (Stage 3) goods*
Domestically produced	110.6	113.0	111.8
Imports	108.6	117.4	123.5
Total	110.2	113.8	114.1

4.8   It can be seen that, over the eight-year period between 1989–90 and June quarter 1998, the price index for domestically produced Final (Stage 3) goods increased by a relatively modest 11.8% while prices for imported Final goods increased by a more substantial 23.5%. The resulting index for total Final goods increased by 14.1% (reflecting the impact of an approximately 80:20 weighting applied in combining the domestic and import series).

4.9   Table 5 shows a decomposition of the Final goods index series into consumption, capital and export goods. Table 6 presents the corresponding annual and quarterly percentage changes.

5 EXPERIMENTAL INDEX NUMBERS FOR FINAL (STAGE 3) GOODS, BY DESTINATION—
Base of each index: 1989–90 = 100.0

Period	Domestic					Imports			Total				
	Consumer	Capital	Consumption + Capital	Exports	Total	Consumption	Capital	Total	Consumption	Capital	Consumption + Capital	Exports	Total
Year													
1991–92	106.8	105.3	106.4	91.2	100.5	106.8	103.9	105.3	106.8	104.7	106.1	91.2	101.4
1992–93	109.3	108.8	109.1	95.4	103.8	117.2	117.6	117.4	110.8	112.9	111.5	95.4	106.4
1993–94	111.0	112.4	111.4	94.0	104.6	120.9	122.9	122.0	113.0	117.3	114.4	94.0	108.0
1994–95	113.7	113.7	113.7	96.3	106.9	119.1	121.5	120.4	114.8	117.3	115.6	96.3	109.5
1995–96	116.8	115.5	116.5	97.5	109.1	118.9	119.2	119.1	117.2	117.2	117.2	97.5	111.0
1996–97	118.7	115.8	118.0	93.1	108.3	114.3	112.0	113.0	117.9	114.0	116.6	93.1	109.2
Quarter													
1991													
Sep	106.0	104.8	105.7	90.5	99.7	104.1	101.3	102.6	105.6	103.2	104.8	90.5	100.3
Dec	106.7	104.8	106.2	89.9	99.8	105.4	102.9	104.1	106.4	103.9	105.6	89.9	100.6
1992													
Mar	107.0	105.4	106.6	92.6	101.1	108.9	105.8	107.2	107.4	105.6	106.8	92.6	102.3
Jun	107.4	106.3	107.2	92.0	101.2	108.9	105.8	107.2	107.7	106.1	107.2	92.0	102.4
Sep	108.2	107.2	108.0	94.8	102.8	114.1	112.8	113.4	109.4	109.9	109.5	94.8	104.9
Dec	108.9	108.2	108.7	96.3	103.9	117.1	117.7	117.4	110.5	112.6	111.2	96.3	106.5
1993													
Mar	109.9	109.5	109.8	96.6	104.6	118.1	118.9	118.6	111.5	113.9	112.3	96.6	107.4
Jun	110.1	110.3	110.1	93.7	103.7	119.5	121.0	120.3	111.9	115.3	113.0	93.7	107.0
Sep	110.5	111.3	110.7	96.1	105.0	123.0	125.5	124.4	112.9	117.9	114.6	96.1	108.8
Dec	111.0	112.2	111.3	95.8	105.2	123.5	125.5	124.6	113.4	118.4	115.1	95.8	109.0
1994													
Mar	110.7	112.8	111.2	92.7	104.0	118.8	120.4	119.6	112.3	116.4	113.6	92.7	107.0
Jun	112.0	113.3	112.3	91.6	104.2	118.4	120.4	119.5	113.2	116.6	114.4	91.6	107.2
Sep	112.4	113.2	112.6	92.3	104.7	118.6	120.4	119.6	113.7	116.6	114.6	92.3	107.6
Dec	112.9	113.2	112.9	94.1	105.6	116.9	118.7	117.9	113.7	115.8	114.4	94.1	108.0
1995													
Mar	114.3	113.8	114.2	97.2	107.5	118.0	120.0	119.1	115.1	116.7	115.6	97.2	109.8
Jun	115.3	114.7	115.1	101.6	109.8	122.8	126.8	125.0	116.8	120.3	117.9	101.6	112.8
Sep	116.5	115.2	116.2	100.1	109.9	121.9	123.4	122.7	117.6	119.0	118.1	100.1	112.4
Dec	117.0	115.4	116.6	97.9	109.3	119.9	120.9	120.4	117.6	118.0	117.7	97.9	111.5
1996													
Mar	116.8	115.6	116.5	97.9	109.2	118.7	118.9	118.8	117.2	117.1	117.1	97.9	111.1
Jun	117.0	115.9	116.7	94.3	107.9	115.1	113.6	114.3	116.6	114.8	116.0	94.3	109.2
Sep	117.6	115.6	117.1	93.4	107.8	114.8	113.1	113.9	117.1	114.4	116.2	93.4	109.0
Dec	118.6	115.6	117.9	91.7	107.6	113.9	112.2	113.0	117.7	114.0	116.5	91.7	108.7
1997													
Mar	119.4	116.0	118.5	92.9	108.5	114.1	111.5	112.7	118.3	113.9	116.9	92.9	109.3
Jun	119.4	116.0	118.6	94.4	109.1	114.3	111.1	112.6	118.4	113.7	116.8	94.4	109.8
Sep	118.0	116.3	117.6	96.9	109.5	117.4	114.4	115.8	117.9	115.4	117.1	96.9	110.7
Dec	118.4	116.7	118.0	99.8	110.9	122.0	118.7	120.2	119.1	117.6	118.6	99.8	112.7
1998													
Mar	117.8	116.9	117.6	99.8	110.6	123.8	119.6	121.5	119.0	118.2	118.7	99.8	112.8
Jun	118.7	118.3	118.6	101.2	111.8	126.2	121.2	123.5	120.2	119.6	120.0	101.2	114.1

6 EXPERIMENTAL INDEX NUMBERS, FINAL (STAGE 3) GOODS, BY DESTINATION—Percentage change (from previous period)

Period	Domestic					Imports						Total	
	Con-sump-tion	Capital	Con-sump-tion + Capital	Exports	Total	Con-sump-tion	Capital	Total	Con-sump-tion	Capital	Con-sump-tion + Capital	Exports	Total
Year													
1992–93	2.3	3.3	2.5	4.6	3.3	9.7	13.2	11.5	3.7	7.8	5.1	4.6	4.9
1993–94	1.6	3.3	2.1	–1.5	0.8	3.2	4.5	3.9	2.0	3.9	2.6	–1.5	1.5
1994–95	2.4	1.2	2.1	2.4	2.2	–1.5	–1.1	–1.3	1.6	0.0	1.0	2.4	1.4
1995–96	2.7	1.6	2.5	1.2	2.1	–0.2	–1.9	–1.1	2.1	–0.1	1.4	1.2	1.4
1996–97	1.6	0.3	1.3	–4.5	–0.7	–3.9	–6.0	–5.1	0.6	–2.7	–0.5	–4.5	–1.6
Quarter													
1991													
Dec	0.7	0.0	0.5	–0.7	0.1	1.2	1.6	1.5	0.8	0.7	0.8	–0.7	0.3
1992													
Mar	0.3	0.6	0.4	3.0	1.3	3.3	2.8	3.0	0.9	1.6	1.1	3.0	1.7
Jun	0.4	0.9	0.6	–0.6	0.1	0.0	0.0	0.0	0.3	0.5	0.4	–0.6	0.1
Sep	0.7	0.8	0.7	3.0	1.6	4.8	6.6	5.8	1.6	3.6	2.1	3.0	2.4
Dec	0.6	0.9	0.6	1.6	1.1	2.6	4.3	3.5	1.0	2.5	1.6	1.6	1.5
1993													
Mar	0.9	1.2	1.0	0.3	0.7	0.9	1.0	1.0	0.9	1.2	1.0	0.3	0.8
Jun	0.2	0.7	0.3	–3.0	–0.9	1.2	1.8	1.4	0.4	1.2	0.6	–3.0	–0.4
Sep	0.4	0.9	0.5	2.6	1.3	2.9	3.7	3.4	0.9	2.3	1.4	2.6	1.7
Dec	0.5	0.8	0.5	–0.3	0.2	0.4	0.0	0.2	0.4	0.4	0.4	–0.3	0.2
1994													
Mar	–0.3	0.5	–0.1	–3.2	–1.1	–3.8	–4.1	–4.0	–1.0	–1.7	–1.3	–3.2	–1.8
Jun	1.2	0.4	1.0	–1.2	0.2	–0.3	0.0	–0.1	0.8	0.2	0.7	–1.2	0.2
Sep	0.4	–0.1	0.3	0.8	0.5	0.2	0.0	0.1	0.4	0.0	0.2	0.8	0.4
Dec	0.4	0.0	0.3	2.0	0.9	–1.4	–1.4	–1.4	0.0	–0.7	–0.2	2.0	0.4
1995													
Mar	1.2	0.5	1.2	3.3	1.8	0.9	1.1	1.0	1.2	0.8	1.0	3.3	1.7
Jun	0.9	0.8	0.8	4.5	2.1	4.1	5.7	5.0	1.5	3.1	2.0	4.5	2.7
Sep	1.0	0.4	1.0	–1.5	0.1	–0.7	–2.7	–1.8	0.7	–1.1	0.2	–1.5	–0.4
Dec	0.4	0.2	0.3	–2.2	–0.5	–1.6	–2.0	–1.9	0.0	–0.8	–0.3	–2.2	–0.8
1996													
Mar	–0.2	0.2	–0.1	0.0	–0.1	–1.0	–1.7	–1.3	–0.3	–0.8	–0.5	0.0	–0.4
Jun	0.2	0.3	0.2	–3.7	–1.2	–3.0	–4.5	–3.8	–0.5	–2.0	–0.9	–3.7	–1.7
Sep	0.5	–0.3	0.3	–1.0	–0.1	–0.3	–0.4	–0.3	0.4	–0.3	0.2	–1.0	–0.2
Dec	0.9	0.0	0.7	–1.8	–0.2	–0.8	–0.8	–0.8	0.5	–0.3	0.3	–1.8	–0.3
1997													
Mar	0.7	0.3	0.5	1.3	0.8	0.2	–0.6	–0.3	0.5	–0.1	0.3	1.3	0.6
Jun	0.0	0.0	0.1	1.6	0.6	0.2	–0.4	–0.1	0.1	–0.2	–0.1	1.6	0.5
Sep	–1.2	0.3	–0.8	2.6	0.4	2.7	3.0	2.8	–0.4	1.5	0.3	2.6	0.8
Dec	0.3	0.3	0.3	3.0	1.3	3.9	3.8	3.8	1.0	1.9	1.3	3.0	1.8
1998													
Mar	–0.5	0.2	–0.3	0.0	–0.3	1.5	0.8	1.1	–0.1	0.5	0.1	0.0	0.1
Jun	0.8	1.2	0.9	1.4	1.1	1.9	1.3	1.6	1.0	1.2	1.1	1.4	1.2

4.10   The following table provides a summary of some key data from table 5.

EXPERIMENTAL INDEX NUMBERS FOR JUNE QUARTER 1998—
Base: 1989–90 = 100.0

					Final goods
	Consumption	*Capital*	*Consumption plus Capital*	*Exports*	*Total*
Domestically produced	118.7	118.3	118.6	101.2	111.8
Imports	126.2	121.2	123.5	. .	123.5
Total	120.2	119.6	120.0	101.2	114.1

4.11   It can be seen that over the period 1989–90 to June quarter 1998, the modest 11.8% increase for domestic Final goods can be attributed to the dampening effect of export prices. A marginal rise of 1.2% in Export prices over the period offset the much more substantial 18.6% increase in prices of goods destined for domestic final consumption and capital formation. When combined with imports the total Final goods index, excluding exports, rose by 20.0%.

4.12   A further observation is that for both domestic and imported Final goods, prices of consumption goods increased slightly more than prices of capital goods.

4.13   Returning to the table in paragraph 4.7, the index for domestic Intermediate (Stage 2) goods rose between 1989–90 and June quarter 1998 by less than the imported series (13.0% compared with 17.4%) leading to a 13.8% increase in the total Intermediate goods index.

4.14   For Preliminary (Stage 1) goods, the domestically produced series increased between 1989–90 and June quarter 1998 by a greater amount than the imports series (10.6% compared with 8.6%) resulting in an increase of 10.2% in the Preliminary goods index.

4.15   It is interesting to note the different impacts of import prices on the total indexes for each stage. In the case of Final goods, import prices had a substantial upward impact while for Intermediate goods, prices of imported goods had a more modest upward impact. However, for Preliminary goods import prices had a moderating influence.

4.16   Another observation is that, for each Stage, the series for imports is far more volatile than the series for domestic goods (see tables 4 and 6). This is largely attributable to exchange rate movements.

4.17   In summary, the growth in the index over the eight-year period for each stage progressively increases as shown below:

Preliminary goods	+10.2%
Intermediate goods	+13.8%
Final goods (excluding exports)	+20.0%.

4.18   The table in paragraph 4.10 shows that the 20.0% increase in Final goods (excluding exports) prices comprises price increases of 20.2% for Consumption goods and 19.6% for Capital goods. The 20.2% increase in the producer price index for Final Consumption goods can be compared with an increase of 23.1% over the same period for the goods component of the Consumer Price Index (table 7 of *Consumer Price Index, June Quarter 1998* (Cat. no. 6401.0)). This indicates a continuation of the progressive increase in the growth of prices of goods as they advance along the production and distribution chain associated with, for example, wholesale, transport and retail margins being added to the value of the goods.

4.19   This progressive increase in the growth of goods prices over the eight-year period of study could be attributable to price pressures from *other inputs*, apart from goods. That is, prices of intermediate inputs of services as well as goods, labour costs, indirect tax rates and changes in profit margins also need to be considered. Prima facie, it could be deduced that, taken together, the prices of these *other inputs* rose at a greater rate than the prices of *goods* over the period, culminating in the progressive increases along the production and distribution chain.

4.20   Obviously a more complete statistical framework is required to support a rigorous study of inflation processes. A comprehensive SOP data model, intended for this purpose, is articulated in section 5. Further analysis of the available data is also undertaken.

5—A COMPREHENSIVE SOP DATA MODEL

The model   5.1   While the presentation of the experimental indexes within the SOP framework is expected to increase the usefulness of the available price data, it represents a very incomplete picture of the inflation process because of limitations in both the scope and coverage of the data.

5.2   The conceptual scope of the producer price index SOP index model relates to the output of *all* domestic goods and services industries, whether used domestically or exported. The model also incorporates imports flowing into each stage of production.

5.3   However, data availability has restricted the initial coverage of domestic output in the experimental SOP indexes to goods producing industries, excluding the construction industry. Prices of service industry and construction industry commodity flows are therefore not included in the experimental series. The scope of the current import series is restricted to merchandise.

5.4   Further, the scope of a fully comprehensive data model would incorporate all the key aggregates contained in the Input-Output framework. Thus, in addition to the industry output, the scope of the complete model would include primary inputs (i.e. labour costs, Gross operating surplus (GOS) and Indirect taxes) as each of these elements can represent an important source of inflationary pressure.

The model *continued*   5.5   Diagram 2 provides a summary of this comprehensive model and identifies some of the potential price transmission linkages.

5.6   This data model allows for the extension of analyses by including additional data as they become available. In the longer term, the analyses could incorporate data relating to service industry outputs from new producer price index collections that are being developed. Similarly, wage costs could be represented by data from the newly released indexes of wage costs (*Wage Cost Index, Australia* (Cat. no. 6345.0)). However, change in the rate of GOS is more problematic as it is not directly measurable.

5.7   In diagram 2, potential linkages between available experimental SOP index aggregates are represented by solid arrows. Other possible linkages are shown by broken arrows and provide for the future introduction of additional information that would form part of a more complete analysis.

Leading indicators   5.8   A potential leading indicator of economy-wide inflation, as measured by a DFP index covering both consumption and capital transactions, would be the index aggregate 'Final goods—Total Consumption plus Capital' from the experimental SOP indexes. A more complete study would include measures of price change for final services and Indirect taxes.

5.9   On the other hand, for an analysis focusing on household consumer inflation (as measured by the Household Consumption Purchases component of a Domestic Final Purchases index), 'Final goods—Total Consumption', along with indicators for final consumption services (particularly relating to wholesale and retail trade margins and transport costs) and relevant indirect taxes, would be a potential leading indicator.

**2   COMPREHENSIVE STAGE OF PRODUCTION DATA MODEL(a)**
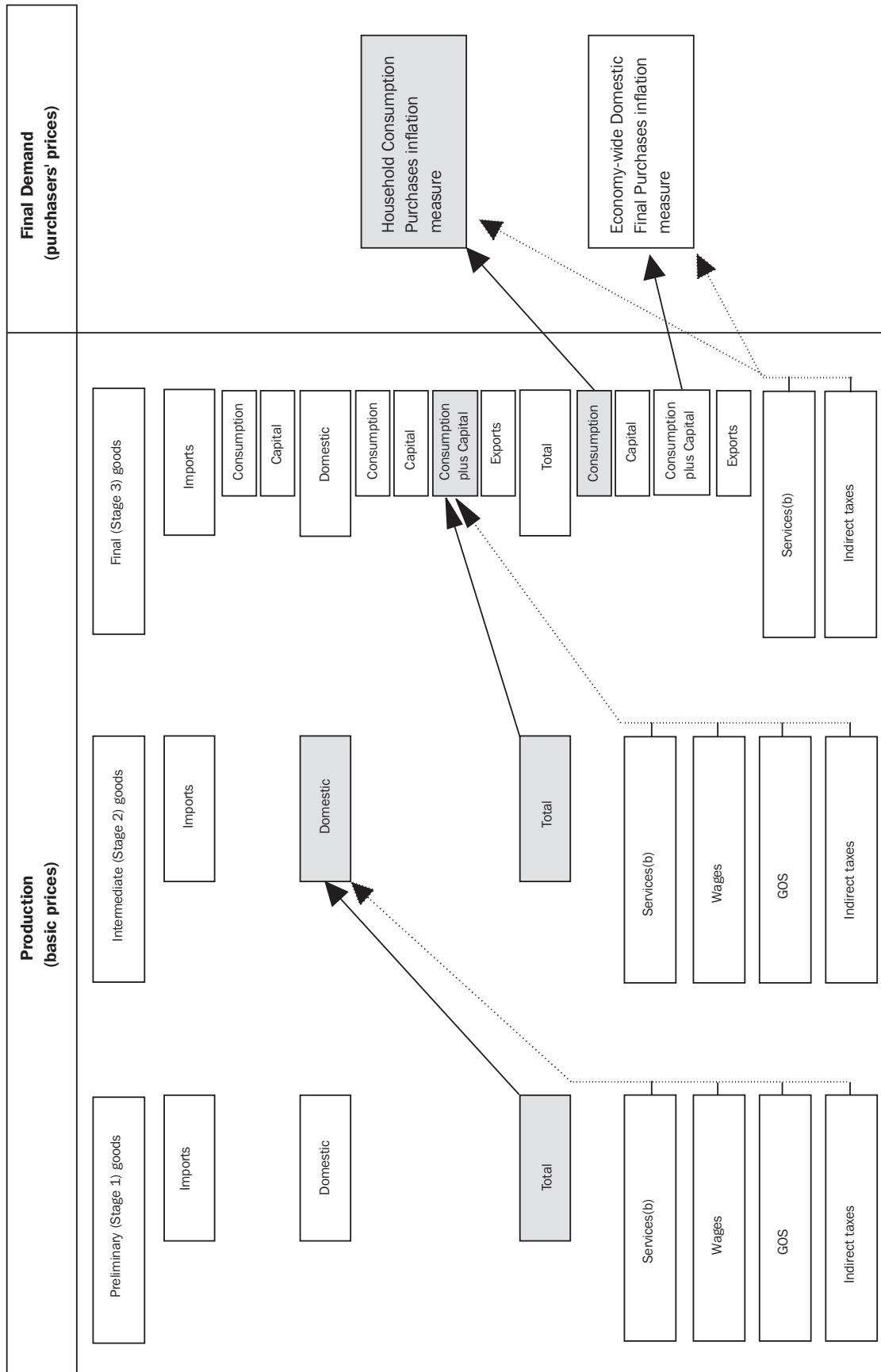
(a) See paragraphs 5.10 and 5.23 for an explanation of the shaded boxes. (b) Includes trade and transport services which are margins representing the difference between basic prices and purchasers' prices.

Case study   5.10   As a case study, data on the latter stages of production and distribution are examined more closely below. The following graph summarises the behaviour of the SOP 'Final goods—Total Consumption' series and the Consumer Price Index (CPI) goods component series. In the data model illustrated in diagram 2, these data series are represented by the two shaded boxes on the right-hand-side, joined by a solid arrow.

COMPARISON, CPI GOODS COMPONENT AND TOTAL FINAL (STAGE 3) CONSUMPTION GOODS— Base: Year 1989–90 = 100.0
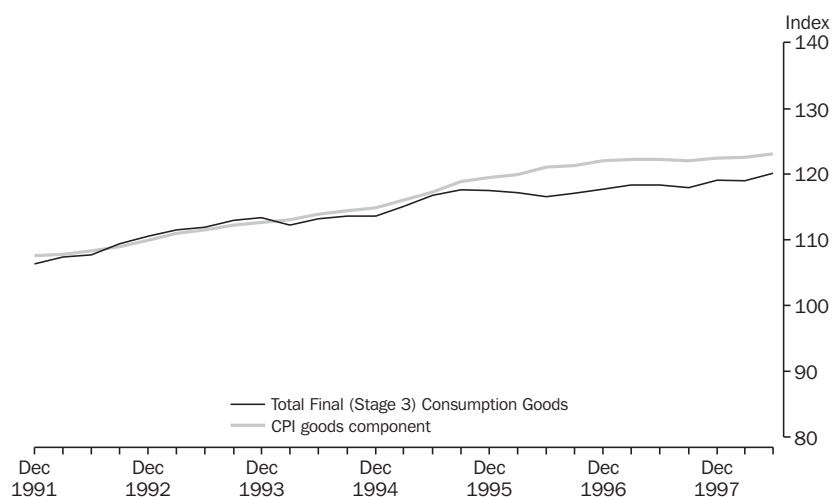
5.11   As noted in section 4, over the period 1989–90 to June quarter 1998, the CPI-based series increased by more than the SOP-based series (23.1% compared with 20.2%). However, the relative rates of change in the two series varied over time, as can be seen below, where the index changes are presented for separate intervals of the total period of study.

	SOP-based series	CPI-based series
Interval	%	%
1989–90–Sep 1991	5.6	7.0
Sep 1991–Jun 1993	5.9	4.2
Jun 1993–Jun 1995	4.4	5.2
Jun 1995–Jun 1998	2.9	4.9
Total period	20.2	23.1

5.12   For the first interval (of nearly two years), the CPI-based series rose at a significantly greater rate than the SOP-based series, while over the second interval (again, just under two years) the situation reversed with the SOP series outstripping the CPI series.

5.13   However, over the third (two year) interval the pattern reverted to that of the first interval with the rate of increase in the CPI series a little higher than that of the SOP series. Finally, in the fourth (three year) interval, the disparity in the rates of change increased as the CPI series increased at a much greater rate than the SOP series.

5.14   Looking separately at the imported component of each of the series[2] for each of the four intervals, import prices have generally had a dampening effect in each of the intervals. The outstanding exception is for the SOP series over the second interval (September 1991 to June 1993) when import prices rose by 14.8%, boosting a 3.9% increase in domestic prices to an increase of 5.9% in the total series. That is, import price rises caused the SOP index series to increase by more than the CPI series in this interval.

5.15   However, most of the 14.8% increase in prices of imported final consumption goods recorded in the SOP series does not appear to have flowed through to the relevant component of the CPI over the period. In order to rationalise this situation, the other cost elements associated with distributing imported goods to consumers would need to be considered.

5.16   That is, a reconciliation is required of:

(i)   the f.o.b. import prices of consumption goods from the SOP framework (which are recorded on a valuation basis earlier than that associated with basic prices);

(ii)   the prices recorded in the relevant component of the CPI which are valued at purchasers' prices; and

(iii)   the different costs associated with moving from a pre-basic prices valuation basis to a purchasers' prices valuation basis.

5.17   As explained in footnote 1 in section 1, the difference between basic prices and purchasers' prices comprises:

- indirect taxes less subsidies,

- wholesale and retail trade margins, and

- transport charges.

5.18   In addition, because the prices of the imported consumer goods are recorded on an f.o.b. basis it is also necessary to consider international freight and insurance.

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[2]   Source: The imported component of SOP series is contained in table 5 above, and the imported component of the CPI goods series is published in *Consumer Price Index: Effect of Changes in Prices of Imported Items, June Quarter 1998* (Cat. no. 6444.0).

5.19　In assessing the behaviour of the different trade and transport margins, indirect taxes and international freight charges, the following questions could be posed.

1　Were there any changes in the indirect tax regime over the period? In particular, did the rates of wholesale sales taxes and excise taxes change?

2　Is there any evidence of wholesalers and retailers absorbing any of the price rises for imported consumer goods by reducing profit margins?

3　What movement was there in freight costs over the period, especially for road transport?

4　Did international freight charges on imports change significantly?

5.20　The second question would be the most difficult to answer because of statistical measurement complexities.

5.21　Generalising this specific analysis, if the work the ABS is undertaking in expanding its data collection and analysis on service industry price movements (especially for freight charges) assists in answering at least some of the questions posed above, then we are closer to being able to use the data model to assist in deriving estimates of period-to-period changes in wholesale and retail trade margins as a residual.

5.22　Within the framework of the data model, similar exercises could be undertaken in relation to trade margins on domestically sourced goods.

Lead-lag analysis　5.23　A preliminary lead-lag analysis of the relevant series that have the potential linkages illustrated by the shaded boxes in diagram 2 did not reveal evidence of any significant lead-lag relationships between the selected pairs of price indexes. However, the analysis was limited because of the relatively short period of study and the low inflation rates over the period.

5.24　In the future, it will be informative to extend the lead-lag analysis to incorporate the additional data shown in diagram 2 as they become available (e.g. producer price indexes for service industries, the Wage Cost Index, etc.) and for a longer time period.

6—ISSUES FOR FURTHER CONSIDERATION

Treatment of exports　6.1　As explained in section 3, the scope of the SOP index model includes both exports and imports as well as domestically produced and consumed final goods (i.e. 'Final goods—Domestic—Consumption plus Capital', in diagram 1). This approximates the national accounts concept of National turnover (of goods).

6.2   The model also provides for the separate analyses of:

(i)   domestically consumed final goods plus exports but exclusive of imports (i.e. 'Final goods—Domestic', in diagram 1) which approximates Gross domestic product (of goods); and

(ii)   domestically produced final goods plus imports but exclusive of exports (i.e. 'Final goods—Domestic— Consumption plus Capital', plus 'Final goods—Imports' in diagram 1) approximating Gross national expenditure (on goods).

6.3   The model is flexible in allowing for the tailoring of analyses of indexes of final goods to be targeted at National turnover, Gross domestic product or Gross national expenditure. However, there is not the same flexibility associated with the Intermediate (Stage 2) goods and Preliminary (Stage 1) goods indexes, as the 'Intermediate goods— Domestic', and 'Intermediate goods—Imports' aggregates (see diagram 1) both include goods that flow to *all* Final goods (that is, National turnover of goods).

6.4   Therefore, analyses focusing on, say, assessing price transmission effects between Stage 2 goods, Stage 3 goods exclusive of exports (Gross national expenditure) and DFP (see diagram 2) could give misleading signals. The reason is that Stage 2 will include goods that are destined to be inputs to the production of Stage 3 goods for export. Such export prices do not *directly* impact on domestic inflation and should be excluded for this analysis.

6.5   Similarly, the Stage 1 goods aggregates include those destined for the production of Stage 2 goods that subsequently flow into the production of Stage 3 goods for export.

6.6   Users' views are requested on whether the model should be further complicated through the calculation of indexes for subsets of the Stage 2 and Stage 1 aggregates which exclude flows relating to the production of goods for export.

6.7   No assessment has yet been made as to the feasibility or desirability of such an elaboration. The practical reality is that it may be necessary to make a choice between an index model that completely excludes, or completely includes, transactions associated with exports.

Number of stages   6.8   In section 2, it is stated that aggregating data relating to *all* the non-final commodities would result in multiple counting of transactions. Therefore, under the SOP model developed in this paper, the non-final commodities have been split between two stages, resulting in a total of three stages.

Number of stages *continued* 6.9   The development of the experimental indexes under the three-stage model was more complex and resource consuming than would have been the case for a relatively straightforward two-stage model comprising final goods and non-final goods, and with non-final goods being on a gross sector basis.

6.10   Users' views are sought on the relative merits of a three-stage model compared with a two-stage model. In this regard, basic issues to be addressed include an assessment of:

(i)   the extent to which the multiple counting of transactions in indexes compiled on a gross sector basis leads to distorted results; and

(ii)   whether a three-stage model provides greater potential for identifying early price signals, particularly within a more comprehensive data model, and in times of higher inflation.

6.11   Readers' views on these issues, and any other matters associated with the experimental SOP indexes, will be welcomed.

PART B	EXPERIMENTAL INDEX NUMBERS FOR SELECTED SERVICE INDUSTRIES

7—INTRODUCTION

7.1 In recognition of the increasing contribution of service industries to the Australian economy, the ABS has embarked on a long-term development program to progressively extend the scope of the producer price indexes into the service sectors of the economy. Similar initiatives are also being undertaken by statistical agencies in several other countries.

7.2 The main objectives of the development program are to generate additional price index series to:

(i) be of use in their own right for industry analysis;

(ii) assist in improving the quality of the national accounts by providing a wider range of deflators for deriving real measures of economic growth; and

(iii) contribute to the development of new measures of inflation through expanding the coverage of the indexes compiled under the SOP framework.

8—METHODOLOGY

8.1 The service industry price index development work is taking place within the classification framework provided by the Australian and New Zealand Standard Industrial Classification (ANZSIC). The work to date has focused on a selection of industry classes in the Transport and Storage Division and the Property and Business Services Division of the ANZSIC. In selecting the industry classes for initial study, particular attention has been given to national accounts priorities.

8.2 Developing these new collections has involved a wide range of diverse industries and there have been particularly complex measurement problems. Customised approaches to price collection have had to be adopted on a case-by-case basis because of the tendency in many service industries to provide one-off, unique services tailored to each particular customer's needs. Also, difficulties have been encountered in fully identifying and specifying all of the price influencing characteristics of the service actually provided.

8.3 This has necessitated extensive consultation with industry associations and individual businesses to determine the most viable approach. For these and other reasons, the development of the indexes has proven to be very resource intensive, involving a long elapsed time between commencement of the initial desk top research and the actual compilation of useable series.

8.4 The weighting patterns of the indexes are based on data from a variety of sources, primarily ABS surveys and industry data.

| 8—METHODOLOGY *continued* | 8.5   The indexes have reference base periods which vary according to when the first data became available. In some cases the price history goes back a number of years, while in other cases it was not possible to obtain retrospective data. |

9—THE EXPERIMENTAL INDEX NUMBERS

9.1   Experimental index number series for each of the following ANZSIC classes are presented below, along with a brief outline of the index scope and coverage and summary of the results:

- Road Freight Transport—ANZSIC 6110

- Rail Transport—ANZSIC 6200 (part)

- Grain Storage—ANZSIC 6701

- Storage n.e.c.—ANZSIC 6709

- Commercial Property Operators and Developers—ANZSIC 7712 (part)

- Real Estate Agents—ANZSIC 7720 (part)

- Motor Vehicle Hiring—ANZSIC 7741

- Plant Hiring or Leasing—ANZSIC 7743

- Surveying Services—ANZSIC 7822

- Data Processing Services—ANZSIC 7831.

Road Freight Transport— ANZSIC 6110

9.2   The Price Index of Road Freight Transport covers the major road freight categories such as bulk freight, express freight, refrigerated freight, etc. The index covers both short- and long-haul freight transport.

9.3   The table below shows the Price Index of Road Freight Transport for the period March quarter 1997 to June quarter 1998.

EXPERIMENTAL PRICE INDEX OF ROAD FREIGHT—Base: March quarter 1997 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1996–97	. .	. .	100.0	100.0
1997–98	100.0	100.8	101.8	101.5

Rail Transport—ANZSIC 6200 (part)

9.4   The index covers all the *freight* activities defined within ANZSIC Class 6200 Rail Transport. The passenger transport component of this class is already largely covered by the urban rail and holiday rail travel components of the Consumer Price Index. The index for the freight component represents a new collection with the results shown below.

EXPERIMENTAL PRICE INDEX OF RAIL FREIGHT TRANSPORT—
Base: Year 1989–90 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1990–91	100.1	103.3	103.4	102.4
1991–92	103.6	103.6	103.6	104.3
1992–93	104.4	105.5	105.0	104.5
1993–94	105.6	105.6	105.6	104.9
1994–95	105.0	105.3	105.3	105.0
1995–96	104.9	105.1	105.3	105.6
1996–97	104.3	103.8	104.5	104.5
1997–98	104.0	103.8	103.1	103.2

9.5   The index has been relatively stable over the last six years, reflecting competitive pressures in the industry, especially from road freight. The index numbers are graphed below.

PRICE INDEX OF RAIL FREIGHT TRANSPORT(a)

(a) Base : Year 1989–90 = 100.0.
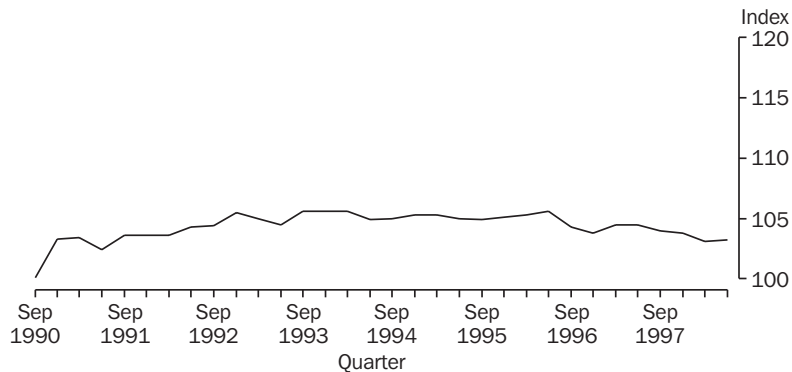
Grain Storage—ANZSIC 6701

9.6   The Grain Storage Index covers activities such as grain elevator operation, grain silo operation, grain storage and services related to the storage of grain. The operation of grain loading facilities at water terminals is excluded as this is classified to ANZSIC Class 6622, Water Transport Terminals.

9.7   Movements in the Price Index of Grain Storage have occurred annually (in the March quarter), largely reflecting the impact of summer crops, particularly wheat.

EXPERIMENTAL PRICE INDEX OF GRAIN STORAGE—
Base: September Quarter 1990 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1990–91	100.0	100.0	99.8	99.8
1991–92	99.8	99.8	101.5	101.5
1992–93	101.5	101.5	101.7	101.7
1993–94	101.7	101.7	101.1	101.1
1994–95	101.1	101.1	108.2	108.2
1995–96	108.2	108.2	110.6	110.6
1996–97	110.6	110.6	114.0	114.0
1997–98	114.0	114.0	113.1	113.1

9.8   Overall the index has risen by 13.1.% since September quarter 1990, with most of the increase occurring since December quarter 1994.

PRICE INDEX OF GRAIN STORAGE(a)
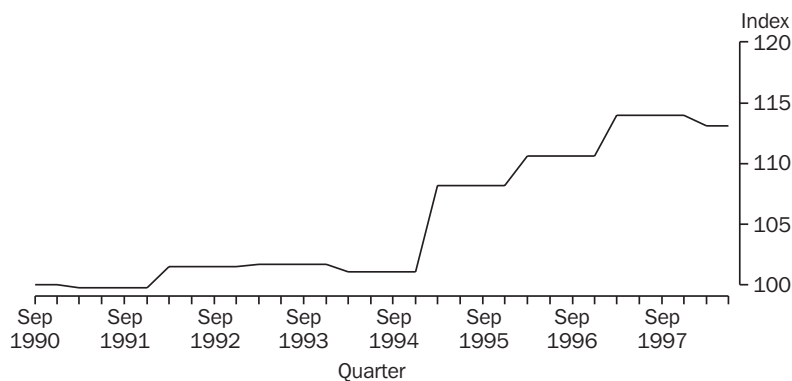
(a) Base : September quarter 1990 = 100.0.

Storage n.e.c.—ANZSIC
6709

9.9   The Price Index of Storage n.e.c. directly covers the four major storage categories covered by this ANZSIC class: controlled atmosphere storage, self storage, records management and warehousing. The majority of the services priced relate to the provision of services on a long-term contract basis. The exception is self-storage operators that mainly service small domestic clients on a list price basis.

9.10   As price data have only been collected from September quarter 1996, it is not yet possible to identify a trend in the movement of storage prices. The index numbers are presented below and show an increase of 11.8% between September quarter 1996 and June quarter 1998. This was largely due to increased warehouse storage rates.

EXPERIMENTAL PRICE INDEX OF STORAGE n.e.c.—
Base: September quarter 1996 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1996–97	100.0	102.7	106.4	108.1
1997–98	110.9	109.4	110.4	111.8

Commercial Property
Operators and Developers—
ANZSIC 7712 (part)

9.11   ANZSIC class 7712 (part), Commercial Property Operators and Developers, consists of businesses mainly engaged in:

■ the renting or leasing of commercial (office), retail, industrial, agricultural or pastoral property as the owner or leaseholder;

■ conference/convention centre operations; and/or

■ land subdivision and development, excluding construction.

9.12   The ABS collects data in relation to the first two activities listed above. Problems with data definition and collection have led to land subdivision and development activity being excluded from the index at this stage.

9.13   For commercial, retail and industrial property, the sample is stratified by activity and location and covers the six State capital cities and Canberra. Renting or leasing of agricultural or pastoral property has been excluded from the index as it is not significant.

9.14   The sample for conference/convention centres covers all State and Territory capitals. Hotel operations, often associated with conference/convention centres (and included with commercial property in some industry publications), are classified to different ANZSIC classes (5710 or 5720) and are thus not covered by this index.

9.15   The Price Index of Commercial Property Operators has risen by 13.0% between June quarter 1995 and June quarter 1998.

EXPERIMENTAL PRICE INDEX OF COMMERCIAL PROPERTY OPERATORS—
Base: Year 1995–96 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1994–95	. .	. .	. .	97.5
1995–96	98.7	99.7	100.6	101.0
1996–97	101.9	103.1	104.9	106.1
1997–98	107.6	108.2	108.8	110.2

COMMERCIAL PROPERTY OPERATORS(a)
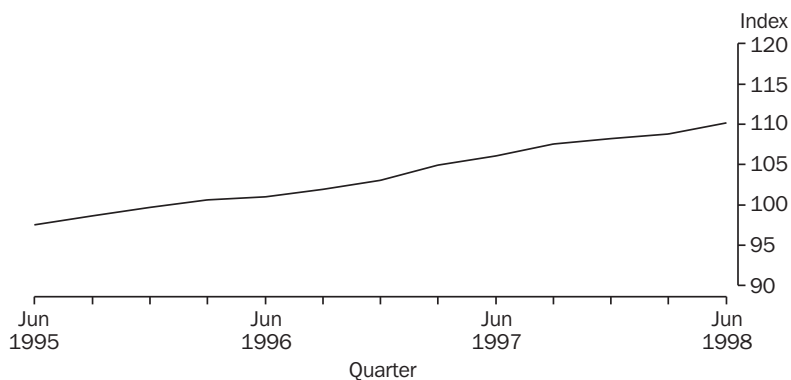
(a) Base : Year 1995–96 = 100.0.

Real Estate Agents—
ANZSIC 7720 (part)

9.16   The real estate industry in Australia divides naturally into two main sectors, residential property and commercial/industrial property. Each of these sectors has two main components: property sales and property management. Reflecting this industry structure the ABS index of real estate agents' fees covers:

- the sale of a residential property;

- the management of leased residential property;

- the sale of a commercial property; and

- the management of leased commercial property.

9.17   The ABS collection in respect of residential property is a sample survey supplemented by direct collection from the head offices of major franchise operators. The sample of real estate agents selected was chosen from the ABS business register and relates only to the residential category of the industry. The sample on which the index is constructed is stratified by location and covers the largest five State capital cities.

9.18   The ABS has utilised data compiled by a major private commercial property management organisation to represent commercial sales and property management services. These are dominated by a few large businesses.

9.19   Between September quarter 1990 and June quarter 1998 the Price Index of Real Estate Agents' Fees has increased by 10%.

EXPERIMENTAL PRICE INDEX OF REAL ESTATE AGENTS' FEES—
Base: Year 1989–90 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1990–91	98.2	98.0	97.4	97.2
1991–92	97.6	96.6	95.6	95.0
1992–93	94.5	94.2	94.2	94.0
1993–94	91.9	92.2	93.3	94.1
1994–95	95.3	95.4	96.1	96.0
1995–96	96.3	96.3	96.4	97.3
1996–97	97.7	98.2	99.0	100.2
1997–98	101.9	103.7	105.7	108.0

PRICE INDEX OF REAL ESTATE AGENTS' FEES(a)
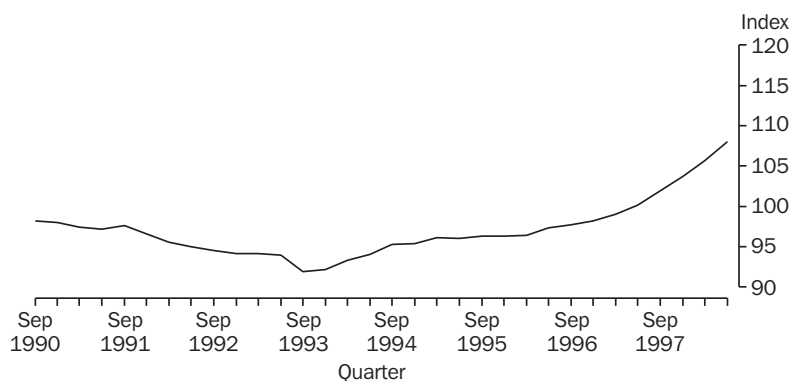
(a) Base : Year 1989–90 = 100.0.

Motor Vehicle
Hiring—ANZSIC 7741

9.20   The Price Index of Motor Vehicle Hiring covers activities classified to ANZSIC class 7741. This class consists of 'units mainly engaged in leasing, hiring and renting of motor vehicles from own stocks, without drivers (except licensed taxi cabs or hire cars)'. Included are all types of vehicles from passenger cars to trucks and buses, all hired or leased strictly without drivers or operators. Only operating leases are in-scope for this industry class (financial leases are included in ANZSIC class 7519, Services to Finance and Investment n.e.c.).

9.21   The Australian motor vehicle hiring and leasing industry is divided into two distinct sectors which are both represented in this index. One sector provides vehicles for temporary hire or rental, while the other supplies vehicles for leasing under long-term contractual agreements. Long-term leasing is generally undertaken by clients as an alternative to purchasing vehicles.

9.22   Between June quarter 1996 and June quarter 1998 the index for motor vehicle hiring has shown minor fluctuations with an overall slight downward trend. However, due to the different price determinants and market conditions prevailing in the long-term and the short-term sectors, analysis of the index at a disaggregated level is more indicative of industry trends.

EXPERIMENTAL PRICE INDEX OF MOTOR VEHICLE HIRING—
Base: June quarter 1996 = 100.0

Quarter	Short-term hiring	Long-term lease	Total
1996			
Jun	100.0	100.0	100.0
Sep	101.4	98.6	99.8
Dec	103.1	96.4	99.3
1997			
Mar	102.6	96.4	99.1
Jun	102.1	97.3	99.4
Sep	100.5	96.2	98.1
Dec	101.2	94.5	97.4
1998			
Mar	99.7	97.3	98.3
Jun	103.0	98.5	100.4

Motor Vehicle Hiring—ANZSIC 7741
continued

9.23   Prices in the short-term hire market are fairly volatile, mainly affected by supply and demand conditions and competitive pressure.

9.24   Price change in the long-term lease market is closely linked to changes in interest rates which are the major determinant of lease charges.

Plant Hiring or Leasing—ANZSIC 7743

9.25   This industry class consists of units mainly engaged in leasing, renting or hiring industrial machinery, plant or equipment (except transport equipment) without operators, from stock physically held for that purpose.

EXPERIMENTAL PRICE INDEX OF PLANT HIRING OR LEASING—
Base: June quarter 1996 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1995–96	. .	. .	. .	100.0
1996–97	99.3	97.3	95.3	95.7
1997–98	93.9	90.2	90.0	95.4

Surveying Services—ANZSIC 7822

9.26   This industry class consists of units mainly engaged in providing surveying services, including exploration surveying services on contract.

9.27   As price data have only been collected from March quarter 1997, it is not yet possible to identify a trend in the series. The index numbers for the period March quarter 1997 to June quarter 1998 are shown below. The series indicates minimal change over this period.

EXPERIMENTAL PRICE INDEX OF SURVEYING SERVICES—
Base: March quarter 1997 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1996–97	. .	. .	100.0	99.2
1997–98	101.0	102.0	102.0	99.9

Data Processing Services—ANZSIC 7831

9.28   The Price Index for Data Processing Services includes data from the four major data processing groups: computer time sharing services, data entry services, data processing services and tabulating services. The majority of the services priced relate to the provision of services on a long-term contract basis.

9.29   The collection of price data commenced with the March quarter 1997. The index series for the period March quarter 1997 to June quarter 1998 are shown below. The index increased by 4.9% over the period.

EXPERIMENTAL PRICE INDEX OF DATA PROCESSING SERVICES—
Base: March quarter 1997 = 100.0

Year	Sep qtr	Dec qtr	Mar qtr	Jun qtr
1996–97	. .	. .	100.0	100.0
1997–98	99.9	102.2	103.5	104.9

10—FUTURE DEVELOPMENTS

10.1   The index series presented above will be updated and released on a regular basis, but in a format which has not yet been finally determined.

10.2   Over the next 18 months, it is also planned to complete work in relation to a range of other ANZSIC classes in the Transport and Storage Division and the Property and Business Services Division. This work is currently in various stages of progress. The industry classes are listed below:

■ Scheduled International Air Transport—ANZSIC 6401 (part)

■ Scheduled Domestic Air Transport—ANZSIC 6402 (part)

■ Information Storage and Retrieval Services—ANZSIC 7832

■ Computer Maintenance Services—ANZSIC 7833

■ Computer Consultancy Services—ANZSIC 7834

■ Accounting Services—ANZSIC 7842

■ Advertising Services—ANZSIC 7851

■ Employment Placement Services—ANZSIC 7861

■ Contract Staff Services—ANZSIC 7862

■ Secretarial Services—ANZSIC 7863

■ Security and Investigative Services (Except Police)—ANZSIC 7864

■ Pest Control Services—ANZSIC 7865

■ Cleaning Services—ANZSIC 7866.

10.3   Within the same time frame, work will also commence on developing indexes for a number of additional industry classes within the Business Services Subdivision.

10.4   Once indexes have been established for the bulk of the industry classes within the Transport and Storage Division and the Property and Business Services Division, a coverage of about one-third of the gross output of the market component of the services sector will have been achieved.

10.5   Given that over 20% of the output of service industries flows to private final consumption expenditure (as opposed to intermediate usage by businesses)—especially in areas such as accommodation and restaurants, health, education and personal services—then the CPI data base will provide an extensive range of data to augment this data on business usage.

10—FUTURE DEVELOPMENTS *continued*

10.6 To place this coverage in context, the table below shows the contribution of different goods and services sectors (in terms of ANZSIC Divisions) to gross output of the market economy. It is based on data contained in table 4 of 1993–94 *Australian National Accounts, Input-Output Tables* (Cat. no. 5209.0). The data reflect Total supply, in basic prices, excluding the value of supply flowing to Government final consumption expenditure and the output of the nominal industry Ownership of dwellings.

TOTAL MARKET SUPPLY BY ANZSIC DIVISION, 1993–94

	Description	*$b*	*% of Total*	*% of Services*
A	Agriculture, etc.	27	4.4	..
B	Mining	33	5.4	..
C	Manufacturing	183	29.9	..
D	Electricity, Gas, Water	20	3.3	..
E	Construction	50	8.2	..
A–E	*GOODS*	*313*	*51.1*	..
F	Wholesale Trade	38	6.2	12.7
G	Retail Trade	37	6.0	12.4
H	Accommodation, Cafes & Restaurants	17	2.8	5.7
I	Transport & Storage	39	6.4	13.0
J	Communications	17	2.8	5.7
K	Finance & Insurance	39	6.4	13.0
L	Property & Business Services	57	9.3	19.1
M	Government Admin & Defence	8	1.3	2.7
N	Educaton	7	1.1	2.3
O	Health & Community Services	20	3.3	6.7
P	Culture & Recreation	12	2.0	4.0
Q	Personal & Other	8	1.3	2.7
F–Q	*SERVICES*	*299*	*48.9*	*100.0*
TOTAL		612	100.0	..

11—ISSUES FOR FURTHER CONSIDERATION

11.1 The ABS welcomes views on the work undertaken to date on the development of experimental price indexes for service industries, the plausibility of the results obtained and on priorities for future development of indexes.

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 margins, and transport margins invoiced separately by the producer.

Free on board (f.o.b.) Imports are priced on a free on board country of origin basis. This means that freight and insurance charges involved in shipping the goods from foreign to Australian ports are excluded from the prices, as are Australian import duties.

Gross domestic product (GDP) The total market value of goods and services produced in Australia after deducting the cost of goods and services used up in the process of production (intermediate consumption), but before deducting consumption of fixed capital.

Gross national expenditure The total expenditure within a given period on final goods and services (i.e. excluding goods and services used up during the period in the process of production) bought by Australian residents.

Gross operating surplus A measure of the surplus accruing to owners of incorporated enterprises from processes of production before deducting any explicit or implicit interest charges, rents or property incomes payable on the financial assets, land or other tangible non-produced assets required to carry on the production and before deducting consumption of fixed capital. The income earned by unincorporated enterprises from production is called mixed income, because it includes the labour income of the owners.

Gross output The market value of all the goods and services produced in Australia (before deducting intermediate consumption to derive Gross domestic product).

Index number series A series of numbers measuring movement over time from a reference period value. The reference 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.

National turnover The sum of Gross domestic product and the value of imports of goods and services.

Price index An indicator used to measure the proportionate changes in the prices of a specified set of goods and services.

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).

SELF-HELP ACCESS TO STATISTICS

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