Australian Bureau of Statistics

Information Paper:

Review of the Import Price Index and Export Price Index

1999

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INQUIRIES

- For further information about these and related statistics, contact Client services in any ABS office as shown at the back of this paper, or David Collins on 02 6252 6248.

CONTENTS

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
AHECC	Australian Harmonised Export Commodity Classification
ANZSIC	Australian and New Zealand Standard Industrial Classification 1993
BEC	Broad Economic Categories
BLS	Bureau of Labor Statistics
cif	cost, insurance and freight
CPI	Consumer Price Index
EPI	Export Price Index
fob	free on board
GDP	gross domestic product
HS	Harmonised System
IPI	Import Price Index
SITC	Standard International Trade Classification
SNA 93	System of National Accounts 1993
SOP	Stage of Production price index model

PREFACE

The Australian Import Price Index (IPI) and Export Price Index (EPI) are important economic statistics with each measure having a considerable history.

The Australian Bureau of Statistics (ABS) has maintained a program of periodic reviews of these indexes. While an important objective of the reviews has been to update item weights, the opportunity is also taken to reassess methodological aspects of the indexes. The ABS has embarked on the latest of these reviews.

The main purpose of this information paper is to seek user input into clarifying the key uses of the IPI and EPI, and assess the extent to which the indexes satisfy these uses.

The paper is structured as follows. A Summary outlines the key issues discussed in the paper. Part A provides a background to the review of each of the indexes. Part B outlines major uses of the IPI, assesses the conceptual and methodological bases of the index and proposes a number of technical changes. Part C provides a similar assessment of the EPI and also discusses issues and develops proposals for technical changes.

Finally, Part D of the paper seeks user comment on the uses and suitability of each index, and reactions to a number of proposed technical changes.

Comments would be appreciated by 26 November 1999, addressed to:

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SUMMARY

Comprehensive reviews of the Import Price Index (IPI) and the Export Price Index (EPI) have commenced. A major outcome of the reviews will be updated item weights for each index. A number of significant issues have also been identified for consideration during the reviews.

The Australian Bureau of Statistics (ABS) intends to use this information paper as a means of consulting with users on the key uses of each of the indexes and how well the indexes satisfy these uses. Feedback on a range of proposed technical changes to the indexes would also be appreciated.

Major uses of the IPI include the estimation of national accounts and balance of payments volume aggregates and the analysis of inflation. The EPI is used for volume estimation and economic analysis. The ABS is very interested in being advised of any other major uses of the indexes.

An initial assessment of each index is provided in the paper in relation to these uses. From this evaluation a number of proposals have been developed for improving the suitability of the indexes.

The ABS is therefore seeking input from users on:

- the key uses of the IPI and EPI;

- the extent to which the IPI and EPI satisfy these uses; and

- the suitability of the range of classifications provided in the IPI and EPI publications.

In addition, the ABS would welcome any comments on the technical changes being proposed for the indexes. These include annual reweighting and chaining; using trade unit values to augment current samples for appropriate EPI items; investigating alternative collection methodologies; introducing tailored exchange rate conversion lags for import prices; and using US hedonic series to better estimate imported computer prices.

PART A   BACKGROUND

1. INTRODUCTION

1.1   The Australian Bureau of Statistics (ABS) is currently undertaking the latest periodic reviews of the Import Price Index (IPI), which is published in *Import Price Index, Australia* (Cat. no. 6414.0) and the Export Price Index (EPI), published in *Export Price Index, Australia* (Cat. no. 6405.0). While an important objective of the reviews is to update the item weights, the opportunity is also being taken to reassess the purpose, scope and coverage of the indexes and other methodological issues.

Consultation   1.2   As part of the index reviews, the ABS intends to consult widely and this information paper is being released to assist in the consultation process. The paper identifies a number of significant issues for consideration which are discussed below and tentative proposals are presented for consideration.

1.3   During the consultation process, users will also be encouraged to put forward any additional issues for consideration. Organisations and individuals are invited to provide comments on any aspects of the IPI and the EPI.

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Seminars can be presented to groups of interested users or, alternatively, individual meetings can be arranged.

Background   1.4   Historically, Australia has always had extensive international commodity trade. Input-Output tables show that in 1974–75, merchandise imports comprised 15% of Australia's supply of goods while merchandise exports accounted for 14% of the use of goods. Twenty years later, these figures have increased to 23% (imports) and 17% (exports). With such a substantial exposure to the outside world, statistics on price movement for imports and exports are particularly important for Australia.

Background *continued*

1.5   International price pressures can have an important effect on domestic prices, directly through exchange rates and imports, and indirectly through exports. There is considerable policy interest in import prices as a potential source of inflation and in the impact of export prices on national income. In disaggregated form, the IPI and the EPI are used extensively in Australia's system of national accounts and balance of payments to deflate merchandise import and export values to derive volume estimates. Therefore, there is considerable longstanding interest in the import and export price measures.

1.6   Import price measures in Australia have a substantial history:

- An import price index was published by the Reserve Bank of Australia from 1928 until September 1982.

- The first index of import prices produced by the ABS was introduced in May 1983. This index was compiled quarterly from September Quarter 1981 until June Quarter 1991 (on a reference base of 1981–82 = 100.0).

- A reweighted index of import prices was introduced in September 1991 with index numbers compiled monthly from April 1991 until June 1997. From September quarter 1997 the index reverted to a quarterly cycle. This series has a reference base of 1989–90 = 100.0. The weights are based on the average value of merchandise imports landed in Australia during 1988–89 and 1989–90.

1.7   Export price measures also have a long history with an index of export prices, of one form or another, having been published by the ABS since 1901:

- The first index was compiled annually from 1901 to 1916–17 as a current weighted unit value index.

- The method of calculation was changed in 1918 to incorporate fixed weights. The index was published up to 1929–30.

- An index of export prices was not published again until 1937, when a new series was introduced. This series continued until 1962.

- A fixed weight index was introduced in August 1962 with a reference base of 1959–60 = 100.0. It was replaced by an interim index which was published from July 1969 until June 1979.

- The index then progressed to a reference base of 1974–75 = 100.0 and was published in this format up until August 1990.

- The current export price index was introduced in September 1990 and index numbers were compiled from July 1989. From the September quarter 1997 the index has been compiled and released quarterly.

Background *continued*   1.8   Import and export price indexes are components of a suite of ABS indexes. The ABS has an extensive prices development program, which aims to achieve comprehensive, economy-wide coverage. The ABS *Information Paper: An Analytical Framework for Price Indexes in Australia* (Cat. no. 6421.0), released in February 1997, describes how specific price indexes can be presented as part of a family of indexes within the context of an overall framework.

Aim of the reviews   1.9   The key objective of the index reviews is to ensure that the ABS continues to compile measures of import and export prices which are appropriate for the main purposes for which they are used. One of the main outcomes will be a revision of their weighting patterns to reflect current trading profiles.

1.10   This paper provides an initial assessment of the IPI and the EPI in relation to their major uses and discusses issues identified by these assessments. Tentative proposals are then provided on which users are invited to comment as part of a consultation process. Users are also invited to identify any additional issues for consideration.

1.11   The focus of this paper is based on the major uses of the indexes, i.e. for deflation of import and export values to produce estimates of volumes of imports and exports for national accounts and balance of payments purposes, and for economic analysis (particularly analysis of inflation in the case of the IPI). The ABS understands that the use of the indexes for contract adjustment has declined over recent years. Nevertheless, user views would be appreciated on other uses of each index, including business applications.

1.12   In line with established practice, users will be informed of the outcome of these reviews and provided with the new weights and structures for each of the indexes.

PART B	IMPORT PRICE INDEX

2. MAJOR USES

2.1   As stated in paragraphs 1.9–1.12 above on the aim of the reviews, the focus of this Part of the paper is based on the uses of the Import Price Index (IPI) for estimation of import volumes, and for the analysis of inflation.

2.2   To assist in the review process, an initial assessment of the index in relation to each of these two main uses is provided below in sections 3 and 4 for consideration.

3. ESTIMATION OF IMPORT VOLUMES

3.1   Before the IPI can be assessed against this use, it is important that there is a clear understanding of how price indexes are used in the process of volume estimation. A detailed description is provided in *Australian National Accounts: Concepts, Sources and Methods* (Cat. no. 5216.0), and a brief summary is presented below.

3.2   All the current price aggregates of expenditure and production appearing in the national accounts are estimates of the sums of the values of individual transactions. Each transaction has two elements: quantity and price. In order to estimate by how much the quantity or '*volume*' of a leading National Accounts measure such as Gross Domestic Product (GDP) has changed between two periods (as an indicator of economic growth), we need to measure the value of GDP in each period using, as far as possible, common prices. One of the most commonly employed methods of deriving volume estimates is to deflate current values to price levels at a common point in time using estimates of relative price change such as price indexes.

3.3   Given that a major use of the IPI is in the production of volume estimates of merchandise imports, it is very important that the conceptual basis and methodology used in the compilation of the IPI mirror those underlying the merchandise imports value data. To assist users evaluate the effectiveness of the current IPI for this deflation role, the following summary provides a comparison of the conceptual and methodological bases of the merchandise imports value data and the IPI. Then, issues that emerge from this initial evaluation are discussed.

COMPARISON OF THE CONCEPTUAL AND METHODOLOGICAL BASES OF THE MERCHANDISE IMPORTS VALUE DATA AND THE IPI

	Merchandise imports values	IPI
Valuation basis	The ABS uses fob country of origin Customs based value data in the estimation of volumes.	The pricing basis of the IPI is also fob country of origin.
Classification	Imports value data are classified by Standard International Trade Classification (SITC).	SITC is used as the primary classification for the IPI. Nevertheless, there will be consultation with users on classifications (see paras 3.4–3.6).
Exchange rates used for currency conversion	Market exchange rates are used for conversion of Customs import values to Australian dollars where imports are transacted in foreign currencies.	The IPI also uses market exchange rates for conversion of prices to Australian dollars.
Timing of currency conversion	Imports of goods are recorded for Customs purposes at the time they arrive in Australian ports. Market exchange rates prevailing at the date the imports left the foreign port are used for currency conversion.	The IPI uses market exchange rates lagged by a uniform three weeks for conversion of foreign prices to Australian dollars. The three weeks lag represents an approximation of the average shipping time. This could be better targeted and is an issue for the review (see paras 3.7–3.8).
Weights	Australia's imports are characterised by their diversity and the large number of countries from which imports are sourced. The nature of these imports also change over time.	The current IPI covered directly or indirectly, 95% of merchandise imports in 1998. However, while the latest trade data are used to review samples, the broad level weights used in the IPI are now dated (based on 1988–89 and 1989–90 trade data). This issue is discussed in paras 3.9–3.11.
Pricing computers	The technical characteristics of some high technology imported goods, particularly computers, is subject to rapid change.	The Australian Bureau of Statistics (ABS) attempts to price to constant quality, but this is not a simple matter when dealing with complex and changeable items such as computers. See paras 3.12–3.15 for further discussion.

Issues

3.4 The Standard International Trade Classification (SITC), Revision 3 is currently the primary classification system for the IPI. To comply with international statistical requirements, indexes are also published according to the Combined Australian Customs Tariff and Statistical Nomenclature (Customs Harmonised Tariff), based on the international Harmonised System (HS).

3.5 Indexes are also classified according to the 1993 edition of the Australian and New Zealand Standard Industrial Classification (ANZSIC) and the United Nations' Classification by Broad Economic Categories (BEC).

3.6 Is this range of classifications still adequate to meet the needs of users of the IPI? User views would be appreciated.

Currency conversion 3.7 Customs record imports of goods at the time the goods land in Australia. The value of the goods is based on free on board (fob) prices (prices at the foreign port). Consistent with the fob pricing basis, transactions conducted in foreign currencies are converted to Australian dollars using market exchange rates prevailing at the time the goods left the overseas ports.

3.8 In order to match the merchandise imports values, exchange rate conversion of the IPI's sampled prices is lagged by three weeks. Applying a uniform average three weeks lag to all currency conversions represents a crude approximation of the actual shipping times, and these lags could be better targeted. Lags based on the actual shipping times from each major source country, or region, to Australia would provide a more accurate representation of exchange rate effects on prices. The ABS therefore proposes to use tailored shipping lags for exchange rate conversion of its import price data.

Weights 3.9 The current IPI relies on weights from 1988–89 and 1989–90. As there has been some change in the profile of imports since this time, more up to date weights will be introduced.

3.10 In addition, more frequent re-weighting of the IPI would help to minimise 'item substitution' bias in the IPI. Old weights can, for example, ignore more recent shifts to lower priced substitutes. ABS studies show that an annually re-weighted and chained Laspeyres (fixed weight) index approximates the benchmark Fisher ideal index (see Glossary for a description of these indexes). The minimisation of item substitution bias through annual chaining could be expected to have a modest, but nevertheless significant, impact on the IPI. The ABS prefers the annual Laspeyres to the Fisher index for reasons of data availability.

3.11 Annual chaining appears to be the optimal periodicity, even being preferred to more frequent reweighting. Sub-annual (e.g. quarterly) reweighting can be subject to seasonal and other variation and quarterly linking may result in chain linking bias or 'drift'. ABS studies show that

Weights continued   both item substitution bias, and chain linking bias, are minimised by applying *annual* chaining to the IPI. The ABS therefore proposes to use Laspeyres-type annual chaining for the IPI. User views on this issue are invited.

Pricing computers   3.12   Measures of pure price change must take into account changes in the quality of commodities. Some goods, such as computers, are renowned for their rapid rate of technological change. Much has been written about dealing with quality change in computers and the use of hedonic regression techniques (e.g. refer Triplett, Jack E.,1989, "Price and technological change in a capital good: a survey of research on computers" in Dale W. Jorgenseon and Ralph Landau, ed., *Technology and capital formation*, Cambridge, Mass. MIT Press). Such techniques require considerable resourcing and large databases of information on price and quality attributes.

3.13   The US Bureau of Labor Statistics (BLS) uses a hedonic model to adjust for quality changes in computers. Essentially, hedonic modelling involves dividing a good into its component characteristics and using these characteristics as explanatory variables for the price. This model is currently used for the US Producer Price Index and updated every three months due to the rapid pace of change in the computer market, particularly for desktop computers. The model was developed from a large number of computer observations, with each significant cost-determining characteristic of the computer described by a separate variable. The parameter estimates, which measure the dollar value per unit of the component (e.g. $ per Mb of hard drive space, or $ per Mhz of computing speed), are determined through price observations and are regularly updated.

3.14   The use of the US hedonic modelling for the computer component of the IPI is proposed. The US series would need to be adjusted for currency differences, and typical transaction lags to match Australian circumstances. User views on this proposal would be appreciated.

3.15   There are other areas of the index that are difficult to price to constant quality, such as large and irregular imports of capital goods. Passenger aircraft, for example, experience very fast technological change. They are also typically customised and irregular, so that repricing is very difficult. This review will also investigate such items.

Summary   3.16   While the IPI appears to broadly satisfy the requirements of a price index used for deriving import volumes, there is scope to enhance the index through updating the weights on an annual basis, introducing tailored exchange rate lags and addressing quality change issues for computers and other high technology goods using new methodologies.

4. ANALYSIS OF INFLATION

4.1   In this section, an initial assessment is made of the extent to which the IPI has the attributes required of an inflation measure. Before this assessment can be made, it is necessary to identify the ideal conceptual properties that should be possessed by a price index designed to measure inflation. The properties presented below are based on those articulated in Section 3 of the earlier ABS *Information Paper: An Analytical Framework for Price Indexes in Australia* (Cat. no. 6421.0).

4.2   Ideally, an index should only cover actual market transactions, as inflation results from market activity. It should adopt a pure price change approach and incorporate very recent weighting information. Index results should be clear and unambiguous reflections of price changes, i.e. weighting information and prices used in the index compilation should reflect the trend in weights and prices and should not be subject to abnormal volatility. It is also desirable that it form part of a family of price indexes within a broader statistical framework offering alternative, complementary views of the economy, within meaningful classification structures. Finally, analytical use will be greatly enhanced if the measure can provide early signals of final end-use inflationary pressures.

4.3   An assessment of the IPI against these criteria is summarised below.

ASSESSMENT OF THE IPI AGAINST CRITERIA FOR INFLATION ANALYSIS

	Inflation measurement criteria	IPI treatment
Market transactions	Price actual transactions in the market place.	The IPI samples actual transaction prices. Where prices are denominated in foreign currencies, the IPI uses market exchange rates for conversion to $A. Forward exchange cover is excluded from the prices.[1]
Pure price change	A pure price measure.	As the IPI uses fixed weights and precise specification pricing to constant quality, it constitutes a measure of pure price change.
Weights	Use very recent weighting information.	The IPI uses weights based on 1988–89 and 1989–90 trade data, which are now dated. Frequent re-weighting and linking (see paras 3.9–3.11) would enhance the analytical use of the IPI.
Trend	Reflect the trend in weights and prices.	Samples and fine level weights are kept up to date through a process of ongoing review. At the broader level, the proposed annual reweighting would keep weights up to date. Analysis has shown that annual import values are relatively stable and tend to approximate trend levels, so that smoothing import values for weighting purposes is unnecessary (unlike exports, see para 7.6).
Analytical framework	Form part of a family of indexes within a broader statistical framework.	As well as being a stand alone sectoral index, the IPI will feed into broader, economy-wide indexes that are under development.
Classifications	Employ meaningful classification structures.	As well as using standard trade and industry classifications (SITC and ANZSIC), indexes are also produced for Broad Economic Categories - Intermediate goods and end-use Consumption goods and Capital goods. The ABS is also developing a Stage of Production categorisation of producer and international trade price index data. See paras 4.4–4.7 below.
Early inflation signals	Provide early warnings of final end-use inflationary pressures.	The IPI's pricing basis is fob, which is a long way removed from final purchasers' prices. There are therefore some limitations on the ability of the IPI to foreshadow movements in, say, the imported component of the Consumer Price Index (CPI) and other end-use measures (see paras 4.8–4.13 below for discussion).

1   Forward exchange cover is considered to be the service of providing currency fluctuation compensation, separate from the core market transaction between the Australian importer and the foreign exporter.

Issues

4.4   See *Classifications* in Section 3 on *Estimation of import volumes*. In addition, the ABS is developing a new Stage of Production (SOP) index model for the producer and international trade price indexes to support the analysis of inflation.

4.5   In this model, flows of commodities - whether domestically produced or imported - are categorised according to their economic destination on a sequential basis along the production chain.

4.6   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.

4.7   The framework allows for the analysis of price change as commodities flow through production processes. Price indexes for earlier stages of production may be indicators of future price changes for later stages. The SOP framework is described in detail in *Information Paper: Producer Price Index Developments* (Cat. no. 6422.0) released in March 1999.

Early inflation signals   4.8   In the context of recent exchange rate fluctuations, it has become apparent that users have had a considerable expectation of the IPI as a means of anticipating potential future sources of household inflation. However, there have been instances where the IPI has shown significant price increases for certain consumer goods, as a result of a devaluation of the Australian dollar, which have not, in the short term, flowed through to the relevant components of the CPI.

4.9   In order to understand this phenomenon, it is necessary to appreciate the significance of the IPI's fob pricing point relative to the purchasers' price valuation basis of the CPI. There are a number of cost elements that form wedges between the two pricing points, i.e:

- international freight and insurance costs;

- indirect taxes (including import duty);

- wholesale and retail trade margins; and

- domestic transport charges.

4.10   Input-Output estimates of the value of imported goods at various stages in the distribution chain show that the value of all imported goods on an fob basis, whether destined for final consumption, capital investment or intermediate use, accounts for about 60% of the purchasers' price value. Pricing on a cost, insurance and freight (cif) basis increases this value to around 65%.

4.11   Therefore, while a fob IPI measure can provide early upstream signals of imported inflation, at subsequent points in the distribution chain significant domestic considerations come into play as imported goods are taxed, transported and distributed by wholesalers and retailers.

Early inflation signals
continued

4.12   A study of the recent experience with imported motor vehicles showed that although fob import prices rose significantly due to the devaluation of the Australian dollar, this was not reflected in retail prices. Investigations revealed the following:

(i) wholesale and retail margins were compressed due to intense price competition;

(ii) there had been reductions in the rates of Customs duty;

(iii) significant time lags can occur between vehicles arriving in Australia and being sold at retail level due to large stockholdings; and

(iv) the effects of importers hedging, e.g. by taking out forward exchange cover (which is excluded from pricing for the IPI), can help keep domestic onselling prices down, at least in the short term.

4.13   Expectations of the IPI to predict final price change therefore need to be tempered with the knowledge that there is considerable scope for prices to be affected beyond the IPI pricing point.

Summary

4.14   The IPI, with modifications such as annual re-weighting, appears to broadly satisfy most of the inflation analysis criteria. However, it is important that users have realistic expectations of the capacity of an fob measure to predict changes in final prices.

5. OVERALL ASSESSMENT OF THE IPI

5.1   In summary, while the IPI appears to satisfy most of its volume estimation and inflation measurement requirements, its suitability would be enhanced by updating weights on an annual basis, introducing tailored exchange rate lags and addressing quality change issues for computers and other high technology goods using new methodologies. For inflation analysis, an appreciation of the significance of the index's fob pricing point is particularly important.

5.2   User views would be appreciated on this tentative assessment of the IPI.

PART C   **EXPORT PRICE INDEX**

6. MAJOR USES

6.1 As stated in paragraphs 1.9–1.12 above on the aim of the reviews, the focus of this Part is based on the uses of the Export Price Index (EPI) for estimation of export volumes and for economic analysis.

6.2 To assist in the review process, an initial assessment of the index in relation to each of these two main uses is provided below in sections 7 and 8 for consideration.

7. ESTIMATION OF EXPORT VOLUMES

7.1 Given that an important use of the EPI is in the production of volume estimates of a high proportion of merchandise exports, it is important that the conceptual basis and methodology used in the compilation of the EPI mirror those underlying the merchandise exports value data. To assist users evaluate the effectiveness of the current EPI for this deflation role, the following summary provides a comparison of the conceptual and methodological bases of the merchandise exports value data and the EPI. Then, issues that emerge from this initial evaluation are discussed.

COMPARISON OF THE CONCEPTUAL AND METHODOLOGICAL BASES OF THE MERCHANDISE EXPORTS VALUE DATA AND THE EPI

	Merchandise exports values	EPI
Valuation basis	The Australian Bureau of Statistics (ABS) uses fob Customs based value data in the estimation of volumes.	The pricing basis of the EPI is also free on board (fob).
Classification	Exports value data are classified by the Australian Harmonised Export Commodity Classification (AHECC).	AHECC is used as the primary classification for the EPI. There will be consultation with users on classifications (see paras 7.2–7.3).
Exchange rates used for currency conversion	The ABS converts Customs export values denominated in major foreign currencies to Australian dollars using market exchange rates prevailing at the date of shipment.	ABS converts sampled export prices denominated in major foreign currencies to Australian dollars using average quarterly market exchange rates. Lagging is not an issue.
Weights	Australia's exports are characterised by their diversity and the large number of countries to which we export. The nature of these exports also changes over time and the quantities underlying the export values are highly volatile.	In 1998 the EPI covered directly or indirectly, 93% by value of current merchandise exports. However, while the latest trade data is used to review samples, the broad level weights used in the EPI are now dated (based on 1988–89 trade data). The quantities underlying export values are volatile and there is currently no special treatment in the EPI to account for the impact of this volatility. This issue is discussed in paras 7.4–7.10.
Price volatility	The prices underlying the trade values for many commodities are comparatively volatile.	Pricing for the EPI should be as representative and comprehensive as possible. Average unit values from the trade data are used to 'quantity revalue' export values to estimate volumes for many of the basic commodities (see the Glossary), as these unit values are considered to be more robust than the current EPI series in such areas. This issue is discussed in more detail below in paras 7.11–7.16.

Issues

Classifications   7.2   The commodities included in the current index have been combined into broad index groups using three different classifications, namely:

- the Australian Harmonised Export Commodity Classification (AHECC);

- the Standard International Trade Classifications (SITC);

- the Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993 edition, on an industry of origin basis.

7.3   Is this range of classifications still adequate to meet the needs of users of the EPI? User views will be appreciated.

Weights   7.4   The current EPI is based on 1988–89 weights. These are now dated and, as the profile of exports since this time has changed, more up to date weights will be introduced.

7.5   In addition, more frequent re-weighting of the EPI would help to minimise 'item substitution' bias in the EPI. Old weights can, for example, ignore more recent shifts to lower priced substitutes. The ABS therefore proposes to annually reweight and chain the EPI. However, in considering implementing frequent chaining, it is important to consider the behaviour of the pattern of export volumes over time (see table below).

Table: General Merchandise exports, Chain Volume Measures (original series, reference year 1996–97)

	Annual			June Qtr	Sep Qtr	Dec Qtr	Mar Qtr	June Qtr	Sep Qtr
	1995–96 $b	1996–97 $b	1997–98 $b	1997 $b	1997 $b	1997 $b	1998 $b	1998 $b	1998 $b
General merchandise	66.3	73.4	75.9	19.7	19.5	19.9	17.4	19.1	19.1
Rural goods	18.0	21.0	20.8	5.8	5.2	5.6	4.8	5.2	5.1
Meat and meat preparations	3.0	3.0	3.4	0.8	0.8	0.9	0.8	0.9	0.9
Cereal grains and cereal preparations	4.3	6.0	5.0	1.6	1.2	1.3	1.3	1.2	1.2
Wool and sheepskins	3.5	3.7	3.5	0.9	0.9	1.1	0.8	0.7	0.7
Other rural	7.3	8.4	8.9	2.5	2.3	2.3	2.0	2.4	2.3
Metal ores and minerals	8.9	9.4	9.6	2.6	2.3	2.5	2.3	2.5	2.3
Coal, coke and briquettes	7.7	8.0	8.9	2.1	2.3	2.2	2.1	2.3	2.3
Other mineral fuels	4.7	5.2	5.8	1.3	1.5	1.5	1.4	1.4	1.6
Metals (excl. non-monetary gold)	6.0	6.1	6.3	1.5	1.5	1.6	1.6	1.7	1.7
Machinery	6.6	7.0	7.6	1.9	2.0	2.1	1.6	1.8	1.7
Transport equipment	2.5	3.6	3.2	1.4	0.8	0.9	0.6	1.0	0.8
Other	11.9	13.1	13.7	3.1	3.9	3.5	3.0	3.2	3.6

Source: Balance of Payments & International Investment Position, September Quarter 1998 (Cat. no. 5302.0)

Weights *continued*   7.6   From this table, it is clear that the pattern of exports is very volatile for both quarterly and annual volumes, which respond to world supply and demand conditions and local climatic and other factors. Further, commodity export prices can also change significantly from one period to the next.

7.7   Experience has shown that frequently linked indexes using weights that display significant volatility over time can be subject to chain linking bias. Where, say, exports of rural crops are subject to significant seasonal patterns, sub-annual chain linking can introduce chain linking bias or drift as subsequent indexes are linked at non-trend levels. However, even annual chaining can be problematic as drift can also occur where there are major differences in weights between one year and the next.

7.8   To counter the problem of index drift, consideration is being given to smoothing the export volumes over a run of years to even out weighting volatility. Analysis undertaken by the ABS indicates that the EPI would benefit significantly from the use of smoothed weights, but updated and chained each year. The ABS will investigate appropriate smoothing techniques for deriving EPI weights.

7.9   Note that this is a much more significant issue for the EPI than for the Import Price Index (IPI) which generally has more stable volumes and prices.

7.10   Users are invited to present views on the proposal to annually reweight and chain the EPI and to use appropriate smoothing techniques for the weights.

Price volatility   7.11   As the prices of many exported commodities are volatile, the EPI requires comprehensive and accurate pricing. In these circumstances, there are several pricing methodologies available for consideration:

- specification pricing, surveyed independently from the Customs collection (method currently widely used in both the EPI and the IPI);

- where available, matched sampling directly from the Customs collection data (currently not used in either EPI or the IPI);

- price indicator pricing from administrative and industry sources; and

- average unit values.

7.12   In concept, the second method (matched sampling directly from the Customs System) is very similar to the first method with identical items priced over time, the only difference being the source of the data. If Customs data could be collected on an individual transaction basis, there would be scope for utilising this method of collection in both the EPI and the IPI. In some cases the EPI uses commodity price indicators (the third method listed above, see para 7.16 for discussion), and this could also be described as a type of specification pricing. For the purposes of the following evaluation, therefore, the first three pricing variants can be considered as specification pricing.

Price volatility continued   *Average unit values*

7.13   The current EPI relies heavily on specification pricing and makes very limited use of average unit values. The 1993 edition of the United Nations' *System of National Accounts* (SNA 93) generally recommends specification pricing and is strongly opposed to using average or 'unit value' indexes for commodities that are not homogeneous and are likely to be affected by changes over time in compositional mix and quality. Nevertheless, a summary of the relative merits of specification pricing and average unit values for measuring export prices is presented below.

	Average unit value	**Specification pricing**
Cost	Low cost.	Existing mail based collections employing specification pricing are more costly (although customs sourced specification pricing may reduce the cost).
Comprehensiveness	Constitutes a broad average (i.e. high coverage).	Sample size, coverage and promptness of data collection and processing are constrained by costs and resource availability.
Accuracy	Potential compositional mix problems.	Identical items are priced over time and thus pure price change is measured.
Quality change	Dealing with quality change is difficult because of the compositional mix and lack of personal contact with exporters.	Quality change is more readily identifiable using specification pricing and personal contact with exporters facilitates quantification.
Internal consistency	As the trade system is the common source for unit values and volumes, then average unit values should mirror the implicit prices in the values.	Where exports are regular and of a reasonable value, specification pricing can be expected to align with the implicit prices in the trade values.

7.14   On the basis of this assessment, for items that are homogeneous and where quality change is minimal, e.g. basic commodities from the mining and agricultural sectors, it can be beneficial to selectively use average unit values as price estimators. Where index accuracy is not compromised, the use of average unit values would reduce cost and respondent burden and, in some cases, provide increased robustness and coverage to price estimation. The ABS has access to a rich source of trade data and this review will further investigate the possibility of selectively using average unit values in the EPI to augment specification pricing.

7.15   Note that this is less of an issue for the IPI which should continue to rely predominantly on specification pricing, as import commodities are typically more stable in price, but non-homogenous in character and generally do not lend themselves to measurement by average unit value. However, greater use could be made of average unit values for editing IPI series.

Use of price indicators

7.16   For the EPI, several price indicators are used to estimate transaction prices. Sources such as the Australian Wool Market Indicator, London Metal Exchange and other sources provide accurate prices for basic commodities on particular pricing bases (spot pricing, averaged contract prices etc). Specific grades of these commodities are covered by these sources, so that accurate repricing to constant quality is possible. Where prices are reported in foreign currencies (often the US dollar) appropriate exchange rate conversions are undertaken to derive prices in Australian dollars. While this is, in most cases, an efficient and accurate method of pricing certain commodities, a review should be undertaken in this area to assess the pricing basis, timing and coverage, particularly in the light of the recent trend away from centralised marketing and administration of Australian export commodities.

Summary   7.17   While the EPI appears to largely satisfy the criteria required of a price index used for deriving export volumes, there is scope to enhance the index through updating the index weights on an annual basis (based on smoothed values) and selectively augmenting specification pricing with average unit values.

8. ECONOMIC ANALYSIS

8.1   In this section, an initial assessment is made of the extent to which the EPI has the attributes required of a measure for economic analysis. Before this assessment can be made, it is necessary to identify the ideal conceptual properties that should be possessed by a price index designed for economic analysis. The properties presented below are based on those articulated in Section 3 of the earlier ABS *Information Paper: An Analytical Framework for Price Indexes in Australia* (Cat. no. 6421.0).

8.2   Ideally, an index should only cover actual market transactions. It should adopt a pure price change approach and incorporate very recent weighting information. Index results should be clear and an unambiguous reflection of price change, i.e. weighting information and prices used in the index compilation should reflect the trend in weights and prices and should not be subject to abnormal volatility. The index should be constructed within meaningful classifications.

8.3   An assessment of the EPI against these criteria is summarised below.

ASSESSMENT OF THE EPI AGAINST CRITERIA FOR ECONOMIC ANALYSIS

	Economic analysis criteria	EPI treatment
Market transactions	Price actual transactions in the market place.	The EPI samples actual transactions prices. Where prices are denominated in foreign currencies, the EPI uses market exchange rates for conversion to $A.
Pure price change	A pure price measure.	As the EPI uses fixed weights and precise specification pricing to constant quality, it constitutes a measure of pure price change.
Weights	Use very recent weighting information.	The EPI uses weights based on 1988–89 trade data, which are now dated. This could be rectified with frequent re-weighting and linking (see paras 7.4–7.10).
Trend	Reflect the trend in weights and prices.	Samples and fine level weights are kept up to date through a process of ongoing review. At the broader level, the proposed annual reweighting would keep weights up to date. Analysis has shown that annual export values are highly volatile. Therefore, to reflect trend levels that are not unduly affected by abnormal volatility, weights should be smoothed over recent periods (see para 7.8).
Classifications	Employ meaningful classification structures.	AHECC is used as the primary classification for the EPI. Consultation with users on classifications is planned (see paras 7.2–7.3).

Summary   8.4   The criteria which are relevant to the use of the EPI for the estimation of export volumes, i.e. classification, weighting and unit values, are also relevant for an EPI designed for economic analysis as described above. There do not appear to be any serious inadequacies in the EPI in its use for economic analysis. However, the ABS is interested in obtaining from users a more complete picture of the current and potential applications of the EPI for economic analysis and will review this assessment in the light of user feedback.

9. OVERALL ASSESSMENT OF THE EPI

9.1   In summary, while the EPI appears to satisfy most of its volume estimation and economic analysis requirements, it could be further enhanced by updating the weights more frequently using smoothed weights. Also, the selective use of average unit values could potentially provide more robust price measures for some components of the index.

9.2   User views would be appreciated on this tentative assessment of the EPI.

PART D   CONSULTATION

10. ISSUES FOR FURTHER CONSIDERATION

10.1   Parts B and C of this paper outline major uses of the indexes and then discuss the substantive issues resulting from an initial evaluation of each index against these uses. The Australian Bureau of Statistics (ABS) is seeking input from users and comments are invited on:

- the key uses of the Import Price Index (IPI) and Export Price Index (EPI);

- the extent to which the indexes satisfy these uses; and

- the suitability of the range of classifications, provided in the IPI and EPI publications.

10.2   In addition, the ABS would welcome any comments on the technical changes being proposed for the indexes. These include annual reweighting and chaining; using trade unit values to augment current samples for appropriate EPI items; investigating alternative collection methodologies; introducing tailored exchange rate conversion lags for import prices; and using US hedonic series to better estimate imported computer prices.

11. THE CONSULTATION PROCESS

11.1   This paper is being widely distributed to users of the IPI and the EPI to assist in the consultation process.

11.2   Organisations and individuals are invited to provide comments, by 26 November 1999, on any aspect of the IPI and the EPI. See para 1.3 above for contact details.

11.3   Seminars can be presented to groups of interested users or, alternatively, individual meetings can be arranged.

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 taxes and subsidies on commodities.

Bias
: Any systematic variation in the chosen estimator from the phenomena that it is trying to estimate, arising from fundamental weaknesses in the estimator.

Chain linking
: 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).

Chain linking bias
: A chained index is likely to experience bias when prices and quantities are correlated and fluctuate significantly. This phenomenon is know as chain linking bias or drift.

Deflation
: In the context of this paper, deflation refers to the process of using price indexes to adjust current values to constant price levels.

Drift
: See Chain linking bias.

Fisher price index
: The Fisher index is described as a 'superlative' index and is often used as a benchmark measure. The Fisher index is a geometric average of the Laspeyres and Paasche indexes and will always lie between the two.

Fixed weighted index
: An index in which the weighting pattern is fixed for the life of each index series.

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.

Laspeyres price index
: A price index in which the fixed weights used represent the relative importance of index items in the weighting base period.

Paasche price index
: A price index in which the weights for each period are derived from values from that same period.

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

Producers' prices
: The producer's price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any indirect taxes, or similar deductible tax, invoiced to the purchaser. It excludes any transport charges invoiced separately by the producer.

Purchasers' prices
: The value of a commodity at purchasers' prices is equal to its producers' price value plus 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.
Quantity revaluation	One technique used to derive volume estimates at the elemental level. For individual commodities, an estimate of quantity in each period is multiplied by the average unit value in the base period to obtain a constant price estimate. This method requires that a commodity be homogeneous and not subject to quality change over time.
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.
Smoothing techniques	The range of techniques which can be used to remove the irregular component from a time-series. The standard ABS trending technique is one example.

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