Modifications to the Reserve Bank of Australia's Commodity Price Index[1]

Introduction

Although much of the growth in Australia's exports over the past 15 years has been in manufactured goods and services, primary commodities still comprise around three-fifths of Australia's exports. Movements in commodity prices therefore remain an important influence on export income and, indirectly, on domestic activity.

The Reserve Bank's Index of Commodity Prices was developed to provide a timely indicator of the prices received by Australian commodity exporters. It is based on the prices of 18 major commodities exported by Australia, which account for around two-thirds of total commodity exports. The Index, including its rural, non-rural and base metals components, is published monthly in terms of US dollars, Australian dollars and Special Drawing Rights (SDRs).

A number of changes are to be made to the Index to make it both easier to understand and more relevant. The changes are as follows:

- the Index is to be calculated as a fixed-weight Laspeyres index;

- the Index is to be re-based from 1989/90 to 1994/95; and

- crude oil is to be excluded from the Index.

This article reports on the changes. They will be adopted in the October release of the RBA Commodity Price Index on Thursday, 1 October 1998.

Simplifying the Construction of the Index

The two most commonly used formulas for constructing a price index are the Paasche and Laspeyres indexes. A Paasche index uses weights determined in the current period to establish the relative importance given to individual components – in this case, individual commodities – in order to compare current prices with those of a base period. A Laspeyres index uses base-period weights in making the same comparison. In tracking an index through time, the weights of a Paasche index will change as the composition of commodity exports changes, whereas for the Laspeyres index, there is no movement in the weights over time.

There is no unambiguous theoretical rationale for preferring one of these two types

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1. Previous articles on the Commodity Price Index appeared in the Bank's April 1993, February 1989 and December 1987 issues of the *Bulletin*.

of index over the other.[2] The current Commodity Price Index is a modified-Paasche index. (It is modified in the sense that the quantities used to determine the current period weights are moving averages of the physical amounts of each commodity exported in the preceding 12-month period, rather than just those in the current period.) The main reason for choosing a Paasche index was that this most closely corresponded with the way the export price deflator has been calculated in the National Accounts.[3]

The use of a Laspeyres formula for the Commodity Price Index has two practical advantages. The first is that the data requirements are less onerous – since weights are determined in the base period only – and the Index is therefore less subject to revision. The second advantage is that it is simpler to interpret. Movements in the Index from one period to the next would simply reflect underlying price movements – a 10 per cent rise in the prices of all commodities in a given month, for example, would always be reflected in a 10 per cent rise in the Index, regardless of quantity changes. In contrast, movements in a Paasche index reflect changes in both prices and quantities in the period.

Reflecting these considerations, the Commodity Price Index is to be constructed as a Laspeyres index commencing in October 1998. A technical description of the Index appears in the Appendix.

Re-basing the Index

To maintain the relevance of the Commodity Price Index, the base period used in its calculation has been updated every five years. (Periodic re-basing is desirable regardless of the index formula used.) The last time this occurred was in 1993, using a base period of 1989/90, the same as for the National Accounts. The National Accounts are now to move to annual re-basing, but the Bank has decided to retain a five-year re-basing period for the Commodity Price Index. The Index will be re-based to 1994/95.

The desirable frequency of re-basing reflects a trade-off between the short-run and longer-run properties of the Index, the nature of which, in turn, will depend partly on the volatility of the component series. Frequent re-basing has the advantage of ensuring that weights are up-to-date, which helps to ensure that short-run movements are accurately measured. The disadvantage is that erratic price and volume fluctuations, by being built into the base period, would cause the level of an index to 'drift' from its initial level, such that the Index would not necessarily return to its starting point even if all individual prices did so. Longer-run comparisons can therefore be rendered less reliable. The potential for drift is most serious when the underlying volumes and prices are relatively volatile, as is the case for the Commodity Price Index. The decision to retain the five-year re-basing period reflects these considerations.[4]

Changes in the Coverage of the Index

The Commodity Price Index has been designed and constructed with a view to providing information about an important source of fluctuation in export income. This

2. For a discussion of the relevant merits of the Paasche and Laspeyres indexes, as well as a number of alternative indexes, see Johnson L. (1996), 'Choosing a Price Index Formula: A Survey of the Literature with an Application to Price Indexes for the Tradable and Non-tradable Sectors', Australian Bureau of Statistics Working Papers in Applied Econometrics and Applied Statistics No. 96/1.

3. The Australian Bureau of Statistics (ABS) is soon to vary the way the export price deflator is derived. It will remain a Paasche index, but the volume estimates used to derive the export price deflator will be derived from annually chained volume data, rather than volume data chained every 5 years. For reasons discussed below, it has been decided not to apply that approach to the Commodity Price Index.

4. Both the United Nations, in its 1993 *System of National Accounts,* and the ABS, in its *Introduction of Chain Volume Measures in Australian National Accounts* (ABS Cat. No. 5248.0) note that in series where prices can vary quite widely from period to period, it is preferable to re-base less frequently than annually.

has, in particular, motivated the use of export weights for its construction. (An index designed to provide information about movements in commodity producers' incomes, by contrast, would ideally use production weights in its construction.) The further question arises as to whether the weights should reflect gross or net exports of each commodity. It has been decided to retain the current approach of using gross export weights, but to remove crude oil, since Australia is a net importer of crude oil. The other commodities in the Index for which there are significant imports are gold (where imports amounted to around 16 per cent of exports in 1997) and aluminium (11 per cent), but in both cases the adoption of net export weights would have a negligible effect on the Index.

Impact of the Changes

The new weights, which incorporate the three sets of changes outlined above, are shown in Table 1; the weights in the current modified-Paasche index are also shown.

Table 1 highlights the growing relative importance of resource commodities. Under the old weighting scheme these commodities accounted for 59.2 per cent of the Index. They will now account for 66.8 per cent of the Index. This reflects both a relative decline in the price of rural commodities – the rural price component of the Commodity Price Index, measured in SDRs, has fallen by around 35 per cent since the beginning of the decade,

Table 1: Commodity Price Weights
All items index; per cent

	Current weights[a]	New weights[b]	Change
Rural commodities	**40.8**	**33.2**	**-7.6**
Beef and veal	7.3	9.6	+2.3
Wool	12.9	8.6	-4.3
Wheat	9.9	5.5	-4.4
Sugar	2.5	5.2	+2.7
Cotton	6.7	2.3	-4.4
Rice	0.6	1.0	+0.4
Barley	0.9	1.0	+0.1
Base metals	**10.9**	**15.0**	**+4.1**
Aluminium	6.1	8.6	+2.5
Copper	1.8	2.7	+0.9
Nickel	1.0	1.4	+0.4
Zinc	1.0	1.2	+0.2
Lead	1.0	1.1	+0.1
Other resources	**48.3**	**51.8**	**+3.5**
Gold	12.1	16.3	+4.2
Coking coal	13.4	13.8	+0.4
Steaming coal	8.6	9.4	+0.8
Iron ore	7.9	9.3	+1.4
Liquefied natural gas	2.4	3.0	+0.6
Crude oil	3.9	–	-3.9

(a)   Weights as at August 1998 based on the modified-Paasche index using 1989/90 prices.

(b)   Laspeyres index using 1994/95 as the base period.

compared with a fall of around 18 per cent in the non-rural component – and sizeable increases in resource commodity export volumes. The impact is most notable for wheat (the share of wheat has fallen by 4.4 per cent), cotton (by 4.4 per cent) and wool (by 4.3 per cent); the commodities with the largest increase include gold (4.2 per cent), sugar (2.7 per cent), aluminium (2.5 per cent) and beef and veal (2.3 per cent).

Graph 1 illustrates the impact of the changes on the history of the index.[5]

It is apparent that these changes do not greatly affect the overall trends in the Index, although the Index is slightly less volatile. For example, the rise in commodity prices from the trough in late 1993 to the peak in March 1997 was 18.1 per cent on the new Index, compared with 23.1 per cent on the old basis; similarly, the fall in commodity prices from March 1997 to August 1998 has been 17.3 per cent based on the new Index, compared with 20.2 per cent based on the old

Graph 1

RBA Commodity Price Index
SDRs; 1994/95 = 100
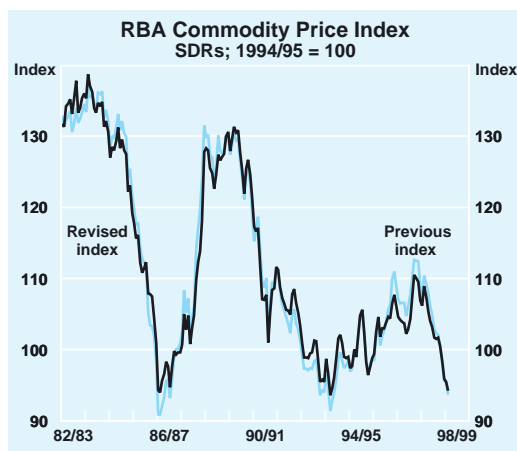
Index. Most of the difference between the two series is attributable to the move to the Laspeyres index, rather than the re-basing of the Index or the exclusion of crude oil. The changes do not vary the interpretation of movements over the past 12 months.

Appendix

The RBA Commodity Price Index will be calculated as a fixed-weight Laspeyres index. The Index will be calculated as follows:

$$It = \left[\frac{\sum\limits_{i} Qi,0\, Pi,t}{\sum\limits_{i} Qi,0\, Pi,0} \right] \times 100 \qquad (1)$$

where:

$Qi,0$ = quantity of commodity i exported in period 0;

Pi,t = price of commodity i in period t;

0 = base period; and

t = current period.

The denominator measures the value of commodity exports in the base period (in the case of the latest base period, average export

values in 1994/95). The numerator measures export volumes in the base period at current prices.

Alternatively, Equation (1) can be expressed as

$$It = \sum Wi\left(Pi,t / Pi,0\right) \times 100 \qquad (2)$$

where

$$Wi = \frac{Qi,0\, Pi,0}{\sum\limits_{i} Qi,0\, Pi,0}$$

Thus the Index is a weighted arithmetic average of the individual commodity price series. The weights used correspond to the export value of each commodity as a share of total commodity exports.

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5. In order to provide a time series back to July 1982, the re-based Index is spliced to earlier Indexes at July 1989 (based on 1989/90 weights) and July 1984 (based on 1984/85 weights) using the ratio of the re-based Index to the earlier Index at that time as a splicing factor.