

## Box D: Measures of Underlying Inflation

Australia's inflation target is expressed in terms of the Consumer Price Index (CPI). With inflation low and relatively stable, CPI inflation has been a reasonable guide to trend inflationary pressures in recent years. However, the CPI is still subject to a degree of short-term volatility, which sometimes makes it difficult to interpret quarterly movements in measured inflation. Accordingly, the Bank continues to incorporate a selection of underlying inflation measures, which are less affected by short-term volatility, into its analysis of the economy. These include exclusion-based measures (such as the CPI excluding volatile items) and statistical measures (such as the trimmed mean and weighted median).<sup>1</sup> Recent research has shown that, while existing statistical measures perform satisfactorily as measures of underlying inflation, they can be enhanced, at the margin, by technical modifications to better account for seasonality, as outlined in Roberts (2005). This Box introduces four underlying inflation measures that have been modified along these lines, and explains how they augment the existing set of underlying inflation measures published by the Bank.

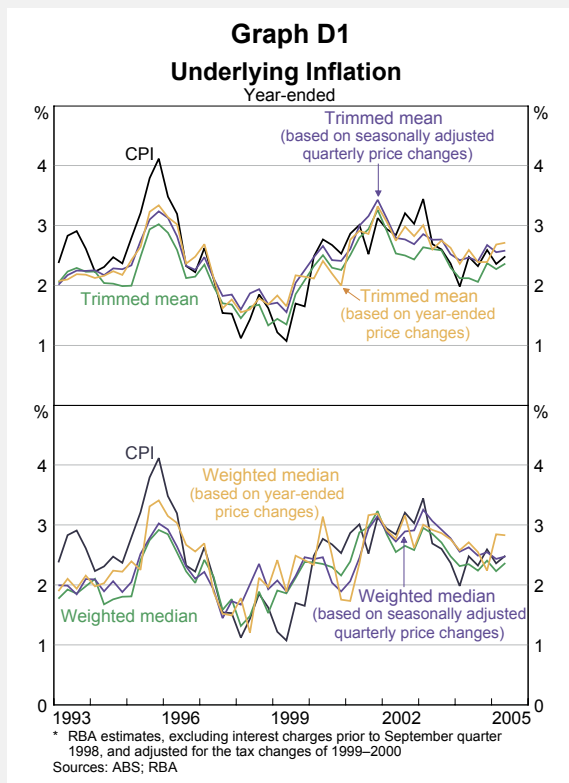
The trimmed mean and weighted median measures published by the Bank have been calculated each quarter using disaggregated quarterly price changes and expenditure weights drawn from the CPI. Year-ended rates have then been calculated by compounding the quarterly movements. There are a couple of alternatives to this approach that provide slightly different estimates of underlying inflation when CPI components display seasonality in the timing of their price changes. One is to calculate the quarterly trimmed mean and weighted median inflation rates using seasonally adjusted quarterly price changes; another is to calculate year-ended underlying rates directly using year-ended price changes.

To understand the issues raised by seasonality at the CPI component level, it is helpful to consider the example of the trimmed mean. The trimmed mean is calculated as the weighted mean of the central 70 per cent of the distribution of quarterly price changes when the latter are arranged in order of magnitude. Goods and services in the CPI that display seasonally large increases once a year often fall into the top 15 per cent of the distribution in the quarters when these large price changes occur, and are therefore removed in those quarters. However, it is much less likely that they would fall into the lower 15 per cent of the distribution in the quarters when they tend to have only small price changes. The tendency to trim high outcomes but not low ones will result, on average, in a slightly lower inflation rate for statistical measures such as the trimmed mean than for the published CPI.

Seasonally adjusting prices at the disaggregated component level can eliminate bias from such effects by smoothing seasonal increases over the course of a year. Calculating the trimmed

<sup>1</sup> *The advantages and disadvantages of both types of measures have been explored in detail in recent Bank publications. For more information, see: 'Box D: Underlying Inflation', Statement on Monetary Policy, May 2002, pp 55–56; Heath, Roberts and Bulman (2004), 'Inflation in Australia: Measurement and Modelling', in Kent and Gutmann (eds), The Future of Inflation Targeting, Proceedings of a Conference, Reserve Bank of Australia, pp 167–207; and Roberts (2005), 'Underlying Inflation: Concepts, Measurement and Performance', Reserve Bank of Australia Research Discussion Paper No 2005-05.*

mean directly on an annual basis achieves a similar effect, because large seasonal quarterly movements in particular components tend to wash out of year-ended price changes. Both approaches reduce the chance that a strong seasonal price movement will regularly be trimmed from the distribution of price changes. For example, the pharmaceuticals component is one of the items most frequently removed by the trimmed mean based on unadjusted quarterly price changes, owing to a large positive movement once each year resulting from the operation of the Pharmaceutical Benefits Scheme. But when prices are seasonally adjusted, or annual price changes are used, this component is removed far less frequently.



Graph D1 shows the trimmed mean and weighted median based on unadjusted quarterly price changes, seasonally adjusted quarterly price changes and year-ended price changes. It is apparent that the different measures are highly correlated, but the measures based on seasonally adjusted quarterly price changes and year-ended price changes tend to be slightly higher than the unadjusted measures. Over time, on average, the unadjusted measures record slightly lower inflation than the CPI. By comparison, there is no evidence that growth in the four alternative underlying inflation measures is substantially different on average from CPI inflation.

All of the statistical underlying inflation measures considered in this Box have been found in recent research to perform satisfactorily, on various criteria, as measures of

underlying inflation. The fact that the measures based on seasonally adjusted or annual price changes have been unbiased with respect to CPI inflation suggests that they may be conceptually superior as measures of underlying inflation. In practice, however, the calculation of these types of measures is complicated by the need to seasonally adjust data, which involves potential revisions to the series as estimates of seasonality are updated. Furthermore, there is the added complication of periodic compositional change, following the five-yearly revisions to the CPI basket. Accordingly, it is likely that both the traditional and the new measures will be useful in making ongoing assessments of inflationary pressures. ❧