

Inflation in the June 1995 quarter

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I Introduction

Following the quarterly release by Statistics New Zealand of the Consumers' Price Index (CPI), the Bank examines closely the movements in sub-component prices which are used to produce the familiar "headline" measure of inflation. A close examination of the distribution of price movements is essential for the Bank's interpretation of the CPI outcome. A key objective is to distinguish between generalised price inflation, which is the focus of monetary policy, and the other price movements which obscure the general trend.

It should be noted that Statistics New Zealand already publishes a variety of analytical price series, based on the CPI, which facilitate interpretation of the CPI. The purpose of this article is to supplement or complement the analyses produced by Statistics New Zealand.

II The distribution of price movements in the June quarter

(i) The CPI vs CPI excluding credit services

In the June quarter, the CPI rose by 1.0 percent, bringing the annual increase to 4.6 percent. A more appropriate measure of inflation for monetary policy purposes is the CPI excluding interest cost sub-components.¹ This is defined as the Statistics New Zealand analytical series of the *All groups CPI excluding credit services*.

In the June quarter the CPI excluding credit services rose 0.6 percent, bringing the annual increase to 2.7 percent. In other words, credit service sub-components of the CPI accounted for 0.4 percentage points of the increase in the CPI in the June quarter, and for 1.9 percentage points of the increase in the CPI in the year to June.

(ii) The frequency distribution of price movements

The increase of 0.6 percent in the CPI excluding credit services in the June quarter is a weighted arithmetic average of the increases in several hundred sub-component prices. An examination of the frequency distribution of these sub-component price movements provides useful information on the extent to which the average measure of inflation is representative of the general trend of inflation.

Figure 1 shows the weighted frequency distribution for the CPI excluding credit services, disaggregated into slightly more than 300 sub-component price movements. The horizontal scale measures the percentage movements in prices and is divided into 0.5 percent intervals (except at the ends), while the vertical scale measures the proportion of prices, weighted by their importance in the CPI regimen, experiencing a given price movement in the quarter.

Thus, for example, the tallest column shows that about 22 percent of the CPI regimen experienced price increases of between zero and 0.5 percent during the quarter (8.9 percent of the regimen showed no change in price). It may be noted that the end-points of the distribution shown in the figure lump together all price increases greater than 7 percent at one end and falls of greater than 7 percent at the other.

The characteristics of the distribution of price changes can also be described by the *moments* of the distribution. (The first four moments are the mean, variance, skewness and kurtosis of the distribution.²) The moments of the distribution in the June 1994 - June 1995 quarters are shown in Table 1:

For a symmetric distribution, in which the distribution of the price changes to the left of the mean is an exact mirror image of the distribution to the right of the mean, the skewness would be zero. The actual skewness of 11.29 indicates that the distribution of price changes in the quarter was quite "lop-sided" to the right. As is evident from figure 1, most price movements less than the mean were concentrated in the -1.5 to 0.6 percent range (53.1 of all price movements were in the -1.5 to 0.6 percent range). By

¹ See, for example, the discussion in Box 1 in the Bank's June 1995 *Monetary Policy Statement*.

² The mean is defined as the regimen-weighted arithmetic average of prices. The variance (σ^2) is defined as the second moment around the mean. The skewness and kurtosis are defined as the third and fourth moments around the mean, deflated by σ^3 and σ^4 , respectively.

Figure 1

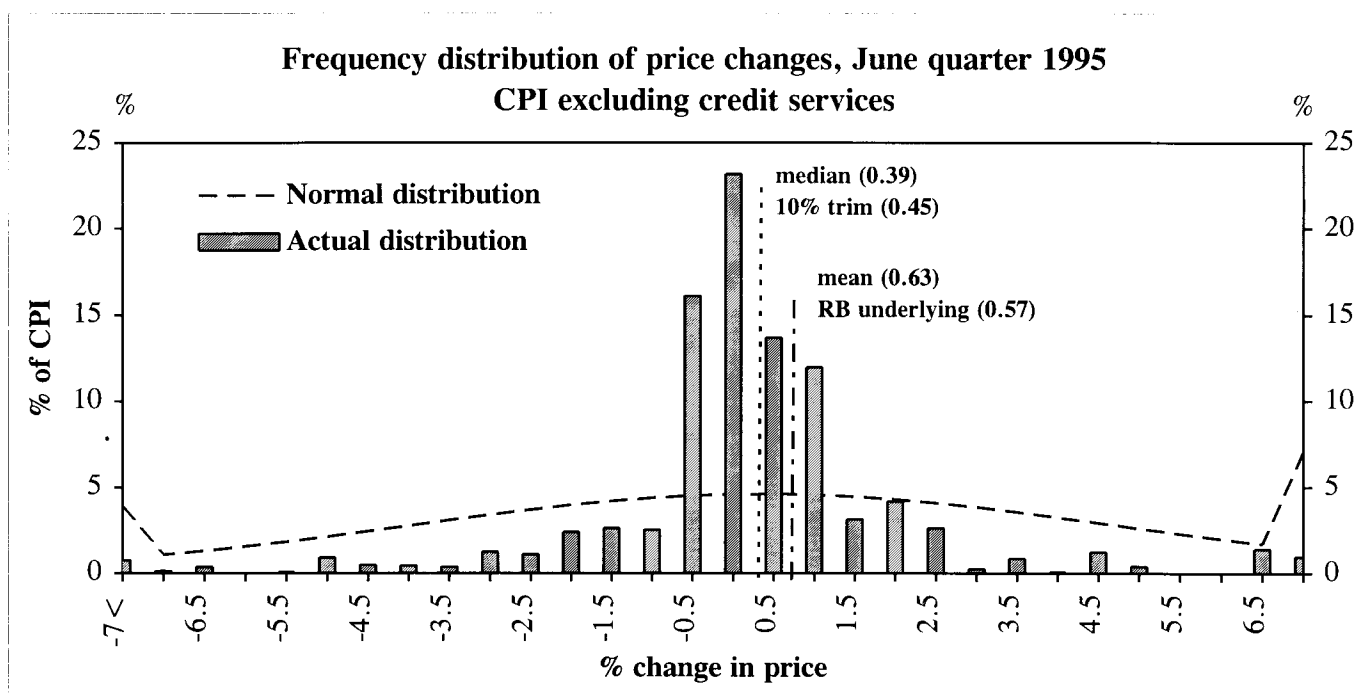


Table 1

Moments of the distribution of consumer price changes (ex. credit services) 1994Q2 - 1995Q2

| | 95Q2 | 95Q1 | 94Q4 | 94Q3 | 94Q2 |
|----------|-------|------|------|------|------|
| mean | 0.63 | 0.47 | 0.70 | 0.95 | 0.54 |
| variance | 18.8 | 22.8 | 6.4 | 7.4 | 11.6 |
| skewness | 11.3 | 3.2 | 6.8 | 1.9 | -2.7 |
| kurtosis | 184.7 | 57.2 | 95.9 | 53.2 | 40.7 |

contrast, a rather smaller proportion of price movements greater than the mean were concentrated in a similar range above the mean (only 32.1 percent of price movements were in the 0.6 to 2.7 percent range).

The kurtosis of the distribution of price changes provides an indication of how "peaked" the distribution is. The kurtosis of a normal distribution is 3, far less than the kurtosis of 184.7 for the distribution in the June quarter. This is also evident from figure 1. The dashed line shows the normal frequency distribution of prices with the same mean and variance as the actual distribution. As can be seen in the figure, the actual distribution of price changes was far more concentrated in the -0.5 to 1.5 percent range than would be the case with a normal distribution.

The high variance, skewness and kurtosis of the distribution of prices reflects the influence of a few extreme price increase during the quarter. A quick glance at individual price movements confirms this. In the June quarter just 0.36 percent of prices fell by over 10 percent, with an average decrease of 17.1 percent. At the other end of the spectrum, slightly more prices - 0.44 percent of the regimen - rose by more than 10 percent, but with an average increase of 47.3 percent. The extreme price movements were almost entirely concentrated in the fresh fruit and vegetables group.

These extreme price movements tend to increase the variance and kurtosis of the distribution. Their asymmetric character also works to raise the mean and skewness of the distribution. A more accurate impression of the general trend of inflation may be obtained, therefore, by reducing the influence of such extreme price movements on the calculated average.

Two measures which reduce the influence of outliers are the trimmed-mean and the weighted median.³ If the top 5 percent and the bottom 5 percent of price movements (by CPI regimen weight) are removed, the mean of the remaining distribution of price changes falls to 0.45 percent in

³ See S. Roger (1994) "Alternative measures of underlying inflation: further results", *Reserve Bank Bulletin*, vol. 57(4), pp.330-338.

the June quarter. The weighted median, which is the 50th percentile price change (ie, half the prices in the regimen rose by more and half by less), was 0.39 percent.

The recent evolution of these price measures is shown in Table 2:

Table 2

Measures of inflation 1994Q2 - 1995Q2

| | Annual % change <u>1995Q2</u> | Quarterly percentage changes | | | | |
|------------------------|-------------------------------------|---------------------------------|-------------|-------------|-------------|-------------|
| | | <u>95Q2</u> | <u>95Q1</u> | <u>94Q4</u> | <u>94Q3</u> | <u>94Q2</u> |
| Headline CPI | 4.6 | 1.0 | 1.2 | 1.2 | 1.2 | 0.4 |
| CPI ex credit services | 2.7 | 0.6 | 0.5 | 0.7 | 0.9 | 0.5 |
| RB Underlying | 2.2 | 0.6 | 0.5 | 0.6 | 0.5 | 0.3 |
| Weighted median | 1.7 | 0.39 | 0.39 | 0.43 | 0.48 | 0.31 |
| 10% trimmed mean | 2.5 | 0.45 | 0.52 | 0.64 | 0.90 | 0.52 |

As can be seen in figure 1, the median and trimmed mean measures lie slightly closer to the centre of the main cluster of price movements, and it is in this sense that we may think of them as more accurately representing the general trend of inflation than the mean, which can be strongly affected by a few quite extreme price changes.

The Bank's current measure of underlying inflation follows a different approach than the trimmed mean or median measures. Because the extreme price movements during the June quarter were in the food price group, and not specifically covered by the terms of the Policy Targets Agreement, they could not be excluded when calculating underlying inflation. The difference between the mean and the underlying rate, therefore, reflects the estimated delayed impact on prices of past increases in world petroleum prices. ■