

# Notes on a composite leading indicator of inflation

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## Introduction

In many countries leading indicators are used to forecast turning-points in the cyclical movement of *economic activity*. Although equally deserving, leading indicators for the future evolution of *price inflation* have not attracted similar attention.

The main objective of monetary policy<sup>1</sup> is to protect the value of the currency. This task is complicated by the long and variable lags between changes in the monetary policy stance and its ultimate effect on inflation. The delay between changes in monetary policy and their full effect on inflation could be as long as two and a half years. This means that monetary policy decisions have to be forward-looking and that policy-makers should avail themselves of information which could provide insight into future inflation. Reliable forecasts of inflation are therefore important.

The aim of this note is to introduce and propose a composite indicator that should be capable of foreshadowing movements in inflation. The purpose is not so much to forecast the magnitude of inflation, but merely to indicate important possible changes in the direction of inflation.

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## Reference data series

The generally accepted measure of inflation is the percentage change over periods of twelve months in the overall consumer price index. This statistical time series does, however, have some shortcomings when it is used as a reference series on which a leading indicator of inflation is to be based.

A rise in interest rates, for example, will increase measured inflation directly as the South African consumer price index includes the mortgage bond rate as a component of home-owner's costs. However, increases in interest rates are meant to reduce inflation in an indirect way through their effects on saving and consumption in the medium to long term. To avoid this apparent anomaly, home-owner's costs should therefore be excluded from the overall consumer price index, for the purpose of this exercise.

Apart from monetary policy steps, some fiscal policy measures are often applied for broader macroeconomic purposes despite their potential short-term price-raising effects on the general level of prices. More specifically, the price-raising effect of value-added tax (VAT) should for instance preferably be excluded from the consumer price index to obtain a more reliable reference series of inflation.

Accordingly, the reference data series of inflation used in this note is the percentage change over twelve months in the overall consumer price index, excluding home-owner's costs and value-added tax (see Graph 1).

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Graph 1: Reference data series of consumer price inflation

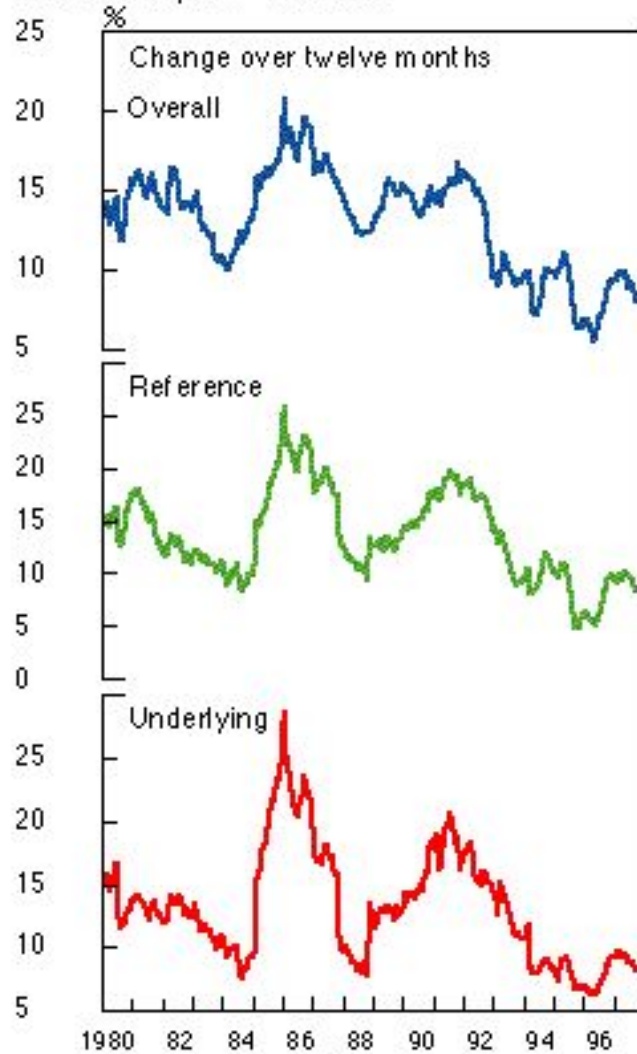


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It could be argued that the prices of food which are often affected by extraneous climatic conditions should also be excluded from the consumer price index. This will reduce the reference data series to what is commonly referred to as underlying inflation. Food, however, comprises a substantial part of consumer spending. (The average weight of food in the overall consumer price index is almost 20 per cent, ranging from about 45 per cent in the case of very low expenditure categories to 15 per cent in the highest expenditure categories.) Furthermore, the impact of food prices is dispersed over a wide variety of potential leading indicators, thereby frustrating any attempt to eliminate the effect of food prices on a composite leading indicator. It was therefore decided not to exclude food from the reference data series. However, as food prices are subject to abrupt fluctuations from time to time, they could introduce corresponding movements in the reference data series. Although the various prospective leading indicators will be compared with the reference data series, the relationship between such indicators and underlying and overall inflation may still be valuable in explaining particular movements in inflation( see Graph 2).

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Graph 2: Overall, reference and underlying consumer price inflation



According to Table 1 the turning-points of the reference data series show only a few deviations from those of the more comprehensive overall inflation rate. The only significant difference occurred when the overall inflation cycle of 1989-1990 was not accompanied by a corresponding cycle in either the reference or the underlying data series. This can mainly be explained by the strong contribution of a rise of 3 percentage points in the mortgage bond rate between November 1988 and October 1989. In the period 1994-1995 the overall inflation series again experienced a cycle that was not clearly reflected in the reference data series and even less so in the underlying inflation series. The major contribution to this difference was an increase in the prices of food resulting from the lower-than-expected growth in agricultural output on account of the withholding of livestock from the market to replenish herds, as well as frost damage to vegetable production and drought-related damage to the wheat crop.

**Table 1. Turning-points of inflation**

|        | <b>Overall</b> | <b>Reference</b> | <b>Underlying</b> |
|--------|----------------|------------------|-------------------|
| Trough | Feb 1984       | Aug 1984         | Aug1984           |
| Peak   | Jan 1986       | Jan 1986         | Jan 1986          |
| Trough | Aug 1988       | Oct 1988         | Oct 1988          |
| Peak   | Jun 1989       | ...              | ...               |
| Trough | Jul 1990       | ...              | ...               |
| Peak   | Oct 1991       | Jul 1991         | Jul 1991          |
| Trough | Apr 1994       | ...              | ...               |
| Peak   | Apr 1995       | ...              | ...               |
| Trough | Apr 1996       | Oct 1995         | May 1996          |

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## Identification of indicators

To compile a composite indicator as accurately as possible, a large number of economic time series were evaluated. Those series identified as consistent reliable predictors of inflation were then combined into a single composite indicator. The methodology applied was the same as that used to compile the leading business cycle indicator in South Africa (Van der Walt 1983 and Van der Walt & Pretorius 1995).

To reduce the degree of subjective discretion in choosing individual indicators, an objective evaluation system similar to those used in various other countries was relied upon. The main criteria used in the evaluation system were the economic significance of the specific activity or process included in the indicator, the statistical adequacy of the data, the historical conformity and the relationship with the reference cycle as to the timing of changes, the smoothness of the time series, and the timely availability of data. Marks or scores were allotted to each criterion. As the reliability of economic time series as reference cycle indicators is of overriding importance, historical conformity and the timing of changes with the reference cycle were regarded as the most important criteria. In accordance with practices used in other studies (see for example Moore & Shiskin 1967, Beck, Bush & Hayes 1973 and Zarnowitz & Boschan 1975), those economic time series that closely conformed with the specified criteria were awarded the highest scores.

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## Evaluation of indicators

More than sixty different time series, including quantitative and qualitative indicators, which could

possibly have some relationship with inflation, were tested for inclusion in the composite leading indicator of inflation. Ultimately, nine indicators were selected for incorporation into the composite index. Selection criteria consisted not only of the highest scores obtained in the evaluation process, but various activities and processes in the economy that may conceivably reflect the origins of inflation were seriously considered for inclusion in the indicator irrespective of whether they have been awarded the highest scores. Among these were excess demand, supply shortages, cost increases and inflation expectations. In many cases the data series were transformed into percentage changes over a period of twelve months to conform with the measurement of inflation. In the case of time series with quarterly frequencies, the data were converted into time series with a monthly frequency.

The nine indicators selected to serve as leading indicators of inflation are presented in Table 2. These nine individual components were then combined into a single composite indicator using the techniques described by Van der Walt and Pretorius (1995).

**Table 2. Leading indicators of inflation**

| Indicator  | Measuring unit  |
|--|---|
| Value of retail trade sales at constant prices   | Percentage change over twelve months                                    |
| Gross domestic expenditure as percentage of gross domestic product   | Percentage and converted to monthly frequency                           |
| Output gap (difference between potential and actual real gross domestic product in the private non-agricultural sectors) | Percentage and converted to monthly frequency                           |
| Delivery period of orders received in manufacturing (opinion survey)   | Net percentage and converted to monthly frequency                       |
| Unit labour costs in the non-agricultural sectors  | Percentage change over four quarters and converted to monthly frequency |
| Prices of imported goods and non-factor services   | Percentage change over four quarters and converted to monthly frequency |
| M3 money supply  | Percentage change over twelve months                                    |
| Yield on government stock with maturity of 10 years and longer   | Percentage  |

Expected average retail selling price (opinion survey)

Net percentage and converted to monthly frequency

The relationship between the movement in the composite leading indicator and inflation is indicated in Table 3 (as well as Graph 3). The changes in the direction of the composite indicator gave early warnings of changes in the direction of inflation - one to two years ahead of the actual change in the reference data series of inflation.

**Table 3. Turning-points of the composite leading indicator**

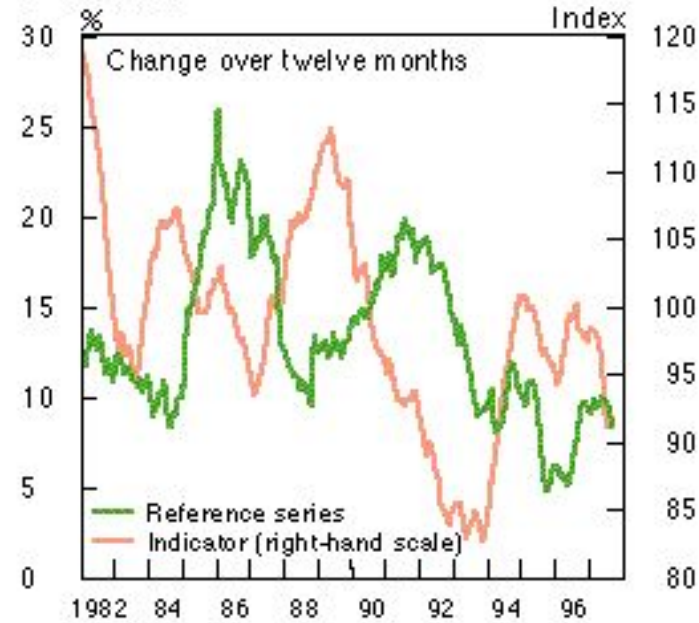
|        | <b>Leading indicator</b> | <b>Reference data series of inflation</b> | <b>Lead time (months)</b> |
|--------|--------------------------|---|---------------------------|
| Trough | Aug 1983                 | Aug 1984                                  | 12                        |
| Peak   | Oct 1984                 | Jan 1984                                  | 15                        |
| Trough | Feb 1987                 | Oct 1988                                  | 20                        |
| Peak   | May 1989                 | Jul 1991                                  | 26                        |
| Trough | Nov 1993                 | Oct 1995                                  | 23                        |
| Peak   | Aug 1996*                | ...                                       | ...                       |

\* Although the leading indicator showed a "peak" early in 1995, this "peak" was solely attributable to two components which increased strongly over a short period, before declining again equally strongly.

Firstly, the strong upward movement of domestic rates on long-term bonds in 1994 was caused by factors such as uncertainties pertaining to political developments and concern about the government's large financing needs.

Secondly, there was a sharp increase in 1994 in the number of manufacturers who experienced a lengthening in the delivery period of orders received.

Graph 3: Composite leading indicator of inflation



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## Concluding comments

The composite leading indicator of inflation turned out to be a reliable predictor of inflation turning-points during the 1980s. The forecasting power of the indicator was broadly left intact in the 1990s. A deep trough in the leading indicator in 1993 was followed by a trough in the reference data series in 1995.

After having reached a peak in 1996, the composite leading indicator moved downwards. This movement still has to be reflected more convincingly in a further slowdown in the rate of increase in consumer prices. Movements in inflation in the months to come are likely to confirm that the composite indicator is still, also under present circumstances, a reliable predictor for the movement in consumer price inflation.

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## References

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**1** To attain the ultimate objective of price stability, the monetary authorities determine an acceptable growth rate for the money supply as an intermediate objective. The growth in the money supply is then affected by changes in the amount of liquidity available in the banking system and by changing the cost of accommodating the money market shortage.