

Appendix only: Technical details for *What's down with Australian inflation?*

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Full article: [What's down with Australian inflation?](#)

Published: 25 March 2021

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This appendix explains the technical details for the inflation decomposition described by [Saunders \(2021\)](#). This includes a:

- A.1: description of the methodology,
- A.2: discussion of the robustness of the results, and
- A.3: comparison to the results from a principal components analysis as a further robustness check.

A.1: Methodology

Our methodology is similar to that described by [Shapiro \(2020\)](#). We first ran a Phillips curve regression for each of the 87 expenditure class components in the Consumer Price Index (CPI) basket, using all available data from 1993 to December quarter 2020.

$$\pi_t^i = \lambda \frac{(UR_{t-1} - NAIRU_{t-1})}{UR_{t-1}} + \beta_0 + \beta_1 \pi_{t-1}^e + \frac{1}{4} \beta_2 \sum_{j=1}^3 \Delta TWI_{t-j}^i + \frac{1}{3} \beta_3 \sum_{j=1}^3 \pi_{t-j}^i + dummies$$

Where:

- π^i represents seasonally adjusted quarterly inflation for CPI expenditure class component i
- UR is the unemployment rate
- $NAIRU$ is the RBA's measure of the non-accelerating inflation rate of unemployment (NAIRU)
- π^i is the RBA's measure of inflation expectations
- TWI is the natural log of the trade-weight exchange rate
- *dummies* refers to dummy variables that account for the effect of the introduction of the GST and COVID-19 on inflation

The results from these regressions were then used to place each expenditure class component into one of the following four categories.

1. **Labour market-sensitive inflation:** Includes components that have a negative and statistically significant relationship with the unemployment gap (based on the estimated coefficient λ).
2. **Exchange rate-sensitive inflation:** Includes components that have a negative and statistically significant relationship with changes in the exchange rate (based on β_2). Where there is overlap between the labour and exchange rate-sensitive components, we have allocated the series to labour market-sensitive inflation.
3. **Persistent acyclical inflation:** Includes components that don't fall into either of the previous two categories, but that have a positive and statistically significant with its own lags (based on β_3).
4. **Transient acyclical inflation:** Includes all components that do not fall into any of the previous three categories. These series do not have a significant (or correctly signed) relationship with the unemployment gap, the exchange rate, or its own lags.

Finally, the components in each of these categories were weighted together using a time-series of the historical Australian Bureau of Statistics (ABS) expenditure class weights.

A.2: Robustness

The results from this exercise will inevitably be affected by modelling choices, some of which are necessarily arbitrary. To address this issue, we could have repeated the exercise using different assumptions and versions of the model, and then taken an average of the results. However, we found that the key conclusions were robust to different specifications, so we decided to keep the analysis simple and use a single specification.

The main sensitivity analyses we conducted were related to the lag structure, the sample period, the level of statistical significance used for the classification, and data sources.

- To keep the analysis simple, we used a fixed lag structure for both changes in the trade-weighted exchange rate index (TWI) and the lagged dependent variable. However, the results did not change noticeably when we used different (plausible) lag structures.
- The results were also not sensitive to whether we started the sample in 1996 (when the Government officially endorsed the RBA's inflation targeting objective) or 1993 (when inflation targeting was first adopted by the RBA).
- We used a 10 per cent level when assessing the significance of the coefficients, to account for measurement error and volatility associated with detailed component level data. However, we obtained similar results when we used a five per cent level of significance.
- The results were relatively insensitive to the use of import prices rather than the trade weighted exchange rate.

The results did differ slightly with each of the iterations above. However, these differences were relatively small and did not change the key findings from this work. Further sensitivity analyses could assess different measures of inflation expectations or the NAIRU, or different specifications of the Phillips curve model.

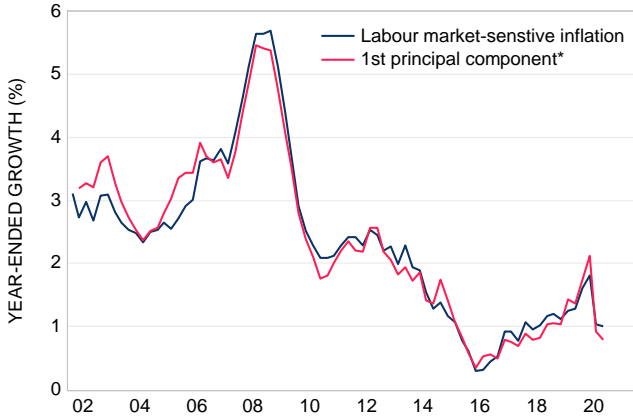
A.3: Comparison to Principal Component Analysis

The results from a principal components analysis (PCA) also support the validity of our results. PCA allows us to reduce the large number of expenditure class components into a smaller set of variables that explain the common movements across the different series. The first principal component explains the largest possible share of the variance in the data set. The second principal component explains the second largest share of the variance, and so on. Each principal component is linearly independent (ie, orthogonal) from each other.

The first three principal components are highly correlated with our first three estimated inflation categories. The first principal component is highly correlated with labour market-sensitive inflation (Graph 1), the second principal component is correlated with exchange rate-sensitive inflation (Graph 2), and the third is correlated with persistent acyclical inflation (Graph 3). This results in our fourth inflation category being correlated with the weighted sum of the remaining 84 principal components. The correlation with the first two principal components is particularly remarkable, keeping in mind that these series were estimated using completely different techniques and assumptions.

Taken at face value, these results suggest that our first three estimated inflation categories are picking up on the three largest sources of variation across the different CPI components. It also gives a clear economic interpretation to the different principal components, with labour market conditions seemingly accounting for the largest source of variation across the CPI components and the exchange rate being the second largest. Overall, the consistency of these different results supports the validity of our inflation decomposition.

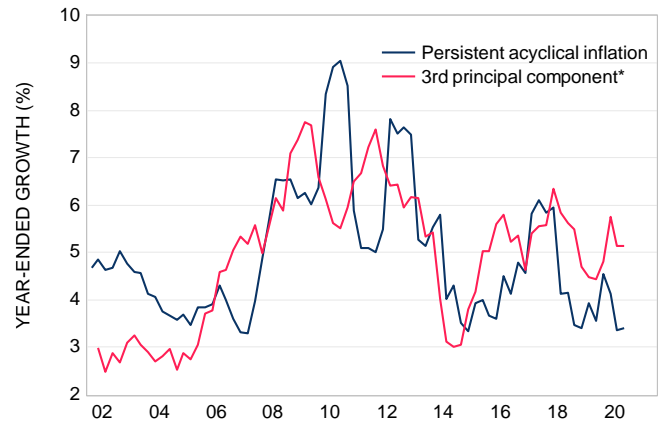
GRAPH 1: LABOUR MARKET-SENSITIVE INFLATION AND THE FIRST PRINCIPAL COMPONENT



* Scaled to have the same mean and standard deviation as labour market-sensitive inflation

SOURCES: REFINITIV DATASTREAM, QTC

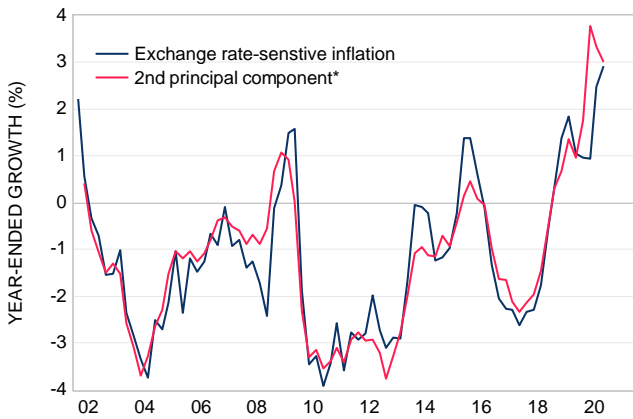
GRAPH 3: PERSISTENT ACYCLICAL INFLATION AND THE THIRD PRINCIPAL COMPONENT



* Scaled to have the same mean and standard deviation as persistent acyclical inflation

SOURCES: REFINITIV DATASTREAM, QTC

GRAPH 2: EXCHANGE RATE-SENSITIVE INFLATION AND THE SECOND PRINCIPAL COMPONENT



* Scaled to have the same mean and standard deviation as exchange rate-sensitive inflation

SOURCES: REFINITIV DATASTREAM, QTC