

Sentiment, Uncertainty and Households' Inflation Expectations

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Abstract

High inflation expectations can have significant consequences for the economy as a whole, and can become self-reinforcing. It is therefore noteworthy that inflation expectations of Australian households are persistently higher than actual inflation. This is partly because when consumers are more uncertain about the economy, they tend to report their inflation expectations in round multiples of 5 per cent, which is higher than inflation has averaged over recent decades. In addition, there is a negative relationship between consumer sentiment and inflation expectations. This article examines the relationship between sentiment, uncertainty and households' inflation expectations in Australia, and considers how this uncertainty might be addressed. It suggests that targeted and clear communication about inflation can help to reduce uncertainty and provide consumers with a better understanding of the path of future inflation.

Introduction

Consumer price inflation has picked up significantly over the past year. A key risk that could arise from a period of elevated inflation is that firms and households come to expect continued high levels of inflation into the future – and that this shifts behaviour in ways that are hard to reverse (Lowe 2022). Inflation expectations influence wage negotiations and price-setting behaviour, and can become self-reinforcing. When firms expect

inflation to be high, they set their prices accordingly and households demand higher wages, creating high actual inflation. Inflation expectations also determine the stance of monetary policy. All else equal, changes in inflation expectations affect real interest rates (the difference between nominal interest rates and inflation expectations), and in turn households' consumption and firms' investment and hiring decisions (D'Acunto *et al* 2021).

The Reserve Bank monitors a range of measures of inflation expectations, including those of financial markets and professional forecasters, as well as households (Moore 2016). This article seeks to develop a better understanding of the relationship between sentiment, uncertainty and household inflation expectations in Australia.

The data

Alongside other data sources, the analysis uses microdata from the Melbourne Institute, which is derived from a survey of around 1,200 households. The survey has been run every month since 1995. The responses are weighted to ensure the survey matches Australia's population characteristics for sex, age and location. Alongside socio-demographic information (e.g. sex, age, income, occupation, education, location and home ownership), the survey asks about the respondent's assessment of a range of economic variables such as unemployment.^[1] On inflation, consumers are asked how they expect the 'prices of things you buy' to change over the next year; if respondents state that prices will go 'up' or 'down', they are then asked to provide a numerical estimate for the expected change. Our analysis covers the period from January 1995 to July 2022, which yields a total of about 358,000 observations. For some of the analysis, we use the middle 70 per cent distribution of responses (cutting the largest 15 per cent and smallest 15 per cent of responses) in order to reduce the effects of extreme responses.^[2]

Characteristics of consumers' inflation expectations in Australia

There are a few key characteristics of consumers' inflation expectations that distinguish them from other measures of inflation expectations. These features are generally found to be common across countries.

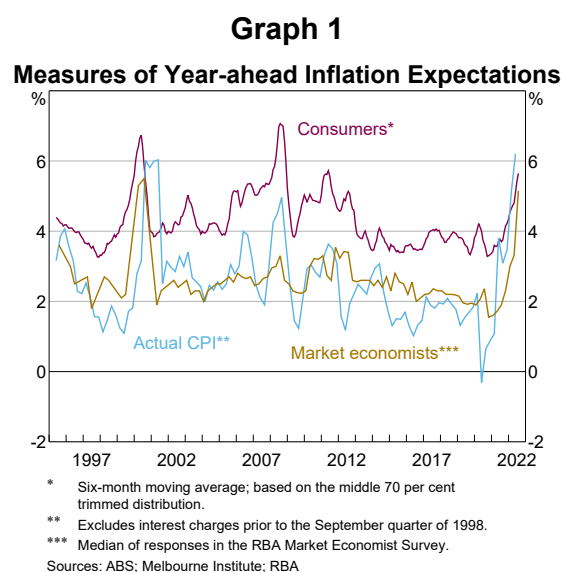
Upward bias in consumers' inflation expectations

Since 1995, Australian consumers' expectations of inflation for the following year have been persistently higher than actual inflation outcomes and other measures of inflation expectations, such as those from professional forecasters (Graph 1).

Inflation expectations averaged about 5.3 per cent over this period (4.3 per cent based on the middle 70 per cent trimmed distribution), while actual inflation averaged 2.5 per cent. The examined time period – January 1995 to July 2022 – coincides with the inflation targeting period, during which time inflation was mostly low and stable; since 1993, the Reserve Bank has sought to keep consumer price inflation to 2–3 per cent, on average, over the medium term. The overestimation of inflation is in part due to consumers paying more attention to the prices of more noticeable items (such as petrol and groceries) when thinking about the inflation outlook, rather than taking into account the full basket of goods and services included in the Consumer Price Index (CPI) (Ballantyne *et al* 2016; D'Acunto *et al* 2021).

While there tends to be a gap between consumers' average inflation expectations and actual inflation, expectations broadly move with trends in inflation – that is, inflation expectations tend to shift higher or lower during periods of high or low inflation. For example, consumers' short-term (one year ahead) inflation expectations have increased over the past year alongside a pick-up in actual inflation. However, most medium- and long-term (5–10 years ahead) measures, including those from financial markets and market economists, remain within the inflation target range.

There is wide variation in inflation expectations across consumers (Graph 2). For example,



25 per cent of respondents in 2019 expected an inflation rate of 6 per cent or more, while another 25 per cent expected a rate of 0 per cent or less. Extreme responses – such as –50 per cent or 100 per cent inflation – are also observed in the data, though they tend to comprise a very small share of the responses. The degree of variation has not fallen over time, despite the mostly low and stable inflation environment since the mid-1990s. In addition, survey responses tend to be clustered around round numbers, such as 5 or 10 per cent.

Differences across socio-demographic groups

There are significant differences in inflation expectations across socio-demographic groups (Graph 3). On average:

- Female respondents have higher inflation expectations than males.
- Respondents with a university education, higher income and in professional jobs have lower inflation expectations.
- Respondents living in regional areas and renting instead of owning their home have higher inflation expectations.

There is not a clear relationship between age and inflation expectations.

Consumers' sentiment and inflation expectations

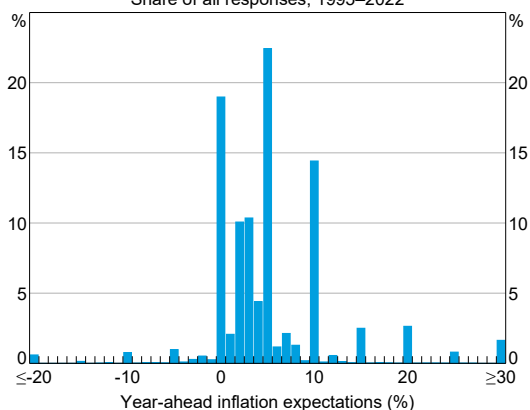
Consumers who feel pessimistic about the outlook tend to have higher inflation expectations than those who expect the conditions in the future to be

similar or better than they are currently (Graph 4) (see Appendix A, Graph A1). This is the case for all the measures of sentiment in the survey, including employment, personal financial situation and the general economic outlook. For example, households who predict that the unemployment rate will increase over the next 12 months expect year-ahead inflation to be 6.1 per cent on average, compared to around 4.5 per cent for those who expect the unemployment rate to remain stable or decrease. More generally, there is a strong negative correlation between sentiment and expectations for inflation: respondents who are more pessimistic about future economic and employment conditions predict higher inflation (Graph 5). This negative relationship has been stable over time, holds for specific demographic groups and is consistent with studies using data from the United States and the euro area (see Appendix A, Graph A2) (Kamdar 2019; Candia, Coibion and Gorodnichenko 2020).

The role of uncertainty in consumer inflation expectations

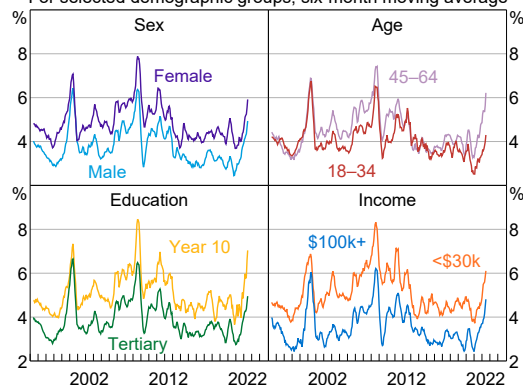
One potential explanation for the upward bias in consumers' inflation expectations and differences across socio-demographic groups is that many consumers are uncertain about the future level of inflation. This uncertainty could reflect factors such as consumers updating their information about prices and future economic conditions infrequently due to the costs of acquiring new information, as

Graph 2
Distribution of Household Inflation Expectations
 Share of all responses, 1995–2022



Sources: Melbourne Institute; RBA

Graph 3
Mean Household Inflation Expectations*
 For selected demographic groups, six-month moving average



* Based on the middle 70 per cent trimmed distribution.
 Sources: Melbourne Institute; RBA

well as how information on economic conditions spreads from professionals to households over time (Mankiw and Reis 2003; Carroll 2003). This suggests that at any given period only some consumers are informed about the inflation outlook.

Measuring uncertainty

Empirical studies have measured inflation uncertainty in various ways, including by directly asking respondents about their level of certainty or asking them to attach probabilities to different outcomes (Jonung 1986; Armantier *at al* 2013). However, most consumer surveys, including that by the Melbourne Institute, only record an individual's point forecast of inflation, which means they do not directly observe consumers' level of certainty about

their forecast. As an alternative, some studies have shown that point forecasts can be used to infer information about the respondent's uncertainty (Binder 2017; Reiche and Meyler 2022).

In particular, studies from fields such as cognition, linguistics and communication suggest that the use of round numbers (e.g. multiples of five) in survey responses often indicates more uncertainty, compared to the use of non-round numbers (e.g. digits and decimals) – this has been called the 'round numbers suggest round interpretations' principle (Krifka 2009). We adopted this approach to study the role of uncertainty in households' inflation expectations, defining respondents reporting in round numbers as being more uncertain about the inflation outlook and respondents reporting in non-round numbers as being more certain. It is possible that round responses may instead indicate disengagement or carelessness on behalf of respondents, rather than uncertainty. However, the share of round responses increases materially during times of economic and policy uncertainty, providing evidence that uncertainty is a driver of those responses.

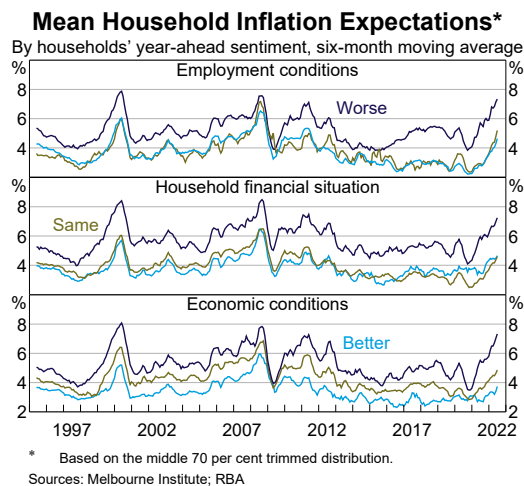
Uncertainty is widespread

Similar to data from other economies, round responses for expected inflation are very common in the Melbourne Institute survey. Close to 50 per cent of respondents typically report their inflation expectations in round numbers. The share of round responses generally increases during times of economic and policy uncertainty – reaching as high as 70 per cent during the global financial crisis, and increasing noticeably at the onset of the COVID-19 pandemic (Graph 6).^[3] This suggests that the responses reflect uncertainty about outcomes, rather than inattention on behalf of consumers.

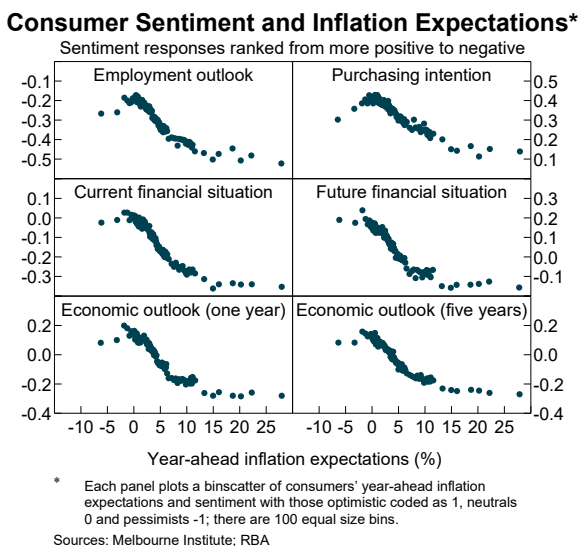
Uncertainty and inflation expectations

Uncertainty appears to play an important role in the upward bias observed in household inflation expectations. The round numbers reported when consumers appear uncertain tend to be high relative to observed inflation, putting upward pressure on average surveyed inflation expectations. As a result, there is a strong correlation

Graph 4



Graph 5



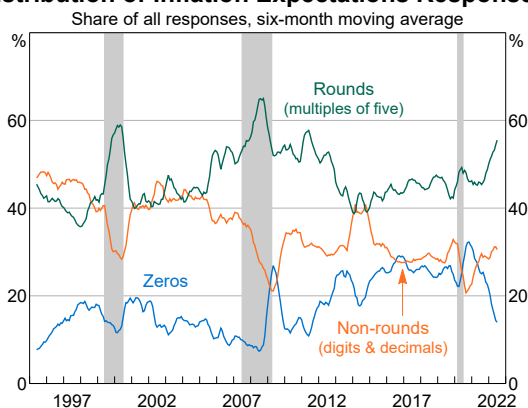
between average consumer inflation expectations and the share of people reporting in round numbers (Graph 7). Moreover, the average inflation expectation of those reporting in non-round numbers (including zeros) has been mostly unbiased relative to actual inflation outcomes (Graph 8). By contrast, the average of those reporting in round numbers has been significantly higher than actual inflation, although the average of these responses has a similar trend to actual inflation outcomes. This indicates that uncertain consumers are able to distinguish between periods of low and high inflation, even if they have difficulty precisely articulating their inflation expectations. This supports the argument that rounding includes information about uncertainty rather than pure inattentiveness.

Uncertainty, demographics and sentiment

Socio-demographic characteristics and economic sentiment help to explain consumers' level of uncertainty. The same demographic groups (such as females, less-educated individuals and those more pessimistic about their personal finances and the economy) who have relatively high inflation expectations are also more likely to be uncertain about the inflation outlook (Graph 9).^[4] These results are similar to those found for the United States and the euro area (Binder 2017; Reiche and Meyler 2022).

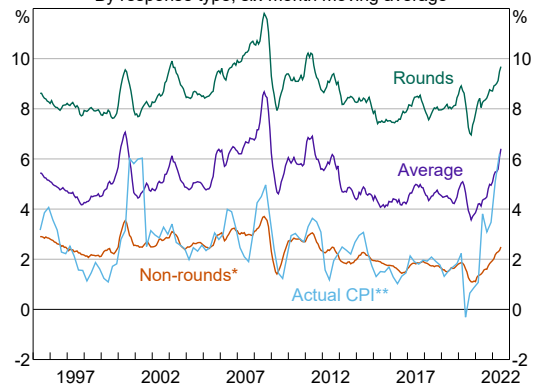
Moreover, statistical models support the idea that uncertainty about the inflation outlook partly explains the differences in average expected

Graph 6
Distribution of Inflation Expectations Responses*



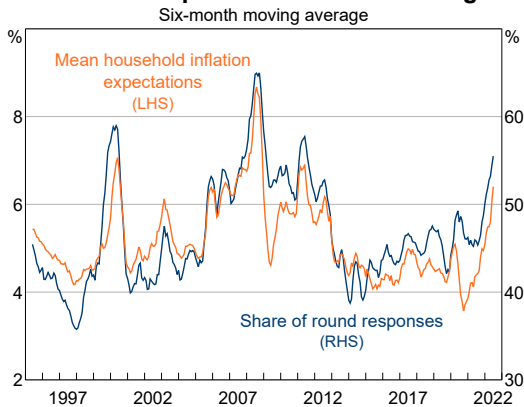
Sources: Melbourne Institute; RBA

Graph 8
Mean Household Inflation Expectations



* Includes zeros.
** Excludes interest charges prior to the September quarter of 1998.
Sources: Melbourne Institute; RBA

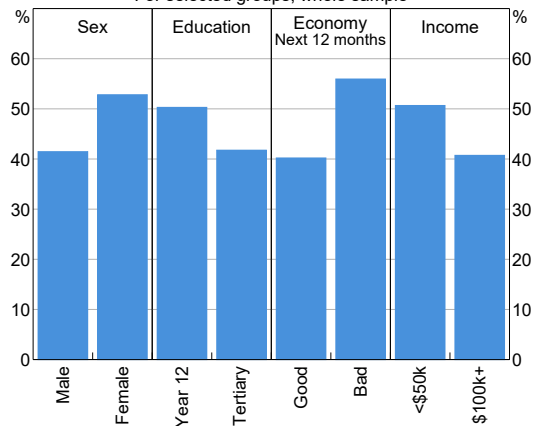
Graph 7
Inflation Expectations and Rounding



Sources: Melbourne Institute; RBA

Graph 9

Share of Round Responses*
For selected groups, whole sample



* Exclude zeros.
Sources: Melbourne Institute; RBA

inflation observed across demographic groups. In a model focused only on the 'certain' group (those reporting in non-round numbers), females, renters and those living in regional areas no longer tend to have higher inflation expectations, while the gap between high-income earners and those with university education, and other consumers, is either eliminated or narrows substantially (Graph 10) (see Appendix B for full model results).

The effects of consumers' sentiment on inflation expectations are also reduced once uncertainty is accounted for. However, even accounting for uncertainty, sentiment still appears to play a part in influencing households' inflation expectations. The negative relationship between consumer sentiment and inflation expectations shown above holds for both certain and uncertain groups (Graph 11).

Discussion

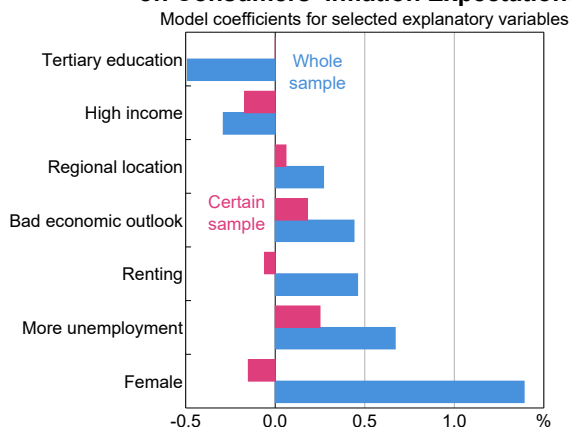
There are a few related takeaways from this analysis. First, we find that uncertainty plays an important role in influencing individuals' surveyed inflation expectations. Individuals and groups (such as those less-educated and those pessimistic about the future) who tend to report higher inflation expectations on average are also more likely to be uncertain about the rate of inflation. In addition, consumer uncertainty about the inflation outlook typically rises noticeably during times of economic distress; this explains why reported consumer inflation expectations can rise even during

recessionary periods, such as at the onset of the COVID-19 pandemic (Candia *et al* 2020). This also suggests that an increase in households' inflation expectation due to increased uncertainty may contain less information about their current behaviour and reduces the risk of higher inflation expectations becoming entrenched. These findings imply that more targeted communication from central banks and others could be effective in lowering consumers' level of uncertainty, particularly during volatile periods. Some studies have found that intense media reporting about inflation lowered households' inflation bias, and this effect was most pronounced for those with a particularly strong upward bias (Ehrmann, Pfajfar and Santoro 2017). Similarly, Hoffmann *et al* (2022) found that communication from the European Central Bank about the inflation outlook reduced German households' inflation expectations, particularly so when a verbal explanation was provided instead of numerical projections.

Second, we find a negative relationship between consumer sentiment and inflation expectations in Australia. Reiche and Meyler (2022) suggest that negative sentiment leads individuals to become more uncertain and therefore more likely to report high inflation expectations. However, even controlling for uncertainty and demographic characteristics, we find that the negative relationship between sentiment and inflation

Graph 10

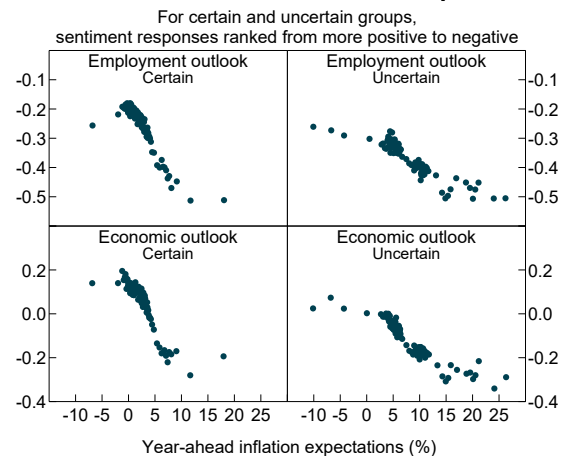
Effects of Demographics and Sentiment on Consumers' Inflation Expectations*



* Consumers' inflation expectations is the dependent variable.
Sources: Melbourne Institute; RBA

Graph 11

Consumer Sentiment and Inflation Expectations*



* Each panel plots a binscatter of consumers' year-ahead inflation expectations and sentiment with those optimistic coded as 1, neutrals 0 and pessimists -1; there are 100 equal size bins.

Sources: Melbourne Institute; RBA

expectations remains. We caution that this result should be interpreted as correlation rather than causation; it could reflect other individual characteristics (not observed in the data) that tend to drive both sentiment and inflation expectations.

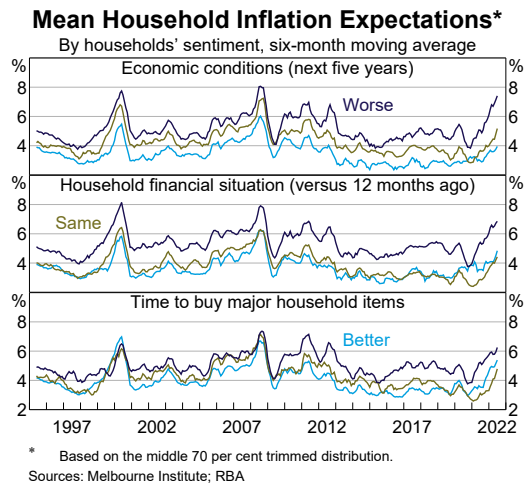
The negative relationship between consumer sentiment and inflation expectations means that consumers associate higher prices with negative effects on their household finances, a weaker economy and a higher unemployment rate. This is inconsistent with the Phillips curve idea that inflation is typically driven by strong demand. Candia *et al* (2020) have argued that households have a 'supply-side' view of the economy, meaning that increases in prices are believed to be driven by supply shocks, similar to the experience of the 1970s and 1980s oil price shocks and the recent rise in global inflation. Others have argued that this relationship between sentiment and inflation expectations could reflect consumers having a simple 'good-bad heuristic', leading them to expect co-movement of all that is bad, such as inflation and unemployment (Kamdar 2019; Andre *et al* 2022). Relatedly, Andre *et al* (2022) found that some household groups, such as younger and less-educated consumers, perceive increases in interest rates as inflationary.

Conclusion

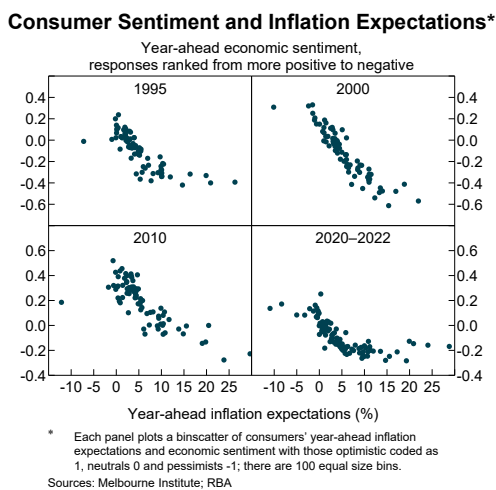
Using microdata from the Melbourne Institute, this analysis found that uncertainty partly explains why consumer inflation expectations are persistently higher than realised inflation outcomes, as well as the differences in inflation expectations across demographic groups. Individuals and groups (such as females and the less educated) who tend to have higher inflation expectations on average are more likely to be more uncertain about the inflation outlook. In addition, consumer uncertainty about inflation typically increases in economic downturns, and there is a negative relationship between consumer sentiment and inflation expectations. Our results, which are consistent with studies of households in the United States and the euro area, suggest that more targeted and clear communication about inflation can help to reduce uncertainty and therefore decrease the bias in inflation expectations for consumers. This is particularly important during periods of heightened uncertainty, as is currently the case in both the Australian and the global economy, which is also coinciding with a period of high inflation.

Appendix A: Additional graphs

Graph A1



Graph A2



Appendix B: Regression results

We first estimated the linear effects of socio-demographic and economic sentiment variables and monthly percentage change in oil prices on households' inflation expectations ('baseline model'). We included change in oil prices as one of the independent variables because previous research has shown that consumer inflation expectations are quite sensitive to prices that are more noticeable, particularly past changes in petrol prices. To analyse the role of uncertainty, we then followed the approach of Reiche and Meyler (2022) by splitting the survey into two subsamples: the 'certain' (those reporting in zeros, digits and decimals); and the 'uncertain' (multiples of five). This allowed for distinguishing the effect of socio-demographic and sentiment variables across the two groups. Excluding zeros from the certain sample yielded similar results.

The benchmark group in the models was arbitrarily chosen to have the following characteristics: male, aged 35 to 44 years, with vocational training, works in trades, has a household income of \$31,000 to \$80,000, votes for the Australian Labor Party, has a mortgage, lives in a capital city, and reports neutral on the economic sentiment variables.

As a robustness check, we also ran regressions on the subsamples of those who have a realistic inflation expectation of 0–10 per cent as well as those with expectations outside that range. We also added macroeconomic variables such as the unemployment rate, actual inflation, the exchange rate and the cash rate to control for aggregate economic conditions. The results were qualitatively similar. ✎

Table A1: Regression Results^(a)

Estimated on January 1995 – July 2022

	Baseline model	Certain model	Uncertain model
Female	1.39***	−0.15***	1.83***
Age			
18–34	−0.32***	−0.20***	−0.34***
45–64	0.27***	0.06***	0.40***
Over 65	−0.06	−0.21***	0.11
Occupation			

	Baseline model	Certain model	Uncertain model
Managers	-0.31***	-0.11***	-0.32***
Professionals	-0.40***	-0.13***	-0.49***
Paraprofessionals	-0.23***	-0.03	-0.23*
Clerks	-0.48***	-0.04	-0.72***
Salespersons	-0.10	-0.07	-0.15
Plants workers	-0.03	-0.02	0.13
Labourers	-0.07	-0.21***	0.07
Retired	-0.18***	-0.13***	0.01
Unemployed	-0.00	-0.23***	0.25**
Occupation refused	-0.09	-0.19	0.33
Education			
Non-secondary	0.45***	0.08***	0.58***
Secondary	0.01	0.05*	-0.03
Tertiary	-0.49***	0.00	-0.63***
Postgraduate	-0.58***	-0.06*	-0.52***
Income			
Under \$30K	0.46***	0.06***	0.62***
\$81K-\$100K	-0.17***	-0.10***	-0.21***
Over \$100K	-0.29***	-0.17***	-0.21***
Voting preference			
Liberal	-0.39***	-0.13***	-0.39***
Nationals	-0.36***	-0.16***	-0.30*
Green	-0.26***	-0.07**	-0.24***
Independent	0.08	0.02	0.14
Swing	0.20***	0.12***	0.37***
Unemployment (next 12 months)			
More	0.67***	0.25***	0.55***
Less	0.03	0.03	0.02
Economic outlook (next 12 months)			
Good	-0.15***	0.00	-0.08
Bad	0.44***	0.18***	0.47***
Economic outlook (next five years)			
Good	-0.20***	-0.09***	-0.04
Bad	0.50***	0.25***	0.49***
Financial situation (versus 12 months ago)			
Better	0.23***	0.14***	0.29***
Worse	0.92***	0.48***	0.76***
Financial situation (next 12 months)			
Better	0.10***	0.07***	0.13**
Worse	1.24***	0.66***	0.96***
Time to purchase major household items			

	Baseline model	Certain model	Uncertain model
Good	0.05*	0.15***	0.04
Bad	0.60***	0.27***	0.53***
Home ownership			
Renter	0.46***	-0.06**	0.65***
Own outright	-0.14***	-0.01	-0.16***
Other	0.59***	0.07	0.82***
Other variables			
Regional area	0.27***	0.06***	0.30***
Change in oil prices	1.39***	0.43***	1.33***
Constant	3.51***	1.92***	6.12***
R squared	0.05	0.03	0.04
Observations	353,387	187,275	166,112

(a) The dependent variable is households' year-ahead inflation expectations. ***, ** and * denote statistical significance at the 1, 5 and 10 per cent levels, respectively.

Sources: Melbourne Institute; RBA

Endnotes

- [*] The authors are from Economic Group and would like to thank Susan Black, Jonathan Hambur, Tom Rosewall and Tom Williams for their feedback on this analysis.
- [1] There are six sentiment variables: unemployment over the next 12 months; household finances compared to the previous 12 months; household finances over the next 12 months; the economic outlook over the next 12 months; the economic outlook over the next five years; and current purchasing intentions for major household items.
- [2] To reduce the impact of outliers on the analysis, we also excluded responses including inflation expectations below -50 per cent and above 50 per cent. This led to only a very small share of the sample being excluded from analysis.
- [3] A significant share of consumers (about 18 per cent on average) also report zero expected inflation. This high share could partly be because those who respond that prices will remain 'the same' are automatically assigned a value of zero. Similar to multiples of five, responses of zeros tend to increase during times of economic uncertainty.
- [4] We also estimated the likelihood of consumers being certain about their inflation forecast through a logistic model. This was done by creating a certainty dummy (equal to one if an individual reports a non-round number and zero otherwise), which was then estimated on a range of socio-demographic and sentiment variables. The results support the descriptive features of the data, but are not reported for brevity purposes.

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