

Special Feature C

Subjective Inflation Expectations of Households

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Inflation expectations of households and firms are central determinants of consumption, savings, portfolio choices, investment, as well as labour supply decisions in most dynamic models. Yet, empirical evidence suggests these decision makers form expectations in ways that deviate from the assumptions of most models: on average, inflation expectations are biased upwards, are substantially dispersed in the cross section, and co-move strongly with the prices of selected goods such as milk or gas. In this Special Feature, I discuss several stylised facts on subjective inflation expectations, their determinants, and how inflation expectations shape individuals' consumption, savings, and investment decisions, with a special focus on Singapore. Finally, I review the recent literature on how central banks should communicate with the general public and highlight the role of the policy message, the messenger, and the medium for the effectiveness of central bank communication.

1 Whose Inflation Expectations?

The expectations of households and firms determine virtually all their forward-looking choices. Inflation expectations play a special role because they shape household consumption and savings decisions (D'Acunto *et al.*, 2022c), household wage bargaining and labour supply (D'Acunto *et al.*, 2022e), but also their portfolio and borrowing choices (Schnorpfeil *et al.*, 2023). For firms, inflation expectations shape investment, hiring, and price setting decisions (Weber *et al.*, 2022a). A leading explanation for realised inflation dynamics, the New Keynesian Phillips Curve, also prescribes an important role to inflation expectations. Hence, it is not surprising that policymakers watch them closely. Jerome Powell (2021) recently argued, "Inflation expectations are terribly important. We spend a lot of time watching them." Yet, for many decades after the rational expectations revolution, academic economists became less interested in studying how actual decision makers form expectations. This was because the model made strong assumptions about the expectations of the representative agent and there was a lack of data that directly measured expectations. Moreover, traditionally, central banks typically focused on the inflation expectations of professional forecasters and financial markets for the purpose of predicting future inflation. However, in our models, it is households and firms whose decisions central banks aim to influence. Empirically, inflation expectations for these agents are dispersed, upward biased relative to *ex-post* realised inflation, and systematically related to the characteristics of

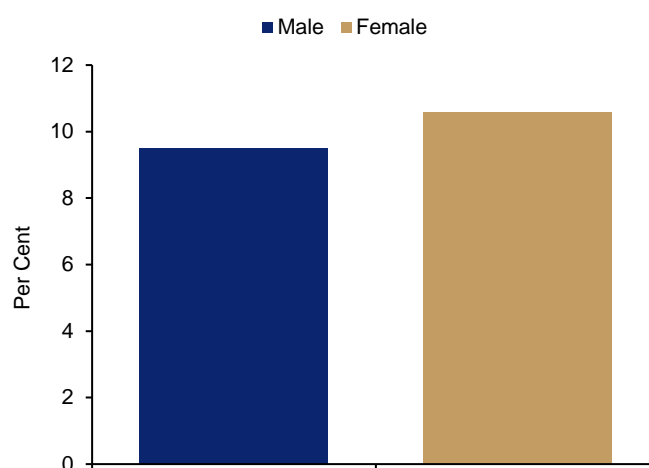
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households and firms (D’Acunto *et al.*, 2021a, 2021b). In this Special Feature article, I review the recent, growing body of work that documents stylised facts on the formation of subjective inflation expectations, their determinants, and how they shape real decisions. I will focus on households but argue at the end that most points apply equally to firms.

2 What Do Households Know and How Do They Actually Form Expectations

A conventional policy narrative assumes that inflation expectations are well-anchored, so changes in the nominal policy rate transmit one-for-one to perceived real interest rates via the Fisher equation. Yet, when we asked 25,000 Americans in 2018 what they thought was the US Federal Reserve’s average inflation target over longer periods of time, fewer than 20% of the survey participants answered 2%, the actual target rate for inflation, whereas almost 40% reported a number larger than 10% (in Coibion *et al.*, 2022). Not only do most ordinary households have incorrect expectations, they typically also overestimate future inflation relative to *ex-post* realisations. Using data from the Federal Reserve Bank of New York’s Survey of Consumer Expectations, we find that men, on average, expected an inflation rate of around 4% over the next twelve months during a sample period between 2011 and 2018, when realised inflation averaged below 2%. On the other hand, women on average expected a rate of more than 6% (in D’Acunto *et al.*, 2021b). A similar pattern was also observed in Singapore. In D’Acunto and Weber (2023), we fielded a global survey of inflation expectations in April of 2023 across 47 countries around the world including Singapore. In Singapore, we find that both men and women have higher inflation expectations compared to the prevailing headline inflation rate of 5.7% at the time of the survey and that women have even higher expectations compared to men (**Chart 1**).

Chart 1 One-year-ahead inflation expectations in Singapore by gender (April 2023)



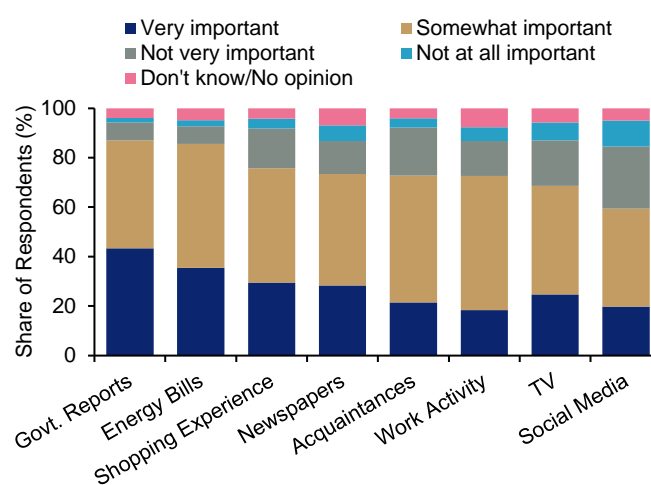
Source: D’Acunto and Weber (2023)

To dig deeper into the possible driving forces of this ‘gender gap’ in inflation expectations, we fielded our own survey on the Nielsen Homescan panel, which allowed us to survey male and female household heads at the same time. This within-household analysis made it feasible to keep constant many things that typically vary across survey participants like housing tenure, household wealth, and other determinants of inflation expectations. But

even within households, we find that women, on average, expect higher inflation than men. Interestingly, the gender gap in inflation expectations differed between ‘traditional households’, where women did all the shopping, and other households where shopping responsibilities were shared between men and women. Notably, inflation expectations were higher for women only in ‘traditional households’ and were in fact 50% larger. In households in which the male household head instead claimed to go grocery shopping at least occasionally, the gap disappeared because the male household heads also had higher inflation expectations. Hence, exposure to the volatile price changes during grocery shopping trips appears to manifest itself in elevated inflation expectations of grocery shoppers (D’Acunto *et al.*, 2021a).

To better understand why this association appears in the data, we fielded another survey in D’Acunto *et al.* (2021a), in which we directly asked survey participants which sources of information were most important to their households when forming inflation expectations. Consistent with the seminal Lucas (1972) island model, we find that households ranked “own grocery shopping experiences” as by far the most relevant source of information, before “Family and Friends”, “TV and Radio”, “Newspapers”, and other sources. Based on recent survey work in D’Acunto and Weber (2023), we find that patterns are slightly different in Singapore, where official government reports are important sources of information to form inflation expectations for more than 85% of the survey population. Nevertheless, shopping experiences still matter for almost 80% of the population (**Chart 2**).

Chart 2 Information sources for inflation in Singapore



Source: D’Acunto and Weber (2023)

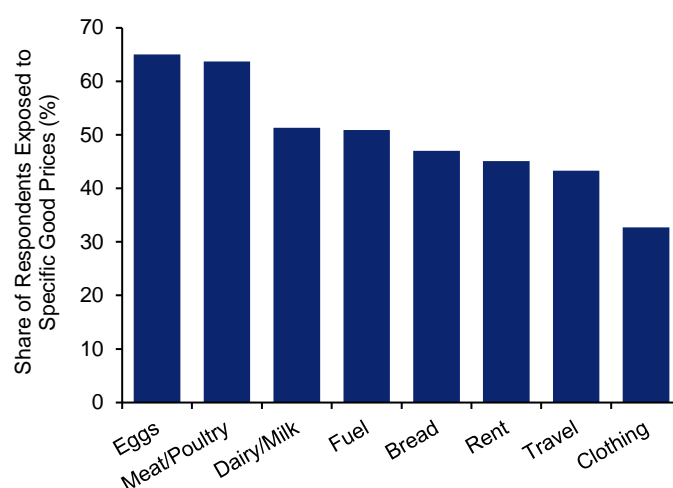
To directly establish a link between price changes observed while grocery shopping and inflation expectations, we leveraged on the Nielsen Homescan panel. The panel allowed us to observe purchasing patterns at the weekly frequency for 50,000 households. These patterns include the goods these households bought, where they bought them, which prices they paid, whether they purchased these goods on discounts, and whether they used coupons. We then followed methods used by national statistical agencies to create a chained Laspeyres price index, although household-specific consumption bundles and prices were used instead of the bundle of a representative household. Households with the highest realised inflation at the household level on average expected inflation rates that were higher by 0.7% point than households with the lowest realised inflation rate over the previous twelve

months. We can directly rule out that households might be forecasting their own inflation rates because we can observe their future realised household-level inflation rates.

In the Nielsen panel, we only observe around 25% of the overall consumption bundle for the average household. The fact that we can find a strong association between realised inflation at the household level for this subset of the bundle and overall inflation expectations suggests that grocery prices have a strong impact on how individuals think about inflation. At the same time, this finding also suggests that not all price changes affect households equally. When we weight price changes by the frequency of purchase rather than expenditure share, we find that this 'Frequency CPI' drives the association between realised inflation and inflation expectations.

Similar patterns are likely present in Singapore. In **Chart 3**, we see that among the 1,000 Singaporeans we surveyed, prices of daily produce such as milk and eggs are among the most important sources of information within the individual consumption bundle for forming inflation expectations.

Chart 3 Relevance of individual goods prices for inflation in Singapore



Source: D'Acunto and Weber (2023)

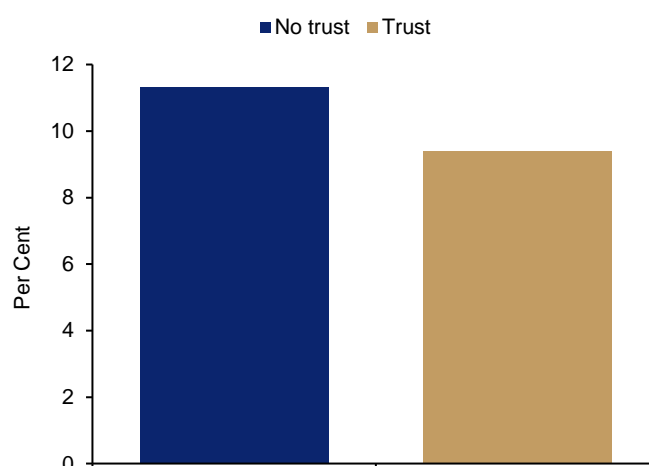
In addition to putting larger weight on the price changes of frequently purchased goods, households also overweight positive price changes relative to equal-sized negative ones. These results can also explain why households immediately updated their one- and two-year-ahead inflation expectations in the summer of 2021 in many developed economies around the world when they witnessed realised price spikes in a few selected goods such as flight tickets or rental cars. This occurred despite central banks' communications that inflationary pressures were likely to be temporary and driven by price increases in narrow categories. For example, the Federal Reserve's one-year-ahead forecast for inflation in the summer of 2021 was substantially lower than consumer inflation expectations at the same horizon. As these initial price spikes occurred in categories that are salient to consumers, like rental cars, we witnessed immediate increases in overall inflation expectations and workers in the US promptly bargained for higher wages. These findings, however, also suggest that even if central banks were successful in bringing realised inflation back to target in the near term, household inflation expectations would still take time to come down again, as ordinary consumers pay less attention to price cuts compared to price hikes (D'Acunto *et al.*, 2021a).

Policy complexity is another factor that might be important for the effectiveness of economic policies, especially those that operate through household expectations. In D'Acunto *et al.* (2022c), we compare the effectiveness of forward guidance by central banks on monetary policy, with pre-announced increases of future consumption taxes that generate a predictable increase in future prices. Both policies, through the lens of the New Keynesian model, operate through inflation expectations and the consumer Euler equation. Yet, the policies differ quite substantially in their complexity and required understanding of economics to be effective. In actuality, when we compare their effectiveness, we find that Germans only updated their inflation expectations and spending plans after the announcement in November of 2005 of higher future consumption taxes. In contrast, Germans on average did not update either their inflation expectations or their consumption plans when then European Central Bank (ECB) President Mario Draghi for the first time explicitly used forward guidance as a policy tool in the summer of 2013 and firmly reiterated, in January 2014, the ECB's intention to keep interest rates at current or lower levels for an extended period of time.

Another important determinant of inflation expectations is trust in institutions, notably the central bank. Christelis *et al.* (2020) show in a survey of Dutch households in 2015 that households with higher trust in the ECB have significantly lower inflation expectations and uncertainty about inflation. Moreover, trust lowers inflation expectations for those with expectations above the ECB target and vice versa. We find similar evidence in Singapore. Households that express high trust in MAS have about a 2% points lower forecast for overall inflation over the next twelve months compared to other survey participants (**Chart 4**).

Taken together, price signals in individuals' local economic environment, such as the price of groceries and gas, shape individuals' perception and their expectations of inflation. Income, education, and race also correlate with individuals' inflation expectations because they determine individuals' consumption baskets and shape their understanding of the concept of inflation.

Chart 4 Trust in MAS and inflation expectations in Singapore



Source: D'Acunto and Weber (2023)

3 How Should Central Banks Communicate with the General Public?

Given these findings, we studied in a series of papers how central banks should communicate to reach ordinary households who ultimately make consumption, savings, and debt decisions. In D'Acunto *et al.* (2022b), we perform an information provision experiment through a customised survey with several thousand participants in Finland. In this survey, we first elicited individuals' prior income change expectations and several socio-demographic characteristics. We then split the sample into three groups: a control group that did not receive any additional information and two treatment groups. We provided these groups with accurate information of policy actions by the ECB in the spring of 2020, keeping constant the sender, Olli Rehn, Governor of the Finnish central bank, and the medium, his official Twitter account, but varying the content. One treatment group received a 'target' communication, that is, a message that specifies the aim of a policy without detailing which measures the central bank would implement to achieve it. The other treatment group received information about the 'instrument', the specific policy that was implemented to achieve the goal. The target group received the announcement that the ECB will do whatever is necessary so that no Finn will suffer any economic harm from the pandemic. The instrument group, instead, read a sentence about the announcement of the Pandemic Emergency Purchase Programme. Finally, all survey participants answered the same questions again including the posterior elicitation of income change expectations. Empirically, we find that only the target communication is effective in improving individuals' income expectations. The effect is concentrated within individuals who were unaware of the specific policies.

In Coibion *et al.* (2022), we instead focus on the medium of the message. In another information provision experiment, we find that simple messages like current inflation, the inflation target, or the inflation forecast are most effective in managing individuals' inflation expectations. Reading the official statement of the Federal Open Market Committee (FOMC), which is in charge of setting monetary policy interest rates, resulted in forecast revisions for inflation of similar magnitudes, even though it contained substantially more information and context. The coverage of the same FOMC meeting in newspapers, which are written for a lay audience and in substantially simpler language compared to the FOMC statement, instead, resulted in forecast revisions of only half the size. In the survey, we also elicited participants' rating of the credibility of different news sources. We find that households in the US, on average, rate newspapers the lowest in terms of credibility when it comes to information about the macroeconomy, whereas social media, especially Twitter, ranked highest. These findings caution against purely relying on the media as a means of transmission of monetary policy announcements to households. In the paper, we also show that individuals with exogenously higher inflation expectations increase their subsequent spending, both in survey data and actual spending data, which we observe via the Nielsen Homescan panel. Thus, we provide direct evidence that the subjective expectations of households matter for macroeconomic aggregates such as consumption.

In D'Acunto *et al.* (2022a), we document that the identity of the sender of the message also matters for the effectiveness of monetary policy communication. Specifically, we conduct an information provision experiment where respondents receive the same message,² from three different senders: (i) Mary Daly, a female regional Federal Reserve Bank President, (ii) Raphael Bostic, a black male regional Federal Reserve Bank President, and (iii) Thomas Barkin, a white male regional Federal Reserve Bank President. We show in the paper that

² Respondents are provided forecasts for inflation and unemployment from the Summary of Economic Projections.

making salient the female or black male presence on the FOMC increases the level of trust women and black survey participants have in the Federal Reserve. In terms of mechanism, our results hint towards a taste for a diversity channel, that is, preferring the representation of underrepresented groups on the FOMC relative to the majority of white men.

Finally, in Weber *et al.* (2022a), we show that when individuals update their short-run inflation expectations, they also update their long-run inflation expectations in a similar fashion, at least during times of stable inflation. This finding casts doubt on the idea that temporary changes to short-run expectations due to shocks do not transmit to long-run expectations. Moreover, in Weber *et al.* (2022b) we show that the stylised facts discussed in this article hold equally for firms. Other recent reviews of this literature are D'Acunto *et al.* (2022d), Weber *et al.* (2022b), and D'Acunto and Weber (forthcoming).

4 Taking Stock

Taken together, these results show that individuals in general focus on the price changes of salient, individual goods when forming inflation expectations, that households pay more attention to price increases relative to cuts, that central banks can manage the expectations of households if they use simple messages, and that trust in central banks results in better-anchored inflation expectations. Yet, the medium via which the message is transmitted and the identity of the messenger also matter for the effectiveness of monetary policy communication. The biggest challenge for central banks remains reaching ordinary households. More creative means of communications are called-for.

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