Food prices matter most: Sensitive household inflation expectations

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Abstract

We construct a novel dataset to investigate the sensitivity of household inflation expectations to personal experienced inflation, testing whether households weigh price changes differently across items in the consumption basket. Food prices matter significantly more for households inflation expectations dynamics than other components, including energy. In particular, households are *asymmetrically* sensitive to *increases* in food price-driven inflation, and above-median income households are more sensitive than peers. Taken together, our findings can rationalise a number of empirical regularities related to household expectations: their upwards bias relative to actual inflation; cross-sectional heterogeneity across demographic groups; and their 'supply-side' oriented view of the economy. Our results imply that the risk of household expectations contributing to persistent inflationary dynamics are greatest when shocks impact prices of non-core components of the basket.

Keywords: Households, inflation expectations, inflation experiences, heterogeneity, food prices
JEL classification: C33, D84, E31, E52

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The views expressed in this paper are ours, and not necessarily those of the Bank of England or its committees. All errors are our own.

1 Introduction

Household inflation expectations are widely inaccurate, cross-sectionally dispersed, and poorly understood [Weber et al., 2022, Arioli et al., 2017, Del Giovane et al., 2008, Jonung, 1981]. A rapidly growing literature has emerged seeking to understand what determines the expectations of households, as inflation expectations are a key driver of consumption and in turn, macroeconomic dynamics [Roth and Wohlfart, 2020, Beraja et al., 2019, Agarwal and Qian, 2014]. A particular strand, which we contribute to, studies the degree to which households focus on their own personal shopping experiences [D'Acunto et al., 2021, Coibion and Gorodnichenko, 2015]. If households place more weight on certain items, then price shocks to those components of the basket may be more likely to raise inflation expectations and generate inflationary pressures.

In this paper, we study whether households are more sensitive to price changes in certain components of the consumption basket, and how that may drive inflation expectations dynamics. To answer these questions, we create a novel dataset to investigate the sensitivity of household inflation expectations to changes in their *own* experienced inflation rate, given the composition of their consumption basket. Our key finding is that households are significantly more sensitive to food price-driven inflation than they are to other components, including energy, and insensitive to core goods or services price-driven. Exploiting the granularity of our dataset, we also uncover significant heterogeneities in sensitivity to price changes across different demographic groups, with above-median income households being more 'observant' of food-price driven inflation than peers. Additionally, we find that households are *asymmetrically* sensitive to *increases* in food price-driven inflation.

The novel dataset combines UK household data on inflation expectations (from the Inflation Attitudes Survey, IAS) with UK household data on personal expenditure (from the ONS's Living Costs and Food Survey, LCFS) and granular CPI inflation rates. We use stylised method to aggregate the entire CPI consumption basket to four key components: food, energy, core goods and services. Based on the expenditure and CPI inflation rate data, we calculate households' personal experienced inflation rates, which we then merge with inflation expectations data at the demographic-group level, based on common characteristics between the LCFS and IAS datasets: age, income, and house tenure. This yields a novel panel dataset with quarterly information on the average experienced personal inflation rate and the average expected inflation rate of a household in a particular demographic group, between 2003 Q1 and 2022 Q1. Matching households' expectations with their expenditure is a crucial step to accurately test the sensitivity of inflation expectations to changes in experienced inflation, given significant variation in personal inflation rates and consumption baskets across demographic groups [Kaplan and Schulhofer-Wohl, 2017]. To date, only a handful of studies have sought, or been able, to identify the impact of price changes on inflation expectations based on 'personalised' expenditure, in relation to salient items such as grocery items [D'Acunto et al., 2021] and fuel [Coibion and Gorodnichenko, 2015].

We make three contributions to the literature. First, the main contribution of this paper is to test the *relative* sensitivities to price changes across the *entire* consumption basket. With data across the entire basket, we are able to test the sensitivity of expectations to price changes in a certain component of the basket while holding fixed price changes in all other components. Moreover, we show that not accounting for simultaneous changes in food price-driven inflation results in an over-estimate of the importance of energy prices, which a number of previous studies have identified as key [Binder and Makridis, 2022, Binder, 2018, Trehan, 2011].

Second, digging into the mechanisms, we document an important role for households' *perceptions* of *current* inflation in driving both short- and long-horizon *expectations* for *future* inflation. While the literature on inflation expectations has overwhelmingly focused on short-horizon (primarily 1-year ahead) expectations, our inflation expectations data contains information on both long-run expectations as well as *perceptions* of *current* inflation. This allows us to identify households' perceived current rate of inflation as an important determinant of both short- and long-run inflation expectations, explaining up to 50% of variation in 1- and 2-year ahead expectations, and up to 30% of variation in 5-year ahead expectations. Moreover, we show that the impact of changes in personal experienced inflation on households' *expected* inflation is entirely explained by changes in households' *perceived* current rate of inflation, with no additional impact above and beyond this. Long-run inflation expectations, meanwhile, are insensitive to changes in experienced inflation.

Third, we are able to explore cross-sectional heterogeneity in the degree to which households are sensitive to certain components of the basket with our dataset. We find that most households 'underreact' to a change in their experienced inflation rate, regardless of which component of the basket is driving that change in inflation. That is, most households' *perceived* inflation changes by less than 1 for 1 with changes in *actual* experienced inflation. The exception are above-median income households, who observe the entire increase in their experienced inflation rate when this is driven by changes in food prices. Moreover, they are more sensitive to changes in food price-driven inflation than are peers, *despite* their consumption baskets being less exposed to food than those of peers. Meanwhile younger cohorts, renters and mortgagors are more sensitive than peers to changes in energy price-driven inflation. We are able to identify these heterogeneities as a direct result of accounting for differences in the composition of demographic groups' respective consumption baskets, as our novel dataset permits us to do.

Taken together, our findings can rationalise a number of empirical puzzles relating to household inflation expectations. One puzzle relates to the well-documented upwards bias in households' beliefs about inflation relative to actual inflation [Weber et al., 2022, Candia et al., 2021, Kumar et al., 2015]. Indeed, we document that UK households' perceived inflation is approximately 1.4pp higher in magnitude, on average, than actual experienced inflation over our sample period. Our finding that households are more sensitive to *increases* in food price-driven inflation, relative to decreases, is consistent with this puzzle as households observe rises but not subsequent falls in inflation - generating a wedge between perceived and experienced inflation. Specifically, our empirical estimates show that households' perceptions of inflation change by 0.6pp more following an increase than a decrease in food-price inflation; explaining nearly half of the observed wedge between perceived and actual inflation.[1]

Another empirical puzzle relates to the well-documented cross-sectional heterogeneity in household inflation expectations [Arioli et al., 2017, Del Giovane et al., 2008, Jonung, 1981]. We document significant heterogeneity across demographic groups not only in households' *expectations* for future inflation but also in their *perceptions* of current inflation. This is an interesting observation in and of itself as — unlike expected inflation – perceived inflation should be independent of news about the future, the source of which may vary significantly across households [Macaulay and Song, 2023, Lamla and Lein, 2015]. One possible determinant could be differences in inflation rates that people actually experience, as Kaplan and Schulhofer-Wohl [2017] find varies significantly across demographic groups. Indeed,

[1] Our findings leave room also for other determinants of the upwards bias of beliefs, for instance general pessimism about the future state of the economy [Michelacci and Paciello, 2024].

we show that the heterogeneity in perceived inflation is directionally consistent with heterogeneity in households' exposure to non-core components of the consumption basket. This, coupled with our empirical findings that households are most sensitive to specifically these components could rationalise part of the observed heterogeneity in expectations.

Our results could also offer some insights into the empirical puzzle that a growing number of studies have identified: households seem to have a 'supply-side' view of shocks to the economy - consistently associating increases in inflation to decreases in output [Coibion et al., 2023, Kamdar, 2018]. If, as our results indicate, households only observe changes in inflation when they are driven by price changes in non-core components - which are more prone to supply-side than demand-side shocks - then this could explain why households may develop a supply-side view of the relationship between inflation and output.

The main policy implications emerge from our empirical findings that household expectations may be most responsive to shocks that impact food prices, especially amongst above-median income households, and particularly to increases in food price-driven inflation. Our findings suggest that household inflation expectations are most likely to become elevated when shocks impacts food prices and remain high once the shocks has subsided. A monetary authority may wish to respond more aggressively than otherwise to food-price shocks in order to reduce the risk of inflationary pressures persisting and propagating.

Related literature. Our work relates to a broad literature seeking to understand the formation of household inflation expectations. A core thesis, across both theoretical and empirical strands, is the role of information frictions faced by households, with particular attention devoted to (variation in) financial literacy levels [De Bruin et al., 2011], cognitive abilities D'Acunto et al. [2019], levels of attention [Sims, 2010, Cavallo et al., 2017], sources of information [Lamla and Lein, 2015], transmission of policy communication [Coibion et al., 2022, 2020, D'Acunto et al., 2020, Ehrmann and Wabitsch, 2022, McMahon and Naylor, 2023], and that that we contribute to, personal inflation experiences. The latter, in turn, can be split into studies that focus on how *past* experiences shape how much weight households place on new information [Malmendier and Nagel, 2016, D'Acunto et al., 2021, Angelico and Di Giacomo, 2019], and studies that instead focus on *current* shopping experiences and the weight that households place on certain types of good or certain components of the consumption basket.

To date, however, only a handful of papers have focused on the latter. D'Acunto et al. [2021] find that household expectations are associated with price changes in grocery items and particularly so to those items that they purchase more frequently. Binder and Makridis [2022], Binder [2018], Coibion and Gorodnichenko [2015] and Trehan [2011] find that household expectations are sensitive to changes in the price of fuel. However, studying the sensitivity of household beliefs to specific components of the consumption basket is difficult. To do so, one needs to match data on household inflation expectations with data on household expenditure. Only two papers have sought to do something along these lines. D'Acunto et al. [2021] do so for a subset of the consumption basket using the Kilts Nielsen Consumer Panel (KNCP) which focuses on non-durable goods expenditure of US households, covering approximately 25% of the consumption basket. Coibion and Gorodnichenko [2015] use statistics from the Consumer Expenditure Survey, also in the US, to capture differences at a certain point in time in expenditure shares of fuel across income and age groups. Meanwhile, Dietrich et al. [2022] adopt a slightly different approach to test which components of the consumption basket matter most to households; merging household-level data on 'total' inflation expectations with household-level data on

inflation expectations for each component of the consumption basket. They show that expectations for 'total' inflation map most closely to their expectations for inflation in specifically non-core components of the consumption basket, such as food and energy. This gives us a sense of which components might be most salient for households, which could offer *potential* insights into the relative sensitivity of beliefs to actual price changes in different components; though not explicitly. We, in contrast, are uniquely able to explicitly test the sensitivity of households' beliefs about inflation to price changes in different components of the consumption basket, across the *entire* basket of goods.

Personal shopping experiences have also, in recent years, become a point of focus within a growing strand of work investigating heterogeneity across households. Kaplan and Schulhofer-Wohl [2017] document variation in personal inflation rates experienced between households, with higher inflation rates amongst lower-income families. Meanwhile, significant heterogeneity in inflation expectations across demographic groups is well-documented Arioli et al. [2017], Del Giovane et al. [2008], Jonung [1981]. A natural question, then, which we seek to answer in this paper is whether and to what extent cross-sectional heterogeneity in personal (current) inflation experiences can explain observed cross-sectional heterogeneity in inflation expectations. We show that a combination of cross-sectional heterogeneity in exposure to non-core components of the consumption basket, and particular sensitivity to those components across households can feasibly explain a significant amount of the observed cross-sectional heterogeneity in expectations across age, income, and house tenure groups.

The remaining of the paper is organised as follows. Section 2 details the different datasets we use and Section 3 describes some initial descriptive analysis. Section 4 discusses the results and Section 5 concludes.

2 Data

In this section, we create a novel synthetic panel dataset that is designed to identify inflation expectations and inflation expenditure of households, which is not available in the UK. We use a long run survey on households' spending to identify household groups' experienced inflation rate and combine it with households' inflation expectations. In this section, we detail the data involved in this exercise.

2.1 Bank of England Inflation Attitude Survey

To retrieve information about inflation expectations, we use a quarterly cross-sectional survey conducted on behalf of the Bank of England to assess public attitudes towards inflation and monetary policy. The weighted data are representative of the UK population aged 16 and over. The survey also collects demographic information, such as age, housing tenure and income and each wave contains about 2000 observations.[2] The data we use is from 2003Q1 to 2022Q1. The survey collects a rich set of questions including households' perception of the current rate of inflation (i.e., inflation over the past 12 months) and household expectations of future rates of inflation, at 1-, 2-, and 5-year ahead horizons. For example, 1-year ahead inflation expectations are derived from the question: "How much would you expect prices in the shops generally to change over the next twelve months?". Starting from the first quarter of 2009, the survey asks analogous questions for 2- and 5-year ahead expectations.

[2]Inflation Attitude Survey that is conducted in the first quarter (February waves) has more participants and additional questions, resulting in about 4000 observations.

2.2 Living Cost and Food Survey

We obtain data on household expenditure using the micro-dataset of Living Costs and Food Survey (LCFS).[3] Survey participants fill in a diary of their households' spending over (at least) the past two weeks. LCFS collects information on spending patterns and the cost of living from across the whole of the UK, and is the most significant survey on household spending in the UK. The survey is published annually containing around 6000 observations. The data is collected throughout the year, which we split convert into quarterly data from 2003Q1-2022Q1. While the LCFS dataset has very detailed information about households expenditure, we use a stylised method for aggregating the CPI basket based on key components: food, energy, core goods and services.[4] Based on this classification, we use information from LCFS to calculate the sub-group expenditure shares.

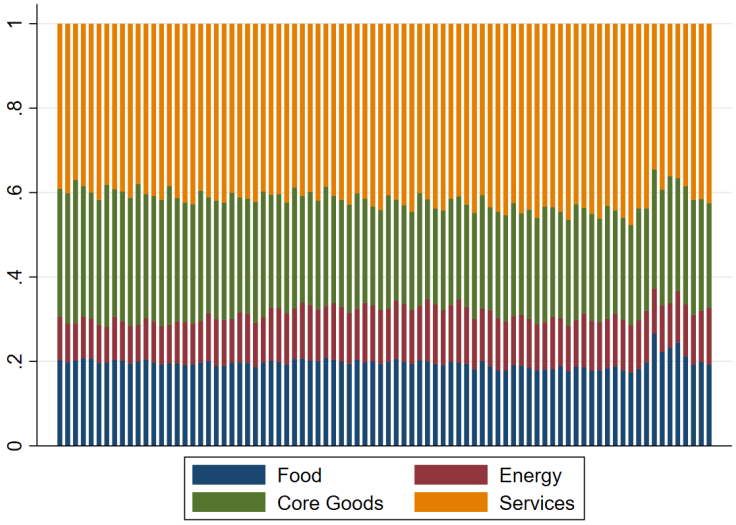


Figure 1: LCFS Households' Expenditure Shares

Figure 1 depicts the mean expenditure shares across the representative sample over our sample period. We observe some year-on-year variation in the shares of each component in the consumption basket, although they have remained broadly stable over time. LCFS is published with substantial delays of around one year, meaning our sample period ends in 2022.[5]

2.3 Group inflation rates

The final step to create the synthetic dataset is to merge the LCFS and IAS data with granular UK CPI data to calculate households' actual experienced inflation rates, by demographic group.

Figure 2 plots the year-on-year CPI inflation rate for the components of the consumption basket that focus on. We observe significant variation in the time series across these components, with a large pick up in inflation rate for most of the components during and after the Covid period.

[3]The survey has formerly been called the Family Expenditure Survey and the Expenditure and Food Survey.

[4]In Figure 1, food category includes alcohol but our analysis we exclude alcohol which makes up less than 5% of total consumption basket.

[5]Once data for 2023 is published, we intend to extend the sample period to include the most recent surge in inflation and the spike in the associated one-year ahead inflation expectations

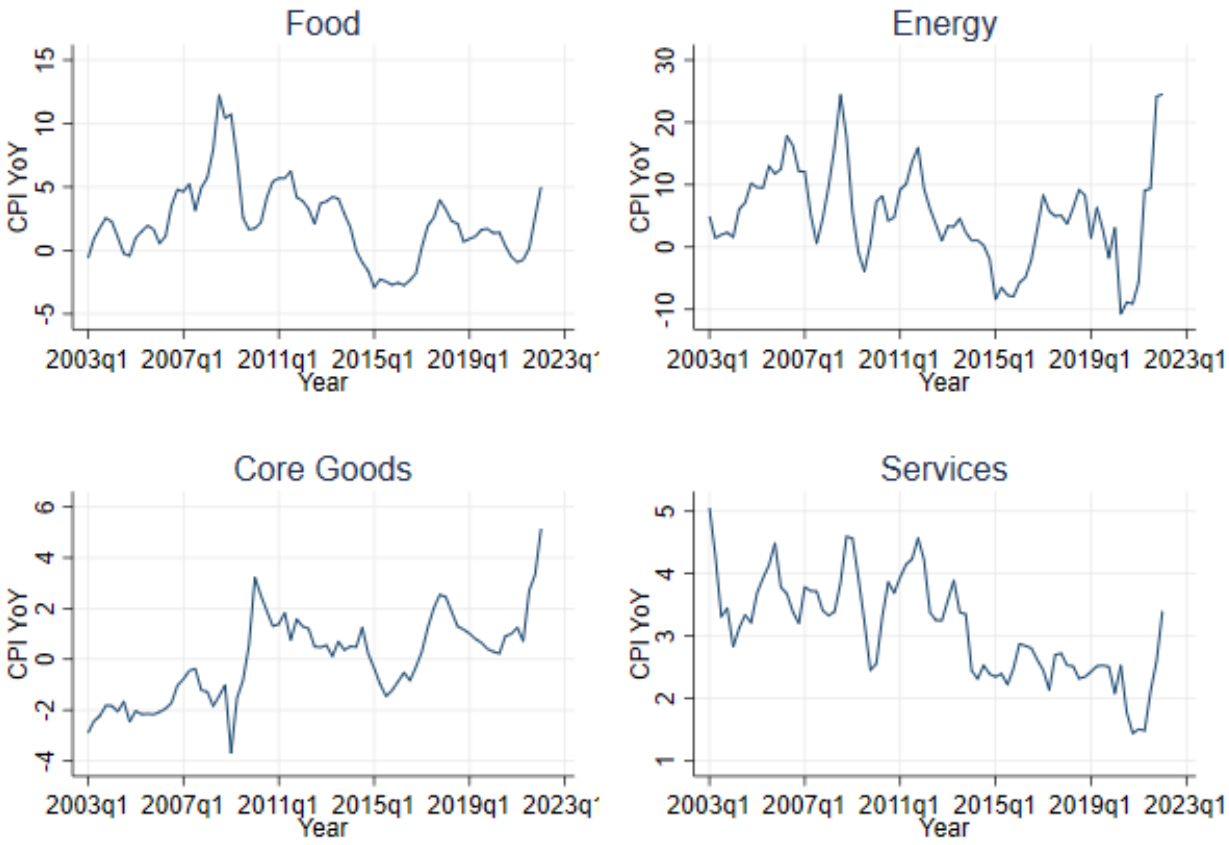


Figure 2: UK CPI data by Components

Note: Sample period is from 2003Q1-2022Q4.

To calculate the 'total' inflation rate experienced by each demographic group, we merge UK CPI inflation rate with the LCFS expenditure shares for each of the four components of interest. The timing of the CPI inflation rate used is important. IAS surveys are collected early in the second month of each quarter - for example, the fieldwork for the Q2 waves is conducted in May. Meanwhile, CPI data is published with a one-month lag by the ONS - for example, CPI data for March is published in (mid-) April. At the time, then, at which households are surveyed about inflation expectations, the latest CPI print relates to that of two months prior - for example, the March CPI data is the latest print during the Q2 IAS fieldwork. For the purposes of our research questions, we are interested in capturing households' information set at the time of filling out the IAS surveys. Thus, we match IAS data (e.g., for Q2) with CPI and LCFS expenditure data related to the last month of the previous quarter (e.g., March).

3 Perceived, Expected, and Experienced Inflation

In this section, the first part explores household beliefs about inflation. We document that households' *perceptions* of *current* inflation co-move closely with their *expectations* for *future* inflation, at both short- and long-run horizons. The second part delves into our novel dataset in great detail to explore the association between inflation expectations and experienced inflation. Starting with 'total' experienced inflation rates – the inflation rates of the entire consumption basket personally experienced by

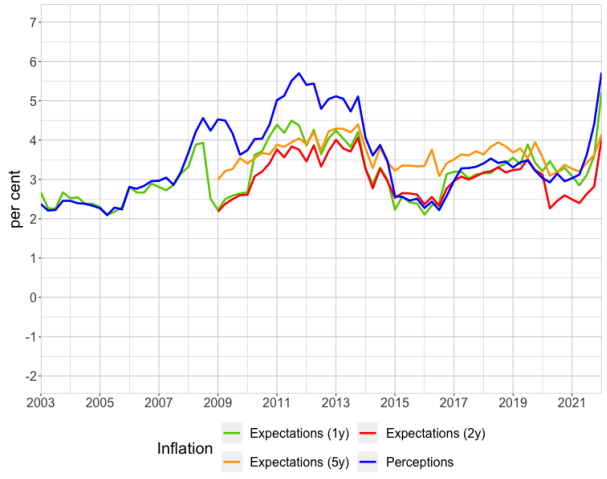
households –, we uncover that perceived inflation amongst households is consistently upwards biased relative to *actual* experienced inflation, and significantly heterogeneous in the cross-section. Digging deeper into the components of the consumption basket, we find that perceived rate of inflation co-moves more closely with the actual rate of inflation experienced driven by certain components. In the cross-section, there is also significant heterogeneity in the degree to which households are exposed to inflation of different components in the consumption basket.

3.1 Household Beliefs about Inflation

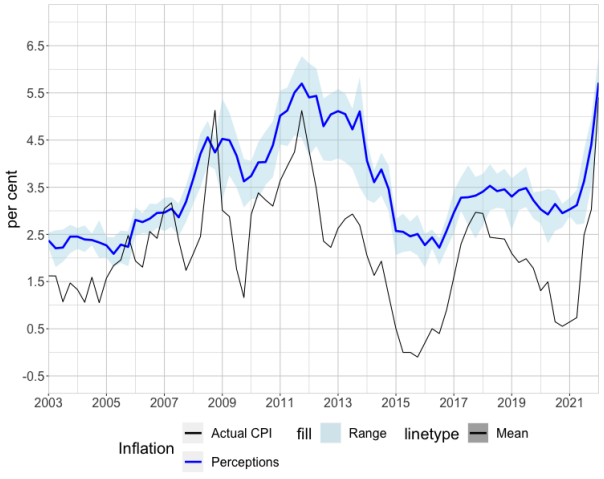
Figures 3i and 3ii depict the quarterly evolution of average perceived inflation (in blue), 1y-ahead (in red), 2y-ahead (in green, available from 2009 Q1 onwards), and 5y-ahead (orange, also from 2009 Q1) expected inflation amongst UK households, from the IAS, and actual CPI inflation (in black) between 2003 Q1 and 2022 Q1. In Figure 3i, we observe close co-movement between households' perceived inflation and their expectations for future inflation. This is particularly strong for 1y- and 2y-ahead expected inflation, where the correlation is 0.82 and 0.77, respectively, but the 5y-ahead expected inflation is a little more stable.[6] Their close co-movement indicates that perceptions of current inflation may be an important determinant of expectations for short- and long-run future inflation. Yet, empirical literature investigating the formation of household inflation expectations have paid surprisingly little attention to the role of households' perceptions of *current* inflation, with the overwhelming majority of studies focusing exclusively on expectations for future inflation, and primarily 1y-ahead expectations at that. Data on perceived inflation is indeed relatively scant across households surveys. In this paper, we exploit the availability of data on perceived inflation from the IAS to bridge this gap, to glean insights into its importance in the formation of both short- *and* long-run expectations - the latter also being surprisingly under-studied in the literature.

Figure 3: UK Household Inflation Expectations

(i) Inflation Expectations



(ii) Inflation Perceptions vs Actual CPI



3.2 Association between Inflation Expectations and Experienced Inflation

If perceived inflation is an important driver of expected inflation, then understanding the determinants of perceived inflation may yield crucial insights into the formation of expectations. Thus, in this

[6] Correlations are taken from the onset of the 2y- and 5y-ahead expectations data in 2009, for consistency across the series.

subsection, we focus on perceived inflation. Figure 3ii plots broad co-movement with actual CPI in aggregate, with a correlation of 0.79. This indicates that households do observe, at least to some extent, changes in inflation. This co-movement is, however, imperfect - suggesting other factors may also be at play - and, in levels, we observe a clear wedge between *perceived* and *actual* inflation. While UK CPI averaged 2.1% during the sample period, inflation perceptions averaged 3.5%. This upwards bias in beliefs about inflation is consistent with findings from numerous empirical studies including Candia et al. [2021], Kumar et al. [2015], and Binder and Makridis [2022].

Looking into the cross-section, the light blue swathe in Figure 3ii represents the range of average perceived inflation across age groups.[7] In the literature, heterogeneity in expectations across households is well-documented, with a range of possible explanations proposed, including, for instance, variation in the sources of news that households are exposed to [Lamla and Lein, 2015], or variation in the degree to which policy communication impacts expectations [Coibion et al., 2020, 2022, D'Acunto et al., 2020]. However, while information that households receive about the future can be widely varied, the range of possible factors contributing to heterogeneity in perceived *current* inflation should, in principle, be more limited. One possible explanation is variation in the degree of attentiveness across households [Sims, 2010]. Another possible explanation, which has attracted increasing focus in recent years, is heterogeneity in households' *exposure* to inflation, stemming from heterogeneity in the makeup of households' consumption baskets across different demographic groups. We explore this below.

3.2.1 Exposure to 'Total' Inflation

Using our novel dataset, we first compare the 'total' inflation rates experienced by different demographic groups, given the average composition of their consumption basket and the CPI rates in each component.[8] Figure 4 plots the evolution of average 'total' inflation rates between 2003 Q1 and 2022 Q1, across age groups (solid lines). We observe little heterogeneity in experienced inflation rates across age groups. On average, younger groups experience slightly higher inflation rates, with age groups over 45 (turquoise, blue and pink lines) experiencing an average inflation rate of 2.0% over the sample, compared to 2.2% for the 15-24 year old cohort (in red). We show similarly little heterogeneity in 'total' inflation rates also across house tenure (Figure 9, where experienced inflation is slightly higher amongst renters then mortgagors and home-owners) and income groups (Figure 7) in Appendix A.[9]

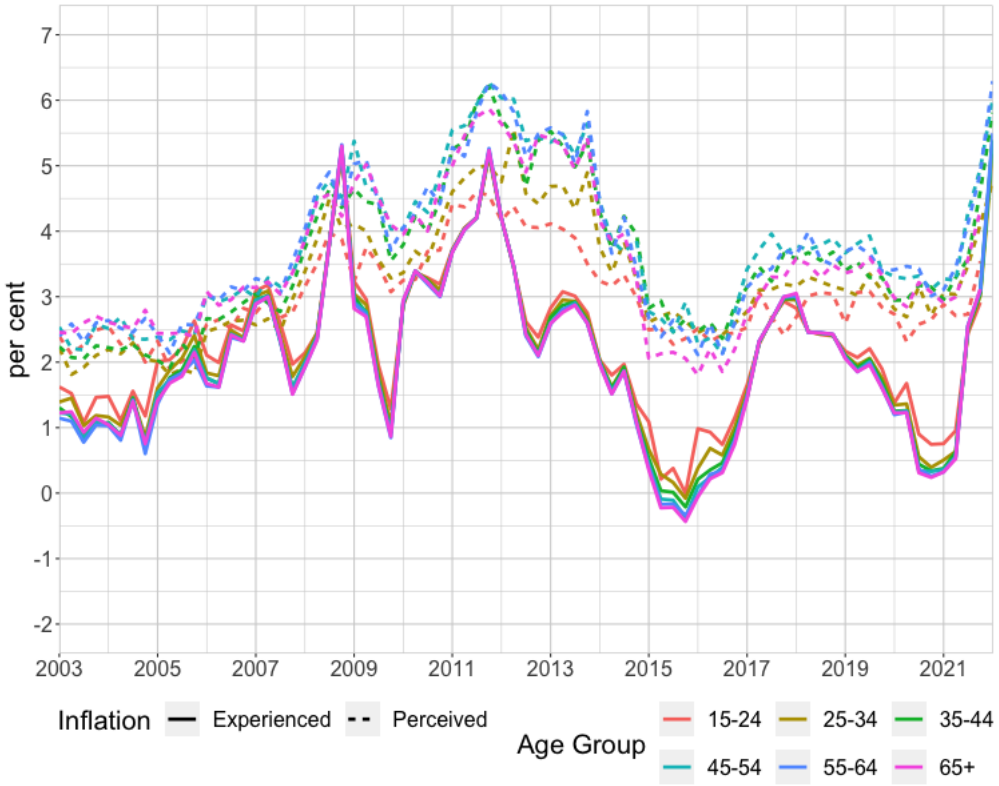
In contrast, we observe significantly greater heterogeneity in perceived inflation (dotted lines), which has an average range of 0.9pp over the sample period, compared with 0.3pp in experienced inflation rates. Additionally, the heterogeneity across the two variables goes in opposing directions. While experienced inflation is (albeit slightly) *decreasing* in age, perceived inflation is *increasing* in age: averaging as high as 3.8% for the 45-54 age group, compared with only 3.0% for the 15-24, over the sample period. Taken together, one might conclude that (differences in) experienced inflation is may thus be unlikely to explain (differences in) perceived inflation perceptions. We show in the next section, however, that looking only at individuals' 'total' inflation rates may not tell the full picture.

[7] We also document similar heterogeneity splitting households by other demographic characteristics, such as by income (Figure 8) and by house tenure (Figure 10).

[8] We do not, with our available data, capture any differences also in *prices* that different demographic groups may pay for items that are in the same component of the consumption basket.

[9] This differs to Kaplan and Schulhofer-Wohl [2017] who show that US inflation rates are decreasing in income.

Figure 4: Correlation between perceived and experienced 'total' inflation



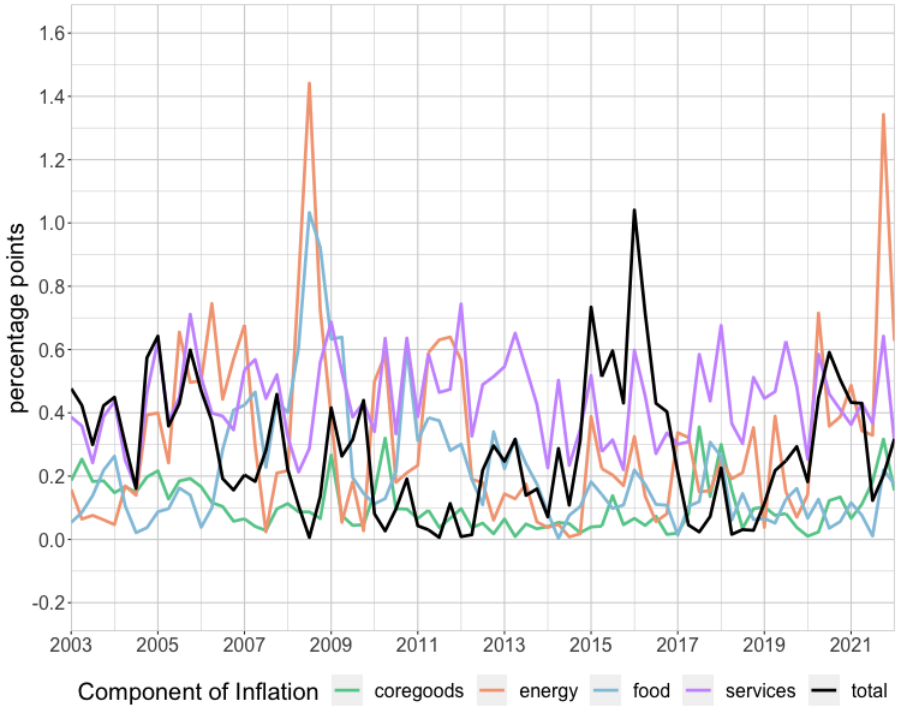
3.2.2 Exposure to Inflation of Consumption Basket Components

Figure 5 plots in black the *range* of 'total' inflation rates, across age groups, in each period of our sample. The range is given by the difference in experienced inflation, in each period, between the age group with the highest inflation rate and that with the lowest; capturing the magnitude of heterogeneity across groups. The range varies over time: from 0.0% in multiple periods to a peak of over 1.0% in 2016 Q1.

The coloured lines instead relate to the 'contribution' to an individuals' 'total' inflation rate coming from each specific component of the consumption basket, split into core goods, services, food and energy. In other words, each coloured line captures the range in the degree to which price changes in each respective component of the consumption basket have driven experienced 'total' inflation rates. In green, we plot the range, in each period, of the contribution of core goods to each respective groups' 'total' inflation rate. In purple we plot that for services, orange for energy, and light blue for food. These coloured lines seek to capture the heterogeneity in exposure, in each period, to each specific component of the consumption basket.

We observe greater heterogeneity in the degree to which different demographic groups are exposed to price changes in *specific* components of the consumption basket, than the heterogeneity in 'total' inflation rates. That is, looking only at 'total' inflation rates masks more significant heterogeneity in the composition of households' consumption basket across age groups. We show similar variation in exposure by income and house tenure groups in Appendix A.

Figure 5: Range in component specific-driven inflation across age groups



A logical next question, then, is whether the observed heterogeneity in exposure to different components of the consumption basket, at different points in time. Figure 5 reflects *systematic* differences between demographics. We observe from Figure 6 that it does. Across Figures 6i to 6iv, we decompose 'total' experienced inflation (plotted in Figure 4) into the constituent parts driven by different components of the consumption basket: food, energy, core goods and services, - by age group (in solid lines). We observe that while younger cohorts are systematically less exposed to food and energy price inflation (on average contributing 0.25pp and 0.45pp, respectively, to the inflation rate experienced by 15-24 year olds, compared with 0.36pp and 0.63pp contributions for the over 65s), they are systematically more exposed to services price inflation (contributing 1.65pp, on average, to 15-24 year olds' total inflation rate, compared to only 1.24pp for the over 65s). Meanwhile, there is little heterogeneity in exposure to core goods price inflation.

There are two further observations from Figure 6. First, in relation to the relative *direction* of the cross-sectional heterogeneity in exposure to different components of the consumption basket and that in perceived inflation. As observed also in Figure 4, perceived inflation is increasing in age. The direction of this heterogeneity is consistent with the direction of the heterogeneity in exposure to food and energy price-driven inflation (Figures 6i and 6ii) - which is also increasing in age, on average, contributing 0.25pp and 0.45pp, respectively, to the inflation rate experienced by 15-24 year olds, compared with 0.36pp and 0.63pp contributions for the over 65s - but not with that to services price-driven inflation - which is decreasing in age, on average, contributing 1.65pp, on average, to 15-24 year olds' total inflation rate, compared to only 1.24pp for the over 65s.[10]

Second, we observe in Figure 6 that perceived inflation seems to co-move more closely with the inflation driven by certain components of the consumption basket than others. In particular, perceived

[10]The differing degree of exposure to different components of the consumption basket explains why the heterogeneity in 'total' inflation depicted in Figure 4 is significantly smaller, as exposure to different components broadly cancels out in total.

inflation correlates most strongly with the inflation contribution of food, with a raw temporal correlation of 0.58. It also correlates with the inflation contribution of core goods (0.50) and energy (0.39) but less so with that of services (0.16).

Figure 6: Correlation between perceived 'total' inflation and component-driven inflation

4 Regression Analysis: Testing the Sensitivity of Inflation Expectations to Experienced Inflation

The previous section notes that inflation expectations vary closely with inflation perceptions, which in turn seem to co-move more closely with certain components of the consumption basket. Here, we test whether these observations hold statistically, both in the aggregate, as well as across different demographic groups. In particular, we seek to answer the following questions through our empirical analysis. Could households be more sensitive to price changes in certain components of the consumption basket, and could that drive aggregate inflation expectations dynamics? Could this also explain cross-sectional heterogeneity in beliefs about inflation? What about the upwards bias in perceived inflation?

We empirically test the sensitivity of households' inflation perceptions and expectations to price changes in different components of the consumption basket. By merging IAS data on household inflation expectations and LCFS data on household expenditure, we are uniquely able to explicitly

test the sensitivity of households' beliefs about inflation to price changes in different components of the consumption basket, independent of households' *exposure* to those components, across the *entire* basket of goods.

Section 4.1 and 4.2 show that household perceptions of current inflation and their short-run expectations for future inflation are (excessively) sensitive to food price-driven inflation. Perceptions of inflation are also (excessively) sensitive to energy price-driven inflation, though to a much lesser extent than food price-driven inflation, while they are insensitive to core goods or services price-driven inflation. Perceptions, in turn, are important for long-run expectations, though this could be driven by sources other than current price changes, to which long-run expectations are stable.

In Section 4.3, we then show that inflation perceptions are *asymmetrically* sensitive to *increases* in food price-driven inflation, and that above-median income households are significantly more sensitive to food price-driven inflation than peers, despite being less exposed to food in their consumption basket. The asymmetric sensitivity to increases in food price-driven inflation can explain about *half* of the wedge between perceived and actual inflation, while sensitivity specifically to food and energy-price driven inflation can rationalise the observed cross-sectional heterogeneity in beliefs about inflation across demographic groups.

4.1 Inflation Expectations Dynamics: Aggregate Sample

We focus first on inflation expectations dynamics. Our baseline regression specification estimates the statistical association, in first differences, between changes in the percentage point inflation contribution of different components of the consumption basket, and households' aggregate inflation perceptions and expectations. Our merged data contains households' inflation expectations and inflation contributions across the consumption basket, aggregated at demographic group-level. We produce multiple datasets that cut across various different demographic characteristics. Thus, each dataset contains data points, in each period, for each demographic group of interest across a specific set of characteristics. That is, we have a panel dataset for a set of demographic factors we are interested in.

In order to estimate aggregate relationships, we employ a fixed effects panel specification capturing the average association between our variables of interest across all demographic groups, over time. We explicitly abstract from potential heterogeneity across demographic groups in each of our (aggregate) specifications through the use of group fixed effects. Our baseline specification is given by:

$$\Delta \mathbb{E}\pi_{g,t|t+y} = \alpha + \beta' \Delta \pi_{g,t} + \gamma_g + \epsilon_{g,t} \tag{1}$$

where y $\in \{0, 1, 2, 5\}$ such that $\mathbb{E}\pi_{g,t|t+y}$ is the average 0-year (i.e. perceived level of current inflation), 1-year, 2-year, and 5-year ahead inflation expectation amongst households in demographic group g at time t. $\Delta \pi'_{g,t} = \begin{pmatrix} \text{Food} & \text{Energy} & \text{CoreGoods} & \text{Services} \end{pmatrix}$ is a matrix capturing the change in experienced inflation driven by each specific component of the consumption basket in period t given the average composition of the basket of a household in demographic group g in that period. $\beta' = \begin{pmatrix} \beta_{Food} & \beta_{Energy} & \beta_{CoreGoods} & \beta_{Services} \end{pmatrix}$ are the associated coefficients. The interpretation of our estimated coefficients is the degree to which *changes* in experienced inflation driven by a specific component of the consumption basket are associated with *changes* in beliefs about inflation, independent of households' exposure to that component in the basket, and holding fixed the changes in experienced inflation driven by all the other components in the consumption basket. Finally, γ_g represent group

fixed effects.

Table 1 reports the results of our baseline regression specification, based on the panel dataset that is cut by age groups. We obtain extremely similar results based on the panel datasets cut by income, house tenure, and every possible combination of the three characteristics, reported in Appendix A.

Table 1: Baseline Results: Aggregate sensitivity of perceived and expected inflation to changes in experienced inflation across components

	Dependent variable:										
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.54***	0.53***				0.42**	-0.002	0.34	-0.04	0.18	-0.06
	(0.14)	(0.14)				(0.21)	(0.13)	(0.24)	(0.15)	(0.17)	(0.11)
Energy	0.16***		0.17***			0.11	-0.01	0.10	0.0001	0.03	-0.03
	(0.06)		(0.06)			(0.08)	(0.08)	(0.10)	(0.10)	(0.05)	(0.05)
Core Goods	0.20			-0.32		0.23	0.07	0.39*	0.09	0.39**	0.19
	(0.20)			(0.21)		(0.23)	(0.17)	(0.23)	(0.12)	(0.19)	(0.12)
Services	0.22				0.09	-0.01	-0.18	0.05	-0.19	0.02	-0.14
	(0.18)				(0.24)	(0.25)	(0.17)	(0.21)	(0.12)	(0.15)	(0.12)
Total Inflation		0.13*	0.15*	0.25***	0.18*						
		(0.07)	(0.08)	(0.09)	(0.10)						
0y							0.78***		0.63***		0.41***
							(0.07)		(0.08)		(0.09)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	454	454	454	454	454	454	454	310	310	310	310
Adjusted R^2	0.21	0.19	0.16	0.12	0.11	0.07	0.44	0.09	0.44	0.03	0.19

Note: *p<0.1; **p<0.05; ***p<0.01. Reported standard errors are heteroskedasticity and autocorrelation robust.

In Table 1, Column (1) reports the results of our baseline regression specification in Eq. (1) for perceived (or, '0-year ahead expected') inflation. A fully rational, informed, and observant household would respond 1:1 in their perceptions of inflation following a change in their actual experienced inflation, regardless of which component of the basket had driven that change. That is, the coefficients in Column (1) would be 1.00 and statistically significant for all components of the basket. At the other end of the spectrum, an entirely unobservant household would not observe any change in their experienced inflation rate, driven by any component of the basket. In this instance, all coefficients in Column (1) would be 0.00. These are of course two rather extreme examples.

We observe that, in aggregate, households are somewhere in between these two extremes. While they *under-react* relative to the rational agent to a change in their experienced inflation rate driven by any component of the basket (coefficients are smaller than 1.00 in all rows), they are sensitive to changes in inflation driven by food and energy prices (coefficients are statistically significantly greater than 0.00). While perceived inflation is also positively associated with changes the contribution of core goods and services, these associations are not statistically significant. Comparing magnitudes of the estimated coefficients, perceived inflation is most sensitive to changes in food price-driven inflation (Column 1), with a 1pp change in the contribution of food price inflation being associated with a 0.54pp change in inflation perceptions; four times as great as the sensitivity to energy price-driven

inflation (0.13).

Columns (6), (8), and (10) report results of our baseline regression for 1y-, 2y-, and 5y-ahead expectations, respectively. We see that 1y-ahead expectations are *also* sensitive to food price-driven inflation, with a 1pp change in food price-driven inflation is associated with a 0.42pp change in 1y-ahead expectations. This association falls to 0.34pp for 2y-ahead expectations, and is marginally insignificant, and continues to fall in both magnitude and statistical significance at the 5y-ahead horizon (Column (10)); indicating that long-run expectations are not sensitive to current price changes in food.

Meanwhile, interestingly, the sensitivity to energy-driven price changes that we observed in households' perceived inflation (Column (1)) does not extend to households' expected inflation. This indicates that households' observe price changes in energy (in their perceptions of current inflation), but see them as transitory (thus not influencing their expectations for future inflation). This contrasts with other studies finding that expectations are sensitive to energy price-driven inflation [Binder, 2018, Binder and Makridis, 2022, Coibion and Gorodnichenko, 2015, Trehan, 2011]. However, as discussed above, each of these studies focus on energy prices *in isolation*, without simultaneously controlling for changes in experienced inflation driven by other components of the consumption basket.[11]

Columns (7), (9) and (11) present results from a modified version of Eq. (1) in which we control also for the change in households' perceptions of inflation, when estimating the sensitivity of inflation expectations to changes in experienced inflation. We do so in order to estimate the association between changes in inflation driven by each component of the consumption basket and households' inflation expectations *over and above* any impact driven by resulting changes in perceptions. We observe that the association between changes in experienced current inflation and expected future inflation is explained entirely by the effect on households' perceived current inflation changes: all statistically significant coefficients in Columns (6), (8), and (10) lose their significance in Columns (7), (9), and (11). This indicates that perceptions are the key variable in explaining any association between experienced price changes today and expectations for the future; and are a key omitted variable in analyses that don't feature the role of perceptions.

Additionally, we make a number of other observations about the relationship between perceptions and expectations. In particular, perceptions are a key driver of both short- and long-run expectations. Columns (7) and (9) show that a 1pp change in perceived inflation is associated with 0.78pp and 0.63pp changes in 1y- and 2y-ahead expected inflation, respectively. Indeed, this remains the case even for long-run (5y-ahead) inflation expectations, which change, on average, by 0.41pp following a 1pp change in perceptions. The inclusion of households' perceptions significantly increases the degree of variation in 1y- and 2y-ahead expectations that the model is able to explain: the R^2 increases from 10% in Column (6) to over 40% in Column (7) with the inclusion of perceptions. Moreover, comparing the R^2 in Columns (10) and (11), changes in inflation perceptions explain nearly 20% of the variation in changes in 5y-ahead expectations. That said, we can also conclude that the impact of perceptions on long-run expectations is independent of changes in food price-driven inflation, given the lack of a statistically significant association in row (1) of Column (10); so this must arise through some other source.

Columns (2)-(5) present the results of modified versions of Eq. (1) in which we regress changes

[11] Coibion and Gorodnichenko [2015] do seek to control for food prices, through the World Bank's food price index. Our results indicate that to truly account for the effect of food prices on households' inflation expectations, one needs to control for food at a much more granular level; personally experienced food price-driven inflation, rather than global aggregates.

in perceived inflation on changes in experienced inflation driven by each respective component of the consumption basket *separately*, while controlling also for changes in the 'total' experienced inflation rate.[12] We do this to test the degree to which households are sensitive to price changes in each specific component of the consumption basket *above and beyond* the degree to which they are sensitive to changes in their total experienced inflation rate. That is, we estimate the degree to which they are *excessively sensitive* to that component.[13] We again see that perceptions of current inflation are significantly associated with food and energy, indicating that perceptions are excessively sensitive to these components, while not to core goods or services. In addition, comparing the magnitude of the coefficients, we see that households' perceptions are four times as sensitive to changes in food price-driven inflation (0.53) as they are, independently, to changes in their 'total' inflation rate (0.13), indicating that the change in inflation driven specifically by food price changes indeed matter more than changes in total inflation rates.

The baseline results presented in Table 1 are based on a panel data set constructed by splitting individuals by age groups. These results are strongly robust to using a panel data set instead constructed by splitting individuals by their income, house tenure, or by age *and* income, age *and* house tenure, and age *and* house tenure *and* income (Tables 10, 11, 12, 13, and 14). They are also robust to sample selection choices. Table 16 presents similar results restricting the sample to the post-GFC period, with evidence that sensitivity to changes in food price inflation may have even increased in recent years.

To summarise, we find that, in aggregate, household perceptions of current inflation are (excessively) sensitive to changes food and energy price-driven inflation, and insensitive to changes in core goods and services price inflation. Households are particularly sensitive to food price-driven inflation, with perceived inflation responding by four times more than to energy-price driven inflation, and short-run expectations *also* changing, explained by the change in perceptions. We also show that inflation perceptions are a key determinant of both short- and long-run inflation expectations, although latter are insensitive to changes in current food prices, so the association with perceived inflation must have some other source.

4.2 Inflation Expectations Dynamics: Demographic Groups

We now test for heterogeneity in the sensitivity of households' beliefs about inflation to different components of the consumption basket, across demographic groups. We do so by cutting our panel datasets across a number of different dimensions to obtain a time series for each demographic group of interest. Our time series specifications are given by:

$$\Delta \mathbb{E}\pi^{g}_{t|t+y} = \alpha + \beta' \Delta \pi^{g}_{t} + \epsilon_t \tag{2}$$

for each demographic group g^d, where d denotes the demographic variable across which we are cutting the data: $d \in \{\text{Age}, \text{Income}, \text{HouseTenure}\}$. To test for heterogeneity across age groups, we

[12] Econometrically, we are unable to control for households' total experienced inflation in Eq. (1), as this is the sum of the constituent components, and would lead to biased estimates (see Greene [2003]).

[13] This differs from the *excess sensitivity* definition in Coibion and Gorodnichenko [2015], which instead based the magnitude of the change in expectations given the weight of fuel in the consumption basket. They do not account for price changes in other components of the consumption basket, which could also contribute to the total inflation rate experienced by households. Thus, they do not capture the change in individuals' 'total' inflation, and thus how much inflation expectations *should* have moved by. We argue that this is crucial to truly capture *excess* sensitivity. We nevertheless reach the same broad conclusion: households are excessively sensitive to energy.

split households by ages: $g^a \in \{15{-}24, 25{-}34, 35{-}44, 45{-}54, 55{-}64, 65{+}\}$. For house tenure, we split households into $g^h \in \{\text{Renters}, \text{Mortgagors}, \text{Owners}\}$. For income, this is slightly trickier as the income buckets within the IAS household survey change over time. Thus, there are an unavoidable set of decisions to take in constructing the income group time series. We have opted for an approach that seeks to minimise overlap between different groups at different points in time, such that, between 2003 and 2022: $g^i \in \{< 9500, 9500{-}17499, 17500{-}24999, \geq 25000\}$, and since 2022: $g^i \in \{< 9999, 10000{-}19999, 20000{-}34999, \geq 35000\}$. The lower bound for the highest income group, then, typically lies around (just below) the median income level in the UK.[14]

4.2.1 Inflation Perceptions

We focus first on inflation perceptions. Table 2 reports the time series regression results based on equation (2) for households' perceptions of inflation (0y). There a number of interesting findings to note.

First, our finding that households' inflation perceptions are sensitive to changes in food price-driven inflation is robust. That is, for households of all incomes, all house tenures and (nearly) all age groups, changes in food price-driven inflation are statistically significantly associated with changes in perceived inflation. Comparing across age groups (columns (1)-(6)), cohorts over the age of 24 have a similar degree of sensitivity to food prices. For instance, inflation perceptions amongst the 35-44 age group change by 0.68pp following a 1pp change in the contribution to total inflation of food price inflation. The estimated coefficients of the other age groups are not statistically different to this. The 15-24 group is the only category for whom the association is not statistically significant, though the estimated coefficient is positive. Comparing across households with different house tenures (columns (11)-(13)), we again see sensitivity to food price changes across groups. The magnitude of the coefficient is particularly large amongst mortgagors, though this is not statistically significantly different to the others.

Across income groups (columns (7)-(10)), however, we see evidence of potential heterogeneity: while all households are sensitive to changes in food price inflation, the highest income group are *particularly* sensitive. The magnitude of the coefficient (0.90) is twice as large as that for the other groups, and is statistically significantly different (in a t-test) to the others. The interpretation of this coefficient is that 'above-median' income households respond *nearly* 1:1 in the perceptions of inflation following a 1pp change in inflation driven by food prices. That is, in relation to food, the 'above-median' group are nearly perfectly observant of changes in food price-driven inflation.

Indeed, we can exploit the richness of our dataset to investigate this result further by comparing the sensitivity to food price inflation distinguishing between households by age *and* income together. Table 3 reports the estimated coefficients for the sensitivity of inflation perceptions to changes in food price inflation, across the full set of possible age-income combinations. We see that the estimated coefficients across (essentially) every age-income combination is positive, indicating some degree of sensitivity across the board. However, across the <£10k, £10k-£20k and £20k-£35k income groups, the estimated coefficient varies in magnitude across age groups and is statistically significant for some cohorts but not others. In contrast, the estimated coefficients for the >£35k income group are *consistently* larger and consistently statistically significant, with the exception only of the over 65s, and the coefficient

[14] According to ONS, median household income in the UK before taxes and benefits was £35,000 in the financial year ending 2022.

lies around 1.00 for a number of age groups - indicating that they are perfectly observant of food price-driven changes in their experienced inflation rate. One possible explanation for this result is that above-median income households are, relative to lower income households, more able to substitute away from (e.g. higher quality to lower quality) items. Thus, the fact that changes in prices can result in decisions about which items to purchase, may increase the degree to which these households notice and compare price changes; allowing them to more accurately perceive the impact this has on their experienced inflation rate.

On energy price-driven inflation, while sensitivity is observed across the range of income groups, younger age groups and renters / mortgagors are more sensitive (both in magnitude and statistical significance) than older cohorts and home-owners, respectively.[15] The magnitudes of the estimated coefficients are consistently smaller than those for food, indicating that perceptions are relatively more sensitive to changes in food price inflation. We again exploit the richness of our dataset to test for further heterogeneity between households when distinguishing between both age group *and* house tenure. Table 4 shows that while, amongst renters, younger cohorts seem to be more sensitive to changes in energy price inflation (and significantly differently so in a t-test), amongst mortgagors, the sensitivity is present broadly across all age groups. In contrast, home-owners are largely insensitive to energy price changes with the exception of the 35-44 cohort.

Finally, we document broad insensitivity of inflation perceptions to changes in core goods and services price inflation, across the board.

Table 2: Demographic Group Results (Perceptions)

	Dependent variable: 0y												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Food	0.28	0.55***	0.68***	0.63***	0.64***	0.41***	0.37***	0.46***	0.37*	0.90***	0.39***	0.78***	0.57***
	(0.23)	(0.13)	(0.22)	(0.21)	(0.18)	(0.12)	(0.11)	(0.12)	(0.19)	(0.27)	(0.13)	(0.20)	(0.16)
Energy	0.24***	0.18***	0.24***	0.11	0.13*	0.10	0.15**	0.10	0.18***	0.14**	0.22***	0.15**	0.08
	(0.08)	(0.05)	(0.09)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)	(0.06)
Core Goods	0.41**	0.26	0.19	-0.04	0.25	0.12	-0.19	0.30	-0.04	0.20	0.11	0.18	0.28
	(0.19)	(0.19)	(0.22)	(0.36)	(0.26)	(0.28)	(0.37)	(0.29)	(0.22)	(0.20)	(0.23)	(0.21)	(0.26)
Services	0.03	0.20	0.27	0.41	0.64*	0.08	0.10	0.23	0.59	0.30	0.20	0.34	0.42
	(0.10)	(0.26)	(0.23)	(0.31)	(0.35)	(0.31)	(0.20)	(0.33)	(0.39)	(0.26)	(0.19)	(0.25)	(0.32)
Demographic Group	15-24	25-34	35-44	45-54	55-64	65+	<£10k	£10k-£20k	£20k-£35k	>£35k	Renters	Mortgagors	Owners
Observations	75	76	76	76	76	75	76	76	76	76	76	76	76
Adjusted R^2	0.20	0.21	0.30	0.18	0.25	0.11	0.16	0.14	0.16	0.27	0.22	0.32	0.22

Note: *p<0.1; **p<0.05; ***p<0.01

[15] These results differ to those of Coibion and Gorodnichenko [2015] who conclude that higher income households are more sensitive to changes in fuel prices. However, as mentioned above, they do not account for price changes in other components of the consumption basket, and do not explicitly account for *time-varying* exposure to different components. The particular sensitivity amongst high income households to (food price) inflation could be driving finding in Coibion and Gorodnichenko [2015], independent of sensitivity to energy price inflation.

Table 3: Age x Income Group Summary: Food

	Dependent variable: 0y					
	(1)	(2)	(3)	(4)	(5)	(6)
Income Group						
<£10k	0.34*	-0.02	0.33	0.66**	0.47*	0.33
	(0.17)	(0.28)	(0.25)	(0.28)	(0.28)	(0.21)
£10k-£20k	0.39	0.51***	0.14	0.25	0.53*	0.26
	(0.39)	(0.16)	(0.20)	(0.22)	(0.29)	(0.17)
£20k-£35k	0.71	0.52*	0.46	0.48	0.41*	0.18
	(0.50)	(0.31)	(0.31)	(0.36)	(0.23)	(0.22)
>£35k	0.92*	1.03***	1.00***	0.80***	0.99***	0.37
	(0.56)	(0.28)	(0.39)	(0.24)	(0.33)	(0.31)
Age Group:	15-24	25-34	35-44	45-54	55-64	65+

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4: Age Group x House Tenure Summary: Energy

	Dependent variable: 0y					
	(1)	(2)	(3)	(4)	(5)	(6)
House Tenure						
Renters	0.36***	0.18**	0.27**	0.22***	0.07	0.15
	(0.13)	(0.08)	(0.10)	(0.09)	(0.11)	(0.13)
Mortgagors	0.11	0.20***	0.22**	0.08	0.21***	0.21
	(0.09)	(0.07)	(0.09)	(0.08)	(0.08)	(0.17)
Home-owners	0.07	-0.04	0.30***	-0.01	0.09	0.08
	(0.32)	(0.10)	(0.06)	(0.14)	(0.09)	(0.05)
Age Group:	15-24	25-34	35-44	45-54	55-64	65+

Note: *p<0.1; **p<0.05; ***p<0.01

4.2.2 Inflation Expectations

Turning to inflation *expectations*, we continue to find that households' perceptions of inflation are very important drivers of 1y-, 2y- and 5y-ahead expectations for *all* demographic groups, being statistically significantly associated with expectations across all specifications, groups, and horizons. We observe from Tables 5, 6, and 7 that a 1pp change in inflation perceptions is associated with between 0.61pp-0.88pp change in 1y-ahead expectations, 0.52pp-0.77pp change in 2y-ahead expectations, and 0.19pp-0.71pp change in 5y-ahead inflation expectations. Moreover, based on the R^2, we document inflation perceptions consistently explain 40-50% of the variation in both 1y- and 2y-ahead inflation expectations, and - though there is slightly more variation - continues to explain 20-30% of variation in 5-year ahead expectations across a range of demographic groups.

We also observe a similar picture as that in the aggregate in relation to changes in perceptions entirely driving any impact of current price changes on expectations. While changes in food and energy price inflation are associated with changes (in particular 1y-ahead) inflation expectations across a range

of demographic groups (see Table 15), this association does not systematically hold over and above the effect coming through the change in perceptions. That is, once we control also for the effect of changes in inflation on people's perceptions of inflation, then the change in inflation does not have an additional effect on households' inflation expectations above and beyond this. Indeed, amongst older, high income, and home-owner households, 5y-ahead inflation expectations are negatively associated with changes in food price inflation, once we account for (the positive association with) perceptions. That is, these households seem to know (to some extent) that an increase in food price inflation today is unlikely to persist for 5 years. That said, the magnitude of the positive association with perceptions - which itself is driven significantly by the increase in food prices - outweighs the negative association with food price inflation. So the 'net' effect is still likely positive.

There are, however, two notable exceptions to the direct relationship of changes in experienced inflation on inflation expectations, independent of that with inflation perceptions. The first is amongst the youngest age group, where a change in energy prices is associated with an increase in 1y-, 2y-, and 5y-ahead inflation expectations, above and beyond the positive association that the energy price change also has with inflation perceptions. The second is amongst middle aged, higher income, renter / mortgagors, where a change in core goods price inflation is positively associated with a change in 5y-ahead inflation expectations. This is interesting given that, not only is this association over and above the effect of changes in inflation perceptions, but this association exists, for each of these demographic groups, despite the fact that perceptions, 1y-ahead and (with the exception of 45-54 year-olds) 2y-ahead inflation expectations are entirely insensitive to core goods. This could potentially reflect a belief that changes in core goods prices are associated with more systemic and persistent inflationary forces.

Table 5: Demographic Group Results: 1 Year Ahead Expectations

	Dependent variable: 1y												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Food	0.07	0.09	0.04	-0.10	-0.14	0.01	0.22	0.04	0.08	-0.02	0.14	-0.21	-0.14
	(0.07)	(0.23)	(0.18)	(0.17)	(0.23)	(0.15)	(0.22)	(0.12)	(0.20)	(0.24)	(0.11)	(0.22)	(0.16)
Energy	0.11*	-0.01	-0.01	0.003	0.004	-0.07	-0.04	-0.04	0.02	0.03	-0.03	0.04	-0.02
	(0.06)	(0.09)	(0.14)	(0.11)	(0.11)	(0.09)	(0.06)	(0.09)	(0.11)	(0.12)	(0.09)	(0.10)	(0.09)
Core Goods	-0.24	-0.05	0.26	0.30	0.10	0.002	0.21	0.16	0.16	0.12	0.10	0.09	0.03
	(0.16)	(0.18)	(0.21)	(0.27)	(0.20)	(0.21)	(0.41)	(0.23)	(0.30)	(0.16)	(0.25)	(0.17)	(0.16)
Services	-0.15	-0.08	-0.51**	-0.26	-0.11	-0.12	-0.25	0.19	-0.42	-0.33	-0.07	-0.45*	-0.21
	(0.12)	(0.21)	(0.24)	(0.29)	(0.24)	(0.30)	(0.30)	(0.22)	(0.33)	(0.26)	(0.16)	(0.27)	(0.26)
0y	0.77***	0.68***	0.82***	0.82***	0.80***	0.81***	0.61***	0.77***	0.69***	0.66***	0.81***	0.88***	0.86***
	(0.10)	(0.09)	(0.12)	(0.10)	(0.10)	(0.06)	(0.18)	(0.06)	(0.07)	(0.07)	(0.08)	(0.09)	(0.08)
Demographic Group	15-24	25-34	35-44	45-54	55-64	65+	<£10k	£10k-£20k	£20k-£35k	>35k	Rent	Mortg	Own
Observations	75	76	76	76	76	75	76	76	76	76	76	76	76
R^2	0.53	0.44	0.51	0.45	0.47	0.41	0.28	0.54	0.44	0.37	0.55	0.49	0.48
Adjusted R^2	0.50	0.40	0.48	0.41	0.44	0.37	0.23	0.51	0.40	0.33	0.52	0.45	0.44

Note: *p<0.1; **p<0.05; ***p<0.01

Table 6: Demographic Group Results: 2 Year Ahead Expectations

	Dependent variable: 2y												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Food	0.19	0.04	0.02	-0.13	-0.19	-0.14	0.30	-0.33*	-0.13	-0.14	0.18	-0.19	-0.24*
	(0.18)	(0.26)	(0.22)	(0.18)	(0.20)	(0.18)	(0.31)	(0.18)	(0.21)	(0.26)	(0.19)	(0.21)	(0.13)
Energy	0.22**	-0.06	0.07	-0.06	-0.04	-0.02	-0.07	0.06	0.03	-0.02	0.003	-0.02	0.01
	(0.10)	(0.12)	(0.11)	(0.12)	(0.08)	(0.09)	(0.07)	(0.10)	(0.11)	(0.09)	(0.13)	(0.11)	(0.05)
Core Goods	-0.26	-0.01	0.12	0.43***	0.01	0.14	-0.04	0.22	0.18	0.08	0.14	0.12	0.04
	(0.20)	(0.09)	(0.14)	(0.13)	(0.18)	(0.16)	(0.41)	(0.24)	(0.19)	(0.13)	(0.17)	(0.10)	(0.10)
Services	-0.26*	-0.08	-0.34*	-0.12	-0.13	-0.25	-0.19	0.20	-0.16	-0.15	-0.20	-0.26	-0.27
	(0.13)	(0.13)	(0.20)	(0.24)	(0.25)	(0.30)	(0.29)	(0.26)	(0.18)	(0.16)	(0.16)	(0.26)	(0.25)
0y	0.62***	0.61***	0.56***	0.65***	0.65***	0.70***	0.53***	0.77***	0.56***	0.52***	0.71***	0.68***	0.64***
	(0.10)	(0.10)	(0.12)	(0.08)	(0.11)	(0.10)	(0.13)	(0.08)	(0.07)	(0.13)	(0.08)	(0.09)	(0.08)
Demographic Group	15-24	25-34	35-44	45-54	55-64	65+	<£10k	£10k-£20k	£20k-£35k	>35k	Rent	Mortg	Own
Observations	51	52	52	52	52	51	52	52	52	52	52	52	52
Adjusted R^2	0.47	0.34	0.47	0.43	0.46	0.41	0.18	0.55	0.39	0.41	0.50	0.41	0.52

Note: *p<0.1; **p<0.05; ***p<0.01

Table 7: Demographic Group Results: 5 Year Ahead Expectations

	Dependent variable: 5y												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Food	0.19	0.18	0.14	0.10	-0.54**	-0.38***	0.14	-0.23	-0.16	-0.22*	0.07	0.12	-0.38***
	(0.20)	(0.33)	(0.36)	(0.23)	(0.23)	(0.14)	(0.35)	(0.22)	(0.27)	(0.13)	(0.13)	(0.18)	(0.10)
Energy	0.22*	-0.12**	-0.08	-0.05	0.03	-0.07	-0.07	-0.04	0.10	-0.06	-0.01	-0.11*	-0.03
	(0.13)	(0.05)	(0.08)	(0.10)	(0.08)	(0.06)	(0.07)	(0.07)	(0.08)	(0.04)	(0.07)	(0.06)	(0.05)
Core Goods	0.03	0.29	0.35*	0.63***	-0.23**	-0.01	0.12	-0.07	0.54**	0.16**	0.46**	0.23**	-0.14
	(0.28)	(0.19)	(0.18)	(0.16)	(0.12)	(0.14)	(0.43)	(0.20)	(0.23)	(0.07)	(0.18)	(0.09)	(0.14)
Services	-0.23*	-0.09	-0.38	-0.09	-0.09	0.11	0.07	-0.10	0.17	-0.03	-0.17	-0.44	-0.24
	(0.14)	(0.13)	(0.27)	(0.28)	(0.22)	(0.30)	(0.34)	(0.32)	(0.28)	(0.15)	(0.11)	(0.33)	(0.25)
0y	0.44***	0.29***	0.51***	0.23	0.52***	0.50***	0.34**	0.71***	0.19*	0.32***	0.47***	0.44***	0.58***
	(0.15)	(0.11)	(0.18)	(0.17)	(0.12)	(0.14)	(0.17)	(0.11)	(0.11)	(0.09)	(0.11)	(0.11)	(0.11)
Demographic Group	15-24	25-34	35-44	45-54	55-64	65+	<£10k	£10k-£20k	£20k-£35k	>35k	Rent	Mortg	Own
Observations	51	52	52	52	52	51	52	52	52	52	52	52	52
Adjusted R^2	0.18	0.10	0.25	0.13	0.29	0.25	0.005	0.33	0.10	0.18	0.27	0.24	0.43

Note: *p<0.1; **p<0.05; ***p<0.01

4.3 Upwards Bias of Food Inflation

Based on a version of our baseline regression specification in equation (2), we can test whether changes in household inflation perceptions are *asymmetrically* sensitive to increases and decreases in inflation driven specific components of the basket. A finding that perceptions are more sensitive to increases than decreases would be consistent with the existence of an upwards bias in perceptions: perceived inflation rises with an increase in experienced inflation and falls by less following a fall in experienced inflation, thus remaining higher than the actual level of inflation.

So far, we have shown that beliefs about inflation are particularly sensitive to changes in the inflation contributions of non-core components of the consumption basket. We have also shown in Table 1 columns (2)-(5) that, in aggregate, inflation perceptions are *excessively* sensitive to changes in the inflation contribution of these components, over and above the change in 'total' inflation they experience. However, each of these results correspond only to the *change* in inflation perceptions

associated with a *change* in experienced inflation. They do not, alone, tell us anything about the relationship between the *level* of either. But, as mentioned in Section 4.1, we are cautious about estimating the association in levels between these two series given the significant degree of persistence we observe in each. Nevertheless, we can glean insights into the observed upwards bias in the level of inflation perceptions relative to the level of actual experienced inflation, through two robust pieces of analyses.

Table 8 presents the results of a modified version of equation (2) in which the right-hand side variables - reflecting the change in inflation contribution of each of the components of the consumption basket - are interacted with a dummy variable that takes the value of 1 if the change in the inflation contribution of that component is positive, and 0 if it is negative.

Table 8: Asymmetric Sensitivity Results (First Differences)

	Dependent variable:	
	$\Delta 0y$	$\Delta 0y$
	(1)	(2)
$\Delta\pi$(Food)	0.54***	
$\Delta\pi$(Food) $*$ Positive		0.61*
$\Delta\pi$(Energy)	0.16***	
$\Delta\pi$(Energy) $*$ Positive		0.02
$\Delta\pi$(CoreGoods)	0.20	
$\Delta\pi$(CoreGoods) $*$ Positive		0.72
$\Delta\pi$(Services)	0.22	
$\Delta\pi$(Services) $*$ Positive		-0.56
Age FE	Yes	Yes
Observations	454	454
Adjusted R^2	0.21	0.24

Note: *p<0.1; **p<0.05; ***p<0.01. Reported SEs are HAC robust.

We see from row (2) that the estimated coefficient on the $\Delta\pi$(Food) $*$ Positive interaction term is 0.61 and statistically significant. This tells us that, in aggregate, households' perceptions of inflation change by 0.61pp more with an *increase* in food price-driven inflation than they do with a *decrease*. We do not see any statistically significant evidence of asymmetric sensitivity with the other components of the basket. We observed that, on average, the wedge between inflation perceptions and actual experienced inflation was 1.4 percentage points. Thus, we can infer that asymmetric sensitivity of households' perceptions to food inflation contributions can explain nearly half of this upwards bias.

5 Further Insights

5.1 Disentangling *Exposure* from *Sensitivity*

A unique advantage of our dataset is that we are able to estimate households' *sensitivity* to components across the entire consumption basket while explicitly accounting for their *exposure* (based on that components' specific weight in their specific consumption basket) to them. This is because we estimate the sensitivity of each demographic groups' beliefs about inflation to inflation rate changes in their

own basket. Absent the LCFS data on household expenditure, we would be (as, with the exception of D'Acunto et al. [2021], all related studies to date are) unable to explicitly distinguish between sensitivity and exposure. Thus, the observed response of a demographic groups' inflation expectations to price changes in certain components of the consumption basket would be the combined effect of that groups' sensitivity *and* exposure. Both elements are important to understand what may drive temporal (and, below, cross-sectional) variation or heterogeneity in inflation expectations, but they are distinct and, as we show below, can pull in *opposing* directions.

At this point, before delving deeper into how we disentangle exposure from sensitivity, it would be useful to scope exisiting literature on this matter. Only a handful of papers have sought to explicitly test the sensitivity of expectations to price changes in certain goods, for instance [Coibion and Gorodnichenko, 2015] and D'Acunto et al. [2021]. There are a number of differences worth noting between the econometric specification, definition of sensitivity, and thus, interpretation of estimated coefficients in our analysis. On the econometric specification, D'Acunto et al. [2021] estimate the sensitivity of households' inflation expectations, in levels, to (grocery item) inflation, also in levels. Coibion and Gorodnichenko [2015] estimate the the sensitivity of *changes* in household inflation expectations, in differences, to (fuel) inflation, in levels. We instead choose to estimate sensitivity with *both* expectations and experienced inflation in first differences, as we observe significant persistence in each series.

On the definition of sensitivity, our approach, which is similar to D'Acunto et al. [2021] is to entirely disentangle households' *sensitivity* to inflation from households' *exposure* to inflation. We do this by defining our right-hand side 'experienced inflation' variables (as explained above) as the percentage point *contribution* to an individuals' 'total' inflation rate that comes from a specific component of the inflation basket, *given* the share of that individuals' expenditure on that component.[16] In contrast, Coibion and Gorodnichenko [2015] test sensitivity of expectations to the actual inflation rate of fuel, rather than its inflation *contribution*. They then compare differences across groups with statistics on expenditure shares calculated at a single point in time. We discuss in Section 5.1 the benefits of explicitly accounting for households' (time-varying) exposure.

In comparison to our paper, while both D'Acunto et al. [2021] and Coibion and Gorodnichenko [2015] test sensitivity to price changes based only on a subset of the consumption basket (grocery items and fuel, respectively), we are able to test sensitivity based on the *entire* consumption basket. This allows us to test the sensitivity of beliefs to changes in the inflation contribution of a specific component of the consumption basket while, crucially, holding constant the inflation contributions of all other components in the basket. This allows us to isolate the price changes in each component, and ensure sensitivity is not reflecting unobserved price changes in other components of the basket.

We show in Table 9 the value of disentangling these two effects, focusing on the sensitivity to food price changes across income groups. We do so based on two slightly different versions of Eq. (2). The second row presents the same estimated coefficients as those presented in columns (7)-(10) of Table 2, whereby we define changes in experienced food price-driven inflation based on each demographic groups' specific consumption basket composition. That is, to cleanly estimate sensitivity, as in our baseline regressions, we exploit the richness of our dataset to strip out variation in exposure to specific

[16] D'Acunto et al. [2021] do this based on individual-level expectations and expenditures across only non-durable goods (25% of the consumption basket), while we do this based on average expectations and average expenditure shares at the demographic-group level, across the entire basket of goods - allowing us to test the sensitivity to price changes in a specific component while holding fixed price changes in all other components.

components of the consumption basket. As above, we see that the estimated coefficient on above-median income groups (column (8)) - 0.90 - is twice as large as that for the other groups, and this difference is statistically significant in a t-test.

In contrast, in the first row, we do not exploit the LCFS expenditure data, and assume a representative consumption basket across all demographics groups (based on averaged CPI weights). While we see that the estimated coefficient for above-median income groups (column (7)) - 0.63 - is still larger than that of the other income groups, it is a third smaller than the estimate in column (8), and not statistically significantly different from the other groups in a t-test. Not accounting for (heterogeneity in each) demographic groups' exposure to food in this instance leads to an *under-estimate* of above-median income households' sensitivity to changes in food price-driven inflation. This results from the fact that above-median income groups are relatively less *exposed* to food (depicted in Figure 8), as it comprises a relatively smaller proportion of their basket. The estimated coefficient in column (8) tells us that, accounting for this relatively lower exposure, these households are more *sensitive* to price changes in this component than peers. This is an important finding - that would be missed without disentangling these two effects.

While we show in Table 9 only the results for food, across only income groups, we show the full regression results, also across age and house tenure groups in Table A.6. We observe very similar patterns across the board. Results based on representative baskets systematically under-estimate the sensitivity of certain groups to components of the consumption that they are less exposed to (such as younger cohorts to food and energy, renters to energy, mortgagors to food) and over-estimate sensitivities to components that they are more exposed to (older cohorts and home-owners to food).

Table 9: Individual vs Average Expenditure Shares (Income)

	Dependent variable: 0y							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Food								
Rep. Basket	0.40***		0.46***		0.39**		0.63***	
	(0.14)		(0.13)		(0.17)		(0.19)	
Individualised		0.37***		0.46***		0.37*		0.90***
		(0.11)		(0.12)		(0.19)		(0.27)
Consumption Basket	Rep	Indiv	Rep	Indiv	Rep	Indiv	Rep	Indiv
Income Group	1	1	2	2	3	3	4	4
Observations	76	76	76	76	76	76	76	76
Adjusted R^2	0.18	0.16	0.14	0.14	0.17	0.16	0.26	0.27

Note: *p<0.1; **p<0.05; ***p<0.01. Reported SEs are HAC robust.

5.2 Implications for Cross-Sectional Heterogeneity

A question remains on how we could understand the cross-sectional heterogeneity observed in inflation perceptions. We seek to do this by combining the observed cross-sectional heterogeneity in exposure to different components of the consumption basket across age, income, and house tenure groups, with the estimated sensitivity to these components across these groups.

Across age groups, we observed from Figure 6 that inflation perceptions are broadly increasing in age. Over the sample period, the perceptions amongst 15-24 years old averages 3.0%. This increases to 3.8% amongst the 45-64 year olds, and is slightly lower at 3.5% amongst the over 65s. The relative

degree of exposure and sensitivity observed across age groups is consistent with this. We observe that the degree of exposure to both food and energy price inflation, captured by the respective inflation contributions of these components, is also increasing in age (0.1pp and 0.2pp higher amongst the age groups over 45 than the 15-24 year old, respectively), and show in column (1) of Table 1 that these are the components of the consumption basket that households are particularly sensitive to. Magnitude-wise, if all households were equally sensitive to changes to food and energy price inflation, we might conclude that a combination of exposure and sensitivity could, thus, explain approximately 0.3pp, of the 0.8pp, heterogeneity in perceptions. The amount that it can explain may be a little greater than this as we, additionally, show in Table 2 that the 15-24 year old are the only group not sensitive to food price inflation, and show some evidence that the over 65s are less sensitive (albeit not statistically significantly so) to food than the middle-age groups and insensitive to energy price inflation. We conclude, then, that heterogeneity in exposure and sensitivity to food and price inflation could feasibly explain up to half of the of the cross-sectional heterogeneity in perceptions; leaving room for other determinants of heterogeneity, such as for instance lifetime experiences [Malmendier and Nagel, 2016].

Across income groups, we see from Figure 8 that perceptions are decreasing in income; on average 0.2pp lower over the sample period amongst those earning over £35k than those earning less than £20k. Consistent with this, the inflation contributions of food and energy are each 0.1pp higher and amongst the low income groups than the high income group, on average over the sample period. Thus, this heterogeneity in exposure *could* explain all of the heterogeneity in perceptions across income groups.[17]

Finally, across house tenure groups, Figure 10 shows that there are no systematic differences in perceptions across house tenure groups: renters perceive inflation to be 3.57% on average, compared to 3.52% amongst home-owners. Indeed, consistent with this, there are no real differences in exposure to food price inflation, on average, between these two groups (0.015pp), and while home-owners are 0.2pp more exposed to energy price inflation, we also show in Table 14 that they are insensitive to changes in food price inflation.

Thus, the observed cross-sectional heterogeneity in inflation beliefs across these groups can be fully rationalised given the cross-sectional heterogeneity in exposure and sensitivity to food and energy price inflation.

5.3 Additional Implications: Households' 'Supply-side' View of the Economy

A growing body of survey evidence has identified that, in a number of developed economies, households (and firms to some extent) typically associate increases in inflation with increases in unemployment (decreases in GDP). That is, they seem to have a 'supply-side', rather than 'demand-side' view of economic shocks. Our findings suggest that household beliefs about inflation are sensitive only to changes in inflation that are driven by non-core components of the basket could potentially rationalise this empirical observation. That is, if households only observe changes in inflation when that change is driven by food and energy price changes, then they are only observant to the shocks that influence these components of the basket. Shocks to food and energy prices, in turn, are usually associated with supply rather than demand shocks, potentially explaining why this appears to be the prevailing perspective that households have on the economy.

[17] We also find that high income groups are more sensitive to food price inflation, potentially amplifying the degree to which the 0.1pp difference in food inflation contribution may generate heterogeneity in perceptions.

6 Conclusion

In this paper, we study whether households are more sensitive to price changes in certain components of the consumption basket, and how that may drive inflation expectations dynamics. To do this, we first construct a novel dataset that combines UK household data on inflation expectations (IAS), UK household data on personal expenditure (LCFS) and granular CPI inflation rate – the combination of the latter two calculates experienced inflation. Using this new dataset, we test the sensitivity of household inflation expectations to changes in their own experienced inflation rate, given the composition of their consumption basket.

Our key finding shows that food matters most – households are more sensitive to food price-driven inflation than they are to other CPI components. Digging deeper to the cross-section, we find that above-median income households are especially sensitive to changes in food price-driven inflation, despite their consumption baskets being less exposed to food than those of peers. We also find that households are asymmetrically sensitive to *increases* in food price-driven inflation.

We use these findings to rationalise a number of empirical puzzles relating to household inflation expectations. First, the asymmetric sensitivity to *increases* in food price-driven inflation (0.6pp in magnitude) can explain nearly half of the documented upwards bias in households' perceptions of inflation, relative to the actual rate of inflation that they experience (1.4pp in magnitude, on average, over the sample period). Second, the sensitivity of perceived inflation to specifically non-core components of the consumption basket, coupled with the degree of cross-sectional heterogeneity, across demographic groups, in exposure to those components, can rationalise all of the cross-sectional heterogeneity in perceived inflation across income and house tenure groups, and half that across age groups. Finally, our results can also rationalise a recently documented empirical puzzle that households seem to have a 'supply-side' view of shocks to the economy.

On the policy implications, our findings indicate that household expectations may be most likely to generate persistent inflationary pressures when shocks impact food prices; rising quickly on the way up and fall slowly on the way down. A monetary authority seeking to maintain a strong anchor on inflation expectations and limit persistence of shocks may thus optimally respond strongly to food price shocks, even if they are temporary in nature.

Appendix A Auxiliary Results

A.1 Income

Figure 7: Correlation between Perceived and Experienced 'Total' Inflation

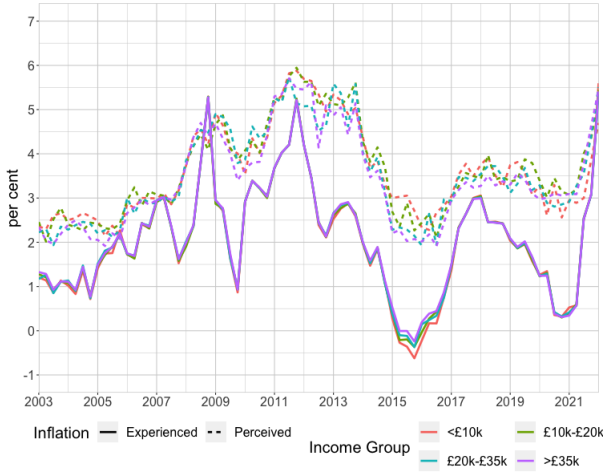
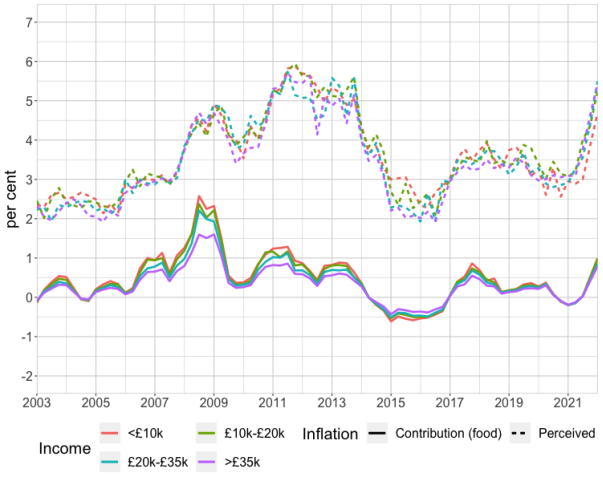
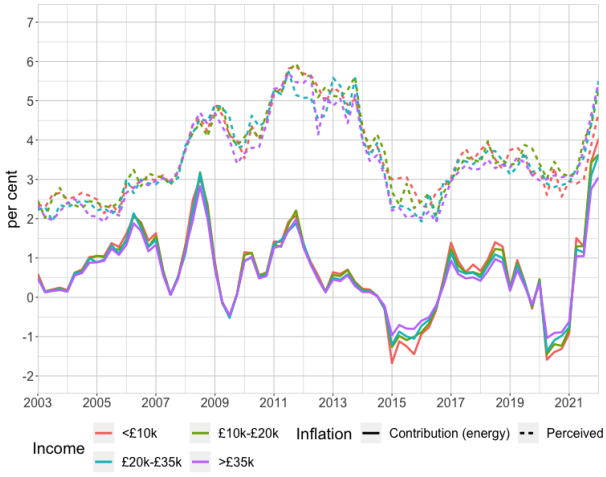


Figure 8: Correlation between Perceived 'Total' Inflation and Inflation Contributions by component (by income group)

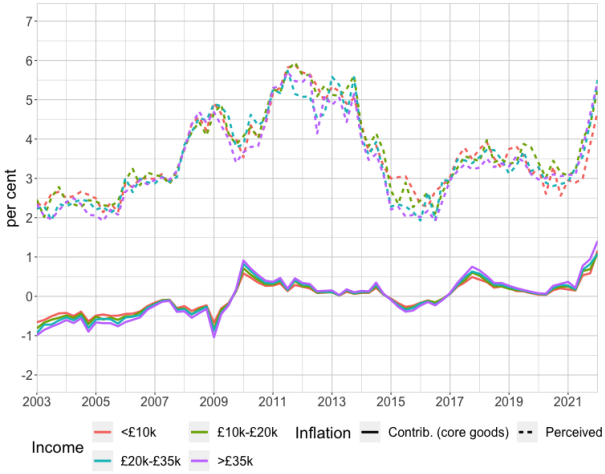
(i) Food



(ii) Energy



(iii) Core Goods



(iv) Services

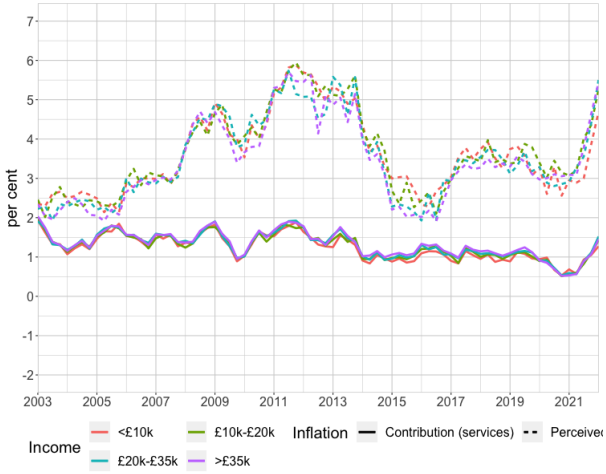


Table 10: Baseline Results (Income, First Differences)

	Dependent variable:										
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.48***	0.51***				0.42**	0.10	0.25	-0.06	0.12	-0.07
	(0.11)	(0.10)				(0.18)	(0.15)	(0.24)	(0.18)	(0.19)	(0.16)
Energy	0.15**		0.16***			0.09	-0.01	0.09	-0.002	0.03	-0.02
	(0.06)		(0.05)			(0.07)	(0.08)	(0.11)	(0.09)	(0.06)	(0.05)
Core Goods	0.09			-0.48**		0.22	0.17	0.36	0.15	0.39*	0.26*
	(0.23)			(0.25)		(0.29)	(0.24)	(0.25)	(0.16)	(0.21)	(0.15)
Services	0.31				0.26	0.01	-0.20	0.22	-0.06	0.19	0.01
	(0.24)				(0.33)	(0.32)	(0.24)	(0.26)	(0.15)	(0.21)	(0.17)
Total Inflation		0.10	0.13	0.25***	0.14						
		(0.07)	(0.08)	(0.09)	(0.10)						
0y							0.68***		0.58***		0.36***
							(0.07)		(0.06)		(0.06)
Income FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	304	304	304	304	304	304	208	208	208	208
Adjusted R^2	0.18	0.15	0.12	0.10	0.08	0.07	0.38	0.07	0.38	0.02	0.14
Note:											*p<0.1; **p<0.05; ***p<0.01

A.2 House Tenure

Figure 9: Correlation Perceived and Experienced 'Total' Inflation

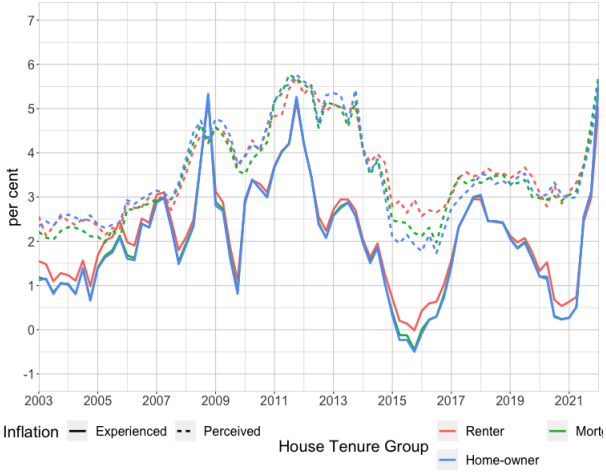
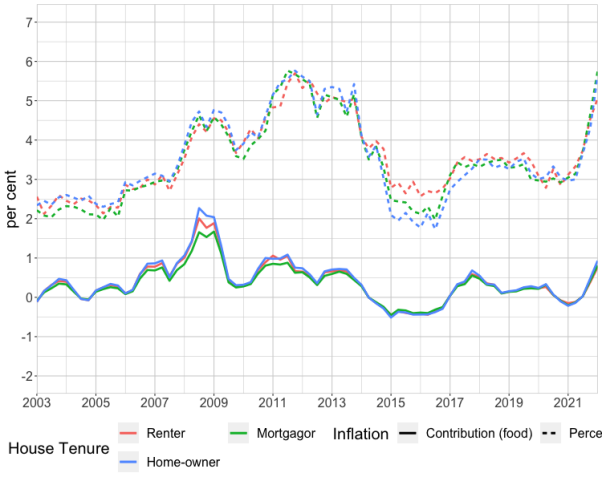
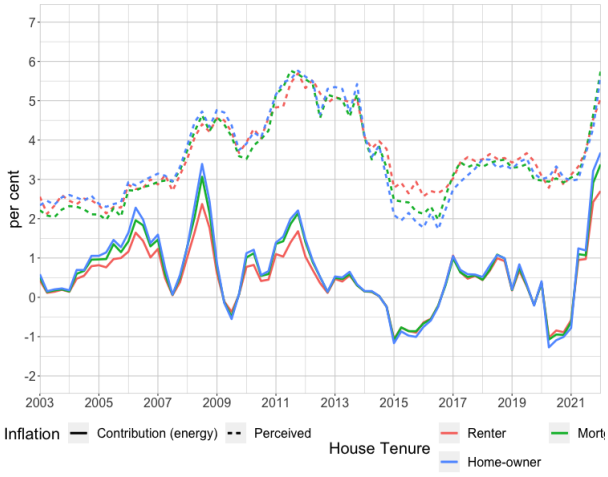


Figure 10: Correlation between Perceived 'Total' Inflation and Inflation Contributions by component (by house tenure)

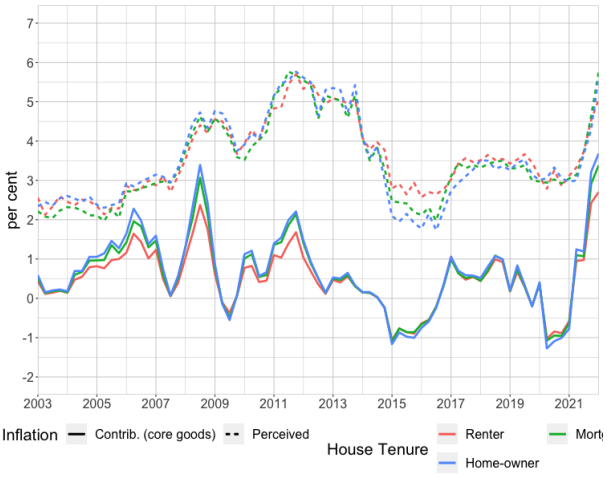
(i) Food



(ii) Energy



(iii) Core Goods



(iv) Services

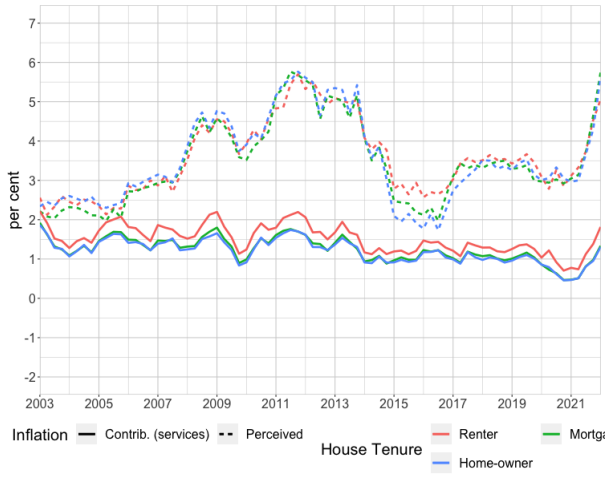


Table 11: Baseline Results (First Differences)

	Dependent variable:										
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.57***	0.56***				0.42**	-0.06	0.32	-0.08	0.21	-0.09
	(0.13)	(0.14)				(0.20)	(0.14)	(0.23)	(0.14)	(0.16)	(0.10)
Energy	0.14**		0.16***			0.11	-0.01	0.09	-0.004	0.01	-0.06
	(0.06)		(0.06)			(0.08)	(0.08)	(0.10)	(0.10)	(0.05)	(0.05)
Core Goods	0.20			-0.36		0.24	0.08	0.42*	0.10	0.38**	0.14
	(0.21)			(0.23)		(0.24)	(0.18)	(0.24)	(0.12)	(0.18)	(0.10)
Services	0.30				0.21	0.05	-0.20	0.12	-0.21	0.004	-0.24
	(0.22)				(0.30)	(0.30)	(0.21)	(0.27)	(0.18)	(0.21)	(0.19)
Total Inflation		0.13*	0.16*	0.26***	0.17*						
		(0.08)	(0.09)	(0.09)	(0.10)						
0y							0.84***		0.65***		0.49***
							(0.06)		(0.06)		(0.09)
House Tenure FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	228	228	228	228	228	228	228	156	156	156	156
Adjusted R^2	0.26	0.23	0.19	0.15	0.14	0.08	0.47	0.11	0.48	0.04	0.30
Note:											*p<0.1; **p<0.05; ***p<0.01

A.3 Age x Income

Table 12: Baseline Results (First Differences)

	Dependent variable:										
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.44***	0.42***				0.36**	0.11	0.19	-0.03	0.02	-0.16
	(0.10)	(0.09)				(0.16)	(0.12)	(0.21)	(0.18)	(0.20)	(0.17)
Energy	0.16***		0.16***			0.08	-0.01	0.09	0.02	0.05	-0.01
	(0.05)		(0.05)			(0.07)	(0.07)	(0.10)	(0.09)	(0.06)	(0.05)
Core Goods	0.16			-0.30		0.21	0.12	0.26	0.09	0.23	0.09
	(0.19)			(0.19)		(0.24)	(0.20)	(0.23)	(0.16)	(0.22)	(0.14)
Services	0.18				-0.01	0.04	-0.06	0.18	0.07	0.11	0.01
	(0.13)				(0.18)	(0.15)	(0.11)	(0.15)	(0.11)	(0.14)	(0.11)
Total Inflation		0.14*	0.14*	0.23***	0.19**						
		(0.07)	(0.08)	(0.08)	(0.10)						
0y							0.56***		0.43***		0.36***
							(0.05)		(0.06)		(0.04)
Age & Income FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,233	1,233	1,233	1,233
Adjusted R^2	0.05	0.05	0.04	0.03	0.02	0.01	0.25	-0.003	0.15	-0.02	0.07
Note:											*p<0.1; **p<0.05; ***p<0.01

A.4 Age x House

Table 13: Baseline Results (First Differences)

	Dependent variable:										
	diff_E0y_all					diff_E1y_all		diff_E2y_all		diff_E5y_all	
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.48***	0.47***				0.29*	-0.03	0.17	-0.09	0.24	0.02
	(0.11)	(0.11)				(0.18)	(0.14)	(0.23)	(0.19)	(0.18)	(0.14)
Energy	0.14***		0.16***			0.12*	0.03	0.14	0.07	0.05	-0.01
	(0.05)		(0.05)			(0.07)	(0.07)	(0.09)	(0.09)	(0.05)	(0.05)
Core Goods	0.15			-0.28*		0.06	-0.05	0.17	-0.03	0.15	-0.03
	(0.17)			(0.16)		(0.19)	(0.17)	(0.17)	(0.12)	(0.18)	(0.14)
Services	0.18				0.01	0.14	0.02	0.18	0.02	0.05	-0.10
	(0.11)				(0.14)	(0.14)	(0.09)	(0.14)	(0.09)	(0.11)	(0.10)
Total Inflation		0.14**	0.15**	0.24***	0.19**						
		(0.07)	(0.08)	(0.08)	(0.09)						
0y							0.68***		0.49***		0.43***
							(0.04)		(0.04)		(0.05)
Age & House FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,316	1,316	1,316	1,316	1,316	1,316	1,316	891	891	891	891
Adjusted R^2	0.09	0.09	0.07	0.06	0.05	0.02	0.34	0.02	0.24	-0.01	0.14

Note: *p<0.1; **p<0.05; ***p<0.01

A.5 Age x House x Income

Table 14: Baseline Results (First Differences)

	Dependent variable:										
	0y	0y	0y	0y	0y	1y	1y	2y	2y	5y	5y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Food	0.33***	0.30***				0.21	0.03	0.19	0.02	0.10	-0.05
	(0.11)	(0.09)				(0.16)	(0.14)	(0.15)	(0.13)	(0.17)	(0.16)
Energy	0.17***		0.15***			0.13**	0.04	0.13	0.06	0.10	0.04
	(0.05)		(0.05)			(0.06)	(0.05)	(0.08)	(0.07)	(0.06)	(0.06)
Core Goods	0.05			-0.30		0.04	0.01	0.03	-0.08	0.13	0.03
	(0.17)			(0.19)		(0.20)	(0.16)	(0.20)	(0.15)	(0.19)	(0.15)
Services	0.19**				0.003	0.10	0.01	0.07	-0.01	0.22**	0.15
	(0.09)				(0.10)	(0.11)	(0.08)	(0.15)	(0.12)	(0.11)	(0.10)
Total Inflation		0.17**	0.16*	0.25***	0.20**						
		(0.07)	(0.08)	(0.09)	(0.09)						
0y							0.57***		0.40***		0.34***
							(0.03)		(0.04)		(0.05)
Age, House Income FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,546	4,546	4,546	4,546	4,546	4,434	4,434	2,934	2,934	2,934	2,934
Adjusted R^2	0.002	-0.001	0.002	-0.002	-0.004	-0.01	0.27	-0.02	0.12	-0.02	0.07
Note:											*p<0.1; **p<0.05; ***p<0.01

Table 15: Demographic Group Results: 1y-ahead Expectations (Full)

	Dependent variable:																							
													diff_E1y_all											
	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y	1y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
Food	0.29	0.07	0.47*	0.09	0.60*	0.04	0.42	-0.10	0.37	-0.14	0.34*	0.01	0.45**	0.22	0.40**	0.04	0.33	0.08	0.57*	-0.02	0.45***	0.14	0.48	-0.21	0.36	-0.14
	(0.21)	(0.07)	(0.25)	(0.23)	(0.31)	(0.18)	(0.27)	(0.17)	(0.30)	(0.23)	(0.19)	(0.15)	(0.20)	(0.22)	(0.17)	(0.12)	(0.24)	(0.20)	(0.33)	(0.24)	(0.15)	(0.11)	(0.31)	(0.22)	(0.24)	(0.16)
Energy	0.29***	0.11*	0.11	-0.01	0.18	-0.01	0.09	0.003	0.11	0.004	0.01	-0.07	0.05	-0.04	0.04	-0.04	0.15*	0.02	0.13	0.03	0.14*	-0.03	0.18*	0.04	0.05	-0.02
	(0.08)	(0.06)	(0.11)	(0.09)	(0.11)	(0.14)	(0.10)	(0.11)	(0.10)	(0.11)	(0.10)	(0.09)	(0.06)	(0.06)	(0.10)	(0.09)	(0.08)	(0.11)	(0.12)	(0.12)	(0.08)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)
Core Goods	0.08	-0.24	0.12	-0.05	0.41	0.26	0.27	0.30	0.31	0.10	0.10	0.002	0.09	0.21	0.39	0.16	0.13	0.16	0.25	0.12	0.19	0.10	0.25	0.09	0.27	0.03
	(0.23)	(0.16)	(0.23)	(0.18)	(0.28)	(0.21)	(0.23)	(0.27)	(0.32)	(0.20)	(0.27)	(0.21)	(0.49)	(0.41)	(0.35)	(0.23)	(0.31)	(0.30)	(0.22)	(0.16)	(0.28)	(0.25)	(0.25)	(0.17)	(0.24)	(0.16)
Services	-0.12	-0.15	0.06	-0.08	-0.29	-0.51**	0.08	-0.26	0.40	-0.11	-0.05	-0.12	-0.18	-0.25	0.37	0.19	-0.01	-0.42	-0.13	-0.33	0.10	-0.07	-0.15	-0.45*	0.15	-0.21
	(0.16)	(0.12)	(0.29)	(0.21)	(0.31)	(0.24)	(0.38)	(0.29)	(0.40)	(0.24)	(0.42)	(0.30)	(0.32)	(0.30)	(0.34)	(0.22)	(0.45)	(0.33)	(0.34)	(0.26)	(0.25)	(0.16)	(0.37)	(0.27)	(0.36)	(0.26)
0y		0.77***		0.68***		0.82***		0.82***		0.80***		0.81***		0.61***		0.77***		0.69***		0.66***		0.81***		0.88***		0.86***
		(0.10)		(0.09)		(0.12)		(0.10)		(0.10)		(0.06)		(0.18)		(0.06)		(0.07)		(0.07)		(0.08)		(0.09)		(0.08)
Dem. Group	15-24	15-24	25-34	25-34	35-44	35-44	45-54	45-54	55-64	55-64	65+	65+	<10k	<10k	10-20k	10-20k	20-35k	20-35k	>35k	>35k	Rent	Rent	Mortg	Mortg	Own	Own
Observations	75	75	76	76	76	76	76	76	76	76	75	75	76	76	76	76	76	76	76	76	76	76	76	76	76	76
Adjusted R^2	0.15	0.50	0.07	0.40	0.13	0.48	0.02	0.41	0.06	0.44	-0.01	0.37	0.04	0.23	0.08	0.51	0.03	0.40	0.06	0.33	0.11	0.52	0.08	0.45	0.02	0.44
Note:																										*p<0.1; **p<0.05; ***p<0.01

A.6 Average vs Individual Shares

	Dependent variable: 0y																									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
Food																										
Rep. Basket	0.26*		0.54***		0.64***		0.66***		0.79***		0.56***		0.40***		0.46***		0.39**		0.63***		0.38***		0.67***		0.69***	
	(0.15)		(0.13)		(0.21)		(0.19)		(0.17)		(0.17)		(0.14)		(0.13)		(0.17)		(0.19)		(0.13)		(0.17)		(0.17)	
Individualised		0.28		0.55***		0.68***		0.63***		0.64***		0.41***		0.37***		0.46***		0.37*		0.90***		0.39***		0.78***		0.57***
		(0.23)		(0.13)		(0.22)		(0.21)		(0.18)		(0.12)		(0.11)		(0.12)		(0.19)		(0.27)		(0.13)		(0.20)		(0.16)
Energy																										
Rep. Basket	0.18***		0.15***		0.23***		0.13		0.13		0.11		0.17**		0.12		0.18***		0.13**		0.18***		0.15**		0.09	
	(0.06)		(0.05)		(0.08)		(0.08)		(0.08)		(0.08)		(0.08)		(0.08)		(0.06)		(0.06)		(0.06)		(0.06)		(0.07)	
Individualised		0.24***		0.18***		0.24***		0.11		0.13*		0.10		0.15**		0.10		0.18***		0.14**		0.22***		0.15**		0.08
		(0.08)		(0.05)		(0.09)		(0.08)		(0.07)		(0.07)		(0.07)		(0.07)		(0.06)		(0.07)		(0.07)		(0.06)		(0.06)
Core Goods																										
Rep. Basket	0.42**		0.24		0.26		-0.004		0.27		0.09		-0.24		0.29		0.02		0.21		0.09		0.18		0.34	
	(0.20)		(0.19)		(0.24)		(0.36)		(0.28)		(0.27)		(0.28)		(0.28)		(0.25)		(0.24)		(0.17)		(0.25)		(0.28)	
Individualised		0.41**		0.26		0.19		-0.04		0.25		0.12		-0.19		0.30		-0.04		0.20		0.11		0.18		0.28
		(0.19)		(0.19)		(0.22)		(0.36)		(0.26)		(0.28)		(0.37)		(0.29)		(0.22)		(0.20)		(0.23)		(0.21)		(0.26)
Services																										
Rep. Basket	0.09		0.17		0.27		0.38		0.47		0.09		0.30		0.28		0.63*		0.44		0.24		0.37		0.37	
	(0.16)		(0.27)		(0.27)		(0.28)		(0.30)		(0.27)		(0.22)		(0.28)		(0.36)		(0.28)		(0.22)		(0.25)		(0.29)	
Individualised		0.03		0.20		0.27		0.41		0.64*		0.08		0.10		0.23		0.59		0.30		0.20		0.34		0.42
		(0.10)		(0.26)		(0.23)		(0.31)		(0.35)		(0.31)		(0.20)		(0.33)		(0.39)		(0.26)		(0.19)		(0.25)		(0.32)
Consumption Basket	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind	Rep	Ind								
Demographic Group	15-24	15-24	25-34	25-34	35-44	35-44	45-54	45-54	55-64	55-64	65+	65+	<£10k	<£10k	£10-20k	£10-20k	£20-35k	£20-35k	>35k	>35k	Rent	Rent	Mortg	Mortg	Own	Own
Observations	75	75	76	76	76	76	76	76	76	76	75	75	76	76	76	76	76	76	76	76	76	76	76	76	76	76
Adjusted R^2	0.23	0.20	0.20	0.21	0.29	0.30	0.20	0.18	0.25	0.25	0.11	0.11	0.18	0.16	0.14	0.14	0.17	0.16	0.26	0.27	0.22	0.22	0.31	0.32	0.24	0.22

Note: *p<0.1; **p<0.05; ***p<0.01

Appendix B Robustness

B.1 Sample Period

Focusing only on the post-GFC period, our baseline results hold. Indeed, the estimated coefficient on food sensitivity is even bigger. Meanwhile, we obtain a positive and significant association with core goods in column (1), but this disappears in column (4) once we account for changes in total inflation (telling us that changes in core goods price inflation co-moves closely with total inflation).

Table 16: Robustness: Post-GFC period (First Differences)

	Dependent variable:				
	0y	0y	0y	0y	0y
	(1)	(2)	(3)	(4)	(5)
Food	0.82***	0.73**			
	(0.21)	(0.29)			
Energy	0.16***		0.16***		
	(0.04)		(0.06)		
Core Goods	0.79***			0.29	
	(0.24)			(0.50)	
Services	0.24				-0.11
	(0.29)				(0.32)
Total Inflation		0.27***	0.35***	0.34**	0.41***
		(0.06)	(0.06)	(0.13)	(0.07)
Age FE	Yes	Yes	Yes	Yes	Yes
Time Period	2012-	2012-	2012-	2012-	2012-
Observations	244	244	244	244	244
Adjusted R^2	0.37	0.35	0.34	0.31	0.30
Note:					*p<0.1; **p<0.05; ***p<0.01

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