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Household Food Inflation in Canada

by Olena Kostyshyna and Maude Ouellet

Canadian Economic Analysis Department
Bank of Canada
okostyshyna@bank-banque-canada.ca; MOuellet@bank-banque-canada.ca

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Abstract

We use Canadian home scanner data to study household food inflation rates during periods of low and high inflation. We find that during the post-pandemic surge in inflation, the actual inflation rates experienced by different households varied more widely. Low-income households faced higher inflation than high-income households. We find that during the high-inflation period, households used several strategies to lower the impact of inflation, including shopping more frequently, shopping at more stores or buying more on sale. Canadian households also substituted more toward low-priced products when inflation increased.

Topics: Inflation and prices
JEL codes: E21, E30, E31, L81

Résumé

Nous utilisons des données canadiennes recueillies à l'aide de lecteurs de codes-barres à domicile pour étudier les taux d'augmentation des prix des aliments subis par les ménages pendant des périodes de faible et de forte inflation. Nos résultats montrent que, durant la poussée d'inflation qui a suivi la pandémie, les taux d'inflation réels ressentis par différents ménages ont affiché de plus grandes variations. Les ménages à faible revenu ont subi une inflation plus forte que ceux à revenu élevé. Nous constatons que, pendant la période de forte inflation, les ménages ont adopté plusieurs stratégies pour atténuer l'incidence de l'inflation, comme magasiner plus fréquemment, faire leurs achats dans un plus grand nombre de magasins ou profiter davantage des rabais. De plus, lorsque l'inflation est montée, les ménages canadiens ont été plus enclins à opter pour des produits à plus bas prix.

Sujets : Inflation et prix
Codes JEL : E21, E30, E31, L81

1 Introduction

During the post-pandemic inflation surge, Canadians have experienced the highest inflation rates in more than 30 years, with total CPI inflation reaching a peak of 8.1% in 2022Q2. The evidence in the literature suggests that inflation rates vary across households in the U.S. and other countries [Kaplan and Schulhofer-Wohl, 2017, Argente and Lee, 2020, Messner and Rumler, 2023], with significant differences between demographic groups. For example, lower-income households experience higher inflation than higher-income groups. However, household inflation rates during the post-pandemic, high-inflation period have not been studied yet (to the best of our knowledge).

In this paper, we study food inflation rates of Canadian households using a new source of data – Nielsen IQ Homescanner data – for the period 2012Q4 to 2023Q4. Our main focus is on documenting the evolution of food inflation and its heterogeneity across Canadian households during two distinct periods: low and stable inflation before the pandemic and the post-pandemic inflation surge. An important advantage of this dataset is the availability of data on the quantity of goods each Canadian household purchased and prices each household paid. We use these to compute inflation rates experienced by *each* household and provide evidence on the dispersion of inflation rates across households and its change during the high-inflation period. We also assess whether households mitigate inflation through higher shopping intensity or purchases on sale and whether these strategies have played a more important role during the recent rise of inflation.

Our evidence about heterogeneity in inflation rates across Canadian households during the low-inflation period is consistent with established results for the U.S. [Kaplan and Schulhofer-Wohl, 2017]. We find a similar high dispersion in food inflation rates across households with an interquartile range of about 8 percentage points. We also find heterogeneity in inflation rates across demographic groups such as lower-income households experiencing higher inflation [Kaplan and Schulhofer-Wohl, 2017, Argente and Lee, 2020]. In addition, we show that higher food inflation is experienced by households in the youngest and oldest age categories, larger families and households with children aged 6–17. Despite finding large variation in household food inflation rates, we show that on average food inflation rates computed using Nielsen IQ data are very close to the CPI food inflation rate reported by Statistics Canada.

Our main results provide evidence about household food inflation rates during the high-inflation period. We find that, as inflation surged starting 2021Q2, the dispersion in food

inflation across households increased, peaking at about 10 percentage points in 2022Q3. We show that the distribution of household food inflation rates has evolved consistently with the dynamics in aggregate inflation. During the peak food inflation in 2022Q4, the distribution of household inflation rates shifted to the right relative to the pre-pandemic period – food inflation rates were higher across many households. With moderation in food inflation in 2023, the dispersion in inflation rates has subsided, and the distribution has returned nearly to its pre-pandemic form.

The heterogeneity in inflation across households reflects both differences in their consumption baskets and differences in the prices they pay. We estimate that the variation in prices across households contributed less to the variation in household inflation rates during the high-inflation period (about 46%) relative to the low-inflation period (about 54%), with variation in the composition of consumption baskets starting to play a more important role. Cavallo and Kryvtsov [forthcoming] show that price dispersion declined during the high-inflation period as low-priced products experienced higher inflation rates than higher-priced products (cheapflation).[1] Lower price dispersion in the high-inflation period likely contributed to a lower share in variation in household inflation rates attributed to price variation across households.

We show that since the post-pandemic inflation surge, the cumulative food inflation rate of the lowest-income households was 2.2 percentage points higher than the inflation rate of the highest-income group (17.0% relative to 14.8%). However, our econometric analysis indicates that observable demographic characteristics explain a relatively small portion of the very large dispersion in food inflation rates across households, similar to Kaplan and Schulhofer-Wohl [2017].

We find that with the post-pandemic increase in inflation, households have substituted more towards lower-priced goods following a downward trend in substitution during the low-inflation period.[2] The substitution measurement bias jumped up to 0.4 percentage points during peak inflation in 2022Q2 and averaged 0.3 percentage points during the post-pandemic inflation surge. These values of substitution bias are comparable to the results for Canadian inflation for an earlier period: substitution measurement bias of 0.5 percentage points in total CPI during 2005–2011 [Sabourin, 2012] and 0.3 percentage points more

[1] When we refer to price dispersion, we mean dispersion in the level of prices. When we discuss inflation, we refer to year-over-year inflation rate at quarterly frequency.

[2] A downward trend in substitution towards lower-priced items was observed in Austria during the low-inflation period [Messner and Rumler, 2023].

recently [Bank of Canada, 2016]. Similar values of bias were reported based on scanner data for the U.S. [Kaplan and Schulhofer-Wohl, 2017] and Austria [Messner and Rumler, 2023].

Our results indicate that the link between households' food inflation rates and official CPI food inflation was strengthened during the post-pandemic inflation surge. People are known to pay more attention to inflation when inflation is high [Weber et al., 2023], consistent with theories of rational inattention [Sims, 2010, Mackowiak and Wiederholt, 2009]. Our findings point to households' inflation rates being aligned more strongly with official inflation statistics during these periods as one of the reasons for greater attention being paid during high-inflation periods.

We report that shopping more frequently, shopping at a larger number of retailers, and buying more on sale are linked with a lower food inflation rate and higher substitution towards lower-priced products. Consumers have relied even more on these shopping strategies to lower their inflation rates since the inflation surge, but these strategies play a relatively limited role quantitatively in mitigating inflation. We also find that inflation rates are correlated with the state of the economy: households in provinces with a higher unemployment rate experience weaker food inflation rates, similar to findings for the U.S. [Coibion et al., 2019], and this link has strengthened in the high-inflation period.

Our main contribution is to provide new evidence about the household food inflation rate and its evolution in a high-inflation environment, taking advantage of the novel Canadian data source from Nielsen IQ Homescanner Panel and the length of its sample. Our results for low-inflation period are consistent with those Kaplan and Schulhofer-Wohl [2017] have provided for the U.S. Our data allow us to account for heterogeneity in both *prices* and *consumption baskets* across households. Consequently, our results are in contrast to the previous findings in Keshishbanoosy et al. [2022], who used only variation in *average consumption baskets* across different demographic *groups* but the *same average prices* for all groups. Keshishbanoosy et al. [2022] found little difference in total CPI inflation rates across demographic groups in Canada.

In addition to documenting the role of the number of shopping trips in reducing inflation during the low-inflation period, as in Kaplan and Schulhofer-Wohl [2017] and Messner and Rumler [2023], we show that households lower their inflation rates by shopping more frequently and at a larger number of retailers and buying more on sale and that consumers relied on these strategies even more to mitigate inflation in the high-inflation environment.

This finding feeds into the discussion about the costs of inflation. We document households' costs of high inflation in addition to welfare costs associated with price dispersion [Cavallo et al., 2023] – costs that households incur in terms of time spent going to a larger number of stores, comparing prices, looking for deals and timing their shopping to sales. As the costs associated with shopping increase during a high-inflation period, households rationally pay more attention to inflation [Sims, 2010, Mackowiak and Wiederholt, 2009].

Our results have implications for assessing consumption and income inequality in Canada as the large dispersion in inflation rates across Canadian households provides an additional source of differences in real income and real spending across Canadian households. Increase in the dispersion in household inflation rates during post-pandemic inflation surge can contribute to higher inequality in real income and real spending. Inequality in nominal earnings is not a sufficient measure to assess inequality in real income [Argente and Lee, 2020]. Similar to Argente and Lee [2020] and Kaplan and Schulhofer-Wohl [2017], we document higher inflation rates among lower-income households than among higher-income households. Lower-income households have less room to substitute [Argente and Lee, 2020] as they are more likely to already be purchasing lower-priced items. Furthermore, Cavallo and Kryvtsov [forthcoming] report higher inflation rates on lower-priced food products (cheapflation) since the pandemic. Given the higher share of income spent on food by lower-income households than by higher-income households, the higher food inflation of the lower-income group suggests a larger negative impact on their real consumption.

We also contribute to a better understanding of households' expectations of inflation. We provide evidence about substantial heterogeneity in household food inflation, which aligns with notable heterogeneity in household inflation expectations [Jain et al., 2024]. Price changes in the goods households purchase most frequently such as food tend to shape households' expectations of *aggregate* inflation [D'Acunto et al., 2021]. Furthermore, we document increased dispersion in food inflation during the post-pandemic inflation surge, which is consistent with the increase in dispersion in inflation expectations during the same time.

We also contribute to the literature on inflation measurement by computing three measures of the food inflation rate (Laspeyres, Paasche, Fisher) and computing substitution measurement bias as the difference between Laspeyres and Fisher indices using home scanner data.[3] Our computations indicate an increase in substitution measurement bias during the post-

[3]Statistics Canada started to incorporate scanner data into its computations of CPI inflation in 2018 [Bilyk et al., 2024].

pandemic inflation surge.

Our paper is organized as follows. Section 2 describes our data. We document evidence on dispersion in household food inflation and substitution in section 3 and provide analysis of the role of demographic characteristics, shopping habits and economic conditions in household food inflation and substitution in section 4. Section 5 provides discussion.

2 Data

We use data from the Nielsen IQ Homescanner Panel for Canada. The dataset is available from 2012Q4 to 2023Q4. In this panel, the participants self-report their weekly purchases using a barcode scanner or a mobile app. They enter the quantities and total expenditure for each purchased item. These data cover frequently purchased items such as food and household goods. On average, 87% of the observations in our dataset are food purchases, which account for 80% of the total spending in these data. This makes this dataset suitable for studying food inflation.

Nielsen IQ Homescanner data include about 320,000 universal product codes (UPC) for food items, amounting to 68 million observations, with 1.5 million observations on average per quarter. The UPCs are grouped into product classes. The number of product classes per quarter varies across quarters, with 102 product classes for food items for most of the quarters, and 445 product classes on average in the sample. We use these product classes to classify products as food and non-food.

The panel consists of an active sample of approximately 12,300 households in 9 Canadian provinces (excluding Newfoundland and Labrador and the territories). Nielsen IQ collects demographic information on each of the households annually. The following demographic characteristics of households are available in our data: the age of the determined head of household based on the birth year (the participant must be at least 18 years old), the size of the household, the total annual income of the household (excluding capital gains and inheritance(s)) and the presence of children by age groups. The availability of the demographic characteristics allows us to study heterogeneity in food inflation rates in Canada across different demographic groups.

Table 1 presents the demographic composition of the Nielsen IQ Homescanner Panel's participants by age, income, province of residence, urban area, household size and presence

of children compared with data from the 2016 Canadian Census [Statistics Canada, 2016]. Information on gender is not available in our dataset. The composition of Nielsen's panel is close to the demographic composition in the 2016 Census, with some differences. Our data have a smaller share of households with high levels of income, younger households and 1-person households. In general, Nielsen's composition is a good representation of the Canadian population. In our analysis, we use survey weights computed by Nielsen IQ.

2.1 Shopping behaviour of Canadians

Our data allow us to explore shopping behaviour of Canadian households. Shopping more frequently, shopping at more retailers and purchasing sale items may present additional costs in terms of time and the inconvenience of timing the purchases to available sales. But these strategies can help households find better prices and, thus, reduce the cost of purchased food and help mitigate the costs of inflation.

Before the pandemic, Canadian consumers made about 27–28% of their purchases on sale (Figure 1, left panel), as a share in total food expenditures or in total number of purchased food products. The share of the purchases made on sale declined during the pandemic to about 24%. This share has been rising with the increase in inflation and is now close to its pre-pandemic level. Figure 1 shows equilibrium behaviour, i.e., the outcome of both the availability of sales at the retailers and the choice of households to purchase on sale. While households might be more motivated to purchase on sale during the high-inflation period to reduce costs of food, the overall share of purchases on sale might be constrained by a lower availability of sales in the stores. Cavallo and Kryvtsov [forthcoming] find evidence of a decline in the offer of food products on sale by retailers post pandemic, using data on posted prices from major retailers in Canada. Our evidence suggests that consumers' uptake of sales steeply increased during the high-inflation period.

Consumers can also look for better prices by going shopping more frequently or by shopping at a larger number of retailers. Figure 1 (right panel) indicates that Canadian consumers made fewer shopping trips and shopped at fewer retailers during the pandemic. Restrictions at the start of the pandemic led to a drop in shopping trips. And shopping intensity has not recovered since its pandemic drop, likely due to the persistent change in the shopping habits including increased online shopping.

3 Household food inflation

We compute the year-over-year food inflation rates using three types of inflation indices, as in Kaplan and Schulhofer-Wohl [2017]. The Laspeyres inflation rate is computed using the base-year basket of goods:

$$\pi^{L}_{it,t+4} = \frac{\sum_{j:q_{ijt},q_{ij,t+4}>0} p_{ij,t+4} q_{ijt}}{\sum_{j:q_{ijt},q_{ij,t+4}>0} p_{ijt} q_{ijt}} \tag{1}$$

The Paasche inflation rate is computed using the current-year basket of goods:

$$\pi^{P}_{it,t+4} = \frac{\sum_{j:q_{ijt},q_{ij,t+4}>0} p_{ij,t+4} q_{ij,t+4}}{\sum_{j:q_{ijt},q_{ij,t+4}>0} p_{ijt} q_{ij,t+4}} \tag{2}$$

The Fisher inflation index is computed as the geometric mean of the Laspeyres and Paasche indices and presents the most accurate measure of inflation:

$$\pi^{F}_{it,t+4} = \sqrt{\pi^{L}_{it,t+4} \pi^{P}_{it,t+4}} \tag{3}$$

Inflation rates computed using the Laspeyres and Paasche indices differ because different baskets, q, are used in the computation. When households substitute towards less expensive goods, the Paasche inflation rate is lower than the Laspeyres rate. This difference between Laspeyres and Paasche inflation rates can be used as a measure of the substitution by households towards less expensive goods [Kaplan and Schulhofer-Wohl, 2017]. And the difference between Laspeyres and Fisher inflation rates indicates substitution measurement bias in inflation [Sabourin, 2012].

We compute food inflation rates for each household using its prices and quantities. We use effective prices that households paid, including sales/discounts, as in Coibion et al. [2019], who showed that inflation dynamics can be less cyclical if only posted prices are used. As a result of using each household's paid prices and consumption baskets in our computations of inflation rates, the outcome is the inflation rate of each household. To understand the role of households' prices in their inflation rates, we also compute inflation rates using UPC (barcode) prices averaged across households in a quarter. We present the main results with inflation rates computed based on baskets with a minimum of 5 items. We also performed our analysis using baskets with a minimum of 10 items and baskets without restrictions on the number of items.[4] Our results are robust across all these modifications.

[4]Computations with baskets with at least 5 items results in 12.15% of all observations being discarded, and using baskets with at least 10 items results in 27.6% of observations being discarded.

First, we review the central tendency in the computed household inflation rates. Figure 2 shows three measures of inflation – Laspeyres, Paasche and Fisher – averaged across households in each quarter. We obtain similar results when using the median in each quarter. Food inflation rates computed using Nielsen IQ Homescanner data are close to the CPI inflation rate for food purchased from stores, produced by Statistics Canada, despite the fact that we use different data with a more limited list of products and a different approach to computation. Yet, when averaged across households, the food inflation of Canadian households is close to the CPI food inflation rate computed using average baskets based on the Survey of Household Spending and average prices collected at representative retailers.

In the remainder of the paper, we will focus on the results obtained using the Fisher inflation rate as this measure is most closely related to the approach taken by Statistics Canada for the computation of inflation at the most disaggregated level [CPI, 2023]. Our results are robust to using the other two measures.

3.1 Dispersion in household food inflation

While food inflation averaged across households is very close to the CPI food inflation rate, Figure 2 illustrates only one aspect of the data – its central tendency. Rich data for each household allow us to study the full distribution of inflation rates.

Our data indicate substantial dispersion in food inflation across households (Figure 3). Large dispersion in household inflation rates during the low-inflation period has been established by Kaplan and Schulhofer-Wohl [2017] for the U.S. and by Messner and Rumler [2023] for Austria. Figure 3 presents the distribution of inflation rates within a range of -10% to 20%, with about 13% of household inflation rates outside of the presented range.[5] Figure A1 in the Appendix shows the full distribution. For inflation rates during our sample, the lowest inflation is -66% and the highest is 199%; the 25 percentile is at -1.9% and the 75 percentile is at 7.8%. The interquartile range of household food inflation rates is 7.8 percentage points during the low-inflation period (Table 2), showing large cross-sectional variation in households' food inflation rates relative to the average inflation of 1.58% during this period (Table 1).

[5]The share of observations outside the range [-10–20] was higher during the high inflation of 2022Q4 at 18.7% than during the low inflation of 2019Q4 at 10.5% or after inflation moderated in 2023Q4 at 8.8%.

During the post-pandemic inflation surge, the distribution of food inflation rates shifted to the right (panel (b) relative to panel (a)) and the dispersion in the food inflation rates increased, as illustrated in Figure 3. The IQR increased from 7.8 percentage points during 2013Q4–2020Q1 to 8.47 percentage points during the high-inflation period (Table 2). Dispersion in household food inflation rates peaked at about 10 percentage points in 2022Q4, following the increase of inflation (Figure 4). The difference between the 10th and 90th percentiles increased to 17.57 percentage points from 16.8 percentage points during the high-inflation period. These dispersion figures indicate that household inflation varied more during the high-inflation period. With the moderation of inflation, the distribution of food inflation rates shifted close to its pre-pandemic form (Figure 3), and the dispersion also subsided (Figure 4).[6]

Figure 3 presents the distribution of food inflation rates computed using UPC barcode-average prices, i.e., the same prices for all households. The share of observations outside the depicted range is 3%, which is smaller than for the inflation rate with household prices. Distribution with UPC barcode-average prices is narrower, indicating that a large portion of the heterogeneity in household food inflation rates can be attributed to the different prices they pay for goods. The interquartile range for the Fisher food inflation rate based on UPC-average prices is 3.66 percentage points during the low-inflation period, which is below the IQR for the Fisher inflation rate with household prices of 7.84 percentage points (Table 2). Interestingly, the dispersion in inflation rates computed using barcode-average prices also increased during pandemic and high-inflation periods to 3.89 and 4.52 percentage points, respectively, suggesting an increase in the variation in the composition of consumption baskets across households during this time.

The variance of food inflation rates using household-level prices is 2.18 times larger than the variance using barcode-average prices during the low-inflation period. The variation in prices across households accounts for about 54% of the variation in household food inflation rates. The relative variance of household food inflation to the variance of inflation based on barcode-average prices declined during the pandemic and then further declined during the high-inflation period. This means that the variation in prices across households contributed less to the heterogeneity in household inflation rates during these periods: about 50% during the pandemic and about 46% during the high-inflation period. Thus, the variation in the composition of consumption baskets began to play a more important role and contributed

[6]The results are similar for inflation rates computed using baskets of at least 10 items, as illustrated in Figure A2.

more to the dispersion in household inflation rates during the high-inflation period than during the low-inflation period. Cavallo and Kryvtsov [forthcoming] show that price dispersion declined during the high-inflation period as low-priced products experienced higher inflation rates (cheapflation). Lower price dispersion likely contributed to lower variation in household inflation rates due to price variation.

Figure 5 shows the cross-sectional correlation between households' food inflation rate in time t and households' food inflation rate in time $t+4$ (left panel) and time $t+8$ (right panel). This figure indicates a weak correlation in households' food inflation rates of about -0.15 using household prices and an even weaker correlation of about -0.1 using UPC-average prices over 4 quarters. This correlation becomes weaker with the onset of the pandemic and during the high inflation period as pandemic restrictions and then high inflation affected consumers' spending. Negative correlation is suggestive of some mean reversion in prices. This could be related to the sales. The correlation weakens when the time period increases to 8 quarters – the correlation fluctuates around 0, ranging between -0.04 and 0.04. Kaplan and Schulhofer-Wohl [2017] report a similarly weak correlation in the U.S. data: correlation of about 0.1 at the 4-quarter horizon.

While on average the household food inflation rate is close to CPI food inflation, the links between household food inflation rates and the official CPI food inflation and the mean household inflation rate vary across households. Table 4 reports the results of quantile regressions of household inflation rates on CPI food inflation and on mean Fisher food inflation from our computations.[7] Our estimations indicate that household food inflation moves less than one-for-one with CPI food inflation for all deciles except for the top two deciles. The link to the official measure of CPI food inflation is stronger for the deciles experiencing higher food inflation, similarly to the finding in Kaplan and Schulhofer-Wohl [2017]. This indicates that the distribution of inflation rates becomes wider during periods of higher inflation, as we discussed above and illustrated in Figure 4. We also find a stronger link between household food inflation and the mean Fisher inflation in our data than the link to official CPI food inflation. This may reflect differences in the composition of the baskets we use based on Nielsen IQ data relative to the CPI food basket. Nevertheless, the link for the bottom five deciles is below one.

We estimated quantile regressions for three distinct subperiods to understand whether the strength of this link changed over time. These periods include low stable inflation before the

[7] Our results are robust to using CPI food inflation by province.

pandemic (2013Q4–2020Q1), the pandemic period (2020Q2–2021Q1) and the post-pandemic inflation surge period (2021Q2–2023Q4). Our results in Table 5 indicate that the link between household food inflation rates and the official CPI food inflation rate was quite weak during the period of low and stable inflation, with coefficients ranging from 0.5 for the lowest deciles to 0.7 for the high deciles. This relationship was strengthened during the pandemic period to about 0.7–0.8 for the lower deciles and 1.065 for the highest decile. And during the post-pandemic inflation surge period, the individual household inflation rate was most strongly aligned with CPI food inflation. Even for the lowest deciles, the coefficient on CPI food was 0.9 during this period. It was close to 1 for the middle deciles, and reached 1.1 for the highest deciles. Similar results are obtained regarding the link of household-level inflation rates to mean inflation across households (Table A1 in the Appendix).

A relatively weak link between households' food inflation and official CPI statistics during the low-inflation period might be one of the reasons why households pay little attention to inflation statistics when inflation is low, thus exhibiting rational inattention [Sims, 2010, Mackowiak and Wiederholt, 2009]. People tend to pay more attention to inflation when inflation is high [Weber et al., 2023]. Our results point to one of the reasons for higher attention to inflation statistics during high-inflation periods – households' experience of inflation is more aligned with the official inflation statistics. In other words, CPI inflation is more representative of household inflation experience when inflation is high.

3.2 Substitution towards lower-priced products

Households can substitute towards less expensive products away from more expensive products to deal with rising prices. A positive difference between the Laspeyres and Paasche inflation rates indicates the extent of substitution towards less expensive items. And the difference between Laspeyres and Fisher inflation indicates substitution bias in inflation as the Fisher index provides an approximately correct measure of inflation by combining the Laspeyres and Paasche indices based on current and last year's baskets. Figure 6 presents differences between the Laspeyres and Paasche indices and the Laspeyres and Fisher indices.

The substitution exhibits a downward trend for the pre-pandemic period, suggesting that the ability to reduce inflation through substitution towards lower-priced products declined. This might have been a result of higher competition. During the pandemic, there was a drop in substitution, likely reflecting difficulties in shopping as a result of pandemic restrictions.

However, substitution towards lower-priced items sharply increased with the increase in the inflation rate. This means that Canadians switched to less expensive food products to deal with the rising inflation rate. On average during the period 2022Q1–2023Q4, the difference between Laspeyres and Paasche is about 0.6 percentage points.

The difference between the Laspeyres and Fisher inflation rates declined before the post-pandemic inflation surge, indicating decreasing substitution measurement bias (Figure 6). With an increase in inflation, substitution bias increased to 0.4 in 2022Q2 and then stabilized around 0.3 percentage points. These values of substitution bias are similar to substitution bias reported for the aggregate CPI inflation in Canada of about 0.5 percentage points for the period 2002–2015 in Sabourin [2012] and 0.3 percentage points more recently Bank of Canada [2016]. Our results are also similar to the values of substitution bias found in the literature for other countries using scanner data: 0.3 percentage points in the U.S. [Kaplan and Schulhofer-Wohl, 2017], 0.4 percentage points in Austria [Messner and Rumler, 2023]. Messner and Rumler [2023] also reported a downward trend during the low-inflation period from 2009 to 2019. These studies do not cover post-pandemic and high-inflation periods.

While on average Canadians substituted towards lower-priced items as evidenced from positive average values of the difference between the Laspeyres and Paasche indices, the distribution of substitution is very wide (Figure A3), similar to the the distribution of inflation rates. Positive values indicate substitution towards less expensive goods, and negative values indicate substitution towards higher-priced products. Negative values of substitution indicate a switch towards more expensive goods, which can reflect positive income shocks or preference shocks [Kaplan and Schulhofer-Wohl, 2017].

4 The role of demographic characteristics and shopping habits

Next, we examine the role of the observed demographic characteristics as well as the role of economic conditions and consumers' shopping behaviour in food inflation and substitution towards lower-priced products. Furthermore, we take advantage of the length of our sample to study whether consumers have relied more or less strongly on some of the shopping strategies during pandemic and high-inflation periods to mitigate rising prices.

Our econometric strategy is based on the following specification:

$$Y_{i,t}^{F} = \alpha_1 + \beta_1 Z_{i,t} + \gamma_1 X_{i,t} + \delta_1 D^{Periods} + \gamma_2 X_{i,t} \times D^{Periods} + \epsilon_{i,t} \tag{4}$$

where $Y_{i,t}^{F}$ is either the food inflation rate of household i in quarter t or substitution, i.e., the difference between the Laspeyres and Paasche food inflation rates of household i in quarter t. $Z_{i,t}$ are demographic characteristics of household i: age of the self-reported head of the household, level of household income, household size, presence of children, province, and urban area. $X_{i,t}$ is the variable describing shopping behavior or economic conditions. We use the following variables: number of shopping trips, number of retailers, share of products purchased on sale, share of expenditures on products purchased on sale, and share of purchases made in the top 10 retailers. We also use the share of income spent on food. And finally, we use the provincial unemployment rate as a variable describing economic conditions. We also control quarter time dummies.

We use dummy variable $D^{Periods}$ to explore whether the strength of the links to variable $X_{i,t}$ is different during three distinct periods spanning our data set: low stable inflation before the pandemic, pandemic period and post-pandemic inflation surge. Specifically, we use the following two dummy variables. D^{Pandemic} is a dummy variable equal to 1 for the period 2020Q2–2021Q1 associated with the outbreak of COVID-19 and equal to 0 for the rest of quarters. $D^{\text{High inflation}}$ is a dummy variable equal to 1 for the period of the post-pandemic inflation surge of 2021Q2–2023Q4 and equal to 0 for the rest of the quarters. The baseline period is the low inflation/pre-pandemic period of 2013Q4–2020Q1.

We perform our estimations using Huber estimations to control for outliers and influential observations, as in Gorodnichenko et al. [2022]. Huber regressions are frequently used in the literature analyzing data that includes outliers (such as data on consumer expectations in Gorodnichenko et al. [2022]). Given that our data on inflation rates are characterized by a wide distribution skewed to the right with thin long tails (Figure A1), Huber estimations address the impact of outliers on the estimation results.

4.1 Results for household food inflation rates

We present our estimation results for household food inflation rates in Table 6. The first column presents estimations of the regressions with demographic characteristics without including variables describing shopping behaviour or interaction terms. Our estimation results

in column (1) show that there are statistically significant differences in food inflation rates across observed demographic characteristics. Food inflation rates are higher for lower-income households, younger people, households with children aged 6 to 17, and larger households. For each of these groups, food inflation is about 0.1–0.2 percentage points higher than for the baseline groups. The lowest-income group experienced higher inflation by 0.2 percentage points than the highest income group on average over the sample period. Figure 8 shows that the largest difference in food inflation rates across income groups was observed during the post-pandemic inflation surge (the difference in inflation rates by income groups is statistically significant during this period).[8]

The lower-income groups have experienced higher cumulative food inflation since 2021Q4 as inflation began to climb (Figure 9). Food inflation was 17.0% for the lowest income groups, whereas it was 14.8% for the highest income groups. The difference in cumulative food household inflation rates is 2.2 percentage points during the post-pandemic inflation surge. This is a new result for Canada. Kaplan and Schulhofer-Wohl [2017], Jaravel [2018] and Argente and Lee [2020], using scanner data, found that lower-income households experienced higher inflation in the U.S. For example, Argente and Lee [2020] report the differences in inflation rates between the highest and lowest household income quartiles ranging between 0.85 percentage points for 2008–2013 and 0.02 percentage points for 2014–2016. Ampudia et al. [2024] find that higher-income households have more room to substitute towards less expensive products and switch to shopping in less expensive stores than lower-income households and, therefore, inflation rates of higher-income households respond more to monetary policy shocks.

Higher food inflation rates among lower-income households, relative to higher-income households, has a negative impact on their real consumption. In addition, lower-income households tend to spend a higher share of their total household income on food as computed using Nielsen IQ Homescanner data (Figure 10). The lowest income group with income below $40,000 spends about 15% of their annual income on food, compared with less than 8% for other groups. Our findings about the high share of income spent on food by lower-income groups are consistent with data from Statistics Canada (Figure A4 in the Appendix).[9]

[8] Our results discussed in sections 4.1 and 4.2 are robust to the computation of inflation rates computed using baskets with at least 10 items. Details are in Tables A3 and A4 in the Appendix.

[9] The differences in the values of the shares computed using Nielsen IQ data and National Accounts data stem from different concepts of income and composition of food spending. We use total household income and a sample of the most frequently purchased food and beverage products from Nielsen IQ. Shares with National Accounts data are based on disposable household income and total spending on food and beverages.

There are several reasons for lower-income households experiencing higher food inflation. Argente and Lee [2020] found that higher-income households substituted towards lower-quality products during the Great Recession, thus lowering their inflation rates, whereas lower-income households were already purchasing lower-priced items and could not further substitute. More recently, since 2019 lower-priced food products have experienced higher inflation than higher-priced products in Canada [Cavallo and Kryvtsov, forthcoming]. Thus, less ability to substitute away from higher-priced items and higher inflation on lower-priced products have likely contributed to the higher food inflation rates experienced by lower-income households.

Estimation results in column (7) of Table 6 show that households spending a higher share of their household income on food experience higher food inflation. Once we control for the share of income spent on food, dummies for household income are no longer significant in specification (7). This is not surprising given the strong negative correlation between the level of household income and the share of it spent on food. A 10 percentage point increase in the share of income spent on food is associated with an increase in the food inflation rate by 3 percentage points, all else being equal. The difference of 10 percentage points in the share of income spent on food is commensurable with the difference in shares between the lowest-income group with income below $40,000 (15%) and the middle-income group with a total household income of $60,000 to $79,999 (about 5%) during the post-pandemic period (Figure 10). The difference between the lowest-income group and the highest-income group with incomes above $125,000 is about 12 percentage points, implying a 3.6 percentage point difference in household food inflation, all else being equal.

The estimations in column (1) of Table 6 indicate statistically significant differences across demographic groups, but the explanatory power of observable demographic characteristics is small relative to the dispersion in the food inflation rates. Observable demographic characteristics explain about 0.3% of cross-sectional variation in food inflation rates, and quarter-time dummies account for almost all of the explanatory power of the regression in column (1). The differences of 0.2 percentage points between low-income and higher-income groups and between youngest and older households obtained from the regression are small relative to the interquartile range of 8 percentage points and the 17.05 percentage point difference between the 10th and 90th percentiles for the Fisher inflation rates using household-level prices (Table 2).

4.2 The role of shopping behaviour in food inflation

Our estimation results indicate that shopping behaviour is associated with household food inflation. Column (2) of Table 6 shows that an increase in the number of shopping trips is linked with lower food inflation. In this specification, we include the number of shopping trips in the current quarter t and also the number of shopping trips 4 quarters earlier $(t-4)$. An increase in the number of shopping trips in the current quarter is linked with lower food inflation between the current period, t, and four quarters earlier, $t-4$. The increase in the number of shopping trips a year earlier is linked with a higher food inflation rate. While an increase in the number of shopping trips can help households find better prices, quantitatively higher shopping intensity plays a very small role in reducing food inflation. Furthermore, the coefficients for the shopping trips in the current quarter and the four quarters earlier roughly offset each other (-0.015 and 0.014), implying zero impact of shopping trips on the inflation rate even though higher search intensity can lower the price level.

In estimations reported in columns (3) to (6), we explore the additional role of other shopping behaviour such as buying products on sale, shopping in different retailers and shopping at the 10 largest retailers. Columns (3) and (4) indicate that shopping more on sale, both as a share of total expenditures (column 3) and as a share of purchased items (column 4), is associated with a lower food inflation rate. Making a higher share of purchases at the 10 largest retailers is also linked with a lower inflation rate (column 5). Canadian households can reduce their food inflation by shopping at a larger number of retailers (column 6). All these strategies indicate that a higher search intensity can lower inflation rates as consumers using them are more aware of better prices and where to shop for certain products. Although these strategies can help lower price levels and are statistically significant in our regressions with inflation rates, these strategies have a limited quantitative role in mitigating food inflation.

Controlling for shopping behaviour does not change the role of most of the demographic characteristics such as income, size of household and presence of children in explaining cross-sectional heterogeneity in household food inflation rates. But the role of age disappears. Thus, shopping behaviour cannot explain all the differences in food inflation rates by demographic characteristics.

The role of economic conditions A standard New Keynesian macroeconomic model suggests a negative relationship between inflation rate and economic activity. Our estimations presented in column (8) of Table 6 show a negative relationship between households' food

inflation rates and provincial unemployment rates. A 1 percentage point increase in the unemployment rate is linked with a decline in food inflation by 0.066 percentage points. This new result for Canada is consistent with findings by Coibion et al. [2019] for the U.S., who find a negative relationship between inflation rates and local unemployment rates.

Variation across time Consumers' shopping behaviour changed during the pandemic and during the post-pandemic inflation surge, as documented in Section 2.1. And so it is interesting to find out whether the link between shopping behaviour and household food inflation changed during these periods. Table 7 reports the estimation results from regressions with interaction terms with dummies for the pandemic period and the high-inflation period.

During the pandemic period, food inflation became more strongly negatively linked with purchasing more on sale (columns (2) and (3)) and shopping at a larger number of retailers. Interestingly, the link between food inflation and the share of income spent on food was negative during the pandemic period. This can be attributed to the large drop in the share of income spent on food for the lowest-income group compared to higher-income groups (Figure 10), likely due to the lowest income group benefiting from transfers such as the Canadian Economic Recovery Benefit (CERB).

During the high-inflation period, Canadian households relied more strongly on purchasing products on sale and shopping at a larger number of retailers to lower their food inflation rates, although these strategies had a relatively small impact on food inflation quantitatively. Surprisingly, shopping more frequently boosted food inflation during this time, as well as shopping at the largest retailers. The relationship between food inflation rates and the provincial unemployment rate was more strongly negative during the period of high inflation. A 1 percentage point increase in the provincial unemployment rate is linked with a 1.5 percentage point decline in food inflation.

Our results indicate that households incur higher shopping costs to deal with high inflation. These include costs in terms of time spent going to a larger number of stores, comparing prices, looking for deals and waiting to shop on sale. Our findings are consistent with household survey evidence. Respondents to the 2022Q3 Canadian Survey of Consumer Expectations reported that they bought more on sale, shopped around more before buying to get a better price, checked flyers more often to find specials and shopped more at discount stores [Bank of Canada, 2022]. These additional shopping costs have not been accounted for in welfare costs of inflation associated with price dispersion [Cavallo et al., 2023]. As the

costs associated with shopping increase during a high-inflation period, households rationally pay more attention to inflation [Sims, 2010, Mackowiak and Wiederholt, 2009].

4.3 Demographic characteristics and shopping behaviour in substitution

The estimation results for substitution are presented in Table 8. Our regressions of substitution on demographic characteristics indicate that substitution is higher for lower-income groups, older and larger households and families with young children. On average, older households can reduce their inflation through substitution by 0.16–0.18 percentage points more than younger households. Larger households can reduce their inflation through substitution by 0.217 percentage points.

The difference in substitution between income groups are quantitatively smaller. For example, the lowest-income group reduces inflation through substitution towards lower-priced products by about 0.09 percentage points more relative to the highest-income group (column (1)). Substitution towards lower-priced products increases during a weak economy when unemployment is higher (column (8)).

Consumers who shop more frequently, shop at a larger number of retailers, and those buying more on sale report higher substitution (columns (2), (3), (4), and (6) of Table 8). However, there are some differences in this relationship over time. Before the COVID-19 pandemic, shopping more frequently, buying more on sale and shopping at more retailers were associated with higher substitution across households (Table 9, columns (1), (2), (3), and (5)). But during the pandemic, buying more on sale had a weaker, but still positive, link to substituting towards less expensive products (negative interaction term with $D^{Pandemic}$). The pandemic restrictions likely diminished the role of buying on sale in the ability of consumers to look for better prices. And during the post-pandemic high-inflation period, all the shopping strategies played the same role as before the pandemic, with the exception of shopping at a large number of retailers. Making food purchases at a larger number of retailers had a weaker link to substitution during the high-inflation period (column (5)). It is likely that shopping at a larger number of stores allowed consumers to pick the best deals for various products and, therefore, they may have switched to less expensive products to a lesser extent.

5 Conclusion

Our paper has provided new results about household food inflation rates and their evolution during the high-inflation period. Our results about food inflation rates across households such as large dispersion and heterogeneity across demographic groups are consistent with evidence for other countries [Kaplan and Schulhofer-Wohl, 2017, Messner and Rumler, 2023]. We further show that dispersion increased during the post-pandemic inflation surge and that lower-income households experienced higher inflation. Despite the large dispersion, the food inflation rates computed based on Nielsen IQ Homescanner data for 2013Q4–2023Q4 are on *average* close to the CPI food inflation rate from Statistics Canada.

We have also provided evidence that Canadian households buy more products on sale and substitute towards less expensive food products since the post-pandemic inflation surge. We find that shopping more frequently and buying more on sale are linked with lower food inflation rates and allow for more substitution towards lower-priced items. However, quantitatively these strategies have a limited role in mitigating inflation.

Our findings show that Canadian households experience widely different inflation rates. Official statistics on CPI food inflation and CPI total inflation do not show the differences in how Canadian households experience inflation. Standard macroeconomic models normally use total CPI inflation and thus do not account for the costs of inflation coming from the different prices paid by households and their different consumption bundles. The heterogeneity in inflation rates across households can present the additional welfare cost of inflation. And we find that as dispersion in inflation rates across households increases during high inflation, the welfare cost of inflation is likely to rise due to this additional source. Furthermore, an increase in the substitution towards lower-priced products with an increase in inflation also lowers consumers' utility. This underscores the importance of low and stable inflation, a mandate that many central banks, including the Bank of Canada, pursue.

In addition, macroeconomic models typically have the same nominal interest rate and the same inflation rate for all households, implying the same real interest rate, even if they model heterogeneity among agents. Different household inflation rates imply that households face different real interest rates and, thus, the impact of the monetary policy can vary across households.

Heterogeneity in household inflation rates can help explain large heterogeneity in inflation

expectations of Canadian households [Jain et al., 2024]. D'Acunto et al. [2021] have reported the importance of the role of inflation in frequently purchased goods on consumers' inflation expectations for *aggregate* U.S. inflation. Our evidence of large heterogeneity in inflation across Canadian households helps understand heterogeneity in their views about future *aggregate* inflation as they extrapolate their own experience.

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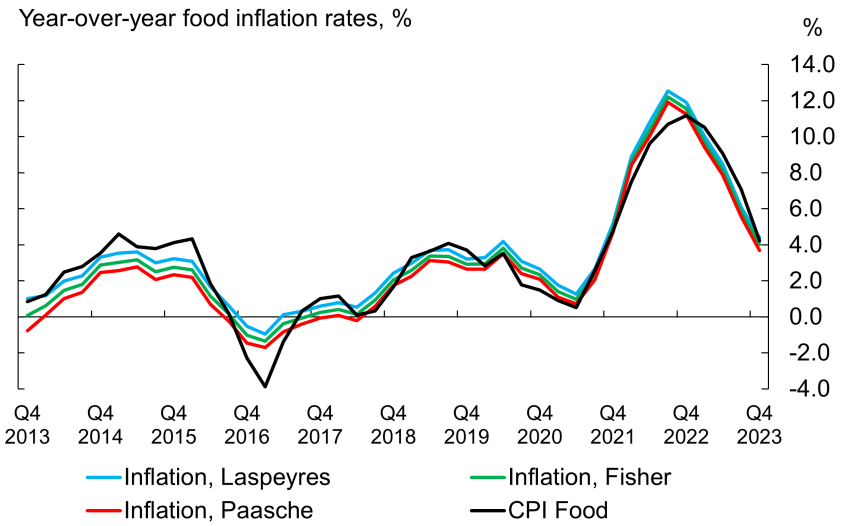
Figure 1: Shopping behaviour of Canadian households

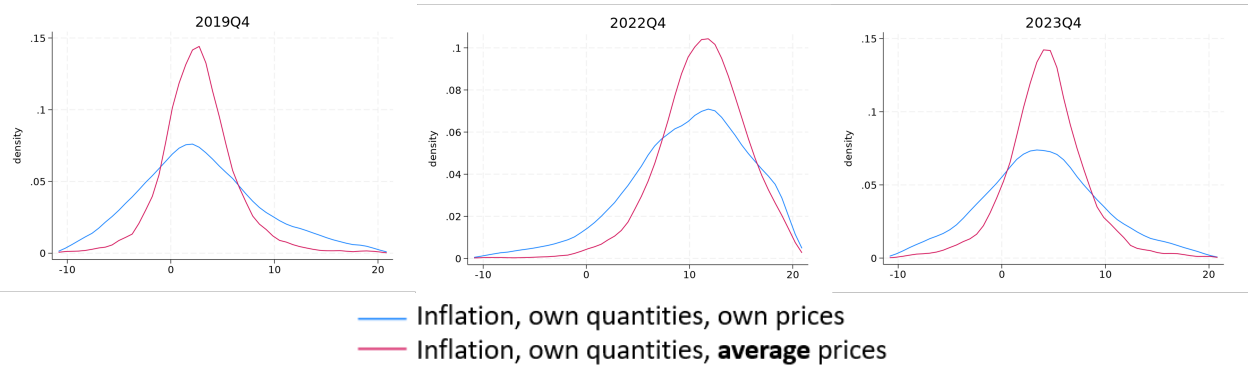
Notes: The left panel presents the share of expenditures or items purchased on sale. The right panel presents the number of shopping trips and retailers visited per quarter.

Figure 2: Household food inflation rate and CPI food inflation rate



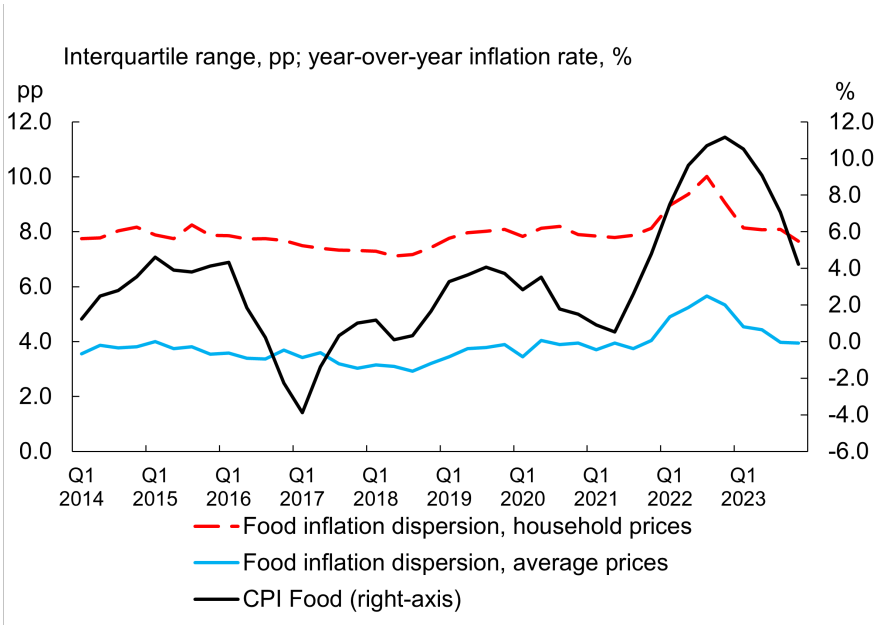
Notes: This figure presents the mean across households of the inflation rates computed with Nielsen's data compared to Statistics Canada's CPI food inflation rate.

Figure 3: The distribution of household food inflation rates



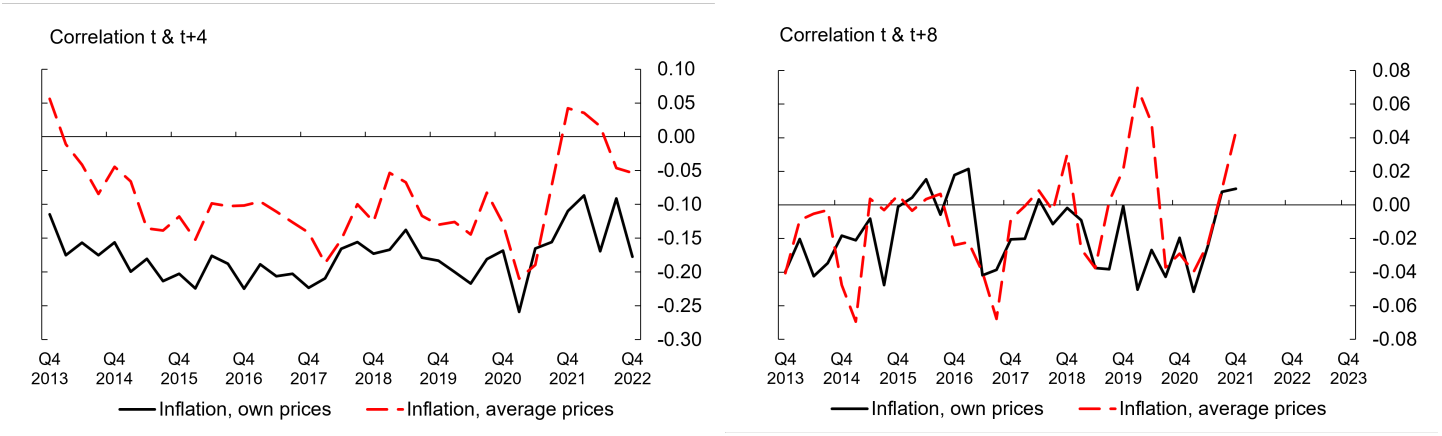
Notes: This figure presents the Kernel density estimates using the Epanechnikov kernel function of households' inflation rates based on household prices and average prices.

Figure 4: The evolution of the dispersion in household food inflation



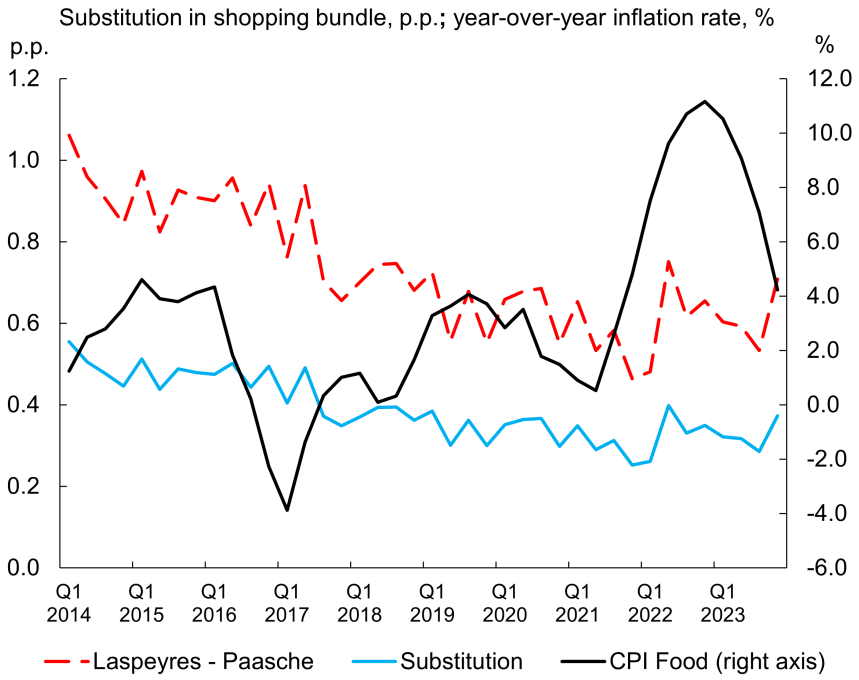
Notes: This figure presents the interquartile range of household Fisher inflation rates computed with Nielsen's data compared with Statistics Canada's CPI food inflation rate.

Figure 5: Correlation in household food inflation rates



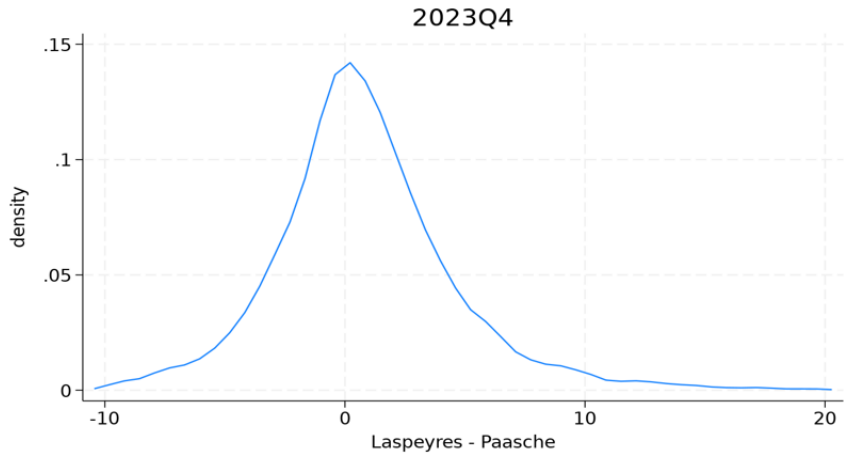
Notes: This figure presents the correlation between t and t+4 (t+8) using Huber weights.

Figure 6: The difference between Laspeyres and Paasche inflation rates and between Laspeyres and Fisher inflation rates



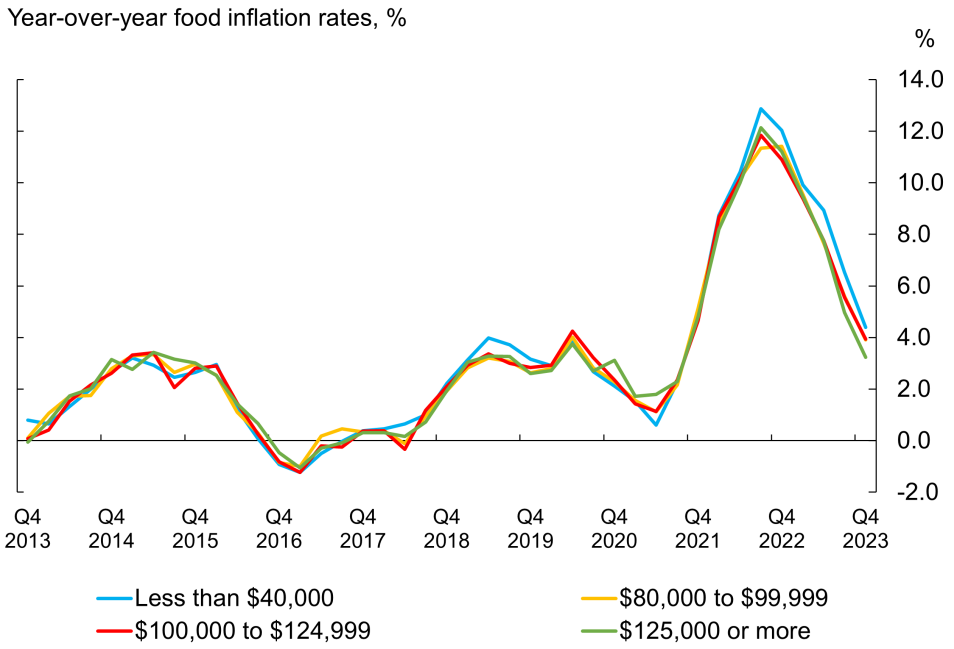
Notes: This figure presents the mean across households of the difference between inflation rates (Laspeyres and Paasche, Laspeyres and Fisher) and the CPI food inflation rate.

Figure 7: The distribution of households' substitution



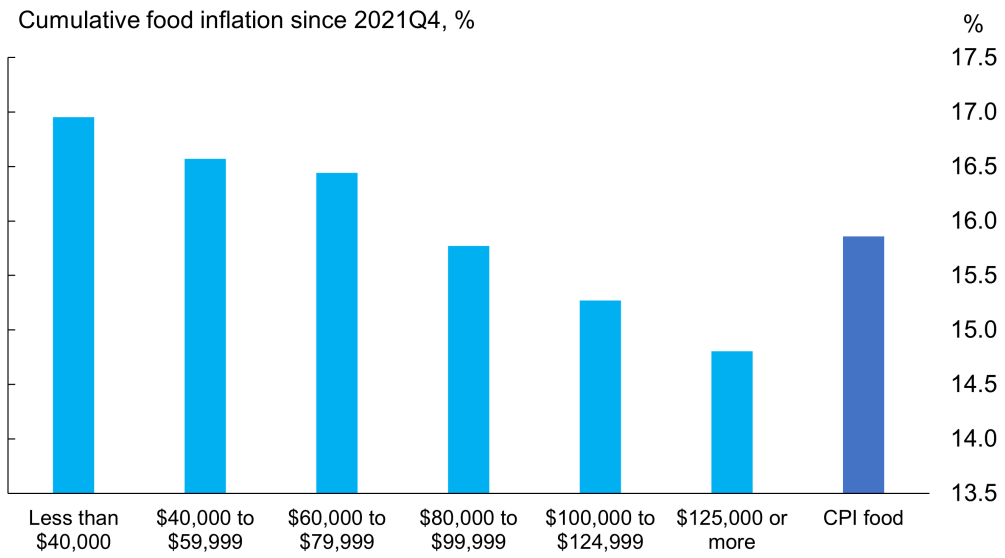
Notes: This figure presents the Kernel density estimates using the Epanechnikov kernel function of the difference between Laspeyres and Paasche household food inflation rates.

Figure 8: Household food inflation rates by income groups



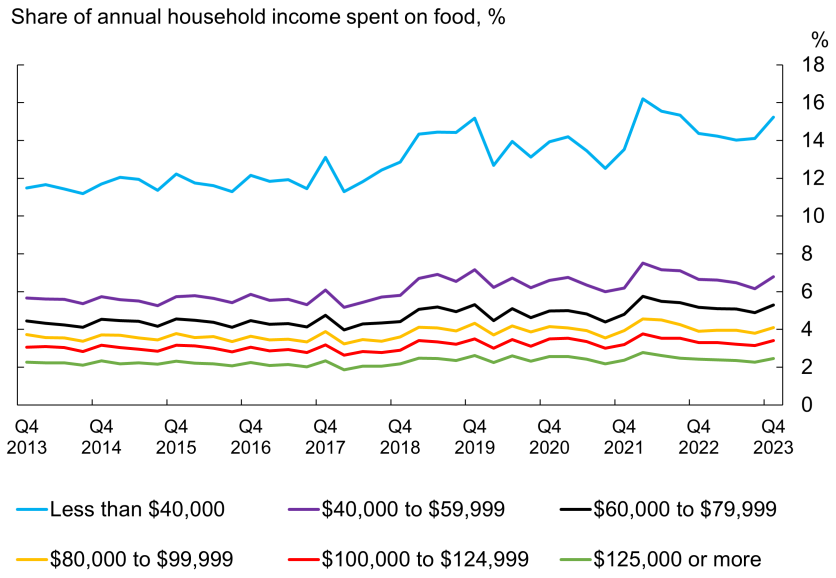
Notes: This figure presents the mean across income groups of the Fisher inflation rates computed with Nielsen's data.

Figure 9: Cumulative food inflation rates by income groups



Notes: This figure presents the cumulative food inflation rate using Fisher inflation rates computed with Nielsen's data compared to Statistics Canada's CPI food inflation rate.

Figure 10: The share of income spent on food



Notes: This figure presents the shares of annual household income spent on food computed with entire sample of Nielsen's data.

Table 1: Demographic composition of sample in Nielsen Homescanner data

	Nielsen IQ	Census 2016		Nielsen IQ	Census 2016
Province			**Income Category**		
Ontario	34	39	Less than $40,000	22	26
British Colombia	12	14	$40,000 to $59,999	17	16
Alberta	11	12	$60,000 to $79,999	18	14
Manitoba/Saskatchewan	7	7	$80,000 to $99,999	18	11
Québec	28	23	$100,000 to $124,999	13	10
Atlantic	6	5	$125,000 or more	13	22
N/A - Other	4				
			Age Category		
Urban			Under 29	3	17
Toronto	7	8	30 to 44 years	24	25
Vancouver	6	7	45 to 54 years	20	18
Montreal	13	11	55 to 64 years	27	18
Other	75	74	65 years and older	26	22
Presence of children			**Household Size**		
Yes	27	39	1	22	28
No / No children under 18	73	61	2	38	34
			3 or more	40	37
Total	100	100		100	100

Table 2: Dispersion of household food inflation rates

	Low Inflation 2013Q4–2020Q1	Pandemic 2020Q2–2021Q1	High Inflation 2021Q2–2023Q4
A. Interquartile range			
Household prices			
Fisher	7.84	8.02	8.47
Laspeyres	8.11	8.29	8.69
Paasche	8.01	8.29	8.74
Barcode-average			
Fisher	3.66	3.89	4.52
Laspeyres	3.79	3.99	4.67
Paasche	3.73	4.02	4.63
B. Difference between 90th and 10th percentiles			
Household prices			
Fisher	16.80	17.20	17.57
Laspeyres	17.53	17.86	18.21
Paasche	17.35	17.92	18.19
Barcode-average			
Fisher	7.56	8.21	9.28
Laspeyres	7.88	8.46	9.57
Paasche	7.77	8.44	9.52
C. Ratio of variance with household prices to variance with UPC prices			
Barcode-average			
Fisher	2.18	1.99	1.85
Laspeyres	2.18	1.99	1.84
Paasche	2.18	1.99	1.85

Notes: Mean of dispersion measures for each quarter over 2013Q4–-2023Q4.

Table 3: Average inflation rate by demographic characteristics (2013Q4–2023Q4)

	Low Inflation 2013Q4–2020Q1	Pandemic 2020Q2–2021Q1	High Inflation 2021Q2–2023Q4
Income Category			
Less than $40,000	1.61	2.53	7.32
$40,000 to $59,999	1.52	2.59	7.29
$60,000 to $79,999	1.64	2.58	7.18
$80,000 to $99,999	1.58	2.66	6.91
$100,000 to $124,999	1.53	2.79	6.92
$125,000 or more	1.61	2.80	6.90
Age Category			
Under 29	1.94	3.12	6.93
30 to 44 years	1.62	2.55	7.18
45 to 54 years	1.56	2.81	7.05
55 to 64 years	1.56	2.40	7.17
65 years and old	1.58	2.74	7.14
Presence of children			
No children under 18	1.58	2.63	7.12
Presence of young children	1.63	2.88	6.96
Only children between 6–17	1.58	2.52	7.25
Province			
Ontario	1.69	3.01	7.46
British Colombia	1.63	2.51	6.91
Alberta	1.47	2.25	6.76
Manitoba/Saskatchewan	1.70	2.20	6.40
Québec	1.58	2.24	6.86
Atlantic	1.22	3.15	8.02
Urban			
Toronto	1.78	3.43	7.46
Vancouver	1.72	2.69	6.90
Montréal	1.56	2.31	6.87
Other	1.57	2.60	7.15
Household Size			
1	1.66	2.65	7.18
2	1.56	2.57	7.07
3 or more	1.56	2.70	7.18
All	1.58	2.63	7.13

Notes: This table presents average household Fisher inflation rate for different demographic groups.

Table 4: Estimation results for quantile regressions

Household food inflation on CPI food inflation rate				
Decile	Slope	SE	Constant	SE
1	0.844	(0.008)	-7.981	(0.036)
2	0.850	(0.005)	-4.906	(0.021)
3	0.864	(0.005)	-3.003	(0.020)
4	0.875	(0.005)	-1.473	(0.020)
5	0.894	(0.004)	-0.092	(0.017)
6	0.919	(0.004)	1.311	(0.017)
7	0.944	(0.004)	2.898	(0.022)
8	0.988	(0.005)	4.956	(0.023)
9	1.035	(0.009)	8.455	(0.039)
Household food inflation on mean Fisher inflation rate				
Decile	Slope	SE	Constant	SE
1	0.912	(0.008)	-8.223	(0.039)
2	0.919	(0.005)	-5.164	(0.024)
3	0.936	(0.005)	-3.276	(0.022)
4	0.962	(0.005)	-1.808	(0.018)
5	0.985	(0.005)	-0.461	(0.020)
6	1.013	(0.004)	0.897	(0.017)
7	1.050	(0.005)	2.421	(0.022)
8	1.090	(0.006)	4.434	(0.027)
9	1.138	(0.011)	7.925	(0.044)

Notes: The table shows the slope and intercept from quantile regressions of household-level Fisher inflation rates on measures of the overall inflation rate (upper panel) and mean Fisher inflation (lower panel). Bootstrap standard errors are in parentheses.

Table 5: Estimation results for quantile regressions by sub-period.

Household food inflation on CPI food inflation rate

Low Inflation, 2013Q4–2020Q1				
Decile	Slope	SE	Constant	SE
1	0.544	(0.012)	-7.652	(0.033)
2	0.555	(0.010)	-4.597	(0.027)
3	0.558	(0.008)	-2.701	(0.021)
4	0.561	(0.006)	-1.190	(0.018)
5	0.568	(0.008)	0.179	(0.023)
6	0.588	(0.008)	1.556	(0.022)
7	0.620	(0.008)	3.093	(0.023)
8	0.667	(0.010)	5.108	(0.027)
9	0.745	(0.016)	8.602	(0.048)
Pandemic, 2020Q2–2021Q1				
Decile	Slope	SE	Constant	SE
1	0.753	(0.076)	-7.286	(0.158)
2	0.762	(0.060)	-4.156	(0.141)
3	0.757	(0.044)	-2.117	(0.084)
4	0.735	(0.038)	-0.530	(0.079)
5	0.718	(0.042)	0.923	(0.105)
6	0.776	(0.048)	2.290	(0.105)
7	0.867	(0.051)	3.814	(0.104)
8	0.884	(0.068)	5.994	(0.141)
9	1.065	(0.098)	9.280	(0.188)
High Inflation, 2021Q2–2023Q4				
Decile	Slope	SE	Constant	SE
1	0.887	(0.014)	-7.939	(0.102)
2	0.903	(0.009)	-4.974	(0.077)
3	0.914	(0.008)	-3.015	(0.063)
4	0.946	(0.008)	-1.588	(0.060)
5	0.975	(0.008)	-0.283	(0.055)
6	1.003	(0.008)	1.074	(0.053)
7	1.045	(0.010)	2.499	(0.072)
8	1.091	(0.009)	4.412	(0.080)
9	1.148	(0.017)	7.710	(0.121)

Notes: The table shows the slope and intercept from quantile regressions of household-level Fisher inflation rates on measures of the overall inflation rate, by sub-period. Bootstrap standard errors are in parentheses.

Table 6: Estimation results for household inflation rates

	(1)	(2)	(3) $X_{i,t}$ = ShareSales	(4) $X_{i,t} = ShareSales$, items	(5) $X_{i,t} = ShareTop10$ Retailers	(6) $X_{i,t} = Number$ Retailers	(7) $X_{i,t}$ = ShareIncome	(8) $X_{i,t}$ = UnemplRate
$40,000 to $59,999	0.019	0.021	0.027	0.029	0.023	0.028	0.063*	0.021
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.034)	(0.032)
$60,000 to $79,999	-0.019	-0.015	-0.005	-0.002	-0.013	-0.007	0.037	-0.015
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.037)	(0.034)
$80,000 to $99,999	-0.173***	-0.171***	-0.161***	-0.159***	-0.169***	-0.161***	-0.113***	-0.171***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.039)	(0.036)
$100,000 to $124,999	-0.191***	-0.188***	-0.177***	-0.174***	-0.188***	-0.178***	-0.125***	-0.188***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.043)	(0.040)
$125,000 or more	-0.192***	-0.189***	-0.181***	-0.180***	-0.188***	-0.180***	-0.119***	-0.188***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.044)	(0.040)
30 to 44 years	-0.137	-0.088	-0.086	-0.086	-0.084	-0.077	-0.095	-0.073
	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)
45 to 54 years	-0.141	-0.073	-0.068	-0.067	-0.071	-0.055	-0.081	-0.059
	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)
55 to 64 years	-0.195**	-0.115	-0.110	-0.110	-0.115	-0.096	-0.123	-0.100
	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)
Over 65 years	-0.137	-0.057	-0.058	-0.060	-0.059	-0.040	-0.060	-0.043
	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)
Young children	0.033	0.027	0.028	0.028	0.030	0.022	0.026	0.027
	(0.056)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
Children 6–17	0.066	0.065	0.065	0.065	0.066*	0.063	0.064	0.064
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
2 persons	0.095***	0.097***	0.083***	0.079***	0.104***	0.104***	0.085***	0.098***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.028)	(0.029)	(0.028)
3 persons or more	0.142***	0.137***	0.123***	0.118***	0.147***	0.140***	0.122***	0.139***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
British Colombia	-0.306***	-0.310***	-0.307***	-0.308***	-0.321***	-0.332***	-0.311***	-0.366***
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.046)
Alberta	-0.373***	-0.373***	-0.371***	-0.373***	-0.362***	-0.386***	-0.375***	-0.341***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.038)
Manitoba/Saskatchewan	-0.318***	-0.318***	-0.312***	-0.312***	-0.317***	-0.330***	-0.319***	-0.378***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.042)
Québec	-0.302***	-0.306***	-0.315***	-0.318***	-0.298***	-0.322***	-0.312***	-0.334***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Atlantic	0.040	0.039	0.047	0.049	0.024	0.023	0.041	0.212***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.058)
ShoppingTrips		-0.015***	-0.015***	-0.015***	-0.015***	-0.012***	-0.016***	-0.015***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)		0.014***	0.014***	0.015***	0.014***	0.014***	0.014***	0.014***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$			-0.003***	-0.004***	-0.001***	-0.028***	0.020***	-0.066***
			(0.000)	(0.000)	(0.000)	(0.005)	(0.005)	(0.015)
Constant	0.123	0.475**	0.521***	0.534***	0.527***	0.533***	0.442**	0.911***
	(0.183)	(0.186)	(0.186)	(0.186)	(0.187)	(0.186)	(0.186)	(0.215)
Observations	306,305	306,197	306,196	306,195	306,199	306,195	306,200	306,196
Adjusted R-squared	0.240	0.241	0.241	0.241	0.241	0.241	0.241	0.241

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

Table 7: Estimation results for household inflation rates with interactions

	(1) $X_{i,t}$ = ShoppingTrips	(2) $X_{i,t}$ = ShareSales	(3) $X_{i,t} = ShareSales$, items	(4) $X_{i,t} = ShareTop10$ Retailers	(5) $X_{i,t} = Number$ Retailers	(6) $X_{i,t}$ = ShareIncome	(7) $X_{i,t}$ = UnemplRate
ShoppingTrips	-0.012***	-0.011***	-0.011***	-0.012***	-0.011***	-0.014***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)	0.014***	0.012***	0.013***	0.012***	0.012***	0.013***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$		-0.002***	-0.003***	-0.001	0.007	0.051***	-0.479***
		(0.001)	(0.001)	(0.000)	(0.006)	(0.006)	(0.013)
$X_{i,t} \times D^{\text{Pandemic}}$	-0.009**	-0.003**	-0.003**	-0.011***	0.002	-0.093***	0.640***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.012)	(0.014)	(0.019)
$X_{i,t} \times D^{\text{High inflation}}$	0.007**	-0.003**	-0.005***	0.004***	-0.058***	0.019*	-1.456***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.009)	(0.010)	(0.019)
D^{Pandemic}	1.021***	1.027***	1.023***	1.637***	0.938***	1.106***	-3.784***
	(0.074)	(0.051)	(0.051)	(0.080)	(0.080)	(0.047)	(0.173)
$D^{\text{High inflation}}$	5.730***	5.549***	5.607***	5.236***	5.812***	5.425***	13.588***
	(0.054)	(0.039)	(0.039)	(0.062)	(0.060)	(0.035)	(0.122)
Constant	1.397***	1.476***	1.476***	1.463***	1.361***	1.323***	4.843***
	(0.111)	(0.111)	(0.111)	(0.114)	(0.112)	(0.111)	(0.136)
Observations	306,201	306,198	306,191	306,200	306,195	306,201	306,200
Adjusted R-squared	0.135	0.135	0.135	0.135	0.135	0.135	0.173

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

Table 8: Estimation results for household substitution

	(1)	(2)	(3) $X_{i,t}$ = ShareSales	(4) $X_{i,t} = ShareSales$, items	(5) $X_{i,t} = ShareTop10$ Retailers	(6) $X_{i,t} = Number$ Retailers	(7) $X_{i,t}$ = ShareIncome	(8) $X_{i,t}$ = UnemplRate
$40,000 to $59,999	0.022	0.022	0.018	0.018	0.022	0.015	0.014	0.021
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)
$60,000 to $79,999	-0.045**	-0.045**	-0.052***	-0.052***	-0.045**	-0.053***	-0.055***	-0.046**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.020)	(0.018)
$80,000 to $99,999	-0.011	-0.010	-0.016	-0.016	-0.009	-0.019	-0.021	-0.010
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.021)	(0.019)
$100,000 to $124,999	-0.022	-0.022	-0.029	-0.028	-0.022	-0.031	-0.034	-0.022
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.022)
$125,000 or more	-0.090***	-0.090***	-0.095***	-0.094***	-0.090***	-0.098***	-0.103***	-0.090***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.024)	(0.022)
30 to 44 years	0.156***	0.145***	0.145***	0.145***	0.146***	0.135***	0.146***	0.130***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
45 to 54 years	0.209***	0.186***	0.184***	0.185***	0.187***	0.170***	0.188***	0.171***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
55 to 64 years	0.182***	0.151***	0.149***	0.150***	0.151***	0.134***	0.153***	0.136***
	(0.049)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Over 65 years	0.158***	0.126**	0.127**	0.128***	0.125**	0.111**	0.126**	0.111**
	(0.049)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Young children	0.075**	0.080***	0.080***	0.080***	0.081***	0.085***	0.080***	0.079**
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Children 6-17	0.017	0.020	0.021	0.021	0.020	0.022	0.020	0.020
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
2 persons	0.194***	0.186***	0.194***	0.195***	0.188***	0.180***	0.188***	0.185***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
3 persons or more	0.217***	0.208***	0.217***	0.217***	0.212***	0.206***	0.211***	0.207***
	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)	(0.020)	(0.021)	(0.020)
British Colombia	-0.070***	-0.065***	-0.067***	-0.066***	-0.069***	-0.047*	-0.065***	-0.049**
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)
Alberta	-0.035*	-0.032	-0.034*	-0.032	-0.028	-0.022	-0.032	-0.043**
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Manitoba/Saskatchewan	-0.013	-0.010	-0.013	-0.013	-0.010	0.001	-0.010	0.008
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.023)
Québec	0.025	0.025	0.031	0.031	0.028	0.039**	0.026	0.032*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Atlantic	0.143***	0.138***	0.133***	0.133***	0.132***	0.152***	0.138***	0.084***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.032)
ShoppingTrips		0.003***	0.003***	0.003***	0.003***	-0.000	0.003***	0.003***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)		-0.001	-0.001*	-0.001*	-0.001	-0.001*	-0.001	-0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$			0.002***	0.002***	-0.000**	0.026***	-0.004	0.020**
			(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.008)
Constant	0.440***	0.394***	0.365***	0.366***	0.414***	0.343***	0.401***	0.313***
	(0.099)	(0.100)	(0.100)	(0.100)	(0.101)	(0.100)	(0.100)	(0.117)
Observations	304,804	304,703	304,705	304,703	304,703	304,721	304,704	304,703
Adjusted R-squared	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

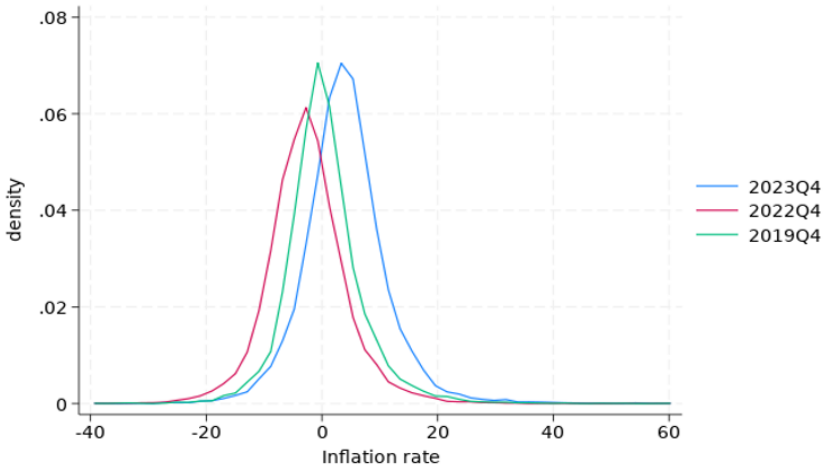
Table 9: Estimation results for household substitution with interactions

	(1) $X_{i,t}$ = ShoppingTrips	(2) $X_{i,t}$ = ShareSales	(3) $X_{i,t} = ShareSales$, items	(4) $X_{i,t} = ShareTop10$ Retailers	(5) $X_{i,t} = Number$ Retailers	(6) $X_{i,t}$ = ShareIncome	(7) $X_{i,t}$ = UnemplRate
ShoppingTrips	0.002***	0.003***	0.003***	0.003***	0.001	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)	-0.000	-0.001**	-0.001**	-0.001*	-0.001*	-0.001*	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$		0.002***	0.002***	-0.000	0.025***	-0.003	0.056***
		(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.007)
$X_{i,t} \times D^{\text{Pandemic}}$	-0.001	-0.002**	-0.002**	-0.001	-0.003	-0.002	-0.041***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.007)	(0.008)	(0.010)
$X_{i,t} \times D^{\text{High inflation}}$	0.001	-0.000	-0.000	0.000	-0.008*	-0.003	-0.077***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.004)	(0.005)	(0.010)
D^{Pandemic}	-0.148***	-0.094***	-0.100***	-0.093**	-0.120***	-0.136***	0.071
	(0.040)	(0.028)	(0.028)	(0.043)	(0.044)	(0.026)	(0.093)
$D^{\text{High inflation}}$	-0.110***	-0.145***	-0.149***	-0.164***	-0.108***	-0.151***	0.327***
	(0.025)	(0.018)	(0.018)	(0.029)	(0.028)	(0.016)	(0.062)
Constant	0.292***	0.270***	0.273***	0.331***	0.235***	0.319***	-0.040
	(0.052)	(0.052)	(0.052)	(0.053)	(0.052)	(0.052)	(0.068)
Observations	304,703	304,705	304,704	304,699	304,712	304,701	304,703
Adjusted R-squared	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

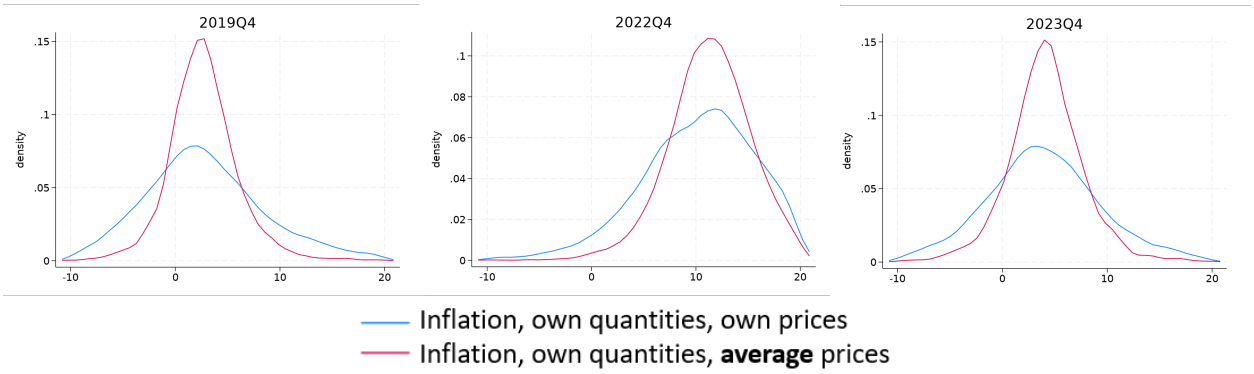
A Additional figures and tables

Figure A1: Distribution of household food inflation rates



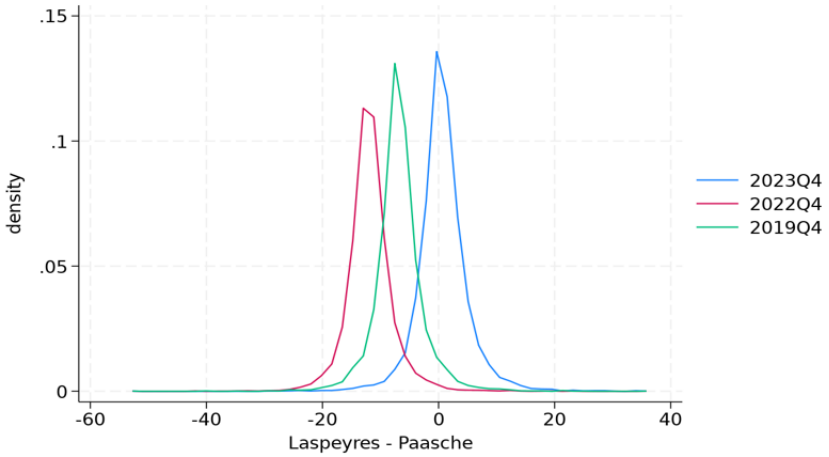
Notes: This figure presents the Kernel density estimates using the Epanechnikov kernel function of household Fisher inflation rates computed with Nielsen's data.

Figure A2: Distribution of household food inflation rates



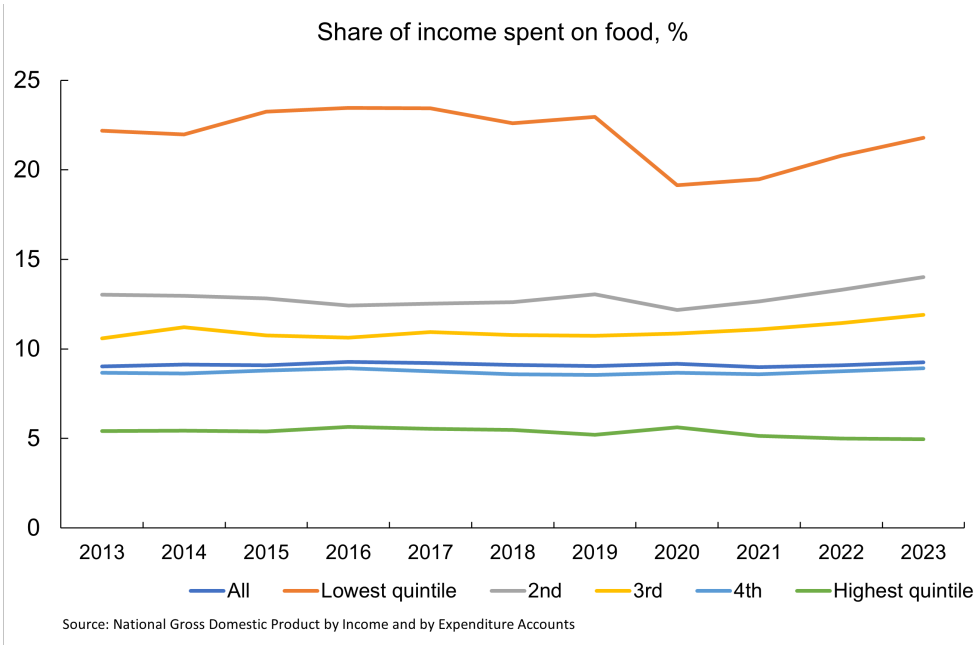
Notes: This figure presents the Kernel density estimates using the Epanechnikov kernel function of household Fisher inflation rates computed with Nielsen's data when restricting for a minimum of 10 matching barcodes.

Figure A3: Distribution of household substitution



Notes: This figure presents the Kernel density estimates using the Epanechnikov kernel function of the difference between households' Laspeyres and Paasche food inflation rates.

Figure A4: Share of income spent on food



Notes: This figure presents shares of disposable household income spent on food and beverages computed using National Accounts data from Statistics Canada (Cansim Table: 36-10-0587-01).

Table A1: Estimation results for quantile regressions with household inflation rates, by sub-period

Household food inflation on mean Fisher food inflation

Low Inflation Period, 2013Q4–2020Q1				
Decile	Slope	SE	Constant	SE
1	0.895	(0.019)	-8.195	(0.044)
2	0.898	(0.014)	-5.139	(0.032)
3	0.905	(0.013)	-3.247	(0.026)
4	0.915	(0.011)	-1.755	(0.024)
5	0.919	(0.012)	-0.380	(0.023)
6	0.954	(0.012)	0.966	(0.025)
7	1.016	(0.013)	2.448	(0.029)
8	1.105	(0.017)	4.395	(0.035)
9	1.246	(0.027)	7.777	(0.061)
Pandemic, 2020Q2–2021Q1				
Decile	Slope	SE	Constant	SE
1	0.824	(0.085)	-8.208	(0.261)
2	0.801	(0.060)	-4.982	(0.191)
3	0.812	(0.043)	-2.971	(0.127)
4	0.787	(0.044)	-1.374	(0.128)
5	0.780	(0.044)	0.065	(0.142)
6	0.842	(0.044)	1.376	(0.130)
7	0.914	(0.049)	2.876	(0.141)
8	0.952	(0.073)	4.970	(0.217)
9	1.143	(0.089)	8.063	(0.258)
High Inflation Period, 2021Q2–2023Q4				
Decile	Slope	SE	Constant	SE
1	0.915	(0.015)	-7.958	(0.108)
2	0.939	(0.011)	-5.001	(0.080)
3	0.951	(0.007)	-3.063	(0.057)
4	0.966	(0.008)	-1.539	(0.058)
5	0.998	(0.007)	-0.217	(0.054)
6	1.021	(0.008)	1.178	(0.059)
7	1.062	(0.009)	2.645	(0.069)
8	1.111	(0.009)	4.614	(0.068)
9	1.164	(0.016)	7.937	(0.120)

Notes: The table shows the slope and intercept from quantile regressions of household-level Fisher inflation rates on the mean Fisher inflation rate, by sub-period. Bootstrap standard errors are in parentheses.

Table A2: Average substitution by demographic characteristics (2013Q4–2023Q4)

	Low Inflation 2013Q4–2020Q1	Pandemic 2020Q2–2021Q1	High Inflation 2021Q2–2023Q4
Income Category			
Less than $40,000	0.77	0.52	0.52
$40,000 to $59,999	0.80	0.64	0.63
$60,000 to $79,999	0.80	0.64	0.55
$80,000 to $99,999	0.83	0.70	0.61
$100,000 to $124,999	0.85	0.68	0.69
$125,000 or more	0.75	0.68	0.56
Age Category			
Under 29	0.63	0.98	0.61
30 to 44 years	0.82	0.57	0.57
45 to 54 years	0.88	0.61	0.59
55 to 64 years	0.80	0.68	0.64
65 years and old	0.72	0.61	0.55
Presence of children			
No children	0.77	0.62	0.57
Young children	0.93	0.71	0.69
Children 6–17	0.90	0.65	0.64
Province			
Ontario	0.82	0.68	0.59
British Colombia	0.65	0.46	0.49
Alberta	0.75	0.64	0.56
Manitoba/Saskatchewan	0.70	0.53	0.56
Québec	0.82	0.64	0.65
Atlantic	0.98	0.72	0.61
Urban			
Toronto	0.61	0.80	0.60
Vancouver	0.60	0.36	0.44
Montréal	0.77	0.61	0.65
Other	0.83	0.63	0.59
Household Size			
1	0.59	0.50	0.51
2	0.83	0.64	0.59
3 or more	0.90	0.69	0.63
All	0.80	0.63	0.58

Notes: This table presents average substitution, computed as the difference between Laspeyres and Paasche household food inflation rates, for different demographic groups.

Table A3: Estimation results for household inflation rates (at least 10 items)

	(1)	(2)	(3) $X_{i,t}$ = ShareSales	(4) $X_{i,t} = ShareSales$, items	(5) $X_{i,t} = ShareTop10$ Retailers	(6) $X_{i,t} = Number$ Retailers	(7) $X_{i,t}$ = ShareIncome	(8) $X_{i,t}$ = UnemplRate
$40,000 to $59,999	-0.009	-0.010	-0.004	-0.002	-0.009	-0.002	0.029	-0.010
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.035)	(0.033)
$60,000 to $79,999	-0.034	-0.032	-0.023	-0.020	-0.031	-0.023	0.017	-0.032
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.037)	(0.035)
$80,000 to $99,999	-0.207***	-0.207***	-0.198***	-0.196***	-0.206***	-0.197***	-0.153***	-0.207***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.039)	(0.036)
$100,000 to $124,999	-0.178***	-0.178***	-0.168***	-0.166***	-0.179***	-0.168***	-0.120***	-0.179***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.044)	(0.041)
$125,000 or more	-0.216***	-0.214***	-0.208***	-0.206***	-0.214***	-0.205***	-0.151***	-0.214***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.045)	(0.041)
30 to 44 years	-0.155	-0.123	-0.123	-0.124	-0.122	-0.115	-0.127	-0.102
	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)
45 to 54 years	-0.195*	-0.142	-0.140	-0.140	-0.142	-0.127	-0.147	-0.123
	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)
55 to 64 years	-0.270**	-0.205*	-0.203*	-0.204*	-0.206*	-0.190*	-0.210*	-0.186*
	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)
Over 65 years	-0.233**	-0.167	-0.170	-0.173	-0.169	-0.153	-0.167	-0.149
	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)
Young children	-0.023	-0.032	-0.031	-0.030	-0.031	-0.037	-0.032	-0.032
	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)
Only children 6–17	0.025	0.023	0.022	0.022	0.023	0.020	0.022	0.021
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)
2 persons	0.099***	0.103***	0.091***	0.087***	0.105***	0.111***	0.093***	0.104***
	(0.029)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
3 persons or more	0.132***	0.129***	0.117***	0.112***	0.133***	0.133***	0.115***	0.132***
	(0.038)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
British Colombia	-0.342***	-0.350***	-0.348***	-0.349***	-0.354***	-0.373***	-0.350***	-0.431***
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.047)
Alberta	-0.384***	-0.386***	-0.385***	-0.388***	-0.381***	-0.399***	-0.388***	-0.337***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.039)
Manitoba/Saskatchewan	-0.365***	-0.368***	-0.363***	-0.364***	-0.367***	-0.380***	-0.369***	-0.453***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.043)
Québec	-0.335***	-0.340***	-0.348***	-0.351***	-0.337***	-0.356***	-0.345***	-0.379***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Atlantic	0.023	0.023	0.029	0.031	0.017	0.006	0.025	0.276***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)	(0.058)
ShoppingTrips		-0.016***	-0.015***	-0.015***	-0.016***	-0.013***	-0.016***	-0.016***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)		0.014***	0.014***	0.014***	0.014***	0.014***	0.014***	0.014***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$			-0.002***	-0.003***	-0.000	-0.029***	0.017***	-0.095***
			(0.000)	(0.000)	(0.000)	(0.005)	(0.005)	(0.015)
Constant	-0.142	0.270	0.313	0.327	0.292	0.329	0.233	0.854***
	(0.286)	(0.288)	(0.288)	(0.288)	(0.289)	(0.288)	(0.288)	(0.309)
Observations	252,945	252,893	252,886	252,886	252,891	252,896	252,895	252,893
Adjusted R-squared	0.272	0.273	0.273	0.273	0.273	0.273	0.273	0.273

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

Table A4: Estimation results for household inflation rates (at least 10 items) with interactions

	(1) $X_{i,t}$ = ShoppingTrips	(2) $X_{i,t}$ = ShareSales	(3) $X_{i,t} = ShareSales$, items	(4) $X_{i,t} = ShareTop10$ Retailers	(5) $X_{i,t} = Number$ Retailers	(6) $X_{i,t}$ = ShareIncome	(7) $X_{i,t}$ = UnemplRate
ShoppingTrips	-0.011***	-0.011***	-0.010***	-0.011***	-0.010***	-0.013***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ShoppingTrips(t-4)	0.012***	0.011***	0.011***	0.010***	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$X_{i,t}$		-0.002***	-0.002***	0.000	0.008	0.049***	-0.466***
		(0.001)	(0.001)	(0.000)	(0.006)	(0.006)	(0.014)
$X_{i,t} \times D^{\text{Pandemic}}$	-0.009***	-0.003*	-0.003*	-0.012***	0.006	-0.093***	0.629***
	(0.004)	(0.001)	(0.001)	(0.001)	(0.012)	(0.014)	(0.020)
$X_{i,t} \times D^{\text{High inflation}}$	0.007**	-0.004***	-0.006***	0.004***	-0.067***	0.021**	-1.461***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.009)	(0.010)	(0.020)
D^{Pandemic}	0.994***	0.993***	0.992***	1.684***	0.896***	1.098***	-3.743***
	(0.077)	(0.052)	(0.052)	(0.081)	(0.082)	(0.049)	(0.175)
$D^{\text{High inflation}}$	5.744***	5.555***	5.609***	5.235***	5.863***	5.400***	13.611***
	(0.059)	(0.041)	(0.041)	(0.066)	(0.063)	(0.037)	(0.125)
Constant	1.536***	1.634***	1.635***	1.571***	1.515***	1.472***	4.931***
	(0.127)	(0.127)	(0.127)	(0.130)	(0.128)	(0.127)	(0.149)
Observations	252,901	252,889	252,890	252,896	252,896	252,893	252,893
Adjusted R-squared	0.152	0.152	0.152	0.152	0.151	0.152	0.194

Notes: This table presents estimation results for equation 4. The regressions include controls for demographic characteristics (household income, age of head of household, children by age groups, household size, province, urban regions) and survey quarter. In each regression, we use sampling weights in the regressions and use Huber regressions to control for outliers and influential observations. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively