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Anchored Inflation Expectations: What Recent Data Reveal

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Abstract

We analyze micro-level data from the Canadian Survey of Consumer Expectations through the lens of a heterogeneous-expectations model to study the state-dependent risk of inflation expectations unanchoring in low- and high-inflation environments. In our model, agents are either trend-chasing or mean-reverting forecasters of inflation. We interpret the degree of mean reversion in inflation expectations as a measure of anchoring, which varies over time with the share of agents using each approach. We find that during the post-pandemic inflation spike, trend-chasing expectations surged, resulting in a heightened risk of unanchoring expectations and entrenching above-target inflation. Furthermore, forming trend-chasing inflation expectations is associated with higher expectations for other key economic variables — such as interest rates, wages, and house prices — and a restraint in household spending. We provide additional new insights into household expectation formation, documenting that forecasting behaviors, attention, and noise in beliefs vary across socio-demographic groups and correlate with views about monetary policy.

Topics: Inflation and prices
JEL codes: E70; E31; D84

Résumé

Nous analysons des données microéconomiques tirées de l'enquête sur les attentes des consommateurs au Canada à l'aide d'un modèle à anticipations hétérogènes. Nous souhaitons ainsi étudier le risque de désancrage des anticipations d'inflation – qui est lié à l'état de l'économie – dans un contexte de faible et de forte inflation. Dans notre modèle, les agents sont soit des prévisionnistes de l'inflation qui suivent la tendance, soit des prévisionnistes qui anticipent un retour à la moyenne. Nous interprétons le degré de retour à la moyenne des anticipations d'inflation comme une mesure de l'ancrage, qui varie au fil du temps en fonction de la proportion d'agents utilisant chacune des deux approches. Nous constatons qu'au cours de la flambée d'inflation ayant suivi la pandémie, les anticipations d'inflation extrapolant la poursuite de cette tendance ont bondi, ce qui a engendré un risque accru de désancrage des anticipations d'inflation et un enracinement durable de l'inflation au-dessus de la cible. De plus, ces anticipations extrapolant la tendance d'inflation sont associées à des anticipations plus élevées pour d'autres variables économiques importantes – comme les taux d'intérêt, les salaires et les prix de l'immobilier – et à une modération des dépenses des ménages. Nous apportons de nouvelles perspectives sur la formation des anticipations des ménages en montrant que les comportements de prévision, les niveaux d'attention et le niveau de bruit dans les croyances varient d'un groupe sociodémographique à l'autre et sont corrélés avec les opinions sur la politique monétaire.

Sujets : Inflation et prix
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1 Introduction

The aftermath of the COVID-19 pandemic has been accompanied by a shift from persistently low to surging above-target inflation. Central banks (CBs) have been particularly concerned that inflation expectations could become unanchored, which would contribute to entrenched high inflation.[1] This paper uses macro- and micro-level data for Canada and model-based analyses to assess this state-dependent risk of inflation expectations unanchoring in low- and high-inflation environments. We interpret the degree of mean reversion in inflation expectations as an indicator of the anchoring.

We estimate the degree of mean reversion in inflation expectation in aggregate and micro-level data from the Canadian Survey of Consumers' Expectations (CSCE) through the lens of a heterogeneous expectation model. In this framework, the degree of mean reversion in the economy evolves with the relative composition of aggregate inflation expectations, in which trend-chasing and mean-reverting beliefs co-exist.[2] An increase in the prevalence of trend-chasing behavior indicates an increase in the risk of unanchoring inflation expectations. This is because trend-chasing expectations extrapolate the latest inflation trend into the future, steering expectations away from the target, accentuating the persistence of the shocks on inflation, and complicating the CB's stabilization task. By contrast, mean-reverting expectations help expectations remain anchored and stabilize inflation at the target despite transitory inflationary pressures. Since agents are assumed to switch between these two forecasting behaviors based on their recent relative forecast accuracy, the composition of aggregate expectations can vary along the business cycle, producing a state-dependent unanchoring risk. As a result, our heterogeneous expectation framework precisely captures two key criteria for expectations to be well-anchored: insensitivity to

[1] Among others, FED Chairman Powell expressed such a concern on August 25, 2023, in Jackson Hole, Wyoming [Powell, 2023]. Governor Macklem from the Bank of Canada expressed a similar concern in his remarks at the Saint John Region Chamber of Commerce in New Brunswick on November 22, 2023 [Macklem, 2023].

[2] In the paper, we use the terms trend-chasing, trend-extrapolating, and trend-following interchangeably.

transitory economic shocks and alignment with the inflation target.[3] Mean reversion in aggregate expectations clearly translates their alignment with the target. In addition, the possibility of switching between the two forecasting models accurately describes the potential unanchoring effect of short-run disturbances on expectations.

We estimate the degree of mean reversion over the business cycle using non-linear least squares for the Canadian inflation time series and maximum likelihood methods for the micro-level data from the CSCE. We find strong evidence of time variation in the mean reversion of inflation expectations associated with the varying relative prevalence of trend-chasing forecasting behaviors over mean-reverting ones. During the period of low and stable inflation preceding the recent inflation spike, aggregate inflation expectations were mean-reverting, and we identify a low share of trend-chasing beliefs over this period. By contrast, we observe a strong increase in trend-chasing forecasting models during the post-pandemic inflation surge, which contributes to increasing the persistence in aggregate inflation expectations and pushing inflation expectations away from the target. These developments indicate a heightened risk of unanchoring of inflation expectations during the post-pandemic inflation surge. We also find that time-variation in mean reversion reveals an asymmetry in the state-dependent risk of expectation unanchoring. This risk appears more severe when inflation peaks above target than on the downside.

Furthermore, the use of micro-level CSCE data allows us to provide further evidence about heterogeneity in the formation of inflation expectations across socio-economic and demographic characteristics. We find that CSCE respondents with lower levels of education and income, females, and renters are more prone to adopting trend-chasing behaviors than other categories of respondents. We also identify groups that are more responsive to news about inflation. These are, in particular, older respondents, females, home owners with mortgages, and employed people. Additionally, we leverage survey questions

[3] See, for instance, the remarks delivered by the President of the New York Federal Reserve [Williams, 2022].

about respondents' knowledge about monetary policy in Canada and their views about inflation. We find that respondents reporting a low level of credibility about the inflation target or concerns about the level of inflation and respondents attributing a high importance to low and stable inflation are more likely to have trend-chasing forecasts during the post-pandemic inflation surge. These differences contribute to our understanding of the dynamics underlying expectation heterogeneity and speak to the need for targeted CB communication strategies.

In addition, we provide new evidence about the link between trend-chasing inflation expectations of households and their expectations for other key economic variables. We find a strong positive and significant association between forming trend-chasing short-run inflation expectations and all other economic and financial expectations available in the CSCE, at all horizons. In particular, during the post-pandemic inflation surge, forming trend-chasing short-term inflation expectations is associated with higher longer-horizon inflation forecasts, higher interest rate forecasts in the short-, medium-, and long-run, higher household spending growth and tax forecasts, and higher house price growth expectations over both the short and long term. A significant—albeit weaker—correlation also exists between short-term, trend-chasing inflation forecasts and wage and income expectations. Interestingly, regarding the state-dependent risk of unanchoring expectations, we find that trend-chasing, short-term inflation expectations have remained associated with higher inflation expectations at five years ahead since the post-pandemic inflation surge.

Taken together, our findings speak to the existence of a state-dependent risk of unanchoring of household inflation expectations. During the post-pandemic inflation surge, this unanchoring risk is heightened due to three co-existing developments: the increase in the share of trend-chasing expectations; higher inflation expectations among trend-chasers; and the strengthened association between short- and long-term inflation expectations among trend-chasers when inflation is high. Within the context of the Canadian econ-

omy, our results may call for tighter monetary policy to sustainably bring inflation back to target and to ensure that inflation expectations remain anchored.

Finally, the CSCE systematically surveys consumer plans, allowing us to document a novel association between inflation forecasting behaviors and spending and income intentions. We find that during the recent inflation surge, trend-chasing consumers are more likely than those who hold mean-reverting inflation expectations to restrain their spending and increase their saving, in particular by postponing major purchases and chasing cheaper shopping deals and additional income opportunities. It is worth noting that these behaviors do not align with the standard consumer optimization framework embedded in the majority of macroeconomic frameworks. These findings could pose a substantial challenge to policy design and entail aggregate demand effects given the recent prevalence of trend-chasing inflation forecasting behavior that we document.

To summarize, we find that the degree of mean reversion in household inflation expectations is a useful indicator of their anchoring in low- and high-inflation environments. Furthermore, more trend-chasing and less mean-reverting expectations reverberate into expectations about other key economic variables and consumer spending plans. Our model can serve as a useful policy tool to assess the state-dependent risk of unanchoring of inflation expectations, along with providing monetary policy implications.

The rest of the paper is organized as follows. After a literature review, Section 2 describes the data used, Section 3 reports the estimation of the behavioral model on inflation data, and Section 4 provides the micro-level data. Section 5 concludes.

Related Literature Our work relates to the theoretical and empirical literature on heterogeneous expectations. Earlier evidence of heterogeneity in inflation expectations in surveys is documented in Branch [2004]; see D'Acunto, Malmendier and Weber [2023] for a recent overview of this literature. Meeks and Monti [2023] highlight the quantitative

relevance of expectation heterogeneity in accounting for inflation dynamics. Forecasting lab experiments also provide data that reveal heterogeneity in expectations and switching behaviors between simple heuristics to form a variety of beliefs, including expectations of asset prices, house prices, or macroeconomic data; see, in particular, Anufriev and Hommes [2012]. The heterogeneous expectation model that we use belongs to the class of heuristics-switching models introduced in the seminal application of replicator dynamics in Brock and Hommes [1997], which has sparked a lengthy literature on both the theoretical and empirical fronts; see Hommes [2021] for a review.

Our work is also related to the literature that assesses the state-dependent anchoring of inflation expectations. Higher sensitivity of inflation expectations to current dynamics in inflation suggests unanchoring of expectations [Gürkaynak, Levin, Marder and Swanson, 2007; Williams, 2022; Gáti, 2023]. In our environment, the sensitivity of inflation expectations to current inflation increases with the share of trend-chasing expectations in the population.

The papers that are most closely related to ours are Cornea-Madeira, Hommes and Massaro [2019] and Bolt, Demertzis, Diks, Hommes and Van Der Leij [2019]. These papers document evidence of switching in forecasting heuristics using, respectively, aggregate inflation and house price times series. We extend this line of research by adding, among other things, a micro-level analysis of these switching behaviors, which we further differentiate along demographics and relate to other beliefs, central bank credibility, and consumer behaviors. We also emphasize state-dependent forecasting behaviors in the context of the recent inflation surge, which has not been studied by this strand of the literature. Our maximum likelihood approach is adapted from the seminal contribution of Branch [2004].

Other closely related models of heterogeneous expectations include Branch and McGough [2010]; Branch and Evans [2011*a*]; Massaro [2013] and Gasteiger [2014]. Hommes and Lus-

tenhouwer [2019] and Ozden [Forthcoming] have brought this class of models to the data using Bayesian techniques. Other relevant approaches to model heterogeneous expectations include a two-type model of pessimistic and optimistic agents [Andrade, Gaballo, Mengus and Mojon, 2019], Ricardian and non-Ricardian agents [Branch and Gasteiger, 2019], social learning expectations [Arifovic, Bullard and Kostyshyna, 2013; Arifovic, Grimaud, Salle and Vermandel, Forthcoming], and mixed models of adaptive learning, k-level reasoning, and replicator dynamics [Evans, Gibbs and McGough, Forthcoming].

Next, we describe the macroeconomic data and the micro-level survey data used in the rest of the paper.

2 Description of the data

2.1 Macroeconomic data

For macro-level time series, we rely on Statistics Canada, the official statistical agency of Canada. We compute the inflation rate as the year-over-year growth rate of the CPI All-Item (Cansim Table 18-10-0004-01). The unemployment rate is based on the labor force survey (LFS), an official source for the measurement of unemployment by Statistics Canada (Cansim Table 14-10-0287-01). Figure 1a presents these two times series.

The Bank of Canada introduced an inflation-targeting mandate in 1991 and targets inflation at 2% within an inflation-target control range between 1% and 3%. Between 1991 and the start of COVID-19 pandemic in 2020, the average inflation rate has been 1.9% and within the 1–3% band 80% of the time. Over the last decade, Canada has experienced a period of low and relatively stable inflation during 2014Q4–2021Q1, before the recent post-pandemic inflation surge over 2021Q2–2024Q2.

2.2 Expectation data

2.2.1 The Canadian Survey of Consumer Expectations (CSCE)

For our analysis of household-level inflation expectations and expectations about other key economic variables, we use a comprehensive source of data from the Canadian Survey of Consumer Expectations (CSCE). The Bank of Canada introduced this quarterly survey in 2014 to fill the data gap concerning expectations of Canadian households [Gosselin and Khan, 2015]. Its structure and questions share many similarities with the Survey of Consumer Expectations used by the Federal Reserve Bank of New York [Armantier, Topa, Van der Klaauw and Zafar, 2017].

The CSCE is an online representative survey of 2,000 respondents[4] aged 18 and over. The CSCE is a rotating panel where each respondent stays in the survey for four quarters, with an equal number of respondents rotating in and out of the sample in each quarter. A large polling firm implements the CSCE on behalf of the Bank of Canada. The survey collects views of Canadian consumers about inflation at different horizons, labor market prospects, interest rates, house price growth over various horizons, household income and spending outlooks, and demographic characteristics. Our data span the period 2014Q4–2024Q2.

Table 1 summarizes the distribution of age groups, education levels, regions of residence, and employment status from the CSCE sample. We also provide the demographic distributions of the Canadian population obtained from Census data in this table for comparison. Overall, the composition of the CSCE sample by demographic characteristics is similar to the composition of the Canadian population in the Census data. Some differences are present, especially in the age, education, and income categories. The shares of younger respondents, along with those with higher levels of education or income, are

[4]The sample size was 1,000 before 2018Q2.

lower in the CSCE than in the Census data, reflecting less willingness of these groups to participate in this type of surveys. However, the CSCE provides sampling weights for each observation based on age, region, and gender to account for its demographic and geographical representativeness in the Canadian population. We apply sampling weights in our empirical analysis. Moreover, throughout the quantitative analysis in the paper, we use Huber weights, as in Coibion, Gorodnichenko and Weber [2022], to account for outliers and influential observations.

2.2.2 Survey expectations

The CSCE uses the following two-part question to elicit their one-year-ahead inflation expectations:

Part 1. ***Over the next 12 months***, *do you think that there will be inflation or deflation? (Note: deflation is the opposite of inflation.) Please choose one.*
–Inflation
–Deflation (the opposite of inflation)

Then Part 2 of the question is presented separately based on the respondent's answer in the first part:
Part 2. *What do you expect the rate of [inflation/deflation] to be* ***over the next 12 months?*** *Please give your best guess. Please enter a number greater than 0 or equal to 0.*
Over the next 12 months *, I expect the rate of [inflation/deflation] to be .... percent*

Figure 1b reports the cross-sectional distribution of these inflation expectations at the one-year forecast for each quarter of the survey, along with realized inflation in Canada. Until 2020, consumers' inflation expectations track realized inflation, but with an upward bias previously documented by, for example, Ehrmann, Pfajfar and Santoro [2017] and Schembri [2020]. At the onset of the pandemic, inflation declined while inflation expectations remained relatively stable. However, as realized inflation started to surge in 2021Q2,

reaching its peak at 8% in early 2022, consumers' inflation expectations have followed this upward trend. During this period, rising inflation expectations are characterized by higher cross-sectional dispersion, indicating higher disagreement among households regarding their outlooks for future inflation. As realized inflation starts to moderate, inflation expectations ease, however, households revise their inflation downward more slowly than upward during the inflation surge. In 2024Q4, household inflation expectations remain more elevated and dispersed than before the post-pandemic inflation surge.

Table 2 provides evidence of the heterogeneity in inflation expectations by respondents' demographic characteristics based on summary statistics. Younger respondents, females, and those with lower levels of education and lower levels of income report higher expectations for inflation over different horizons. Home owners and employed respondents report lower expectations for inflation. Heterogeneity in inflation expectations is documented in other surveys across different countries.[5]

We also analyze household expectations for wage growth, household spending and income, interest rate, and house price growth expectations over short and long horizons. Young respondents, those with higher level of income and education, and house owners have higher expectations for nominal wage growth, and growth of household spending and income (Table B 1). Differences in interest rate expectations across demographic characteristics are similar to those we documented for inflation expectations: younger individuals, female respondents, those with lower education and income, and renters report higher interest rate expectations (Table B 2). Young people, renters, males, those with lower levels of income, and those with higher levels of education have higher expectations for house price growth over a short horizon (Table B 3). We include survey questions for these variables in Appendix A.1.

[5]See, *inter alia*, Bryan and Venkantu [2001]; Bruin de Bruin, van der Klaauw, Downs, Fischhoff, Topa and Armantier [2010]; Madeira and Zafar [2015].

3 Dynamic heterogeneity in Canadian inflation data

This section discusses evidence of dynamic heterogeneity in expectations using aggregate inflation data.

3.1 The inflation expectation formation process

We first develop the model of expectation formation with time-varying heterogeneity and then focus on its application to inflation data.

3.1.1 A model of expectation formation with time-varying heterogeneity

We develop a model of heterogeneous expectation formation with J agent-types, indexed by j. We assume that all agent-types use a parsimonious AR(1) model to forecast the inflation gap (see, *inter alia*, Hommes et al. 2023):

$$E^*_{j,t}\pi_{t+1} = \phi_j \pi_{t-1}, \tag{1}$$

where inflation π is expressed in deviation from its target, and each type j uses a different autoregressive parameter ϕ_j. This is the only difference across the J agent-types.

In the rest of the paper, we consider two types of forecasters. This is the most parsimonious formulation of heterogeneity that is sufficient to model the two polar effects of expectations on inflation, namely the stabilizing mean-reverting type and the destabilizing trend-chasing type.[6]

The first agent-type $j = 1$ uses $\phi_1 \in (0, 1)$, which is analogous to believing in inflation

[6]Results are qualitatively robust to a three-type model where agents have an additional model, a so-called "fundamentalist" model under which they anchor their expectations at the target, that is, $E^*_{j,t}\pi_{t+1} = 0$ (in deviation from the target), or $\phi = 0$. However, when inflation is stable and oscillates around the target, as is the case before 2020, the identification of the different forecasting types is challenging, and adding this third type results in less precise estimates than under the more parsimonious two-type model.

returning to the target (or the inflation gap converging back to zero) whenever it has deviated from it in the last period, that is, whenever $\pi_{t-1} \neq 0$. The lower the value of ϕ_1, the faster the expected mean-reversion. Since inflation is (at least partly) self-fulfilling, mean-reverting expectations contribute to stabilizing inflation around the target in the face of adverse shocks, and can be seen as a tailwind for monetary policy.

The second agent-type $j = 2$ extrapolates the last inflation gap by using $\phi_2 > 1$, which implies that previous deviations from the target are believed to be cumulative and inflation to diverge from the target (or the inflation gap to diverge from zero). Trend extrapolation arises on the positive as well as on the negative side. On the negative side, trend-chaser forecasters expect inflation to decrease further, while mean-reverting types expect inflation to increase back to the target. In other words, whenever past inflation is below target, mean-reverting forecasters have higher inflation expectations than trend-followers. Symmetrically, when inflation is above target, trend-followers expect inflation to keep increasing away from the target, so they hold higher expectations than mean-reverting agents who instead expect inflation to fall back towards the target. For this reason, the presence of self-validating trend-chasing expectations increases the risks of unanchoring inflation expectations because trend-chasing expectations hinder the stabilization of inflation in the presence of adverse shocks, akin to a headwind for monetary policy. The higher the value of ϕ_2, the stronger the trend extrapolation and the faster inflation is expected to diverge away from the target. Note that the two forecasting models yield the same predictions when inflation is on target (or, equivalently, $\pi_{t-1} = 0$), and both agent-types then forecast inflation to remain on target in $t + 1$.

These two views about future inflation co-exist. In each period t, a fraction $\boldsymbol{n_{1,t}}$ of the agents belong to the first type and are mean-reversion believers, and the other $\boldsymbol{n_{2,t}} \equiv (1 - \boldsymbol{n_{1,t}})$ share belong to the second type and hold trend-chasing expectations. In each period, the aggregate inflation expectation is given by the weighted average of the two types:

$$E_t^* \pi_{t+1} = \boldsymbol{n_{1,t}} \phi_1 \pi_{t-1} + \boldsymbol{n_{2,t}} \phi_2 \pi_{t-1}. \tag{2}$$

where the star-superscript indicates that this expectation need not be rational.

Agents endogenously switch between types according to the recent relative forecasting accuracy of each model. Specifically, the shares of each type $j = 1, 2$ of agents evolve according to a replicator dynamics described by the following set of equations:

$$U_{j,t} = -\frac{FE_t^j}{FE_t^1 + FE_t^2}, \tag{3}$$

$$FE_t^j = \sum_{k=0}^{K-1} \left| E_{j,t-k-2}^* \pi_{t-k-1} - \pi_{t-k-1} \right|, \tag{4}$$

$$\boldsymbol{n_{j,t}} = \delta \boldsymbol{n_{j,t-1}} + (1-\delta) \frac{\exp\left(\beta U_{j,t}\right)}{\exp(\beta U_{1,t}) + \exp(\beta U_{2,t})}. \tag{5}$$

Let us unpack each of these equations. Variable $U_{j,t}$ is the forecasting accuracy of agent-type $j = 1, 2$. This variable depends on the size of the absolute forecast errors denoted by FE^j and given by Equation (4), which would have resulted had the agent used type-j model to forecast inflation over the last K periods. Looking only at the recent past allows for the possibility of structural breaks in the time series of inflation and agents' limited memory, which is well-documented both in the survey [Malmendier and Nagel, 2016] and in the lab literature [Anufriev and Hommes, 2012]. The lower the absolute forecast error of model j is as per Equation (4), the higher the forecasting accuracy $U_{j,t}$ is as per Equation (3). In the rest of the paper, we set $K = 4$ quarters (i.e., a year) in line with the related literature (see, for example, Cornea-Madeira et al. 2019). When applying this model to micro data in Section 4, a year of experience also matches the maximum length of the survey tenure of the respondents in the sample.

Equation (5) is the replicator dynamics, which describe how the forecasting type with relatively lower forecast errors gains market shares at the expense of the other type. Pa-

rameter $\beta > 0$ is the so-called intensity of choice: a higher β means a quicker switch to the better of the two rules, and therefore proxies for the degree of rationality of the agents.[7] Finally, parameter $\delta \in (0, 1)$ introduces inertia in the heuristic-switching process since only a fraction $1 - \delta$ of the agents evaluate and consider changing their forecasting model in each period. We interpret this parameter as a measure of inattention to recent data: a higher δ implies a higher fraction of agents ignoring their forecast errors and, therefore, not paying attention to the recently added inflation data points.

3.1.2 Embedding heterogeneous expectations in an inflation model

To estimate the above model using inflation time series, we also need to specify how inflation expectations relate to inflation. We use a standard New Keynesian Phillips curve (NKPC) with heterogeneous expectations in line with the related literature surveyed earlier:

$$\pi_t = \gamma E_t^* \pi_{t+1} + \kappa y_t + \xi_t. \tag{6}$$

The different components are as follows. Variable π_t is the inflation gap with respect to the CB's target and y_t is the output gap, which provides a measure of economic activity and is negatively related to unemployment. Parameter $\gamma \in (0, 1)$ is the discount factor common across all agent-types and $\kappa > 0$ corresponds to the slope of the NKPC derived under a price rigidity assumption ($\kappa < 0$ if unemployment is used instead of output y).

Following the diverse-belief approach of Kurz et al. [2013] used in Cornea-Madeira et al. [2019, Appendix A], the economy-wide inflation expectation $E_t^* \pi_{t+1}$ can be aggregated from the J agent-types using the arithmetic mean while retaining micro-foundations.[8] We

[7] In the limiting case where $\beta = 0$ (and without inertia, that is, $\delta = 0$), $n_{j,t} = 1/2$, $j = 1, 2$, $\forall t$, so that the distribution of types is uniform and independent from their relative performances, depicting a zero-level of rationality. The literature refers to the polar case of $\beta = \infty$ as the "neoclassical limit" where $n_{1,t} = 0$ or 1 and all agents switch to the better type in every period.

[8] In this approach, the shock ξ_t represents the average forecast across all firm-types of their relative prices, which need not be zero (in log-deviation) in the presence of heterogeneous and boundedly rational

may then use the weighted average of the two forecaster types given in Equation (2) for aggregate inflation expectations $E_t^*\pi_{t+1}$. Note finally that within the context of the inflation model given by Equation (6), both forecasting models (1), $j = 1, 2$, are mis-specified since agents misperceive inflation as being driven by past inflation values instead of past output gaps.

We now bring this model to the Canadian inflation time series and let the data speak: Do the estimated parameter values fit the aforementioned behavioral interpretation?

3.2 Estimation results in Canadian inflation data

The behavioral parameters to be estimated are the degree of inattention δ, the degree of rationality β, and the two AR(1) parameters of each type, ϕ_j, $j = 1, 2$. Table 3 presents our estimated values of these parameters under non-linear least squares (NLS) using different specifications. Column I reports the baseline specification given by Equations (1) to (6), where we use the unemployment gap in Equation (6) and consider a monthly frequency. Columns II and III consider, respectively, a common or type-specific intercept in the forecasting models (1). In both cases, such intercepts are statistically insignificant and are therefore not further considered in the rest of the paper. The absence of significant intercepts over the whole sample speaks against a time-invariant bias in households' expectations. In anticipation of the approach developed in Section 4, Column IV shows the robustness of the two-type estimates to assuming $\delta = 0$, that is to ruling out inertia in the adjustment of the relative share of each type. Column V restricts the sample to the time span of the CSCE. Column VI replaces the unemployment gap with the Canadian out-

expectations. Given the lack of data or empirical guidance to specify a price forecasting model, we treat this shock as a residual in the estimation in Section 3.2. Note that other micro-foundations and interpretations are possible. For instance, Arifovic et al. [Forthcoming, App. A] develop the micro-foundations of such a textbook model where heterogeneous expectations are aggregated using the arithmetic mean where the only requirement is a discrete and finite distribution of agent-types; see also, for example, Andrade et al. [2019] for another alternative.

put gap as estimated by the Bank of Canada, which is only available quarterly. In these last two columns, we also set $\delta = 0$ since the lower number of observations compared to the whole sample at a monthly frequency does not permit a precise estimation of this parameter.

In all cases, all estimated coefficients have the correct sign and magnitude and are significant at the conventional level. This implies that the data do not reject the behavioral model of Section 3.1.1 and the dynamics of Canadian inflation are consistent with significant time-varying heterogeneity in inflation expectations.

In detail, the positive and significant estimates of the intensity of choice β indicate that agents exhibit some rationality in adjusting their forecasting model in response to forecasting errors. The degree of inattention as modeled by δ is estimated around 0.5, which suggests that it takes an average of two periods over the sample for agents to review their forecasting strategies. It is convenient to estimate the autoregressive parameters ϕ_j by setting $\phi_2 \equiv \phi_1 + \Delta\phi$ and estimating ϕ_1 and $\Delta\phi$. Parameter ϕ_1 is consistently estimated to be significantly positive but below one, which is in line with mean-reverting inflation beliefs. The estimates of $\Delta\phi$ are systematically positive and significant and the implied values of ϕ_2 significantly exceed one, in line with trend-chasing forecasting behavior.

Figure 2a reports the time series of the implied share of the trend-chasing forecasters n_2. Over the decades following the introduction of the inflation targeting framework in 1991 (marked by the dashed black vertical line), that is, from the mid-1990s to 2020, inflation was low and stable and fluctuated around the target of 2% (thick red line). Accordingly, during this period, the shares of the two forecasting models are roughly equal, fluctuating around 50% each (thick blue line). This is intuitive since both models provide similar forecasts and yield similar forecasting performances when inflation deviations from the target are close to zero. By contrast, before the adoption of inflation targeting in Canada in 1991, trend-chasing inflation forecasters is prevalent, consistently fluctuating around 70%

of the forecasters amid a higher average historical inflation than in the recent decades.

To summarize the degree of anchoring of inflation expectations within the context of our framework, it is convenient to compute the implied total mean reversion in aggregate expectations. We denote this indicator by ρ_t and compute it as the average of the two estimated autoregressive coefficients weighted by the time-varying share of each forecaster type, that is, $\rho_t \equiv \phi_1 \boldsymbol{n_{1,t}} + \phi_2(1 - \boldsymbol{n_{1,t}}) \in [\phi_1, \phi_2]$. This indicator ρ_t increases with the share of trend-followers, and so does the risk of expectation unanchoring. In particular, given the inflation dynamics (6), the target becomes expectationally unstable, and expectations can be said to lose their anchoring whenever $\rho_t \geq \frac{1}{\gamma}$, where the threshold $\bar{\rho} \equiv \frac{1}{\gamma}$ is slightly above one given that γ is a monthly discount factor.[9] Moreover, it is clear from the literature that even when the total mean reversion remains below the stability threshold, the closer it is to this threshold, the more likely escape dynamics will drive inflation away from the target as soon as expectations are not model-consistent (see, for example, Branch and Evans [2011*b*]).

The time series of ρ_t is reported in Figure 2b (orange line with diamonds), where its comovement with the share of trend-followers (blue line with dots) is evident. Over the inflation-targeting decades preceding 2020, the total mean reversion mostly remains well below the threshold $\bar{\rho}$, only occasionally spiking towards it as in the wake of the Great financial crisis. This indicates that aggregate inflation expectations are, on average, mean-reverting and, hence, anchored at the target during this period. This reveals the absence of any expectation unanchoring risk, including during the 2010 decade where policy concerns about below-target inflation were dominant.

By contrast, the most dramatic rise in trend-chasing behavior happens during the post-

[9] To see this, insert aggregate expectations (2) into the inflation law of motion (6), which results in a backward-looking process where inflation in t depends on inflation in $t-1$. Inflation is expectationally stable when the (absolute) value of the first derivative with respect to past inflation is strictly lower than one, which is the case whenever $\gamma\left(\phi_1 \boldsymbol{n_{1,t}} + \phi_2(1 - \boldsymbol{n_{1,t}})\right) < 1$, or $\gamma\rho_t < 1$, where we use $\gamma = 0.996$ and $\bar{\rho} \simeq 1.004$. The statistic ρ_t is reminiscent of the housing market sentiment index in Bolt et al. [2019].

pandemic inflation surge when their share rises from about 50% to about 70%, a level last observed before inflation targeting was introduced in 1991. The resulting increase in the total mean reversion above $\bar{\rho}$ in the wake of this event indicates that inflation expectations on average extrapolate the rising inflation trend into the future, which translates into an unanchoring risk of these expectations. However, our estimations indicate that such an heightened risk has remained relatively short-lived. The share of trend-chasing expectations as well as the total mean reversion start to wane with the moderation in realized inflation following its peak in early 2022.

Overall, our estimation results of the model corroborate the behavioral expectation model, in particular, the time variation in the use of the destabilizing trend-chasing and stabilizing mean-reverting forecasting heuristics, and the ensuing state-dependent risk of expectation unanchoring.

4 Dynamic heterogeneity in micro-level survey data

We now use the micro-level survey data to shed light on the composition of forecasting models in household inflation expectations, and the link between formation of inflation expectations and expectations about other key economic and financial variables, as well as spending intentions.

4.1 Assigning individual respondents to forecasting types

The first step is to classify the short-term inflation expectations of each respondent in each quarter as one of the two forecasting types—trend-chasing or mean-reverting.

4.1.1 Classification strategy

When we bring the model to the micro-level expectations data, we use the expectation formation process described by Equations (5)-(4) in Section 3.1.1. When applied to micro-data, the fraction of type j out of the whole population of agents given in Equation (5) may be reformulated as the theoretical probability of a forecast of being of type j. Like in the exercise in Table 3 above, we set $\delta = 0$ given the relatively limited number of time periods in our sample (CSCE data are available for 39 quarters at the time of writing). The model-implied probability of a forecast π^e to be of type j given the relative accuracy of this type then simplifies into:

$$\Pr(\pi^e \in j \mid U_{j,t}) \equiv n_{j,t} = \frac{\exp(\beta U_{j,t})}{\exp(\beta U_{1,t}) + \exp(\beta U_{2,t})}. \tag{7}$$

The inertia in the forecasting behavior is now entirely captured by the "intensity of choice" β, where higher β values signal a higher level of attention to forecast errors, and a quicker shift towards the more accurate belief-type. The rest of the behavioral model is unchanged: The forecasting performance $U_{j,t}$ of each type is given by Equations (3) and (4).

The elicited inflation forecast of respondent i in quarter t in the CSCE, denoted by $\pi^e_{i,t}$, may be assigned either to the mean-reverting type or the trend-following type, as defined in Equation (1). To bring the behavioral model to the micro-level data, we write any CSCE forecast as:

$$\pi^e_{i,t} \equiv \hat{\phi}_j \pi_{t-1} + v_{i,t},\ j = 1, 2, \tag{8}$$

where we use the estimated values $\hat{\phi}_1 = 0.657$ and $\hat{\phi}_2 = 1.139$ presented in Table 3,[10] and $v_{i,t}$ is a noise term, perhaps reflecting an idiosyncratic perception adjustment, inattention, or confusion.

[10]Results are virtually identical if using $\hat{\phi}_1 = 0.771$ and $\hat{\phi}_2 = 1.119$ from Column V of Table 3, estimated using data for CSCE sample period 2014Q4–2024Q4. These results are available upon request.

Following Branch [2004], we assume $v_{it} \overset{iid}{\sim} \mathrm{N}(0, \sigma_v^2)$, and we write the individual-level empirical probability $\Pr\left(\pi_{i,t}^e \in j\right)$ of a given CSCE forecast $\pi_{i,t}^e$ of belonging to type j as:

$$\Pr\left(\pi_{i,t}^e \in j\right) = \frac{1}{\sqrt{2\pi}\sigma_v} \exp\left(-\frac{1}{2}\left(\frac{\pi_{i,t}^e - \hat{\phi}_j \pi_{t-1}}{\sigma_v}\right)^2\right). \tag{9}$$

This means that when a forecast $\pi_{i,t}^e$ is close to the type-j implied forecast $\hat{\phi}_j \pi_{t-1}$, the probability of this forecast being of type j increases.

The probability of observing the entire CSCE sample with a type assignment has the following density function:

$$Pr(\pi_{i,t}^e, i = 1, \ldots, N, t = 2014Q4, \ldots, 2024Q2 \,|U_{j,t}, \hat{\phi}_j \pi_{t-1}, t = 2014Q4, \ldots, 2024Q2, j = 1, 2) \tag{10}$$

$$= \prod_t \prod_i \left[\sum_{l \in \{1,2\}} n_{l,t} P(\pi_{i,t}^e \in j = l)\right]$$

Combining Equations (9) and (10), we may write the log-likelihood function of each $\pi_{i,t}^e$ being a certain belief-type given its relative forecasting performance:

$$\mathcal{L} = \sum_t \sum_i \ln \sum_{j \in \{1,2\}} \frac{\exp(\beta U_{j,t-1})}{\exp(\beta U_{1,t-1}) + \exp(\beta U_{2,t-1})} \times \frac{1}{\sqrt{2\pi}\sigma_v} \exp\left(-\frac{1}{2}\left(\frac{\pi_{i,t}^e - \hat{\phi}_j \pi_{t-1}}{\sigma_v}\right)^2\right). \tag{11}$$

We can now estimate the values of β and σ_v that maximize the likelihood $\mathcal{L}$. We then match every forecast in each period to the most likely type j as given by Equation (9). That is, a respondent i's forecast $\pi_{i,t}^e$ is classified as type $j = 1$ if $\Pr\left(\pi_{i,t}^e \in 1\right) > \Pr\left(\pi_{i,t}^e \in 2\right)$.[11]

[11] In the event of a tie, the type is randomized. However, as both forecasts are continuous and the probability of each forecast is given by (9), ties are unlikely. One may also notice that a forecasting type may be attributed to a given forecast by simply minimizing the distance of this forecast to the type-implied fore-

4.1.2 Dynamics of trend-chasing behavior in the micro-level data

We present the share of trend-chasing forecasters estimated from the CSCE micro data in Figure 3 (red solid line with dots). The dynamics of the share of trend-chasing forecasts is closely related to the movements of the inflation gap with respect to the 2% target (the black dashed line represents inflation and the black plain line the target). In the early part of the sample until 2018, inflation fluctuates below the target, so the inflation gap is negative and the share of trend-chasing forecasts is relatively low, fluctuating around a quarter of the respondents. In 2018 and 2019, inflation is on average on target, so the inflation gap is essentially zero and both belief-types deliver the same short-run inflation expectations.[12] This proximity makes it difficult to identify each type from the expectation data. Therefore, due to this identification challenge, the share of each belief-type fluctuates around 50% between 2018 and 2020, with somewhat large fluctuations.

More interestingly, at the onset of the COVID-19 pandemic in 2020, inflation falls sharply below target, and so does the share of trend-chasers, to around 15%. This relatively higher share of mean-reverting beliefs implies that the vast majority of consumers (about 85%) do not expect further disinflation, or even deflation (as evidenced in Figure 1b), and their expectations align more closely to the mean-reverting than to the trend-chasing ones. This could reflect downward rigidity in inflation expectations.

The picture changes drastically during the post-pandemic inflation surge: After inflation overshoots the target on its upward trend (around 2021Q2), the share of trend-chasing inflation expectations quickly increases and reaches almost 70% within a couple of quarters. Trend-chasers then extrapolate above-target inflation into the future, which corresponds

cast. The resulting classification would be identical, but our model-based approach provides a behavioral framing of the results. Most importantly, our approach allows for the comparison of the estimated values of the noise and the intensity of choice across different groups of respondents, which sheds further light on the heterogeneity of forecasting behaviors in the public.

[12] This can be clearly seen from the closeness of the dark gray line with 'T' marks (representing the trend-chasing forecasts conditional on the last inflation gap) with the light gray line with 'M' marks (representing the mean-reverting expectation) in Figure 3.

to *higher* expectations than the mean-reverting ones since the inflation gap is positive. Interestingly, the share of trend-chasing expectations starts declining—from 68% in 2022Q1 to 64% in 2022Q2, the quarter when inflation reaches its peak— *before* inflation starts moderating and before the Bank of Canada starts to hike its policy rate in 2022Q2 (represented by the dotted-dashed blue line on Figure 3). This is consistent with the plateauing of expectations observed in these quarters (see, again, Figure 1b). Trend-chasing expectations continue moderating down to 43% in 2023Q1 and mean-reverting expectations become more prevalent. This pattern, along the inflation peak, is an encouraging sign for the anchoring of inflation expectations: Many Canadians did not further extrapolate the inflation upswing, even though their expectations remained elevated throughout the disinflation period.This could be a result of the anticipation of the tightening cycle of monetary policy to address high inflation.

Despite such a positive development during 2022 and early 2023, trend-chasing expectations grow again from 2023Q2 on, and their share reaches 74% in 2024Q2, our last observation. This also corresponds to the highest trend-chasing share during the sample period. To understand why, recall that the expectations of trend-chasers are higher than the ones of mean-reverting consumers since the inflation gap remains positive, even though the difference between these two types of expectations has shrunk considerably compared to the previous quarters featuring higher realized inflation. Both belief-types expect a decrease in inflation, but trend-chasing expectations decline more slowly than mean-reverting expectations, in line with the dynamics of the CSCE expectations (see Figure 1b). While expectations moderate in the wake of the disinflation, their decrease is less steep than that of actual inflation, and expectations remain persistently above inflation. This persistent high share of trend-chasing expectations indicates that the risk of expectations unanchoring remains high in Canada, with many Canadians persistently expecting inflation to remain above target despite the current disinflation.

Before diving into the drivers of each belief-type, Figure 4a compares the model-implied fraction of trend-chasing forecasters over time as estimated from the micro data (red line with dots) with the one estimated in Section 3 from the aggregate inflation data (blue line with diamonds) for the sample period of the CSCE (2014Q4–2024Q2). Figure 4b compares the implied total mean reversions implied by the two datasets (the orange line with dots is estimated on the aggregate data, and the blue line with diamonds on the CSCE data). The dynamics of the two estimates share many similarities; most notably the quick rise during the post-pandemic inflation surge, followed by a decline. In the most recent quarters, both approaches also show an increase in trend-chasing expectations, and the total mean reversion from the micro data even exceeds the stability threshold in the latest quarter. This suggests that the risk of unanchoring of inflation expectations has not fully dissipated yet.

Our estimates of the dynamics of trend-chasing expectations and total mean reversion based on macro- and micro-level data also exhibit three differences. First, along the negative inflation gap in 2014–2017, the share of trend-chasers in the micro-level data hovers around 20%, which is saliently below the 50% average found in the aggregate data. The micro-based estimate indicates rather anchored expectations despite persistently low inflation, while much of the academic literature and policy discussions at the time were concerned about the risk of downside unanchoring. Once the inflation gap closes in 2018–2019, this discrepancy disappears and both estimates hover around 50%, in line with the previous discussion on the identification challenge of the two types when the inflation gap is essentially zero. The total mean reversion also becomes similar under both approaches.

Second, when inflation declines at the onset of the COVID-19 pandemic, trend-chasing expectations become less prevalent in the micro-data, in line with the CSCE expectations remaining close to the target in this period (see, again, Figure 1b). By contrast, the share of trend-chasing expectations estimated from the aggregate data remains around 50%.

Finally, the timing of the decline in trend-chasing expectations differs between the two estimates. Trend-chasing behavior from the aggregate data starts declining *after* the realized inflation rate starts doing so, whereas from the micro-level data, it starts moderating *before* the turning point in the inflation trend. This is consistent with the plateauing of expectations discussed above in this period. In line with this difference, the total mean reversion from the aggregate data is higher during the inflation surge and declines later than its micro-data counterpart.

These differences highlight the added value of using micro-level data to analyze the dynamics of inflation expectations over the business cycle. In the case of Canada, using micro-level data also reveals that negative inflation gaps are associated with a lower share of trend-followers compared to inflation surges, which speaks to an asymmetry in the state-dependent risk of expectation unanchoring. This risk appears more serious on the upside, when inflation peaks above target, than on the downside, when inflation hovers below target.

The micro-data approach also allows us to look at various demographic groups separately, along with leveraging the richness of CSCE microdata to shed light on the profile of these trend-chasers.

4.1.3 Estimated heterogeneity using micro-level data

Table 4 provides the estimated values of the "intensity of choice" β and the variance of the idiosyncratic noise σ^v for the entire sample of households in the CSCE, and by demographic groups. Looking first at the whole sample (first row), the estimates of β are significantly positive for all samples and demographic groups.[13] This is consistent with the aggregate estimates of Section 3, and provides an empirical validation of the evolu-

[13]The only exceptions are the youngest respondents (18–24), the lowest income level, and the unemployed respondents.

tionary switching model at the micro level.

Turning now to the estimates per demographic group, our results provide new evidence on the heterogeneity in forecasting behaviors. First, comparing β values across groups reveals distinct levels of rationality and attention to recent forecast errors. Middle-aged respondents, people with low to middle education attainments, middle-income earners, employed respondents, and mortgage holders are associated with higher β values than the other groups, in particular younger and older respondents, most educated people, lowest and highest income earners, mortgage-free homeowners, tenants, and people not working. These differences may reflect distinct positions in the life cycle or different levels of exposure to inflation (and interest rate movements).

Second, the level of noise, measured by the variance σ^v, is also significantly different across demographics, which further demonstrates forecast heterogeneity across groups of respondents. For instance, households with lower levels of education tend to have higher levels of noise in their forecasts compared to those with college or university degrees, which may reflect lower numeracy and financial literacy and, therefore, confusion when it comes to forming inflation expectations. This is also the case for households with lower levels of income or renters, which likely correlates with education levels. Differences in the level of noise in inflation forecasts may also reflect differences in the sensitivity of their consumption baskets to aggregate shocks and distinct inflation perception. Instead, noisier forecasts among the youngest respondents could reflect a shorter inflation experience to draw from and a more pronounced recency bias compared to older respondents. Our findings are consistent with and expand the related literature on the demographic determinants of inflation forecasts (see, for example, D'Acunto et al. 2023; Euihyun Bae and Andrew Hodge and Anke Weber 2024). Our model provides a behavioral interpretation of these distinct forecasting behaviors.

Next, we dive into the socio-demographic and economic profiles of trend-chasing fore-

casters by the means of probit regression models. In these models, the dependent variable is a dummy that equals one if a given respondent is a trend-follower in a given quarter. Results are reported in Table 5 for the whole sample (Columns I and IV), and by considering separately the years before (Columns II and V) and since the recent inflation surge (Columns III and VI).

Overall, we find that trend-chasing behavior is significantly more likely among respondents under the age of 55, respondents with lower levels of education, middle-income respondents, females, and renters relative to homeowners (whether they hold a mortgage or not). Taking the age pattern as an example, younger respondents being more likely to be trend-chasers than older ones is consistent with the dynamics of trend-following behavior by demographic groups displayed in Figure B1. During the decline in inflation in 2020, while all age groups became more likely to expect mean reversion, this switch to mean reversion was particularly more pronounced the older the respondents. While almost all respondents aged 55 and older switched to mean-reverting expectations, substantially fewer did so among younger respondents, and less than 70% did so among the youngest age group. This pattern also aligns with the lower estimate of the intensity of choice and the higher level of noise among younger respondents compared to older ones (see, again, the second to fourth rows of Table 4). These translate into younger respondents displaying more inertia in their forecasting model.

Coming back to Table 5, socio-demographic differences along gender and education attainment hold no matter the sub-period considered, but all other differences become significantly more pronounced over the recent inflation surge (Column III). Most interestingly, Columns VI to VI additionally control for measures of financial stress, numeracy, and "inflation literacy" skills, which considerably and significantly weakens the association between demographics and trend-chasing behavior. In detail, over the whole sample (Column IV), education, gender, and housing tenure are the only demographic variables that remain significantly associated with trend-chasing inflation expectations,

while income and age become insignificant factors. The strongest association is then with financial stress and numeracy: Respondents under higher financial stress and with lower numeracy skills are more likely to hold trend-following expectations than the others, perhaps reflecting pessimism. Before the recent inflation surge (Column V), no significant demographic difference even persists and trend-chasing behavior is only associated with lower numeracy skills and a higher financial stress.

Focusing on the recent inflation surge (Column VI), significantly more trend-following behavior among females, low- or high-income groups (compared to middle-income groups), married people, employed respondents, and renters persist despite controlling for numeracy and the (particularly strong) association with financial stress. This pattern among females may reflect a stronger exposure to food prices during grocery shopping compared to male respondents [D'Acunto et al., 2023]. The patterns among high-income, employed, and married respondents may also reflect an association between larger household sizes and trend-chasing behaviors. The higher prevalence of trend-chasing behaviors among renters and lowest earners may reflect a higher vulnerability to price increases.

Overall, our findings point to a significantly higher risk of unanchoring inflation expectations of specific socio-demographic and economic groups, in particular amid the recent inflation surge. This risk may be mitigated by the means of targeted and differentiated central bank communication strategies.

4.1.4 Trend-chasing behaviors and views about monetary policy and inflation

We further explore the factors influencing the formation of trend-chasing inflation expectations using special questions that are occasionally included in the CSCE. One question asks about the respondents' views about the importance of low and stable inflation in 2019 and in 2021. Another question proxies for the credibility of the Bank of Canada by eliciting the respondents' beliefs about how frequently the Bank has achieved its target in

the past, and how often they believe it will in the future. We also use a question posed during the post-pandemic inflation surge about how concerned respondents are about inflation relative to the past. The survey questions are included in Section A.1 and the estimation results are presented in Table 6.

Here again, separating the pre- and post-inflation surge periods becomes particularly insightful. While respondents who view low and stable inflation as important are less likely to be trend-chasers when inflation is low in Canada (Column 2), they become *more* likely to be trend-chasers during the recent inflation surge (Column 3). The association between believing in the importance of low and stable inflation and trend-chasing inflation expectations has become particularly strong in the recent period, and so has the association between a lack of credibility and trend-chasing forecasting (Columns IV and VII). In other words, respondents with a higher level of trust in the ability of the Bank to achieve its target form their inflation expectations consistently by expecting inflation to return to its target (i.e., hold mean-reversing expectations). The correlation between trust in the monetary policy and inflation expectations only materializes during the high-inflation period (see Columns V and VIII vs. VI and IX).

A similar story emerges when considering the association between growing concerns about inflation and forecasting behaviors. When inflation is low (Column X), growing concerns about inflation are linked with mean-reverting beliefs. By contrast, amid the post-pandemic inflation surge, respondents more concerned with inflation become more likely to be trend-chasers and expect higher future inflation.

Overall, our results underline the importance of trust in the central bank and the credibility of its inflation target in the formation of inflation expectations. In addition, they support the use of mean-reverting expectations as a proxy for central bank credibility [Ozden, Forthcoming; Kostyshyna et al., 2024].

4.2 Trend-chasing inflation forecasts and other macroeconomic expectations

Once each individual respondent is assigned to a forecasting type reflecting their short-run inflation forecasts, we can explore the association between this behavior and other economic and financial expectations elicited in the survey. We do so by using the following econometric specification:

$$z^e_{i,t} = c + \alpha_0 \text{Trend-follower}_{i,t} + \alpha_1 \text{HIFE}_t + \alpha_2 \text{Trend-follower}_{i,t} \times \text{HIFE}_t + \alpha_4 \mathbf{X}_{i,t} + \epsilon_{i,t} \quad (12)$$

where the dependent variable $z^e_{i,t}$ is a variable describing the expectation elicited in quarter t from respondent i concerning either medium-term (two-year) or long-term (five-year) inflation; interest rate over the next one, two, and five years; local house price growth over the next one and five years; nominal wage growth over the next year; or growth in household spending, income, and tax over the next year. The dummy variable $\text{Trend-follower}_{i,t}$ equals one if respondent i's one-year-ahead inflation expectation in quarter t is classified as trend-chasing (as described in Section 4.1), and zero if classified as mean-reverting. The dummy variable HIFE_t for "high-inflation environment" is equal to one for the period 2021Q2–2024Q2, and zero otherwise. The vector $\mathbf{X}_{i,t}$ is a set of control variables that gathers demographic characteristics (age, gender, income, marital status, education, labor force status, home ownership status), the region of residence, survey quarter, and tenure fixed effects, which may account for participants' learning through survey participation [Kim and Binder, 2023].

The estimation results of Equation (12) are reported in Table 7. Strikingly, over the recent period, the two belief types also form distinct expectations of all other variables at all horizons available in the CSCE.

In detail, the first three columns show the link between being a trend-chaser in short-run

inflation and one-, two-, and five-year-ahead inflation forecasts. In times of stable and low inflation (corresponding to HIFE $= 0$), trend-followers tend to have *lower* short- and medium-term inflation forecasts than mean-reverting forecasters since they tend to extrapolate below-target inflation (Columns I and II). In the long run, both forecaster types expect similar levels of inflation (Column III). By contrast, during the recent inflation surge (corresponding to HIFE $= 1$), while both types have higher short-run inflation forecasts than previously, the average trend-chasing short-run inflation forecast is about 3.85 percentage points (p.p.) higher than the average mean-reverting forecast (Column I).

While both types of forecasters expect inflation to moderate in the medium to long run, the gap between the two types persists at 3.06 p.p. for two-year-ahead and 2.06 p.p. for five-year-ahead inflation. These results show there exists a substantial pass-through between short-term and medium- to long-term inflation expectations. Inflation expectations are often viewed as anchored when *long-term* inflation expectations are not sensitive to current shocks that affect the contemporaneous inflation and, possibly, short-term inflation forecasts [Williams, 2022]. Our finding that trend extrapolation in short-run inflation forecasts in the wake of an inflation surge feeds into household longer-term expectations suggests an increase in the risk of unanchoring longer-run expectations, exacerbating the persistence of inflationary shocks and entrenching above-target inflation. Our model-based approach, combined with micro-level data, highlights three self-reinforcing developments during the inflation surge that contribute to the increase in the unanchoring risk: an increase in the share of trend-chasing expectations (Figure 4a), higher inflation expectations of these trend-chasing forecasters (Table 7), and an increase in the pass-through from short-term to long-term inflation expectations among trend-chasers.

Consistent with higher inflation expectations, forming trend-chasing, short-term inflation expectations is linked with higher interest rate forecasts at all recent horizons. Before the inflation surge, the differences between the two groups are negligible (see Columns IV to VI in Table 7). Inflation trend-chasers expect one-year, two-year, and five-year-ahead

interest rates to be more than 1 p.p. higher; that is, they expect a tighter monetary policy for the foreseeable future compared to the mean-reverting forecasters. However, the pass-through between their inflation and interest rate forecasts is incomplete since they expect a less than one-to-one adjustment of the interest rate to inflation.

A similar pattern holds for all other forecasts. In the high-inflation environment, trend-chasing inflation forecasters expect higher growth in their spending (by 1.50 p.p.), their wages (by 0.26 p.p.), their household income (by 0.51 p.p.), and their tax bill (by 0.83 p.p.) compared to the mean-reverting forecasters (see Columns VII to X in Table 7). Prior to the inflation surge, no sizable difference is found between these expectations for the two forecaster types. Recently, trend-followers also have higher expectations of house price growth than mean-reverters (by about 2.2 p.p. over a one-year horizon, which persists to almost 2 p.p. over five years). The opposite pattern holds prior to the inflation surge, but the magnitude of the differences is not large (around 0.5 p.p.).

To summarize, when inflation is low and stable, holding trend-chasing or mean-reverting, short-run inflation expectations is not significantly associated with expectations for other variables. However, during times of high-inflation, trend-chasing inflation expectations are associated with higher expectations for all other economic variables. The most concerning finding from the point of view of expectation anchoring is the reinforced pass-through between short- and long-term inflation expectations among trend-chasers during the post-pandemic inflation surge.

4.3 Trend-chasing inflation forecasts and consumer spending

A fundamental question in studies of inflation expectation is how they affect consumer's actions, such as spending. To address this question, we estimate the relationship between trend-chasing in short-run inflation and consumer spending intentions. CSCE respon-

dents are asked whether they intend to undertake any of the following seven actions in light of their inflation expectations: (1) bring forward major purchases, (2) cut back spending and save more, (3) look to increase income in other ways, (4) postpone major purchases, (5) push for increased pay with their current employer, (6) shop around more for better value goods and services, (7) take no action (the survey question is included in Appendix A.2). Multiple choices are possible. Based on this information, we estimate the following probit models:

$$\mathbb{1}_{i,t}^{A} = c + \gamma_0 \text{Trend}_{i,t} + \gamma_1 \text{HIFE}_t + \gamma_2 \text{Trend}_{i,t} \times \text{HIFE}_t + \gamma_4 \mathbf{X}_{i,t} + u_{i,t}, \tag{13}$$

where the dependent variable $\mathbb{1}_{i,t}^{A}$ equals one if respondent i in quarter t reports the intention to undertake action A in light of their inflation expectations, and zero otherwise. Action A is one of the seven actions listed above. The rest of the variables in Equation (13) are defined as in Equation (12). This equation allows us to estimate whether the relationship between the inflation forecasting models and consumer behaviors has changed during the recent period. The estimated marginal effects for each of the seven actions are presented in Table 8.

In periods of low and stable inflation, trend-chasing behavior in inflation forecasting does not significantly or substantially influence consumers' plans. This is evident from the non-significant coefficients on the trend-chasing dummy in most columns, and the small magnitude of the marginal effects in the others.

However, significant differences between the two types of forecasters arise during the post-pandemic inflation surge. While all respondents become more likely to say they intend to cut spending and save more (Column II), postpone major purchases (Column IV), and push for a pay raise (Column V), and are less likely to undertake no action (Column VII), trend-followers are even more likely to do so than mean-reverters in the recent environment. By contrast, both types also declare they are more likely to bring forward major

purchases (Column I), but the magnitude of the marginal effect is smaller than the one associated with postponing such purchases. Trend-followers are also more likely than mean-reverting forecasters to shop around to decrease their spending (Column VI) and to look to increase their income in other ways (Column II).

The finding about the negative impact of trend-chasing on spending when inflation is above target is important in light of theory. The Euler equation, which constitutes the workhorse of consumer modeling, prescribes that households with higher inflation expectations should *increase* rather than decrease their consumption. Our findings do not support this prediction. While both the income and the substitution effects may find some support in the data, the income effect is dominant in our dataset. This is an important result for modeling, prediction, and policy design purposes since the workhorse model of consumer behavior relies almost exclusively on the substitution effect at play in the Euler equation. However, when confronted with a severe inflationary shock, our data indicate the opposite effect. This negative impact of trend-chasing inflation expectations on spending can have a stabilizing impact on inflation through lower demand.

Our results are consistent with the evidence of the negative effect of inflation expectations on household spending documented by Coibion, Georgakos, Gorodnichenko and van Rooij [2023], Binder and Brunet [2022], and Kostyshyna and Petersen [2024]. Coibion et al. [2023] find that Dutch households with higher inflation expectations spend less on durable goods. Binder and Brunet [2022] report that U.S. households expecting higher inflation plan to spend less on cars. Kostyshyna and Petersen [2024] find that higher inflation expectations by Canadian households lead to lower total spending, including both durable and non-durable goods. The negative effect of inflation expectations on spending may be attributed to consumers associating inflation with negative developments in the economy (see Andre et al. 2022; Stantcheva 2024).

The negative effect of higher inflation expectations on spending plans in our data is con-

sistent with the positive but particularly weak pass-through between inflation expectations and CSCE respondents' nominal wage expectations [Jain, Kostyshyna and Zhang, 2024]. In other words, trend-chasing consumers expect a sizable decline in their real wages over the coming years. They react by restricting spending and, to a lesser extent, looking for ways to increase their nominal income (Column III of Table 8).

Our exercise clearly underscores a significant and sizable relationship between trend-chasing behavior in short-run inflation expectations and consumer spending plans in a high-inflation environment. This finding has policy implications as it reiterates the role of the expectation channel in consumer decisions and the need to manage expectations in face of inflationary shocks. It also points to potentially sizable aggregate demand effects of changes in forecasting behavior amid inflationary shocks.

5 Conclusion

We characterize the heterogeneity in inflation expectation formation among Canadian households over the business cycle and across demographics through the lens of a stylized heterogeneous expectations macroeconomic model. This model allows us to disentangle two types of forecasting behaviors from both aggregate data and micro-level survey data: a mean-reverting model that delivers anchored (medium-run) expectations, and destabilizing trend-chasing behaviors where agents expect inflation to drive further away from the target in the face of transitory shocks.

We find that the recent inflation surge has led to a higher share of trend extrapolation when it comes to forecasting short-run inflation, and a mirroring declining share of mean-reverting beliefs. The granularity of the micro-level survey data allows us to establish how much more prevalent trend-chasing behavior is across some demographic groups. Views about monetary policy and trust in the CB are also found to correlate with inflation

forecasting behaviors. In particular, mean-reverting inflation beliefs are more prevalent among respondents who think that the Bank of Canada can achieve its inflation target. Our model-based behavioral interpretation of the data further identifies distinct levels of noise and attention in the inflation expectations of the various demographic groups.

Our findings highlight the interplay between movements in inflation, expectation adaptation, and changes in consumer behaviors. Not only do the mean and the cross-section dispersion of households' inflation expectations increase in the wake of an inflation surge, people also change the way they form their expectations. This change further extends to longer-run inflation and other economic outlooks. Perhaps most importantly, the heightened use of trend-chasing models could translate into sizable aggregate demand effects as trend-chasers are more likely to report restricting their spending than mean-reverters.

The results of this study have three types of important implications, namely for the nature of inflation expectations, macroeconomic modeling, and monetary policy. First, not only do people's inflation expectations differ along demographic groups, as surveyed in, for example, D'Acunto et al. [2023], but our results unveil one mechanism behind this heterogeneity, namely the use of distinct *models* of expectation formation. This leads to different groups adjusting their beliefs differently along the business cycle. Our findings are particularly important since these distinct expectation formation processes concern beliefs about a broad spectrum of economic variables as well as consumer decisions. Age-sensitive trend-chasing behaviors could be explained by cohort-specific experiences, in line with the work of Malmendier and Nagel [2016], since the recent surge in inflation has no precedent in the lifetime of younger cohorts. However, we document similar differences along other dimensions, such as education achievements, income levels, sex, and house ownership status. These differences may relate to distinct group-level economic experiences and exposure to economic information (as surveyed, for example, in Malmendier 2021). Recent contributions also highlight the role of subjective memories

of past economic circumstances that are carried out distinctively into expectations (see Salle, Gorodnichenko and Coibion 2023; Bordalo, Burro, Coffman, Gennaioli and Shleifer Forthcoming). Policy-makers could benefit from a detailed picture of this heterogeneity to design targeted communication policy. Additionally, the framework used in this paper could be applied to model heterogeneous, group-specific expectation formation processes in general-equilibrium models. In general, our work calls for further research to understand the sources of these heterogeneous behaviors, which is essential to help predict beliefs, choices, and the effects of policies.

Second, our findings emphasize the interplay between inflation expectation formation mechanisms and economic behaviors. Trend-chasing consumers, who anticipate higher inflation and nominal interest rates, intend to save more and spend less. This finding stresses that household inflation expectation formation may have a sizable impact on aggregate demand and the transmission mechanism of monetary policy. Importantly, this finding contradicts the predictions of the Euler equation in standard macroeconomic models. Instead, it aligns with the empirical evidence showing a negative effect of inflation expectations on consumer spending [Coibion et al., 2023; Binder and Brunet, 2022; Kostyshyna and Petersen, 2024]. Therefore, boundedly rational agents need not behave consistently with optimization models based on rational expectations, which calls for further behavioral research beyond expectation formation to inform model-based policy design. Interestingly, in our data, consumer plans are consistent with their real wage expectations: Trend-chasing consumers do not expect nominal wages to keep pace with inflation, but instead expect their real wages to substantially decline [Jain et al., 2024; Savignac et al., 2024], leading them to restrict spending and chase income growth opportunities. The possible implications of this behavior for aggregate demand suggest an urge to move beyond the (already extensive) research on inflation expectations to emphasize instead the dynamics of real wage expectations as a whole.

Finally, the positive pass-through from unstable trend-chasing prediction models of short-run inflation to long-run inflation poses a substantial state-dependent risk to the anchoring of inflation expectations, exacerbating the persistence of inflationary shocks and entrenching above-target inflation. On the policy front, this paper highlights the added-value of bringing a parsimonious behavioral model to the micro-data. Our framework can be deployed in near real time, matching the frequency of collection of expectation data. Within the context of the Canadian economy, our results may call for higher-for-longer interest rates to durably bring inflation back into the targeted range and ensure the anchoring of inflation expectations. This policy would entail higher output costs and heightened financial vulnerabilities compared to what would prevail had long-run expectations remained well-anchored to the target despite transitory inflationary pressures.

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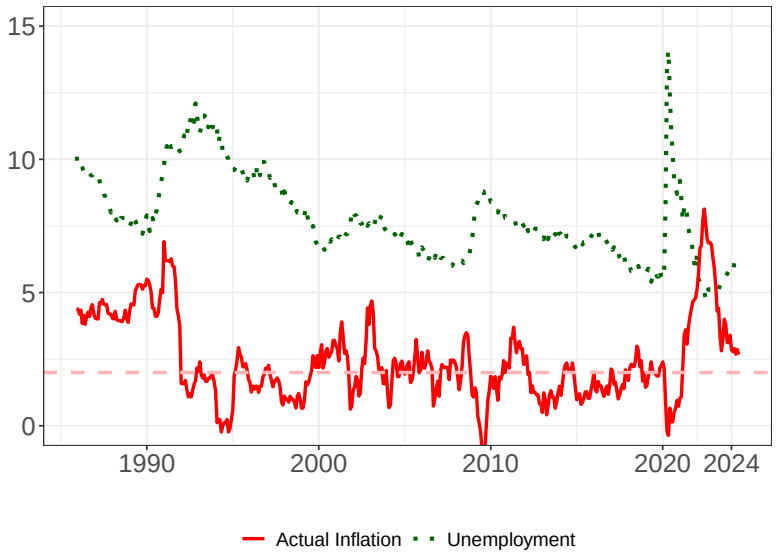
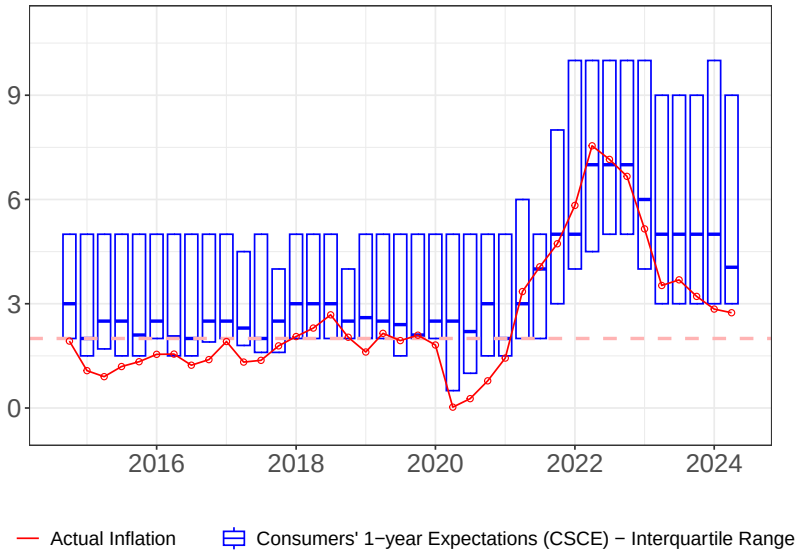
Figure 1: Realized inflation, unemployment rate, and inflation expectations

(a) Unemployment and inflation in Canada



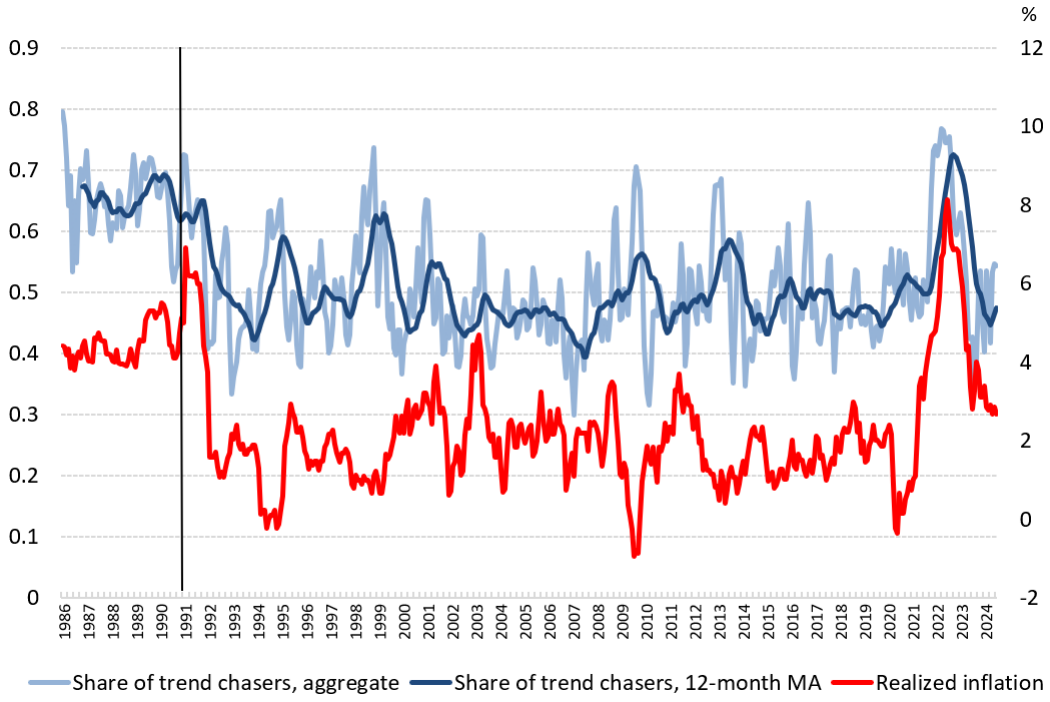
(b) Inflation expectations in the CSCE



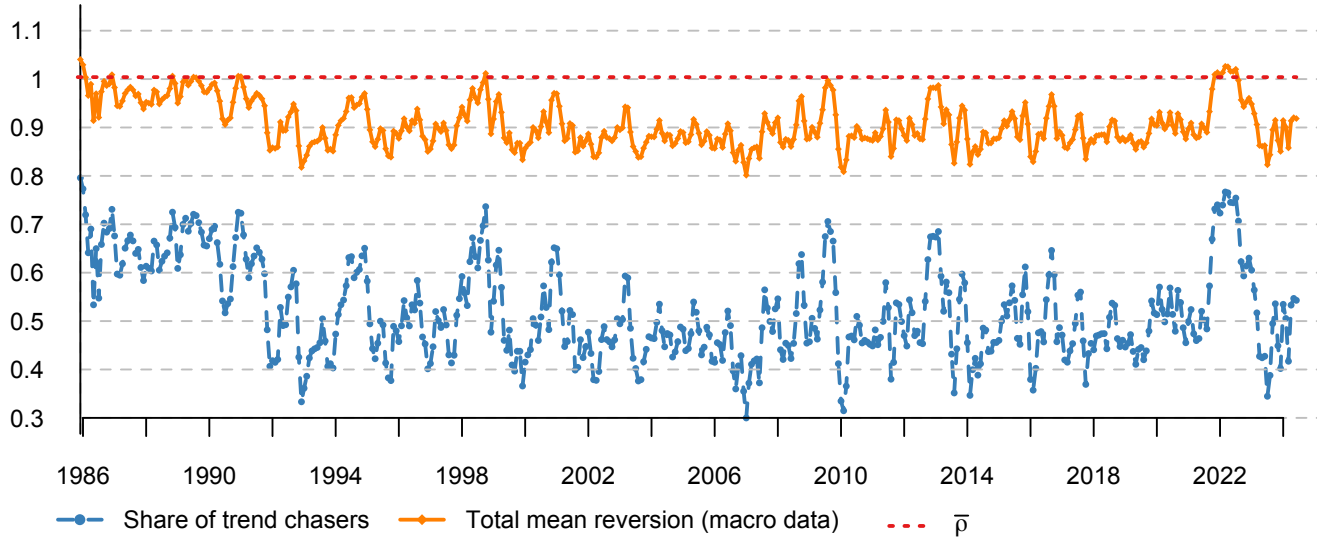
Notes: The straight dashed red line represents the 2% inflation target adopted by the Bank of Canada in 1991. Panel (a) presents realized inflation from Statistics Canada (Cansim Table 18-10-0004-01) and unemployment rate (Cansim Table 14-10-0287-01). Panel (b) presents the median one-year-ahead inflation expectations (blue vertical bars) and the second and third quartiles of these expectations (blue boxes) from the CSCE.

Figure 2: Dynamics of trend-following behavior in aggregate data

(a) Trend-followers and inflation dynamics in Canada



(b) Mean reversion in aggregate inflation expectations



Notes: The black vertical line marks the introduction of the inflation targeting mandate in Canada in 1991. The correlation of the share of trend-follower forecasters n_2 (blue line) with realized inflation (red line) is 0.676 ([0.623, 0.723]).

Figure 3: CSCE expectations dynamics, inflation and monetary policy

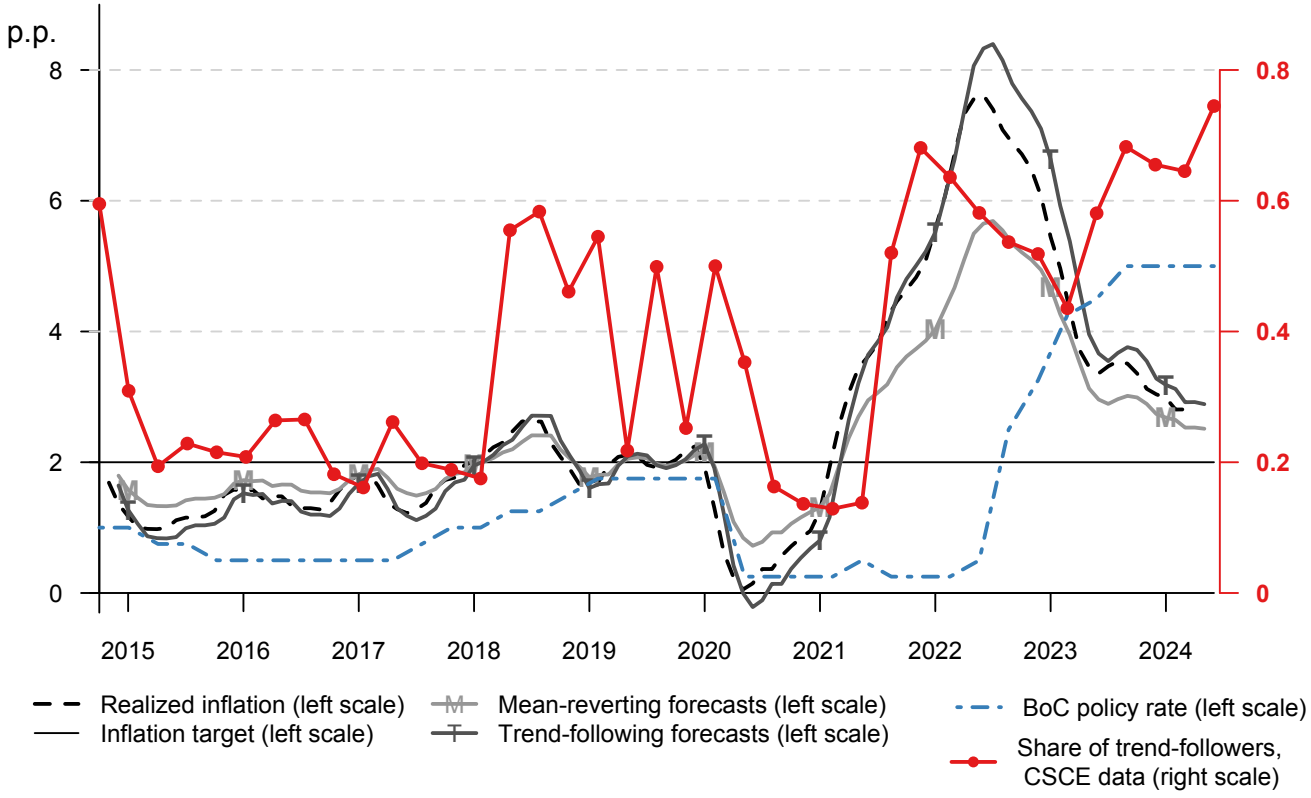
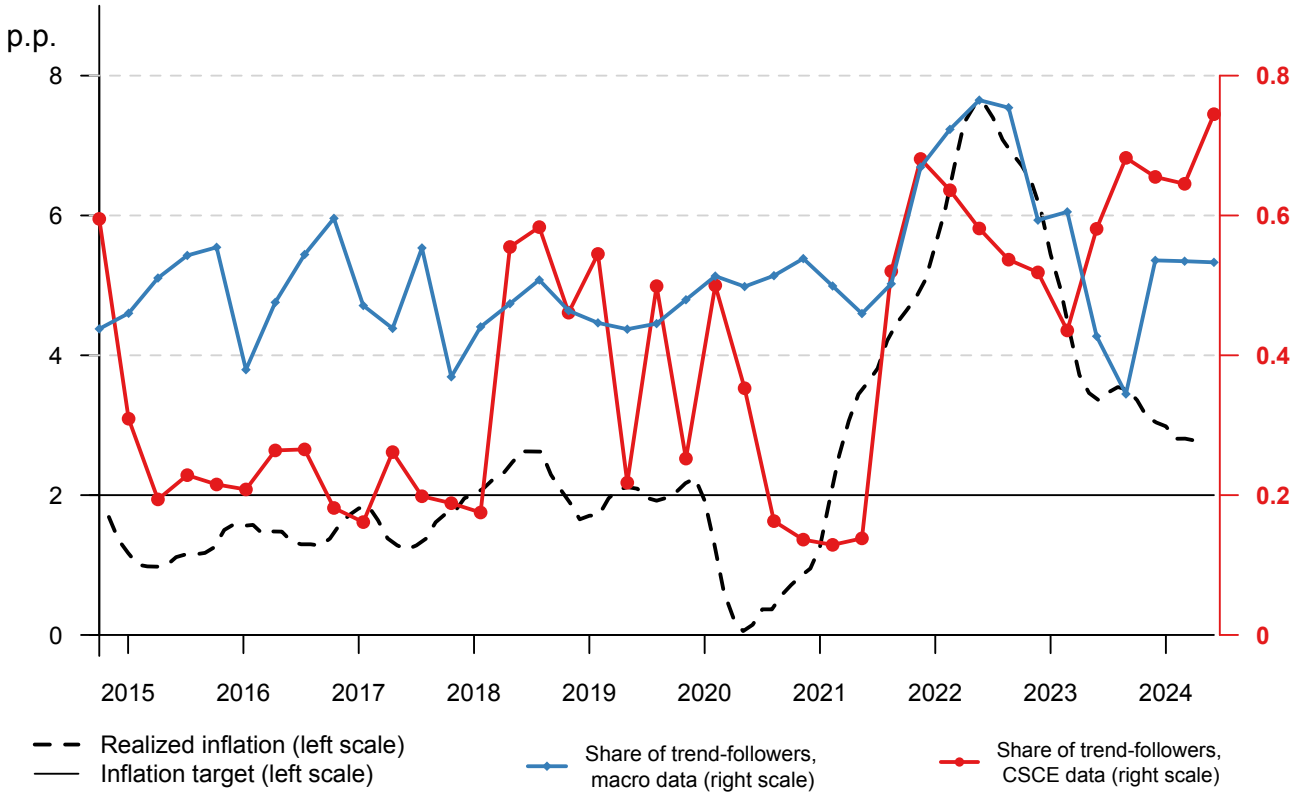
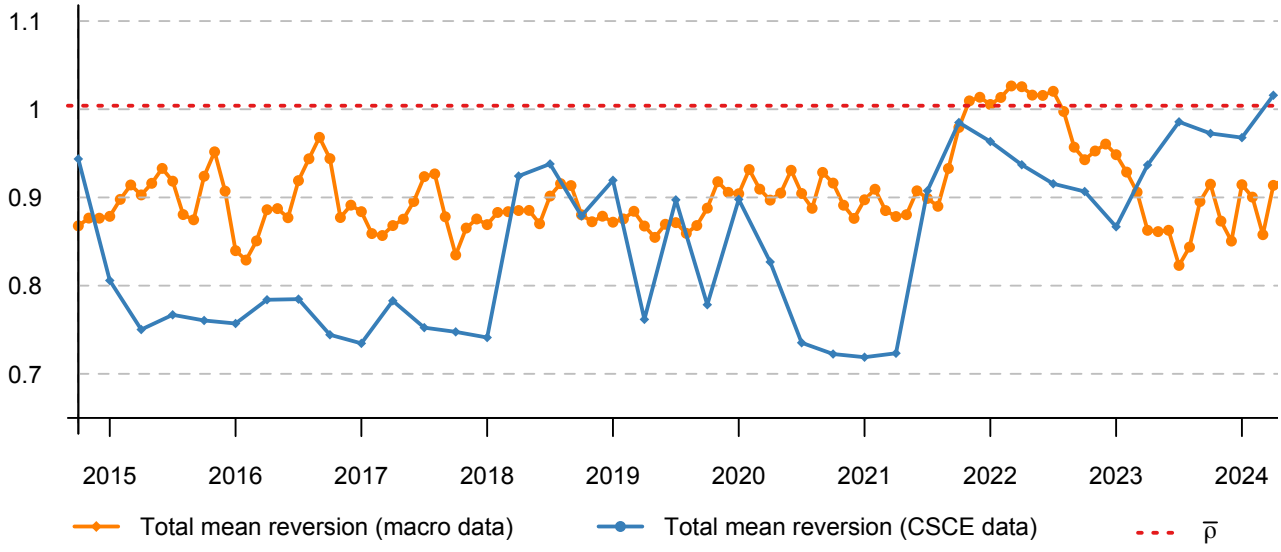


Figure 4: Comparison of trend-chasing behavior in the macro and the CSCE micro data

(a) Comparison of the shares of trend-chasing inflation forecasts



(b) Comparison of the total mean reversion in inflation expectations



Notes: The share of trend-chasers and the total mean reversion based on aggregate data correspond to the data used in Figure 2 aggregated to a quarterly frequency to match the one of the CSCE data.

Table 1: Demographic composition in the CSCE

	CSCE		***Canadian Census***
	No. observations (N=64,685)	*Proportion* (%)	*Proportion* (%) (N=36,991,981[a])
Age groups:[a]			
Young	3,139	4.85	8.29
Middle	37,579	58.10	51.10
Senior	23,967	37.05	40.61
Education levels:[b]			
High School/Lower	11,110	17.18	32.50
College/Middle	23,933	37.00	34.60
University/Higher	28,283	43.72	32.90
Sex:[b]			
Female	31,327	48.43	50.73
Male	32,220	49.81	49.27
Income groups:[c]			
Below 40K	13,705	21.19	45.2
40K to 100K	30,063	46.48	44.48
Over 100K	20,418	31.57	10.32
Housing tenure:[d]			
Not house owner	20,238	31.29	41.20
Yes, with mortgage	22,045	34.08	35.50
Yes, without mortgage	22,378	34.6	23.30
Employment status:[b]			
Unemployed	3,415	5.28	4.54
Employed	38,619	59.70	68.74
Not in labor force	22,164	34.26	26.72
Canada regions:[b]			
Atlantic	14,080	21.77	6.49
British Columbia and Yukon	7,047	10.89	13.81
Ontario	18,697	28.90	38.86
Prairies, NWT, and Nunavut	12,122	18.74	18.47
Quebec	12,724	19.67	22.37

Data sources:
[a]: Statistic Canada (Table 17-10-0005-01). The age compositions in Statistics Canada's table are 20–24, 25–54, and 55+, while the CSCE age compositions are 18–24, 25–54, and 55+ for young, middle-aged, and senior people.
[b]: Statistics Canada's Census and Labor Force Survey.
[c]Statista's income distribution in Canada in 2020 [Statista, 2020].
[d]: Financial Consumer Agency of Canada's 2023 Report [FCAC, 2023].

Table 2: Summary statistics for inflation expectations by demographic groups

	Inflation expectations (p.p.)					
	One-year-ahead		Two-year-ahead		Five-year-ahead	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
All	3.18	1.80	3.08	1.76	3.35	1.98
Young	3.27	1.95	3.17	1.90	3.59	2.13
Middle	3.11	1.79	3.05	1.75	3.35	1.97
Senior	3.26	1.77	3.11	1.75	3.33	1.96
High school/Lower	3.41	1.90	3.27	1.86	3.50	2.07
College/Middle	3.28	1.80	3.20	1.78	3.50	2.00
University/Higher	3.05	1.75	2.95	1.71	3.21	1.91
Female	3.27	1.93	3.18	1.91	3.51	2.14
Male	3.12	1.67	3.00	1.63	3.22	1.83
Below 40K	3.43	1.90	3.33	1.87	3.60	2.09
40K to 100K	3.22	1.80	3.12	1.78	3.41	2.01
Over 100K	3.00	1.72	2.91	1.67	3.16	1.86
Not house owner	3.35	1.88	3.24	1.85	3.44	2.07
Yes, with mortgage	3.09	1.78	3.01	1.75	3.33	1.96
Yes, without mortgage	3.13	1.74	3.03	1.70	3.30	1.91
Employed	3.14	1.78	3.05	1.75	3.33	1.97
Unemployed	3.26	1.88	3.20	1.83	3.49	2.04
Not in labor force	3.23	1.80	3.12	1.78	3.36	1.98

Notes: These summary statistics were computed using the CSCE sampling weights and the Huber weights.

Table 3: Non-linear least-square estimates of the behavioral model using aggregated data

	I	II	III	IV	V	VI
ϕ_1: Type 1	0.657***	0.661***	0.637***	0.732***	0.771***	0.550*
	(0.107)	(0.107)	(0.113)	(0.079)	(0.141)	(0.229)
$\Delta\phi$: Type 2's difference	0.482***	0.475***	0.496***	0.387***	0.348**	0.604*
	(0.170)	(0.170)	(0.173)	(0.131)	(0.225)	(0.365)
ϕ_2: Type 2	1.139***	1.136***	1.133***	1.119***	1.119***	1.154***
	(0.170)	(0.170)	(0.173)	(0.131)	(0.225)	(0.365)
β: Selection intensity	1.576***	1.598***	1.634***	1.341*	1.570**	1.193**
	(0.580)	(0.594)	(0.502)	(0.584)	(1.254)	(1.044)
$\delta^{asyn.}$: Inattention	0.571***	0.571***	0.603***			
	(0.183)	(0.185)	(0.168)			
κ: NKPC slope	-0.034*	-0.035*	-0.039*	-0.031*	-0.024**	0.101***
	(0.017)	(0.017)	(0.017)	(0.016)	(0.030)	(0.035)
α: Inflation belief (both)		-0.005				
		(0.025)				
α_1: Inflation belief (type 1)			-0.064			
			(0.100)			
α_2: Inflation belief (type 2)			0.025			
			(0.083)			
Sample	All	All	All	All	CSCE	All
Frequency	Monthly	Monthly	Monthly	Monthly	Monthly	Quarterly
Num.Obs.	463	463	463	463	117	150
AIC	521.6	523.5	525.3	525.6	141.5	305.4
BIC	546.4	552.5	558.4	546.3	155.3	320.5
Log.Lik.	-254.789	-254.766	-254.645	-257.805	-65.727	-147.707

Notes: Sample "All" spans the period 1981M12 to 2024M6. Sample "CSCE" spans the period 2014M10 to 2024M6, which matches the time period of the CSCE data. All columns except Column VI use the Canadian unemployment gap for the deviation of economic activity from its fundamental level. Column VI uses the Canadian quarterly output gap estimated by the Bank of Canada, available at a quarterly frequency. *p<0.1; **p<0.05; ***p<0.01.

Table 4: Maximum likelihood estimation results using CSCE data by demographic group

Sample	β	σ_v	N	Log Likelihood Value
All respondents	64.793	14.308	64386	-262685.567
	(20.884)	(0.04)		
Young	48.452	24.124	3099	-14261.718
	(74.381)	(0.307)		
Middle	175.578	15.617	37367	-155718.688
	(41.792)	(0.057)		
Senior	62.415	9.725	23920	-88355.136
	(33.139)	(0.044)		
High School/Lower	112.165	19.017	11015	-48072.369
	(60.44)	(0.128)		
College/Middle	165.306	13.93	23814	-96519.326
	(55.542)	(0.064)		
University/Higher	22.589	12.351	28203	-110916.231
	(6.322)	(0.052)		
Female	159.432	15.673	31169	-130002.588
	(44.939)	(0.063)		
Male	132.493	12.873	32083	-127526.033
	(41.121)	(0.051)		
Below 40K	20.882	18.524	13572	-58874.762
	(9.121)	(0.112)		
40K to 100K	147.95	13.5	29974	-120544.719
	(46.499)	(0.055)		
Over 100K	19.738	12.106	20365	-79686.747
	(6.506)	(0.06)		
Not house owner	33.164	17.934	20082	-86463.538
	(15.297)	(0.09)		
Owner, with mortgage	190.654	14.041	21978	-89250.911
	(55.903)	(0.067)		
Owner, without mortgage	39.692	10.349	22307	-83787.485
	(13.617)	(0.049)		
Unemployed	36.444	19.608	3383	-14866
	(47.488)	(0.239)		
Employed	174.323	14.653	38447	-157796.805
	(41.865)	(0.053)		
Not in labor force	103.021	12.525	22073	-87115.411
	(57.2)	(0.06)		

Table 5: Marginal effects of probit models of trend-chasing behaviors

	Dependent variable: trend-following					
	Full Sample	Pre-HIFE	HIFE	Full Sample	Pre-HIFE	HIFE
	I	II	III	IV	V	VI
Age: 25- 54	−0.035	−0.005	−0.083*	−0.023	0.013	−0.078
	(0.034)	(0.046)	(0.050)	(0.035)	(0.048)	(0.050)
Age: 55+	−0.086**	−0.131***	−0.023	−0.051	−0.080	−0.005
	(0.035)	(0.048)	(0.052)	(0.037)	(0.051)	(0.054)
Educ: college	−0.052***	−0.050*	−0.049*	−0.041**	−0.028	−0.045
	(0.019)	(0.026)	(0.027)	(0.019)	(0.026)	(0.028)
Educ: Uni/Higher	−0.069***	−0.069***	−0.065**	−0.044**	−0.025	−0.056*
	(0.019)	(0.026)	(0.028)	(0.020)	(0.027)	(0.029)
Male	−0.088***	−0.047***	−0.145***	−0.075***	−0.016	−0.152***
	(0.013)	(0.017)	(0.019)	(0.013)	(0.018)	(0.020)
Income: 40K-100K	−0.045***	−0.004	−0.099***	−0.023	0.009	−0.064***
	(0.015)	(0.021)	(0.023)	(0.016)	(0.021)	(0.024)
Income: >100K	0.036**	0.011	0.074***	0.013	0.002	0.041
	(0.018)	(0.024)	(0.027)	(0.019)	(0.025)	(0.028)
Married	0.017	−0.038*	0.089***	0.015	−0.034*	0.082***
	(0.015)	(0.020)	(0.021)	(0.015)	(0.020)	(0.022)
Unemployed	−0.001	0.044	−0.081*	−0.040	0.023	−0.122**
	(0.031)	(0.040)	(0.048)	(0.032)	(0.041)	(0.049)
Out of the LF	−0.019	0.014	−0.077***	−0.019	0.008	−0.071***
	(0.017)	(0.022)	(0.025)	(0.017)	(0.022)	(0.026)
Owner with mortgage	−0.047***	−0.003	−0.100***	−0.048***	0.005	−0.109***
	(0.017)	(0.023)	(0.026)	(0.018)	(0.024)	(0.027)
Owner w/o mortgage	−0.078***	−0.035	−0.131***	−0.062***	−0.025	−0.097***
	(0.018)	(0.024)	(0.026)	(0.018)	(0.025)	(0.027)
Responsible for financial decisions				−0.028	−0.058	0.016
				(0.034)	(0.044)	(0.054)
Debt default probability				0.119***	0.081**	0.183***
				(0.028)	(0.039)	(0.041)
Financially worse off				0.125***	−0.011	0.273***
				(0.014)	(0.020)	(0.020)
Know inflation well				0.034*	−0.063***	0.171***
				(0.018)	(0.023)	(0.027)
Easy to express inflation as a number				−0.045***	−0.041**	−0.058**
				(0.016)	(0.021)	(0.024)
Numeracy score				−0.026***	−0.032***	−0.020***
				(0.005)	(0.007)	(0.007)
Constant	0.479***	0.418***	−0.690***	0.481***	0.555***	−0.872***
	(0.058)	(0.070)	(0.078)	(0.070)	(0.084)	(0.100)
Observations	56,930	33,877	23,053	55,378	33,073	22,305
Log Likelihood	−35,949	−20,209	−15,683	−34,902	−19,693	−15,039

Notes: The reference group is aged 18–24, with "High school or lower" education, female, income level of $\leq 40k$, not married, employed, and renter. All estimations include Canadian regions, survey-quarter, and survey tenure effects, and use survey sampling weights. Variables about financial decisions, debt default, and knowledge of inflation are based on the survey questions included in Appendix A.1. Numeracy score is the number of correct answers to five questions about numerical skills. Standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Marginal effects of probit models of trend-following behavior and monetary policy perception

	Dependent variable: trend-following, that is, a dummy = 1 if respondent i in quarter t is a trend-follower, 0 if mean-reverter											
	Trend-following											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Importance of low inflation	0.144	−0.261*	0.402***									
	(0.130)	(0.151)	(0.144)									
BOC achieved target in the past				−0.134***	0.031	−0.246***						
				(0.050)	(0.075)	(0.071)						
BOC can achieve target in the future							−0.175***	0.074	−0.235***			
							(0.032)	(0.074)	(0.035)			
Concerned about inflation										0.400***	−0.206**	0.301***
										(0.031)	(0.085)	(0.036)
Constant	−0.391	0.425	0.120	−0.245	0.221	0.509*	−0.316**	0.208	0.527***	0.155	0.295	0.232*
	(0.252)	(0.332)	(0.319)	(0.235)	(0.313)	(0.309)	(0.132)	(0.312)	(0.135)	(0.124)	(0.311)	(0.138)
Quarters	2019Q4, 2021Q4	2019Q4	2021Q4	2019Q4, 2021Q4	2019Q4	2021Q4	2019Q4, 2021Q4-22Q4	2019Q4	2021Q4-22Q4	2019Q4, 2021Q4-22Q4	2019Q4	2021Q4-22Q4
Observations	3,713	1,845	1,868	3,713	1,845	1,868	9,217	1,845	7,372	9,257	1,844	7,413
Log Likelihood	−2,280.383	−1,019.359	−1,167.427	−2,276.653	−1,021.266	−1,163.307	−6,430.520	−1,020.890	−5,355.858	−6,628.109	−1,014.362	−5,195.055

Notes: All estimations include controls for demographic characteristics (age, gender, income, marital status, education, labor force status, home ownership status), fixed effects for Canadian regions, survey-quarter, and survey tenure. Sampling weights and Huber weights are used in all regressions to control for outliers and influential observations. Variables about the importance of low inflation, the ability of the Bank of Canada to achieve its target, and concern about inflation are based on the questions that are included in some quarters of the survey listed in the line "Quarters." These questions are included in Appendix A.1. Robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Estimates of the link between trend-chasing in inflation expectations and other key economic expectations

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
VARIABLES		Inflation			Interest rate		Spending	Wage	Income	Tax	House prices	
HORIZON	one-year	two-year	five-year	one-year	two-year	five-year	one-year	one-year	one-year	one-year	one-year	five-year
Trend-chasing	-0.401***	-0.145***	-0.0293	0.144***	0.103***	0.0655**	0.0122	0.0503	0.111***	-0.196***	-0.576***	-0.451***
	(0.0207)	(0.0208)	(0.0283)	(0.0193)	(0.0223)	(0.0257)	(0.0410)	(0.0318)	(0.0304)	(0.0311)	(0.0556)	(0.0899)
HIFE	0.263***	-0.447***	-1.327***	0.723***	0.206***	-0.533***	-0.168***	0.194***	-0.112***	-0.386***	-0.353***	-1.046***
	(0.0200)	(0.0225)	(0.0358)	(0.0286)	(0.0281)	(0.0307)	(0.0412)	(0.0334)	(0.0298)	(0.0316)	(0.0578)	(0.0844)
Trend-chasing	4.253***	3.252***	2.062***	0.931***	1.096***	1.014***	1.504***	0.257***	0.401***	1.217***	2.774***	2.432***
x HIFE	(0.0329)	(0.0353)	(0.0558)	(0.0400)	(0.0417)	(0.0465)	(0.0617)	(0.0495)	(0.0445)	(0.0469)	(0.0848)	(0.127)
Constant	1.212***	1.756***	2.933***	3.654***	4.568***	5.513***	4.532***	2.487***	3.742***	2.306***	5.658***	4.754***
	(0.0529)	(0.0613)	(0.0923)	(0.0642)	(0.0740)	(0.0849)	(0.103)	(0.0947)	(0.0853)	(0.0790)	(0.137)	(0.218)
Observations	51,353	50,107	37,540	40,859	40,459	40,142	52,096	28,713	49,149	51,667	47,827	43,477
R-squared	0.465	0.249	0.071	0.133	0.079	0.037	0.041	0.030	0.048	0.043	0.060	0.058

Notes: This table presents the estimation results of Equation (12). All estimations include controls for demographic characteristics (age, gender, income, marital status, education, labor force status, home ownership status), Canadian region fixed effects, survey-quarter fixed effects, and survey tenure. In each regression, we use the sampling weights and the Huber weights 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: Marginal effects for estimations of probit models for consumer spending intentions

	Dependent variable:						
	Bring forward major purchases I	Cut spending/ save more II	Seek income opportunities III	Postpone major purchases IV	Push for pay raise V	Look for cheaper shopping VI	Do nothing VII
Trend-chasing	0.002	0.002	0.004**	0.003	-0.003**	-0.004**	-0.002
	(0.003)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)	(0.005)
HIFE	0.045***	0.018**	-0.021**	0.129***	0.022*	0.009	-0.023**
	(0.012)	(0.018)	(0.014)	(0.017)	(0.013)	(0.018)	(0.016)
Trend-chasing	0.002	0.079***	0.040***	0.072***	0.030***	0.065***	-0.075***
x HIFE	(0.005)	(0.009)	(0.008)	(0.008)	(0.006)	(0.009)	(0.007)
Num.Obs.	56886	56886	56886	56886	56886	56886	56886
Log.Lik.	-12992.831	-34053.622	-24276.208	-25511.670	-16657.816	-33307.642	-29279.603
RMSE	0.24	0.45	0.36	0.37	0.29	0.44	0.40

Notes: This table presents the estimated results of Equation (13). The dependent variable in each column is the dummy variable equal to one if the respondent reports the intention to undertake one of the suggested actions. All columns include controls for demographics (age, gender, income, marital status, education, labor force status, home ownership status), Canadian region fixed effects, survey-quarter fixed effects, and survey tenure. In each regression, we use the sampling weights and the robust standard errors are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

A Survey questions

A.1 Questions about expectations and intentions

The following two-part question is used to elicit respondents' point forecast for inflation in two years, $\mathrm{E}_{i,t}\pi_{t+2yr}$.

Part 1. *Now we would like you to think about inflation further into the future. Over the 12-month period between [t+12 and t+24], do you think that there will be inflation or deflation? Please choose one.*

- *Inflation*
- *Deflation (the opposite of inflation)*

Part 2. *What do you expect the rate of [inflation/deflation] to be over that period? Please give your best guess. Please enter a number greater than 0 or equal to 0.*
Over the 12-month period between [t+12 and t+24],

- *I expect the rate of [inflation/deflation] to be .... percent*

The following two-part question is used to elicit respondents' point forecast for inflation in five years, $\mathrm{E}_{i,t}\pi_{t+5yr}$.

Part 1. *Looking further into the future, say five years from now, do you think that there will be inflation or deflation? (Note: deflation is the opposite of inflation). Please choose one.*

- *Inflation*
- *Deflation (the opposite of inflation)*

Part 2. *What do you expect the rate of [inflation/deflation] to be five years from now? Please give your best guess. Please enter a number greater than 0 or equal to 0.*

- *Five years from now, I expect the rate of [inflation/deflation] to be .... percent*

Wage growth expectations The following two-part question is used to elicit respondents' point forecast for the growth of **their own** earnings in one year, $\mathrm{E}_{i,t}(\mathrm{w})_{i,t+1yr}$. This question is posed to respondents who have responded to an earlier survey question that they are currently *employed* full-time or part-time:

Part 1. *Please think ahead to **12 months from now**. Suppose that you are working in the exact same (main) job at the same place you currently work, and working the exact same number of hours. What do you expect to have happened to your earnings on this job, before taxes and deductions? Please choose one. **Twelve months from now**, I expect my earnings to have...*

- *increased by 0% or more*
- *decreased by 0% or more*

After the respondent answers the previous question, the second part of the question is presented separately.

Part 2. *By about what percent do you expect your earnings to have [increased/decreased]? Please give your best guess. Please enter a number greater than 0 or equal to 0.*
Twelve months from now, I expect my earnings to have [increased/decreases] by .... percent

Note that this question elicits the growth of the respondent's *own* earnings *conditional* on the respondent working in the *same* job and working the *same* hours, or in other words, the expectations about the *individual hourly* wage growth of a *job stayer*.

Interest rate expectations are elicited using the following questions.

At what level do you think that interest rates on things such as mortgages, bank loans, and savings will be? Please enter a number.

- ***One year from now**, interest rates will most likely be .... percent*
- ***Two years from now**, interest rates will most likely be .... percent*
- ***Five years from now**, interest rates will most likely be .... percent*

Expectations about household income growth over the next year , $\mathrm{E}_{i,t}(\text{income})_{i,t+1yr}$, are based on the following questions.

Next we would like to ask you about your overall household income going forward. By household we mean everyone who usually lives in your primary residence (including yourself), excluding roommates and renters.

Part 1. **Over the next 12 months** , what do you expect will happen to the total income of all members of your household (including you), from all sources before taxes and deductions? Please choose one.

- **Over the next 12 months** , I expect my total household income to...
  - increased by 0% or more
  - decreased by 0% or more

Part 2. By about what percent do you expect your total household income to [increase/decrease]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- **Over the next 12 months** , I expect my total household income to have [increased/decreased] .... percent

Household spending growth expectations are elicited based on the following question.

Now think about your total household spending, including groceries, clothing, personal care, housing (such as rent, mortgage payments, utilities, maintenance, home improvements), transportation, recreation and entertainment, education, and any large items (such as home appliances, electronics, furniture, or car payments).

Part 1. Over the next 12 months, what do you expect will happen to the total spending of all members of your household (including you)? Please choose one.

- Over the next 12 months, I expect my total household spending to...
  - increase by 0% or more
  - decrease by 0% or more

Part 2. By about what percent do you expect your total household spending to [increase/decrease]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the next 12 months, I expect my total household spending to [increase/decrease] by .... percent

Expectations for the growth rate of taxes are elicited based on the following questions.

Part 1. Suppose that 12 months from now, your total household income is the same as now. What do you expect to have happened to the total amount of taxes you will have to pay, including federal, provincial and local income, property and sales taxes? Please choose one.

- Twelve months from now, I expect my total taxes to have...
  - increase by 0% or more
  - decrease by 0% or more

Part 2. By about what percent do you expect your total taxes to have [increased/decreased]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the next 12 months, I expect my total taxes to [increase/decrease] by .... percent

Next we would like you to think about home prices nationwide. We would also like to get an understanding of how changes in house prices may impact your attitude to spending in general.

Part 1. Over the next 12 months, what do you expect will happen to the average home price nationwide? Please choose one.

- Over the next 12 months, I expect the average home price to...
  - increase by 0% or more
  - decrease by 0% or more

Part 2. By about what percent do you expect the average home price nationwide to [increase/decrease]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the next 12 months, I expect the average home price to [increase/decrease] by .... percent

Perceptions about the growth of local house prices are elicited using the following questions.

Part 1. Over the last 12 months, what do think happened to the average home price in your area? Please choose one.

- Over the last 12 months, the average home price in my area...
  - increased by 0% or more
  - decreased by 0% or more

Part 2. By about what percent do you think the average home price in your area [increased/decreased]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the last 12 months, I think the average home price in my area [increased/decreased] by .... percent

Expectations for the growth in local house prices over the next year are elicited based on the follwing questions.

Part 1. Over the next 12 months, what do you expect will happen to the average home price in your area? Please choose one.

- Over the next 12 months, I expect the average home price to...

  - increase by 0% or more
  - decrease by 0% or more

Part 2. By about what percent do you expect the average home price in your area to [increase/decrease]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the next 12 months, I expect the average home price to [increase/decrease] by .... percent

The expectations for the growth of local house prices over the next five years are elicited based on these questions.

Part 1. Over the next 5 years, what do you expect will happen to the average home price in your area? Please choose one.

- Over the next 5 years, I expect the average home price to...
  - increase by 0% or more
  - decrease by 0% or more

Part 2. By about what percent do you expect the average home price in your area to [INSERT increase/decrease BASED ON RESPONSE TO Q4.7 PART 5A]? Please give your best guess. Please enter a number greater than 0 or equal to 0.

- Over the next 5 years, I expect the average home price to [INSERT increase/decrease BASED ON RESPONSE TO Q4.7 PART 5A] by a total of .... percent

A.2 Questions about intended actions

Which, if any, of the following actions are you taking, or planning to take, in light of your expectations of [inflation/ deflation] over the 12-month period between [t+12 and t+24]? Please select all that apply.

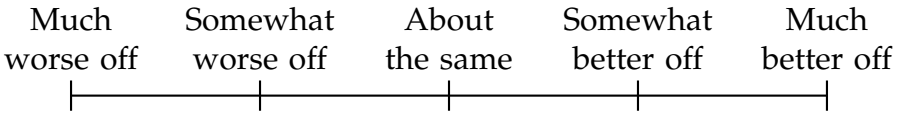
1. Bring forward major purchases (such as furniture or appliances)
2. Postpone major purchases
3. Cut back spending and save more
4. Shop around more for better value goods and services
5. Push for increased pay with current employer

6. Look to increase income in other ways (e.g., change jobs, take on second job, work more hours with current employer)

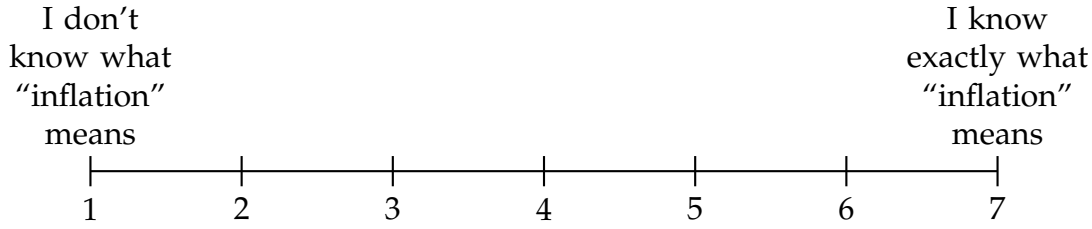
7. Take no action

A.3 Additional questions

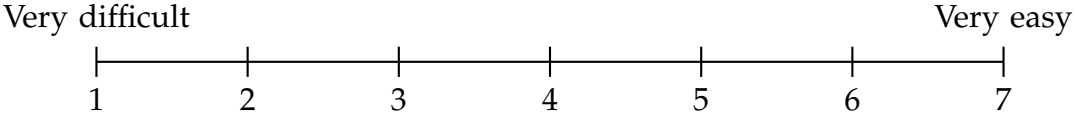
Variable *financially worse off* used in Table 5 is defined using the following question. This variable is equal 1 if respondent has reported being much worse off or somewhat worse off than 12 months ago.
Do you think you (and any family living with you) are financially better or worse off these days than you were 12 months ago? Please select only one.



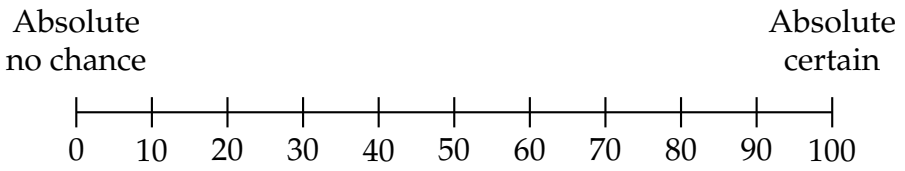
Variable *know inflation well* used in Table 5 is defined based on this question. It equals 1 if the respondent reports knowledge of inflation of 5 and above, and equals 0 otherwise.
The next few questions are about inflation. On a scale of 1 to 7, how well would you say you understand what "inflation" means?



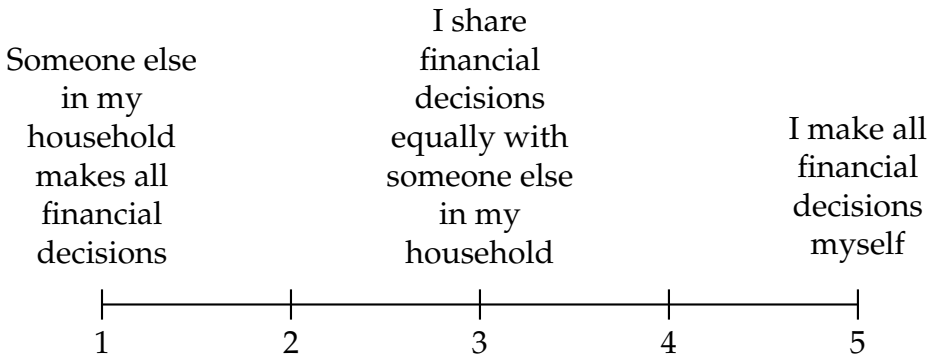
Variable *easy to express inflation as a number* used in Table 5 is based on the following question. It equals 1 if a respondent reports ease equal to 5 or above and equals 0 otherwise.
On a scale of 1 to 7, how easy is it for you to express the rate of inflation as a number? Please select only one



Variable *Debt default probability* in Table 5 is based on the following question.
What do you think is the percent chance that, over the next 3 months, you will NOT be able to make one of your debt payments (the minimum required payments on credit and retail cards, auto loans, student loans, mortgages, or any other debt you may have)? Please enter your response in the box on the left or by clicking on the scale below, where 0% means "Absolutely no chance" and 100% means "Absolutely certain".



Variable *responsible for financial decisions* in Table 5 is based on the following question. It equals 1 if a respondent reports answers equal to 3 or above, and is equals 0 otherwise. On the scale below, which of the following best describes how financial decisions are made in your household? Please select only one.



A.4 Questions about inflation target and importance of low inflation

Variable *BOC achieved inflation in the past* in Table 6 is based on the following question. It equals 1 if a respondent reports "always" or "most of the time," and equals 0 otherwise. How often do you think the Bank of Canada has achieved its inflation target in the past?

1. Always
2. Most of the time
3. Some of the time
4. Never

Variable *BOC can achieve target in the future* in Table 6 is based on the following question. It equals 1 if a respondent reports "always" or "most of the time," and equals 0 otherwise. How often do you think the Bank of Canada can achieve its inflation target in the future?

1. Always
2. Most of the time
3. Some of the time

4. Never

Variable *importance of low inflation* in Table 6 is based on the following question. It equals 1 if a respondent reports "very important" or "somewhat important" in this question, and equals 0 otherwise.
In your view, how important is it that Canada has low and stable inflation? Scale of very important to not important

1. Very important
2. Somewhat important
3. Not very important
4. Not important at all

Variable *Concerned about inflation* in Table 6 is based on the following question. It equals 1 if a respondent reports "Inflation is more of a concern," and equals 0 otherwise.
How has your view about inflation changed in the last five years? Choose one.

1. Inflation is more of a concern
2. Inflation is less of a concern
3. Inflation concerns me to the same degree
4. Inflation is not and never was a concern to me

B Additional figures and tables

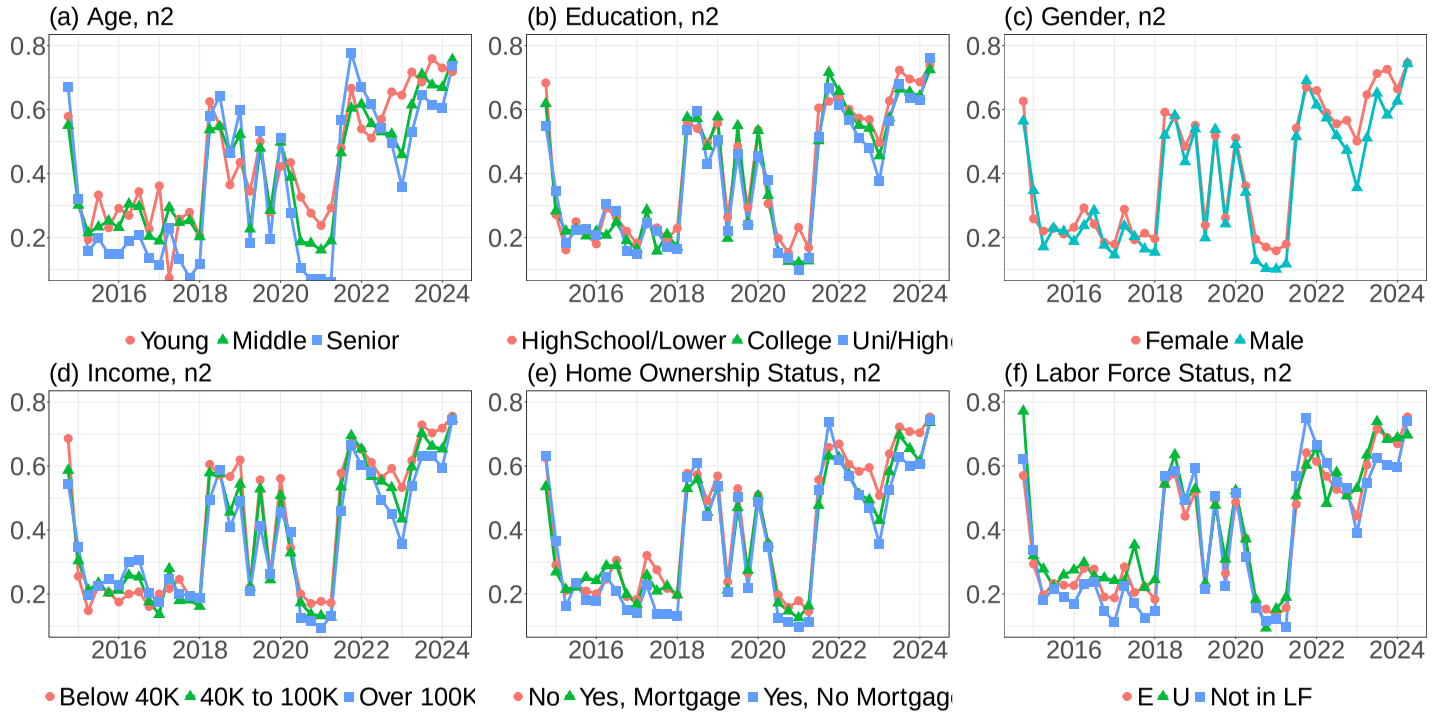


Figure B1: Dynamics of trend-followers by demographic groups

	One-year-ahead expectations (%)							
	Spending		Nominal wage		Income		Taxes	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Young	4.80	2.88	2.60	1.71	3.71	2.07	2.84	2.38
Middle	4.48	2.74	2.08	1.61	3.08	1.92	2.82	2.26
Senior	4.40	2.61	1.90	1.62	2.59	1.79	2.83	2.29
High school/Lower	4.45	2.75	2.02	1.63	2.71	1.88	2.68	2.30
College/Middle	4.61	2.70	2.01	1.59	2.88	1.86	2.80	2.27
University/Higher	4.36	2.68	2.11	1.63	2.99	1.88	2.91	2.27
Female	4.51	2.81	2.01	1.59	2.77	1.92	2.81	2.33
Male	4.43	2.59	2.11	1.64	3.02	1.83	2.85	2.22
Below 40K	4.59	2.82	1.90	1.66	2.67	1.92	2.33	2.33
40K to 100K	4.44	2.70	2.02	1.60	2.80	1.85	2.86	2.28
Over 100K	4.41	2.63	2.15	1.60	3.17	1.87	3.07	2.20
Not house owner	4.67	2.79	2.23	1.66	3.04	1.95	2.43	2.32
Yes, with mortgage	4.46	2.69	2.02	1.58	2.97	1.85	2.96	2.22
Yes, without mortgage	4.29	2.63	1.96	1.61	2.72	1.83	3.01	2.26
Employed	4.40	2.71	2.06	1.61	3.07	1.90	2.92	2.25
Unemployed	5.61	2.96	-	-	3.73	2.06	2.93	2.44
Not in labor force	4.42	2.63	-	-	2.56	1.80	2.66	2.30

Notes: See Table 2. Wage expectations are only elicited for respondents who declare they are employed.

Table B 1: Summary statistics of spending, wage, income, and tax expectations by demographic groups

	Interest rate expectations (%)					
	One-year-ahead		Two-year-ahead		Five-year-ahead	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Young	4.01	1.91	4.67	2.18	5.23	2.44
Middle	3.65	1.68	4.18	1.89	4.70	2.12
Senior	3.69	1.64	4.21	1.82	4.71	2.02
High school/Lower	3.90	1.82	4.46	2.04	4.97	2.28
College/Middle	3.85	1.69	4.41	1.90	4.94	2.13
University/Higher	3.51	1.62	4.00	1.80	4.50	2.01
Female	3.78	1.76	4.35	1.99	4.86	2.23
Male	3.59	1.61	4.09	1.77	4.59	1.97
Below 40K	3.85	1.86	4.48	2.09	5.03	2.35
40K to 100K	3.70	1.68	4.25	1.87	4.77	2.09
Over 100K	3.54	1.57	4.02	1.74	4.50	1.95
Not house owner	3.88	1.83	4.45	2.06	4.96	2.30
Yes, with mortgage	3.61	1.60	4.14	1.78	4.62	2.00
Yes, without mortgage	3.59	1.63	4.11	1.81	4.65	2.01
Employed	3.64	1.66	4.17	1.86	4.68	2.09
Unemployed	3.72	1.81	4.33	2.04	4.85	2.29
Not in labor force	3.74	1.69	4.26	1.88	4.77	2.10

Notes: See Table 2.

Table B 2: Summary statistics of interest rate expectations by demographic groups

	House price expectations (%)					
	One-year-ahead		Two-year-ahead		Five-year-ahead	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Young	4.36	3.67	6.30	5.46	4.54	3.60
Middle	3.85	3.58	6.26	5.16	3.90	3.60
Senior	3.85	3.62	7.19	5.22	3.90	3.69
High school/Lower	3.63	3.54	5.78	5.19	3.84	3.62
College/Middle	3.85	3.61	6.48	5.22	3.97	3.67
University/Higher	3.94	3.60	7.09	5.21	3.88	3.61
Female	3.78	3.68	5.95	5.29	3.95	3.73
Male	3.98	3.53	7.38	5.15	3.92	3.55
Below 40K	3.97	3.63	6.18	5.32	4.20	3.69
40K to 100K	3.90	3.59	6.55	5.19	3.95	3.63
Over 100K	3.77	3.58	7.10	5.19	3.74	3.60
Not House Owner	4.18	3.65	6.45	5.34	4.16	3.70
Yes, with mortgage	3.73	3.55	6.42	5.12	3.82	3.57
Yes, without mortgage	3.77	3.59	7.00	5.18	3.86	3.65
Employed	3.91	3.58	6.49	5.19	3.94	3.60
Unemployed	3.84	3.68	6.48	5.37	4.09	3.74
Not in labor force	3.81	3.61	6.96	5.24	3.90	3.67

Notes: See Table 2.

Table B 3: Summary statistics of house price expectations by demographic groups