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Working Paper

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Bank of Canada Staff Discussion Paper, No. 2023-7

Provided in Cooperation with:
Bank of Canada, Ottawa

Suggested Citation: Miller, Sarah; Sabourin, Patrick (2023) : What consistent responses on future inflation by consumers can reveal, Bank of Canada Staff Discussion Paper, No. 2023-7, Bank of Canada, Ottawa,
https://doi.org/10.34989/sdp-2023-7

This Version is available at:
https://hdl.handle.net/10419/297076

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Staff Discussion Paper/Document d'analyse du personnel—2023-7

Last updated: March 31, 2023

What Consistent Responses on Future Inflation by Consumers Can Reveal

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DOI: https://doi.org/10.34989/sdp-2023-7 | **ISSN** 1914-0568

Acknowledgements

We thank Brigitte Desroches, Chris D'Souza, Olena Kostyshyna, Joshua Slive and Alexander Ueberfeldt for valuable comments and suggestions. We also thank Alison Arnot, Carole Hubbard and Jordan Press for editorial assistance, and Denise Abella for research assistance.

Abstract

Inflation expectations play a vital role in determining inflation. Central bankers need to understand their intricacies and the information they can reveal. We look at the consistency of consumers' answers to questions on inflation expectations in the Bank of Canada's Canadian Survey of Consumer Expectations. We analyze factors that may explain consistencies among individuals and overall. We also compare the inflation forecasts of consumers with consistent responses with those of professional forecasters and consumers with varying responses.

Topics: Central bank research; Inflation and prices

JEL codes: E31, D80, D84

Résumé

Les attentes d'inflation jouent un rôle crucial dans la détermination de l'inflation. Les dirigeants de banques centrales ont besoin d'en comprendre les subtilités et l'information qu'elles peuvent révéler. Nous nous penchons sur la cohérence des réponses à des questions sur l'inflation future fournies par les participants à l'enquête sur les attentes des consommateurs au Canada que mène la Banque du Canada. Nous analysons les facteurs susceptibles d'expliquer cette cohérence au niveau de chaque participant et de l'ensemble des participants. Nous comparons aussi les prévisions d'inflation des consommateurs ayant fourni des réponses cohérentes avec, d'une part, celles de prévisionnistes professionnels et, d'autre part, celles des consommateurs ayant donné des réponses qui manquent de cohérence.

Sujets : Inflation et prix; Recherches menées par les banques centrales
Codes JEL : E31, D80, D84

Motivation and key messages

Inflation around the world, including in Canada, has recently been high and broad-based. The longer high inflation persists and the more pervasive it becomes, the greater the risk that inflation expectations become unmoored and makes high inflation self-fulfilling.[1] Because inflation expectations play a role in determining inflation, broadening the Bank of Canada's understanding of consumers' inflation expectations is important.

When inflation is high and volatile, uncertainty around any inflation forecast tends to grow. In such a context, households and businesses find it more beneficial to incorporate views on inflation into their economic decisions because high and unpredictable inflation is more costly. Using the Bank of Canada's Canadian Survey of Consumer Expectations (CSCE), we review how the high inflation environment of 2021–22 affected the consistency of participants' responses to questions about future inflation. A consumer's responses are considered consistent when their answers to different types of questions about future inflation match (described in more detail in section 1). More specifically, we look at what drives consistent responses to questions about inflation expectations and whether having consistent responses improves a consumer's forecasting performance. Such an improvement would help identify risks to the Bank's inflation forecasts.

- At the individual level, consistency is related to gender, age, education, level of income and being part of equity-seeking groups. Strong numeracy and a solid understanding of inflation are also linked to consistent responses about inflation.
- On average, slightly less than half of respondents to the CSCE provided consistent answers about their inflation expectations. After falling at the onset of the COVID-19 pandemic, the share of consistent responses recovered as inflation rose, but it remains below pre-pandemic levels. Higher uncertainty about the path for inflation and survey fatigue may partly explain why consistency had not recovered by the third quarter of 2022.
- Short-term inflation expectations for respondents with consistent answers have been strongly correlated with actual consumer price index (CPI) inflation during the high inflation environment of 2021–22. The weaker link before this period of high inflation suggests that respondents with consistent views may have started to pay more attention, in line with the literature on rational inattention.[2]

[1] For more details, see Macklem (2022).

[2] For a definition of rational inattention, see Sims (2003). The belief is that when inflation is high and more costly, people care more about it and start incorporating it into their inflation expectations and decision-making processes. We assume that a positive link between inflation expectations and CPI inflation captures this type of attention in some ways.

- Since the second quarter of 2021, the gap between actual and perceived inflation for consumers with consistent views has narrowed markedly, and their inflation forecasts have outperformed those of professional forecasters. Expectations among these consumers suggest an upside risk to the short-term inflation outlook published in the Bank's January 2023 *Monetary Policy Report*.

The rest of the paper is organized as follows. Section 1 provides details on how we define consistent responses. Section 2 examines drivers of consistent responses at the individual level. Section 3 presents the shares of consistent responses over time and the potential factors that could be driving them. Section 4 discusses implications of consistent responses for the Bank's inflation outlook. Section 5 concludes.

1 Measuring the consistency of consumers' responses to questions about future inflation

1.1 Description of the Canadian Survey of Consumer Expectations

The Canadian Survey of Consumer Expectations (CSCE) is a nationally representative, internet-based quarterly survey. The survey's target population is residents of Canada aged 18 and older. A rotating panel of approximately 2,000 participants answer the survey each quarter. In principle, respondents participate in the panel for up to a year, with a roughly equal number joining and leaving the panel each quarter. They answer questions about inflation, the labour market and household finances, along with demographic questions about themselves and their household. In addition, to gain timely insights for policy-making, the survey has asked several questions on special topics each quarter (e.g., shifts in preferences during the pandemic, the impact of high inflation and rising interest rates, the importance of working remotely). These special topic questions have been extremely useful in helping the Bank to better understand consumer behaviour and expectations.

Data collected in this survey allow the Bank to monitor changes in households' expectations for inflation. Consumers provide their expectations for inflation at one-, two- and five-year horizons. The survey also asks respondents for their perceptions about current inflation (i.e., inflation over the past 12 months).

1.2 Questions asking for point predictions and subjective probability distributions

Point predictions: One set of questions about inflation expectations asks respondents to report single-value forecasts for inflation. The point prediction for one-year-ahead inflation is based on the following questions:[3]

Q.1A 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)

Q.1B 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 ___%.

Subjective probability distributions: Because respondents are not entirely sure about any single-value forecast, the following question asks them to assign probabilities to forecasts within specific bins. The question measures individuals' uncertainty for one-year-ahead inflation:

Q.2: In your view, what would you say is the percent chance that over the next 12 months...

Please note: The numbers need to add up to 100.

the rate of inflation will be 12% or higher	___ % chance
the rate of inflation will be between 8% and 12%	___ % chance
the rate of inflation will be between 4% and 8%	___ % chance
the rate of inflation will be between 2% and 4%	___ % chance
the rate of inflation will be between 0% and 2%	___ % chance
the rate of deflation (opposite of inflation) will be between 0% and 2%	___ % chance
the rate of deflation (opposite of inflation) will be between 2% and 4%	___ % chance
the rate of deflation (opposite of inflation) will be between 4% and 8%	___ % chance
the rate of deflation (opposite of inflation) will be between 8% and 12%	___ % chance
the rate of deflation (opposite of inflation) will be 12% or higher	___ % chance
TOTAL	100

[3] The questions for two-year- and five-year-ahead inflation expectations are the same.

1.3 Comparing point predictions with intervals from subjective probability distributions

To determine whether respondents' point predictions from Q.1A and Q.1B are consistent with their probability distributions from Q.2, we calculate reasonable upper and lower bounds for the mean implied by their distributions. This is one of the non-parametric approaches described in Engelberg, Manski and Williams (2009). See **Appendix B** for descriptions of other approaches we considered.

To illustrate, here is an example of responses to Q.2:

the rate of inflation will be between 8% and 12%	10% chance
the rate of inflation will be between 4% and 8%	20% chance
the rate of inflation will be between 2% and 4%	40% chance
the rate of inflation will be between 0% and 2%	30% chance

To calculate the lower bound mean estimate, we use the lower bound of each bin and the probability mass in that bin. We use a similar calculation for the upper bound mean estimate:

$$Lower\ bound = 0\% \times 0.3 + 2\% \times 0.4 + 4\% \times 0.2 + 8\% \times 0.10 = 2.4\%$$

$$Upper\ bound = 2\% \times 0.3 + 4\% \times 0.4 + 8\% \times 0.2 + 12\% \times 0.10 = 5.0\%$$

Here, the lower and upper bounds create an interval of 2.4% to 5.0%. We compare this interval with the point predictions based on responses to Q.1A and Q.1B. For example:

Answer to Q.1. Over the next 12 months, I expect the rate of inflation to be +3%. → CONSISTENT

Answer to Q.1. Over the next 12 months, I expect the rate of inflation to be +2%. → INCONSISTENT

In addition, for our analysis, we define a consumer in period *t* as consistent if their answers match in terms of point predictions and subjective distributions for both their one-year- and two-year-ahead inflation expectations questions (to be clear, the answers do not have to match across horizons).[4] While some respondents have participated in the survey in more than one quarter, we do not look directly at the consistency of their answers over time. We are interested in several time-invariant characteristics, so we use the data as repeated cross-

[4] We focus on short-term expectations because of the availability of data. Subjective distributions of consumers' one- and two-year inflation expectations are available over the entire history of the survey. However, the CSCE did not collect the distributions for five-year-ahead expectations until the first quarter of 2021.

sections rather than as a panel. However, we control for correlations among individuals' responses over time by using clustered standard errors at the respondent level.

2 Drivers of consistency at the individual level

2.1 Who is more likely to provide consistent responses on inflation?

Chart 1 presents a breakdown of the share of consistent responses by demographic groups. The share of consistent responses differs by gender, age, education and level of income as well as for equity-seeking groups (for more details, see **Table A-1**, column 1).

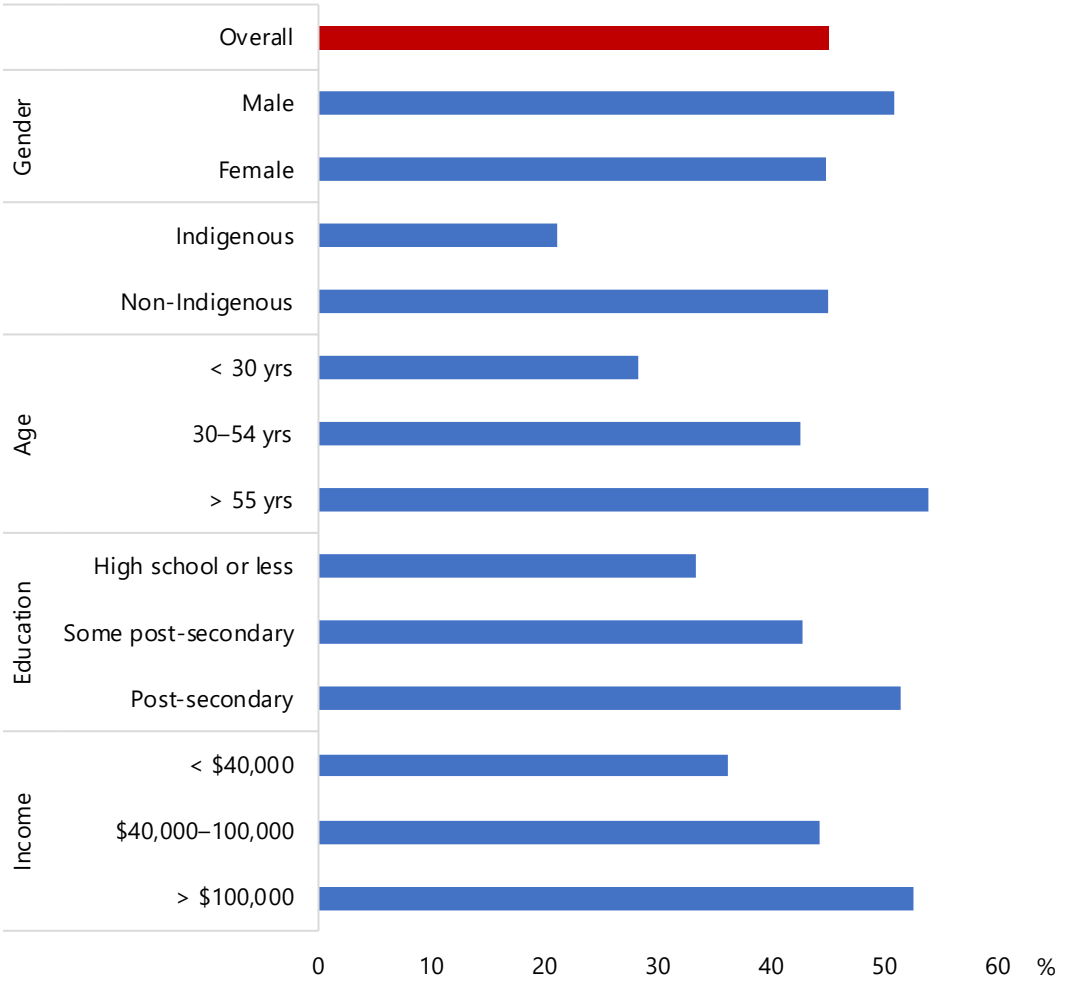
Consumers aged 30 years and over with income above $100,000 and a post-secondary degree are more likely to provide consistent answers. The most important characteristic for consistency is age. For instance, respondents aged 55 years and over are almost twice as likely to provide consistent answers than respondents under 30 years old. We also find that women are less likely to be consistent than men—their point predictions exceed their subjective distributions more often. Indigenous people are less likely than non-Indigenous people to respond consistently. Similar to the gap between consumers' perceptions of inflation and actual inflation, the likelihood that consumers provide consistent responses may also vary by their shopping patterns.[5] For instance, they may be influenced by the prices of goods they purchase frequently, such as food and gasoline.

Several factors may influence why certain demographic groups are more likely than others to provide consistent responses. These factors include:

- a propensity for overpredicting because it is less costly than underpredicting (or vice versa). This is known as asymmetric loss and may cause a consumer to report a point forecast that is outside the interval from their subjective probabilities (for more details, see Patton and Timmermann 2007).
- a tendency to round probabilities, although Engelberg, Manski and Williams (2009) tested and rejected this hypothesis
- the possibility that youth, with less experience of high inflation, update their inflation expectations more strongly in response to surprise inflation than older people do (proposed by Malmendier and Nagel 2016)
- other unobserved personal characteristics such as patience and maturity

[5] See Box 2 in the *Monetary Policy Framework Renewal* for details.

Chart 1: Older and higher-income consumers are most likely to have consistent responses



Share of consistent responses by demographic group to both 1-year- and 2-year-ahead inflation expectations

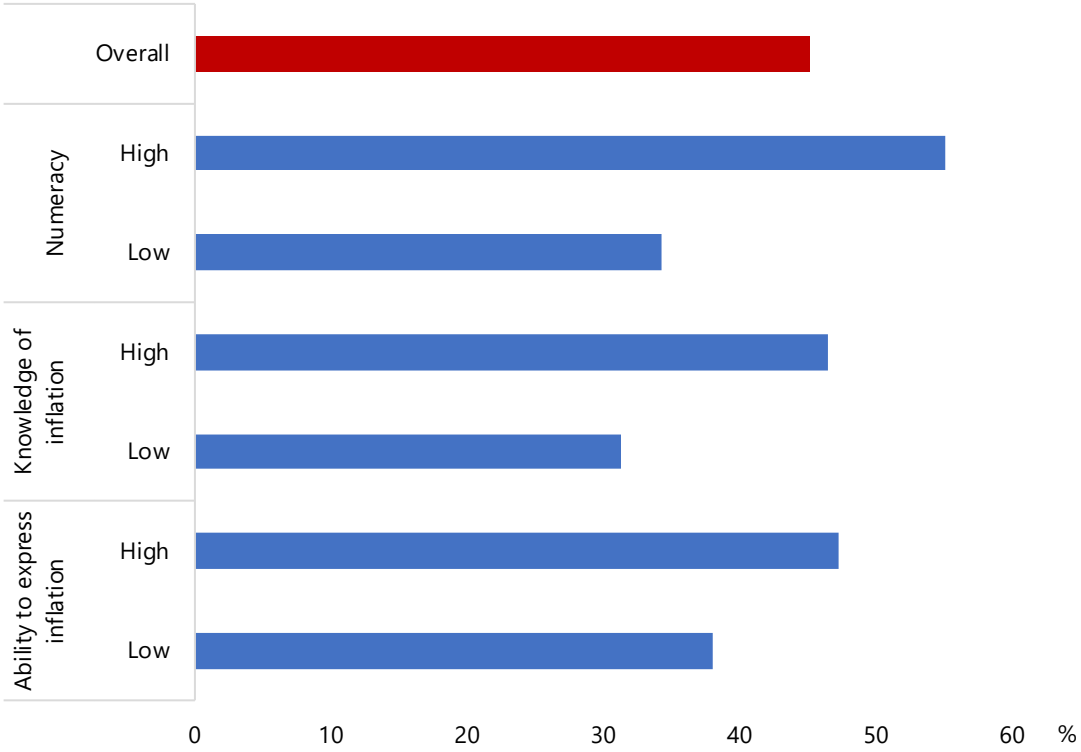
2.2 Strong numeracy and understanding of inflation are linked to increased consistency

Using probit regression models and controlling for the demographic characteristics mentioned earlier, we also review what else could matter for providing consistent responses. The dependent variable equals 1 for consistent responses and 0 otherwise.

We find that demonstrating high numeracy and having a good understanding of inflation are positively related to consistent responses (**Chart 2**, **Table 1**; see **Table A-2** for variable definitions). Using special questions with smaller samples, we also find that the likelihood of responding consistently to questions on future inflation increases for respondents who are more concerned about inflation now than they were before the pandemic began and who

perceive increased difficulty for the Bank or authorities to control inflation (**Table A-1**, columns 3 and 4). These results suggest that worries about inflation may lead to increased attention to inflation or greater information gathering.[6]

Chart 2: High numeracy and knowledge of inflation are linked to consistent responses about inflation expectations



Share of consistent responses by demographic group to both 1-year- and 2-year-ahead inflation expectations

[6] Respondents' awareness of an inflation target in Canada is not linked to providing consistent responses (**Table A-1**, column 5).

Table 1: High numeracy and knowledge of inflation are linked to consistency
Probit regressions with average marginal effects
Dependent variable: Binary variable for consistent 1-year and 2-year inflation expectations

	Average marginal effects	z-statistic
Low numeracy (fewer than 4 of 5 questions correct)	-0.183**	(-18.31)
Does not understand inflation well	-0.050**	(-12.74)
Has difficulty expressing inflation	-0.018**	(-4.10)
Observations	44,120	
Survey periods	2014Q4–22Q3	
Pseudo R^2	0.079	

Note: This regression accounts for the same demographic variables in Table A-1, column 1. Probit models explain the consistency of individuals' point predictions and uncertainty forecasts (Q.1 and Q.2 in section 1). The dependent variable equals 1 when the matched answers to Q.1 and Q.2 are consistent and 0 otherwise. Z-statistics using robust standard errors clustered at the individual level are reported.
** $p < 0.01$
Source: Canadian Survey of Consumer Expectations

3 Potential drivers of consistent responses

3.1 The share of consistent responses remains below pre-pandemic levels

Chart 3 plots the quarterly share of respondents to the CSCE who provided consistent answers to questions about their inflation forecasts at both one- and two-year horizons (see **Appendix C** for the dynamics of inconsistent responses and possible drivers).[7] On average, slightly less than half of respondents provided consistent answers about their inflation expectations.[8] This proportion is close to the result from a survey of consumers in the United States by the Federal Reserve Bank of Cleveland (Braitsch and Mitchell 2022). In contrast, Clements (2010) reports that 70% to 80% of professional inflation forecasters have consistent answers about their inflation expectations.

The share of consistent responses on inflation dropped to a survey low of 36% in the second quarter of 2020 with the emergence of COVID-19. That proportion partially recovered during the period of high inflation over 2021–22 but remains below pre-pandemic levels. The next

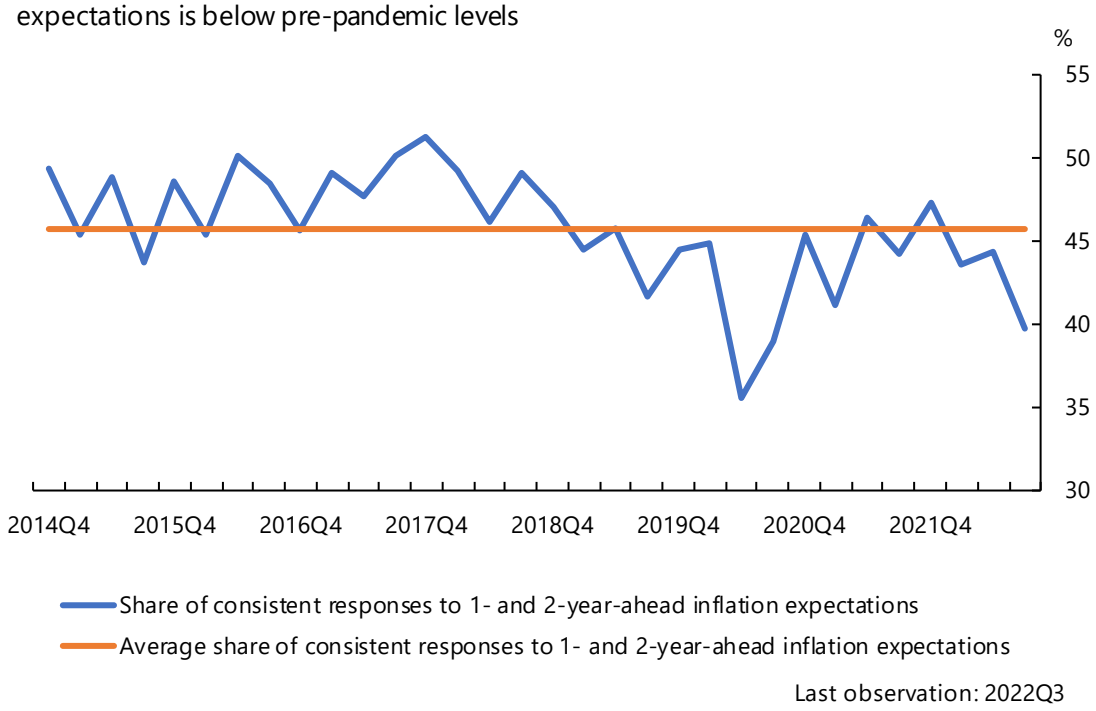
[7] Over the survey's history, the share of consumers with consistent short-term and long-term expectations is similar to the share with consistent short-term expectations (**Chart A-1**). Our results are robust to the definition of consistency.

[8] As in Braitsch and Mitchell (2022), we focus on results based on intervals around the mean of consumers' subjective distributions using a non-parametric approach. However, we also calculate intervals using alternative approaches (see **Appendix B** for descriptions). **Chart B-1** shows that, for all specifications, the share of consistent responses is similar over time and the share has been below pre-pandemic levels in recent quarters.

sections investigate several factors that may explain the dynamics in the overall share of consistent responses, namely:

- Higher inconsistency than before the pandemic may be due to greater uncertainty.
- Higher inconsistency than before the pandemic may be related to increased survey fatigue because of longer questionnaires.
- Consistency in responses may have risen in the high inflation environment of 2021–22 due to increased attention.

Chart 3: The share of consistent responses for both 1- and 2-year-ahead inflation expectations is below pre-pandemic levels



Last observation: 2022Q3

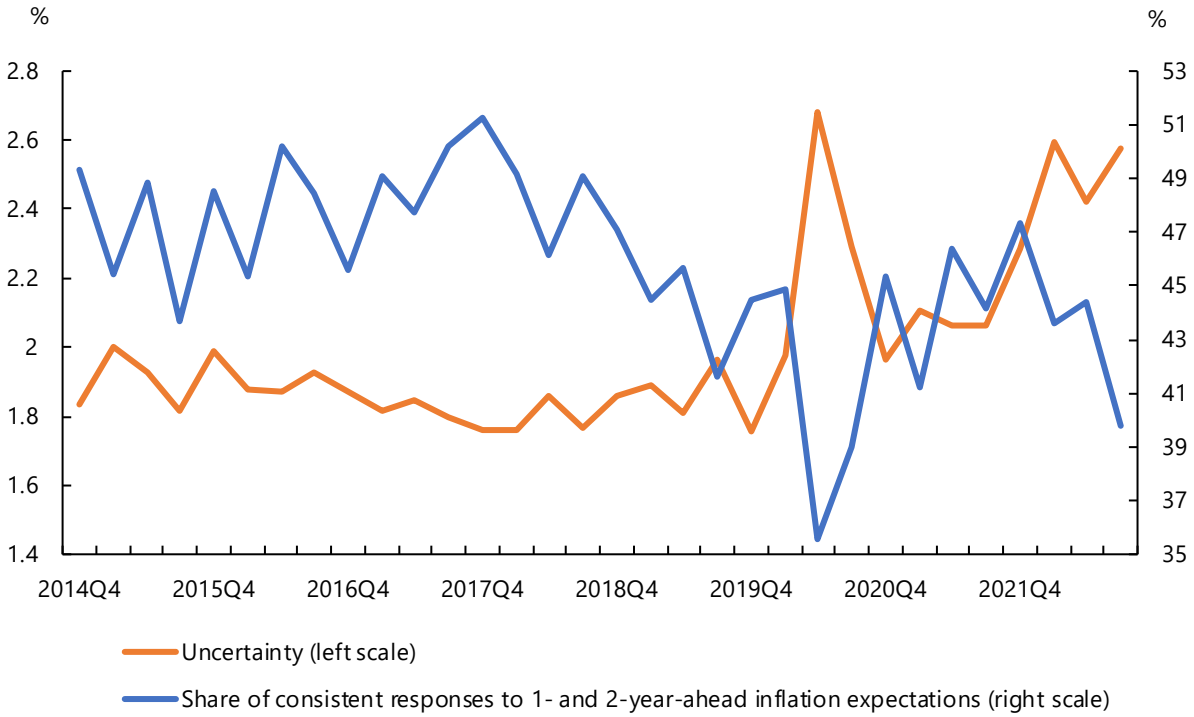
3.2 Could higher uncertainty be reducing response consistency?

High and unpredictable inflation creates uncertainty around future changes in prices. In the current environment, this includes considerable uncertainty about the evolution of global supply chains and commodity prices. Uncertainty muddies the information that consumers rely on to form expectations and make economic decisions.

At the onset of the pandemic, uncertainty in consumers' one-year-ahead inflation expectations reached a survey high (**Chart 4**). Soon after, uncertainty dropped but has steadily increased since. The share of consumers with consistent responses to inflation expectations has mirrored these dynamics: the share hit a trough at the beginning of the pandemic, quickly bounced back and then declined again. A simple correlation between the

share of consistent responses and the level of uncertainty is -0.69. This suggests that the lower level of consistency in recent quarters compared with the early years of the survey may be partly due to increased uncertainty around future inflation.

Chart 4: Consistency in responses has declined with increased uncertainty about inflation



Note: Uncertainty is calculated as the interpolated median each quarter of respondents' interquartile ranges (IQR). A respondent's IQR is equal to the difference between the 25th and 75th percentiles based on the estimated density quartiles from their subjective probability distribution (for more details, see Engelberg, Manski and Williams 2009).

Last observation: 2022Q3

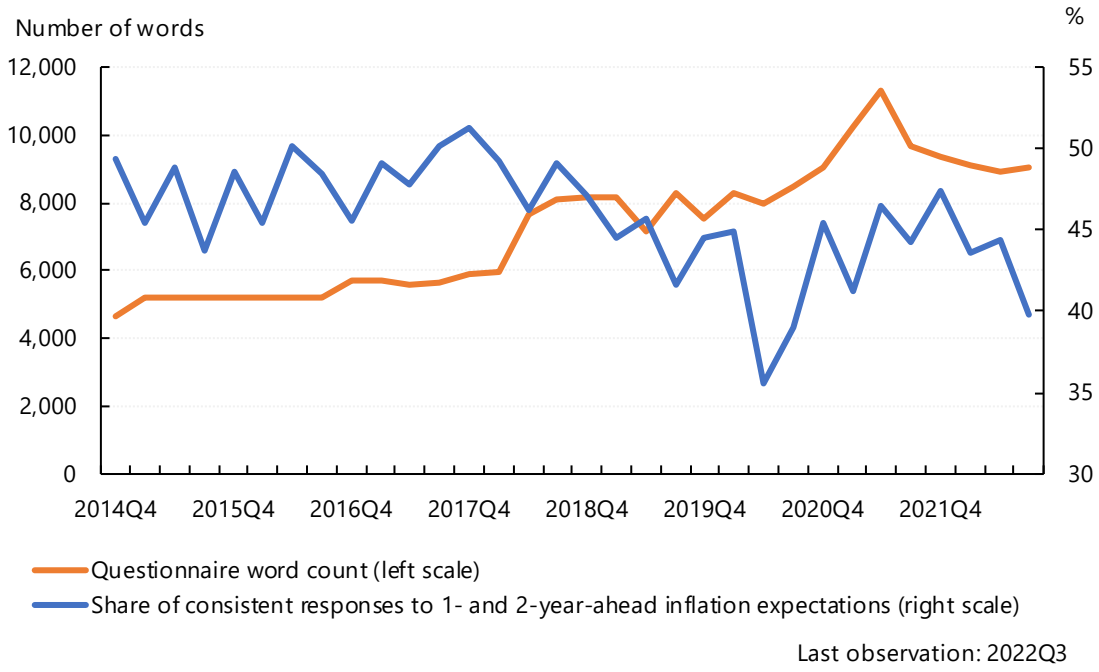
3.3 Could survey length be affecting response consistency?

Survey fatigue is an important concern in the design of a questionnaire (Stantcheva 2022). The consistency, variability and number of questions influence survey fatigue, or whether a respondent maintains focus and attention over the course of the questionnaire.

In early 2018, in addition to the survey's core questions, the CSCE started including several special questions on timely topics for policy analysis. These questions often changed from quarter to quarter. The length of the survey, measured by the number of words in the questionnaire, then remained stable until 2020 (**Chart 5**). Starting in 2020, the number of special questions was increased to gauge the impact and evolution of the pandemic before plateauing at a higher level by the end of 2021. In 2022, the survey was almost double the length from the early years. A simple correlation between the share of respondents with consistent responses and the length of the survey is 0.52. Results from simple regressions at

the individual level also show a negative, although small, link (**Table A-1**, column 6). Together, these findings suggest that survey fatigue from lengthier questionnaires than in the past may partly explain the lower share of consistent responses than before the pandemic.

Chart 5: Consistency in responses has fallen with an increase in questionnaire length



Last observation: 2022Q3

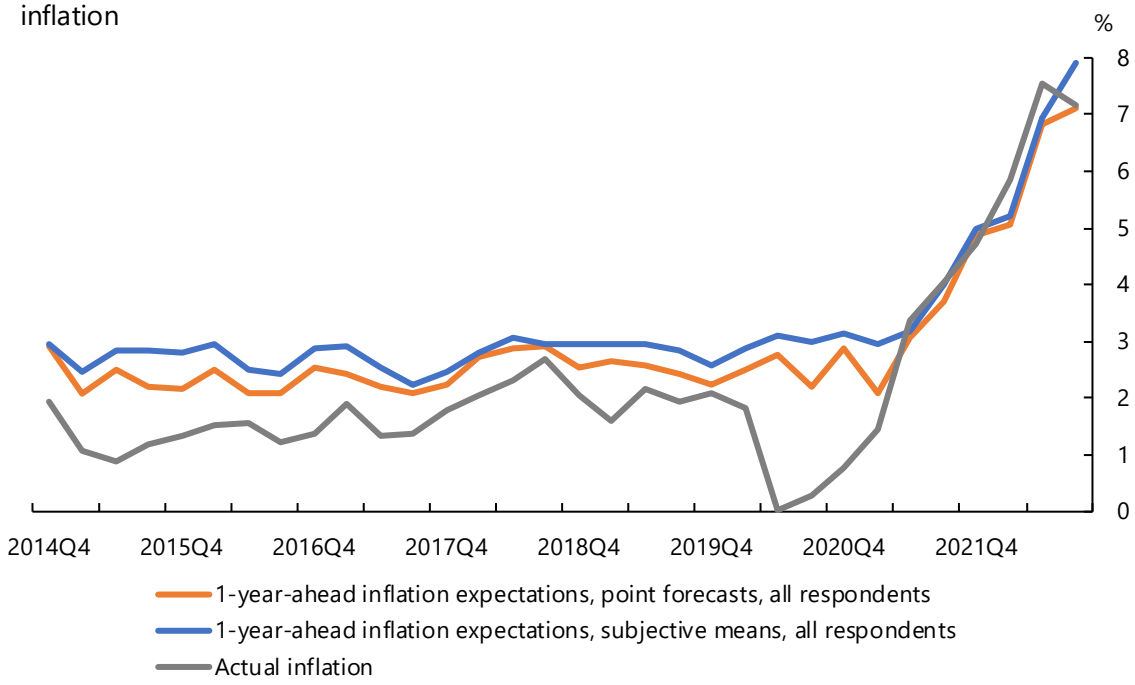
3.4 Can we link increased consistency with greater attention to inflation?

The rebound in the share of consistent responses since its trough at the onset of the pandemic may reflect increased attention to inflation. The theory of rational inattention (Sims 2003) suggests that firms and households typically pay little attention to inflation when it is low and stable. Informational frictions make paying attention to inflation costly and simply not worth the effort. But when inflation is high and volatile, paying attention to inflation and monetary policy becomes more important—the marginal benefit is greater than when inflation is low and stable. In such situations, households and businesses benefit from incorporating views on inflation into their economic decisions and expectations.

Looking at the overall results, respondents' point forecasts and subjective means rose with large increases in actual inflation (**Chart 6**). The correlations between actual CPI inflation and consumers' point forecasts and subjective means improved to greater than 0.9 after the onset of the pandemic. We suggest that a stronger link between inflation expectations and actual inflation captures this type of rational attention. Bracha and Tang (2022) and Braitsch and

Mitchell (2022) make similar conclusions based on analyses of data on consumers in the United States.

Chart 6: Respondents' point forecasts and subjective distributions increased with higher inflation



Sources: Statistics Canada and Canadian Survey of Consumer Expectations Last observation: 2022Q3

We also use the individual-level data for consistent responses to examine the link between expectations and CPI inflation. Here, instead of explaining the share of consistent responses, we assess whether information on general and specific prices (e.g., total CPI, food prices) influences individuals' inflation expectations.

Using an ordinary least squares (OLS) regression specification, we find, since the second quarter of 2021, a strong positive relationship between CPI inflation and inflation expectations for respondents with consistent answers (**Table 2**). A weaker relationship holds during the low inflation period prior to the first quarter of 2021. These respondents may have become more rationally attentive since inflation became elevated.[9]

[9] We find no increase in attention to inflation in 2021–22 for consumers with inconsistent responses (**Table A-3**). However, short-term expectations for this group are linked to food and gas prices starting in the second quarter of 2021 (**Table A-4** and **Table A-5**). This means that some respondents from this group may have become more rationally attentive by relying more on their own experiences and paying more attention to the prices of the items they frequently purchase.

Table 2: Actual inflation is strongly linked with expectations among consumers with consistent views

OLS regressions

Dependent variable: 1-year-ahead inflation expectations

	Consistent consumers	
	t-statistic	Coefficient estimate
Total inflation	2.37	0.126*
Total inflation (after 2021Q1)	10.33	0.420**
Observations	22,769	
Survey periods	2014Q4–22Q3	
Adjusted R^2	0.12	

Note: T-statistics with robust standard errors clustered at the individual level are reported.
* $p < 0.05$, ** $p < 0.01$
Source: Canadian Survey of Consumer Expectations

3.5 Do other factors play a role in consistency?

Results in section 2 show that respondents with low numeracy are more likely than others to provide inconsistent responses to questions on future inflation. The average quarterly share of respondents with low numeracy has nearly doubled from 33% in the period between the fourth quarter of 2014 and the second quarter of 2019 to 61% in the period since (**Chart A-2**). A simple correlation between the share of respondents with consistent responses and the share with low numeracy is -0.55. Together, these findings suggest that having a higher-than-usual share of respondents with low numeracy may partly explain the lower-than-usual share of consistent responses recently.

During periods of exceptionally high or low inflation, a greater share of respondents is likely to assign higher probabilities to the specified bins at the outer ranges of the distribution. In such situations, the assumptions used for the endpoints of the outer bins are more important in determining whether responses are consistent. To account for an environment of high inflation, the outer specified bins can be adjusted to compensate for higher ranges of inflation forecasts. With larger endpoints, the share of consistent responses increases, but by roughly the same amount across all quarters (**Chart A-3**). That is, the sizes of the outer specified bins have little effect on the dynamics in the share of consistent responses.

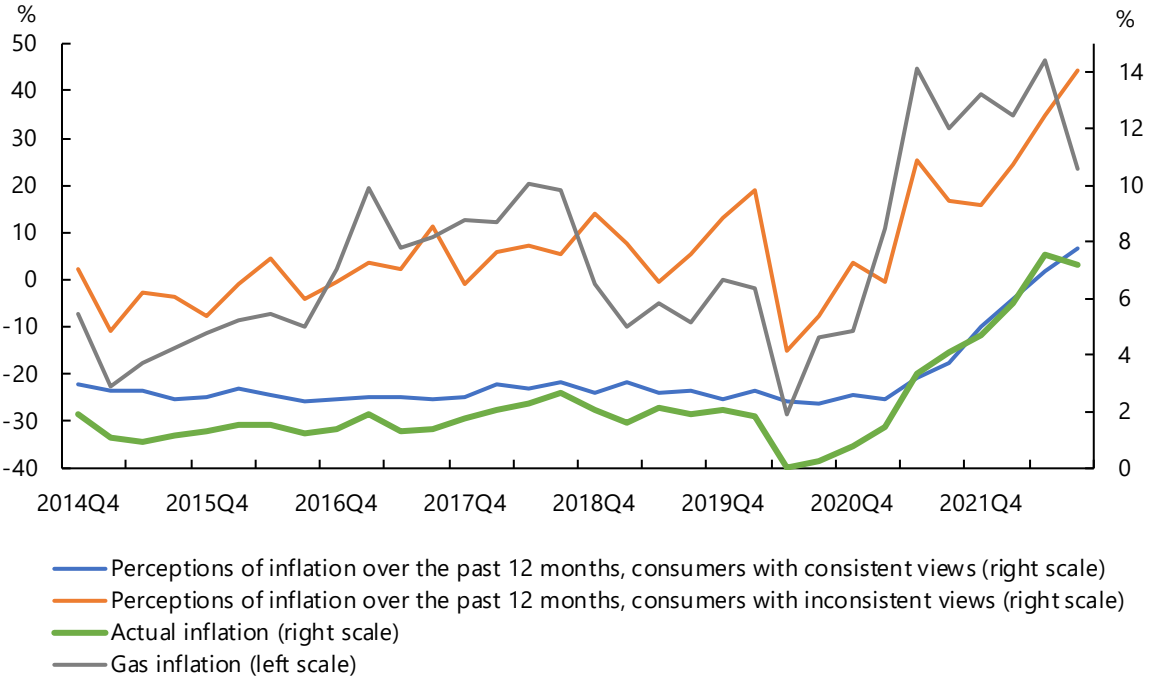
4 Implications for the Bank's inflation outlook

4.1 Consistent respondents have a narrower inflation-perception gap

To determine whether the inflation expectations of consumers with consistent responses are more informative of actual CPI inflation than those of other consumers, we look at perceived inflation (i.e., inflation over the past 12 months) separately for these two groups. **Chart 7** reveals striking differences. Perceived inflation averaged across consumers with consistent responses is close to actual CPI, but well above actual CPI for consumers with inconsistent responses. Instead, the pattern of perceived inflation averaged across the inconsistent group is closer to CPI inflation for gasoline.

While short-term inflation expectations have trended up in each group as inflation increased, the upward bias among consumers with inconsistent views has not changed much. Disagreement in short-term inflation expectations has also increased for both groups with high inflation, which may reflect that consumers are more polarized than usual about the causes of inflation (e.g., supply chain issues, elevated energy prices, high government spending) (**Chart A-4** and **Chart A-5**).

Chart 7: Consumers with consistent responses about future inflation have accurate perceptions of actual inflation



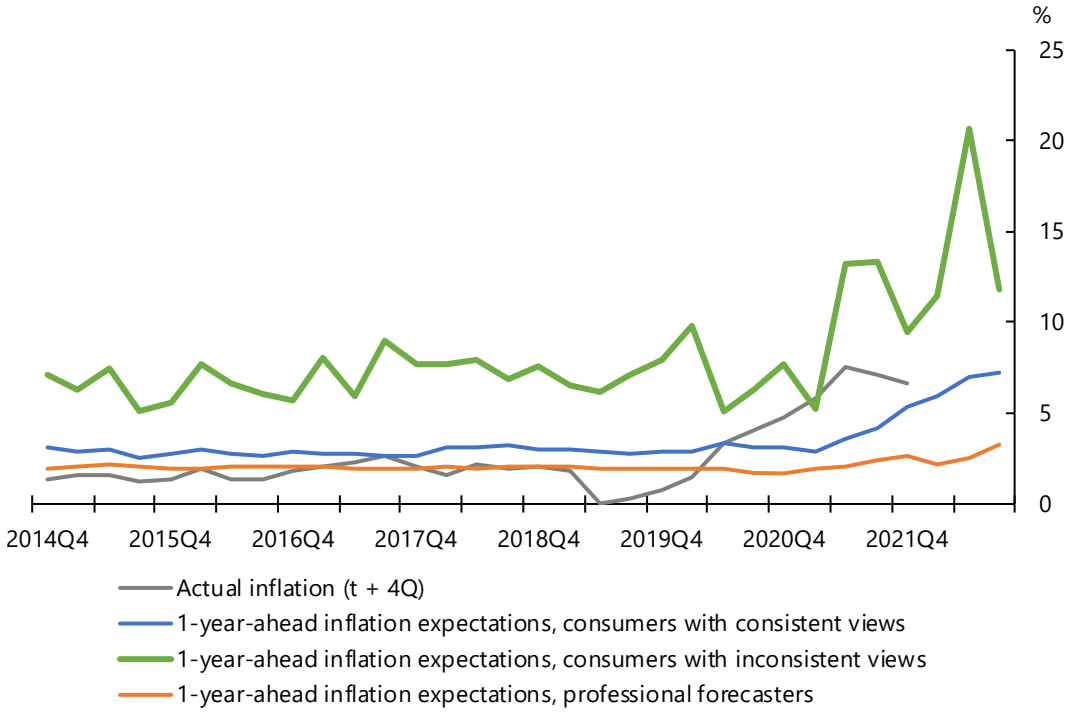
Sources: Statistics Canada and Canadian Survey of Consumer Expectations Last observation: 2022Q3

4.2 Comparing forecast errors between consumers and professional forecasters

We know that consumers with consistent views are better than other consumers at forecasting inflation. But how does their forecasting compare with that of professional forecasters? Before the pandemic, the one-year-ahead inflation expectations of consumers with consistent views were systematically above actual inflation four quarters later (**Chart 8**). Forecasting errors for these consumers were larger than those of professional forecasters in Canada surveyed by Consensus Economics.[10] Since the pandemic started, forecasting performance has deteriorated for both groups. However, the one-year-ahead inflation expectations of consistent consumers have been closer to actual inflation than those of professional forecasters. This suggests that, when assessing risks around inflation, we should seriously consider the survey results from these consumers. Their expectations represent an upside risk to the inflation outlook presented in the January 2023 *Monetary Policy Report*.

[10] The average absolute forecast error is 1.5 percentage points for consumers with consistent responses compared with 1.1 percentage points for professional forecasters.

Chart 8: Consumers with consistent views have inflation expectations closer to actual inflation than professional forecasters



Note: Actual inflation for time *t* plus 4 quarters is shown to compare with 1-year-ahead inflation expectations at time *t*.
Sources: Consensus Economics, Statistics Canada and Canadian Survey of Consumer Expectations

Last observation: 2022Q3

5 Concluding remarks

Inflation expectations play a vital role in determining inflation. Therefore, central banks need to understand their intricacies and what they can reveal. We look at the consistency of consumers' answers across questions on short-term inflation expectations in the CSCE.

Overall, slightly less than half of respondents have provided consistent answers on future inflation over the survey's history. Higher uncertainty and survey fatigue may partly explain why consistency since the first quarter of 2019 has been lower than in early years of the survey. Increased attention to inflation alongside high inflation since the second quarter of 2021 may explain the recovery in consistent responses since its trough at the onset of the pandemic. At the individual level, the likelihood of giving consistent answers increases with age, income, numeracy and level of understanding of inflation.

One-year-ahead forecasts for consumers with consistent responses to questions on inflation expectations have been more accurate than forecasts from other consumers and professional

inflation forecasters since the second quarter of 2021. Inflation expectations from consumers with consistent responses are more informative, and policy-makers should more closely track them when assessing inflationary pressures in the economy.

Signs of increased attention to inflation suggest that households may be following central bank communications more closely. An analysis by Bank staff shows that individuals update their views on inflation when they receive new information, particularly details about the Bank's inflation target and forecasts for inflation published by the Bank or produced by professional forecasters (Kostyshyna and Petersen, forthcoming). However, like Braitsch and Mitchell (2022), we think targeted and additional forms of communication may be needed to reach consumers with inconsistent responses to encourage them to moderate their inflation expectations. The Bank's The Economy, Plain and Simple series and the Bank of Canada Museum's education programs are steps in that direction.

Appendix A: Extra tables and charts

Table A-1: The share of consistent responses differs by gender, age, level of income and for equity-seeking groups

Probit regressions with average marginal effects

Dependent variable: Binary variable for consistent 1-year and 2-year inflation expectations

	(1)	(2)	(3)	(4)	(5)	(6)
Aged 30–54	0.144**	0.113**	0.137**	0.122**	0.153**	0.113**
	(6.92)	(19.57)	(6.79)	(5.10)	(11.07)	(18.74)
Aged 55 and over	0.316**	0.220**	0.307**	0.289**	0.295**	0.221**
	(14.97)	(13.15)	(14.83)	(11.66)	(13.73)	(13.36)
Some post-secondary education	0.068**	0.052**	0.045**	0.054**	0.055**	0.052**
	(4.05)	(14.06)	(2.68)	(2.69)	(3.75)	(13.86)
Post-secondary degree/diploma	0.100**	0.095**	0.072**	0.071**	0.088**	0.095**
	(5.23)	(21.99)	(4.01)	(2.86)	(7.00)	(21.89)
Income $40,000–$100,000	0.033	0.033**	0.021	0.015	0.027*	0.034**
	(1.79)	(10.76)	(1.15)	(0.70)	(2.27)	(10.89)
Income over $100,000	0.073**	0.068**	0.061**	0.053*	0.059**	0.069**
	(3.89)	(19.43)	(3.21)	(2.42)	(4.36)	(19.86)
Female	-0.055**	-0.068**	-0.044**	-0.047**	-0.054**	-0.068**
	(-3.82)	(-30.26)	(-2.69)	(-2.87)	(-6.14)	(-30.02)
Racialized people	-0.016					
	(-1.04)					
Indigenous people	-0.123**					
	(-3.63)					
People with disabilities	-0.026					
	(-1.72)					
Employed	-0.042**	-0.012**	-0.033*	-0.007	-0.039**	-0.012**
	(-2.81)	(-2.62)	(-2.27)	(-0.41)	(-3.73)	(-2.72)
Unemployed	-0.041	-0.061**	-0.045	-0.010	-0.077**	-0.061**
	(-1.55)	(-10.99)	(-1.77)	(-0.34)	(-4.15)	(-11.17)
Renter	-0.030*	-0.018**	-0.025	-0.023	-0.014	-0.018**
	(-2.19)	(-6.49)	(-1.82)	(-1.50)	(-0.77)	(-6.31)
Makes most household financial decisions	-0.015	0.022**	-0.002	0.010	-0.005	0.022**
	(-1.29)	(4.68)	(-0.22)	(0.73)	(-0.46)	(4.71)
Atlantic	-0.034	-0.063**	-0.024	-0.025	-0.040**	-0.062**
	(-1.47)	(-13.80)	(-0.93)	(-0.94)	(-2.68)	(-13.80)
Quebec	-0.030	-0.012*	-0.029	-0.026	-0.020	-0.013**
	(-1.91)	(-2.57)	(-1.61)	(-1.36)	(-1.68)	(-2.77)
Prairies	-0.018	-0.019**	-0.025	-0.011	-0.024	-0.018**
	(-1.09)	(-5.16)	(-1.53)	(-0.58)	(-1.96)	(-4.97)
British Columbia	0.047**	0.003	0.044*	0.052*	0.033*	0.003
	(2.62)	(0.63)	(2.48)	(2.58)	(2.46)	(0.54)
Low numeracy (fewer than 4 of 5 questions correct)		-0.183**	-0.124**	-0.120**	-0.136**	-0.180**

		(-18.31)	(-12.14)	(-8.74)	(-7.44)	(-18.71)
Does not understand inflation well		-0.050**	-0.036	-0.077	-0.054**	-0.049**
		(-12.74)	(-1.23)	(-1.94)	(-3.03)	(-12.64)
Has difficultly expressing inflation		-0.018**	0.017	0.049**	0.004	-0.021**
		(-4.10)	(1.03)	(2.66)	(0.33)	(-4.10)
Total inflation			-0.006	-0.009		
			(-0.98)	(-1.12)		
Is more concerned about inflation			0.060**			
			(4.70)			
Believes inflation is more difficult to control				0.080**		
				(4.39)		
Aware of inflation targeting					0.006	
					(0.70)	
Survey word count						-0.005**
						(-2.81)
Observations	8,092	44,120	7,432	5,463	8,185	44,120
Pseudo R^2	0.068	0.079	0.079	0.080	0.075	0.079
Survey periods	2021Q3–22Q3	2014Q4–22Q3	2021Q4–22Q3	2021Q4–22Q3	2019Q4, 21Q1, 21Q4, 22Q2–Q3	2014Q4–22Q3

Note: Probit models explain the consistency of an individual's point and uncertainty forecasts (Q.1 and Q.2 in section 1.2). The dependent variable equals 1 when the answers to Q.1 and Q.2 are consistent, and 0 otherwise. Z-statistics using robust clustered standard errors are reported. Included in the base categories for the regressions are consumers who: 1) are under 30 years old, 2) have less than a high school education, 3) have less than $40,000 in household income, 4) are male, 5) are non-racialized, 6) are non-Indigenous, 7) are without a disability, 8) are not in the labour force, 9) do not rent, 10) do not make most household financial decisions, 11) reside in Ontario, 12) have high numeracy, 13) understand inflation well, 15) have little difficulty expressing inflation as a number, 16) are not more concerned about inflation than before the pandemic, 17) do not believe inflation is more difficult to control and 18) are not aware that Canada has an inflation target.
* $p < 0.05$, ** $p < 0.01$
Source: Canadian Survey of Consumer Expectations

Table A-2: Variable definitions

Variable name	Definition	Time period
Low numeracy	Equals 1 if the respondent correctly answered 3 or fewer of 5 numeracy questions. The questions are used to gauge a respondent's ability to understand and work with numbers.	2014Q4–22Q3
Does not understand inflation well	Equals 1 if the respondent answered 5 or more to the question: On a scale of 1 to 7, how well would you say you understand what "inflation" means?	2014Q4–22Q3

Has difficultly expressing inflation	Equals 1 if the respondent answered 5 or more to the question: On a scale of 1 to 7, how easy is it for you to express the rate of inflation as a number?	2014Q4–22Q3
Is more concerned about inflation	Equals 1 if the respondent answered "a" to the question below: Compared with before the pandemic, how has your view about inflation changed? a) Inflation is more of a concern b) Inflation is less of a concern c) Inflation concerns me to the same degree d) Inflation is not and never was a concern to me	Introduced in 2021Q4
Believes inflation is more difficult to control	Equals 1 if the respondent answered "a" to the questions below: Group A: Do you think the pandemic has impacted authorities' ability to control inflation in Canada? Group B: Do you think the pandemic has impacted the ability of the Bank of Canada to control inflation in Canada? a) Yes, it's more difficult now for them to control inflation b) Yes, it's less difficult now for them to control inflation c) No impact, the authorities have a similar ability to control inflation	Introduced in 2021Q4

Chart A-1: The share of consumers with consistent responses about future inflation is similar for each horizon

Share of consumers with consistent responses to questions about inflation expectations

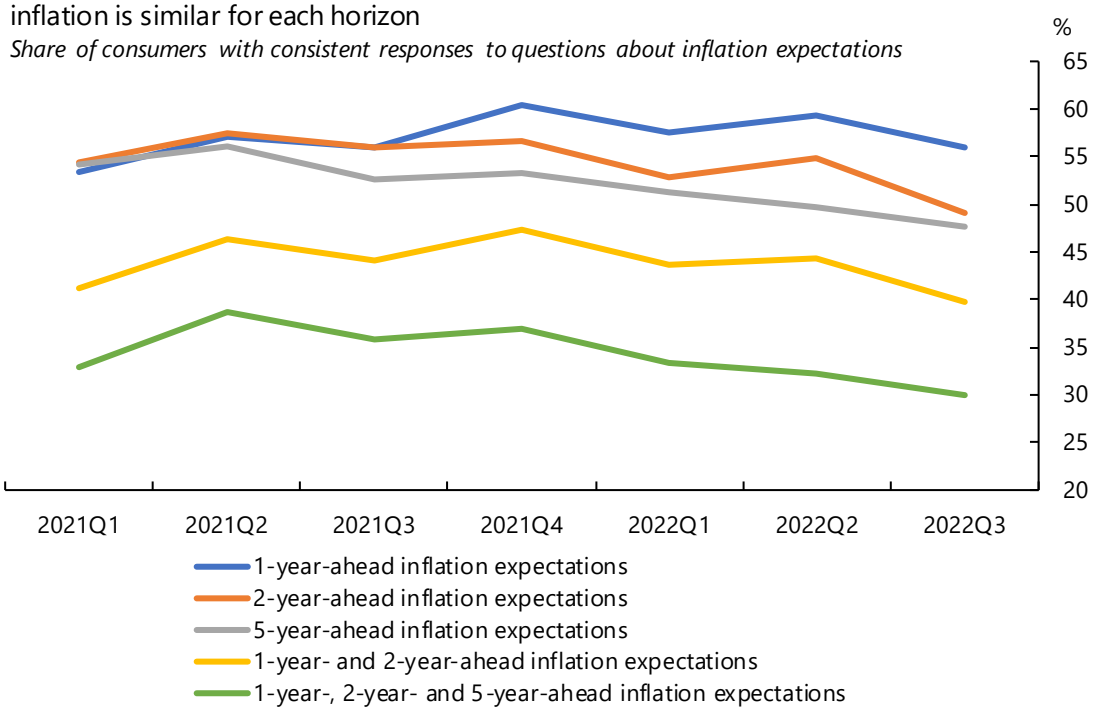


Table A-3: Respondents with inconsistent views show no increase in attention to inflation in 2021–22

OLS regressions

Dependent variable: 1-year-ahead inflation expectations

	Consistent consumers		Inconsistent consumers	
	t-statistic	Coefficient estimate	t-statistic	Coefficient estimate
Total inflation	2.37	0.126*	4.12	0.652**
Total inflation (after 2021Q1)	10.33	0.420**	1.67	0.665
Observations	22,769		27,430	
Survey periods	2014Q4–22Q3		2014Q4–22Q3	
Adjusted R^2	0.12		0.002	

Note: T-statistics with robust standard errors clustered at the individual level are reported.
* $p < 0.05$, ** $p < 0.01$
Source: Canadian Survey of Consumer Expectations

Table A-4: Respondents with inconsistent views show an increase in attention to food inflation in 2021–22

OLS regressions

Dependent variable: 1-year-ahead inflation expectations

	Consistent consumers		Inconsistent consumers	
	t-statistic	Coefficient estimate	t-statistic	Coefficient estimate
Food inflation	0.16	0.001	-3.08	-0.371**
Food inflation (after 2021Q1)	38.79	0.456**	2.71	1.162**
Observations	22,769		27,430	
Survey periods	2014Q4–22Q3		2014Q4–22Q3	
Adjusted R^2	0.131		0.001	

Note: T-statistics with robust standard errors clustered at the individual level are reported.

* p < 0.05, ** p < 0.01

Source: Canadian Survey of Consumer Expectations

Table A-5: Consumers with inconsistent responses show an increase in attention to gas prices in 2021–22

OLS regressions

Dependent variable: 1-year ahead inflation expectations

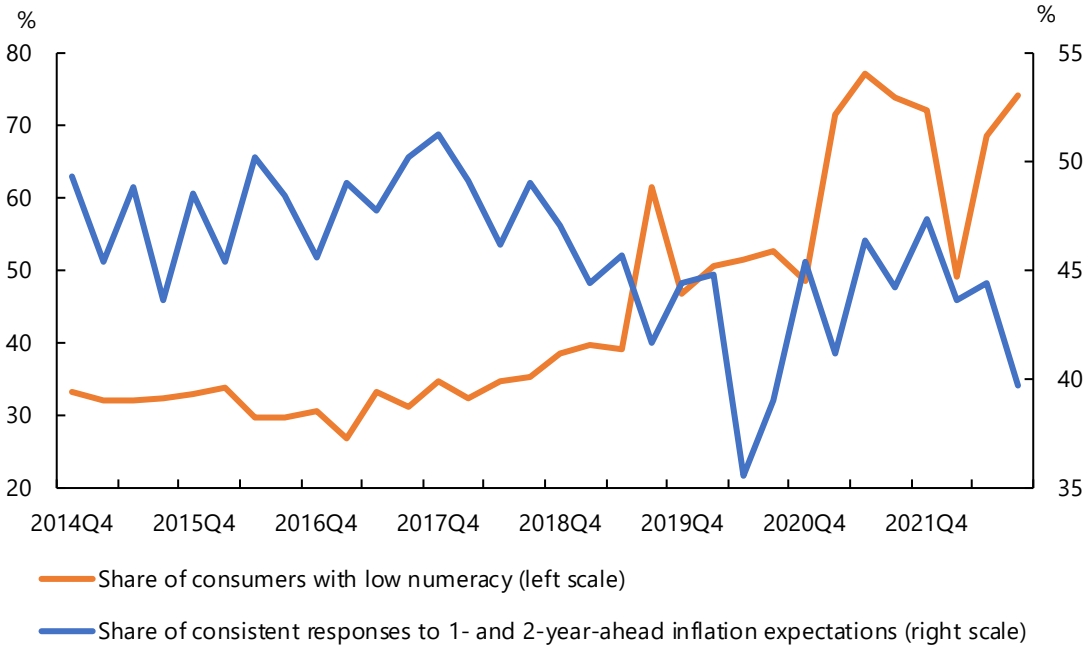
	Consistent consumers		Inconsistent consumers	
	t-statistic	Coefficient estimate	t-statistic	Coefficient estimate
Gas inflation	-2.61	-0.001**	39.62	0.034**
Gas inflation (after 2021Q1)	13.18	0.064**	1.98	0.142*
Observations	22,769		27,603	
Survey periods	2014Q4–22Q3		2014Q4–22Q3	
Adjusted R^2	0.085		0.002	

Note: T-statistics with robust standard errors clustered at the respondent level are reported.

* p < 0.05, ** p < 0.01

Source: Canadian Survey of Consumer Expectations

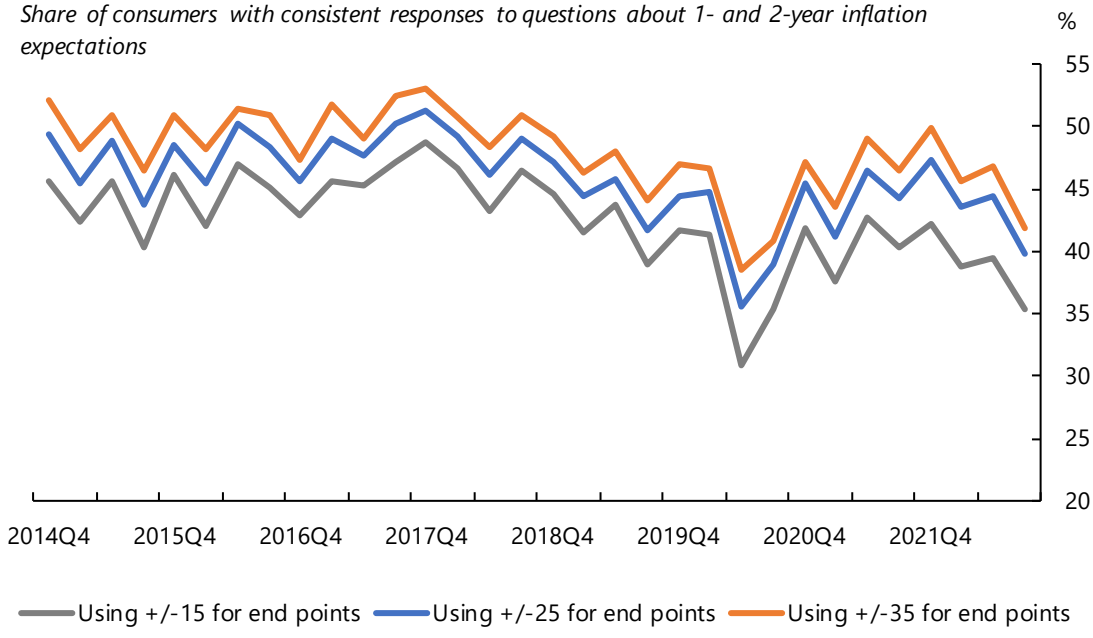
Chart A-2: Consistency in responses has decreased with a greater share of consumers with low numeracy



Last observation: 2022Q3

Chart A-3: Dynamics for share of consistent responses do not depend on end points of specified bins

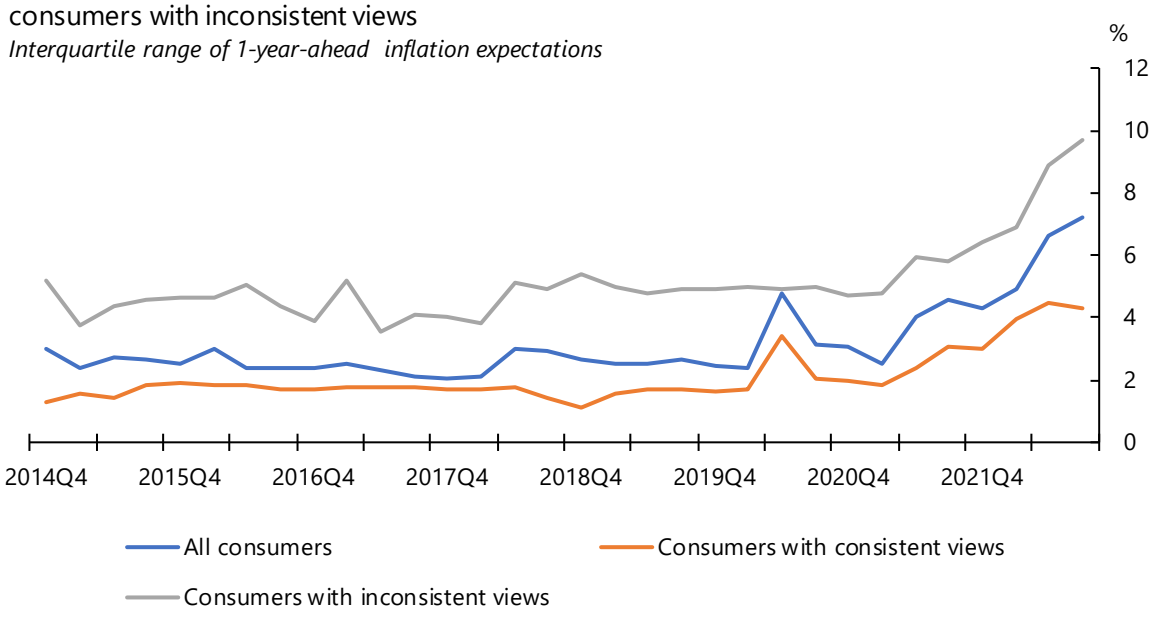
Share of consumers with consistent responses to questions about 1- and 2-year inflation expectations



Last observation: 2022Q3

Chart A-4: Disperson in near-term inflation expectations has increased, especially among consumers with inconsistent views

Interquartile range of 1-year-ahead inflation expectations

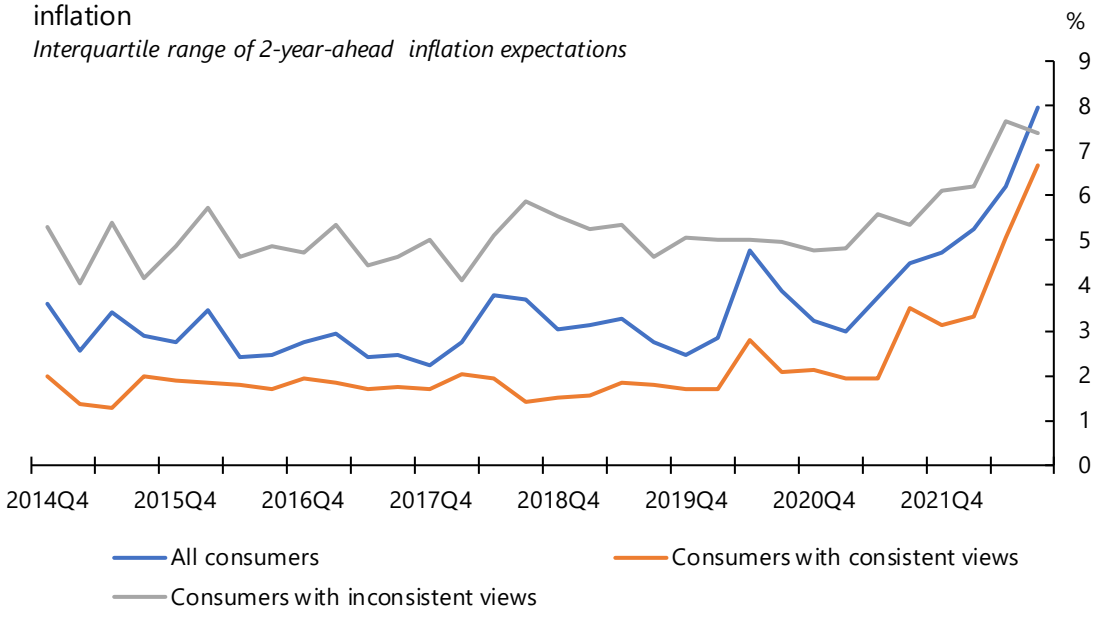


Note: The interquartile range is a measure of dispersion or disagreement among respondents. It is equal to the difference between the 25th and 75th percentiles of the distribution of responses.

Last observation: 2022Q3

Chart A-5: Dispersion in short-term inflation expectations has increased with higher inflation

Interquartile range of 2-year-ahead inflation expectations



Note: The interquartile range is a measure of dispersion or disagreement among respondents. It is equal to the difference between the 25th and 75th percentiles of the distribution of responses.

Last observation: 2022Q3

Appendix B: Alternative specifications show a similar share of consistent responses over time

Median non-parametric approach

The interval for the median using the non-parametric approach equals the specified bin that separates the lower half of the distribution from the upper half—that is, the bin that has the cumulative sum of the probability mass equal to 50%.[11] In the example below, the median interval is 2%–4%.

the rate of inflation will be between 8% and 12%	10% chance
the rate of inflation will be between 4% and 8%	20% chance
the rate of inflation will be between 2% and 4%	40% chance
the rate of inflation will be between 0% and 2%	30% chance

Consumers' responses about inflation expectations are defined as consistent if their point prediction lies in this interval. That is:

Answer to Q.1. Over the next 12 months, I expect the rate of inflation to be 3%. → CONSISTENT

Answer to Q.1. Over the next 12 months, I expect the rate of inflation to be 2%. → CONSISTENT

Answer to Q.1. Over the next 12 months, I expect the rate of inflation to be 1%. → INCONSISTENT

Mean and median parametric approaches

We use individuals' responses to the probabilistic questions to parametrically estimate the underlying forecast density function by fitting a generalized beta distribution (see Engelberg, Manski and Williams 2009). Using the probability density function for each respondent, we compute corresponding density means, medians and quartiles. Using the density quartiles, we use the interquartile range as the size of the interval around the density means and medians.[12] As in the non-parametric approach, we use ±25% to delimit the end-tail ranges. These intervals are compared with the point prediction from Q.1.

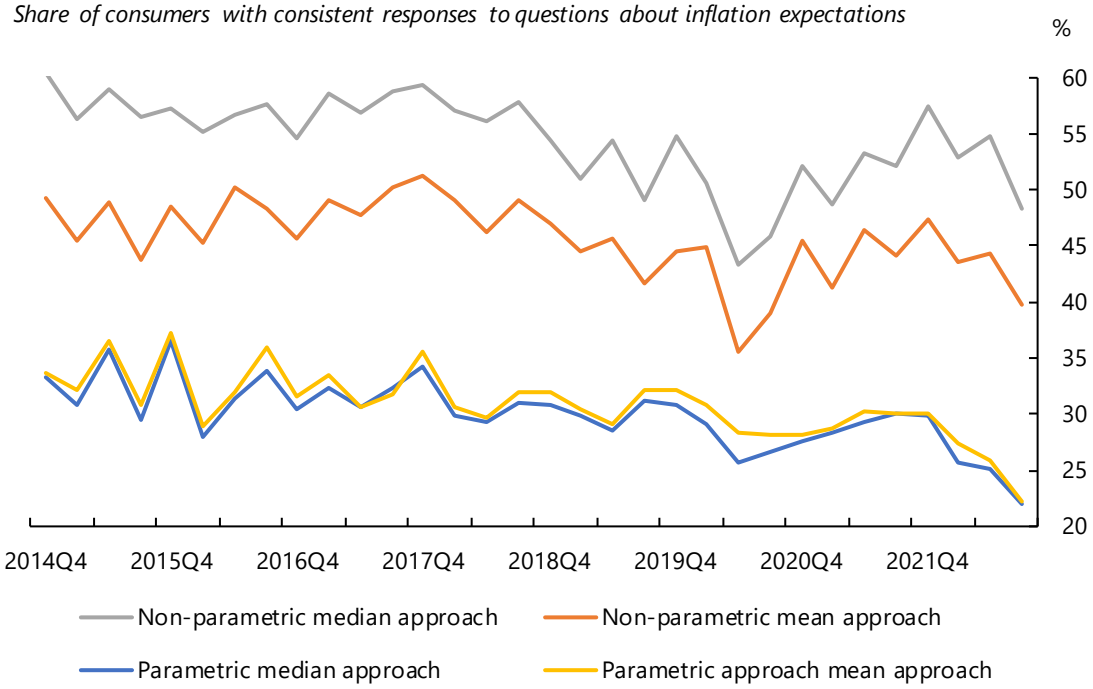
Chart B-1 shows that, for all specifications, the share of consistent responses over time is similar and the share has been below pre-pandemic levels.

[11] In cases where the cumulative sum is exactly 50%, two bins are used to identify the interval for the median.

[12] The interquartile range is the difference between the third and first quartiles. It is also used as a measure of an individual's forecast uncertainty.

Chart B-1: Across various approaches, the share of consumers with consistent 1-year and 2-year inflation expectations is below pre-pandemic levels

Share of consumers with consistent responses to questions about inflation expectations



Last observation: 2022Q3

Appendix C: Point predictions for inconsistent respondents have become more upwardly biased with high inflation

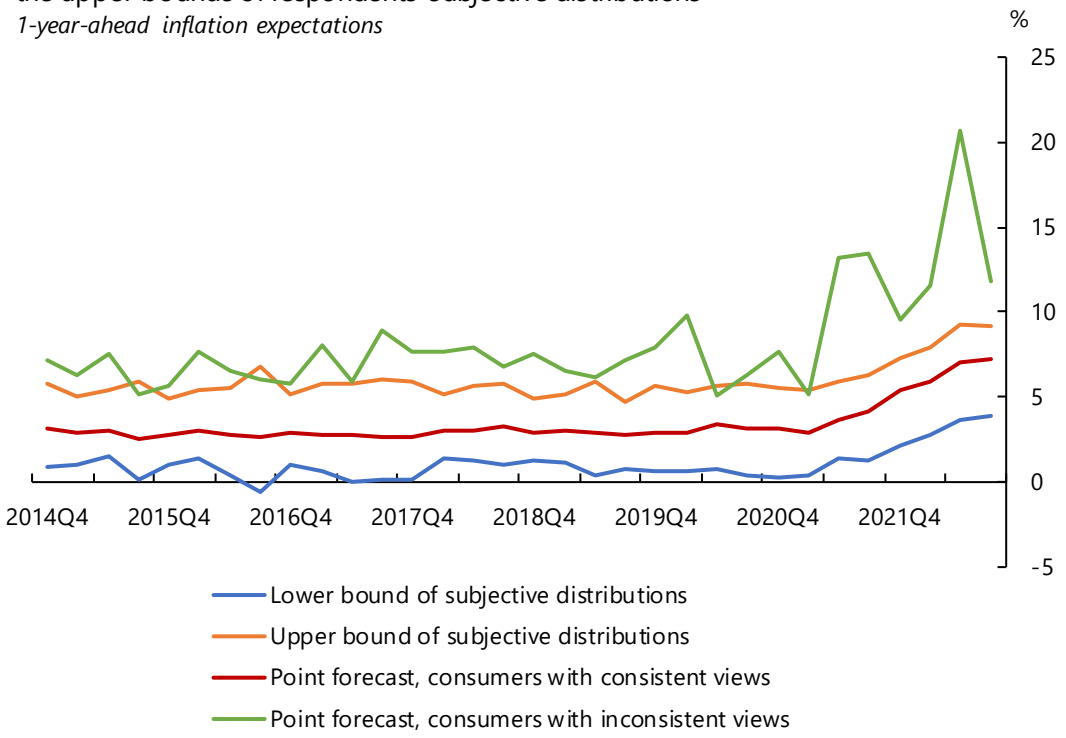
Point predictions for inconsistent respondents are noticeably more likely to be above than below the interval from their subjective distributions (**Chart C-1**). Before the pandemic, the shares of point predictions above and below the interval was about 55% and 45%, respectively. In recent years, those proportions shifted to roughly 60% and 40%. Braitsch and Mitchell (2022) also find a positive gap between inconsistent point predictions and subjective distributions for consumers in the United States, while Clements (2010) and Engelberg, Manski and Williams (2009) find a negative gap for professional forecasters.

We suggest two potential explanations for the asymmetry in CSCE responses:

- The narrower specified bins around 2% in Q.2 may serve as an anchor for some respondents' expectations. This may lead to downward revisions of the midpoint forecast for their subjective distribution relative to their initial point prediction.
- Respondents could have an asymmetric loss function with respect to their inflation expectations (and expectations that are still rational). Here, the loss of overpredicting is less than underpredicting, and respondents have point predictions that are simply high percentiles of their underlying distributions. Patton and Timmermann (2007) and Engelberg, Manski and Williams (2009) also suggest this explanation.

Chart C-1: Inflation point forecasts of consumers with inconsistent views are well above the upper bounds of respondents' subjective distributions

1-year-ahead inflation expectations



Last observation: 2022Q3

In addition, the gap between inconsistent respondents' point forecasts and the average upper bound of consumers' probability distributions has widened since inflation has been high.[13] Several potential explanations exist, including:

- the degree of inconsistency may increase with greater uncertainty
- the costs of overpredicting inflation may be increasingly lower than the costs of underpredicting with inflation being high

[13] The average gap between point predictions and the subjective mean (midpoint of the interval) is larger for overpredictions than underpredictions throughout the survey's history. The gap for both groups has widened with inflation between the first quarter of 2021 and the third quarter of 2022, but the gap for overpredictions has grown by more.

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