

# Inflation Expectations and Information Selection: Evidence from a Randomized Control Trial\*

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## Abstract

We use experimental methods to measure how information selection and information processing leads to heterogeneity in inflation expectations. There are four findings. First, we find that respondents differ in their preferred piece(s) of inflation forecasts from established institutions. It suggests that only those who can process a set of information are likely to demand information. Second, we find that providing credible information about future inflation helps to stabilize inflation expectations. Third, we show that respondents tend to more incorporate multiple pieces of information into their expectations than a single piece of information. The evidence may suggest that respondents believe that information from multiple sources contains more precise signals than information from a single source. Fourth, we find that endogenous information selection induces respondents to incorporate the acquired information into their expectations more than those who receive the same information exogenously. The result may imply that those who are exposed to inflation risk through interest rate risk are likely to pay high attention to signals.

*JEL Classification:* D12; D84; E52

*Keywords:* attention allocation; imperfect information; information processing; information selection; monetary policy

## 1 Introduction

This study uses experimental methods to measure how each of these stages of belief formation leads to heterogeneity in expectations. To this end, we conduct an experiment on a nationwide sample of consumers, broadly representative of the Japanese population. In our experiment, respondents can select and process information. Moreover, we create exogenous variation in information selection, which allows us to measure the effects of the quality and quantity of information on the heterogeneity in expectations.

The experimental design is inspired by the recent literature on information-provision experiments. The literature provides a random subset of respondents with a piece of information and measure the corresponding effects on expectations. In the real world, however, individuals are rarely offered hand-picked information. Instead, they have to find the information on their own, having to choose from multiple information sources and processing the acquired information. In our experiment, we study a more realistic information acquisition environment in which agents have to choose the information sources they want to see. The main survey

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underlying our study was conducted in September 2023. While the experimental design can be applied to many contexts, we provide an application to the context of inflation expectations.<sup>1</sup>

There are four findings from this study. The first finding is that respondents differ in their preferred piece(s) of information. Our results suggest that older respondents and higher income earner prefer to see all information while younger respondents and those with low educational attainment prefer not to see any information at all. The second finding is that respondents incorporate the provided information into their expectations. Our results suggest that respondents who see piece(s) of information basically incorporate the information and revise the beliefs. In addition, the provision of information causes posterior beliefs to be lower than prior beliefs. The third finding is that respondents tend to more incorporate multiple pieces of information into their expectations than a single piece of information. The evidence suggests that respondents believe that information from multiple sources contains more precise signals than information from a single source. The fourth finding is that endogenous information-selection treatment induces respondents to incorporate the information into their expectations more than exogenous information-provision treatment. The result may imply that exposures to inflation risk through interest rate risk are one of key mechanisms to explain heterogeneity in expectations. Respondents who are exposed to inflation risk are likely to allocate the more amount of attention to signals than those who are not. As a results, they more incorporate the information they see into their expectations than those who are less exposed to inflation risk.

## 2 Research design

We use the online panel, maintained by MyVoice Communications, Inc, to collect a sample of 2,009 respondents that is representative of the Japanese population in terms of gender and age. We invite only people between 20 and 79 years old. The data were collected from September 5 to 7, 2023. We (are going to) conduct the follow-up survey approximately one month after the main survey is administered.

### Stage 1: Prior belief

The first stage elicits individuals' prior belief about future inflation rates. The survey proceeds as follows. At the beginning of the survey, respondents are presented with a question asking about the percentage change in consumer prices over the last 12 months. The average forecast is 9.1 percent, above the actual rate of 3.3 percent but very close to the percentage change in food prices (less fresh food) of 8.8 (9.2) percent in July 2023.<sup>2</sup> Respondents are then presented with distributional questions about aggregate inflation over the next 12 months and 10 years.

### Stage 2: Information preferences

After being asked about perceived and expected inflation rates, respondents enter the second stage. Before providing posterior belief about expected inflation rates, respondents are *randomly* assigned to the following groups:

- (C0) (100 respondents): No information provided
- (T2) (100 respondents): Population growth rates in Japan ( $-0.45\%$  in July 2023).
- (T3) (100 respondents): Inflation forecasts by the Government of Japan (GOJ) ( $+2.6\%$  in FY2023).
- (T4) (100 respondents): Inflation forecasts by Bank of Japan (BOJ) ( $+2.5\%$  in FY2023).
- (T5) (100 respondents): Inflation forecasts by professionals in the private sector (ESP) ( $+2.6\%$  in FY2023).
- (T6) (100 respondents): Inflation forecasts by both the GOJ and BOJ.
- (T7) (100 respondents): Inflation forecasts by both the GOJ and ESP.
- (T8) (100 respondents): Inflation forecasts by both BOJ and ESP.
- (T9) (200 respondents): inflation forecasts by all of the GOJ, BOJ, and ESP.

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<sup>1</sup>The main body of the experimental design relies on Fuster et al. (2022).

<sup>2</sup>The figures are the most recent publicly available ones for inflation at the time of the survey.

(T10) (1,000 respondents): Respondents can choose one option between (T3) and (T9).

The group (C0) is not given any information, while the group (T2) is given *placebo* information about the growth rate of population in Japan. We label the group (C0) and the groups (T2) to (T9) as control group and exogenous information treatment groups. The group (T10), which we label as endogenous information selection group, is a key for our research. Respondents assigned to the group (T10) are given an opportunity to see inflation forecasts by established forecasters: the GOJ; BOJ; ESP. Specifically, respondents assigned to the group (T10) choose one of the options below:

Which information about price outlook do you want to see?

(T11) Price outlook by the GOJ.

(T12) Price outlook by BOJ.

(T13) Price outlook by ESP.

(T14) Price outlook by both the GOJ and BOJ.

(T15) Price outlook by both the GOJ and ESP.

(T16) Price outlook by both BOJ and ESP.

(T17) Price outlook by all of the GOJ, BOJ, and ESP.

(T18) I do not want to see any information at all.

We label the groups (T11) to (T18) as *endogenous* information selection groups. Table 1 shows that approximately one-fourth respondents choose the option (T17) to see all pieces of information about price outlook.

### Stage 3: Posterior belief

The final stage elicits respondents' posterior beliefs about future inflation rates. Respondents are presented with questions asking about the percentage change in consumer prices over the next 12 months and 10 years. The average forecasts over the next 12 months (10 years) are 6.8 (6.5) percent, which lower than prior means.

## 3 Econometric framework

We now consider how information treatments affect the beliefs of consumers. We follow Coibion et al. (2022) and Coibion et al. (2023) and use the following specification:

$$X_j^{post} = \alpha \times X_j^{pre} + \sum_{k=2}^{17} \beta_k \times Treatment_j^{(k)} + \sum_{k=2}^{17} \gamma_k Treatment_j^{(k)} \times X_j^{pre} + \mathbf{Z}_j \Psi + \varepsilon_j, \quad (1)$$

where  $j$  is denoted as respondents,  $X$  is a measure of inflation expectations,  $pre$  is denoted as inflation expectations measured before treatment,  $post$  is denoted as inflation expectations measured after treatment, and  $Treatment_j^{(k)}$  is an indicator variable equal to 1 if respondent  $j$  is provided with treatment  $k$ .  $Z$  is a vector of respondent's characteristics.

Equation (1) allows us to assess whether consumers put more or less weight on their prior beliefs in forming their posteriors when new information is provided. According to Coibion et al. (2018), that Bayesian updating of information implies that  $\gamma_k$  should be negative because respondents' posterior beliefs are a weighted average of their prior beliefs and a signal. Thus, our focus is on the value of  $\gamma_k$ ;  $\gamma_k$  should be more negative when treatments provide more precise signals, that is, the weight on the prior becomes smaller.

## 4 Effects of randomized and endogenous information treatments

There are four findings from this study. First, respondents differ in their preferred piece(s) of information: 26.0% choose to see all pieces of information from GOJ, BOJ, and ESP, 16.2% choose only to see the private

sector's consensus forecast, and 13.7% report preferring no information at all. On one hand, the fact that more than a quarter of respondents demand all information suggests that in the real world, consumers choose to see whatever information they can see at no cost. On the other hand, the fact that 13.7% report preferring no information at all may mean that they are reluctant to process information from multiple sources. We conduct probit analysis to identify who prefer to see all pieces of information and prefer not to see any information at all. Our results show that older respondents and higher income earner prefer to see all information, while younger respondents and those with high educational attainment prefer not to see any information at all. The results seem to be consistent with the conjecture that only those who can process a set of information are likely to demand sophisticated forecasts. The results suggest that cost of information processing may affect demand for information.

Second, information provision induces respondents to update their belief. Our results suggest that almost all coefficients are significantly negative. Note that the group is (T2) the control group and respondents who are assigned to the group (T18) prefer not to see any information at all. The evidence suggests that randomized information treatments affect respondents' posterior belief about inflation expectations. Figure 1 supports the evidence. The left panel in the figure illustrates whether placebo information affects posterior beliefs. The figure suggests that the black and red lines have almost the same slopes. It implies that treatment that is uninformative does not affect posterior beliefs. The right panel in the figure suggests, however, the established forecasts provided induce respondents to revise their forecasts on inflation over the next 12 months because the blue line has the smaller slope than the black one. The graphical evidence suggests that respondents who receive sophisticated forecasts significantly change their posterior beliefs.

Third, respondents more revise their belief when they receive multiple established forecasts. Figure 2 illustrates a monotonic decline in the coefficient  $\gamma_s$  except for (T4) and (T5). The evidence suggests that the more information are received, the more revisions are induced.

Fourth, endogenous information selection induces respondents to revise their posterior beliefs than exogenous information treatment. Our estimation results suggest the effectiveness of endogenous information selection more than exogenous information treatment; respondents who are assigned to (T10) revised their posterior belief by approximately 0.4% more than those who are assigned to the exogenous information treatment groups.

## 5 Conclusion

We use experimental methods to measure how information selection and information processing leads to heterogeneity in inflation expectations. There are four findings. First, we find that respondents differ in their preferred piece(s) of inflation forecasts from established institutions. It suggests that only those who can process a set of information are likely to demand information. Second, we find that providing credible information about future inflation helps to stabilize inflation expectations. Third, we show that respondents tend to more incorporate multiple pieces of information into their expectations than a single piece of information. The evidence may suggest that respondents believe that information from multiple sources contains more precise signals than information from a single source. Fourth, we find that endogenous information selection induces respondents to incorporate the acquired information into their expectations more than those who receive the same information exogenously. The result may imply that those who are exposed to inflation risk through interest rate risk are likely to pay high attention to signals.

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Table 1: Basic statistics of inflation expectations

Treatment	Provided information	Prior		Posterior		Observations
		Mean	S.D.	Mean	S.D.	
All	(Entire sample)	6.76%	3.28	6.79%	3.82	2,009
C0	No information provided	6.53%	3.25	7.41%	4.42	100
T2	Population growth	7.15%	3.17	8.00%	3.80	100
T3	Price outlook by the GOJ	6.18%	3.15	7.22%	3.60	101
T4	Price outlook by BOJ	6.79%	2.95	6.40%	3.77	100
T5	Price outlook by ESP	6.09%	3.44	7.17%	3.65	100
T6	Price outlook by both the GOJ and BOJ	6.88%	3.46	6.89%	3.92	101
T7	Price outlook by both the GOJ and ESP	6.81%	3.23	7.35%	3.37	101
T8	Price outlook by both BOJ and ESP	7.01%	3.16	6.83%	3.51	100
T9	Price outlook by the GOJ, BOJ, and ESP	6.90%	3.26	6.77%	3.45	202
T10	Choose one of the options below:					(1,004)
T11	Price outlook by the GOJ	6.72%	3.69	7.33%	4.15	108
T12	Price outlook by BOJ	7.23%	3.19	6.93%	3.46	59
T13	Price outlook by ESP	7.18%	3.27	7.41%	3.30	163
T14	Price outlook by both the GOJ and BOJ	6.62%	3.02	6.72%	3.42	96
T15	Price outlook by both the GOJ and ESP	6.82%	3.01	5.92%	3.28	102
T16	Price outlook by both BOJ and ESP	6.70%	2.62	5.94%	3.15	77
T17	Price outlook by the GOJ, BOJ, and ESP	7.07%	2.89	6.12%	3.41	261
T18	Do not want to see any information at all.	5.90%	4.37	5.96%	5.89	138

Note: Prior and posterior beliefs are inflation expectations over the next 12 months. GOJ, BOJ, and EPS are denoted as the Government of Japan, Bank of Japan, and professional forecasts in the private sector, respectively.

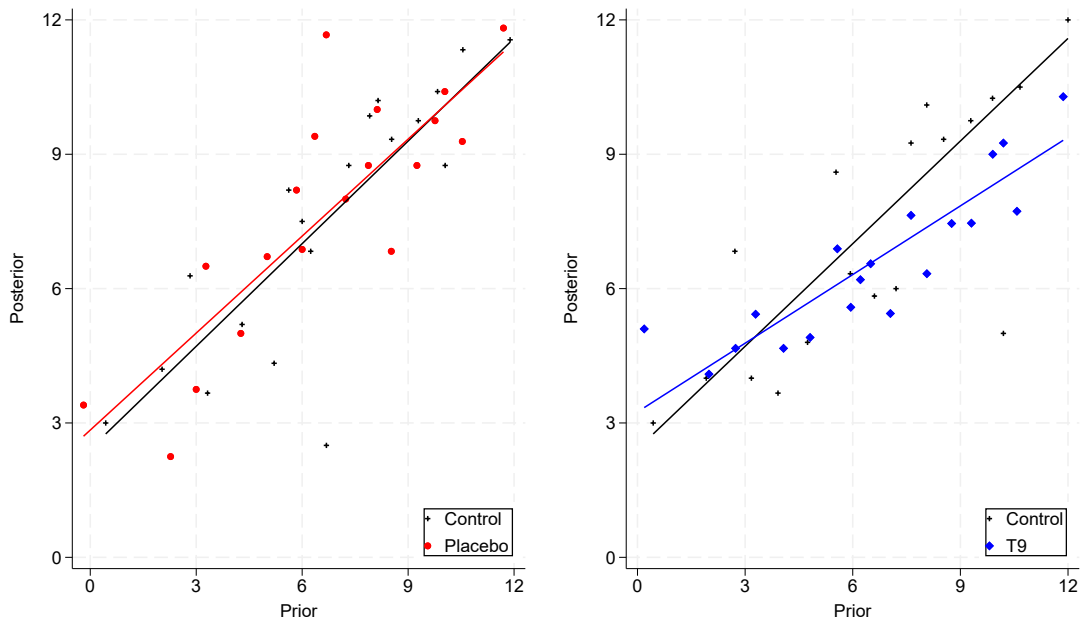


Figure 1: Scattergram: Control group v.s. “placebo” in the left panel; Control group v.s. the group (T9) provided all of the established forecasts over the next 12 months in the right panel.

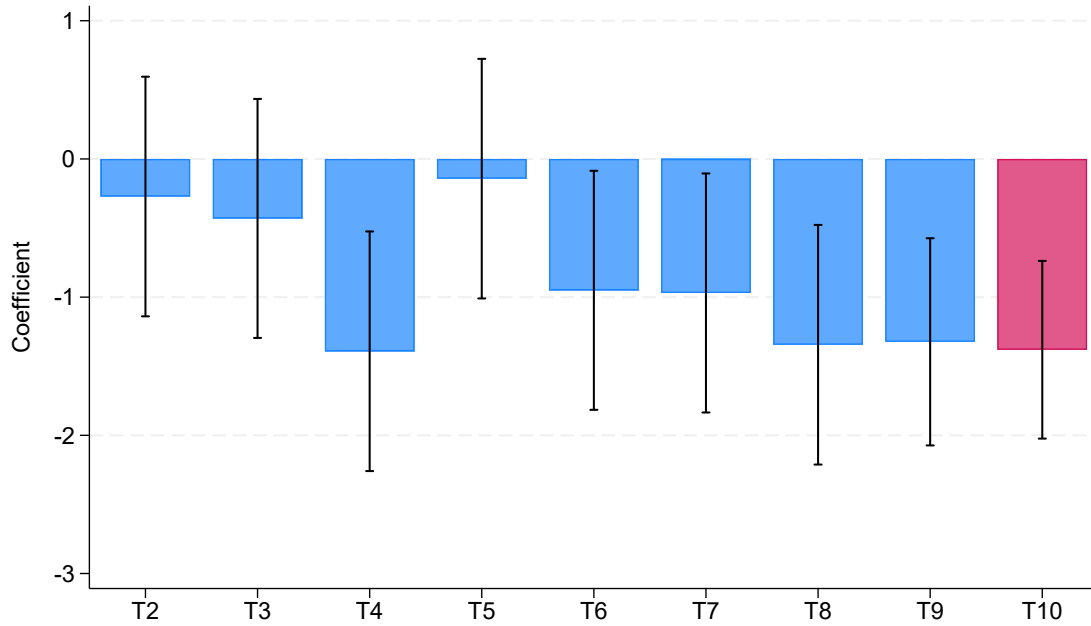


Figure 2: Information provision affects posterior beliefs over the next 12 months. Estimation results from the groups (T2) to (T10). The baseline is set to be (C0).