Information acquisition

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Finance

Direct measures of information acquisition

- Seminal theories of expectation formation in macro feature a key role for **attention** to the macroeconomy (Maćkowiak et al., 2018; Reis, 2006; Sims, 2003).

  - **Information acquisition** and **information processing**.

- "Traditional" approach to testing these theories: Study **belief disagreement** and how it responds to shocks (Coibion and Gorodnichenko, 2012; Mankiw et al., 2003).

- Problem: Belief disagreement may reflect differences in information sets, but could also be due to disagreement about the structure / model of the economy (Andre et al., 2021).

- Alternative approach: Use of **direct measures of information acquisition**.

Overview

Today I will discuss work using direct measures of information acquisition:

- Background: Belief disagreement and macroeconomic theories of expectation formation.

- "Risk Exposure and Acquisition of Macroeconomic Information" by Chris Roth, Sonja Settele, and Johannes Wohlfart (*AER: Insights*).

- "Uncertainty and Information Acquisition: Evidence from Firms and Consumers" by Heiner Mikosch, Chris Roth, Samad Sarferaz, and Johannes Wohlfart (work in progress).

- "Expectations with Endogenous Information Acquisition: An Experimental Investigation" by Andreas Fuster, Ricardo Perez-Truglia, Mirko Wiederholt, and Basit Zafar (*RESTAT*).

- Future research: Potential applications of direct measures of information acquisition.

Background

Belief disagreement and macroeconomic theories of expectation formation.

Disagreement in inflation expectations among households
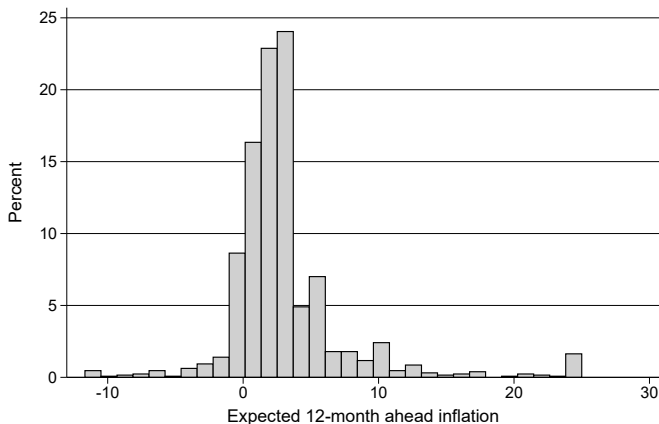
Disagreement in US households' inflation expectations as measured in the NY Fed Survey of Consumer Expectations in January 2020.

Disagreement in macroeconomic expectations

- Strong disagreement in macroeconomic expectations is a well-documented **empirical fact** for various groups:

  - Households (Mankiw et al. (2003), Carroll (2003), Coibion and Gorodnichenko (2012), Das et al. (2020), Link et al. (2021), . . .).

  - Firms (Coibion et al. (2018b), Coibion et al. (2020), Andrade et al. (2020), Link et al. (2021), . . .).

  - Experts (Mankiw et al. (2003), Coibion and Gorodnichenko (2012), Dovern et al. (2012), Andrade and Le Bihan (2013), . . .).

- We see **similar patterns** for expectations about inflation, aggregate unemployment, home price growth, stock returns, . . .

Why we care about belief disagreement per se

Belief disagreement is important for many reasons (see Fuster et al. (2020) for a discussion):

- Drives trade in asset markets (Hong and Stein, 2007).

- Explains variation in household portfolios (Giglio et al., 2020).

- Reduces effectiveness of policy announcements (Angeletos and Lian, 2018).

- Causes inefficiencies in allocations (Angeletos and Pavan, 2009).

Disagreement in macroeconomic expectations: Explanations

- Hard to square with traditional models featuring FIRE ("full information rational expectations") (Coibion et al., 2018a).

- Disagreement can be explained by **differences in information sets**:

  - Sticky information: **Infrequent updating** of information sets (Mankiw and Reis, 2002).

  - Noisy information: Agents receive **noisy private signals** about the state of the economy (Sims, 2003; Woodford, 2003).

Exogenous vs endogenous information frictions

- Some theories posit that information frictions are **exogenous**:
  - Calvo lottery driving updating frequency (Mankiw and Reis, 2002).

  - Exogenous noise in signals (Woodford, 2003).

- Other theories posit that information frictions arise endogenously out of a **trade-off between costs and benefits** of attention:
  - Rational inattention (Sims, 2003; Wiederholt, 2010).
  - Sticky information with endogenous updating frequency (Reis, 2006).
  - Behavioral inattention / sparsity (Gabaix, 2019).

Testing theories based on changes in disagreement I

- These theories make different predictions about **business cycle dynamics** or the **transmission of policies** (Paciello and Wiederholt, 2014; Wiederholt, 2015).

- We can use the **dynamics of disagreement** in response to shocks to test these theories of macroeconomic expectation formation against each other.

Testing theories based on changes in disagreement II

- For instance, Coibion and Gorodnichenko (2012) show that disagreement **does not change** in response to macroeconomic shocks, consistent with noisy information models (Sims, 2003; Woodford, 2003) and at odds with basic sticky information models (Mankiw and Reis, 2002; Reis, 2006).

- One problem: Non-response of disagreement could be due to agents **using new information differentially**, e.g. holding different beliefs about the effects of macroeconomic shocks (Andre et al. (2021) – see my lecture on Wednesday).

Measuring information acquisition

- Alternative: Measure information acquisition and beliefs **separately**.

- Idea: Beliefs reflect "output" of both information acquisition and information processing. Measuring information acquisition directly isolates one **"input"** into belief formation.

- Co-movement of information acquisition and beliefs allows us to **test theories**.

- For instance, does an increase in the number of people acquiring information **lower belief disagreement**? → Tests basic sticky information models (Mankiw and Reis, 2002; Reis, 2006) against more complex models featuring heterogeneity in information processing (see paper 3).

Use of direct measures of information acquisition

Different potential ways to measure information acquisition directly:

- Survey question on how often people have **heard news** / informed themselves about a topic over the last month.

- Measure survey respondents' **willingness to pay** for a professional forecast or data on past realizations, e.g. using multiple price lists.

- Offer survey respondents choice **between receiving different** pieces of information.

- Offering access to a news article or **subscription** to a newspaper.

- **Click data** from newspaper websites.

- **Google search** data.

- …

Models of endogenous information acquisition

- We have seen which **methods** we use to measure information acquisition directly.

- Before diving into the papers, let's take a step back and see what a very **basic model of endogenous information acquisition** tells us.

A simple model I: Objective function

A simple model of rational information acquisition, following Maćkowiak et al. (2018).

Let the agent maximize the expectation of the objective function

$$U(x, y) = -r (x - y)^2$$

- y is the agent's action. x is the target, where x is random.

- The agent faces Gaussian uncertainty about x: $x \sim \mathcal{N}(0, \sigma_x^2)$.

- The parameter r scales stakes.

A simple model II: Cost function

To refine her knowledge about x, the agent needs to receive Gaussian signals:

$s = x + \varepsilon$, where $\varepsilon \sim \mathcal{N}(0, \sigma_\epsilon^2)$.

Precision of the signal is subject to the agent's choice. The more attention she pays, the more precise signal she receives.

Typical cost function in models of rational inattention:

$cost = \lambda \kappa$

- $\lambda > 0$ is a parameter, a unit cost of information.
- κ is the chosen amount of information, measured as the expected reduction of uncertainty, which is expressed by entropy.
- Thus, more precise signals are also more costly.

Model Predictions

- According to models of rational information acquisition, **information acquisition** increases in . . .

  - . . . stake size.

  - . . . the perceived uncertainty of the variable.

- These predictions about stake size and perceived uncertainty arise out of various **macroeconomic models of endogenous information acquisition** (Gabaix, 2019; Reis, 2006; Wiederholt, 2010).

- First two papers I will discuss test these very basic predictions.

Paper 1: Stake size and Information Acquisition

"Risk Exposure and Acquisition of Macroeconomic Information" by Chris Roth, Sonja Settele, and Johannes Wohlfart (*AER: Insights*).

Research question

Does people's demand for information about the macroeconomy respond to their perceived own exposure to macroeconomic risk?

Challenges

- **Identification challenges** with observational data.

- Measuring the demand for information of more and less exposed individuals is **problematic**, as those who are more exposed to macroeconomic risk ...

  - should already be better informed about pieces of information that are relevant for the macroeconomic outlook.

  - differ from less exposed individuals in many unobservables.

- We do not observe people's **choice set** and actual **information choice** with observational data.

$\rightarrow$ To circumvent these identification challenges, we propose an experiment that **manipulates** people's beliefs about their **own exposure** to macroeconomic risk.

Empirical approach

- We conduct a survey experiment on a representative online panel from the US (n>1,000).

- Exogenous variation in perceptions of exposure to macro risk.
  - We provide respondents with **personalized data** on actual changes in the unemployment rate among people similar to them over the **Great Recession 2008-2009**.
  - While some respondents receive data from the **ACS**, other people receive data from the **CPS**, which differ due to sampling variation and procedural differences.

- We measure people's perceptions of how exposed they **personally** are to unemployment risk during recessions.

- Respondents can choose to receive one out of four different **professional forecasts** (about inflation, government spending, returns on government bonds or the likelihood of a recession).

Prior beliefs

Unemployment rate after the Great Recession

We now would like you to think about the effect of the Great Recession in 2008/2009 in the US on people **with similar characteristics as you**. Specifically, please think about the unemployment rate among people who, before the recession started, ...

- had the same occupation (Advertising, Marketing, Promotions, Public Relations, and Sales Manager) as you have now.
- lived in the same census division (Pacific) as you now.
- had the same education level (At least bachelor's degree) as you have now.
- had the same age (35 - 39) as you have now.
- and have the same gender (Male).

In 2007, before the Great Recession started, among people with your characteristics, **36 out of 1000 people were unemployed**. What do you think: Among 1000 people with your characteristics, how many were unemployed in 2010, when the unemployment rate peaked?

The number of unemployed people (out of 1000) in 2010 was: [   ]

Information treatment

Information about unemployment after the Great Recession

You said that you think that among 1000 people **with your characteristics** **90 were unemployed in 2010**, when the unemployment rate peaked.

We now would like to give you information on the effect of the Great Recession in 2008/2009 on people that before the recession started

- had the same occupation (Advertising, Marketing, Promotions, Public Relations, and Sales Manager) as you have now.
- lived in the same census division (Pacific) as you now.
- had the same education level (At least bachelor's degree) as you have now.
- had the same age (35 - 39) as you have now.
- and have the same gender (Male).

According to official US census data, **83 out of 1000** people **with your characteristics** were **unemployed in 2010**, when the unemployment rate peaked.

Number of unemployed among people like you (out of 1000)
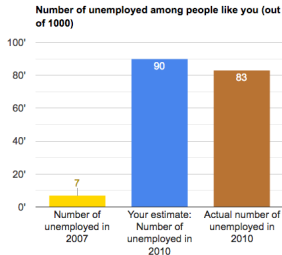
Source: American Community Survey
Note: You will be able to go to the next slide after you have spent 15 seconds on this slide.

Post-treatment beliefs about exposure I

Assume that you work in the same job as now just before the **next recession** occurs in the US. What do you think would be the probability (in %) that you become **involuntarily unemployed** during that recession?

Probability of involuntary unemployment during next recession:

0 ▭─── 100

Next >>

Post-treatment beliefs about exposure II

To what extent do you agree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
A recession would adversely affect my job security.	○	○	○	○	○	○	○
A recession would adversely affect the financial situation of my household.	○	○	○	○	○	○	○
My job situation situation depends on the macroeconomic environment.	○	○	○	○	○	○	○

Next >>

Information demand

The Survey of Professional Forecasters (SPF) is a quarterly survey of macroeconomic forecasts for the economy of the United States issued by the Federal Reserve Bank of Philadelphia. The participants in the survey report their estimate of:

- the real (inflation-adjusted) change in **total federal government spending** over the next 12 months.
- the **yearly rate** on 10-year **government bonds** averaged over the next 12 months.
- The **rate of inflation**, which measures changes in the general price level, over the next 12 months.
- the **probability of a decline in real GDP** in the first quarter of 2020 compared to the fourth quarter of 2019, which has been highly predictive of the occurrence of recessions in the past.

You can now choose which average professional forecast from the SPF you would like to receive.

Which forecast would you like to receive?

○ Forecast of the real change in total federal government spending over the next 12 months.

○ Forecast of the the yearly rate on 10-year government bonds averaged over the next 12 months.

○ Forecast of the rate of inflation over the next 12 months.

○ Forecast of the probability of a decline in real GDP.

○ I do not want to receive any forecast.

Next >>

Advantages of the experimental design

- "Active control group" design: Everyone receives a signal, so **priming and other side-effects** of receiving information likely constant across treatment arms.

- No reliance on difference between prior and signal for identification of treatment effects:
    - No **attenuation bias** in estimated treatment effects due to measurement error in prior.
    - Interpretation of **heterogeneous effects** across groups straightforward.

First stage: Effect of treatment on perceived exposure

Perceived exposure$_i$ =
$$\alpha_0 + \alpha_1 \Delta \text{Unemp\_incr} + \alpha_2 \text{Unemp\_incr}^{alt}$$
$$+ \alpha_3 \Delta \text{Unemp\_2007} + \alpha_4 \text{Unemp\_2007}^{alt} + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i$$

where $\Delta \text{Unemp\_incr} = \text{Unemp\_incr}^{shown} - \text{Unemp\_incr}^{alt}$.

First stage: Effect of treatment on perceived exposure

	Perceived unemployment risk next recession	Agree: Recession affects job security (z)	Agree: Recession affects household situation (z)	Agree: Exposed to macroeconomy (z)	Index (1)-(4) (z)
	(1)	(2)	(3)	(4)	(5)
Δ Unempl. Incr.	0.489***	0.012**	0.007	0.013***	0.016***
	(0.134)	(0.005)	(0.005)	(0.004)	(0.005)
Observations	1008	1008	1008	1008	1008
R^2	0.06	0.07	0.04	0.08	0.07
Mean outcome	32.98	0.00	-0.00	-0.00	0.00
St. dev. outcome	25.94	1.00	1.00	1.00	1.00

Notes: Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

IV: Effect of perceived exposure on demand for information

Demand for info$_i$ =
$$\gamma_0 + \gamma_1 \widehat{\text{Perceived exposure}}_i + \gamma_2 \text{Unemp\_incr}^{alt}$$
$$+ \gamma_3 \Delta \text{Unemp\_2007} + \gamma_4 \text{Unemp\_2007}^{alt} + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i$$

where

$$\widehat{\text{Perceived exposure}}_i =$$
$$\alpha_0 + \alpha_1 \Delta \text{Unemp\_incr} + \alpha_2 \text{Unemp\_incr}^{alt}$$
$$+ \alpha_3 \Delta \text{Unemp\_2007} + \alpha_4 \text{Unemp\_2007}^{alt} + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i$$

and $\Delta \text{Unemp\_incr} = \text{Unemp\_incr}^{shown} - \text{Unemp\_incr}^{alt}$.

IV: Effect of perceived exposure on demand for information

	Forecast: Recession	Forecast: Government spending	Forecast: Interest rate	Forecast: Inflation rate	Forecast: any other (2)-(4)	Forecast: None
	(1)	(2)	(3)	(4)	(5)	(6)
Perceived unemployment risk next recession	0.012**	-0.004	-0.006*	0.002	-0.008	-0.004
	(0.006)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)
Observations	1008	1008	1008	1008	1008	1008
First stage F-stat	13.28	13.28	13.28	13.28	13.28	13.28
Mean outcome	0.25	0.17	0.15	0.25	0.57	0.18
St. dev. outcome	0.43	0.37	0.36	0.43	0.50	0.39

Notes: Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Summary and implications I

- An exogenous increase in perceived unemployment risk during the next recession increases people's **demand for receiving a forecast** about the likelihood of a recession.

  - Suggests information frictions arise out of an optimal trade-off between costs and benefits of receiving information, consistent with models of endogenous information acquisition (Mackowiak and Wiederholt, 2009; Maćkowiak et al., 2018; Reis, 2006).

  - Inconsistent with e.g. standard sticky information models (Mankiw and Reis, 2002; Mankiw et al., 2003; Wiederholt, 2015).

Summary and implications II

- Information about changes of the unemployment rate among similar people during the last recession strongly affects **people's perceived unemployment risk** during the next recession.

  - Consistent with individuals being imperfectly informed about their own risk exposure.

  - Information frictions could also affect people's beliefs about which information is relevant to them.

Paper 2: Uncertainty and Information Acquisition

"Uncertainty and Information Acquisition: Evidence from Firms and Consumers" by Heiner Mikosch, Chris Roth, Samad Sarferaz, and Johannes Wohlfart (work in progress).

Research questions

- How does information acquisition respond to exogenous changes in **uncertainty**?

- Do patterns of information acquisition differ between **firms** and **households**?

This paper

- Our approach has three distinctive features:

    - We conduct **identical** surveys of firms and households at the same point in time.

    - We focus on the open economy Switzerland and the **exchange rate**, which plays an important role in the Swiss economy.

    - We study **direct** measures of information acquisition.

    - We propose a way to **exogenously shift** survey respondents' **perceived uncertainty** about a variable.

Samples

Firm survey:

- We designed a special survey module with the **KOF Swiss Economic Institute**, the major economic forecasting institute in Switzerland.

- Survey was fielded in February, March and April 2020 among 920 firms broadly representative of firms in Switzerland.
  - Our main analysis focuses on the sample collected before the first wave of the coronavirus (**n≈550**).

- Respondents are usually higher level managers.

Household survey:

- We fielded a survey with a sample of **521 households** broadly representative of the German Swiss population.
- Survey was fielded in February and March 2020.

Importance of exchange rate for Swiss firms and households

|	
Firms:	
Exporting to the euro area	52.82%
Use hedging products against exchange rate risk	35.52%
Agree exchange rate important for firm situation	59.29%
Households:	
Employer exporting to the euro area	48.67%
Agree exchange rate important for household situation	45.79%

Information acquisition before the survey

"How frequently did you gather information about the exchange rate of the CHF to the euro in the last 3 months before taking this survey?"
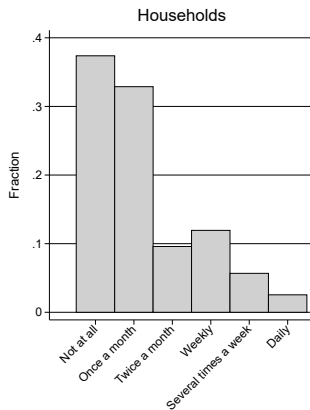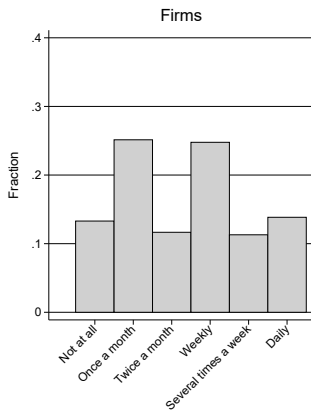
Structure of the experiment

1. Fixing beliefs about current exchange rate and the **level in one year**.
   - Information on the future based on prediction of KOF macroeconomic model (1.06 CHF per euro).

2. Provision of professional forecast about exchange rate **uncertainty**.
   - Respondents are either assigned to a **high uncertainty** or to a **low uncertainty** treatment.

3. Measurement of posterior exchange rate uncertainty.

4. Measurement of information demand.

Experimental variation of uncertainty

We provide our respondents with one of two truthful forecasts from an expert survey in Switzerland:

> *According to an expert that regularly participates in the KOF expert surveys on economic forecasts, the probability that the CHF-EUR exchange rate in March 2021 will on average be somewhere between 1.04 CHF per euro and 1.08 CHF per euro is* **90% [30%]**.

Measuring posterior exchange rate expectations

We now would like to ask you about your expectations regarding the development of the **CHF-EUR exchange rate in March 2021**.

Please indicate the percent chance that you assign to the different scenarios. The probabilities have to sum to 100 percent.

- *less than 0.94 CHF (in %)*
- *between 0.94 and 1.04 CHF (in %)*
- *between 1.04 and 1.08 CHF (in %)*
- *between 1.08 and 1.18 CHF (in %)*
- *more than 1.18 CHF (in %)*

Direct measure of information demand

- Participants choose between receiving a **special report** on one of three macroeconomic variables or no report.
  - Report on development of inflation, unemployment or exchange rate.

- We explain to participants that the reports . . .
  - . . . will be compiled and sent out **three months after the survey**.
  - . . . contain **exclusive** expert interviews, model predictions and expert forecasts.
  - . . . will not be made **publicly available**.

Results firm sample: Exchange Rate Expectations

	Exchange rate: Mean (1)	Exchange rate: SD (2)
High exchange rate uncertainty	0.001 (0.002)	0.007*** (0.002)
Low uncertainty mean	1.05	0.05
Controls	Yes	Yes
R^2	0.35	0.07
Observations	546	544

Notes: Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Results firm sample: Information Acquisition

	Report: Exchange rate	Report: Inflation	Report: Unemployment	Report: None
	(1)	(2)	(3)	(4)
High exchange rate uncertainty	0.083**	0.007	-0.024	-0.067*
	(0.039)	(0.026)	(0.028)	(0.038)
Low uncertainty mean	0.44	0.10	0.13	0.33
Controls	Yes	Yes	Yes	Yes
R^2	0.22	0.04	0.06	0.09
Observations	540	540	540	540

Notes: Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Results for the household sample

- Design is similar to design for firms.

- As for firms, our information treatment **significantly shifts perceived uncertainty** about the exchange rate.

- Yet, information demand does not move in response to the high uncertainty treatment.

Summary

- Information acquisition of **firms** responds to an exogenous increase in uncertainty.

  - Firms' information acquisition consistent with macroeconomic models of **endogenous information acquisition** (Mackowiak and Wiederholt, 2009; Maćkowiak et al., 2018; Reis, 2006).

- Information acquisition of **households** inelastic an exogenous increase in uncertainty.

  - Households' demand for information in this context may be better described by simpler models such as **random updating rules** (Andersen et al., 2020; Mankiw and Reis, 2002; Wiederholt, 2015).

Paper 3: Endogenous Information Acquisition

"Expectations with Endogenous Information Acquisition: An Experimental Investigation" by Andreas Fuster, Ricardo Perez-Truglia, Mirko Wiederholt, and Basit Zafar (*RESTAT*).

Motivation

- Wide disagreement in survey expectations about the macroeconomy (Coibion and Gorodnichenko, 2012; Mankiw et al., 2003).

- May be due to heterogeneity in:
  - i) whether or not agents acquire information (Mankiw and Reis, 2002; Reis, 2006).
  - ii) which type / piece of info agents acquire (Van Nieuwerburgh and Veldkamp, 2009).
  - iii) processing of the same piece of information (Bordalo et al., 2020b; Brock and Hommes, 1997).

- This experiment endogenizes the information acquisition stage to disentangle those three.

- Experiment included in the *New York Fed's Survey of Consumer Expectations* in 2017.

Structure of the experiment

- 1. Respondents are informed that they have to forecast the development of nationwide home prices until the end of the year (cross-randomize high or low incentives).

- 2. Respondents select among three pieces of info (or no info):
  - i) Home price change over past 12 months.
  - ii) Home price change over past 10 years.
  - iii) Expert forecast of home price change over next 12 months.

- 3. Elicit WTP for preferred piece of info using a multiple price list.

- 4. Respondents see preferred piece of info if WTP high enough.

- 5. Elicitation of home price expectations.

Heterogeneity in information choice

Figure 1: Type of Information Most Preferred

a. All   **b.** By Numeracy   c. By Education

<u>Notes</u>: Panel (a) shows the distribution of the type of information most preferred by individuals to help them with forecasting future year-ahead U.S. home prices. Panel (b) provides the same information according to the level of numeracy, and panel (c) according to the level of education. P-value of difference (in panels b and c) tests for whether the distribution of most preferred information source differs by that characteristic.

Heterogeneity in WTP for information

Figure 2: Willingness to Pay for Favorite Information

a. All **b. By Reward Size**
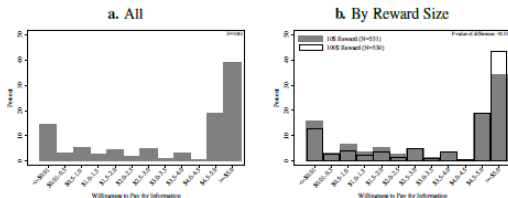
Notes: This sample does not include respondents with non-monotonic choices across the BDM scenarios. Panel (a) shows the distribution of willingness to pay (WTP) for favorite information in the whole sample. Panel (b) shows the distribution of WTP for information according the size of the reward. P-value of difference refers to the Mann-Whitney-Wilcoxon test of the equality of two distributions.

- In addition, they also document some heterogeneity in learning rates (processing of the information).
- Thus, they find evidence of all three potential drivers of heterogeneity in beliefs.

Information acquisition and dispersion of beliefs

- Does a decrease in information costs **lower** dispersion of beliefs?

- Theories of e.g. sticky information (Mankiw and Reis, 2002; Reis, 2006): Yes.

- Fuster et al. (2020) examine how belief dispersion differs when cost of information is exogenously lower due to different (random) draw of relevant scenario in multiple price list.

- However, lower cost of information **does not reduce dispersion** in beliefs.

- Why? People select **different pieces of information**.

- Thus, seems crucial to incorporate heterogeneity in information choice into macroeconomic models.

Future research

Potential applications of direct measures of information acquisition.

Future research: Behavioral models of expectation formation

- Methods can be used to study predictions of **behavioral models** of information choice.

- For instance, models models featuring a role for **memory** (Bordalo et al., 2020a).

- In ongoing work with Chris Roth and Sonja Settele, we use **priming experiments** to study the role of memories of positive and negative events in driving information demand and attention.

Future research: Panels of households and firms

- We can also use direct measures of information acquisition to better understand expectation formation of **firms**.

- Inclusion of such measures into **panels** allows to study co-evolution of beliefs and information acquisition over the business cycle.

- In ongoing work with Sebastian Link, Andreas Peichl and Chris Roth we include direct measures of information acquisition into **panels of households and firms** (see Wednesday's lecture by Chris).

Summary

- Conducting surveys including **direct measures of information acquisition** opens up new possibilities to test macroeconomic theories of expectation formation.

- We have seen three papers showing:
    - . . . important causal roles for **stake size** and **uncertainty** of the outcome of interest in driving information acquisition, consistent with models of endogenous information acquisition.
    - . . . how **heterogeneity in information selection** makes belief disagreement deviate from predictions of most basic models of endogenous information choice.

- Direct measures of information acquisition open up exciting opportunities for future research.

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