Measuring What is Top of Mind

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Seemingly puzzling behavior from a neoclassical viewpoint

Think of a ...

- firm manager who refrains from cutting employee wages even as the economy enters a recession.
- a worker who is talented, but stays put at a low paying firm.
- a company that skips adopting a labor-saving technology, choosing to keep more workers on the payroll.

These behaviors may seem puzzling, yet there could be **plausible reasons** behind them.

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Open-ended questions as a powerful tool **to measure narratives and the attentional foundations** of expectation formation and decision-making.

A depressed labor market as explained by participants I

Bewley, 1995

- Unemployment is extremely difficult to reconcile with the main body of economic theory.
- Why is the labor market so different from other markets in that the price of labor does not adjust to clear it?
- Why do not workers and companies avoid layoffs by having workers continue to work at reduced wages until adverse conditions disappear?

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Bewley's rationale and aim:

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Bewley's rationale and aim:

- "The chief interest is in the **motives** of those making employment and compensation decisions."
- "My object was to learn about **as wide a variety of experience** as possible."

A depressed labor market as explained by participants II

Bewley, 1995

- **Key Insight:** Employers avoid wage cuts to protect morale, cohesion, and long-term productivity.
- **Main Reasons:**
  - Cuts damage morale more than layoffs.
  - Workers motivated by fairness, autonomy, and goodwill.
  - Sustaining an equilibrium of cooperation.
- **When Cuts Happen:**
  - In high-turnover, low-cohesion jobs (e.g., fast food, temp work).
  - To avoid mass layoffs or firm closure.

Asking about prices I

Blinder et al., 1998

- Based on detailed interviews with 200 U.S. firms to uncover real-world pricing behavior.
- **Price Stickiness is Widespread**
  - $\sim$70% of firms keep prices unchanged for over a quarter; many for a year or more.
  - Price rigidity appears across all major sectors.
- **Menu Costs Are Not the Main Story**
- **Customer Relationships Matter**
- **Fairness Norms**

Asking about prices II

Blinder et al., 1998

- *"Price setting turns out to be a deeply human activity, more governed by relationships, trust, and psychology than by equations."*
- *"A key insight of our study is that to understand price stickiness, you need to understand the minds of the people who set prices."*

Creating Moves to Opportunity

Bergman et al., 2024

- RCT with housing voucher recipients in Seattle and King County.
- Random assignment of support to facilitate moves to high-opportunity areas.
- 251 in-depth (on average, two-hour) interviews with a stratified random sample of families to understand **mechanisms behind treatment effects from RCT**.
    - **Barriers in the housing search process** as central to residential segregation.
    - Many families lack a preference for low-opportunity areas; rather, they face attentional, financial and knowledge **constraints**.

Common concerns about qualitative data

- Extremely **labor intensive** and expensive to collect this type of data.
- Very **selected** samples
- Difficult to analyze the **high-dimensional unstructured data**
- Difficult to capture **non-verbal cues** in interview transcripts.
- Concerns about idiosyncratic **interviewer fixed effects**.

New Exciting Methods

- New technologies to collect rich unstructured data at scale:
  - **Using AI** to scale qualitative interviews (Chopra & Haaland, 2023).
  - **Speech recordings** as a way to measure non-verbal cues (e.g. emotions) in more systematic ways (Graeber et al., 2024).

- **LLMs** as a way to analyze unstructured data at scale:
  - powerful tool to help **devise coding schemes**.
  - powerful tool to **annotate** unstructured data

- See Haaland, Roth, Stantcheva, Wohlfart (forthcoming, JEL) for guidance on methodological issues.

What makes the open-ended data exciting?

- **Spontaneous top-of-mind responses:** Open-ended measures allow respondents to freely express their thoughts, uncovering novel factors and capturing genuine top-of-mind concerns.

- **Less ex-post rationalization:** By not suggesting specific responses, open-ended questions make ex-post rationalization less likely.

- **Natural:** Open-ended formats mimic natural thought patterns better than structured options, making them more effective for understanding real-world reasoning.

- **Qualitative insights:** They reveal misunderstandings or confusions, providing deep qualitative insights not possible with structured response formats.

What are the biggest limitation of the open-ended data?

- **Non-classical measurement error**, e.g. due to varying respondent effort.
  - This threatens **interpersonal comparability** of responses.
- **Ex-post rationalization**
  - When are elicited reasons true motives rather than a rationalization? How can we know?
- **Subjective judgment calls** of researchers in analyzing open-ended data, e.g. when devising the coding scheme.
  - This raises concerns about replicability.
  - How important are these subjective judgment calls?

Today

- Subjective Models
- Narratives
- Attention
- **Directions for Future Research**

Outline of talk

Subjective Models of the Macroeconomy
- Measuring Mental Models
- The Role of Selective Recall
- Associative memory and the nature of associations

Narratives
- Measuring Narratives
- The consequences of narratives

Attention to the Macroeconomy
- Measurement

Areas for future research

Motivation

Andre, Pizzinelli, Roth, Wohlfart, 2022

- Well-documented empirical fact: Substantial **disagreement** in survey expectations about the macroeconomy (Coibion and Gorodnichenko, 2012; Coibion et al., 2018).
  - Holds true for households, firms and professional forecasters.
  - Disagreement matters for the transmission of policies.
- Heterogeneity in survey expectations is often attributed to **differences in information** about the current state of the economy across economic agents.
- Alternative driver of disagreement in survey expectations: heterogeneity in **subjective models of the macroeconomy**.

Subjective Models of the Macroeconomy

Andre, Pizzinelli, Roth, Wohlfart, 2022

- Method: **Hypothetical vignettes**.
- Respondents predict future unemployment and inflation under different macroeconomic shocks, holding constant information about the state of the economy.
- Consider four canonical macro shocks: oil prices, taxes, government spending and **interest rates (focus of today)**.
- Advantage of hypothetical vignettes: we can fix beliefs about the reasons underlying the shock.

Subjective Models of the Macroeconomy

Andre, Pizzinelli, Roth, Wohlfart, 2022

What does the general population think? How do major shocks affect the macroeconomy (u and π)? Example today: Change in federal funds rate.
Method: Prediction of u and π in two hypothetical scenarios identifies perceived causal effect.

Scenario: Federal funds rate stay constant (shortened)

Imagine the **federal funds rate** stays **constant**. The Federal Open Market Committee announces that it will keep the rate constant at 2.5%. The committee announces it does so with no changes in their assessment of the economic conditions.

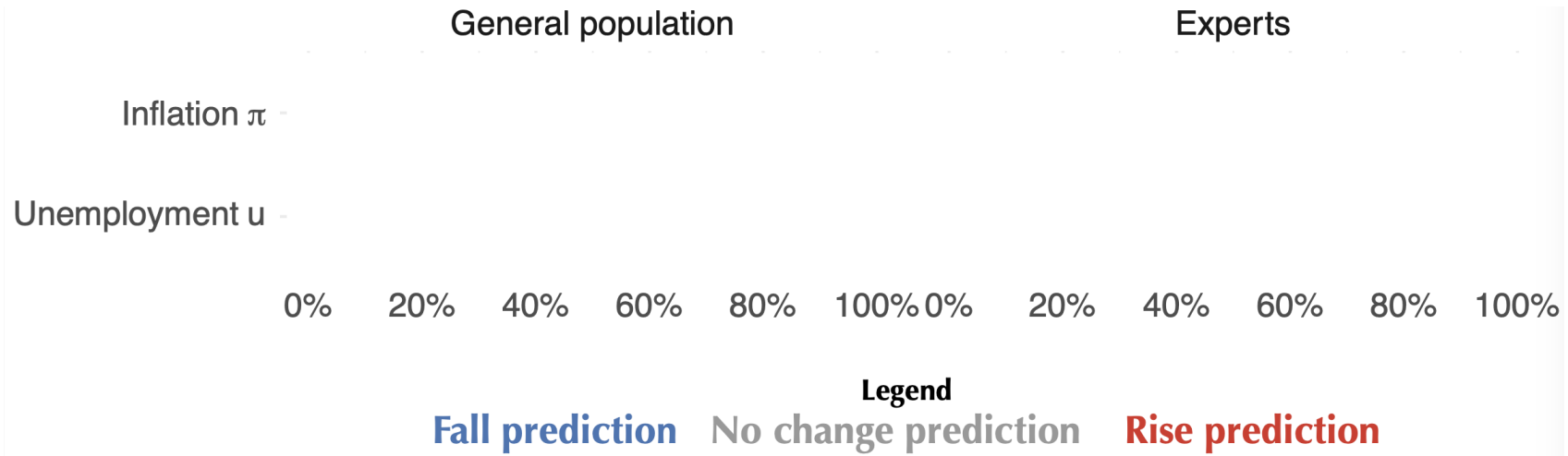
Scenario: Federal funds rate rises (shortened)

Imagine the **federal funds rate** is unexpectedly **0.5 percentage points higher**. The Federal Open Market Committee announces that it is raising the rate from 2.5% to 3%. The committee announces it does so with no changes in their assessment of the economic conditions.

Subjective Models of the Macroeconomy

Andre, Pizzinelli, Roth, Wohlfart, 2022

Respondents indicate the expected unemployment and inflation rates in the different hypothetical scenarios.



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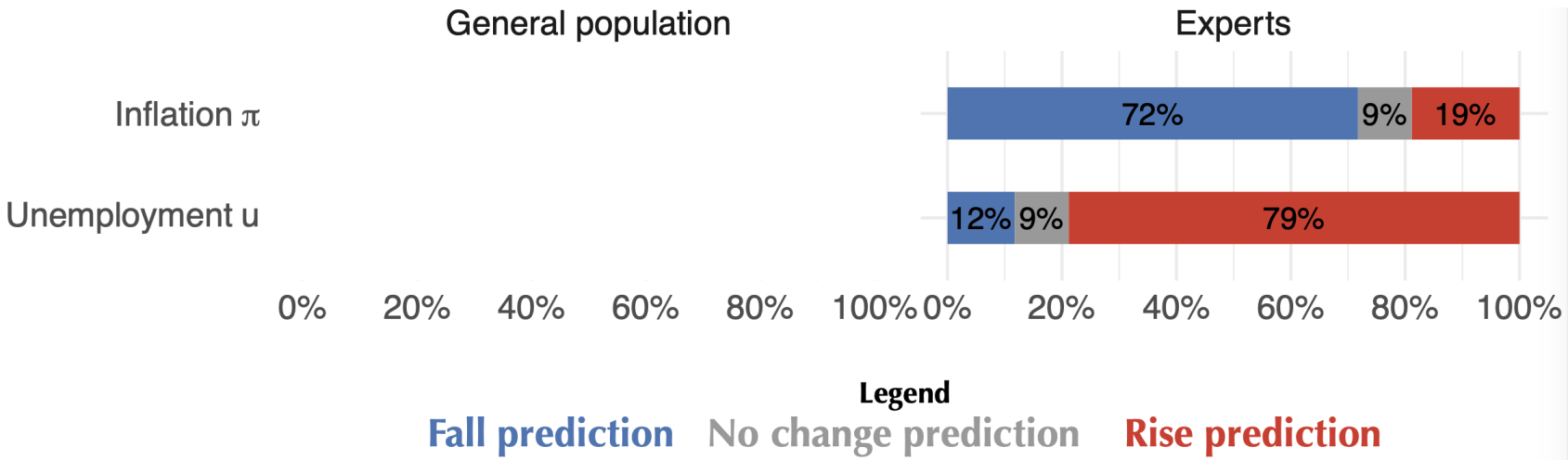

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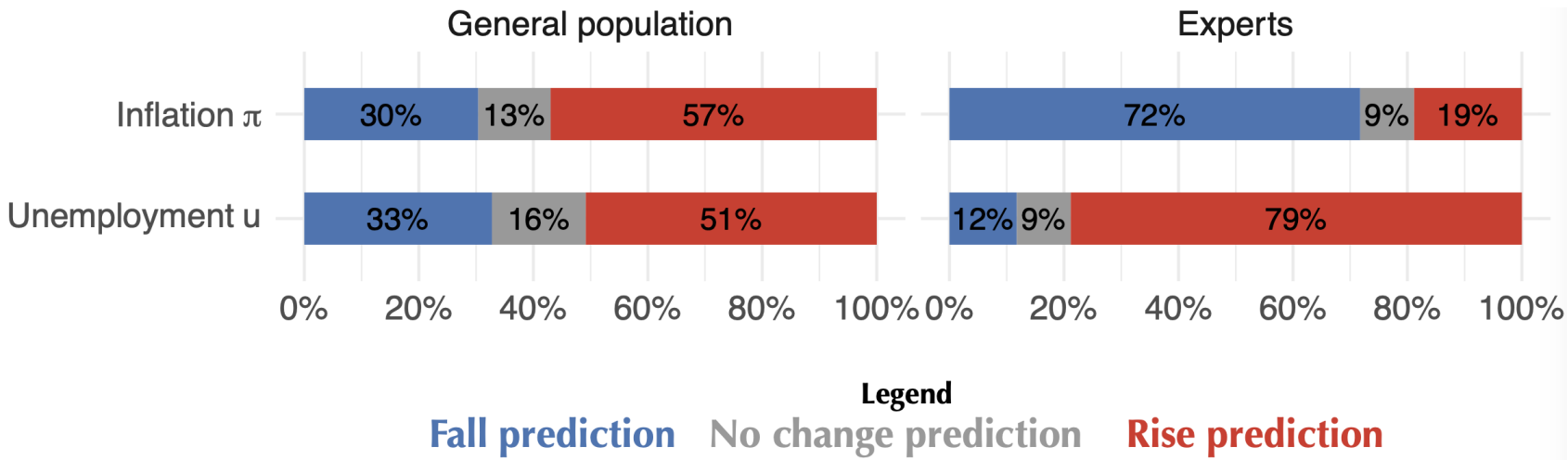


The Role of Selective Recall

Sources of heterogeneity: Role of associations

Andre, Pizzinelli, Roth, Wohlfart, 2022

- What drives heterogeneity in predictions within and between households and experts?
- One potential explanation: differences in **associations** that come to respondents' minds.
  - Experts may think of **textbook models**.
  - Households selectively think of **specific propagation mechanisms** and may not account for the full general equilibrium effects of a shock.
- To shed light on the role of the associations, we directly measure respondents' **thoughts** while they make their predictions.

Measuring thoughts: Dual approach

Andre, Pizzinelli, Roth, Wohlfart, 2022

Design similar to main experiment, but measuring **associations** using a dual approach:

1. Elicitation of thoughts in **open-ended text responses** on prediction screen:
   - No priming and less plagued by ex-post rationalization.
   - But necessarily noisy and incomplete.
2. **Structured question** on a list of 6-7 vignette-specific propagation channels on the next screens:
   - Measure attention to specific channels for which open-text responses are not sufficiently nuanced.
   - Easy to compare across respondents (no judgment calls in coding necessary).
   - Subject to ex-post rationalization and desirability bias.
     - Address ex-post rationalization with an experiment shifting attention.

Measuring thoughts: Prediction screen

Andre, Pizzinelli, Roth, Wohlfart, 2022

Your thoughts

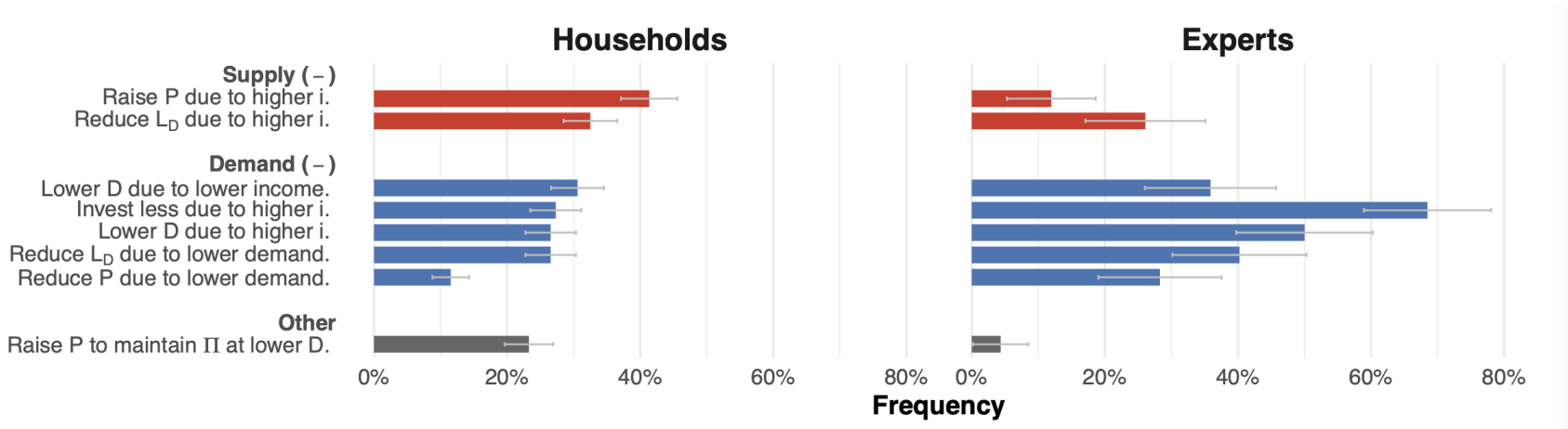
Above, you predict how the change in the alternative scenario affects the US economy.
Please tell us how you come up with your predictions.
What are your main considerations in making those predictions?
Please respond in 2-3 sentences.

→

- Analyze this data using text-analysis tools and hand-coding of responses.

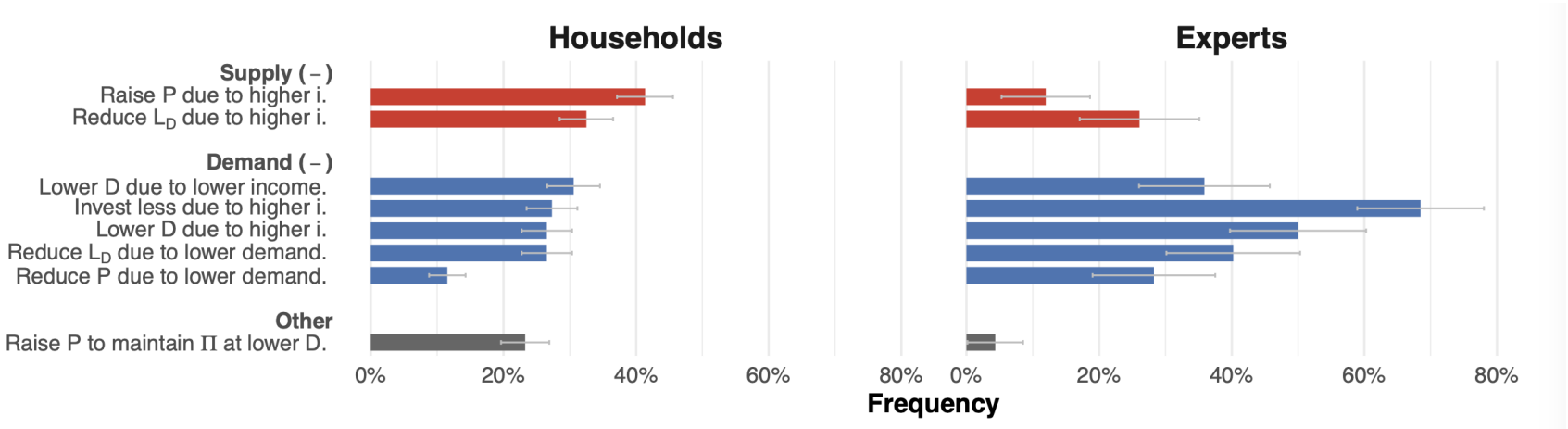
Attentional foundations of mental models I

Andre, Pizzinelli, Roth, Wohlfart, 2022



Attentional foundations of mental models II

Andre, Pizzinelli, Roth, Wohlfart, 2022



- Substantial heterogeneity in thoughts about transmission mechanisms.
- Relatively less demand-side and more supply-side narratives among households

Some qualitative data

Andre, Pizzinelli, Roth, Wohlfart, 2022

Thoughts about a cost channel	Thoughts about demand-side channels
"If the cost to borrow funds goes up, then a business will have to pay more to pay back a loan. Thus, businesses will have to raise prices. This will result in inflation. A business may not be able to pay employees and have to let them go or a business will not be able to pay back the load and the business will fail. The employees will lose their jobs and raises unemployment"	"with change in fed funds rate upward, unemployment is likely to rise (as cost to business to borrow increases and invest less in expansion) and inflation should in theory be kept in check and even fall."
"I believe if the fed rate increases, the inflation rate will as well because companies will be paying more on their credit and they will pass that on to consumers. Do not think it will affect unemployment."	"Interest rates rising will increase the cost of investment. This will make companies lay people off. However, with higher interest rates, less money will be invested and it will cause inflation to fall."
"If the Fed rate is increased, the following usually happens—the cost of borrowing money for businesses increases—the business has to raise prices—there is usually a corresponding effect on the unemployment rate as employers find they have to cut staff to remain competitive "	"when the interest rate goes up I believe the unemployment rate goes up as well. Inflation will also hurt the job market. If people are not buying the jobs decrease."
"The higher federal funds rate causes the cost of borrowing to rise. As a result, prices are raised. And employment is lowered to cover cost of borrowing."	"the demand will decrease and the investment will be less than usual also saving will be increased"
"When the interest rate rises that would mean that it would cost more for companies to borrow money and so they would charge more for their products (inflation would go up) and they would not have money to expand and hire more people (unemployment would go up). I really don't know if the exact amounts of the inflation and unemployment rises would be the same as the % that the inflation rate rose but I thought maybe it would."	"With the target rate going up, money will become more expensive to borrow, consumer credit rates will rise. This will cause consumer demand to drop and possibly put people out of work"
"The cost of business goes up so business will try to raise prices to make a profit. Business will try to cut costs by employing fewer workers."	"when interest rates increase there is less spending no new jobs"
	"Interest rate hike will cause less overall spending slightly more unemployment and greater inflation as prices adjust to this rate hike."

Associative memory

- Where do associations come from?
- Human memory is known to be associative, selective, and to draw on personal experiences (Bordalo et al., 2023).
- Theories of associative memory predict that
  - **contextual cues** affect the forecasts people make by changing the associations that come to their minds.
  - **different personal experiences** in the memory database should be reflected in differences in associations and forecasts.

Contextual cues

Andre, Pizzinelli, Roth, Wohlfart, 2022

- Contextual cues shape people's selective retrieval of propagation mechanisms and, thereby, **causally** affects forecasts.

- **Cueing experiment** with households:
  - Focus on **monetary policy vignette** and **inflation forecast**.
  - Ask subgroups to predict effects on production **costs** or product **demand** before forecasting inflation on the survey screen.
  - Pure control group forecasting inflation only.
  - Experiment shows that exogenous attention manipulation causally shifts inflation expectations.
  - Open-text data post-treatment allows us to verify an **attentional first-stage**.

- We also provide evidence that **experiences are predictive of associations and forecasts**.

Narratives about the Macroeconomy

Outline of talk

Narratives about the Macroeconomy

Andre, Haaland, Roth, Wiederholt, Wohlfart, 2025

Why has the inflation rate increased?

In previous years, the US inflation rate has mostly varied between 1.5% and 2.5%. At this rate, a bundle of goods and services that costs $1,000 in one year, would cost between $1,015 and $1,025 in the next year.

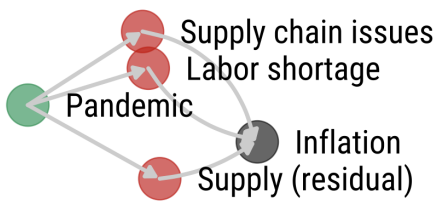
Recently, however, the inflation rate has increased. It is now at 6.8%. At this rate, a bundle of goods and services that costs $1,000 in one year, would cost $1,068 in the next year.

Which factors do you think caused the increase in the inflation rate? Please respond in full sentences.

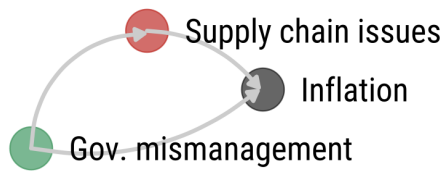
Narratives about the macroeconomy: Examples responses

Andre, Haaland, Roth, Wiederholt, Wohlfart, 2025

"I think the biggest factor in the large inflation rate over the last year or so is probably the pandemic. With labor shortages and business shutdowns because of the pandemic, certain goods are harder to get a hold of, and supply chains have been heavily impacted."



"I fully believe that our President is responsible for this disaster of inflation. [...] Our President has not helped with the backflow of container ships sitting out in the harbors. [...]"



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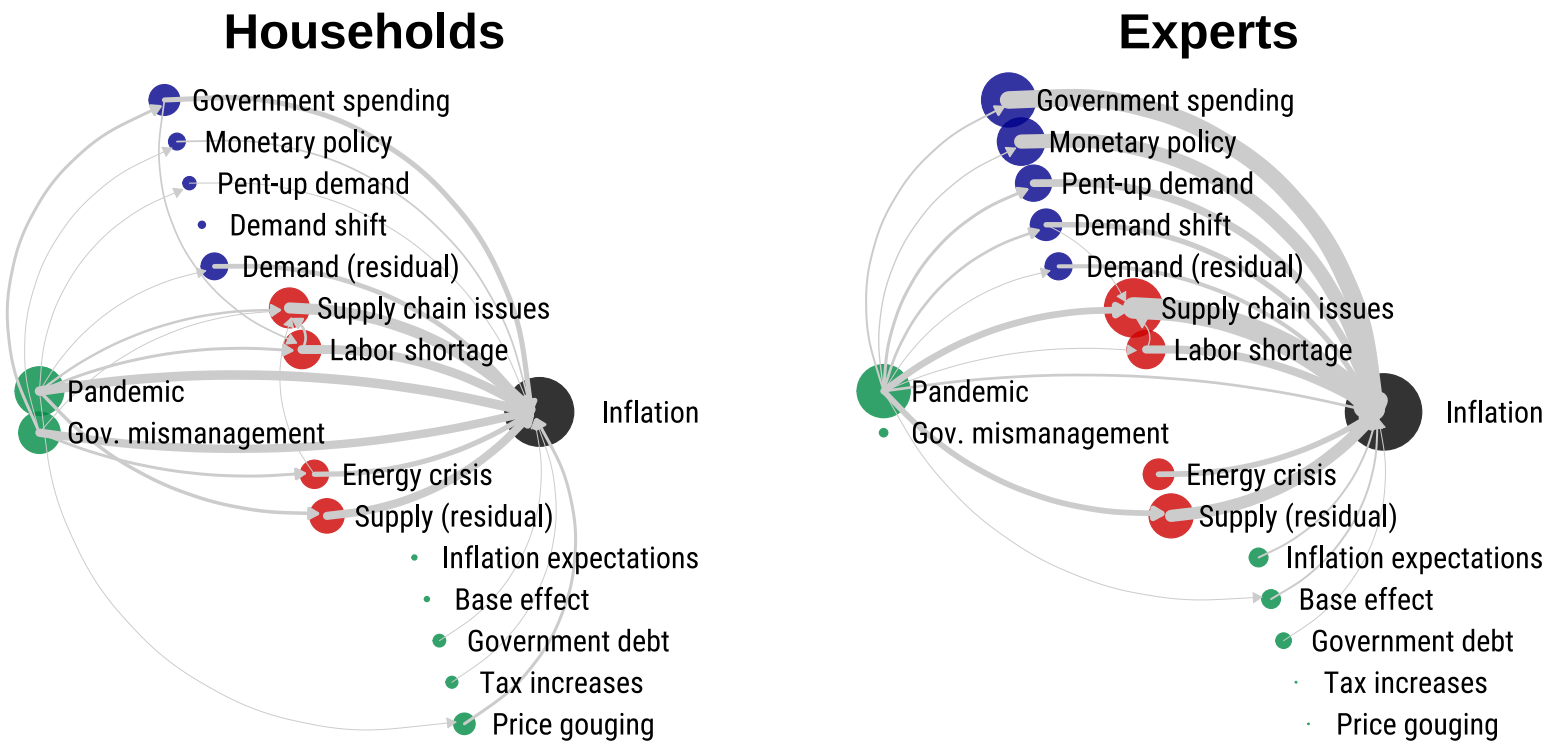

Take-aways:

- Lots of heterogeneity both within and across samples.
- Households more likely to engage in supply-side thinking compared to demand-side thinking.

The consequences of narratives

Andre, Haaland, Roth, Wiederholt, Wohlfart, 2025

We conduct a series of additional experiments which demonstrate that narratives...

- have a direct impact on **inflation expectations**
- shape the **interpretation of new information**

Theoretical analysis incorporates narratives into an otherwise conventional New Keynesian model.

- Narratives formalized as beliefs about which factors have contributed to the current inflation rate (and by how much)
- Agents use these subjective models to form their expectations
- Demonstrates narrative's importance for aggregate outcomes **through their effect on agents' expectations.**

New approaches

Digression I: Speech data to measure narratives

Graeber, Noy and Roth (2024) and Graeber, Roth and Schesch (2024)

- Recent innovation: measuring narratives with **speech recordings** embedded in online experiments.

- **Advantages of Speech Recordings**
  - Captures the spontaneity and natural flow of thoughts.
  - Includes emotional tones, emphasis, and disfluencies.
  - Potentially reduces cognitive cost relative to writing.

- **Disadvantages of Speech Recordings**
  - Potential self-consciousness of participants (though most respondents prefer speech recordings over writing).
  - Complexity in analyzing speech (non-verbal cues).
  - Technical issues like poor audio quality, though this rarely occurs in practice.

Digression II: Conducting Qualitative Interviews with AI

Chopra and Haaland, 2024

- AI interviews go beyond top-of-mind responses by asking a series of probing questions.
  - Use broad, neutral, and non-leading open-ended questions.
  - Adaptive probing helps clarify ambiguities and achieve **greater depth and breadth in responses**
- The interviews are text-based via chat interfaces and can be integrated into survey software like Qualtrics.
  - Builds on a multi-agent LLM model with task specialization.
- Allows for **high-quality interviews** at low cost that are **compatible with large-scale surveys**.
- Allows for the discovery of narratives and mental models that guide economic behavior.
  - Interview data strongly predictive of incentivized behavior measured 8 months after the interview.

Outline of talk

Attention to the Macroeconomy

Link, Peichl, Pfäuti, Roth and Wohlfart, 2025

- Novel measures of households' and firms' attention to the economy using **open-ended survey questions** during a large inflation shock (December 2020 to March 2023).
  - *What topics come to mind when you think about the economic situation of your household/company?*

- Tests theories of rational, **goal-optimal attention allocation**.
  - Attention exhibits large and persistent cross-sectional heterogeneity.
  - Heterogeneity is linked to **exposure** to the economy and **information costs**.
  - Attention responds strongly to shocks:
    - Attentive respondents update expectations more often.
    - They are **more confident** and hold **fewer misperceptions** about current inflation.

Attention to the Macroeconomy

Link, Peichl, Pfäuti, Roth and Wohlfart, 2025

- Patterns **inconsistent with goal-optimality**
  - More attentive agents' expectations about future inflation deviate more from expert benchmarks.
- We propose a model of **selective memory** where attention can be "**non-goal-optimal**":
  - Prior experiences shape attention and belief formation.
  - Attention to other variables can spill over to inflation expectations.
- Data **confirm** the predictions of the **selective memory model**.

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Attention to the Macroeconomy
- Measurement

Areas for future research

Exciting areas: **Linking survey data to admin data**

- Jäger, Roth, Roussille, Schoefer (2024) we match **beliefs about outside options** to IAB data using the SOEP Innovation Sample.

- Exciting opportunities offered by linked survey and admin data:
  - **Benchmarks** from administrative data are key to establishing misperceptions.
  - Administrative data in principle allows us to evaluate the effect of interventions **without any attrition** and **minimal measurement error**.
  - Administrative data provides a rich source of data on **labor market experiences**.

Exciting areas: **Linking surveys to theory**

- How should we integrate survey based measures of expectations and attention into our (labor)models?

- Jäger, Roth, Roussille, Schoefer (2024) first document that firms anchor their wage expectations on their current waves.
  - Analyze the consequences of anchoring in a simple equilibrium model.
  - In the model, anchored beliefs keep overly pessimistic workers stuck in low-wage jobs, which gives rise to monopsony power and labor market segmentation.

- Alternative: use surveys and experiments to **structurally estimate models**.

Narratives about emerging technologies

- Huge uncertainty about the labor market effects of emerging technologies (e.g. AI).
- Understanding people's narratives about these emerging technologies will be key to understand firm and worker expectations behavior.
  - Firm decisions on **technology adoption**.
  - Worker decisions on **human capital investment**.

Which Beliefs are Decision-relevant?

- Too little evidence on mechanisms underlying real world decisions.
- Need more **descriptive evidence** on the reasoning processes underlying **important high stakes decisions**.
  - Deciding between real job offers
  - Deciding between majors
  - Deciding whether to apply for a job
- Important implications for which variables should be **integrated into labor models**.

Qualitative data in Economics: Summary

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  - Bustos, Pomeranz, Suarez Serrato, Vila-Belda, and Zucman (2022) use interviews to form a hypothesis about a tax planning strategy, which they confirm with administrative data.