Teach, don't give?
Mental models, understanding and communication*

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Abstract: Do heterogeneous macroeconomic beliefs come from different mental models of the economy? Recent evidence suggests that they do, raising the question of how institutions like central banks can best influence expectation formation. Our incentivised online experiment finds substantial heterogeneity in households' mental models which largely differ from those economists typically consider. We show that pedagogical interventions explaining economic mechanisms can coordinate their mental models such that consumers then make predictions akin to experts, even months after the initial intervention. This suggests that rather than *giving* households specific information to influence expectations, a *teaching* approach can yield better understanding and boosts trust in institutions.

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1 Introduction

Macroeconomic expectations play a key role in determining macroeconomic dynamics within models, and we believe that they are important in reality too. But unlike standard models in which everyone forms the optimal rational forecast, surveys reveal substantial heterogeneity in views within and across households (Fofana et al., 2024; Mankiw et al., 2003; Kohlhas and Walther, 2021), firms (Coibion et al., 2018; Kohlhas and Walther, 2021), and professional forecasters (Broer and Kohlhas, 2024; Coibion et al., 2022; Kohlhas and Walther, 2021). Such disagreements could have meaningful implications for the transmission of monetary and fiscal policies. In particular, they are a challenge for central banks who rely on communication to guide and coordinate inflation expectations, viewing them as crucial for price stability and monetary policy transmission (Falck et al., 2021; Clarida et al., 1999; Woodford, 2003; Galí, 2008; Candia et al., 2020).

Existing research attributes this heterogeneity to differences in information (Coibion and Gorodnichenko, 2012, 2015) and cognitive ability (D'Acunto et al., 2019; D'Acunto et al., 2022). We examine a third source of disagreement, documented by Andre et al. (2022): households may operate with fundamentally different mental models of how the economy works. This raises an important question, which we address in this paper: can policymakers coordinate these subjective mental models of the economy through their communication strategies?

We develop a large-scale incentivized experiment to measure and potentially influence three fundamental components of households' economic understanding: how they assess macroeconomic developments (the assessment function), how they believe monetary policy responds to these developments (the reaction function), and how they think monetary policy actions transmit through the economy (the transmission function). Our experimental design allows us to document both the extent of heterogeneity in these mental models and test whether pedagogical interventions can coordinate households' understanding toward frameworks used by economists and policymakers.[1]

Consistent with recent work on subjective models and narratives in economics (Shiller (2017), Graeber et al. (2024b), Graeber et al. (2024a), and Andre et al. (2022)), we first confirm substantial heterogeneity in how households think about economic mechanisms, albeit with some aspects more commonly understood. We find that understanding of the central bank

[1] Our work is related to Hommes et al. (2023), who test the use pedagogical interventions to influence public opinions and knowledge of public finance.

reaction function is quite high — around two thirds of participants correctly identify how a central bank would typically respond to changes in economic variables. We also document that households have a better understanding of supply shocks than demand shocks. This corroborates previous findings from survey data where household expectations show positive correlation between inflation and unemployment (Weber et al., 2022; Coibion et al., 2023). Households more accurately predict inflation and unemployment when they are provided with a supply shock scenario than when they face a demand shock. Finally, we also demonstrate that household understanding of the transmission mechanism — how interest rates transmit through the economy — is nuanced. We corroborate Andre et al. (2022), showing that there is considerable disagreement among households how interest rates transmit to inflation and unemployment — almost 40 per cent of respondents believe that higher interest rates lead to higher inflation. However, we build on these results by showing that households have a very strong understanding of how interest rates transmit to economic activity — approximately 80% of households accurately predict the positive relationship.

We then randomly assign participants to one of several pedogogical interventions that vary in their communication approach but, apart from the control, contain identical information about economic relationships. These treatments range from standard central bank communications to explainer videos that describe the basic mechanism underlying the full monetary policy process. This allows us to test whether explaining economic mechanisms, rather than simply stating policy decisions or forecasts, can improve household understanding of key economic relationships. Our results show that pedagogical interventions can substantially coordinate household mental models toward those used by economists. After receiving educational treatments, we find that understanding of key economic mechanisms improves. We show that household understanding of how demand shocks propagate through the economy and influence unemployment and inflation is greatly improved. Furthermore, we demonstrate that the pedagogical interventions substantially improve household understanding of how interest rates transmit through the economy. In particular, we show that the two educational interventions lead to considerable improvements in understanding the link between interest rates, inflation and unemployment. We show that once treated, these households resemble an expert sample from Andre et al. (2022) in their understanding and predictions of these variables and relationships. Participant free-text explanations further demonstrate that households better understand this process — they explain this transmission using mechanisms explained in our treatments and that economists cite as key.

Finally, we find that all treatments, including an active control explaining basic central bank functions, can substantially improve perceived central bank credibility. Notably, these effects

persisted strongly, with scores remaining significantly elevated six weeks later. Correct understanding of the monetary transmission mechanism was associated with credibility ratings 0.46 points higher on a 1-5 scale. As the share of correct responses increased post-treatment, this suggests improved understanding of economic mechanisms contributes to credibility gains.

However, the increase in credibility is only found when measured using a granular approach that captures distinct aspects of credibility described by Blinder (2000); when measured with a single composite question, treatments had no discernible impact on credibility. This suggests that the nebulous nature of credibility as a concept potentially makes improvements difficult to uncover, but our multi-question approach underscores the value of detailed measurement.

Additionally, we examine whether improved understanding persists over time and whether re-exposure to treatment enhances learning. We conduct three follow-up waves at three, six and twenty weeks after the initial experiment, re-eliciting beliefs about all economic functions. In the three-week follow-up, we only test the longevity of the treatment effects and so we do not provide any additional treatment or information to participants. We elicit their beliefs of the economic functions. At six weeks, we test the longevity of the Control, Educational Text and Educational Video treatments. As such, for these groups we again provide no more incremental information and we re-elicit beliefs. For the remaining FOMC treatment group, we retreat this group at the 6-week follow-up with the Educational Video. We can therefore use the Control group to compare the longevity of the two educational treatments as well as the re-treatment effect. At 20 weeks, we just test the longevity of the treatment effects and again do not provide any additional treatment or information to participants.

Our results show that the treatment effects have longevity. At the 3-week follow-up, participants who received the Educational Text and Educational Video treatments had an improved understanding of the transmission mechanism of interest rates. Respondents in these groups increased their understanding of how interest rates transmitted to inflation by more than 10 percentage points relative to the control group. Furthermore, the improved household understanding of how demand shocks influenced the economy remained at the 3-week follow-up. By the 6-week follow-up, participants who received the Educational Video treatment continued to demonstrate much higher understanding of the transmission from interest rates to inflation. The treatment effects of the Educational Text treatment remained positive but were not statistically different from the control — largely driven by big improvements in the accuracy of the control over the follow-up period. Finally, the understanding of how interest rates transmit to inflation and unemployment continues to be elevated 20 weeks after the initial treatment. Two-thirds of participants who were provided the Educational Text and Video treatments

accurately predict the direction of these effects 20 weeks later — in line with experts' predictions from previous studies (Andre et al., 2022). Only around 50 percent of participants accurately predicted these relationships in the prior. The increase immediately following the treatment remains almost exactly the same after 20 weeks in these two treatment groups, while the control group sees a slow drift up in understanding, likely as some participants turn to outside sources to understand the survey they have participated in.

The rest of the paper proceeds as follows. Section 2 details the experimental design. Section 3 outlines the key results. Section 4 discusses the results and Section 5 concludes.

2 Experimental Design

Our experiment aims to measure and potentially influence how individuals understand three fundamental economic mechanisms: how economic conditions and shocks affect macroeconomic developments (the assessment function), how monetary policy responds to these economic developments (the reaction function), and how monetary policy actions transmit through the economy to affect inflation and unemployment (the transmission function). We outline our experiment in Figure 1.

We structure the experiment in four stages to identify these mechanisms and test whether educational interventions via central bank communication can coordinate beliefs about them. First, we elicit prior beliefs about all three functions through a series of incentivized prediction tasks. Second, participants complete a cognitive assessment to control for heterogeneity in ability as well as provide a distraction from the previous questions. During the cognitive assessment phase, participants earned $0.02 for each correct answer provided within the 60-second time limit. Third, we randomly assign subjects to one of four treatments that vary in their communication approach but contain identical information about economic relationships. Fourth, we measure posterior beliefs about all three functions using parallel but distinct scenarios to those used in the prior elicitation. Throughout the experiment, we also measure subjects' views on central bank credibility, allowing us to examine how improvements in understanding of economic mechanisms affect trust in the central bank.

To assess the persistence of treatment effects, we conduct two follow-up waves at three and six weeks after the initial experiment. In the three-week follow-up, we re-elicit mental models and central bank credibility measures from all initial participants without retreatment. This wave focuses on core belief elicitation, omitting perception questions to avoid confounding recall with

belief updating. For the reaction function, we specifically test scenarios involving interest rate decreases, where we observed initial treatment effects. The transmission function randomizes between interest rate increases and decreases, while maintaining scenario consistency with the initial wave.

At six weeks, we implement a targeted retreatment strategy informed by the three-week results. Because subjects who initially received only the FOMC statement showed the weakest persistence in treatment effects, we retreat only this group. Given that the explanatory video format demonstrated the most durable effects at three weeks, we use this format exclusively for retreatment. All other subjects—those in the control group, those who initially viewed the video, and those who received the educational text—receive no additional treatment.

For all experimental waves, we primarily rely on subjective responses to hypothetical scenarios. Because we elicit subjective responses, we introduce marginal incentives focused on effort rather than aligment with some underlying truth value.[2] We carefully structured incentives to encourage effort and attention while avoiding biasing responses toward any particular economic views. For hypothetical scenarios across all functions (assessment, reaction, and transmission), we rewarded thoughtful engagement rather than specific predictions. Participants received approximately \$0.25 for each explanation that: (1) accurately restated their prediction, and (2) provided a coherent rationale for that prediction, regardless of the specific prediction made. We explicitly communicated that there were no right or wrong answers for these scenarios and provided subjects with multiple examples of payable responses to hypothetical scenarios, being careful to mix the responses in such a way that they could not introduce directional bias to actual subject responses in the experiment.

To ensure scenario comprehension, we embedded attention checks throughout the experiment. Participants who failed two attention checks were removed from the study without payment. Additionally, following **?**, we announced upcoming comprehension questions about treatment content, with monetary rewards for correct responses, to maintain attention during the information intervention phase.

Our one caveat to these effort-based marginal incentives is that we used a single real-world prediction task when eliciting subjects' reaction functions. For real-world reaction function tasks, where objectively correct answers exist, we implemented performance-based incentives. Participants received \$0.25 for correctly predicting the Federal Reserve's actual policy decision based on historical FOMC statements. We randomly selected one of two such predictions for

[2]For example, many macroeconomists eliciting beliefs will implement incentives via a scoring rule that penalizes deviations from some rational benchmark. See CITATIONS for examples.

payment to maintain incentive compatibility while managing costs.

We maintained this incentive structure consistently across all three waves of the experiment, with one exception: we did not include real-world prediction tasks in our follow-up waves.

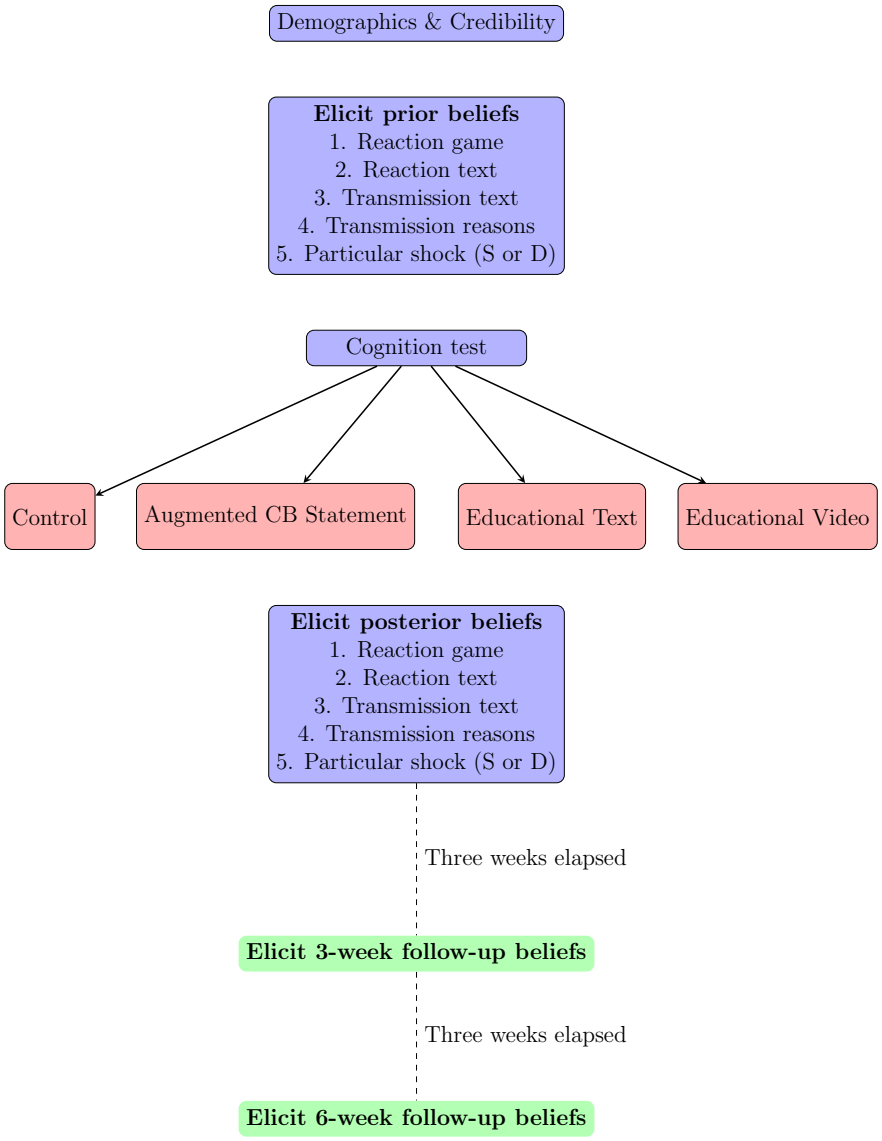


Figure 1: Experimental Design Overview

2.1 Sample and Implementation

We recruited 1,094 U.S. participants through Prolific for our initial wave. The sample broadly matches U.S. demographics on gender (49.0% female vs. 50.4% in census) and age (median

approximately 40.4 years vs. 39.0 years), though it skews more educated (58.0% with bachelor's degree vs. 34.7%) and slightly less racially diverse (69.1% white vs. 58.9%). We collect the data across 3 waves. The first wave was launched in October 2024. The second wave was launched 3-weeks later. This follow-up wave was completed by 826 of the initial wave participants — approximately 75% retention. Table 1 shows that the different treatment groups had similar retention rates. The third wave was launched 6 weeks after the first. Again, the survey had good retention and the retention was not unbalanced across the treatment groups except for the Augmented FOMC. The Augmented FOMC treatment group was retreated with the Educational Video at the 6-week follow-up. This serves to explain why their retention was slightly lower than the other groups in the third wave — they were asked to watch a 5-minute video prior to the belief elicitation.

Finally, the fourth wave was launched 20 weeks after the first. Despite the lengthy delay, the survey had good retention around 65% and this was mostly balanced across the treatment groups — although the groups that received the Education Video (Education Video and Augmented FOMC in the retreatment) had slighlty higher retention.

Table 1: Treatment Assignment and Follow-up Participation

Treatment	**Initial Wave**	**3-Week**	**6-Week**	**20-week**
Control (CB Function)	268	199	195	171
% of original	–	74.3%	72.8%	63.8%
Augmented FOMC	250	188	164	167
% of original	–	75.2%	65.6%	66.8%
Educational Text	293	219	217	182
% of original	–	74.7%	74.1%	62.1%
Educational Video	283	220	210	192
% of original	–	77.7%	74.2%	67.8%
Total	1094	826	786	712
% of original	–	75.5%	71.8%	65.1%

Notes: The Augmented FOMC treatment in the 6-week follow-up was retreated with a video while the other treatments were not retreated in the follow-up.

2.2 Eliciting Beliefs

Our experimental design follows a Bayesian learning framework similar to McMahon and Rholes (2024), where we elicit baseline beliefs (priors), randomly assign subjects to infor-

mation treatments, and measure updated beliefs (posteriors). We apply this framework to measure how subjects understand three distinct economic mechanisms: how shocks affect macroeconomic outcomes (assessment function), how monetary policy responds to economic developments (reaction function), and how policy actions affect the economy (transmission function). We illustrate the framework of our experiment in Figure 1.

While we maintain this basic structure throughout, the specific elicitation approach varies across functions to accommodate their distinct features. We detail the measurement strategy for each function below.

2.2.1 Assessment Function

Initial Wave

To measure the assessment function, we elicit beliefs about how exogenous shocks affect macroeconomic outcomes using incentivized prediction tasks based on hypothetical vignettes, following Andre et al. (2022). We focus on fundamental macroeconomic disturbances that feature prominently in the academic literature and can be explained without extensive technical terminology: supply shocks (changes in oil or food prices) and demand shocks (changes in government spending or tax rates).

Each vignette follows a consistent structure. We first establish a baseline by informing participants that all economic variables were at normal levels prior to the shock. We then describe a specific economic disturbance and ask participants to predict the resulting changes in inflation, unemployment, and economic activity. To ensure engagement and comprehension, we embed attention checks throughout the scenario descriptions.

Our experimental design incorporates several features to facilitate clean identification of treatment effects while avoiding repeated scenarios. First, we randomly assign participants to either supply or demand shock scenarios. This initial assignment determines whether a participant sees supply or demand shocks throughout the experiment. Within these broad categories, we then randomize:

1. Which specific shock a participant will encounter when we elicit priors (e.g., oil prices versus food prices for supply shocks, or government spending versus tax rates for demand shocks)

2. Whether participants see positive or negative shocks when we elicit priors (e.g., an

increase versus decrease in government spending)

A participant's assignment to supply or demand shocks remains fixed, but we systematically vary both the specific shock and its direction between the prior and posterior elicitation. For instance, a participant assigned to demand shocks who initially sees a positive government spending shock will subsequently see a negative tax shock when we elicit posteriors. Similarly, a participant assigned to supply shocks who initially predicts responses to a positive oil price shock will later consider a negative food price shock. This design allows us to measure changes in understanding of the underlying economic mechanisms that result from treatment while minimizing the influence of scenario familiarity. We describe all possible shock combinations in Table 2.

Table 2: Assessment Function Shock Paths

Assignment	Prior Elicitation	Posterior Elicitation
Supply Shocks	*Path 1:* Oil (+)	Food (-)
	Path 2: Oil (-)	Food (+)
	Path 3: Food (+)	Oil (-)
	Path 4: Food (-)	Oil (+)
Demand Shocks	*Path 5:* Gov't Spending (+)	Tax Rate (-)
	Path 6: Gov't Spending (-)	Tax Rate (+)
	Path 7: Tax Rate (+)	Gov't Spending (-)
	Path 8: Tax Rate (-)	Gov't Spending (+)

Notes: This table shows all possible paths through the assessment function elicitation. The (+) and (-) indicate positive and negative shocks respectively. For example, Oil (+) represents an increase in oil prices, while Tax Rate (-) represents a decrease in tax rates. Each participant is randomly assigned to one path at the start of the experiment.

Follow-up Waves

We conducted two follow-up waves at three and six weeks after the initial experiment to measure the persistence of treatment effects and evaluate the impact of selective retreatment. Both follow-ups maintained the initial wave's incentive structure: effort-based rewards for hypothetical scenarios and comprehension-based payments for attention checks.

In the three-week follow-up, we re-elicited mental models from all initial participants without retreatment, focusing exclusively on core belief elicitation to avoid confounding recall with belief updating. For participants initially assigned to supply shocks, we switched between oil and food price scenarios relative to their posterior scenario from the initial wave. Similarly, for those assigned to demand shocks, we alternated between government spending and tax rate

scenarios. We omitted perception questions to maintain a clear focus on belief persistence rather than recall accuracy.

The six-week follow-up maintained this framework but incorporated selective retreatment. Based on the three-week results showing weaker persistence among participants who initially received only the augmented FOMC statement, we retreated this group using the explanatory video format that had demonstrated the strongest (initial wave) and most durable (three-week follow-up) effects. All other participants – those in the control group, those who initially viewed the video, and those who received the educational text – proceeded directly to belief elicitation without retreatment. This selective approach allows us to examine both the natural decay of treatment effects and the potential benefits of targeted reinforcement for groups showing weaker persistence.

2.2.2 Reaction Function

Initial Wave

We measure participants' understanding of monetary policy responses through two complementary approaches: hypothetical scenario analysis and real-world policy prediction. This dual approach allows us to assess both abstract understanding of policy principles and practical interpretation of existing central bank communication issued by the FOMC following real-world policy decisions.

For hypothetical scenarios, participants evaluated an abrupt change in steady-state economic conditions and predicted how policymakers would change monetary policy in response to that change. Each scenario presented specific changes in key economic indicators – inflation and unemployment – and asked participants to predict whether the Federal Reserve would increase, decrease, or leave rates unchanged. Following each prediction, participants provide written explanations for their reasoning. We incentivize effort rather than specific answers by rewarding comprehensive explanations regardless of the predicted policy direction.

Similar to our approach to eliciting subjective assessment functions, we alternated hypothetical scenarios around treatment. If a subject evaluated a scenario that standard economic

The real-world component presents participants with actual Federal Reserve statements from past FOMC meetings and asks them to predict the associated policy decision. Unlike the hypothetical scenarios, these predictions have objectively correct answers, allowing us to implement performance-based incentives. Participants receive $0.25 for each correct prediction.

This approach tests participants' ability to interpret actual central bank communication and extract policy signals.

Follow-up Waves

In the three-week follow-up, we focus exclusively on scenarios involving interest rate decreases, where we observed strong and statistically-significant treatment effects in our initial experimental wave. For hypothetical scenarios, we present economic conditions that would warrant rate decreases according to conventional monetary policy frameworks. To maintain consistency while preventing mechanical learning, some participants see scenarios identical to their posterior scenarios from the initial wave, while others encounter new but structurally similar scenarios. We omit real-world prediction tasks and perception questions to focus solely on testing the durability of understanding. As in the initial wave, we incentivize detailed explanations rather than specific predictions to maintain focus on understanding rather than recall.

The six-week follow-up preserves this framework but introduces targeted retreatment. For participants initially assigned to the FOMC statement treatment, who showed the weakest persistence at three weeks, we first present the explanatory video before proceeding to belief elicitation. This selective retreatment targets only the group showing significant decay in treatment effects, while leaving other groups—the control group, those who initially received the video, and those who received the educational text—untouched. To ensure comparable measurement across groups and waves, we maintain the same incentive structure: payments for detailed explanations of predictions regardless of their direction, but no real-world prediction tasks. This design allows us to examine whether reinforcement through a different communication channel can strengthen treatment effects that showed signs of decay while maintaining measurement consistency with earlier waves.

2.2.3 Transmission Function

To measure how participants understand policy transmission, we present scenarios describing unexpected changes in interest rates The scenarios explicitly direct participants to focus on the effects of the policy change rather than its motivation. Participants then predict the subsequent changes in inflation, unemployment, and economic activity. In an interest rate rise scenario, the respondents receive the following instructions:

Scenario: Federal Reserve raises interest rates.

Imagine that the Federal Reserve unexpectedly increases interest rates by 1 percentage point in the United States and holds them elevated for 12 months (e.g interest rates are increased from 4% to 5% and kept there for 12 months). We would like you to ignore why they might have done this. Instead, we are interested in how you think this increase in interest rates would affect the economy over these 12 months (relative to them being left unchanged). Please select your answers below:

2.3 Central Bank Credibility

We elicit participant perceptions of central bank credibility prior to and following the information treatments in the first wave. We have two ways of measuring credibility; a single-question measure, and a multi-question measure. We use two measures so that participants are not being asked identical questions in the prior and the posterior. We randomly allocate participants to each type of measure in the prior. They are then provided the alternative in the posterior.

The single-question measure simply asks participants "How credible do you find the Federal Reserve?" where they have a likert scale of 5 options from "Not credible" to "Very credible". This question has the benefit of being easy and fast for participants. However, it may also aggregate over too many concepts and requires participants to have a good idea of what credibility means. Indeed, different participants may have different views of what credibility is.

The multi-question measure addresses some of these concerns. The questions are motivated by the various components of central bank credibility discussed in Blinder (2000). We build 5 statements for participants that are answered on a likert scale from 1 to 5, where 1 means 'completely disagree' and 5 means 'completely agree'. The 5 statements were elements that we considered most pertinent and relevant for the public from the suggestions in Blinder (2000):

1. The Federal Reserve consistently fights inflation
2. The Federal Reserve communicates clearly and transparently
3. The Federal Reserve takes actions that benefit the economy
4. The Federal Reserve keeps inflation low
5. The Federal Reserve follows a clear rule when setting policy

2.4 Information Treatments

After we elicit prior beliefs, we provide participants with one of four randomly assigned information treatments; 3 treatments and 1 active control. **??** contains the full text of the information treatments. In general, we aimed to ensure that the complexity and reading time of the information texts were similar across the different treatments. Table 3 shows the word count and various reading metrics of the four treatments.

Table 3: Comparison of Treatments on Readability Measures

Measure	Control	Educational Text	Educational Video	Augmented FOMC Statement
Wordcount	511	636		455
Easily Understood by Age Group	18-19	18-19		18-19
Flesch-Kincaid Grade Level	11.6	11.1		12.5
Gunning Fog Index	14.7	14.6		16.2
Flesch Kincaid Reading Ease	36.1	47.2		43.7
Smog Index	11.2	10.8		12.2
Automated Readibility Index	10.8	11.7		12.8
Coleman Liau Index	16.1	14.6		13.5
% Complex Words	27.59	19.81		20.44

2.4.1 Active Control

The active control information includes factual information about the broad role of the Federal Reserve including payments policy, financial stability, monetary policy, and financial supervision. It is mostly taken directly from the Federal Reserve's own 'The Fed Explained' publications. The text also includes the inflation target of the Federal Reserve - this is done in an identical way across all information treatments. Therefore, while this text may provide some informational content about other areas and responsibilities of the Federal Reserve, it does not detail any of the three key mechanisms that we are interested in. It does, however, contain information about the central bank to ensure the control group did not perceive that they had been given completely useless information unrelated to the beliefs we were eliciting from them. That is, we did not want to make it possible for participants to guess that they were in a control group. Furthermore, we wanted to ensure the control text was as contextually and semantically complex as the treatments.

2.4.2 Educational text

We constructed the educational text to include and discuss three key features:

1. Inflation and prices are primarily affected by supply and demand. We provided examples of how a tornado might cause a reduction in supply and how a reduction of tax rates might cause an increase in demand.

2. The Federal Reserve aims to stabilise the economy and so if an imbalance occurs that causes inflation to rise or fall, they will raise or lower interest rates to try and bring the economy back to balance.

3. The reasons why the Federal Reserve expects interest rates to bring the economy back to balance by managing demand. We walk through an example that higher interest rates should make loans more expensive for businesses and consumers, as well as increasing the incentive for consumers to save. This should all lead to lower demand and therefore bring the economy back to balance. We also cover the opposite situation where interest rates are reduced.

2.4.3 Educational video

We constructed an educational video that used an almost identical transcript to the educational text treatment. The difference was the visual and audio medium. In addition to this transcript:

- We incorporated visuals showing scales that link demand and supply of goods to prices and inflation.

- We incorporated visuals showing when inflation was above a specified target, the Federal Reserve would raise rates and vice verce.

- We incorporated visuals showing the transmission mechanism that had been written in the transcript. These can be thought of as visually showing a DAG as well as writing it out in the transcript.

2.4.4 Augmented FOMC statement

We started wtih the exact FOMC statement from July 2023 where interest rates were increased at the meeting. We then modified this statement to incorporate more pedagogical explanations about the economic mechanisms that were implicitly being assumed of the reader. We aimed to weave the educational text into a regular statement so that a non-regular reader could engage and understand the key messages. For example, the statement usually starts by stating the facts about inflation, economic activity and unemployment. In this statement, after the facts about inflation being above 2 percent, the economy expanding at a moderate place and the unemployment rate remaining low, we add:
"this signals to the Federal Reserve that there is an imbalance of demand relative to supply in the economy. There is more overall demand for goods and services than the economy can currently produce and supply, which can lead to relative shortages and faster price rises — higher inflation".

We then provided some explanation for readers about why the Federal Reserve would change interest rates:
"The Federal Reserve uses changes in interest rates to manage imbalances in the economy by influencing demand. Therefore, given the current and expected state of the economy, the Federal Reserve has decided to increase interest rates. Higher interest rates are expected to slow down demand in the economy and reduce the relative shortages. A closer balance of demand and supply should lead to prices growing more slowly and thus inflation brought back down towards the target rate of 2 percent".

Finally, we then explain to participants how this action is expected to help:
"There are several ways that higher interest rates are expected to slow down demand in the economy. Higher interest rates encourage households to save more and spend less of their income. Additionally, businesses may be less willing to invest in expanding their business (such as buying a new factory or tractor) due to the higher cost of repaying the loan. As a result, both household consumption and business investment would decline, causing a decrease in overall demand in the economy and bringing it closer to balance with the capacity of the economy to supply goods and services.
A related channel that operates in the other direction is that businesses, faced with higher business costs from higher interest rates, might wish to raise prices to maintain profits. However, due to the reduced consumer spending, firms raising prices risk losing customers. As a result, this channel is quite limited and the other effects typically dominate leading prices to increase

less or even fall.

At the beginning of the information text, we informed participants that they were given a modified version of the Federal Reserve statement from that month.

3 Results

In this section, we present the results of households' predictions of the effects of macroeconomic shocks. We again break this in to the three fundamental macroeconomic mechanisms and then we discuss central bank credibility.

3.1 Assessment function

Figure 2 and 3 show that in their prior beliefs, households mostly agree on the directional response of inflation and unemployment to a change in the price of oil and food (typical supply shocks). Furthermore, the households predict a strong positive co-movement between inflation and unemployment when they are provided with scenarios that represent supply shocks. Figure 4 and 5 illustrate that around 50% of households accurately predict the responses of both inflation and unemployment to the supply shocks. This predicted co-movement is perhaps not so surprising given previous work has postulated that households hold a supply-side view of the world (Weber et al., 2022; Coibion et al., 2023)

In line with these previous findings, households do not predict a *negative* co-movement between inflation and unemployment when faced with changes in government spending and taxes (typical demand shocks). Figure 6 and 7 show that before treatment, household beliefs are very dispersed and, in particular, many households do not see links between the shocks and inflation and unemployment. Figure 8 and 9 show that only around 1/3 of households accurately predict the responses of both inflation and unemployment to demand shocks — much lower than supply shocks.

Since the prior beliefs of households about supply shocks largely conformed to the typical macroeconomic view, at least in direction, the treatments did not have identifiable effects. As such, the prior accuracy and posterior accuracy were statistically indistinguishable. In contrast, households were relatively inaccurate when provided with demand shocks. The treatments led to considerable improvements in household understanding of demand shocks.

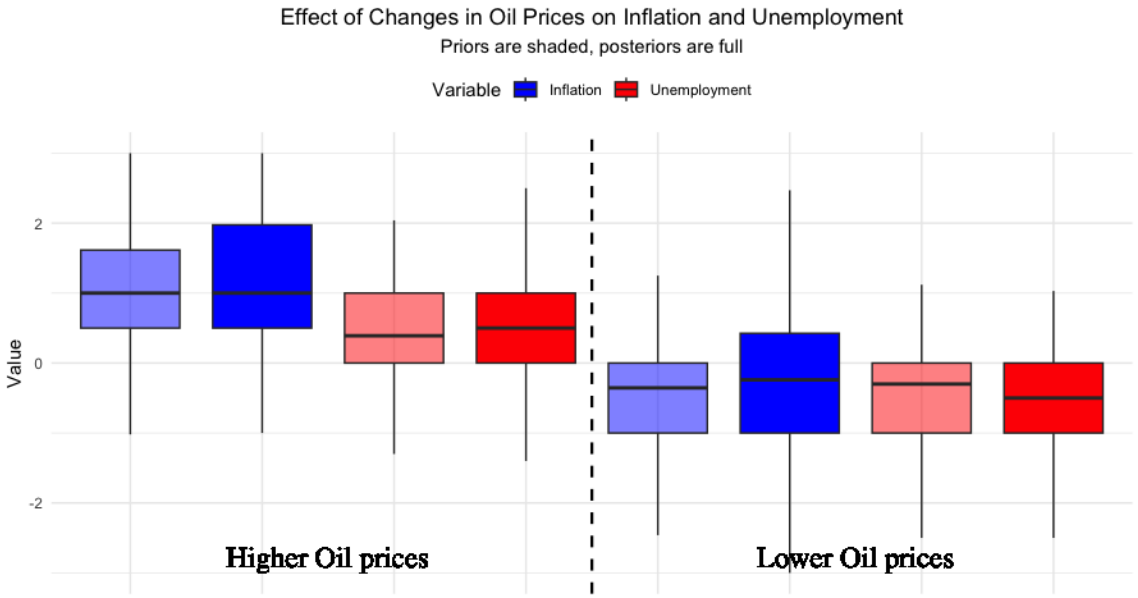


Figure 2: Household predictions of inflation and unemployment

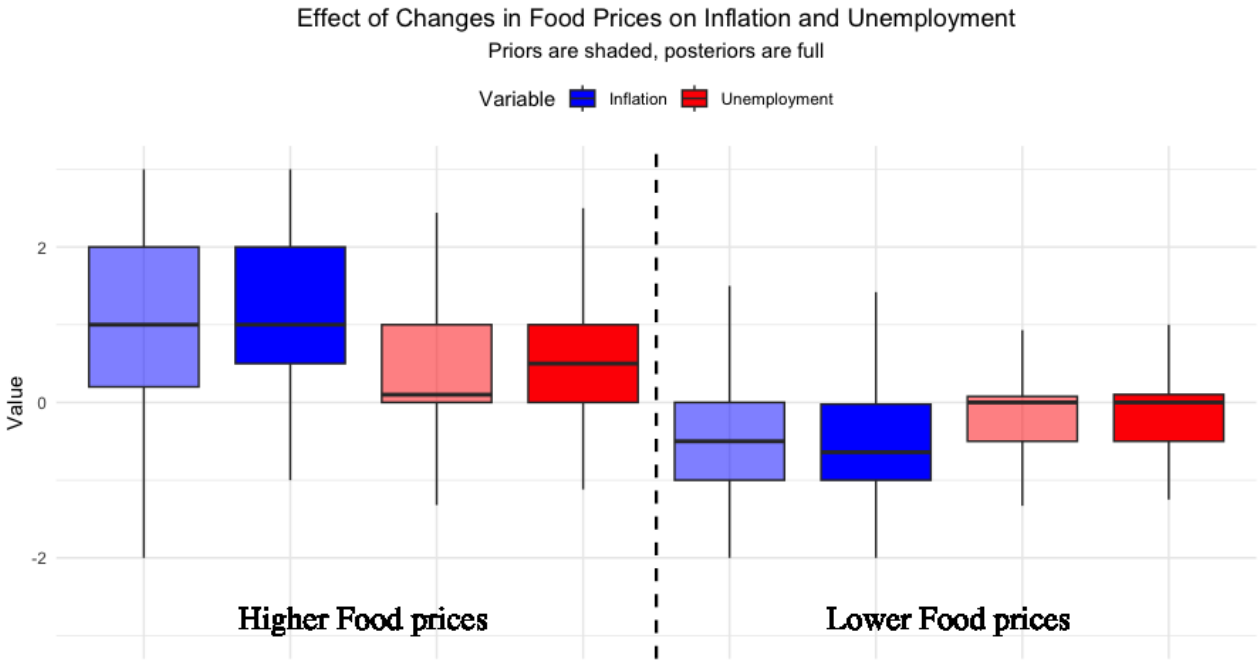


Figure 3: Household predictions of inflation and unemployment

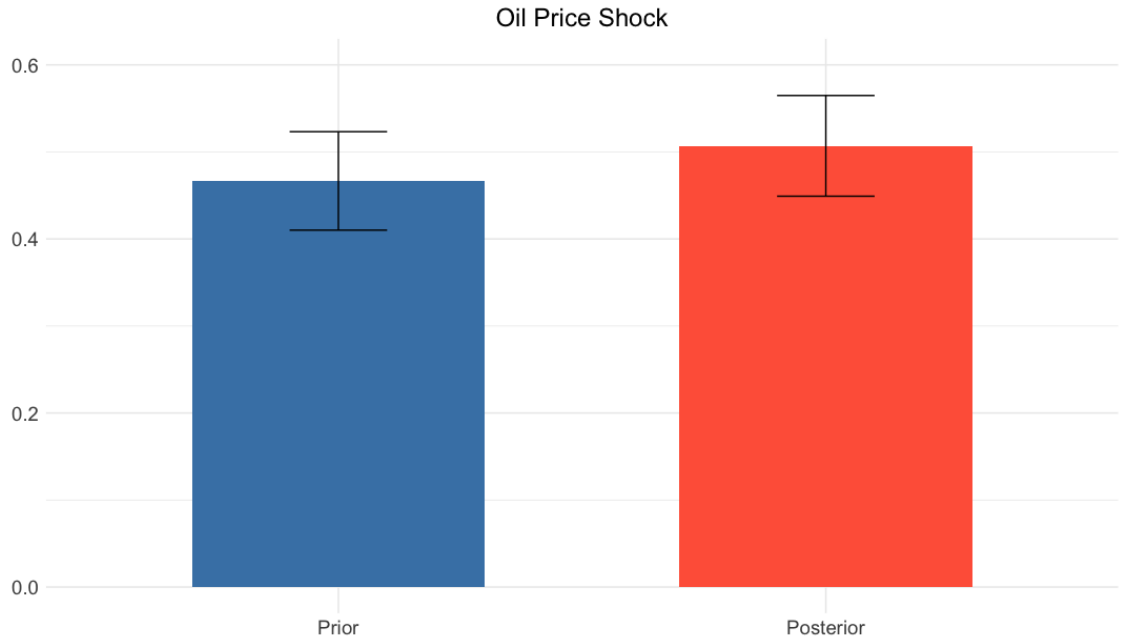


Figure 4: Impulse Response Accuracy



Figure 5: Impulse Response Accuracy

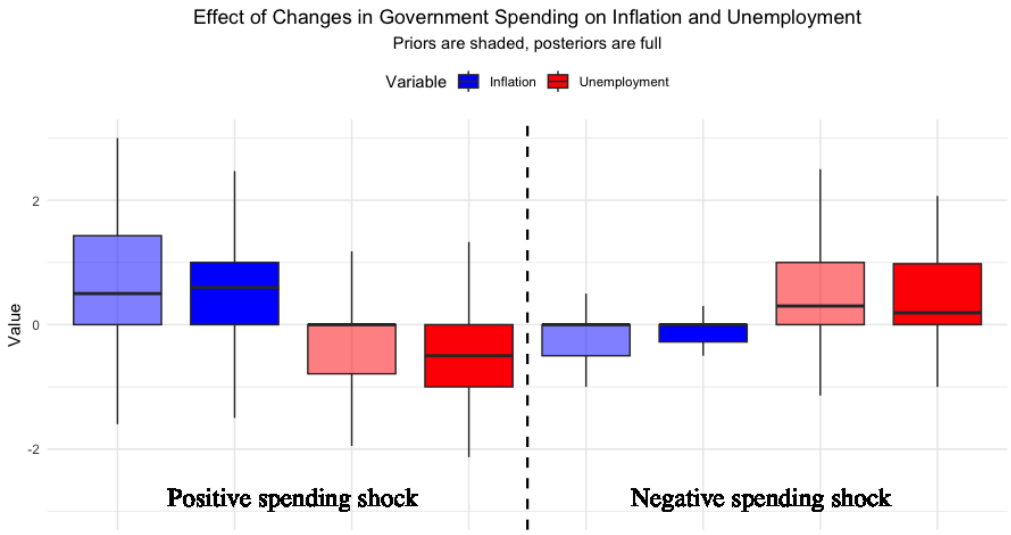


Figure 6: Household predictions of inflation and unemployment

Figure 8 and 9 show that accuracy improved considerably following the treatments. In particular, the Educational Text and Educational Video treatments led to improved understanding relative to the control group. We measure understanding by participants who accurately predicted both the inflation and unemployment directional response to the shocks. The Educational Text treatment led to a 15 percentage point improvement in accuracy relative to the control group — from a base level of understanding around 30% in the prior. The Educational Video treatment led to an 8 percentage point improvement in accuracy — although the relatively wide standard errors meant this was not statistically significant.

Following the information treatments, the majority of households predicted a *fall* in inflation in response to a rise in income taxes — moving towards the economics convention and more in line with the information provided to some of them.

3.2 Reaction function

The expected response of the central bank to economic developments (the reaction function) was considered in two ways, as discussed in the design. The results are split into the hypothetical scenario and the real-world scenarios provided to participants.

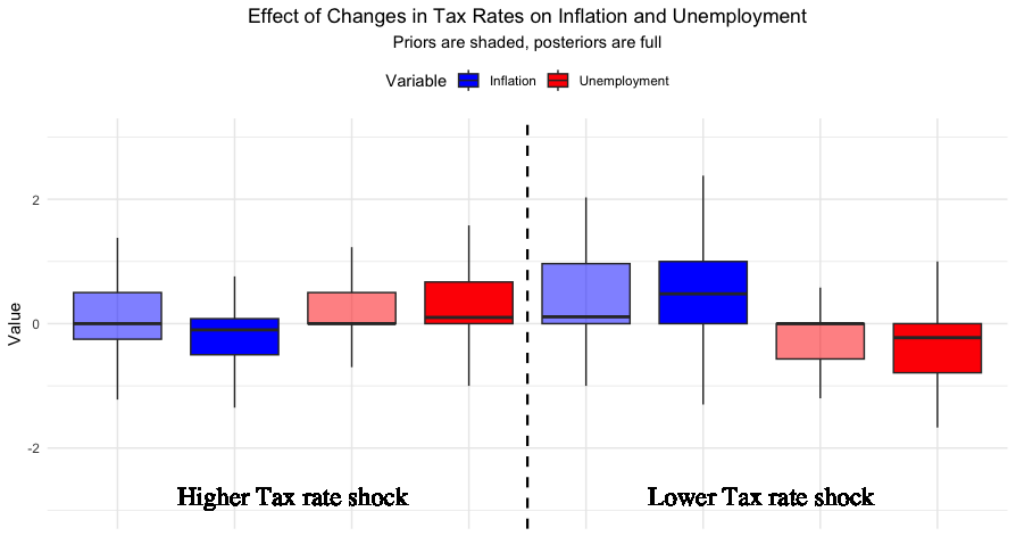


Figure 7: Household predictions of inflation and unemployment

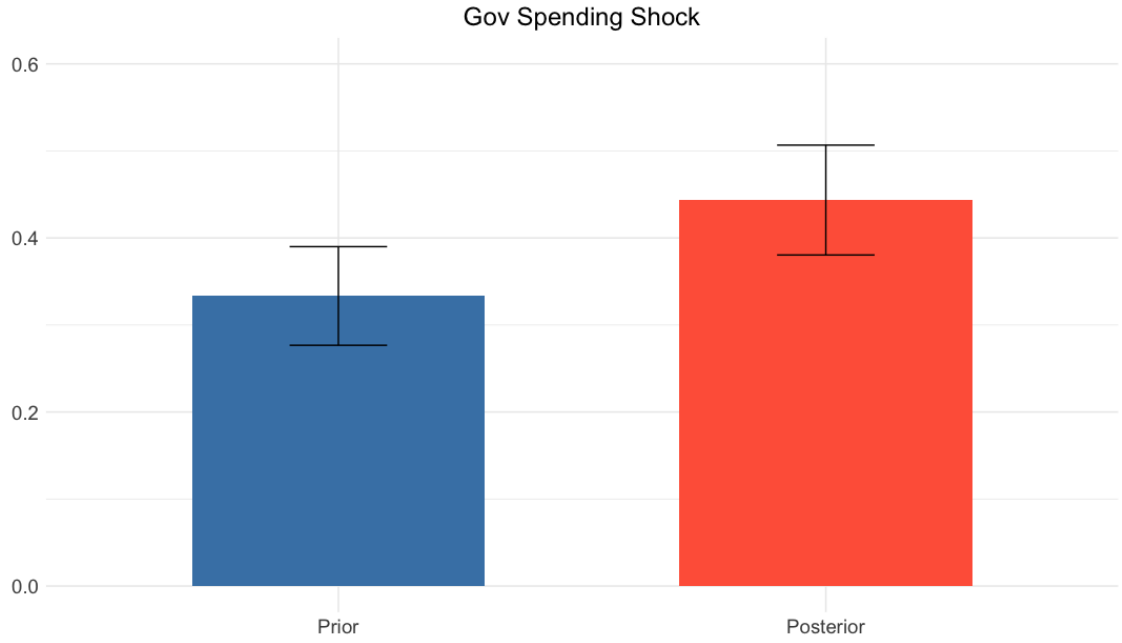


Figure 8: Impulse Response Accuracy

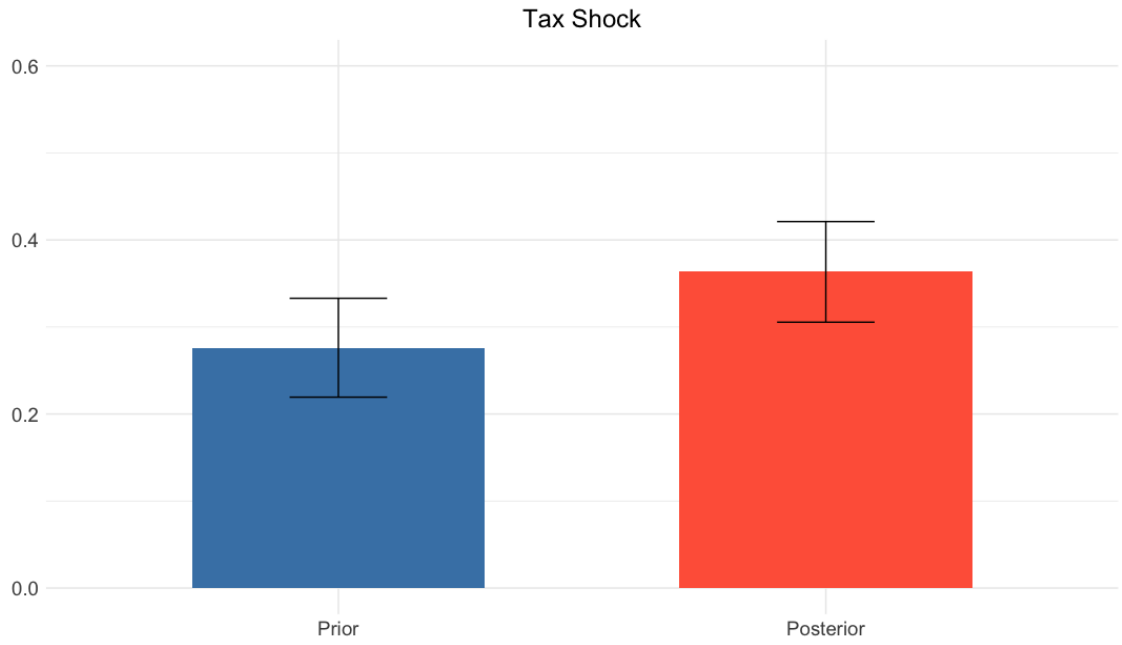


Figure 9: Impulse Response Accuracy

3.2.1 Hypothetical vignette

Figure 10 shows that around two-thirds of households correctly predicted the likely path of interest rates when we elicited their prior beliefs. There was some asymmetry in this. Households were more correct when faced with a scenario that suggested lowering interest rates than with one that required raising rates (66% vs 60%) despite symmetrical scenarios. This perhaps suggests that the average household has an innate preference for lower interest rates — which would make sense given the prevalence of mortgage and debt holders in the United States.

Following the information provision, household beliefs moved towards the conventional economic wisdom and toward the information they were provided. Figure 10 illustrates slight improvements in accuracy across the prior and posterior when pooling the treatments. However, these improvements are not statistically significant. Figure 11 splits the difference in accuracy in the posterior by treatment and by the direction of the scenario. There is a strong directional asymmetry in the effectiveness of the treatments relative to the control group. When faced with a scenario that would induce higher interest rates using a Taylor rule, the educational information provided does not appear to influence the accuracy of the participants relative to the control group (Panel 1). By contrast, when faced with the opposite scenario, participants who received educational information treatments increased their accu-

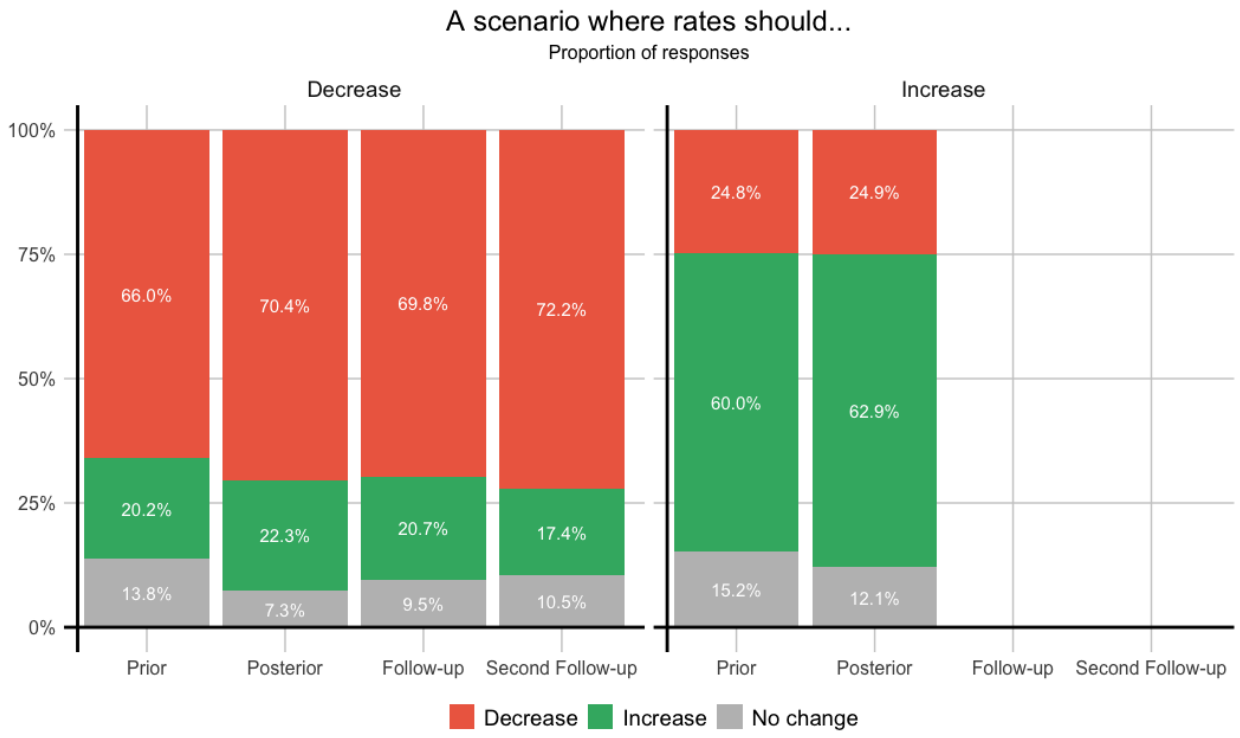


Figure 10: Reaction function predictions

racy by around 10 percentage points relative to the control (Panel 2). This asymmetry in the effectiveness of information treatments likely relates to the original asymmetry across the two directions observed in the priors — households appear more reluctant to (or understand less a scenario that would require a) raise interest rates than lower interest rates. When provided with educational material on this mechanism, they appear to use this information only when it pertains to lowering interest rates.

In addition to the actual predictions of households becoming more accurate, participants also perceived that they understood more about why the Federal Reserve changes interest rates. Figure 12 shows that these improvements in understanding were different across the treatment groups. Around 25% of the control group felt their understanding of the reaction function improve over the course of the first wave. Some of this may have been exposure to Federal Reserve statements they had never seen before as well as the elicitation process. Furthermore, the information the control received also had a very brief statement that the Federal Reserve targets inflation and this may have been incremental information to some participants. Around 45% of participants who received the educational video and text felt they had a greater understanding of the Federal Reserve's reaction function. This is both large and statistically different to the control group. Furthermore, around 40% of the group that

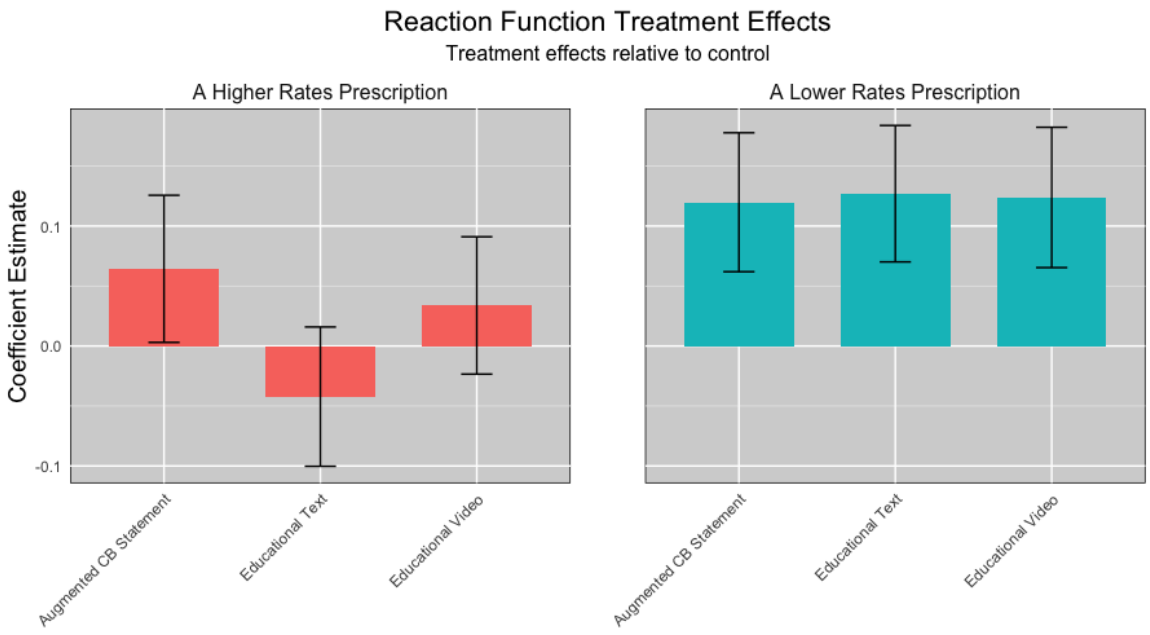


Figure 11: Reaction function prediction treatment effects by scenario

received the augmented FOMC statement perceived an improvement in their understanding — far more than the control group. These findings broadly align with those from the prediction tasks.

3.2.2 Real-world text

Participants were given FOMC statements from the past (removing explicit references to the decisions taken), and incentivized to guess which action the Federal Reserve took. Figure 13 shows that prior to any treatment, participants were only able to correctly predict the direction of the FOMC decision around 25% of the time. There were some differences across the two sample statements as one described a more confused economic situation than the other and, as such, was harder for participants to decipher. As well as being surprisingly low, these proportions are particularly noteworthy since participants were only given three options — random guessing would have been correct 33% of the time. Figure 13 illustrates that providing participants with pedagogical treatments does not improve their ability to correctly identify the decision taken in the FOMC statements after receiving the information treatments. Furthermore, the various treatments do not have differential effects relative to the control — each has no effect on the share of correct responses.

However, it is interesting to note that when provided with stylized situations in the hypo-

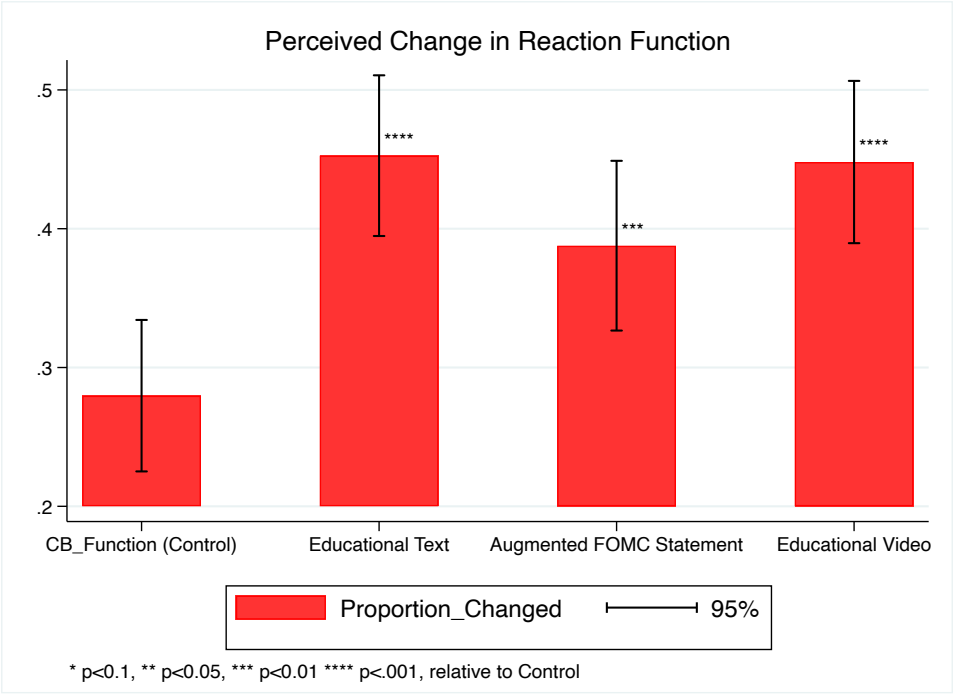


Figure 12: Perceived changes in understanding of reaction function

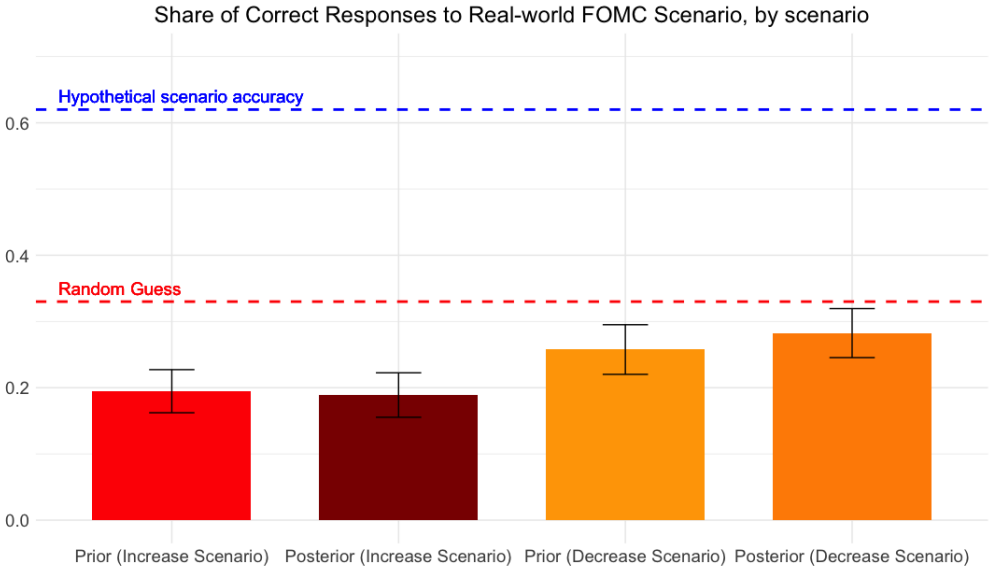


Figure 13: Understanding of reaction function from FOMC statement

thetical scenarios, even before receiving information treatments, these same participants were correct almost two-thirds of the time. While these scenarios were, by design, more simple than the real world, it is clear that the wording of these FOMC statements is not leading readers to an obvious conclusion — even when households do understand the central bank reaction function. Indeed, the Federal Reserve Teal Book, which details possible FOMC text for all the possible policy decisions, details almost identical statements irrespective of the decision.

3.3 Transmission function

Figure 14 shows that there is substantial disagreement among households in our sample about the effects of interest rate changes on the economy. 48% of respondents predict a decrease in inflation in response to an interest rate increase while 39% predict an increase. Households also disagreed on the effect of interest rates on unemployment. 53% predict an increase in unemployment in response to an interest rate increase while 36% predict a decline. These results are qualitatively in line with the findings for interest rate shocks in Andre et al. (2022), although our baseline sample has more 'correct' inflation predictions.[3] In stark contrast, households were in broad agreement (and the vast majority were correct) about the effect of interest rates on economic activity. 73% predict that higher interest rates would slow economic activity with only 11% predicting the opposite. This tends to suggest that households have a reasonable grasp that, in general, higher interest rates should slow the economy, but they fail to translate this to the more general equilibirum concepts of inflation and unemployment. Indeed, the explanations households provide for these predictions suggest quite advanced and typical reasoning for why economic activity would slow, such as due to a higher cost of borrowing for firms and households. However, this same reasoning does not typically extend to their predictions for inflation.

Following the various treatment interventions, households significantly revised their beliefs of the effect of interest rate changes on the economy. When pooling all treatments together, the proportion of participants correctly stating that interest rate increases led to slower economic activity rose from 73% to 79%, led to higher unemployment rose from 53% to 66% and, led to lower inflation rose from 48% to 65%. These are all highly statistically significant increases. Figure 15 illustrates the comparison of the household predictions after receiving the

[3] Andre et al. (2022) find 57% of households (vs our 39%) expected higher inflation. This could be due to a number of factors. First, our sample was conducted in 2024 following large increases in interest rates precisely to slow inflation. This may have in effect 'taught' some households. Second, our wording was slightly different to Andre et al. (2022) — we emphasised that the change occured as part of a central bank response but for participants to ignore why. Andre et al. (2022) explained it more as a random shock to interest rates.

information treatments to experts that were provided a similar question from a previous survey (Andre et al., 2022). Households that received the pedagogical treatments considerably align their predictions with that of the theoretical benchmark and now resemble the predictions of experts sampled in 2022 with almost identical questions. In particular, the share of households that expect higher interest rates to lead to lower inflation and higher unemployment rises to around two-thirds from less than half.

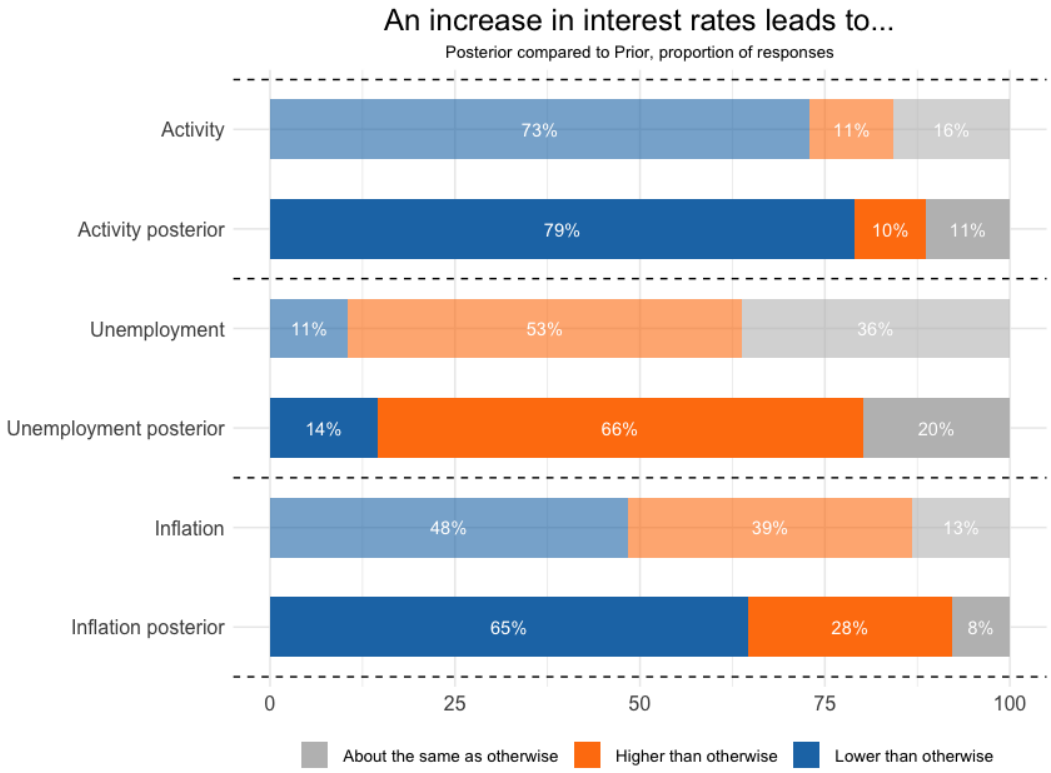


Figure 14: Predictions of directional effects of interest rate increase

3.3.1 Explanatory mechanisms

The results in the previous section illustrated that participants disagreed considerably on the effect of interest rate changes — in particular for inflation. These findings replicate Andre et al. (2022). Furthermore, Andre et al. (2022) demonstrated that much of this is due to consumers having a 'costs-channel' view of inflation in mind rather than a 'demand-side' view. For example, a 'cost-channel' may be that higher interest rates increase the cost of loans for businesses and in order for businesses to break-even or maintain profit margins, they must raise prices. We identify a similar effect in our baseline results. Figure 16 shows the share of household explanations that are categorized into 'cost-channel' and 'demand-channel'. The

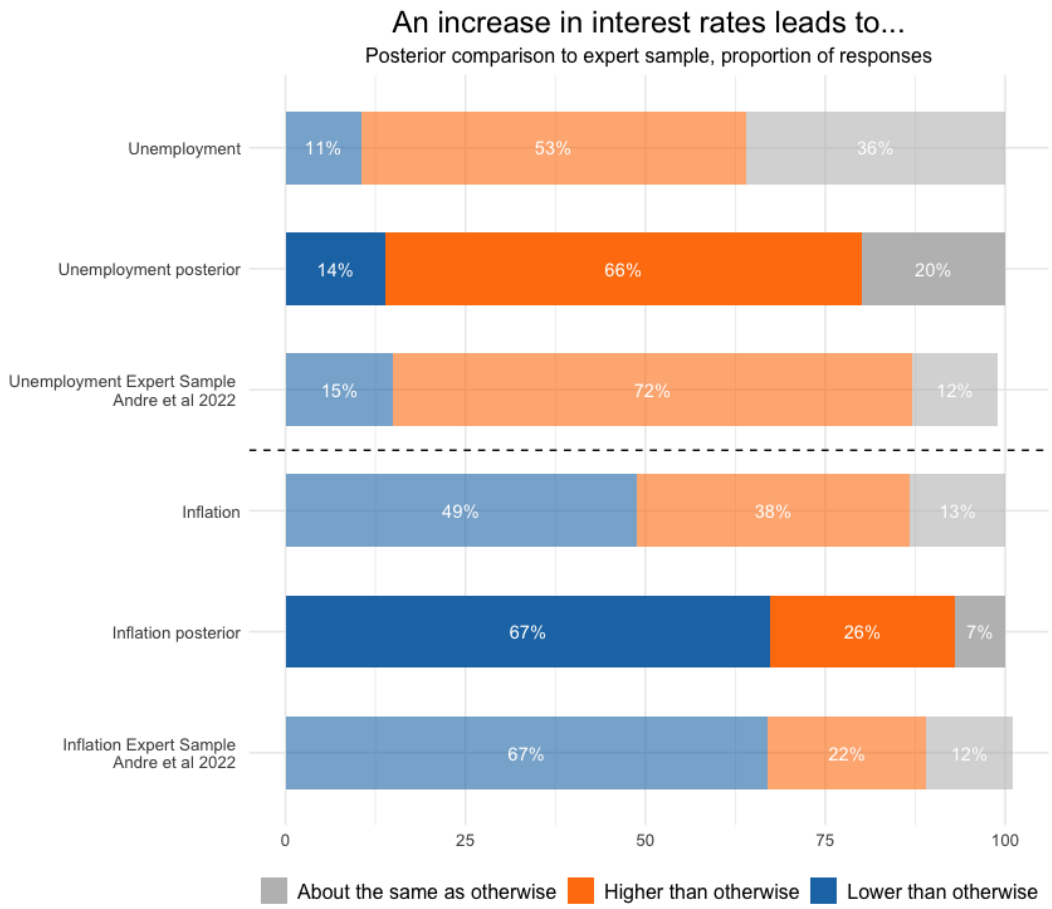


Figure 15: Predictions of directional effects of interest rate increase

explanations provided by participants could pertain to their predictions for inflation, unemployment, or economic activity (or all of them).

Following the various information treatments (which include explicit mentions of 'demand-side' explanations and aims to counter 'costs-channel' thinking), there is a sizeable reduction in the share of participant responses that use explanations that make references to the 'costs channel'. Furthermore, the proportion of explanations that make reference to 'demand channel' reasoning increases considerably from around 35% to 45%. This shift away from 'costs-channel' reasoning towards 'demand channel' reasoning likely helps explain the considerable increase in households predicting inflation decreases following a rise in interest rates.

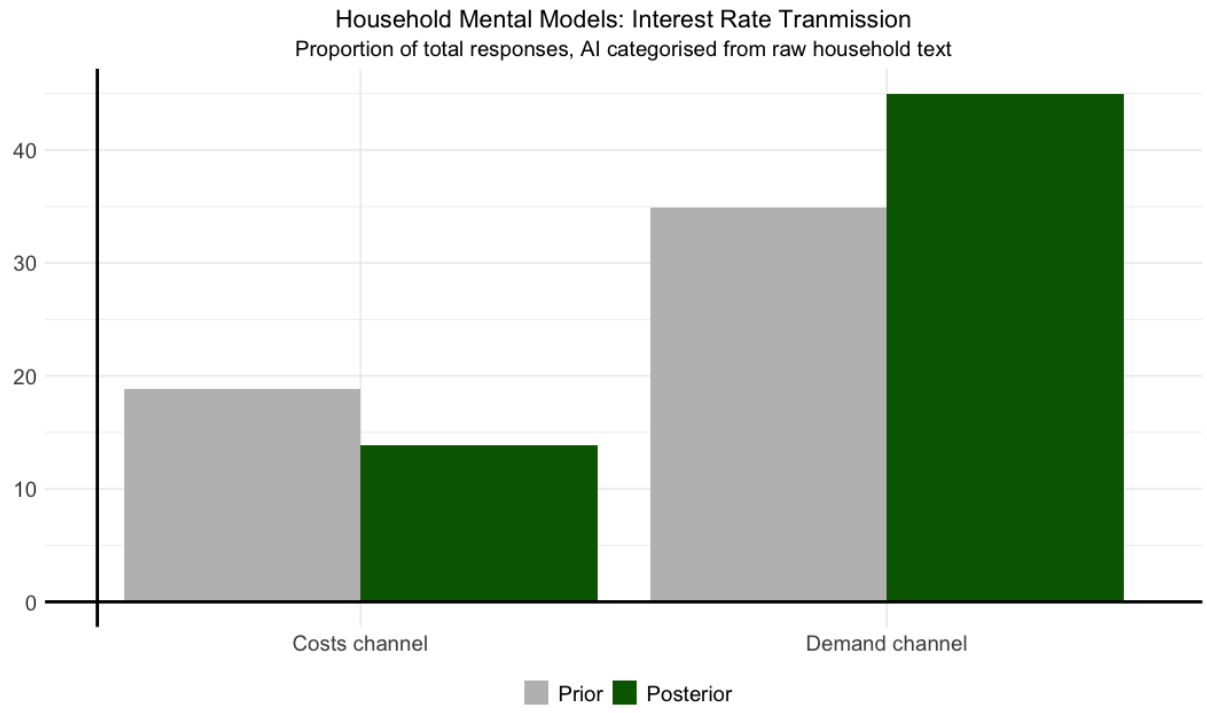


Figure 16: Predictions of directional effects of interest rate increase

3.3.2 Longevity of treatment effects

The sizeable treatment effects identified in the previous sections persist up to three and six weeks later. Figure 17 illustrates the proportion of correct predictions when participants are faced with the interest rate change scenario. Pooling across the control and three treatments in the priors, participants predict the correct direction around 50% of the time for inflation, 56% of the time for unemployment and almost 80% of the time for economic activity. As detailed in previous sections, this rises to 65% for inflation, 68% for inflation and 82% for economic activity. These improvements are then maintained in the 3-week follow up and 6-week follow up.

Figure 18 illustrates that after 20 weeks, the initial large increase in understanding of the link from interest rates to inflation and unemployment remains. The proportion of respondents who accurately predict the directional effect of interest rates on inflation and unemployment continues to be elevated at two-thirds compared to the pre-treatment sample of around one-half.

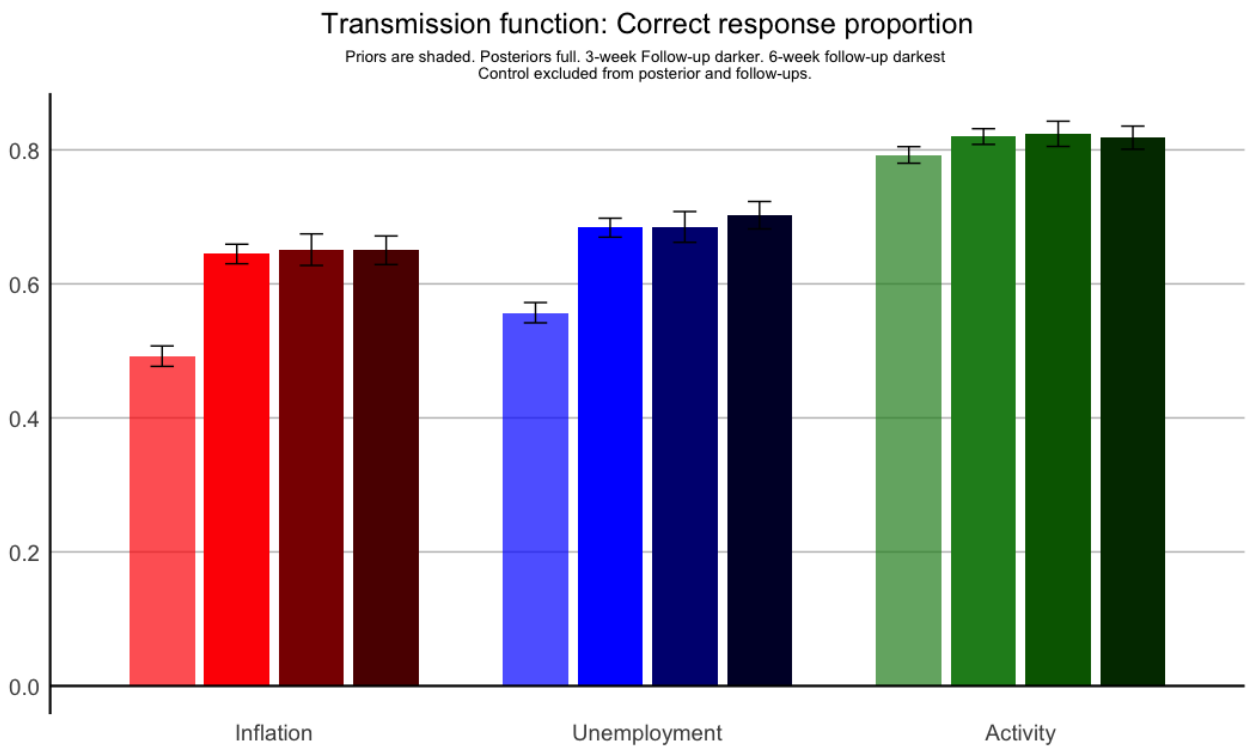


Figure 17: Longevity of treatment effects

3.3.3 Information effects by treatment

In this section, we split-out the effects of the three treatments and the control group. Figure 19 illustrates the proportion of correct predictions when participants are faced with the interest rate change scenario. The three active treatments see considerable increases in correct responses between the prior and posterior beliefs. There is also a slight increase in correct responses among the active control group.[4] Our framework is to consider the increase in correct predictions to approximate understanding changes. We use the following econometric formulation to identify and estimate treatment effects:

$$\Delta Correct_i = \alpha + \beta_1 T + \beta_2 \mathbf{X}_i + \epsilon_i \tag{1}$$

where T is a dummy variable indicating the treatment received and X_i is a vector of controls. In addition to the controls, the change in accuracy ($\Delta Correct_i$) accounts for the initial understanding of participants. We use this econometric formulation to identify the treatment effects for all waves.

[4]This could be due to participants becoming more familiar with the belief elicitation process since the control group did not receive any information directly on the transmission function. Indeed, it helps to control for any natural improvement among the treatments for this same reason.

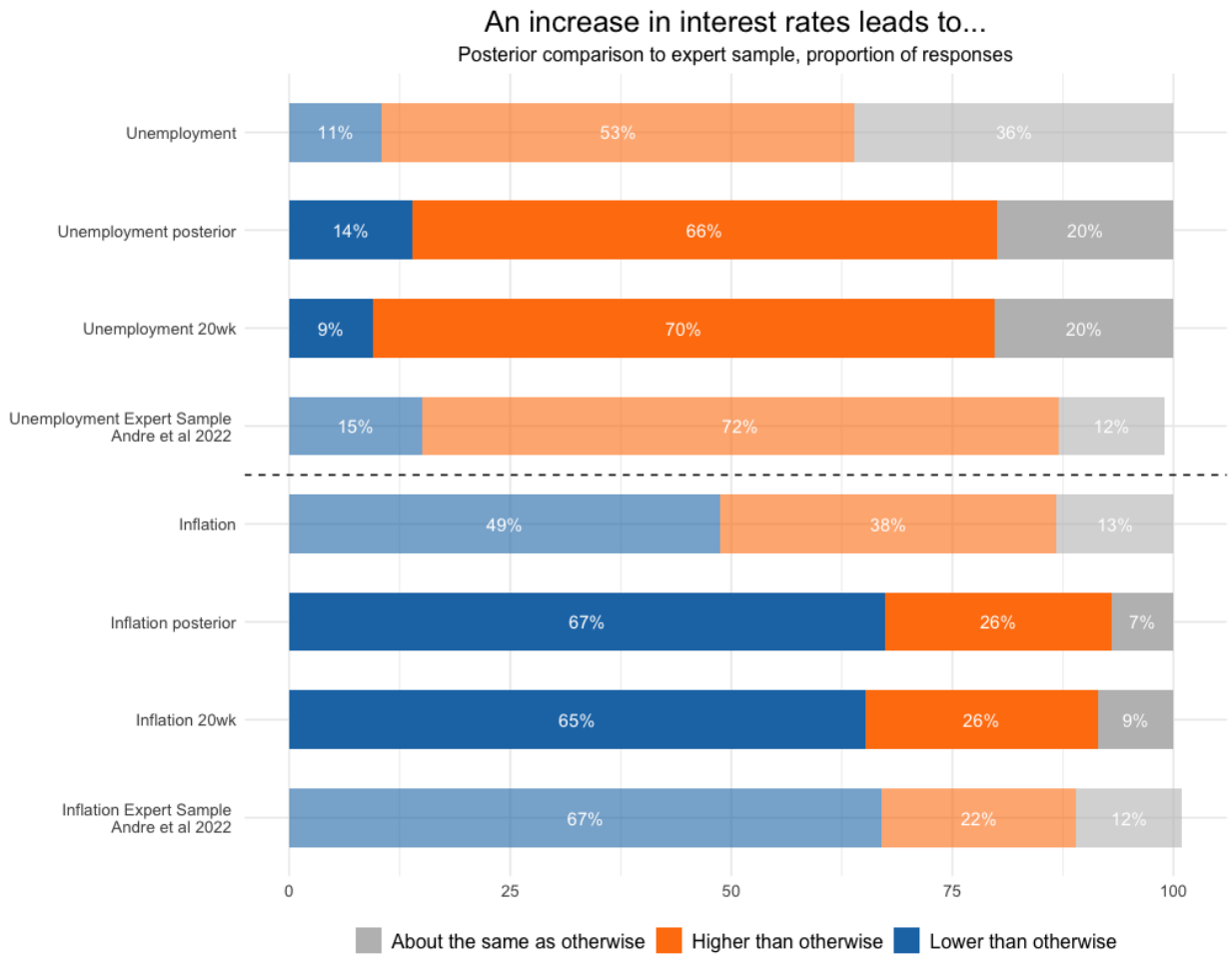


Figure 18: Longevity of treatment effects - up to 20 weeks

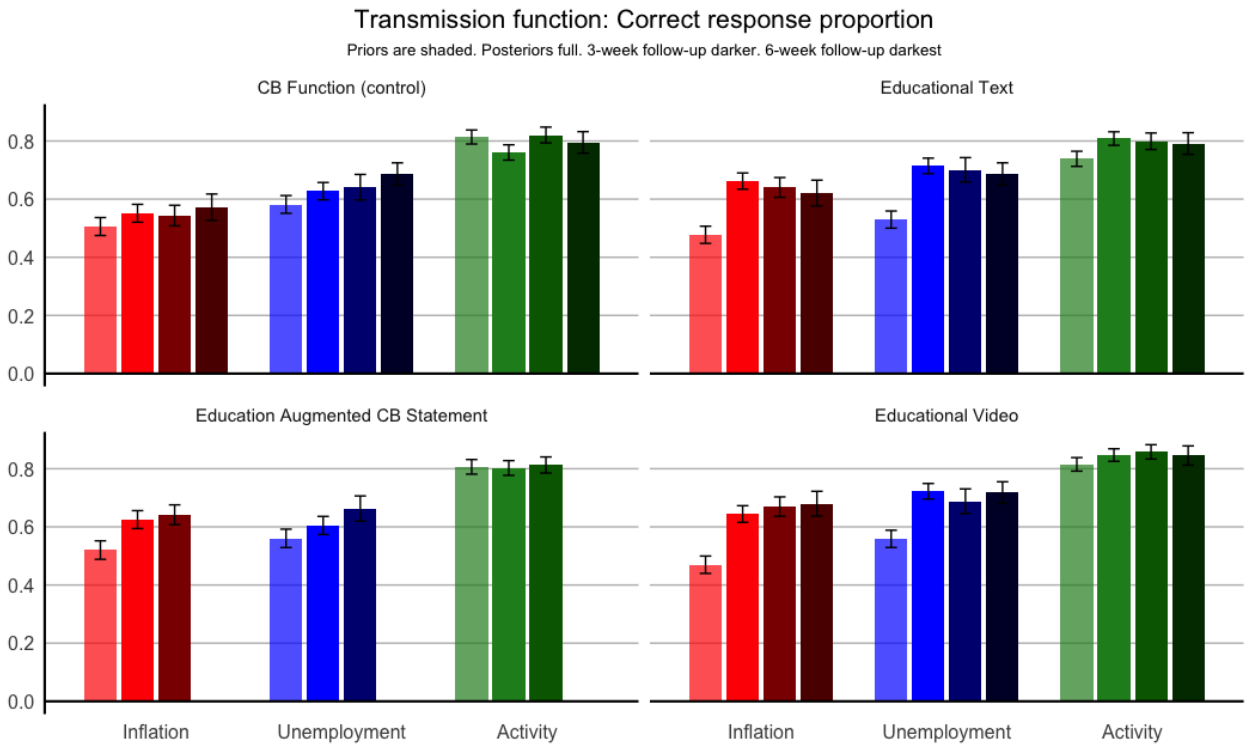


Figure 19: Transmission function understanding by treatment

Table 4 shows the coefficients from the estimation in Equation 1 for the variables we elicit predictions for. Column 1 shows that within the first wave, the Educational Text and Educational Video treatments lead to considerably larger gains in understanding than the control group. The change in inflation and unemployment prediction accuracy from the prior to the posterior in the first wave was around 13 percentage points higher in both treatments relative to the control group. Considering that the prior accuracy was around 50 percent, a 13 percentage point improvement represents a very large proportional improvement in understanding. The augmented FOMC statement improved understanding of the link between inflation and interest rates by up to 6 percentage points more than the control group (around half as effective as the educational text and video treatments) and did not lead to any change in understanding of the link from interest rates to unemployment.

After 3 weeks, the initial effects of the educational text and educational video treatment remain and are distinguishable from the control group. This is despite the reduced overall sample and improvements in the accuracy of the control. After 3 weeks, the participants who received these treatments are between 12 and 16 percentage points more accurate when predicting the link between inflation and interest rates. However, the improved understanding of the link between interest rates and the unemployment rate decays at the 3 week follow-up.

While there is still improved understanding, it is not distinguishable relative to the control group. This is both due to a slight decline over the 3 weeks as well as an improved level in the control.

At the 6-week follow-up, the learning effects still remain. Participants who received the Educational Text treatment are still almost 6 percentage points more accurate when predicting the link between inflation and interest rates, but this is not statistically different from the control group. However, the participants who received the Educational Video predict the link almost 9 percentage points more accurately than the control. This is a statistically significant difference despite the decline in sample due to retention and the increase in the accuracy of the control. This is almost the same treatment effect (relative to the control) as in the initial wave of the experiment and shows that at least out to 6 weeks, there is very little decay in the learning.

The differences between the Educational Video and Educational Text treatments appear to largely be the longevity of the effect. Indeed, the content introduced in the two treatments is almost identical and the initial treatment effects are very similar. However, the Educational Video leads to sustained learning and understanding of the link between interest rates and inflation at 6 weeks. The Educational Text also leads to learning and improved accuracy up to the 3 week follow-up, but this is not distinguishable from the control at 6 weeks. This tends to suggest that the visual aids help individuals retain and recall the information.

When we re-elicit beliefs and predictions at 20 weeks, we see that there remains a considerable effect of the treatment and the pattern of the video having a more lasting effect remains. The Educational Video treatment group predict the direction of inflation more than 9 percentage points more accurately than the control group. Indeed, more than two-thirds of the treatment group, 20 weeks after the initial intervention, accurately predict the effect interest rates have on inflation and unemployment.

Over the course of the intervention and the following 20 weeks, the accuracy of the control group increased from 51 per cent to 59 per cent. This was a statistically insignificant change. In contrast, the accuracy of the Educational Video treatment group increased from 47% to 65%, a highly statistically significant improvement. Likewise, the Educational Text group accuracy improved from 48% to 65%. Importantly, the improvement seen in the Educational Video and Text treatment groups occurred immediately following the intervention and was evident in the posterior estimates in Wave 1. In fact, the level of understanding and accuracy remained almost identical across the follow-up waves for these groups. By contrast,

the control group only improved very slightly immediately after the intervention: by around 3 percentage points.[5] The improvement for the control group occurred over the course of 20 weeks, as participants were free to do their own research to understand the survey. The Educational Video and Text treatments had already been provided this information in their intervention and therefore would likely have less need for searching the information out — a possible explanation for the very steady level of accuracy across the follow-ups.

Table 4: Treatment effect on understanding transmission mechanism

	1st wave	2nd wave: 3wks	3rd Wave: 6wks	4th Wave: 20wks
	(1)	(2)	(3)	(4)
Inflation accuracy				
Educational Text	0.137***	0.117**	0.052	0.070
	(0.043)	(0.053)	(0.053)	(0.057)
Augmented FOMC stmt	0.064	0.039		
	(0.045)	(0.055)		
Educational Video	0.135***	0.165***	0.108**	0.091*
	(0.043)	(0.053)	(0.054)	(0.055)
Unemployment accuracy				
Educational Text	0.139***	0.086	0.055	0.155***
	(0.047)	(0.056)	(0.055)	(0.065)
Augmented FOMC stmt	0.011	0.001		
	(0.049)	(0.058)		
Educational Video	0.122***	0.035	0.035	0.146***
	(0.048)	(0.056)	(0.055)	(0.064)
Observations	1,078	813	610	690
Demographic Controls	Yes	Yes	Yes	Yes
Note:		*p<0.1; **p<0.05; ***p<0.01		

[5]This was likely due to understanding the questions a little more — a test effect which is important to control for. In addition, prompting participants to think about these concepts may have also induced some improved understanding compared to the prior, even without the treatment — another test effect that is important to control for.

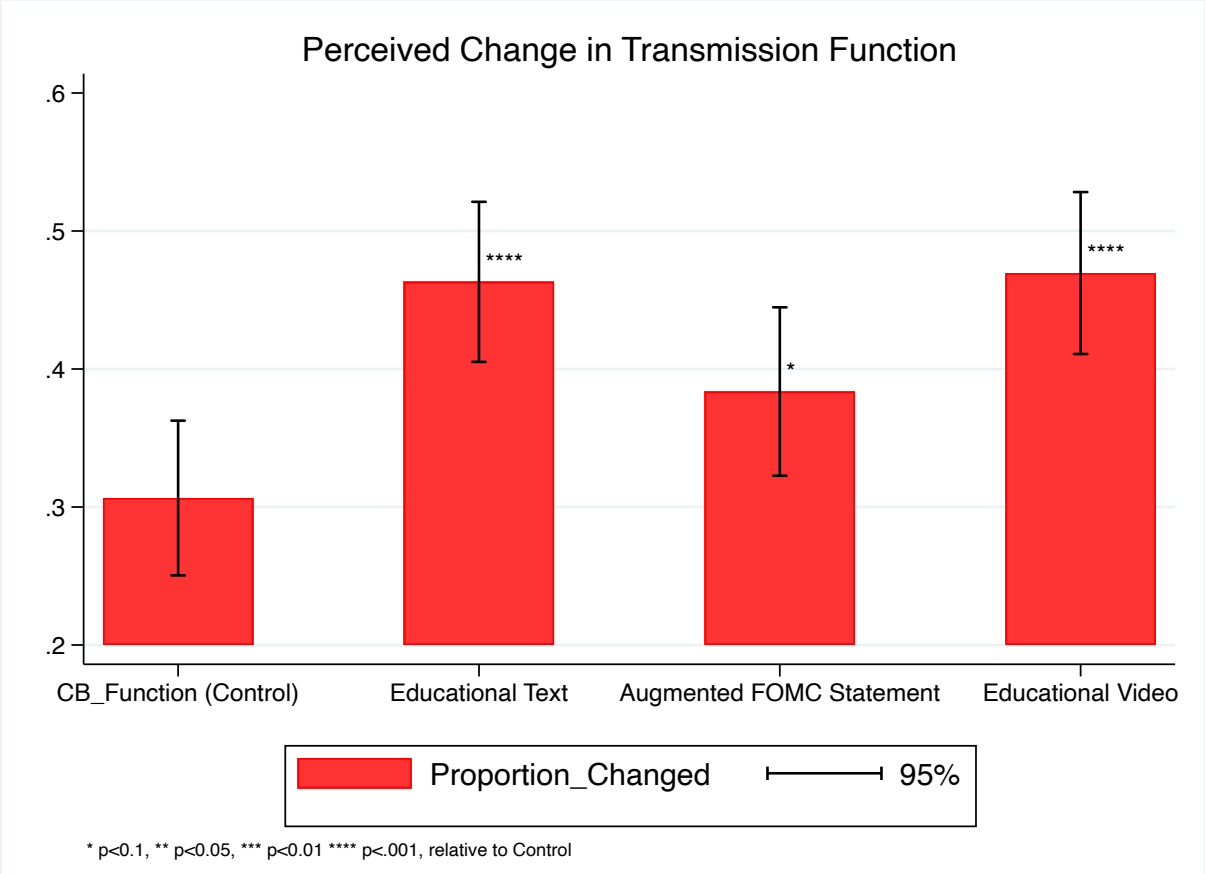


Figure 20: Self-perceived change in understanding of Transmission function

3.3.4 Household Perceptions of Understanding

In addition to eliciting household predictions, participants were asked at the end of the first wave if their understanding of the way interest rate changes influence the economy had changed. Again, there was no incentive for participants to report a particular answer, and we made clear to participants that their payment was independent of the response to this question. Figure 20 details the proportion of respondents that believed their understanding of the transmission mechanism changed as a result of the first wave. All treatment groups, including the active control, reported improved understanding. Almost 50% of participants who received the educational text and video treatments reported that their understanding changed — this is statistically much larger than the control group. Participants who received the augmented FOMC statement also reported higher understanding although this is not strongly significantly different to the control group.

3.4 Participant recall and reasoning methods

After we elicit beliefs from participants, we ask them what methods they used to answer our questions. We find that almost 50% of participants state that they are using their 'gut feeling' in at least some of the predictions they provided to us. This is broadly in line with findings in Andre et al. (2022). At the same time around 60% of participants reported to using some knowledge of economics. Furthermore, around 50% of households relied on their previous experience or memories of macroeconomic events when forming their predictions.

Following the information treatments, there is a broad increase in the share of participants reporting using their knowledge of economics while there is a broad decline in the share using their gut feeling. In particular, the Educational Video group reported an almost 7 percentage point higher share of using their economic knowledge than the control group (a statistically significant difference) while they also reported a 5 percentage point lower share of using their gut feeling (although this is not statistically significant at conventional levels). While the other treatment groups also reported increases it is likely the effects are slightly muted by the fact we asked participants to average across a number of scenarios as well as the factual historical scenario which may have induced more gut feeling and reliance on previous memories given the incentives and reward for accuracy with this question.

3.5 Central Bank Credibility

Across the prior and posterior beliefs, we see considerable improvements in the perceived credibility of the Federal Reserve. Figure 21 shows that each of the information treatments saw improvements across all categories — including the control group. While considerable changes in the control group might normally suggest caution when interpreting results, the improvements in the control are not surprising in this circumstance. This was an active control group and much of the text detailed the broad role of the Federal Reserve in controlling inflation, keeping the financial system stable and regulating banks as well as protecting consumers. While it did not detail economic mechanisms, it is not surprising that it had an influence on credibility.

We find a strong positive relationship between perceived central bank credibility and understanding of key economic mechanisms. This finding is in line with previous research although

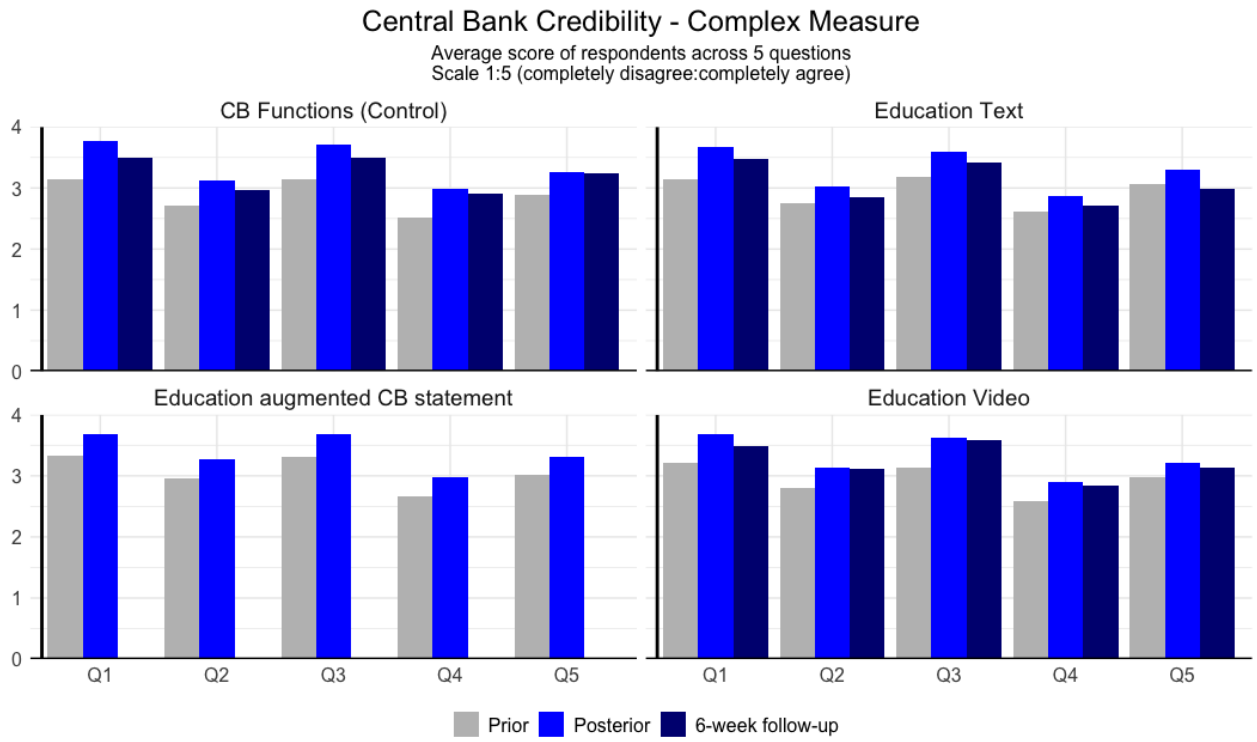


Figure 21: Measures of Central Bank Credibility by Treatment

those studies often proxy understanding with previous education or financial literacy. Participants who correctly identified the transmission mechanism in the posterior rated the Federal Reserve's credibility as 0.46 points higher on average in the posterior than those who were incorrect. Given that the variable ranges from 1 to 5 this is a very large effect size. Indeed a similar finding holds in the priors as well, although the 'correct' bonus for credibility is around 0.3 points. Therefore, overall we see that there is an increased bonus for understanding in terms of credibility from the prior to the posterior. Additionally, we know the absolute level of understanding increased as measured by the share of individuals predicting correctly. This tends to suggest that at least part of the increase in credibility comes from an improvement in understanding economic mechanisms.

The literature's finding of very sticky central bank credibility may also have arisen due to the method of eliciting credibility and trust. We find that when participants are asked to summarize their view on credibility into one single measure, they huddle around the middle of the Likert scale. We also find that information interventions have no impact on this measure. Figure 22 shows the distribution of responses for the single-question and multi-question measures of credibility across the prior and posteriors. The mean and median of the single-question measures do not change and the distribution is also unchanged. In contrast, when

we consider the multi-question measure, we find the information treatments lead to a shift upwards in the entire distribution of responses. Therefore, it is possible that the pedagogical interventions are considerably more influential in altering the beliefs of households than simple central bank statements or forecasts. However, it is also possible that those previous studies did have an influence on credibility, but the single-question masked any effects.

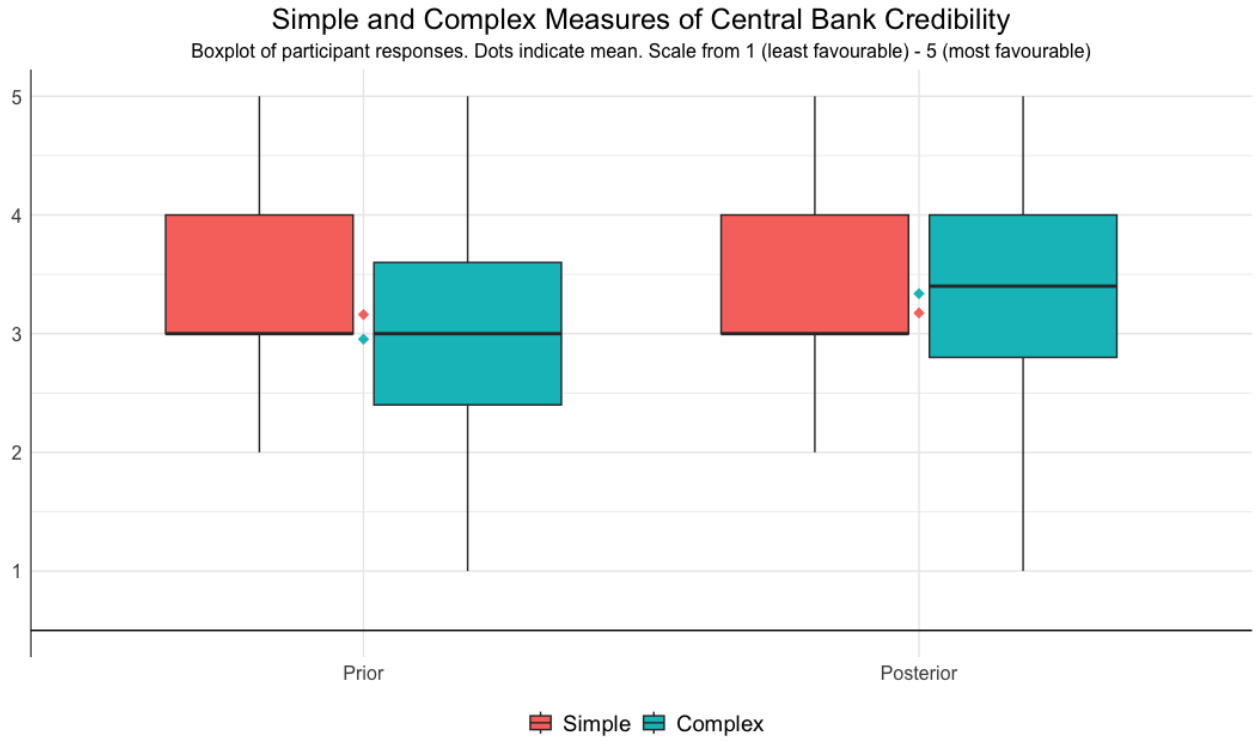


Figure 22: Two types of measures of central bank credibility

4 Conclusion

In this paper we assess the extent to which heterogeneous beliefs are held by households. We decompose household mental models into an assessment function, reaction function and understanding of the transmission mechanism. Despite finding some aspects of the economy where households tend to agree both as a group and with economists, we find substantial heterogeneity across households regarding other aspects. In these areas, households tend to hold views at odds with those of the economics profession.

Most importantly, we show that pedagogical interventions explaining economic mechanisms can coordinate their mental models such that consumers then make predictions akin to experts. This updated understanding persists for many weeks after the initial intervention. Our

novel findings have important implications for policy communication and the management of expectations. They suggest that rather than giving households specific information to influence expectations, a teaching approach can yield better understanding and boost trust in institutions.

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