Complexity in Monetary Policy Communications

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How does the complexity of policy statements affect economic outcomes? When looking at monetary policy announcements, I show that complex language reduces the effects of monetary policy shocks on asset prices. I then look at how the general public, a non-specialized audience, reacts to distinct policy statements that only differ in the complexity of the words used, by making use of data from a new Randomized Control Trial experiment. For this audience, a simpler message is more effective in shaping households' expectations and enhancing understanding, but it reduces the credibility of the Federal Reserve relative to more complex, and less easily understood, communication.

"Traditionally, as central bankers we have been more comfortable speaking to experts and markets than to the general public. (...) But we have to remain vigilant that we do not focus too narrowly on communicating to markets and create our own echo chamber. This is why, in my confirmatory hearing, I announced that one of the priorities of my presidency is to reinforce our bridge with the public."

Christine Lagarde, February 6, 2020[1]

I. Introduction

The statement above, made by the president of the European Central Bank, illustrates what has become common practice for central bankers these days. Until two decades ago, central banks perceived their audience as experts only, represented mostly by financial market participants, and hence did not feel compelled to adapt their language to a non-specialized audience. In contrast to this dated perception, and based on recent evidence that argues for the relevance of the general public to monetary policy transmission[2], most policymakers now consider this audience as an

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[1] Hearing at the Committee on Economic and Monetary Affairs of the European Parliament, Brussels.

[2] See Blinder (2009) and Haldane and McMahon (2018).

important target of their communications and consequently have started to adapt the language in their statements to make them more easily comprehensible, as well as to promote engagement with the general public.

When compared to political speeches, the language used in central bank communications has a history of being highly complex[3]. It seems reasonable to suspect that complexity could potentially be counterproductive for the transmission of monetary policy. But to what extent? And which parts of the audience are more sensitive to complexity in monetary policy statements? In this paper I address these questions, focusing separately on experts and the general public: I first look at how the use of complex language alters the effectiveness of monetary policy on asset prices in the financial markets, and then, by designing and implementing a Randomized Controlled Trial (RCT) experiment with new survey data from approximately 2000 U.S. individuals, I evaluate to what extent understanding, engagement and economic expectations of the general public might be compromised by the use of complex language in central bank communications.

After measuring the complexity as well as a set of additional communication components which could also affect transmission of monetary policy, I find that complexity plays an important role in explaining the reaction of asset prices to monetary policy announcements: a more complex communication decreases the effects of monetary policy shocks on asset prices for a set of assets relevant to monetary policy, such as stock prices, stock market volatility indexes, and exchange rates. These effects compound over the days following policy announcements. For the general public, I developed and implemented an RCT experiment in which survey respondents were exposed to one of three versions of otherwise identical FOMC statements that simply differ in the complexity of the language used. I find that a more complex communication decreases how much of the message individuals understand and the extent to which they adapt their economic expectations. However, this simplicity and understanding does not lead individuals to trust the institution more. In fact, the opposite is true: the public seems to trust more in an institution using complex language rather than one choosing simple words.

The transmission of central bank communications to the financial markets has been widely documented in the literature. From the early works of Kuttner (2001) and Gürkaynak et al. (2005), to the recent papers by Swanson (2021) and Altavilla et al. (2019), the role of monetary policy interventions on market fluctuations has been thoroughly analyzed. Some recent papers have focused on how elements of communication such as complexity change the reaction of asset prices.

[3]Haldane (2017) shows that central bank statements are twice as complex as political speeches in the United States. For more evidence on this, see Figure 1.

Namely, Jansen (2011) and Coenen et al. (2017) find that complexity in communications increases the magnitude of the monetary policy impact on volatility indexes, and Smales and Apergis (2017) show that liquidity in trading decreases after a more complex monetary policy statement. In relation to other communication components, Ehrmann and Talmi (2020) have found that consistency decreases volatility, Hansen and McMahon (2016) and Parle (2021) show that a more positive tone in statements increases the reaction of stock market indexes and decreases volatility, and Galardo and Guerrieri (2017) and Byrne et al. (2021) look at how temporal references affect the reaction of interest rate futures. Leveraging from machine learning tools that capture the semantic content of a set of statements, Hansen et al. (2018) and Acosta (2021) infer how latent topics in the text affect monetary policy transmission differently[4].

I build on the literature described above by looking at how complexity affects the high frequency reaction of a set of asset prices - not only volatility indexes, but also fed funds futures, eurodollar futures, government bond yields and exchange rates - to monetary policy shocks, in a unified framework where other text-based communication components are considered as controls. I then also look at the effects of complexity on the monetary policy transmission towards these asset prices over a 15-day window, in contrast to previous studies only looking at intra-day effects.

In contrast to financial markets, the reaction of the general public to elements of central bank communication is not easily measurable and therefore is not widely documented in the literature. Blinder (2009) provides an overview of research on central bank communication and highlights the need for the literature to address this non-specialized audience. Since then, the literature has shown not only that household expectations matter for economic decisions (Bachmann et al. 2015, Armantier et al. 2015, Malmendier and Nagel 2016), but also that both the content and form of central bank communications shape these household expectations for the general public[5]. Using RCT frameworks and new surveys with German and American citizens, respectively, Baerg et al. (2021) and Coibion et al. (2022) show that shorter statements tend to be more effective in shaping households' inflation expectations. In this context, perhaps the most closely related works to my paper are Haldane and McMahon (2018) and Bholat et al. (2018), who, by also making use of new survey data, find that other variables such as understanding and engagement are enhanced by simpler, relatable and visual ways of communicating monetary policy statements[6]. However, simplifying the language is not necessarily always optimal, as it might give the public a false sense

[4]Section II.A. provides a more detailed discussion of the literature looking at the effects of central bank communication components on asset prices.

[5]A survey of this literature may be found in Blinder et al. (2024).

[6]Section III.A. provides a more detailed discussion of the literature looking at the effects of central bank communication components on general public understanding, engagement and expectations.

of certainty, as highlighted in Istrefi (2019) and modeled by Haldane et al. (2020).

By designing and conducting my RCT experiment with new survey data from a sample of 2000 individuals representing the general public in the U.S., this paper is adding to the literature, by comparing how central bank statements with different levels of complexity induce different effects on the reaction of the general public to a monetary intervention. In particular, this is the first paper to specifically focus on the variation of the complexity of FOMC statements, which allows me to establish a causal relation between language complexity and economic outcomes. More specifically, this is the only work to look not only at the effects of complexity on the understanding of the message, but also on engagement with the central bank, economic expectations and plans for future consumption, investment and job search.

The remaining content of this paper is organized as follows. Section II provides an account of how asset prices react to complexity in FOMC statements, starting with a description of the computation of communication components in subsection II.A, followed by an exposition of the empirical analysis in subsection II.B. Section III looks at the general public reaction to complexity in central bank communications, presenting the RCT experiment and the survey design in subsection III.A, succeeded by a look at survey data in subsection III.B, and the analysis of treatment effects and heterogeneity in treatment effects in subsections III.C and III.D, respectively. Finally, section IV concludes.

II. How do financial markets react to complexity in FOMC statements?

As described in the introduction, the integrated approach I propose to estimate the effects of complexity on asset prices demands the computation of additional text-based communication components for FOMC statements, such as consistency across statements, distribution of topics for each statement, as well as measures of sentiment and temporal orientation.

I start this section by describing the process of computing these components, and then estimate the effects of complexity on a set of asset prices relevant for monetary policy transmission, considering the additional components as controls. I look at these effects separately for a high frequency window of 30 minutes, to look at the immediate effect using OLS estimation, and then for a 15 day window in a daily local projection framework, to look at the dynamic effect, considering the intra-day log price change as the dependent variable for different asset prices.

A. Computation of Central Bank Communication Components

In order to compute the measures of communication, the set of FOMC statements was web scraped from the website of the Federal Reserve. Using the Python library *Beautiful Soup*, I was able to obtain text files for all FOMC statements between May 1999 and September 2021, which consists in a sample size of 191 statements.

As discussed in the literature review, many components of central bank communication have been shown to move financial markets in different ways. Here I motivate the usage of every component in my empirical approach: complexity, consistency, topics, sentiment and time.

The component of complexity that I focus on is the Flesch-Kincaid reading grade level, or FK_t, a measure of linguistic complexity defined in Kincaid et al. (1975) and commonly used in related central bank communication literature[7]. It is constructed such that it reflects the number of education years required to understand any given text, and it consists in the weighted average of the average number of words per sentence and the average number of syllables per word:

$$FK_t = 0.39\left(\frac{\text{Words}_t}{\text{Sentences}_t}\right) + 11.8\left(\frac{\text{Syllables}_t}{\text{Words}_t}\right) - 15.59$$

The time series of FK_t is presented in Figure 1 for all FOMC statements in the sample[8]. As seen in the plot, there seems to be an increasing trend since 1999 in both complexity and size of each statement, especially noticeable around the time when the Federal Reserve started conducting unconventional monetary policy. If we take into account that FK_t reflects the years of education required to understand each statement, it is noticeable that many statements can only be understood by highly educated people, with over 20 years of education. Moreover, the plot highlights the different communication styles of each Fed chair, as each regime clearly has a distinct average complexity level. Finally, the periods with highest complexity coincide with the Great Recession, the introduction of unconventional policies and the pandemic crisis, which reflect the increased complexity required to communicate the introduction of new policies in times of crisis or regime changes.

Previous literature has shown that the similarity across FOMC statements is relevant to explain the reaction of asset prices to the release of each statement[9]. Following Meade and Acosta (2015),

[7]Recent works considering this measure include Coenen et al. (2017), De Pooter (2021), Ferrara and Angino (2021), Haldane and McMahon (2018), Hernandez-Murillo and Shell (2014), Jansen (2011), Parle (2021) and Smales and Apergis (2017).

[8]Other measures of complexity, such as the Gunning-Fog index from Gunning (1952), Smog index from McLaughlin (1969) and the Automated Readability Index from Senter and Smith (1967), were also considered as robustness checks for the final results, but the takeaways did not change qualitatively.

[9]Some relevant works are Acosta (2021), Byrne et al. (2021), Cross and Greene (2017), Ehrmann and Talmi (2020), Handlan

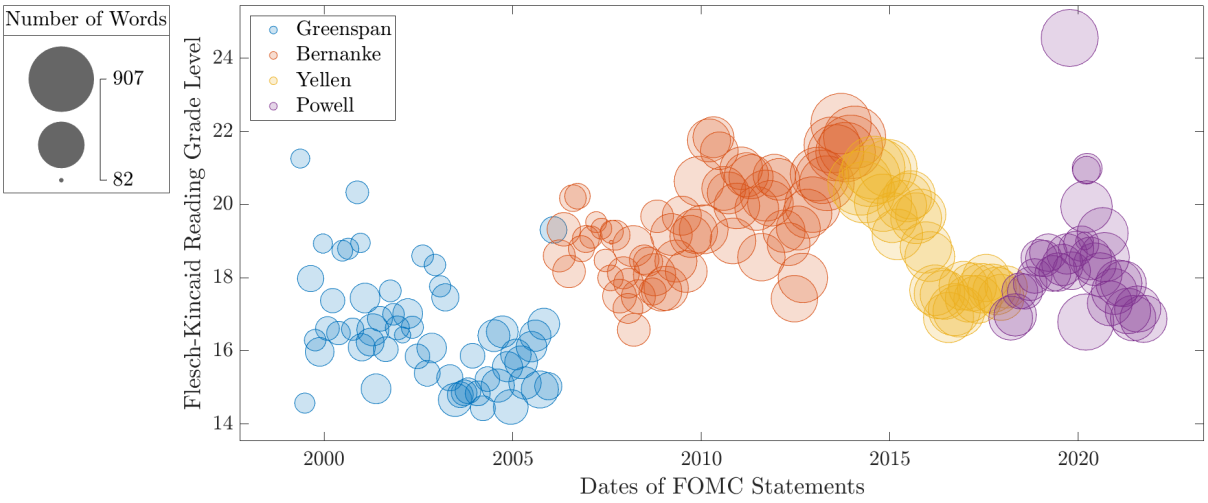


FIGURE 1. COMPLEXITY IN FOMC STATEMENTS

Note: This plot presents the Flesch-Kincaid reading grade level for the 191 FOMC statements from May 1999 to September 2021. The bubble size reflects the size of each statement, measured by the number of words used, and the different colors reflect periods with different Federal Reserve chairs.

preprocessing the text of each statement is needed before the computation of a similarity measure. This process consists in three steps, done for each statement individually: i) removing words with little semantic content (e.g. "the", "of", "a"); ii) concatenating meaningful sets of words (e.g. "federal funds rate" becomes "federalfundsrate"); iii) stemming all familiar words down to a common root (e.g. "expectations" and "expecting" are both reduced to "expect"). Following these steps, similarity across two consecutive statements, or consistency, is computed as the Cosine Similarity, or CS_t, among two consecutive word frequency vectors:

$$CS_t = \frac{\sum_{i=1}^{n} \text{freq}_{i,t} * \text{freq}_{i,t-1}}{\left(\sqrt{\sum_{i=1}^{n} \text{freq}_{i,t}^2}\right)\left(\sqrt{\sum_{i=1}^{n} \text{freq}_{i,t-1}^2}\right)}$$

where $\text{freq}_{i,t}$ measures the frequency of word i in statement t; $\text{freq}_{i,t-1}$ measures the frequency of word i in statement $t-1$; and n the number of unique words across both statements. Note that for two identical consecutive statements, $CS_t = 1$, and for two entirely different consecutive statements, $CS_t = 0$.

The time series for consistency, measured by CS_t, is plotted in Figure A1 in the Figures Appendix, for all FOMC statements in the sample. It is observable that, as related papers have shown, there is a general trend of increasing consistency across time, and that in times of crisis such as the Great

(2020) and Meade and Acosta (2015).

Recession or the pandemic period, there are significant drops in consistency, since the Federal Reserve had to change its discourse.

Other component of communication that has been shown as relevant for the reaction of asset prices is the set of topics discussed in each statement[10]. Given a predefined number of topics κ, topic models estimate time series of topic distributions for each statement. One model is the Non-negative Matrix Factorization (NMF), developed by Lee and Seung (1999), which uncovers the hidden semantic structure in a set of statements, identified by words that are used together frequently. This is done by decomposing the m x n term-document matrix A, where each cell A_{ij} represents the frequency of each word $i \in \{1, ..., m\}$ in each document $j \in \{1, ..., n\}$. Much like a factor model, given κ, matrix A can be decomposed in the product of two matrices: κ x n matrix W, which measures the relevance of each topic $k \in \{1, ..., \kappa\}$ in each document $j \in \{1, ..., n\}$; and m x κ matrix H, which measures the relevance of each word $i \in \{1, ..., m\}$ in each topic $k \in \{1, ..., \kappa\}$[11].

$$A = W * H$$

Following the stability method in Cross and Greene (2017), the number of optimal NMF topics for my set of FOMC statements is $\kappa = 6$. The resulting time series for the proportions of all $\kappa = 6$ topics are presented in Figure A2, and the denomination of each topic comes from the set of words more strongly associated with each topic[12]. This procedure resulted in the following topics: *Securities* (T1), *Interest Rates* (T2), *FOMC Members* (T3), *Labor Markets* (T4), *Economic Growth* (T5) and *Public Health* (T6). It is worthy to mention that T1 increases significantly in the QE period, whereas T2 becomes less relevant. Also importantly, the increasing relevance of labor markets throughout the history of FOMC statements is observable through the evolution of T4 through time. Finally, the sudden increase of T6 during the pandemic crisis illustrates the considerations about public health made at the time.

As for the tone in each FOMC statement, or sentiment, the literature has shown that positive statements create different asset price reactions than negative statements[13]. This measure is usually computed using a "search and count" approach to classify the sentiment of a text, where a

[10]Related works estimating topics in a set of monetary policy statements include Acosta (2021), Boehm and Kroner (2020), Cross and Greene (2020), De Pooter (2021), Dieijen and Lumsdaine (2019), Griffiths and Steyvers (2004), Hansen and McMahon (2016), Hansen, McMahon and Prat (2018) and Nimark and Pitschner (2019).

[11]In comparison to the more popular Latent Dirichlet Allocation (LDA) model, by Blei, Ng, and Jordan (2003), the NMF topic model was chosen due to its greater topic coherence and lower number of topics chosen by maximizing stability, as argued in Cross and Greene (2017).

[12]The list of characteristic words per topic is presented in Table B1 in the Tables Appendix.

[13]See Byrne et al. (2021), Ehrmann and Talmi (2020), Gorodnichenko, Pham and Talavera (2021), Hansen and McMahon (2016), Parle (2021) and Shapiro and Wilson (2021).

given dictionary classifying positive and negative words is used to identify these words in the text. Following the majority of related works, I use the financial dictionary in Loughran and McDonald (2011) to identify positive and negative terms in each FOMC statement, and then compute a "net sentiment index", following the expression below:

$$\text{Net sentiment index}_t = \frac{\text{Positive Terms}_t - \text{Negative Terms}_t}{\text{Total Words}_t}$$

The sentiment index is plotted in Figure A3, where we can observe that the sentiment of FOMC statements has a cyclical nature. In other words, it follows along the business cycle: in good times statements are generally more positive, whereas in bad times the choice of words tends to be more negative.

The final component of communication to be considered is the temporal orientation of each statement, which is computed following Byrne et al. (2021). In a similar fashion as the sentiment index, i.e. following a "search and count" approach, a "net temporal orientation" index is computed following the expression below:

$$\text{Net temporal orientation}_t = \frac{\text{Future Terms}_t - \text{Past Terms}_t}{\text{Total Words}_t}$$

In order to identify past and future references in the text, I make use of two algorithms: *SUTime*, a rules-based temporal tagger developed by Chang and Manning (2012) that captures both categorical (e.g. "in three months from now", "two years ago") and numerical (e.g. "December 3, 2001") temporal references in the text; and the *Tense-Mood-Voice* (TMV) tool developed by Ramm et al. (2017), which identifies the tense of all verbal complexes in each statement, and it assigns each verbal form to past, present or future. The time series for my net temporal orientation index is presented in Figure A4.

Having computed all the communication components proposed to be collected, all the covariates that will be considered in my empirical approach are now measured. The analysis of the effects of complexity on asset prices, controlling for consistency, topics, sentiment and time, is discussed in the following section.

B. Role of Complexity in Monetary Policy Transmission to Financial Markets

Following related literature assessing the effects of communication on asset prices, I start by using high frequency identification to measure the relevance of complexity, by looking at the effects on 30-

minute yield changes around FOMC announcements[14]. However, in contrast with previous papers, and with the intent of estimating the relevance of complexity in monetary policy transmission, I compare the responses of asset price changes to a monetary policy shock with the responses to the interaction among this same shock and my index of complexity. The shock considered here is the unified measure proposed by Bu, Rogers and Wu (2021) - hereafter referred to as the BRW shock -, which measures both conventional and unconventional monetary policies. The comparison is achieved by estimating regressions of the following form:

$$\Delta y_t = \alpha + \beta MPShock_t + \delta MPShock_t * FK_t + \theta FK_t + \sum_{j=i}^{k} \gamma_j \Gamma_t^j + \varepsilon_t$$

The set of controls considered in the specification above, or Γ, include all the components computed in section II.A - consistency, topics, sentiment and time -, as well as the interaction terms between each of these components and the monetary policy shock. Table 1 presents the results of doing such exercise, and it enables a direct comparison of the effects of the monetary policy shock with the effects of the interaction term of the same shock and the respective complexity index, FK_t, for each statement. To facilitate interpretation of coefficients, the monetary policy shock, as well as all the interaction terms and communication components, were standardized. The dependent variables Δy_t considered in Panel A of Table 1 are the first and second Federal funds futures, the second to fourth Eurodollar futures, the stock market index and volatility index. In Panel B, the dependent variables Δy_t are government bond yields of 6-month, as well as 1, 2, 5 and 10-year maturities, an exchange rates of the US dollar against the Euro, British Pound and Japanese Yen.

A concern that may arise when looking at the effects of the complexity component is that this regressor might be endogenous to the nature of the policy itself, since some types of announcements might require more complex language than others. However, the inclusion of a monetary policy shock and all the communication components in the regression specification serves the exact purpose of controlling for other elements of the policy, such that we may assume complexity as exogenous under this specification.

When looking at the estimates from Table 1, it is observable that the sign of the monetary policy shock coefficient is the opposite of the sign from the interaction term for all the different asset categories presented in Panels A and B, with the exceptions of the first Fed funds futures

[14] 30 minute changes around FOMC announcements are based on the difference between the last trade before 10 minutes and the first trade after 20 minutes, and come from Boehm and Kroner (2021). Details on the data construction are provided in Appendix B of Boehm and Kroner (2021).

Table 1—OLS Estimates for 30-min changes in Asset Prices

Panel A: Interest Rate Futures and Stock Market Indexes

	ΔFF1	ΔFF2	ΔED2	ΔED3	ΔED4	ΔSPX	ΔVIX
$MPShock_t$	-0.678	0.110	1.251	1.568	1.614	-4.019***	2.566*
	(1.226)	(1.135)	(1.109)	(1.025)	(1.017)	(1.190)	(1.271)
$MPShock_t * FK_t$	-0.255	-0.397	-0.357	-0.165	-0.0687	1.263	0.149
	(0.700)	(0.647)	(0.633)	(0.585)	(0.580)	(0.679)	(0.725)
FK_t	0.0685	0.0695	0.0893	0.114	0.0977	0.0908	-0.0125
	(0.121)	(0.112)	(0.110)	(0.102)	(0.101)	(0.118)	(0.126)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	164	164	164	164	164	164	164
R^2	0.292	0.393	0.400	0.483	0.494	0.302	0.231

Panel B: Government Bond Yields and Exchange Rates

	ΔUS6M	ΔUS1Y	ΔUS2Y	ΔUS5Y	ΔUS10Y	Δ€/$	Δ£/$	Δ¥/$
$MPShock_t$	1.078	3.456	0.756	1.126	1.215	-2.134	-2.106	-0.0994
	(1.112)	(1.843)	(1.010)	(1.067)	(1.113)	(1.149)	(1.124)	(1.086)
$MPShock_t * FK_t$	-0.235	-0.924	-0.289	-0.843	-1.505*	2.307***	2.509***	1.658**
	(0.635)	(0.951)	(0.576)	(0.609)	(0.635)	(0.656)	(0.641)	(0.619)
FK_t	0.033	-0.039	0.063	0.087	0.099	0.041	0.048	-0.027
	(0.121)	(0.112)	(0.110)	(0.102)	(0.101)	(0.118)	(0.126)	(0.110)
(0.215)	(0.1000)	(0.106)	(0.110)	(0.114)	(0.111)	(0.108)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	164	110	164	164	164	164	164	164
R^2	0.414	0.469	0.505	0.447	0.403	0.381	0.407	0.448

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports OLS coefficient estimates of regressing 30-minute changes around FOMC announcements on the Bu, Rogers and Wu (2021) monetary policy shock, the interaction among that same shock and complexity, complexity, consistency, topics, sentiment and time. Panel A reports estimates from regressions considering 30-minute changes in the first and second Fed funds futures (FF), the second to fourth Eurodollar futures (ED), the S&P500 Index (SPX), and the CBOE volatility index (VIX). Panel B reports estimates from regressions considering 30-minute changes in 6-month, 1-year, 2-year, 5-year and 10-year U.S. government bond yields, and the Euro/US Dollar, British Pound/US Dollar and Japanese Yen/US Dollar exchange rates.

and the VIX[15]. This finding suggests that the inclusion of complex language in monetary policy statements systematically decreases the effectiveness of monetary policy shocks on asset prices in high-frequency windows.

However, the coefficient estimates for the interaction term between the monetary policy shock and

[15]For the case of the VIX, the result has an intuitive interpretation: a shock delivered with a more complex statement generates more volatility in the market, suggesting that the market might have more trouble in understanding a complex communication.

complexity are not consistently significant across the different assets considered, and the complexity index coefficient estimates are always insignificant. These facts may have two interpretations: the first is the notion of "slow-moving capital" proposed by Fleckenstein et al. (2014), which states that the low significance of the immediate price reaction can reflect institutional impediments such as search costs, the time to raise capital for intermediaries or the inattention of some investors. The second explanation is perhaps more intuitive: financial market participants trading at such a high frequency window are mostly highly educated individuals with training in economics, or experts, who are used to central bank communications, and therefore most likely are not the most sensitive public to complexity in such communications. On the other hand, economic agents who take some more time to make their decisions in the financial markets, or who are not even active in the markets, are likely to be more sensitive to complex language. This hypothesis becomes motivation to look not only at the effects on the markets beyond this high frequency window, but also, and mostly importantly, to consider the effects of complexity on individuals not trading in financial markets following monetary policy news.

For the reasons enumerated above, I propose to estimate the impulse response functions of asset prices in a window of up to 15 days, by following Gorodnichenko et al. (2021) and estimating a daily local projection framework of the form:

$$\log\left(\frac{Y_t^{\text{close}}}{Y_t^{open}}\right) = b_0^{(h)} + b_1^{(h)} \text{ Shock }_t + \sum_{j=1}^{k} b_j^{(h)} \text{ Control }_t^j + \varepsilon_t^{(h)}$$

The local projection is estimated in two separate specifications: first considering the BRW monetary policy shock, and then a shock to the interaction term between the BRW shock and the complexity index. For the first case, all the other previously used communication components are included as controls. For the second case, all the interaction terms between these components and the monetary policy shock are included as controls. Moreover, all the shock measures and interaction terms were standardized, to aid in the interpretation of the IRF estimates.

Looking at Figure 2 below, which shows the comparison between the two specifications considering the dynamics of fed funds futures, we see that the effect of the interaction term generally has the opposite sign as the monetary policy shock effect. The same trend applies to eurodollar futures, as is illustrated in Figure 3. Additionally, this finding is generally consistent across most asset prices relevant to monetary policy transmission, such as Treasury yields, stock market indexes, and exchange rates, as can be seen in Figures A5 and A6 in the Appendix. Again, as was the case in the high-frequency regressions, VIX-related variables are among the exceptions to the rule. When

looking at Figure A6, we see that a monetary policy shock associated with a more complex message increases the market expectations of future volatility, indicating again that complex language might confuse the markets in relation to the message expressed in the statement.

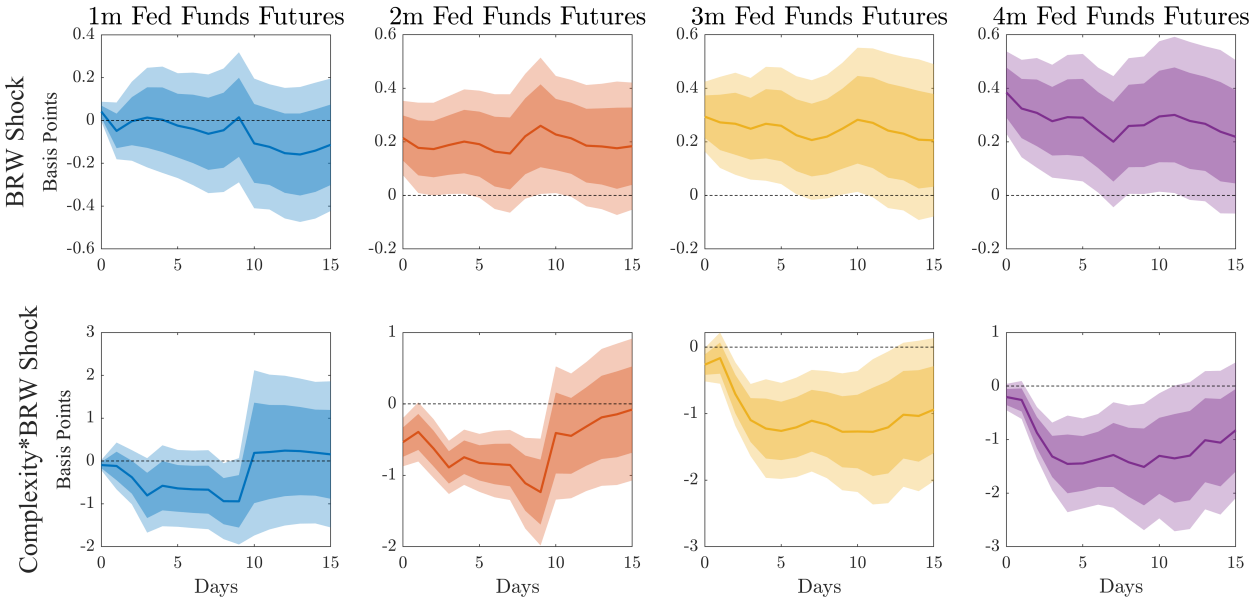


Figure 2. Impulse responses to BRW shock and to interaction with complexity

Note: This figure presents the impulse response functions of the daily series of the first four Fed funds futures to a Bu, Rogers and Wu (2021) monetary policy shock in the first row, and to the interaction between the BRW shock and my *Complexity* index. Along with the 15-day impulse response vectors, the 68% and 95% confidence bands are plotted. These estimations stem from the local projection described in section II.B, where the set of controls include *Consistency*, *Sentiment*, and the 6 *NMF Topics*.

The interpretation from the general trend of these comparisons is, therefore, that whatever the monetary policy shock is doing to these asset prices - in other words, whatever the intended goal of the policy intervention was -, adding complexity to the message reduces the effects on the prices. This conclusion is consistent with the high frequency results from Table 1; however, this time the effects of the complexity interaction term are more consistently statistically significant, but only after a few days, which suggests that the effects of complexity on financial markets are slow-moving, as previously hypothesized.

Moreover, in Figures A7 to A12 in the Appendix, we see the same comparison being made for different dimensions of monetary policy, measured by each Swanson (2021) shock separately, i.e. Fed Funds Rate (FFR), Forward Guidance (FG), and Large Scale Asset Purchases (LSAP) shocks. The motivation to consider these dimensions separately is that it enables us to see the different relevance of the complexity interaction term for different policies. If for FG shocks and LSAP shocks this term is generally insignificant, for FFR shocks it becomes relevant and, as it happened

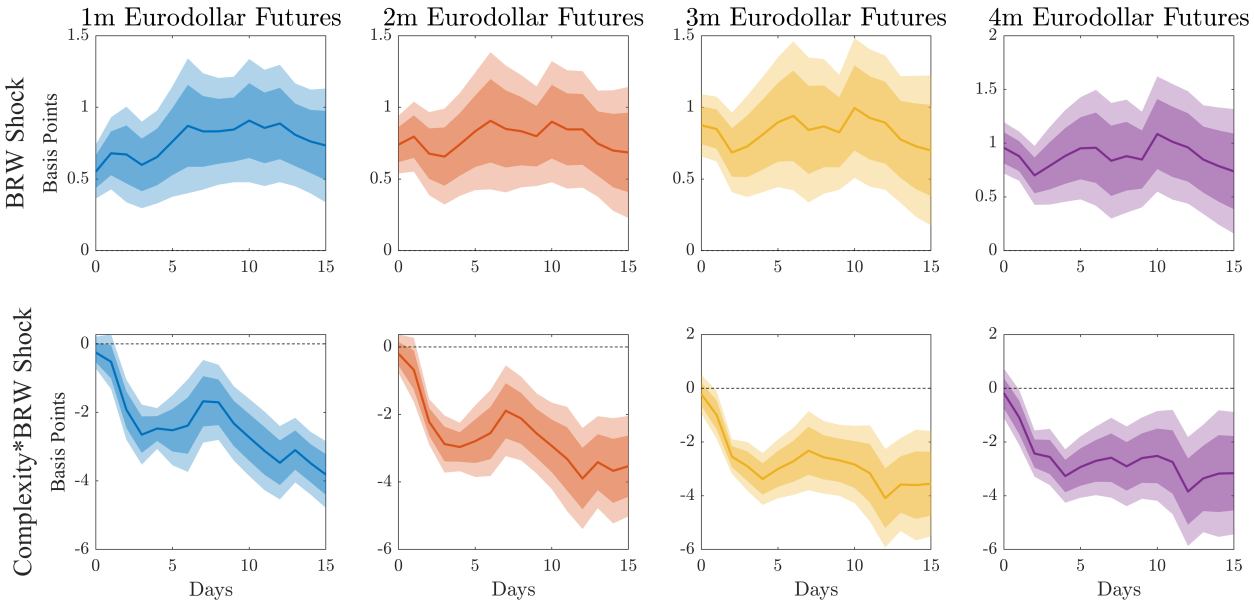


Figure 3. Impulse responses to BRW shock and to interaction with complexity

Note: This figure follows the same logic as Figure 2, but instead considers the impulse response functions of the S&P500 ETF, Euro-US Dollar exchange rate, 10-year Treasury yield and VIX index to the BRW shock, and to the interaction between the BRW shock and my *Complexity* index.

in the original approach with the BRW shock, it moves prices in the opposite direction as the effect of the original FFR shock. This suggests that the markets reaction to interest rate changes is more sensitive to complexity than the reaction to forward guidance or asset purchase policies.

Finally, to directly compare the relevance of complexity and the other communication components to a traditional monetary policy shock, I include all the components and the shock directly in the same local projection model, and measure Forecast Error Variance Decompositions (FEVD). The FEVD figures are plotted in Figures A13 to A16 in the Appendix, considering fed funds futures and government bond yields as dependent variables, where Figures A13 and A14 consider one monetary policy shock only, measured by BRW, and Figures A15 and A16 measure monetary policy the three shocks from Swanson (2021). We can see in these plots that communication components have much more relevance for short term assets such as the fed funds futures or government bond yields with maturity of up to 1 year, whereas in longer-term assets the monetary policy shocks assume more relevance than any communication component.

In summary, the findings from this section can be described by three main points: i) Increased complexity in monetary policy statements seems to decrease the effectiveness of the respective policies on relevant asset prices, despite a slow-moving effect; ii) This effect is more obvious in interest rate policies than other types of monetary policy; and iii) The relevance of the effect is

more obviously seen in short-term rates than in long-term rates.

As mentioned before, the fact that the effects of complexity are not consistently significant in high frequency windows and take some time to be significant in a 15-day window, along with the fact that most non-experts, or members of the general public, are not trading in financial markets, consists in motivation to go beyond the financial markets, where individuals are potentially more sensitive to complexity in communications, while still relevant for monetary policy. The following section addresses the effects of complexity on this non-specialized audience.

III. How does the general public react to complexity in FOMC statements?

A. RCT and Survey Design

When talking about the general public and monetary policy, the first question that might come to mind is why policymakers should even care about communicating their message to a non-specialized audience, and not just focus on the experts - such as news agencies, economists and financial market participants -, since the message would be passed along to the general public through the financial market reactions to the communications. Besides the obvious democratic reasons that central banks are public institutions and therefore should be accountable to the public - which can only happen if they are understood by the public -, there are also a few economic reasons for central banks to engage with the general public. In short, the argument is twofold: it has been shown that household expectations matter for the economic choices that these households make[16], which ultimately are part of what defines real economic outcomes. On top of this, the communication style of monetary policy statements is relevant to shape these same household expectations[17], depending on how much trust the central bank can generate on the general public[18].

The literature of effects of central bank communication on non-specialized audiences is still scarce, and it is based mostly on survey data or experimental data. None of these works, however, focuses solely on complexity in the language used in monetary policy statements, and that is what I propose to do in this section. Using data from a new small-scale survey ran in a Randomized Control Trial (RCT) framework, I measure the differences in treatment effects that result from the exposure to different FOMC statements expressing the same message, only changing the level of complexity in the choice of words used.

[16]See Bachmann, Berg and Sims (2015), Armantier et al. (2015), Malmendier and Nagel (2016).
[17]See Baerg et al. (2021), Bholat et al (2019), Coibion, Gorodnichenko and Weber (2022), Haldane and McMahon (2018), Jost (2017), Kryvtsov and Petersen (2021), Ash et al. (2024).
[18]See Hwang et al. (2023), van der Cruijsen and Samarnina (2023), Hayo and Neumeier (2021), Dräger and Nghiem (2023), Hayo and Neuenkirch (2014), Brouwer and de Haan (2022).

The survey was run in March 2022, and it is divided in three parts: pre-treatment questions, presentation of treatment, and post-treatment questions. Figure 4 presents the timeline of the RCT experimental design, which illustrates the fact that individuals were randomly assigned to one of four groups: Simple Treatment (T1), FOMC Treatment (T2), Complex Treatment (T3) or Control Group (C), to whom no statement was shown. All the survey questions, as well as the three versions of the treatment, are presented in Appendix C.

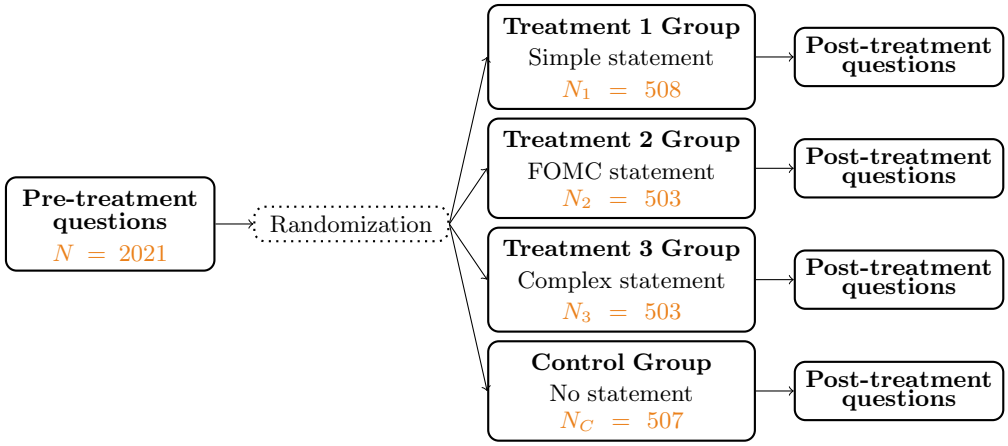


Figure 4. Timeline of RCT Experimental Design

The three treatments are based on the actual FOMC statement from December 15, 2021, and express the same message[19]; however, T1 expresses the message with simple language, and T3 with complex language. T2 is the actual FOMC statement. Unavoidably, inserting different language might result in distorting the message. Nonetheless, the process of constructing the different treatments aims to control for this. The simple treatment, T1, was constructed by adapting the content of the original statement to the form of the simplest FOMC statement in my FK_t time series, resulting in a $FK_{T1} = 14$, and the complex treatment, T3, was constructed by adapting the same content to the form of the most complex statement in my dataset, resulting in a much higher complexity level of $FK_{T3} = 22.3$. For comparison, the complexity level of the original statement from December 15, 2021 is $FK_{T2} = 18$.

The pre-treatment questions in the survey, which can be seen in detail in Appendix C, were designed in order to measure characteristics relevant for controls in the Average Treatment Effect (ATE) regressions, and for covariates to look for heterogeneity in treatment effects. These include demographic factors such as age, employment status, income, education years and education in

[19]Refer to Figure A17 to see that despite the use of different language, topic shares are identical in the three versions of the treatment.

Economics; as well as monetary policy-specific variables such as knowledge about the Federal Reserve goals and instruments. On the other hand, the design of post-treatment questions was made to facilitate the measurement of treatment effects in the following variables: self-reported understanding of the message, actual knowledge of the message, confidence in the central bank, trust in the message, attentiveness to future central bank communications, changes in inflation and GDP growth expectations, consumption and investment plans, job search plans, and reservation wage intentions.

B. Survey Data Visualization

Before analyzing the raw survey data, given the existence of many outliers in the initial dataset, I had to remove some observations from the original 2000 respondents. For this reason, I eliminated all responses that included numbers below the 5^{th} and above the 95^{th} percentiles for any open-ended numerical question. This cut the sample size in less than half, to $N = 939$, but improved the quality of the data significantly.

To make sure that the comparison among the groups is fair, it is relevant to make sure that the random assignment of respondents to each group created groups with identical pre-treatment characteristics. The group-level distributions for these variables are presented in Figure A18 in the Figures Appendix, which depicts the histograms for age, education, inflation perception, inflation expectations and GDP growth expectations[20], and in Table B2 in the Tables Appendix, which presents the averages and standard deviations of selected pre-treatment variables for each of the groups. These pieces of evidence suggest that the groups are indeed balanced; however, and following Payne Carter et al. (2017), a formal test is still needed to robustly guarantee group balance.

The group balance checks are presented in Tables 2 and 3 for pre-treatment and post-treatment variables, respectively. The conclusions from both tables differ significantly. From Table 2, we see that there is not a significant difference among all the group comparisons for pre-treatment variables, and that none of the comparisons is jointly significant, when considering all the variables in the table. The exceptions to this rule are observable for GDP growth expectations and inflation expectations, which differ significantly in at least one of the pairwise comparisons. For this reason, these variables are included as controls in the treatment effect regressions presented in the next subsection. On the other hand, Table 3 shows that there are significant differences among the groups for all the post-treatment variables selected for the table. This contrast suggests that the

[20]Figures A19 and A20 in the Appendix plot similar figures for selected post-treatment variables.

treatments were effective in defining how much the respondents understood, how much engagement they have with the central bank, and how much they shape their economic expectations after reading a monetary policy announcement. In other words, it seems that treatment effects were not only significant, but also significantly different across treatments.

Table 2—Group balance tests for selected pre-treatment variables

	All T vs C	T1 vs C	T2 vs C	T3 vs C	T1 vs T2	T1 vs T3	T2 vs T3
Age	-0.23	0.29	-0.85	-0.21	-1.14	-0.50	0.64
	(1.27)	(1.50)	(1.62)	(1.54)	(1.50)	(1.43)	(1.55)
Education	0.03	0.06	-0.04	0.05	-0.11	-0.01	-0.09
	(0.17)	(0.20)	(0.21)	(0.20)	(0.21)	(0.20)	(0.20)
Economics	0.01	0.04	-0.02	0.00	-0.06	-0.04	0.02
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Fed Goals	0.00	0.01	0.00	0.00	-0.01	-0.01	0.01
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Fed Instruments	0.04	0.04	0.06	0.01	0.02	-0.02	-0.05
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Inflation Perception	0.43	-0.02	0.74	0.60	0.76	0.61	-0.15
	(0.88)	(1.09)	(1.12)	(1.02)	(1.09)	(1.00)	(1.02)
Inflation Expectations	0.09	0.60	-0.42	0.06	-1.02*	-0.54	0.48
	(0.47)	(0.59)	(0.58)	(0.55)	(0.58)	(0.56)	(0.54)
GDP Growth Expectations	1.11**	1.36**	0.37	1.53***	-0.99*	0.17	1.15**
	(0.46)	(0.57)	(0.57)	(0.52)	(0.54)	(0.53)	(0.52)
p (joint significance)	0.583	0.558	0.713	0.390	0.776	0.666	0.513
N	939	469	443	467	472	496	470

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports coefficient estimates from a regression of pre-treatment characteristics on an indicator variable that equals one if a respondent is assigned to be exposed to a treatment. Column 1 considers an indicator of whether the respondents were assigned to any of the three treatments; columns 2-4 consider indicators of specific treatments and the regressions only include observations from that treatment and the control group; columns 5-7 consider indicators of specific treatments and only include observations from two treatment groups. Finally, the p-values for joint significance are obtained from regressing each indicator on all the baseline characteristics in the table.

For greater detail and evidence in the discussion of treatment effects, it is necessary to estimate regressions that are able to precisely capture treatment effects, and compare these effects for each treatment. This is addressed in the following section.

C. Average Treatment Effects

The monetary policy announcement expressed in the FOMC statement of December 15, 2021 can be summarized by 4 main key points: i) stating the Federal Reserve goals of maximum employment and price stability; ii) stating the long-term inflation target of 2%; iii) informing the audience about recent inflation and labor market developments; and iv) explaining the monetary policy

Table 3—Group balance tests for selected post-treatment variables

	All T vs C	T1 vs C	T2 vs C	T3 vs C	T1 vs T2	T1 vs T3	T2 vs T3
Understanding	-	-	-	-	0.09	-0.23**	-0.32***
	(-)	(-)	(-)	(-)	(0.10)	(0.10)	(0.10)
Knowledge: Goals	0.24***	0.29***	0.20***	0.23***	-0.10	-0.06	0.03
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Knowledge: Instruments	0.32***	0.35***	0.31***	0.29***	-0.04	-0.05	-0.01
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
Knowledge: Overall	0.44***	0.53***	0.40***	0.38***	-0.13	-0.14	-0.02
	(0.09)	(0.10)	(0.11)	(0.10)	(0.11)	(0.11)	(0.11)
Confidence	0.42**	0.20	0.64**	0.45*	0.44*	0.25	-0.20
	(0.20)	(0.24)	(0.25)	(0.24)	(0.24)	(0.23)	(0.24)
Trust	0.53*	0.26	0.72***	0.62**	0.47*	0.36	-0.11
	(0.21)	(0.25)	(0.25)	(0.25)	(0.24)	(0.24)	(0.25)
Attentiveness	0.49**	0.57**	0.63**	0.27	0.07	-0.30	-0.37
	(0.21)	(0.25)	(0.26)	(0.26)	(0.24)	(0.24)	(0.25)
$\Delta\mathbb{E}_t\pi_{t+1}$	-1.13**	-1.79***	-0.50	-1.03	1.29**	0.76	-0.53
	(0.54)	(0.68)	(0.69)	(0.67)	(0.64)	(0.61)	(0.62)
$\Delta\mathbb{E}_t g_{t+1}$	-2.01***	-2.86***	-1.51*	-1.61*	1.36*	1.26	-0.10
	(0.70)	(0.82)	(0.82)	(0.86)	(0.81)	(0.84)	(0.85)
p (joint significance)	0.006	0.000	0.005	0.014	0.193	0.074	0.659
N	939	469	443	467	472	496	470

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports coefficient estimates from a regression of post-treatment characteristics on a treatment indicator variable. The estimates in each column reflect the same procedure as described in Table 2, but this time for post-treatment variables. The tests comparing the control group for the variable *Understanding* are not possible, as this variable in not measured in this group.

intervention: keeping the Fed funds rate target range unchanged, and reducing the pace of asset purchases. Therefore, the monetary policy stance can be considered as contractionary. Given this nature, the expected effects of the announcement would be to decrease inflation expectations, decrease GDP growth expectations, decrease future plans of consumption and investment, as well as decrease intentions for future job search and reservation wages.

To evaluate how complexity helps in the effectiveness of the monetary policy announcement, I separately compare the three treatment groups to the control group, and look at which group has the greatest Average Treatment Effect (ATE), taking into account the expected effects from the contractionary nature of the monetary policy announcement. Specifically, I look at two variables reflecting comprehension of the statement's message: *Understanding*, which is simply measured by a scale from 0 to 5 directly taken from each respondent's answer to question 14 in the survey[21]; and *Knowledge*, which is a score from 0 to 6 given to each respondent based on a count of how

[21]See section "Post-Treatment Questions" in Appendix C for more details.

many correct answers each person got in the 6 questions about the message of the statement[22]. Additionally, engagement scores are also measured: *Confidence*, *Trust* and *Attentiveness* metrics are directly taken from questions 23, 24 and 25, respectively. Finally, updates in inflation and GDP growth expectations are defined as $\Delta\mathbb{E}_t\pi_{t+1} = \mathbb{E}_t\pi_{t+1}^{posterior} - \mathbb{E}_t\pi_{t+1}^{prior}$ and $\Delta\mathbb{E}_t g_{t+1} = \mathbb{E}_t g_{t+1}^{posterior} - \mathbb{E}_t g_{t+1}^{prior}$, where the prior expectations are measured by the average of the distributions given in questions 12 and 13, and the posterior expectations are measured by the point estimates given in questions 26 and 27.

To estimate Average Treatment Effects on all the above-mentioned variables, I estimate a regression of the following nature:

$$Y_i = \alpha + \sum_{j=1}^{3} \beta_j \theta_i^j + \gamma \Gamma_i + \varepsilon_i$$

where θ_i^j are indicator variables that reflect the treatment assignment $j \in \{1, 2, 3\}$ for each respondent i; Y_i represents each dependent variable; and Γ_i is a vector of controls, which includes pre-treatment inflation expectations and GDP growth expectations, as these were significantly different in a few pairwise comparisons of the group balance tests in Table 2.

The Huber regression estimates are presented in Table 4 below, for selected outcome variables. Given the hypothesized effects on these outcomes, from the table numbers we see that the treatment effects were significantly higher in the group exposed to the simple version of the statement for the following outcomes: *Understanding*, *Knowledge*, $\Delta\mathbb{E}_t\pi_{t+1}$ and $\Delta\mathbb{E}_t g_{t+1}$. On the other hand, treatment effects on *Confidence*, *Trust* and *Attentiveness* were higher for the actual FOMC statement treatment than for the simplified version. This means that a simple message is more effective to enhance understanding about the message and to shape economic expectations, but for engagement variables such as trust, confidence and attentiveness, the usual FOMC statement language is more effective. In other words, even if households do not understand well the traditional Federal Reserve language, they will trust more in a central bank using it. This finding relates to a phenomenon known in the psychology literature as the Illusion of Explanatory Depth, which leads people to trust messages from entities communicating with overly complex reasoning because their lack of understanding signals to them that these entities have privileged insight[23].

An additional way to present a comparison of the Average Treatment Effects across the groups is plotted in Figure A21. In this figure, which shows scatter plots of pre-treatment against post-treatment inflation and GDP growth expectations for all four groups in the survey, we can see that

[22]This score reflects the number of correct answers in questions 15 to 20.
[23]See Sloman and Fernbach (2018) for greater detail.

Table 4—Average Treatment Effects

	Understanding	Knowledge	Trust	Confidence	Attentiveness	$\Delta\mathbb{E}_t\pi_{t+1}$	$\Delta\mathbb{E}_t g_{t+1}$
α	-	2.07***	4.96***	4.80***	4.86***	2.16***	1.43***
	(-)	(0.10)	(0.19)	(0.19)	(0.20)	(0.49)	(0.38)
T1: Simple	1.78***	0.60***	0.25	0.20	0.61**	-2.78***	-1.34**
	(0.08)	(0.14)	(0.27)	(0.26)	(0.27)	(0.67)	(0.52)
T2: FOMC	0.28**	0.40***	0.68**	0.68**	0.65**	-1.54**	-0.48
	(0.11)	(0.14)	(0.27)	(0.27)	(0.28)	(0.69)	(0.54)
T3: Complex	0.36***	0.38**	0.65**	0.47*	0.29	-1.74**	-0.95*
	(0.11)	(0.14)	(0.27)	(0.26)	(0.27)	(0.68)	(0.52)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	939	939	939	939	939	939	939
R^2	0.023	0.021	0.009	0.008	0.008	0.018	0.008
p(T1=T2)	0.00	0.23	0.06	0.07	0.79	0.08	0.06
p(T2=T3)	0.16	0.89	0.67	0.41	0.14	0.88	0.41
p(T1=T3)	0.01	0.17	0.13	0.29	0.22	0.11	0.23

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing outcome variables on three indicators representing the assignment of individuals to each treatment. Each column represents a different outcome variable. All estimates include $\mathbb{E}_t\pi_{t+1}^{prior}$ and $\mathbb{E}_t g_{t+1}^{prior}$ as controls. The p-values reported in the last 3 rows are from $H_0 : \beta_i = \beta_j$.

the update in expectations, measured by the difference between post-treatment and pre-treatment expectations, is always higher for the simple version of the treatment. This consists in further evidence that simplifying the language in the statement improves the effectiveness of the monetary policy announcement on household expectations.

When looking at the treatment effects on consumption and investment plans, as well as job search and wage reservation plans, as presented in Table B3 in the Tables Appendix, I find that the effects are not as significant, but for consumption and investment plans the insignificant estimates are higher for the group exposed to the simple treatment. A different way to look at the effects on consumption and investment, however, is to consider how the effects on inflation and GDP growth expectations, already discussed in the previous paragraphs, may also have an additional, indirect effect on consumption and investment. To assess the possibility of this additional effect, I estimate IV regressions, where I regress consumption and investment plans on the interaction between post-treatment expectations and the treatment dummies, and instrument it with the same interaction, but considering pre-treatment expectations instead.

The respective results are presented in Table B4 in the Tables Appendix, where it is observable that both inflation and GDP growth expectations have significant effects on consumption plans,

but not necessarily on investment plans. However, complexity here does not seem to be relevant, as the magnitude of these effects can not be related to how simple or complex the statements are.

D. Heterogeneous Treatment Effects

How does complexity affect different segments of the household population? In this section, I propose to look at how complex language in central bank communications affects differently households with different characteristics, by analyzing the heterogeneity in treatment effects across the survey respondents. This analysis is relevant if policymakers consider targeting their communications to a specific subset of the public, or even release different forms of communication to express the same message, directed at different audiences[24].

The first method I propose to evaluate heterogeneity consists in estimating ATE regressions separately for different subsets of the public, as defined by characteristics such as years of Education, Income level, whether someone had any college education in Economics or a related field, how frequently each person reads Economics-related news, if a person follows the announcements of the Federal Reserve, and whether someone knows about the Federal Reserve goals and instruments.

Table 5 presents coefficient estimates for treatment effects using the same specification as in the ATE regressions from Table 4; however, this time focusing on $Y_i = \Delta\mathbb{E}_t\pi_{t+1}$ only, and separately for respondents with different levels of the covariates mentioned in the previous paragraph.

There are three main messages to be taken from Table 5.[25] Firstly, the effects of the simple version of the FOMC statement are significant and highly negative across all segments of the respondents, independently of the covariate considered in the segmentation of the sample - with the sole exception of low education households. This means that, no matter which group of households we are considering, simplifying the language always causes a significant decrease in inflation expectations, as expected by the nature of the specific monetary policy intervention expressed in the December 2021 statement.

The second message relates to the drivers of heterogeneity. When looking at the table values, it is easily seen that education seems to be the main driver for treatment effects heterogeneity in inflation expectations. This finding additionally applies to treatment effects in GDP growth expectations and knowledge. Generally, simplifying the message has greater effects for highly

[24] A good example of releasing different forms of communication is the visual summary of the Inflation Report from the Bank of England, which complements the traditional summary Inflation Report in each release since November 2017 and it is directed at a non-specialized audience.

[25] A similar exercise to what is presented on Table 5, which considers other covariates - understanding, knowledge, trust, confidence, attentiveness, and pre-treatment inflation and GDP growth expectations -, is presented in Table B5 in the Tables Appendix. Additionally, the process was repeated for different outcome variables: GDP growth expectations, knowledge and trust, and the respective estimates are presented in Tables B6 to B11, also available in the Tables Appendix.

Table 5—Heterogeneous Treatment Effects on Inflation Expectations

Panel A: General Demographic Characteristics

	Education		Income		Econ Educ?		Econ News Freq	
	Low	High	Low	High	No	Yes	Low	High
α	0.88	2.41***	2.60***	1.71***	2.17***	2.14***	2.43***	1.89***
	(1.31)	(0.52)	(0.81)	(0.60)	(0.82)	(0.59)	(0.77)	(0.61)
T1: Simple	0.21	-3.31***	-3.43***	-2.14***	-2.49**	-2.97***	-2.84**	-2.69***
	(1.79)	(0.71)	(1.13)	(0.81)	(1.15)	(0.79)	(1.10)	(0.81)
T2: FOMC	3.01*	-2.67***	-0.46	-2.27***	-1.34	-1.80**	-0.91	-2.30***
	(1.80)	(0.74)	(1.18)	(0.83)	(1.14)	(0.84)	(1.10)	(0.85)
T3: Complex	1.25	-2.31***	-1.93*	-1.45*	-0.97	-2.20***	-1.21	-1.99**
	(1.84)	(0.71)	(1.13)	(0.82)	(1.12)	(0.81)	(1.09)	(0.82)
N	183	756	444	495	464	475	481	458
R^2	0.020	0.031	0.025	0.019	0.011	0.031	0.014	0.027

Panel B: Federal Reserve-specific Characteristics

	Follows Fed?		Fed Goals		Fed Instruments	
	No	Yes	Wrong	Right	Wrong	Right
α	2.48**	1.91***	2.32***	1.79**	3.01***	1.48***
	(0.98)	(0.56)	(0.60)	(0.83)	(0.95)	(0.49)
T1: Simple	-3.24**	-2.49***	-2.94***	-2.40**	-2.47*	-2.42***
	(1.45)	(0.74)	(0.83)	(1.12)	(1.34)	(0.66)
T2: FOMC	-0.23	-2.19***	-1.51*	-1.71	-1.19	-1.73**
	(1.40)	(0.78)	(0.85)	(1.17)	(1.40)	(0.67)
T3: Complex	-1.47	-1.76**	-1.96**	-0.88	-1.59	-1.68**
	(1.37)	(0.76)	(0.83)	(1.13)	(1.32)	(0.66)
N	340	599	727	212	393	546
R^2	0.018	0.021	0.018	0.025	0.009	0.026

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the change in inflation expectations on three indicators representing the assignment of individuals to each treatment. However, in contrast to Table 4, here each column considers only a subset of the sample, always defined by a pre-treatment characteristic of the respondents. In Panel A, columns 1-2 separate respondents by individuals with high school or less, and individuals with college or more; columns 3-4 consider separately each half of the income distribution; columns 5-6 represent subsets of the respondents defined by whether individuals have education in Economics; and columns 7-8 separate respondents by individuals who read economic news at least once a week, and individuals who read economic news once a month or less frequently. In Panel B, columns 1-2 represent subsets of the respondents defined by whether individuals follow the Fed; columns 3-4 divide respondents who answered correctly to questions about Fed goals from respondents who answered incorrectly; and columns 5-6 divide respondents who answered correctly to questions about Fed instruments from respondents who answered incorrectly.

educated respondents, but also for respondents with education in Economics, low knowledge and low income.

Finally, in relation to the reaction to the non-simple treatments, T2 and T3, we see that Fed

followers, economic news readers and Economics-educated are the only respondents to react to these treatments significantly. This finding means that when the language is not simplified, only specialized individuals, used to deal with Federal Reserve communications, are able to significantly update their inflation expectations in response to a monetary intervention, in contrast to what happens with the simple communication, which is effective towards all segments of individuals.

IV. Conclusion

This paper proposes to study how complex language in central bank communications might compromise the goals of the central bank in relation to two distinct audiences: experts, represented by financial market participants, and the general public, a non-specialized audience. In relation to the financial market response, the main results achieved are that complexity matters and it decreases monetary policy effectiveness on asset prices, but it is mostly relevant for short-term debt and it has slow-moving effects, which suggested that the greatest sensitivity to complexity would possibly come from non-specialized economic agents, not trading in financial markets.

Given the hypothesis that non-specialized households are more sensitive than financial market participants to complex language in central bank communications, I design and implement an RCT experiment and collect new survey data to find that, when measuring effectiveness by how much people understand of the statement and how much they shift their inflation and GDP growth expectations following a monetary policy intervention, using complex language is not the best communication strategy. However, in relation to engagement variables such as trust in the central bank, simplifying the language is not beneficial: people understand more, but do not necessarily trust more in a central bank using simple language. This finding relates directly to previous findings in the psychology literature.

When measuring heterogeneity in the effects of complexity on inflation expectations, I find that simplifying the language is helpful for virtually all segments of society, independently of their demographic characteristics or how familiarized they are with monetary policy, whereas non-simple communications are only effective towards specialized groups of individuals. Nonetheless, using simple language is especially more effective towards highly educated, Economics-educated, low knowledge and low income people.

The intrinsic value of this paper relies on two features: a new unified approach to estimate the effects of complexity on financial markets, considering a selected set of relevant communication components as controls; and on the new RCT experiment designed to study the sensitivity of general public households to complexity in central bank communications. Besides the value added from

the takeaways from the analysis on the financial markets sensitivity to complexity, the conclusions in relation to the general public are entirely new in the literature, since this is the first paper to focus specifically on how complex language in monetary policy statements affects the perception and reaction of the general public to monetary policy interventions.

The findings in this paper suggest that simplifying the language in monetary policy statements is generally helpful for monetary policy transmission to the general public, if we measure it by how much households understand or how much they shape their economic expectations. Moreover, there is no tradeoff in relation to the financial markets reaction: simplifying is generally also better for the effectiveness of monetary policy on asset prices. However, if the central bank is concerned with engagement with the general public, a simpler statement might actually be harmful.

To directly address the comparison of the effects of complex language in central bank statements towards specialized and non-specialized audiences, a good complement to this paper would be a theoretical model-based study where the interaction between the financial markets' and the general public's reactions to central bank communications is analyzed, and how this changes with complex language.

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A. Figures Appendix

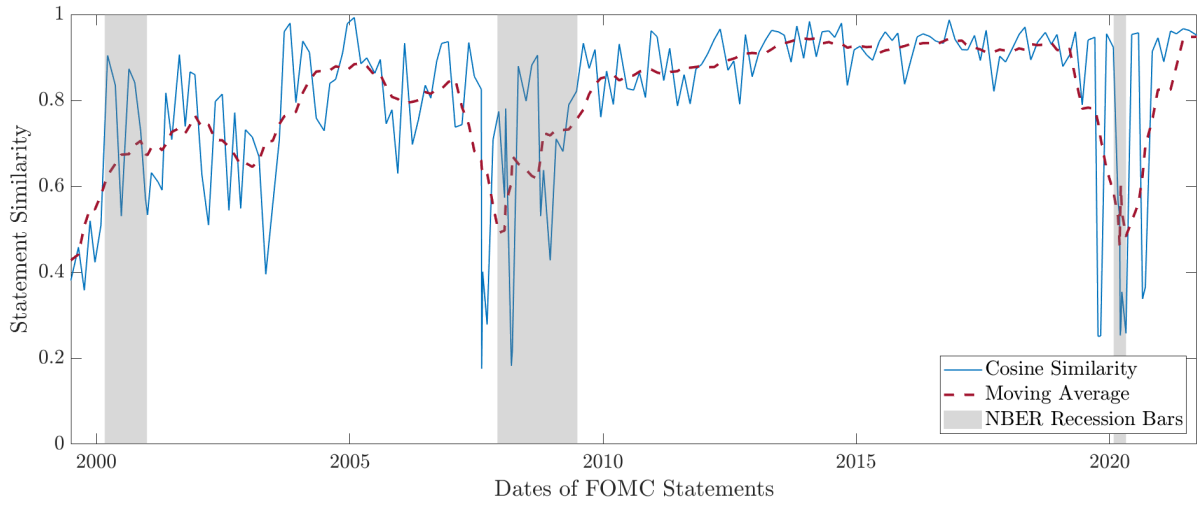


Figure A1. Consistency in FOMC Statements

Note: This plot presents the Cosine Similarity of consecutive FOMC statements for the entire sample from May 1999 to September 2021. The red dashed line represents the 10-statement moving average of the Cosine Similarity, and gray areas are recession periods in the US as defined by NBER.

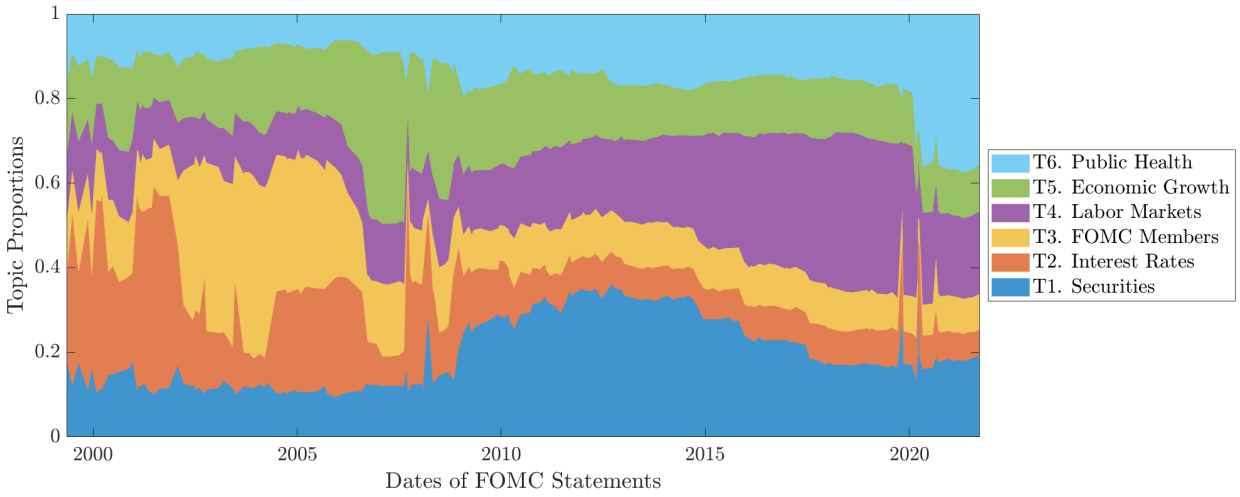


Figure A2. Topic Shares in FOMC Statements

Note: This plot presents the NMF topic distribution for all FOMC statements from May 1999 to September 2021. Each color represents the proportion of each of the 6 NMF topics associated with each statement, estimated by following the NMF method defined in Lee and Seung (1999).

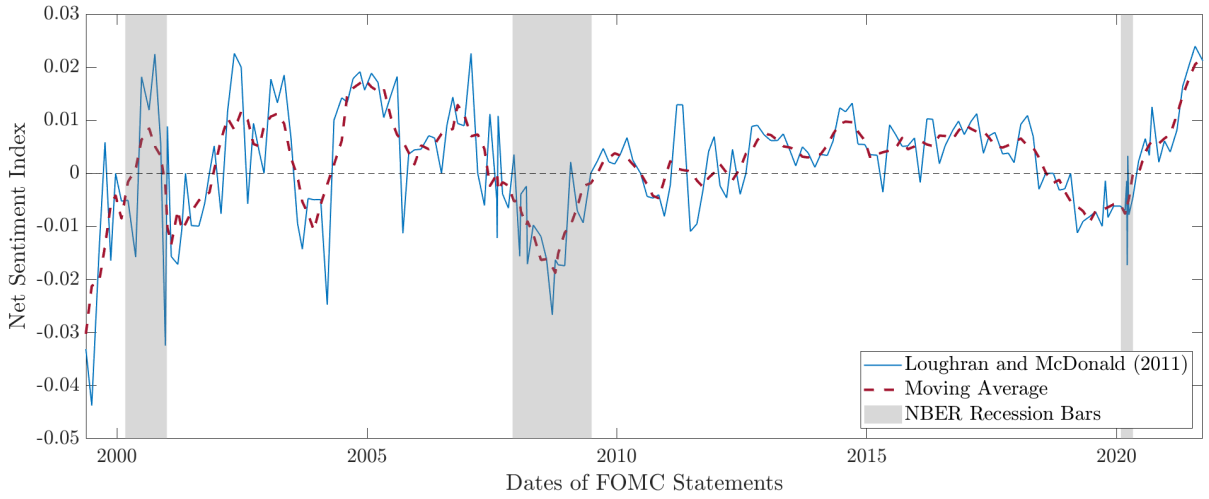


FIGURE A3. SENTIMENT IN FOMC STATEMENTS

Note: This plot presents the net sentiment index for each FOMC statement from May 1999 to September 2021, as defined in section II.A. The red dashed line represents the 10-statement moving average of the net sentiment index, and gray areas are recession periods in the US as defined by NBER.

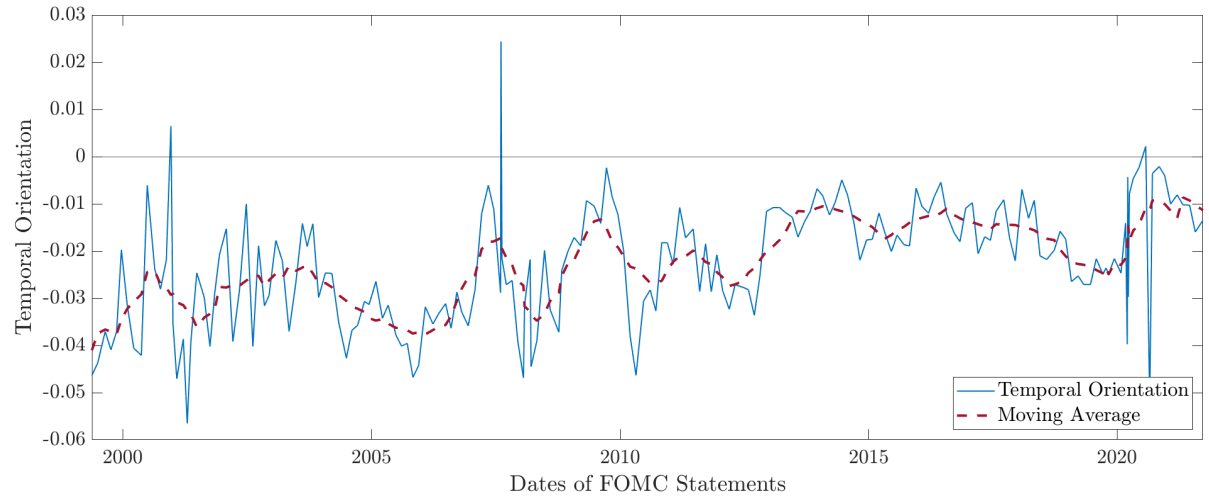


FIGURE A4. TEMPORAL ORIENTATION IN FOMC STATEMENTS

Note: This plot presents the net temporal orientation index for each FOMC statement from May 1999 to September 2021. The red dashed line represents the 10-statement moving average of the net temporal orientation index, and gray areas are recession periods in the US as defined by NBER.

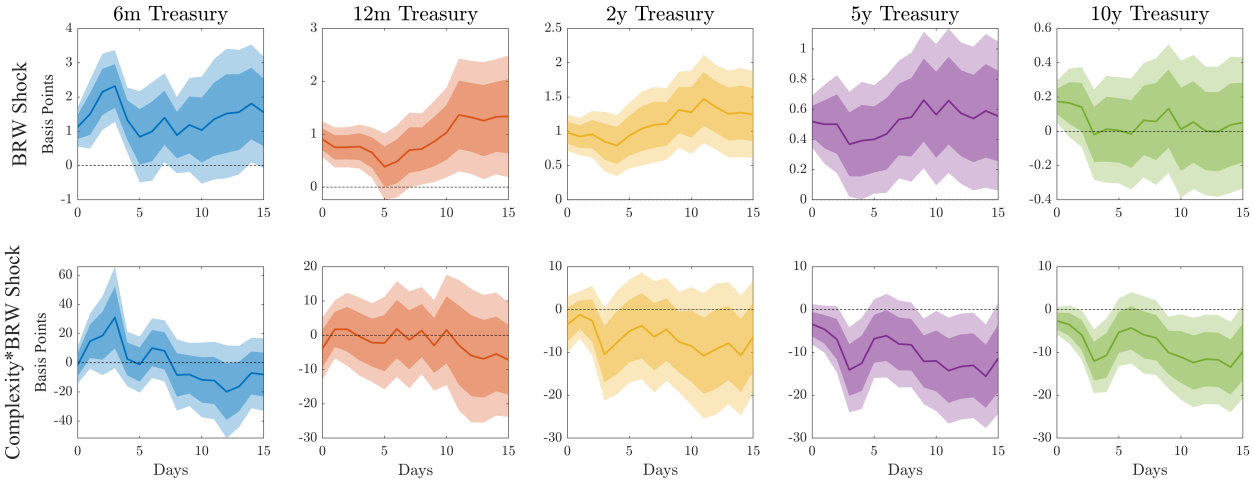


FIGURE A5. IMPULSE RESPONSES TO BRW SHOCK AND TO INTERACTION WITH COMPLEXITY

Note: This figure follows the same logic as Figure 2, but instead considers the impulse response functions of the 6-month, 1-year, 2-year, 5-year and 10-year U.S. Treasury yields to the BRW shock, and to the interaction between the BRW shock and my *Complexity* index.

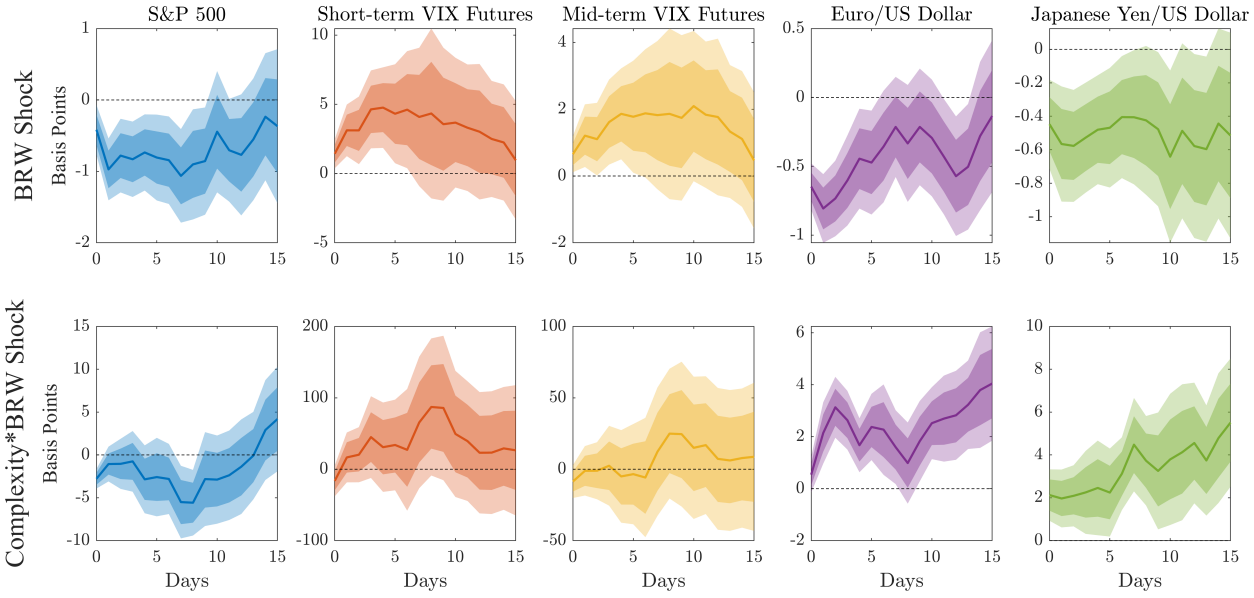


FIGURE A6. IMPULSE RESPONSES TO BRW SHOCK AND TO INTERACTION WITH COMPLEXITY

Note: This figure follows the same logic as Figure 2, but instead considers the impulse response functions of the S&P 500 Index, short-term and mid-term VIX futures, British Pound/U.S. Dollar and Japanese Yen/U.S. Dollar exchange rates to the BRW shock, and to the interaction between the BRW shock and my *Complexity* index.

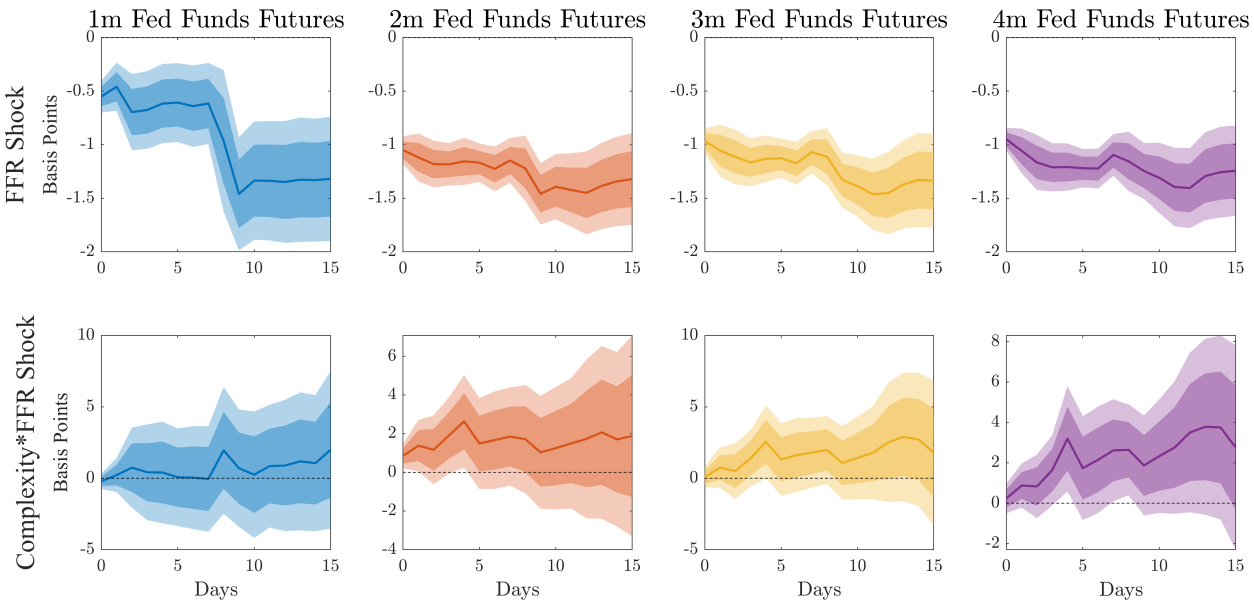


FIGURE A7. IMPULSE RESPONSES TO FFR SHOCK AND TO INTERACTION WITH COMPLEXITY

Note: This figure follows the same logic as Figure 2, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Fed funds futures to the Federal Funds Rate (FFR) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the FFR shock and my *Complexity* index.

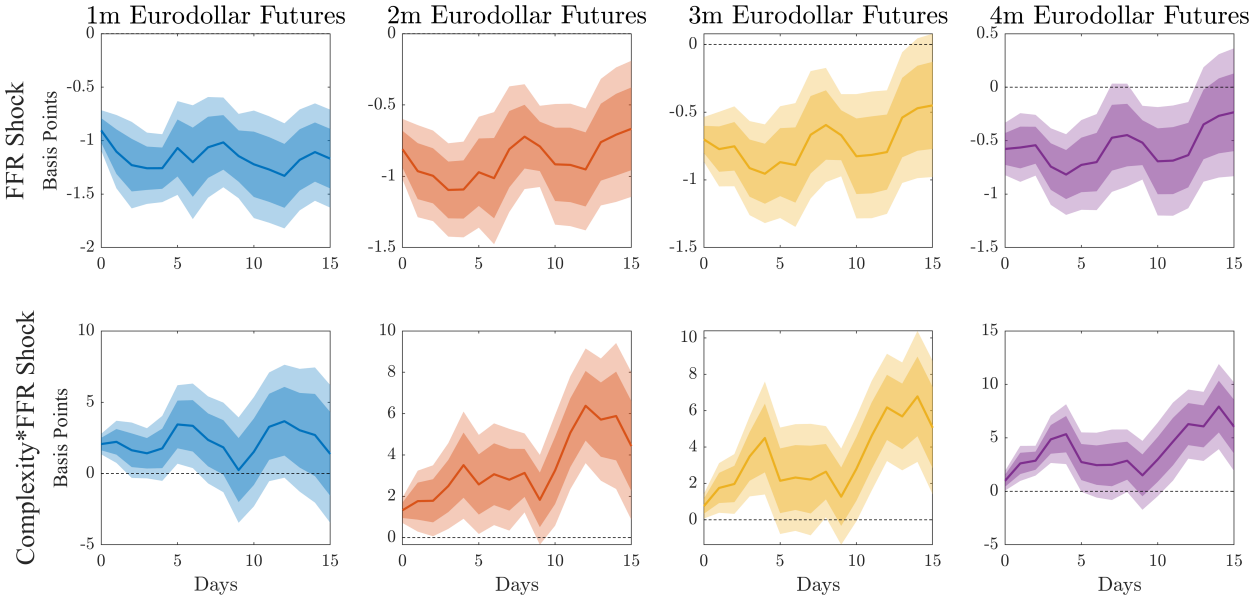


FIGURE A8. IMPULSE RESPONSES TO FFR SHOCK AND TO INTERACTION WITH COMPLEXITY

Note: This figure follows the same logic as Figure 3, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Eurodollar futures to the Federal Funds Rate (FFR) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the FFR shock and my *Complexity* index.

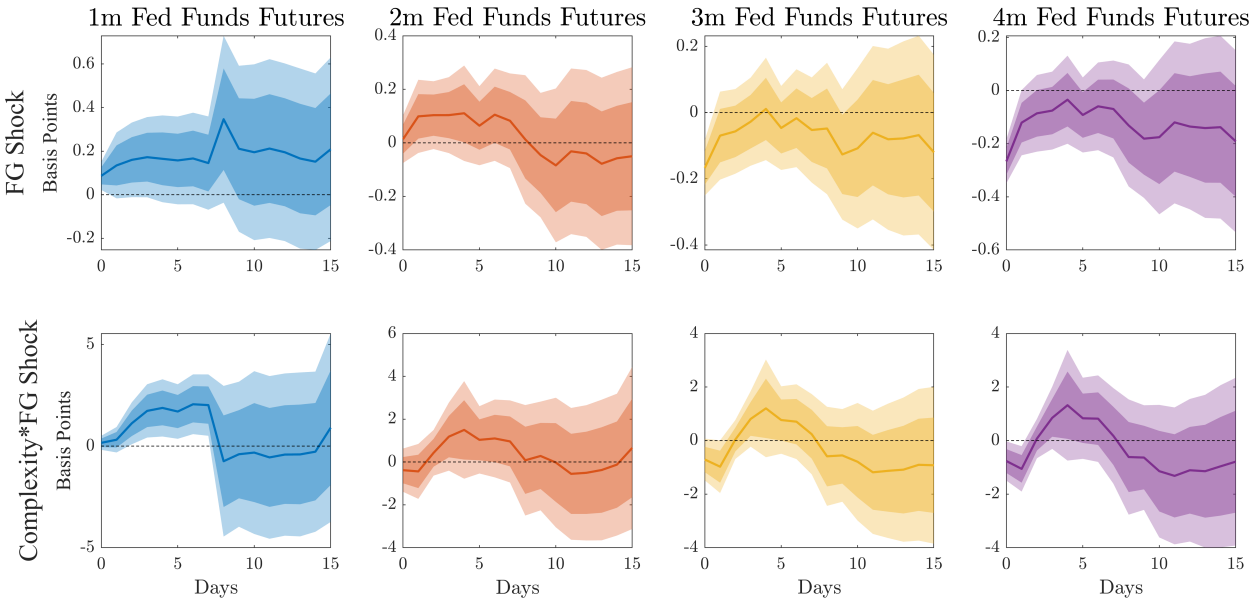


Figure A9. Impulse responses to FG shock and to interaction with complexity

Note: This figure follows the same logic as Figure 2, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Fed funds futures to the Forward Guidance (FG) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the FG shock and my *Complexity* index.

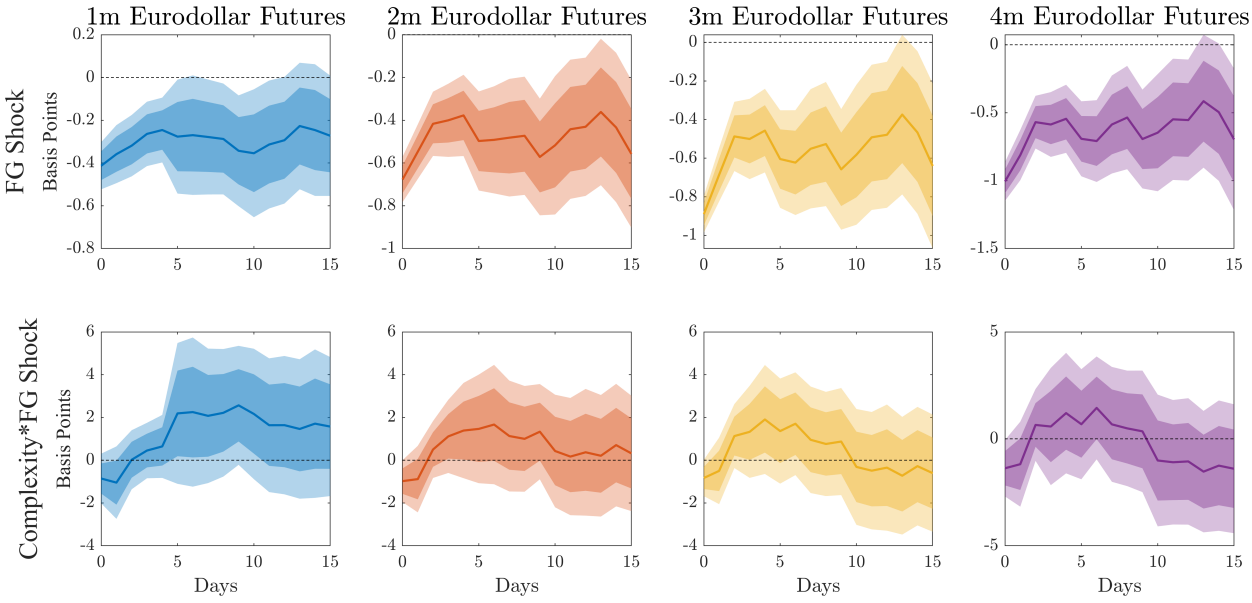


Figure A10. Impulse responses to FG shock and to interaction with complexity

Note: This figure follows the same logic as Figure 3, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Eurodollar futures to the Forward Guidance (FG) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the FG shock and my *Complexity* index.

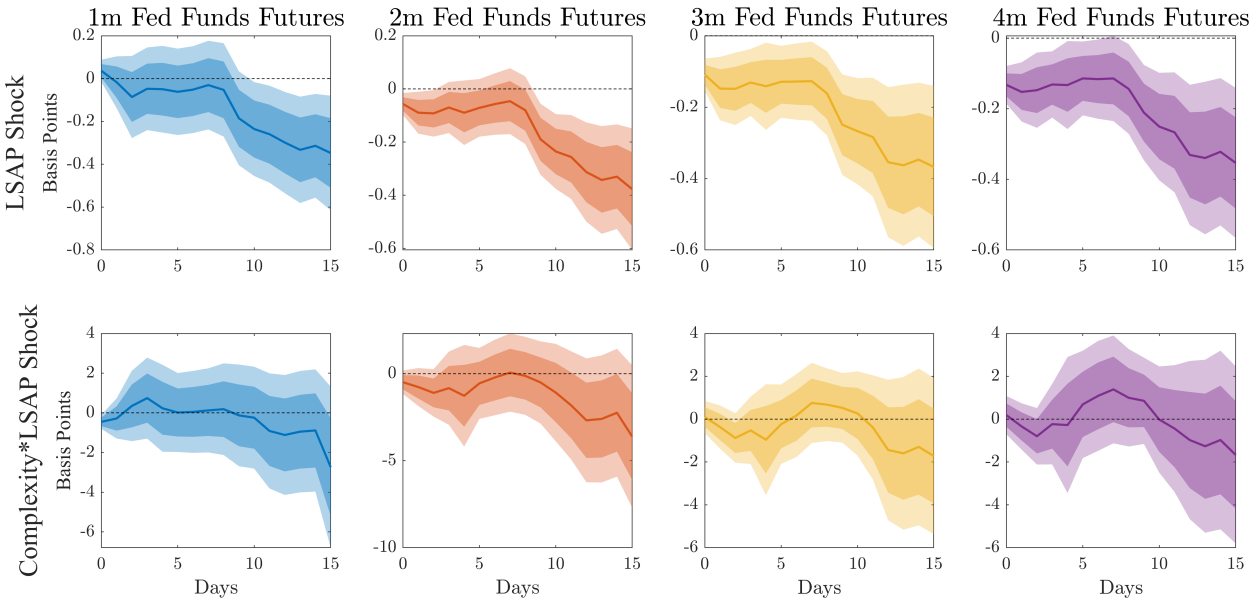


Figure A11. Impulse responses to LSAP shock and to interaction with complexity

Note: This figure follows the same logic as Figure 2, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Fed funds futures to the Large Scale Asset Purchases (LSAP) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the LSAP shock and my *Complexity* index.

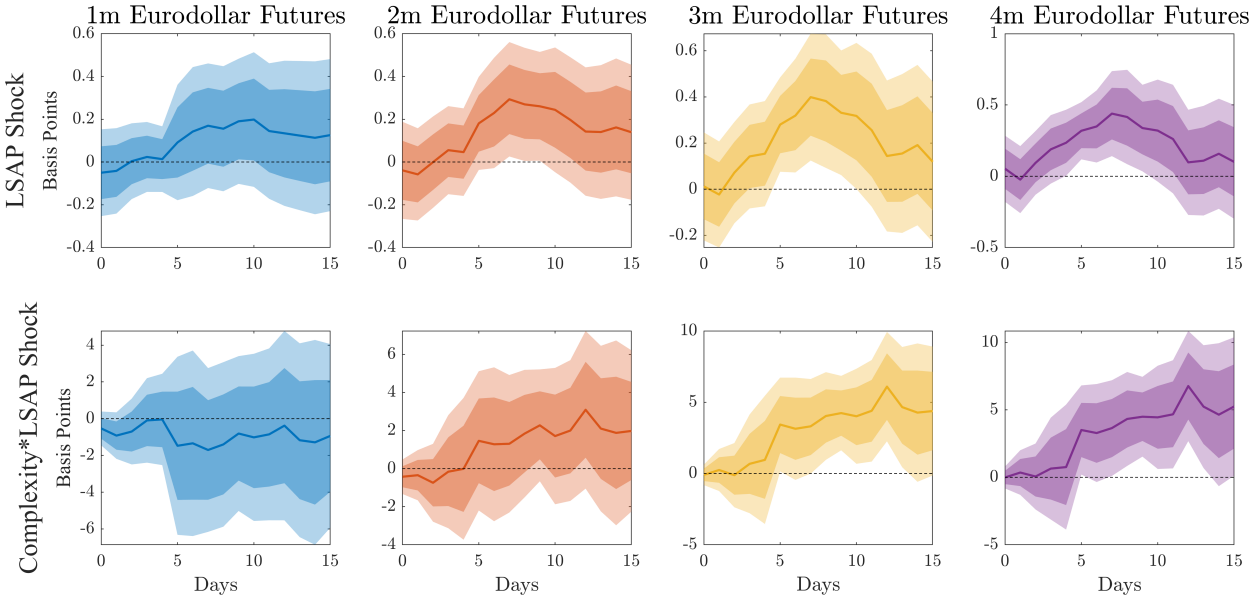


Figure A12. Impulse responses to LSAP shock and to interaction with complexity

Note: This figure follows the same logic as Figure 3, with the same outcome variables, but with different shocks. Here, the first row plots the impulse responses of Eurodollar futures to the Large Scale Asset Purchases (LSAP) monetary policy shock as defined in Swanson (2021), and the second row the impulse responses to the interaction between the LSAP shock and my *Complexity* index.

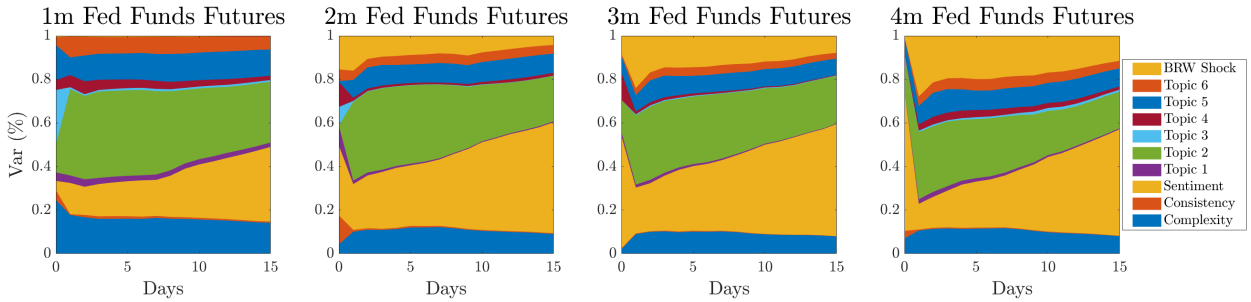


FIGURE A13. FORECAST ERROR VARIANCE DECOMPOSITIONS USING BRW SHOCK

Note: The colored areas represent the shares of variance that each covariate accounts for in the h period ahead variable of interest, where $h \in \{0, 1, ..., 15\}$. The variables of interest are the daily series of the first four Fed funds futures. The Forecast Error Variance Decomposition (FEVD) method follows Gorodnichenko and Lee (2020). The covariates considered are the same communication components in my local projection procedure described in section II.B, including the unified measure of monetary policy shock in Bu, Rogers and Wu (2021).

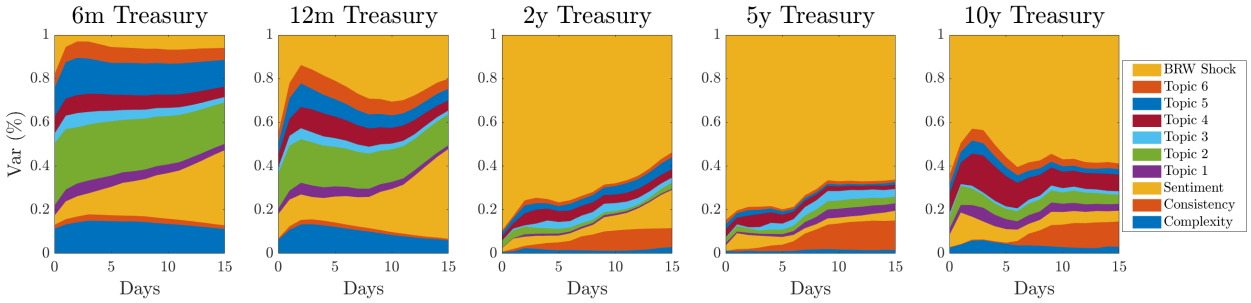


FIGURE A14. FORECAST ERROR VARIANCE DECOMPOSITIONS USING BRW SHOCK

Note: The colored areas represent the shares of variance that each covariate accounts for in the h period ahead variable of interest, where $h \in \{0, 1, ..., 15\}$. The variables of interest are the daily series of Government Bond yields of 6-month, 1-year, 2-year, 5-year and 10-year maturity. The Forecast Error Variance Decomposition (FEVD) method follows Gorodnichenko and Lee (2020). The covariates considered are the same communication components in my local projection procedure described in section II.B, including the unified measure of monetary policy shock in Bu, Rogers and Wu (2021).

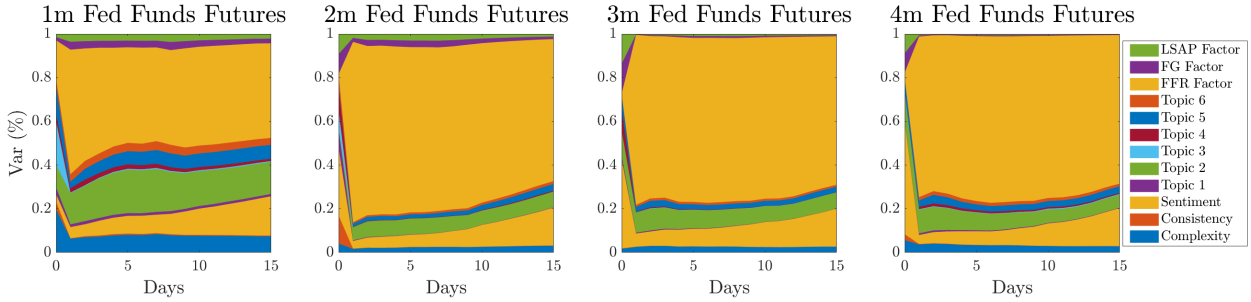


FIGURE A15. FORECAST ERROR VARIANCE DECOMPOSITIONS USING SWANSON SHOCKS

Note: The colored areas represent the shares of variance that each covariate accounts for in the h period ahead variable of interest, where $h \in \{0, 1, ..., 15\}$. The variables of interest are the daily series of the first four Fed funds futures. The Forecast Error Variance Decomposition (FEVD) method follows Gorodnichenko and Lee (2020). The covariates considered are the same communication components in my local projection procedure described in section II.B, including the three monetary policy shocks in Swanson (2020).

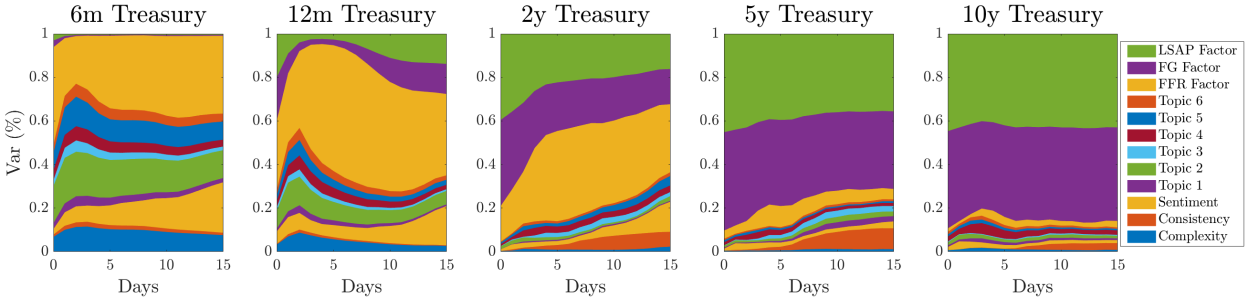


FIGURE A16. FORECAST ERROR VARIANCE DECOMPOSITIONS USING SWANSON SHOCKS

Note: The colored areas represent the shares of variance that each covariate accounts for in the h period ahead variable of interest, where $h \in \{0, 1, ..., 15\}$. The variables of interest are the daily series of Government Bond yields of 6-month, 1-year, 2-year, 5-year and 10-year maturity. The Forecast Error Variance Decomposition (FEVD) method follows Gorodnichenko and Lee (2020). The covariates considered are the same communication components in my local projection procedure described in section II.B, including the three monetary policy shocks in Swanson (2020).

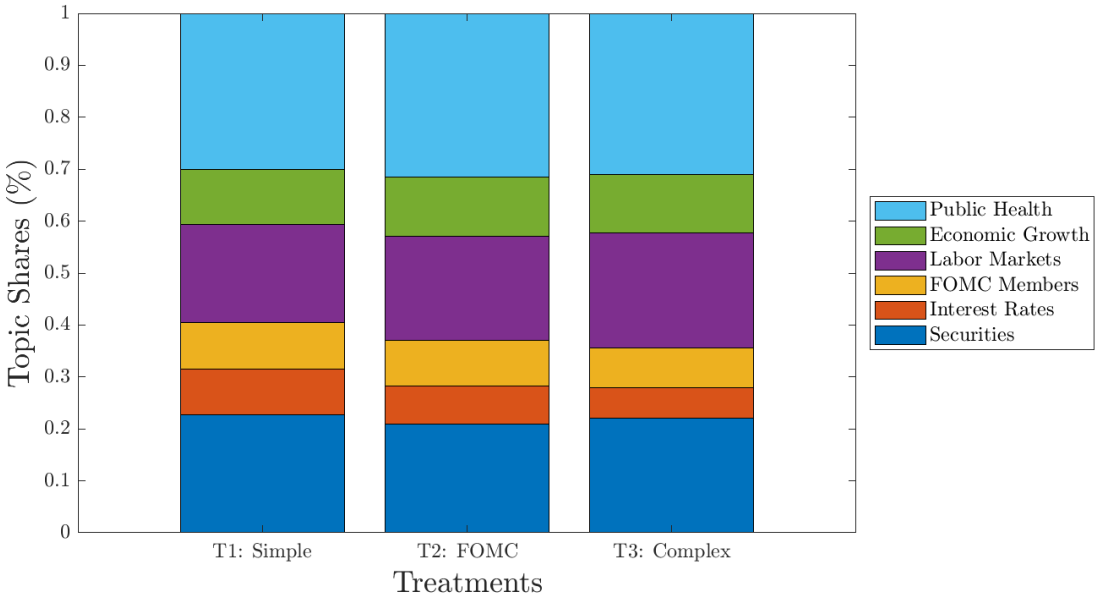


FIGURE A17. TOPIC SHARES FOR THE THREE TREATMENTS

Note: This figure plots the topic distributions for each treatment considered in the survey, by considering the exact same 6 NMF topics, estimated as described in Section II.A. These proportions were obtained by including each treatment, one at a time, in the set of statements initially used to estimate NMF topics.

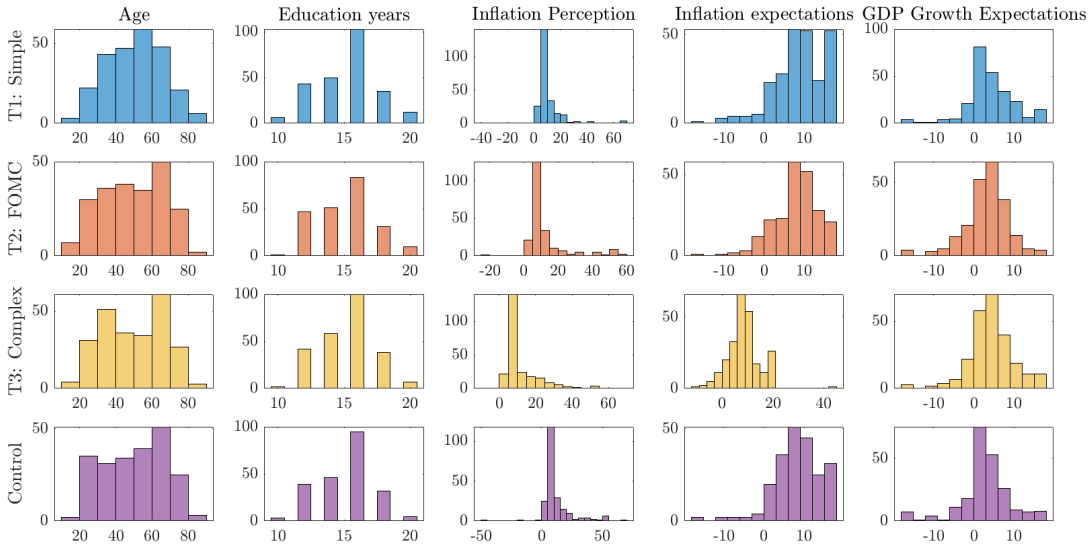


FIGURE A18. HISTOGRAMS OF PRE-TREATMENT VARIABLES

Note: This figure plots histograms for a set of selected pre-treatment survey variables: age, education years, perception of inflation, inflation expectations and GDP growth expectations. Each row reflects data from the four different groups of respondents: individuals exposed to the first treatment; second treatment; third treatment and lastly individuals not exposed to any treatment - control group. The data considered for this figure is outlier-free, following the data cleaning process described in section III.B.

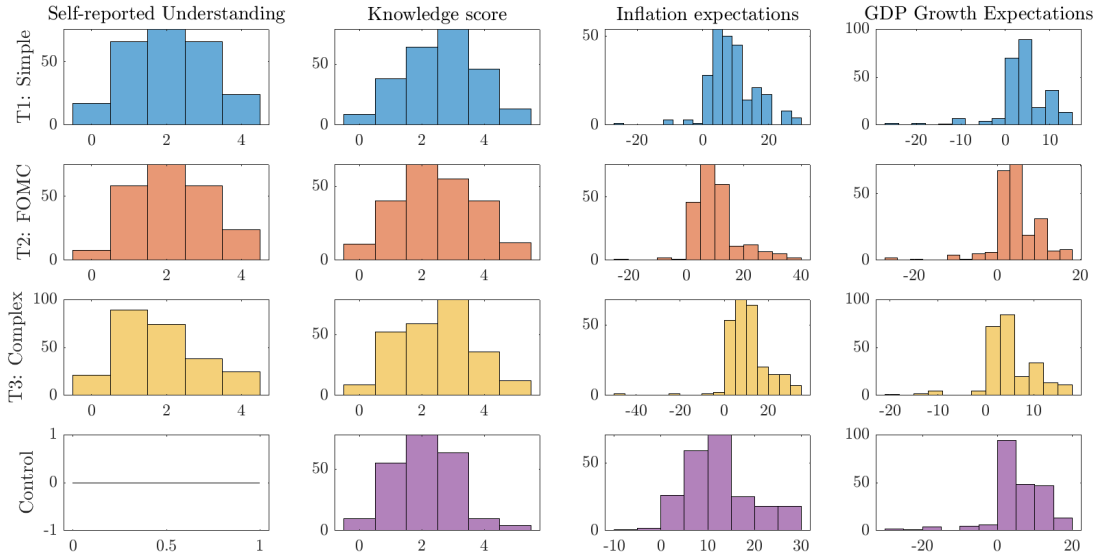


FIGURE A19. HISTOGRAMS OF POST-TREATMENT VARIABLES I

Note: This figure plots histograms for a set of selected post-treatment survey variables: self-reported understanding, knowledge score, inflation expectations and GDP growth expectations. Each row reflects data from the four different groups of respondents: individuals exposed to the first treatment; second treatment; third treatment and lastly individuals not exposed to any treatment - control group. The data considered for this figure is outlier-free, following the data cleaning process described in section III.B.

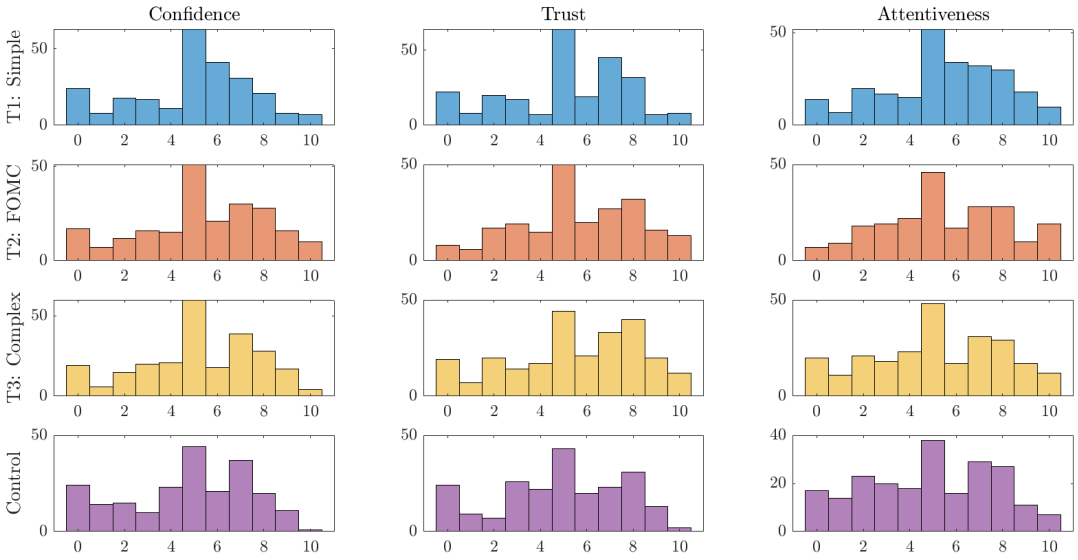


FIGURE A20. HISTOGRAMS OF POST-TREATMENT VARIABLES II

Note: This figure plots histograms for a set of selected post-treatment survey variables: confidence, trust and attentiveness scores. Each row reflects data from the four different groups of respondents: individuals exposed to the first treatment; second treatment; third treatment and lastly individuals not exposed to any treatment - control group. The data considered for this figure is outlier-free, following the data cleaning process described in section III.B.

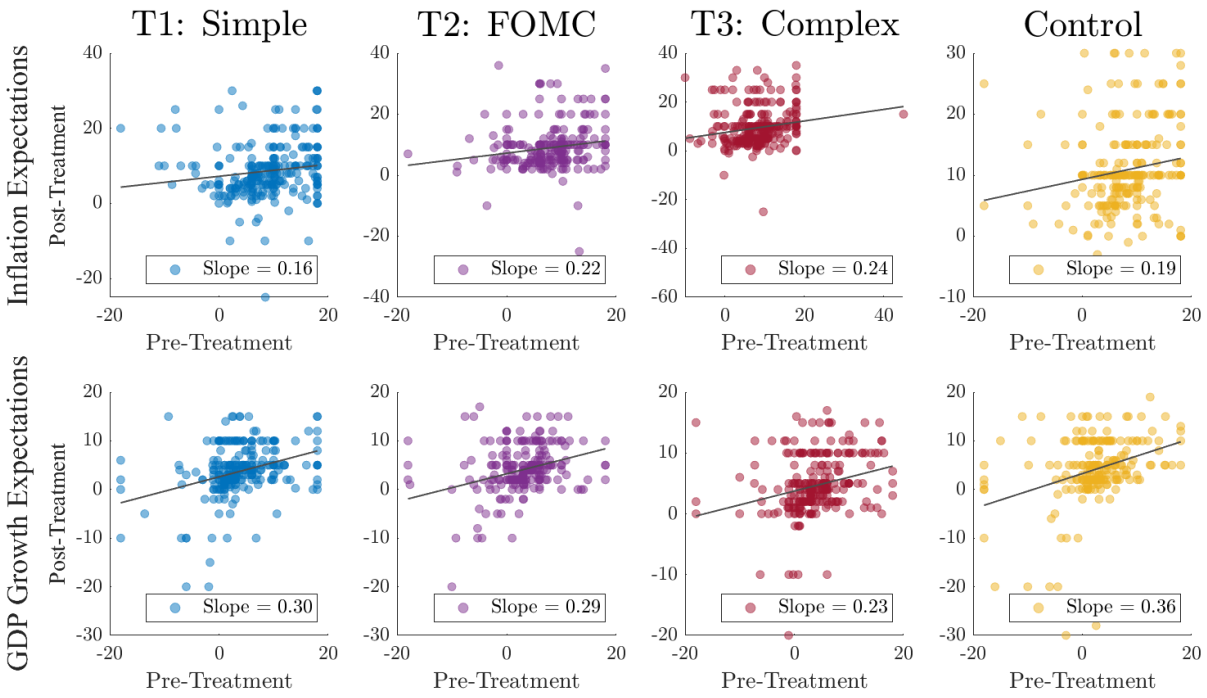


FIGURE A21. INFLATION EXPECTATIONS AND GDP GROWTH EXPECTATIONS TREATMENT EFFECTS PER GROUP

Note: The first row of this figure presents scatter plots of prior inflation expectations versus posterior inflation expectations, for each of the four groups of survey respondents. The second row presents scatter plots of prior GDP growth expectations versus posterior GDP growth expectations, again for each group.

B. Tables Appendix

Table B1—Characteristic Words per Topic

	Characteristic Words
Topic 1: Securities	committee, securities, agency, mortgage, inflation, longer, backed, consistent, economic, mandate, levels, purchases, recovery, holdings, policy, term, anticipates, appropriate, run, pace
Topic 2: Interest Rates	board, approved, discount, reserve, federal, basis, banks, rate, action, requests, points, directors, submitted, boards, governors, related, growth, point, york, francisco
Topic 3: FOMC Members	jr, committee, believes, policy, roger, ferguson, greenspan, alan, mark, olson, gramlich, edward, susan, bies, coupled, underlying, equal, robust, chairman, monetary
Topic 4: Labor Markets	inflation, committee, labor, market, range, rate, expected, conditions, strong, federal, economic, measures, objective, funds, based, symmetric, adjustments, employment, realized, maximum
Topic 5: Economic Growth	inflation, committee, moderate, kroszner, randall, economic, kevin, warsh, chairman, frederic, mishkin, timothy, geithner, federal, resource, implied, donald, kohn, utilization, high
Topic 6: Public Health	public, employment, health, economy, flow, committee, households, businesses, inflation, achieve, credit, goals, assessments, maximum, range, appropriate, reserve, support, policy, chair

Table B2—Summary statistics of selected pre-treatment variables

	T1: Simple	T2: FOMC	T3: Complex	Control
Age	50.14	49.00	49.65	49.85
	(15.50)	(17.13)	(16.44)	(16.90)
Education	15.24	15.13	15.22	15.17
	(2.28)	(2.23)	(2.11)	(2.11)
Economics	0.54	0.48	0.50	0.50
	(0.50)	(0.50)	(0.50)	(0.50)
Fed Goals	0.23	0.22	0.23	0.22
	(0.42)	(0.41)	(0.42)	(0.42)
Fed Instruments	0.59	0.61	0.57	0.55
	(0.49)	(0.49)	(0.50)	(0.50)
Inflation Perception	10.82	11.58	11.43	10.83
	(11.88)	(11.86)	(10.34)	(11.71)
Inflation Expectations	8.75	7.73	8.36	8.16
	(6.60)	(5.87)	(6.20)	(6.23)
GDP Growth Expectations	3.79	2.80	3.96	2.43
	(6.08)	(5.69)	(5.62)	(6.29)
N	249	223	247	220

Standard deviations in parentheses

Note: This table reports averages and standard deviations for selected pre-treatment variables, separately for each of the four groups of the survey: respondents exposed to T1, T2, T3 and not exposed to any treatment.

Table B3—Treatment effects - Huber Regression for additional variables

	(1) Consumption	(2) Investment	(3) Search (E)	(4) Search (U)	(5) $\log w_R^E$	(6) $\log w_R^U$	(7) $\log w_R^N$
α	-0.46***	0.21***	1.99***	0.77***	11.08***	11.03***	11.14***
	(0.04)	(0.05)	(0.13)	(0.10)	(0.16)	(0.52)	(0.21)
T1: Simple	-0.02	-0.06	-0.27	-0.23	-0.06	-0.12	-0.24
	(0.06)	(0.07)	(0.18)	(0.15)	(0.20)	(0.63)	(0.29)
T2: FOMC	-0.01	-0.03	-0.18	-0.02	-0.02	-0.37	-0.35
	(0.06)	(0.07)	(0.18)	(0.16)	(0.21)	(0.80)	(0.29)
T3: Complex	0.09	0.02	-0.37**	-0.15	0.04	-0.10	-0.13
	(0.06)	(0.07)	(0.18)	(0.15)	(0.20)	(0.68)	(0.27)
Controls	No	No	No	No	No	No	No
N	939	939	939	939	939	939	939
R^2	0.005	0.002	0.017	0.253	0.012	0.763	0.679

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing outcome variables on three indicators representing the assignment of individuals to each treatment. Each column represents a different outcome variable, where *Consumption* and *Investment* are variables that take values of 1, 0 or -1, depending whether respondents report to plan increasing, keeping constant or decreasing their year-ahead consumption and investment levels, respectively.

Table B4—IV Regressions - Additional Treatment Effects

	X_i = Inflation expectations		X_i = GDP Growth expectations	
	Y_i = Consumption	Y_i = Investment	Y_i = Consumption	Y_i = Investment
j = T1: Simple	-0.057***	0.007	-0.051***	0.017
	(0.006)	(0.007)	(0.013)	(0.014)
j = T2: FOMC	-0.058***	0.006	-0.064***	0.001
	(0.006)	(0.007)	(0.016)	(0.015)
j = T3: Complex	-0.038***	0.014**	-0.043***	0.049***
	(0.005)	(0.006)	(0.011)	(0.013)
Controls	No	No	No	No
N	939	939	939	939

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports coefficient estimates of regressing consumption and investment plans on the interaction between post-treatment inflation and GDP growth expectations and the treatment dummies. The coefficients are estimated using GMM, where the instrument is the interaction between pre-treatment inflation and GDP growth expectations and the treatment dummies.

Table B5—Heterogeneous Treatment Effects on Inflation Expectations II

	Understanding		**Knowledge**		**Trust**		**Confidence**		**Attentiveness**		$\mathbb{E}_t \pi_{t+1}^{pre}$		$\mathbb{E}_t g_{t+1}^{pre}$	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
α	-0.45	-0.44	3.19***	0.55	2.58***	1.57**	2.11***	2.18***	2.64***	1.42**	4.76**	-0.91***	2.62	1.56***
	(0.63)	(0.70)	(0.73)	(0.62)	(0.74)	(0.66)	(0.71)	(0.68)	(0.68)	(0.71)	(0.65)	(0.66)	(0.76)	(0.64)
T1: Simple	-	-0.35	-3.08***	-1.70**	-2.97***	-2.38***	-2.15**	-3.45***	-2.54***	-2.68***	-2.46***	-2.15***	-3.10***	-2.30***
	-	(0.97)	(1.10)	(0.78)	(1.03)	(0.88)	(0.98)	(0.92)	(0.97)	(0.94)	(0.92)	(0.88)	(1.08)	(0.85)
T2: FOMC	1.79*	-	-0.89	-1.43*	-1.24	-1.70*	-0.69	-2.43***	-1.35	-1.56	-1.42	-1.44	-0.57	-1.93**
	(0.92)	-	(1.09)	(0.82)	(1.08)	(0.89)	(1.03)	(0.92)	(0.98)	(0.98)	(0.91)	(0.93)	(1.13)	(0.86)
T3: Complex	1.45*	-0.39	-1.44	-1.12	-1.80*	-1.42*	-1.29	-2.10**	-1.98**	-1.24	-1.43	-1.66*	-1.35	-1.78**
	(0.86)	(1.07)	(1.08)	(0.79)	(1.06)	(0.86)	(0.98)	(0.92)	(0.94)	(0.97)	(0.89)	(0.91)	(1.14)	(0.83)
N	484	235	490	449	505	434	530	409	517	422	469	470	428	511
R^2	0.009	0.001	0.017	0.012	0.017	0.018	0.010	0.036	0.015	0.020	0.016	0.014	0.021	0.016

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the change in inflation expectations on three indicators representing the assignment of individuals to each treatment. Each column considers only a subset of the sample, defined by a post-treatment characteristic of the respondents. Columns 1-2 separate respondents by individuals who reported understanding half or less of the statement, and individuals who reported understanding more than half. Columns 3-4 separate respondents by individuals who answered correctly to 2 or less of the 6 questions about the statement, and individuals who answered correctly to 3 or more questions. Columns 5-6, 7-8 and 9-10 separate respondents by a score of 5 or less, and respondents with a score of 6 or more, respectively for trust, confidence and attentiveness scores. Columns 11-12 and 13-14 separate respondents by the bottom half and the upper half of expectations distributions, respectively of inflation and GDP growth expectations.

Table B6—Heterogeneous Treatment Effects on GDP Growth Expectations I

	Education		**Income**		**Econ Educ?**		**News Freq**		**Follows Fed?**		**Fed Goals**		**Fed Instruments**	
	Low	High	Low	High	No	Yes	Low	High	No	Yes	Wrong	Right	Wrong	Right
α	2.79***	1.15***	1.81***	1.13**	1.81***	1.10**	1.49***	1.42***	3.15***	0.53	1.41***	1.30*	2.75***	0.72*
	(1.11)	(0.40)	(0.63)	(0.48)	(0.58)	(0.51)	(0.60)	(0.49)	(0.77)	(0.42)	(0.45)	(0.71)	(0.77)	(0.40)
T1: Simple	-2.24	-1.15**	-1.72**	-1.08*	-1.26	-1.38**	-1.01	-1.51**	-2.6**	-0.59	-1.53***	-0.72	-3.01***	-0.47
	(1.51)	(0.55)	(0.88)	(0.65)	(0.81)	(0.69)	(0.86)	(0.65)	(1.13)	(0.56)	(0.62)	(0.96)	(1.08)	(0.54)
T2: FOMC	-1.13	-0.36	-0.08	-0.69	-0.67	-0.38	-0.47	-0.59	-1.13	-0.26	-0.46	-0.34	-0.45	-0.54
	(1.52)	(0.57)	(0.91)	(0.66)	(0.80)	(0.73)	(0.86)	(0.68)	(1.09)	(0.59)	(0.64)	(1.00)	(1.13)	(0.55)
T3: Complex	-1.64	-0.74	-0.98	-0.89	-1.08	-0.87	-0.55	-1.35**	-2.64***	-0.11	-1.28**	0.16	-1.58	-0.66
	(1.55)	(0.55)	(0.87)	(0.66)	(0.79)	(0.70)	(0.85)	(0.66)	(1.07)	(0.58)	(0.62)	(0.97)	(1.07)	(0.55)
N	183	756	444	495	464	475	481	458	340	599	727	212	393	546
R^2	0.013	0.007	0.012	0.006	0.006	0.010	0.003	0.015	0.024	0.002	0.011	0.005	0.023	0.003

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the change in GDP growth expectations on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table 5.

Table B7—Heterogeneous Treatment Effects on GDP Growth Expectations II

	Understanding		**Knowledge**		**Trust**		**Confidence**		**Attentiveness**		$\mathbb{E}_t\pi^{pre}_{t+1}$		$\mathbb{E}_t g^{pre}_{t+1}$	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
α	0.38	-0.11	2.57***	0.08	1.87***	0.94*	1.11**	1.89***	1.5***	1.37***	1.89***	0.89	4.05***	-0.98**
	(0.49)	(0.46)	(0.61)	(0.47)	(0.60)	(0.50)	(0.54)	(0.55)	(0.55)	(0.53)	(0.51)	(0.57)	(0.58)	(0.45)
T1: Simple	-	-0.23	-2.14**	-0.21	-1.64**	-0.95	-0.82	-1.96***	-1.14	-1.48**	-1.11	-1.38*	-1.2	-1.04*
	-	(0.64)	(0.93)	(0.59)	(0.84)	(0.67)	(0.75)	(0.74)	(0.79)	(0.70)	(0.73)	(0.75)	(0.82)	(0.60)
T2: FOMC	1.21*	-	0.09	-0.49	-1.25	0.36	-0.53	-0.55	-0.23	-0.82	0.02	-1.05	-0.12	0.11
	(0.72)	-	(0.91)	(0.61)	(0.88)	(0.68)	(0.78)	(0.75)	(0.79)	(0.73)	(0.72)	(0.80)	(0.86)	(0.61)
T3: Complex	0.21	0.35	-1.23	-0.14	-1.24	-0.58	-0.64	-1.37*	-1.05	-0.86	-0.51	-1.29*	-0.39	-0.18
	(0.67)	(0.70)	(0.91)	(0.59)	(0.87)	(0.66)	(0.75)	(0.75)	(0.76)	(0.72)	(0.71)	(0.78)	(0.86)	(0.59)
N	484	235	490	449	505	434	530	409	517	422	469	470	428	511
R^2	0.006	0.003	0.015	0.001	0.009	0.012	0.003	0.021	0.006	0.011	0.007	0.009	0.006	0.010

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the change in GDP growth expectations on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table B5.

Table B8—Heterogeneous Treatment Effects on Knowledge I

	Education		**Income**		**Econ Educ?**		**News Freq**		**Follows Fed?**		**Fed Goals**		**Fed Instruments**	
	Low	High	Low	High	No	Yes	Low	High	No	Yes	Wrong	Right	Wrong	Right
α	1.83***	2.13***	1.95***	2.19***	1.94***	2.21***	2.05***	2.11***	1.89***	2.21***	2.00***	2.34***	1.86***	2.25***
	(0.2)	(0.09)	(0.12)	(0.11)	(0.11)	(0.12)	(0.11)	(0.13)	(0.12)	(0.11)	(0.11)	(0.19)	(0.12)	(0.12)
T1: Simple	0.25	0.65***	0.47***	0.62***	0.63***	0.50***	0.39**	0.65***	0.49**	0.53***	0.55***	0.61**	0.41***	0.62***
	(0.27)	(0.13)	(0.17)	(0.15)	(0.16)	(0.16)	(0.16)	(0.17)	(0.18)	(0.15)	(0.15)	(0.25)	(0.17)	(0.16)
T2: FOMC	0.26	0.46***	0.18	0.58***	0.49***	0.36**	0.41***	0.41**	0.31*	0.45***	0.37**	0.44*	0.06	0.59***
	(0.27)	(0.13)	(0.17)	(0.15)	(0.16)	(0.17)	(0.16)	(0.17)	(0.18)	(0.15)	(0.15)	(0.26)	(0.18)	(0.16)
T3: Complex	0.31	0.40***	0.50	0.29***	0.38***	0.42**	0.23***	0.52**	0.40*	0.35***	0.36**	0.38*	0.26	0.47***
	(0.28)	(0.12)	(0.17)	(0.15)	(0.16)	(0.17)	(0.16)	(0.17)	(0.17)	(0.15)	(0.15)	(0.26)	(0.17)	(0.16)
N	183	756	444	495	464	475	481	458	340	599	727	212	393	546
R^2	0.008	0.036	0.027	0.042	0.036	0.022	0.018	0.036	0.025	0.024	0.019	0.028	0.019	0.035

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the knowledge score on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table 5.

Table B9—Heterogeneous Treatment Effects on Knowledge II

	Understanding		**Knowledge**		**Trust**		**Confidence**		**Attentiveness**		$\mathbb{E}_t\pi^{pre}_{t+1}$		$\mathbb{E}_t g^{pre}_{t+1}$	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
α	2.42***	2.84***	1.51***	3.19***	1.93***	2.29***	2.00***	2.18***	1.98***	2.21***	2.09***	2.06***	2.04***	2.12***
	(0.1)	(0.15)	(0.05)	(0.07)	(0.1)	(0.15)	(0.11)	(0.13)	(0.11)	(0.14)	(0.12)	(0.11)	(0.1)	(0.12)
T1: Simple	-	0.11	0.03	0.28***	0.69***	0.38*	0.69***	0.40**	0.56***	0.49***	0.34**	0.74***	0.47***	0.60***
	-	(0.2)	(0.08)	(0.08)	(0.15)	(0.2)	(0.16)	(0.17)	(0.15)	(0.18)	(0.17)	(0.15)	(0.15)	(0.16)
T2: FOMC	-0.16	-	0.00	0.35***	0.34**	0.40**	0.31*	0.45***	0.26*	0.54***	0.29*	0.52***	0.15	0.58***
	(0.15)	-	(0.08)	(0.09)	(0.15)	(0.2)	(0.16)	(0.17)	(0.15)	(0.19)	(0.17)	(0.16)	(0.15)	(0.16)
T3: Complex	-0.04	-0.15	-0.06	0.22***	0.45***	0.23	0.42***	0.30*	0.38***	0.35*	0.21	0.56***	0.46***	0.31**
	(0.14)	(0.22)	(0.07)	(0.08)	(0.15)	(0.2)	(0.16)	(0.17)	(0.15)	(0.19)	(0.16)	(0.15)	(0.16)	(0.16)
N	484	235	490	449	505	434	530	409	517	422	469	470	428	511
R^2	0.003	0.006	0.003	0.038	0.044	0.012	0.037	0.019	0.028	0.024	0.010	0.054	0.032	0.034

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the knowledge score on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table B5.

Table B10—Heterogeneous Treatment Effects on Trust I

	Education		**Income**		**Econ Educ?**		**News Freq**		**Follows Fed?**		**Fed Goals**		**Fed Instruments**	
	Low	High	Low	High	No	Yes	Low	High	No	Yes	Wrong	Right	Wrong	Right
α	4.50***	5.05***	5.21***	4.68***	4.84***	5.08***	4.85***	5.13***	4.64***	5.17***	4.83***	5.46***	4.74***	5.07***
	(0.45)	(0.21)	(0.27)	(0.27)	(0.29)	(0.25)	(0.27)	(0.29)	(0.33)	(0.24)	(0.23)	(0.35)	(0.27	0.27)
T1: Simple	0.41	0.23	0.06	0.47	0	0.4	0.35	0.13	0.07	0.25	0.08	0.71	0.3	0.22
	(0.61)	(0.29)	(0.38)	(0.37)	(0.41)	(0.34)	(0.38)	(0.38)	(0.48)	(0.32)	(0.31)	(0.48)	(0.38)	(0.36)
T2: FOMC	1.42**	0.52*	0.28	1.05***	0.61	0.74**	0.47	0.92**	0.58	0.75**	0.57*	1.01**	0.73*	0.65*
	(0.61)	(0.3)	(0.39)	(0.38)	(0.41)	(0.36)	(0.38)	(0.4)	(0.47)	(0.33)	(0.32)	(0.5)	(0.4)	(0.37)
T3: Complex	0.76	0.63**	0.36	0.94***	0.78**	0.49	0.55	0.69*	0.57	0.66**	0.62**	0.64	1.01***	0.39
	(0.62)	(0.29)	(0.38)	(0.37)	(0.4)	(0.35)	(0.38)	(0.38)	(0.46)	(0.32)	(0.31)	(0.48)	(0.38)	(0.36)
N	183	756	444	495	464	475	481	458	340	599	727	212	393	546
R^2	0.032	0.007	0.003	0.020	0.013	0.009	0.005	0.017	0.008	0.012	0.009	0.021	0.021	0.006

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the trust score on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table 5.

Table B11—Heterogeneous Treatment Effects on Trust II

	Understanding		**Knowledge**		**Trust**		**Confidence**		**Attentiveness**		$\mathbb{E}_t\pi^{pre}_{t+1}$		$\mathbb{E}_t g^{pre}_{t+1}$	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
α	4.96***	6.16***	4.69***	5.61***	3.08***	7.44***	3.29***	7.10***	4.22***	5.94***	5.56***	4.19***	4.39***	5.53***
	(0.22)	(0.32)	(0.26)	(0.32)	(0.16)	(0.14)	(0.22)	(0.18)	(0.26)	(0.24)	(0.25)	(0.28)	(0.27)	(0.27
T1: Simple	-	-0.51	0.71*	-0.49	0.16	-0.08	0.4	-0.04	-0.03	0.26	0.29	0.4	0.38	0.1
	-	(0.44)	(0.39)	(0.40)	(0.23)	(0.19)	(0.30)	(0.24)	(0.37)	(0.32)	(0.36)	(0.37)	(0.38)	(0.36)
T2: FOMC	0.41	-	0.65*	0.33	0.46**	0.28	0.58*	0.53**	0.27	1.12***	0.23	1.28***	0.72*	0.53
	(0.32)	-	(0.39)	(0.42)	(0.24)	(0.19)	(0.31)	(0.24)	(0.37)	(0.34)	(0.36)	(0.39)	(0.40)	(0.36)
T3: Complex	0.66**	-0.56	0.92**	0.04	0.03	0.28	0.58**	0.53**	0.60*	0.79**	0.29	1.15***	0.40	0.63*
	(0.30)	(0.48)	(0.39)	(0.40)	(0.23)	(0.18)	(0.30)	(0.24)	(0.36)	(0.33)	(0.35)	(0.38)	(0.40)	(0.35)
N	484	235	490	449	505	434	530	409	517	422	469	470	428	511
R^2	0.010	0.008	0.013	0.012	0.009	0.015	0.009	0.026	0.008	0.033	0.002	0.032	0.008	0.010

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports Huber robust estimates of regressing the trust score on three indicators representing the assignment of individuals to each treatment. The definition of each column follows what is explained in Table B5.

C. Survey Questions and Treatments

Introduction: The following survey is intended for the purpose of collecting data for a doctoral dissertation at the University of Texas at Austin. The survey is directed at both specialized and non-specialized audiences. All multiple-choice responses are single answer only, unless otherwise indicated.

Pre-Treatment Questions

1) "What is your age?"

   __ years old

2) "What is your employment status?"

   a. Part-time employed
   b. Full-time employed
   c. Unemployed (Not employed but actively looking for work)
   d. Non-employed (Not employed and not available or looking for work)

3) "What is your annual income?"

   a. $0-$20.000
   b. $20.000-$50.000
   c. $50.000-$100.000
   d. $100.000-$200.000
   e. More than $200.000

4) "What is the highest education degree you have completed?"

   a. Never finished high school
   b. High school completion
   c. Started an undergraduate degree but never finished
   d. Undergraduate degree
   e. Master's degree
   f. Doctorate degree

5) "Have you ever studied economics, finance or a similar subject?"

   a. Yes

   b. No

6) "How often do you read or visit a website for economic or business news?"

   a. Every day

   b. About once a week

   c. About once a month

   d. Never or hardly ever

7) "The Federal Reserve is the central banking system of the United States of America. Are you familiar with the role of the Federal Reserve in the economy?"

   a. Very familiar

   b. Somewhat familiar

   c. Not familiar

8) "What is (are) the goal(s) in the current mandate of the Federal Reserve?"

   a. Preserve the value of the dollar

   b. Maximum employment and stable prices

   c. Pay for government spending

   d. Keep stock prices high

9) "What is the main instrument used by the Federal Reserve to achieve its goals?"

   a. Guarantee deposit insurance to everyone with a bank account

   b. Change the exchange rate

   c. Change interest rates

   d. Define government spending and taxes

10) "Do you follow the announcements of the Federal Reserve?"

   a. Yes, all of them

   b. Some of them

c. No

11) "Inflation is the percentage rise in overall prices in the economy, and deflation is the percentage drop in overall prices in the economy. Over the last 12 months, the rate of inflation/deflation in the US was..." percent (Please use a percent between -100 and 100)

12) "In this question, you will be asked about the probability of something happening. The probability must be a percentage between 0 and 100 and the sum of your answers must add up to 100. What do you think is the probability that, over the next 12 months..."

a. The rate of inflation in the US will be 12% or more: __

b. The rate of inflation in the US will be between 8% and 12%: __

c. The rate of inflation in the US will be between 4% and 8%: __

d. The rate of inflation in the US will be between 2% and 4%: __

e. The rate of inflation in the US will be between 0% and 2%: __

f. The rate of deflation in the US will be between 0% and 2%: __

g. The rate of deflation in the US will be between 2% and 4%: __

h. The rate of deflation in the US will be between 4% and 8%: __

i. The rate of deflation in the US will be between 8% and 12%: __

j. The rate of deflation in the US will be 12% or more: __

13) "GDP, or Gross Domestic Product, is the total value of all goods and services produced in a country. In this question, you will be asked about the probability of something happening. The probability must be a percentage between 0 and 100 and the sum of your answers must add up to 100. What do you think is the probability that, over the next 12 months..."

a. The growth rate of GDP in the US will be 12% or more: __

b. The growth rate of GDP in the US will be between 8% and 12%: __

c. The growth rate of GDP in the US will be between 4% and 8%: __

d. The growth rate of GDP in the US will be between 2% and 4%: __

e. The growth rate of GDP in the US will be between 0% and 2%: __

f. The growth rate of GDP in the US will be between -2% and 0%: __

g. The growth rate of GDP in the US will be between -4% and -2%: __

h. The growth rate of GDP in the US will be between -8% and -4%: __

i. The growth rate of GDP in the US will be between -12% and -8%: __

j. The growth rate of GDP in the US will be -12% or less: __

Treatment 1: Simple version of FOMC statement

We are committed to using our full range of tools to support the U.S. economy in this challenging time. Thereby we are promoting our maximum employment and price stability goals.

With progress on vaccinations and strong policy support, indicators of economic activity and employment have continued to strengthen. The sectors most adversely affected by the pandemic have improved in recent months but continue to be affected. Job gains have been solid in recent months, and the unemployment rate has declined substantially.

The path of the economy continues to depend on the course of the virus. Progress on vaccinations and an easing of supply constraints are expected to support continued gains in economic activity and employment as well as a reduction in inflation. Risks to the economic outlook remain, including from new variants of the virus.

We seek to achieve maximum employment and inflation at the rate of 2 percent over the longer run. In support of these goals, we decided to keep the target range for the federal funds rate at 0 to 1/4 percent. We expect to maintain this target range until labor market has reached maximum employment levels.

Inflation has now exceeded 2 percent for some time, and the labor market has further improved. Given these developments, we decided to reduce the monthly pace of our net asset purchases by $20 billion for Treasury securities and $10 billion for agency mortgage-backed securities. Starting in January, we will increase holdings of Treasury securities by at least $40 billion per month, and of agency mortgage-backed securities by at least $20 billion per month. Similar reductions in the pace of net asset purchases will likely be appropriate each month. Nonetheless, we are prepared to adjust the pace of purchases if the economic outlook changes.

We will continue to look at incoming information regarding the economic outlook. We are prepared to adjust monetary policy if risks emerge that could impede our goals. Our assessments will consider readings on public health, labor market conditions, inflation pressures and inflation expectations, and financial and international developments.

Treatment 2: Actual FOMC statement

The Federal Reserve is committed to using its full range of tools to support the U.S. economy in this challenging time, thereby promoting its maximum employment and price stability goals.

With progress on vaccinations and strong policy support, indicators of economic activity and employment have continued to strengthen. The sectors most adversely affected by the pandemic have improved in recent months but continue to be affected by COVID-19. Job gains have been solid in recent months, and the unemployment rate has declined substantially. Supply and demand imbalances related to the pandemic and the reopening of the economy have continued to contribute to elevated levels of inflation. Overall financial conditions remain accommodative, in part reflecting policy measures to support the economy and the flow of credit to U.S. households and businesses.

The path of the economy continues to depend on the course of the virus. Progress on vaccinations and an easing of supply constraints are expected to support continued gains in economic activity and employment as well as a reduction in inflation. Risks to the economic outlook remain, including from new variants of the virus.

The Committee seeks to achieve maximum employment and inflation at the rate of 2 percent over the longer run. In support of these goals, the Committee decided to keep the target range for the federal funds rate at 0 to 1/4 percent. With inflation having exceeded 2 percent for some time, the Committee expects it will be appropriate to maintain this target range until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment. In light of inflation developments and the further improvement in the labor market, the Committee decided to reduce the monthly pace of its net asset purchases by $20 billion for Treasury securities and $10 billion for agency mortgage-backed securities. Beginning in January, the Committee will increase its holdings of Treasury securities by at least $40 billion per month and of agency mortgage backed securities by at least $20 billion per month. The Committee judges that similar reductions in the pace of net asset purchases will likely be appropriate each month, but it is prepared to adjust the pace of purchases if warranted by changes in the economic outlook. The Federal Reserve's ongoing purchases and holdings of securities will continue to foster smooth market functioning and accommodative financial conditions, thereby supporting the flow of credit to households and businesses.

In assessing the appropriate stance of monetary policy, the Committee will continue to monitor the implications of incoming information for the economic outlook. The Committee would be prepared to adjust the stance of monetary policy as appropriate if risks emerge that could impede the attainment of the Committee's goals. The Committee's assessments will take into account a

wide range of information, including readings on public health, labor market conditions, inflation pressures and inflation expectations, and financial and international developments.

Treatment 3: Complex version of FOMC statement

With progress on vaccinations and strong policy support, indicators of economic activity and employment have continued to strengthen, and the sectors most adversely affected by the pandemic have improved in recent months but continue to be affected by COVID-19. In light of supply and demand imbalances related to the pandemic and the reopening of the economy, which have continued to contribute to elevated levels of inflation, the Federal Reserve decided to keep the target range for the federal funds rate at 0 to $\frac{1}{4}$ percent, namely to support the Committee goals of achieving maximum employment and inflation at the rate of 2 percent over the longer run. In addition, the Federal Reserve will increase its holdings of Treasury securities starting in January 2022 by at least $40 billion per month and of agency mortgage-backed securities by at least $20 billion per month.

The Federal Reserve is committed to using its full range of tools to support the U.S. economy in this challenging time, thereby promoting its maximum employment and price stability goals. The Committee will continue to monitor money market developments as it assesses the level of reserves most consistent with efficient and effective policy implementation, and the Committee stands ready to adjust the details of these plans as necessary to foster efficient and effective implementation of monetary policy. In connection with these plans, the Federal Open Market Committee voted unanimously to authorize and direct the Federal Reserve Bank of New York, until instructed otherwise, to execute transactions in the System Open Market Account in accordance with the following domestic policy directive:

"Effective December 15, 2021, the Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 0 to 1/4 percent. With inflation having exceeded 2 percent for some time, the Committee expects it will be appropriate to maintain this target range until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment. In light of inflation developments and the further improvement in the labor market, the Committee decided to direct the Desk to reduce the monthly pace of its net asset purchases by $20 billion for Treasury securities and $10 billion for agency mortgage-backed securities. Beginning in January, the Committee will direct the Desk to increase its holdings of Treasury securities by at least $40 billion per month and of agency mortgage backed securities by at least $20 billion per month. The Committee judges that similar reductions in the pace of net asset purchases will likely be appropriate each month, but it is prepared to adjust the pace of purchases if warranted by changes in the economic outlook. The Federal Reserve's ongoing purchases and holdings of securities will continue to foster smooth

market functioning and accommodative financial conditions, thereby supporting the flow of credit to households and businesses. In assessing the appropriate stance of monetary policy, the Committee will continue to monitor the implications of incoming information for the economic outlook. The Committee would be prepared to adjust the stance of monetary policy as appropriate if risks emerge that could impede the attainment of the Committee's goals. The Committee's assessments will take into account a wide range of information, including readings on public health, labor market conditions, inflation pressures and inflation expectations, and financial and international developments."

Post-Treatment Questions

14) "How much of the material you just read were you able to understand?"

   a. None or nearly none of it
   b. A small amount of it
   c. About half of it
   d. A lot of it
   e. All or nearly all of it

15) "In what way does the Federal Reserve support price stability in the US?"

   a. The Federal Reserve tries to keep changes in prices of goods and services to 2% per year on average
   b. The Federal Reserve tries to keep prices of good and services as low as possible
   c. The Federal Reserve tries to make sure that prices of goods and services do not change
   d. The Federal Reserve tries to keep changes to prices of goods and services to 0.5% per year on average

16) "In what way does the Federal Reserve support the US labor market?"

   a. The Federal Reserve tries to keep employment as stable as possible
   b. The Federal Reserve tries to keep the unemployment rate below 5%
   c. The Federal Reserve tries to achieve maximum employment
   d. The Federal Reserve tries to keep the unemployment rate below 10%

17) "Which of these is true about prices at the moment?"

   a. Prices are falling
   b. Prices are not changing
   c. Prices are rising, but more slowly than the Federal Reserve's target
   d. Prices are rising faster than the Federal Reserve's target

18) "What has recently happened to the Federal Reserve's asset purchases?"

   a. The Federal Reserve is increasing the dollar amount of securities it purchases per month

b. The Federal Reserve is keeping the dollar amount of securities it purchases per month constant

c. The Federal Reserve is decreasing the dollar amount of securities it purchases per month

d. The Federal Reserve is increasing the dollar amount of securities it sells per month

e. The Federal Reserve is keeping the dollar amount of securities it sells per month constant

f. The Federal Reserve is decreasing the dollar amount of securities it sells per month

19) "What is the Federal Reserve's current target range for the federal funds rate?"

From __ to __ percent

20) "What is the Federal Reserve's current goal for inflation in the long-term?"

__ percent

21) "Your friend currently spends $100 a week on groceries. They are planning their household finances for next year, and are thinking about how much money they will need to budget for groceries. They want to keep buying the same things as they are buying now. How much should your friend budget each week for their grocery shop next year?"

__ $ per week

22) "Your friend earns $100 per day. They will have a chance to ask for a pay rise at the end of this year to cover increases in the cost of living. How much should they ask for as their daily rate, just to cover increases in the cost of living?"

__ $ per day

23) "On a scale of 0 to 10, how would you rate your confidence in the Federal Reserve?"

__ (Insert a whole number between 0 and 10)

24) "On a scale of 0 to 10, if you want trustworthy information about the economy, how would you rate communications from the Federal Reserve?"

__ (Insert a whole number between 0 and 10)

25) "On a scale of 0 to 10, how would you rate your attentiveness to future Federal Reserve announcements?"

__ (Insert a whole number between 0 and 10)

26) "By how much do you expect GDP in the US economy to grow over the next 12 months?"

__ percent (Please use a percent between -100 and 100)

27) "By how much do you expect prices in the economy (as measured by the Consumer Price Index) to change over the next 12 months?"

__ percent (Please use a percent between -100 and 100)

28) "Compared to your current level of spending on goods and services, do you plan to buy more or fewer goods and services over the next 12 months?"

a. I plan to buy more goods and services

b. It will not change

c. I plan to buy less goods and services

29) V1. "What kind of goods and services do you plan to additionally consume over the next 12 months? Check all that apply." [Only for respondents who selected a. on question 28]

a. Durable goods (e.g. real estate, clothing or vehicles)

b. Nondurable goods (e.g. food, drink or gas)

c. Services (e.g. haircuts or cleaning services)

d. Travelling

e. Other

29) V2. "Do you plan to reallocate your consumption across different types of goods and services over the next 12 months?" [Only for respondents who selected b. on question 28]

a. Yes, I plan to consume more durables (e.g. real estate, clothing or vehicles) and less non-durables (e.g. food, drinks or gas).

b. Yes, I plan to consume more non-durables and less durables.

c. No, I plan to keep it about the same.

29) V3. "What kind of goods and services do you plan to consume less of over the next 12 months, compared to your current consumption basket? Check all that apply." [Only for respondents who selected c. on question 28]

a. Durable goods (e.g. real estate, clothing or vehicles)

b. Nondurable goods (e.g. food, drink or gas)

c. Services (e.g. haircuts or cleaning services)

d. Travelling

e. Other

30) "Comparing to your current savings, do you plan to save more or less money over the next 12 months?"

a. I plan to save more

b. It will not change

c. I plan to save less

31) V1. "What do you plan to do with the additional savings over the next 12 months?" [Only for respondents who selected a. on question 30]

a. Keep these in checking or savings accounts

b. Invest in financial markets

c. Invest in cryptocurrencies

d. Other

31) V2. "Do you plan to reallocate your savings across types of investments over the next 12 months?" [Only for respondents who selected b. on question 30]

a. Yes, I plan to invest more in financial markets or cryptocurrencies and keep less money in my checking or savings account

b. Yes, I plan to invest more in financial markets or cryptocurrencies and keep less money in my checking or savings account

c. No, I plan to keep it about the same

31) V3. "What kind of investments do you plan to not do over the next 12 months, compared to your usual savings plan?" [Only for respondents who selected c. on question 30]

a. I plan to keep less money in checking or savings accounts

b. I plan to invest less in financial markets

c. I plan to invest less in cryptocurrencies

d. Other

32) V1. "How likely are you to look for new jobs over the next 12 months?" [Only for respondents who selected a. or b. on question 2]

a. Very likely

b. Likely

c. Unlikely

d. Very unlikely

32) V2. "How intensely to you plan to look for a job over the next 12 months if you remain unemployed?" [Only for respondents who selected c. on question 2 pre-treatment]

a. More intensely than in the past 12 months

b. It will not change

c. Less intensely than in the past 12 months

33) V1. "How high do you need a new wage to be to accept a new job, or consider changing jobs? Choose only one option." [Only for respondents who selected a. or b. on question 2]

a. __ $ per year

b. __ $ per hour

c. I don't know or I would never consider changing jobs

33) V2. "How high do you need a new wage to be to accept a new job? Choose only one option." [Only for respondents who selected c. on question 2]

a. __ $ per year

b. __ $ per hour

c. I don't know or I would never consider changing jobs

33) V3. "How high would you need a new wage to be to consider getting a job again? Choose only one option." [Only for respondents who selected d. on question 2]

a. __ $ per year

b. __ $ per hour

c. I don't know or I would never consider getting a job again