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**Working Paper**

## Subjective Models of the Macroeconomy: Evidence from Experts and a Representative Sample

CESifo Working Paper, No. 7850

**Provided in Cooperation with:**

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

*Suggested Citation:* Andre, Peter; Pizzinelli, Carlo; Roth, Christopher; Wohlfart, Johannes (2019) : Subjective Models of the Macroeconomy: Evidence from Experts and a Representative Sample, CESifo Working Paper, No. 7850, Center for Economic Studies and Ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/207241>

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## **Impressum:**

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

Poschingerstr. 5, 81679 Munich, Germany

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Editor: Clemens Fuest

[www.cesifo-group.org/wp](http://www.cesifo-group.org/wp)

An electronic version of the paper may be downloaded

- from the SSRN website: [www.SSRN.com](http://www.SSRN.com)
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# Subjective Models of the Macroeconomy: Evidence from Experts and a Representative Sample

## Abstract

We propose a method to measure people's subjective models of the macroeconomy. Using a sample of 2,200 households representative of the US population and a sample of more than 1,000 experts, we measure beliefs about how the unemployment rate and the inflation rate respond to four different hypothetical exogenous shocks: a monetary policy shock, a government spending shock, an income tax shock, and an oil price shock. While expert predictions are quantitatively close to benchmarks from standard DSGE models and VAR evidence and relatively homogeneous, there is strong heterogeneity among households. Households predict changes in unemployment that are largely in line with the experts' responses for all four shocks. However, their predictions of changes in inflation are at odds with those of experts both for the tax shock and the interest rate shock. We show that a substantial fraction of deviations of household predictions from expert predictions can be explained by the use of a simple heuristic according to which people expect a positive co-movement among variables they perceive as good and among variables they perceive as bad. Our findings inform the validity of central assumptions about the expectation formation process and have important implications for the optimal design of fiscal and monetary policy.

JEL-Codes: D120, D140, D830, D840, E320, G110.

Keywords: expectation formation, subjective models, macroeconomic shocks, monetary policy, fiscal policy.

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September 10, 2019

We thank Benjamin Born, Francesco D'Acunto, Andreas Fuster, Yuriy Gorodnichenko, Michael Haliassos, Chi Hyun Kim, Michael Kosfeld, Matt Lowe, Sonja Settele, Uwe Sunde, Johannes Stroebel, Michael Weber, Mirko Wiederholt, Basit Zafar, the many experts who participated in our survey as well as seminar and conference participants at Bonn, Leiden, Frankfurt, the ifo Institute (Munich), the Theories and Methods in Macroeconomics conference (Nuremberg), the workshop on Expectations and Decisions of Households (Berlin), the IAAE conference (Nicosia) and the SEM Conference (Frankfurt) for helpful comments. We thank Dorine Boumans, Johanna Garnitz, Andreas Peichl, and the ifo Institute for including our module in the World Economic Survey. Anna Lane and David Zeimentz provided excellent research assistance. We received ethics approval from Goethe University Frankfurt. Disclaimer: The views expressed in this paper are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

# 1 Introduction

A core assumption underlying rational expectations macroeconomic models is that economic agents form expectations about aggregate outcomes that are consistent with the underlying model. For instance, standard New Keynesian models predict increases of both unemployment and inflation in response to a negative supply-side shock, but an increase of unemployment and a decrease of inflation in response to a negative demand-side shock. Households recognize these relationships and form their expectations accordingly. In this paper, we study empirically people’s beliefs about the response of inflation and unemployment to different types of macroeconomic shocks.

Studying households’ beliefs about the effects of aggregate shocks not only sheds light on a crucial assumption underlying macroeconomic models, but is also important for better understanding the “subjective models” households use to form expectations about inflation and unemployment. Recent evidence indicates that these expectations matter for households’ consumption and financial decisions, and thereby shape aggregate outcomes (Armona et al., 2018; Bailey et al., 2018; Coibion et al., 2019a,c; D’Acunto et al., 2019a; Kuchler and Zafar, 2019). Understanding these beliefs is also essential to assess the effects of government and central bank policies, as the impact of such policies depends on households’ forward-looking expectations of aggregate dynamics. Indeed, some of these policies, such as monetary forward guidance, aim to influence people’s behavior primarily by shifting macroeconomic expectations (Coibion et al., 2018b).

Measuring households’ beliefs about changes in inflation and unemployment in response to macroeconomic shocks poses several challenges. First, it is difficult to find clean exogenous variation in beliefs about the likelihood of macroeconomic shocks in the real world. Second, people’s beliefs should be measured in a way that enables a comparison with benchmarks from the theoretical and empirical literature. Third, beliefs should be measured using survey questions that are understandable to individuals without an economics education.

We propose an approach to measure beliefs about the effects of different macroeconomic shocks, which we apply both to a representative sample of 2,200 individuals of the US population and to more than 1,000 experts, economists from leading universities and policy institutions. We use vignettes in which we ask our respondents to predict future unemployment and inflation under different hypothetical macroeconomic shocks.

We focus on four different exogenous shocks that are among the most commonly studied in macroeconomics: an oil price shock, a monetary policy shock, a government spending shock, and an income tax shock. Our approach allows us to fix the respondents' beliefs about the source of the shock and to ensure that the shocks are perceived as exogenous. This enables us to characterize our respondents' "subjective models" and to compare their beliefs to well-established benchmarks from theoretical models and empirical evidence.

For each vignette, we elicit the respondents' expectations about the unemployment rate and the inflation rate twice: First, under the assumption that the shock variable of interest will not change over the next 12 months. Then, the respondents are randomly assigned to either a "rise-scenario" or a "fall-scenario". In the "rise-scenario", the shock variable of interest increases relative to the baseline scenario. For example, in the oil price vignette, we tell our respondents that the oil price will be on average \$30 higher over the next 12 months or, in the income tax vignette, that tax rates increase by 1 percentage point. In the "fall-scenario", the shock variable of interest decreases relative to the baseline scenario. By taking the difference in the expectations about unemployment and inflation between the rise/fall and the baseline scenario we measure the effect of the shock as perceived by respondents, while taking out constant differences in expectations across individuals.

We first present the predictions from the experts, which serve two distinct purposes: First, they allow us to compare economists' beliefs about the functioning of the US economy with standard models and empirical evidence. Second, the expert predictions allow us to benchmark the estimates of the respondents from the representative online panel without having to rely on any particular macroeconomic model. Experts think that both inflation and unemployment positively respond to an increase in oil prices. Experts forecast that unemployment responds positively to increases in taxes and to decreases in government spending, while inflation responds negatively. Finally, experts think that inflation drops in response to interest rate hikes, while unemployment increases. The experts' forecasts are all precisely estimated and largely consistent with predictions from DSGE models and empirical evidence from VARs. Moreover, there is relatively little disagreement among experts.

We next compare the expert predictions to those of respondents from the representative online panel. The respondents in this sample hold very similar expectations as the

experts in the oil vignette, both for unemployment and inflation. While households think that inflation positively responds to changes in government spending, they on average do not think that unemployment significantly responds to changes in government spending. The most striking deviation from the experts' forecast is that households think that increases in the federal funds target rate would increase inflation, as would a rise in income tax rates. Across the vignettes, households' predictions about the unemployment rate are largely aligned with those of experts, while their inflation forecasts are less in line with those of experts.

What is driving the accuracy of predictions among respondents in the representative online panel? We include a series of tailored questions that allow us to study the mechanisms behind our findings. We begin by measuring our respondents' beliefs about the propagation mechanisms of macroeconomic shocks. Holding more accurate beliefs about propagation channels positively correlates with making predictions that are qualitatively aligned with those of experts, but the effects are relatively moderate. Moreover, respondents' evaluation of how relevant aggregate unemployment or inflation is to their own economic situation is uncorrelated with how close their predictions are to the benchmarks, inconsistent with the idea that rational inattention is driving biased beliefs among households. Furthermore, respondents' numeracy is uncorrelated with the accuracy of their predictions. Among respondents' demographic characteristics, higher education and age are associated with predictions that are more in line with those of experts, providing some support for learning over the life-cycle and cognitive constraints (D'Acunto et al., 2019b,c,d).

Given the lack of strong evidence for the above mechanisms, we propose a novel behavioral channel based on respondents' affective representation of macroeconomic variables, which we term the good-bad-heuristic (GBH). The GBH is a simple heuristic which posits that individuals perceiving two variables as both good (or both bad) predict that these variables co-move, while they predict movement in opposing directions if they perceive one variable as good and the other as bad. We measure for each variable of interest whether respondents consider higher values of the variable as good or bad for their own household and for the US economy. We find that a substantial fraction of deviations of household predictions from expert predictions can be explained by the use of the GBH.

We contribute to a growing literature studying the formation of macroeconomic ex-

pectations of experts, households and firms (Afrouzi, 2019; Bachmann et al., 2019, 2015; Bordalo et al., 2018, 2019; Coibion and Gorodnichenko, 2012, 2015a,b; Fuster et al., 2012, 2010). This literature has found that macroeconomic expectations are affected by agents' socioeconomic status (Das et al., 2017), personal experiences (Goldfayn-Frank and Wohlfart, 2019; Kuchler and Zafar, 2019; Malmendier and Nagel, 2011, 2016) and social interactions (Bailey et al., 2019, 2018). Some papers have used survey experiments to study how individuals respond to the provision of information in the context of expectations about inflation (Armantier et al., 2016, 2015; Binder and Rodrigue, 2018; Cavallo et al., 2017; Coibion et al., 2019b, 2018a), house prices (Armona et al., 2018; Coibion et al., 2019a,c; Fuster et al., 2019) and aggregate economic growth (Roth and Wohlfart, 2019).

Our paper is related to work studying beliefs about the co-movement of different macroeconomic variables. Carvalho and Nechio (2014), Dräger et al. (2016) and Kuchler and Zafar (2019) use observational data to examine how households' beliefs about unemployment, inflation and interest rates are correlated. We provide the first direct, causal evidence on people's beliefs about the effects of different macroeconomic shocks on inflation and unemployment. Our approach allows us to characterize how well beliefs about the response of inflation and unemployment align with theoretical and empirical benchmarks.

We methodologically contribute to the literature on macroeconomic expectation formation by proposing the use of hypothetical vignettes to characterize people's subjective beliefs about the responses of unemployment and inflation to different macroeconomic shocks. A series of recent papers uses hypothetical vignettes to study belief formation and behavior in contexts that are hard to study in a real-world setting, such as in the area of education and human capital (Delavande and Zafar, 2018; Wiswall and Zafar, 2017), and recently also for the study of the consumption response to changes in current or expected future economic resources (Christelis et al., 2017; Fuster et al., 2018). We contribute to the literature by applying this approach to study household beliefs about changes in unemployment and inflation in response to commonly modelled shocks. We test for the relevance of prediction incentives, leveraging expert responses as an external benchmark. We find that incentives only moderately affect the accuracy of predictions.<sup>1</sup>

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<sup>1</sup>Our evidence on the predictions from experts and the representative sample contributes to a literature studying differences in forecasts among experts and the general population (DellaVigna and Pope,



The rest of this paper is structured as follows. Section 2 provides an overview of the samples of households and experts and the survey design. Section 3 presents our main evidence on experts’ and households’ predictions in the different vignettes and compares them to benchmarks from standard DSGE models and VARs. Section 4 discusses a series of mechanisms underlying the heterogeneity in household predictions. Section 5 provides evidence on the robustness of our results. Section 6 discusses the implications of our findings for macroeconomic modeling and policymaking. Section 7 concludes.

## 2 Data and Design

### 2.1 Samples

**Representative Samples** The first wave of our household survey consists of a sample of 1,063 respondents that is representative of the US population in terms of education, gender, age, region, and total household income. We conducted the online survey in February and March 2019 (consumers Wave 1) in collaboration with the market research company “Research Now SSI” which is commonly used in social science research (de Quidt et al., 2018; Enke, 2019). In July 2019 (consumers Wave 2) we collected a sample of another 1,151 respondents, which is representative of the US population in terms of education, gender, age, region, and total household income, in collaboration with an online panel provider (“Lucid”) that is widely used in the social sciences (e.g. Wood and Porter, 2019).

Table A2 provides summary statistics for the pooled sample and compares it to the general population using data from the 2017 American Community Survey (ACS). Our sample matches the distributions of education, gender, age, region and total household income very closely. 55 percent of our respondents are female, compared to 51 percent in the ACS. The average age in our sample is 46.4, while it is 47.4 in the ACS. 32 percent of the respondents in our sample have at least a bachelor’s degree compared to 30 percent in the ACS. The median income in our sample is \$62,500 compared to \$65,700 in the ACS.

**Expert Samples** We recruited a sample of leading economists working on macroeconomics by directly inviting them to take part in our survey in February and March 2019 (2018a,b).

(experts Wave 1). We invited economists who were authors or discussants in at least one of a series of leading conferences on macroeconomics, including the NBER annual macroeconomics conferences, and the Cowles Foundation conference on macroeconomics.<sup>2</sup> In addition, we invited Ph.D. students, experts from several policy institutions, as well as several experts working in the broad areas of expectation formation and forecasting. In total, 179 experts completed our survey.<sup>3</sup> We also included our own module into the World Economic Survey (WES) conducted by the ifo Institute (experts Wave 2). Their sample comprises about 1,800 economic experts from around the world that make forecasts about the economic prospects of their country on a quarterly basis (Boumans and Garnitz, 2017). The relevant survey round was conducted in July 2019 and 908 experts completed at least one hypothetical vignette in our module.<sup>4</sup>

As shown in Table A3, 16% percent of the experts that participated in Wave 1 are from policy institutions, such as the IMF and central banks, and 83 percent of the experts are from academic institutions. Moreover, only 26 percent of the experts are female. 21 percent are Full Professor, while 18 percent are PhD students.

In Wave 2 of our expert survey, 16% of experts are from policy institutions, 56% from academia, 16% work in a bank or a company, while the remaining 12% have another type of employer. The field of study of most of the experts is economics (84%). 65% of the experts have a PhD, and they predominantly come from North America or Western Europe (50%).<sup>5</sup>

## 2.2 Structure of the survey

**Representative sample** The structure of our survey with the representative sample is summarized in Figure 1. First, our respondents complete a series of demographic questions. Second, they receive brief non-technical definitions of the unemployment rate and the inflation rate to establish a common-ground definition of the two terms at the start of the survey. We also inform the respondents about the current values of the unemployment rate and the inflation rate in the US to ensure comparable information sets

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<sup>2</sup>For details on all conferences considered, see Appendix D.

<sup>3</sup>Demographic data on the 179 experts was collected directly from their CVs. For respondents from PhD programs and policy institutions we asked a few questions on demographics at the end of the survey.

<sup>4</sup>743 out of the 908 experts responded to all questions in the survey.

<sup>5</sup>In Wave 2 of our survey we have slightly different descriptives due to the specific demographic questions posed by the World Economic Survey.

about the current state of the economy. Third, in the main part of the survey participants make predictions about unemployment and inflation under two hypothetical vignettes. Fourth, we ask additional questions to better understand the mechanisms driving our respondents' predictions. Finally, we collect data on some additional demographics. The full set of experimental instructions for Wave 1 and Wave 2 of the experiments are shown in Appendices E and F.

**Expert survey** The expert survey consists of a subset of the survey given to the general population (see Figure 1). After being introduced to the question format, experts directly proceed to the prediction task in two randomly selected vignettes.<sup>6</sup> Afterwards, experts from policy institutions and PhD students continue with a few demographic questions, while the survey ends immediately for all other experts.<sup>7</sup>

## 2.3 Hypothetical vignettes

To measure our respondents' beliefs about the effects of different macroeconomic shocks, we use hypothetical vignettes in which we introduce our respondents to different scenarios and ask them to predict future unemployment and inflation. This approach allows us to fix people's beliefs about the source and the parameters of the shock and, importantly, to ensure that our respondents understand that the shocks are truly exogenous. The vignettes focus on four different exogenous shocks which are among the most commonly studied in macroeconomics: an oil price shock, a monetary policy shock, a government spending shock, and a tax shock. Our participants are randomly assigned to make predictions for two out of four different hypothetical vignettes that are presented in random order.<sup>8</sup>

Each vignette follows the same structure (summarized in Figure 1). All start with a short introduction to familiarize respondents with the setting of the vignette and the variable that will be subject to the shock (a). For example, in the income tax vignette they are informed about the rate and the amount that the median household currently

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<sup>6</sup>A small fraction of experts in Wave 1 faced all four vignettes, which did not affect the responses.

<sup>7</sup>We do not include the definitions of inflation and unemployment, but still provide the experts with the most recent values of both variables to ensure common information sets about the current state of the economy.

<sup>8</sup>In Wave 2 of the expert survey we did not fully randomize the order of vignettes as this is not feasible in the World Economic Survey.

pays in taxes on labor income. Then, respondents are presented with a baseline scenario in which they are asked to imagine that the variable of interest does not change (b). In this scenario, we elicit people’s expectations about the unemployment rate in 12 months from now and the inflation rate over the next 12 months. Our respondents are then randomly assigned to either a “rise-scenario” or a “fall-scenario” (c). In the “rise-scenario” (“fall-scenario”), respondents predict unemployment and inflation under a hypothetical increase (decrease) of the shock variable of interest. Eliciting beliefs both under a baseline and under a rise/fall scenario allows us to measure beliefs about the effects of shocks by taking differences across the scenarios. Thereby, constant individual-level differences in expectations about the future level of unemployment and inflation are cancelled out. Moreover, this addresses the behavioral phenomenon of “coherent arbitrariness” according to which statements about levels are often arbitrary and susceptible to ephemeral influences such as framing or anchoring, while differences between stated levels are comparatively coherent, robust, and reliable (Ariely et al., 2003). At the end of each vignette, respondents are asked how confident they are about their prediction for the vignette on a five-point scale (d).

Respondents indicate the expected unemployment and inflation rates on two sliders that range from 0% to 10% for unemployment and from -2% to 8% for inflation. The default position of the sliders is the current value of the respective rate. The sliders ease the task for our respondents and reduce noise and cognitive strain. Finally, to account for order effects, we cross-randomize whether respondents first receive the questions on the inflation rate or on the unemployment rate. For each participant, the order of the inflation and unemployment questions is identical across all vignettes. In what follows, we provide details on the vignettes.

**Oil price shock** In the introduction to the oil vignette, respondents learn about the current average price of one barrel of crude oil. Then, in the baseline scenario, our respondents are told to imagine that the average price of crude oil stays constant over the next 12 months. Thereafter, they are randomly assigned to either an “oil price rise scenario” or an “oil price fall scenario”. Specifically, respondents in the “oil price rise scenario” receive the following instructions:

Imagine the average price of crude oil unexpectedly rises due to problems with

the local production technology in the Middle East. On average, the price will be \$30 higher for the next 12 months than the current price. That is, the price will be on average \$84 for the next 12 months.

As is the case for all other vignettes, instructions for the fall-scenario are analogous to the rise-scenario.

**Government spending shock** This vignette first provides respondents with information on the size of yearly government spending in the US and its usual growth rate. In the baseline scenario, our respondents are told to imagine that federal government spending grows as usual over the next 12 months. That is, it grows at a rate that equals the growth that took place in the previous years. In the “rise-scenario”, our respondents receive the following instructions:

Imagine federal government spending unexpectedly grows to a larger extent than usual over the next 12 months due to a newly announced spending program on defense. In particular, total government spending grows by 2.4 percentage points more than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government’s assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending program.

**Monetary policy shock** We familiarize respondents with the federal funds target rate and its current value. The baseline scenario asks our respondents to imagine that the Federal Open Market Committee announces that it will keep the federal funds target rate constant. In the subsequent “fall-scenario” our respondents receive the following instructions:

Imagine the federal funds target rate is unexpectedly 0.5 percentage points lower. That is, in its next meeting, the Federal Open Market Committee announces that it is reducing the rate from 2.5% to 2%.

Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

**Tax shock** After a brief explanation of federal income taxes in the US, the baseline scenario tells our respondents to imagine that income tax rates stay constant for all US citizens over the next 12 months. In the subsequent “rise-scenario”, our respondents receive the following instructions:

Imagine that income tax rates are unexpectedly 1 percentage point higher for all households in the US over the next 12 months. This means that the typical US household would pay about \$400 more in taxes.

The government announces: The tax change is temporary and occurs despite no changes in the government’s assessment of the economic conditions. Moreover, government spending does not change in response to the tax increase.

**Endogenous policy response** Our main object of interest are people’s beliefs about the effects of the shocks on the unemployment and inflation rate accounting for any endogenous responses to the shocks by policymakers. In Wave 1 of our experiments we did not explicitly mention that respondents should take into account endogenous government and monetary policy responses when responding to the survey. To make this point more explicit, we gave respondents in Wave 2 of both the consumer and expert survey the following instructions:

In all your responses to the following questions, please think about what policymakers (the government and the central bank) would do under the different scenarios. Please account for the actions of policymakers that you would expect under the different scenarios and include them in your predictions.

**Additional instructions** In our instructions in both Wave 1 and Wave 2 we clearly stated that respondents were asked to make predictions about the US economy. In Wave 2 we included an additional instruction to make sure that they make predictions about the US economy instead of a hypothetical economy. Moreover, to make sure that the respondents did not just interpret our questions as a test of their knowledge of economics, we told them that we were interested in their actual views on what would happen under the different scenarios:

In all of the following questions, please give us your best guess about how the unemployment rate and the inflation rate in the US economy would actually

develop under the scenarios considered. This may or may not be in line with theoretical findings and evidence from economics. We are only interested in your own views and opinions on the US economy. All of the hypothetical scenarios and all of your predictions deal with the US economy.

**Incentives** To study the role of effort, we provide a random subset of respondents with monetary incentives in Wave 1 of the household survey if their responses are close to the expert forecasts.

**Discussion of vignette design** Since we work with a general population sample, we face a trade-off between the precision of the vignette and the ease of understanding it. To avoid cognitive overload among the general population sample, we make the vignettes as simple to understand as possible. Still, we take care to make it clear that the shocks are exogenous to the economy. For instance, we attribute the oil price shock to changes in the production technology in the Middle East. Similarly, in the interest rate scenario, we explicitly state that the change in interest rates occurs with no changes in the Fed’s assessment of the economic conditions. Moreover, we also fix people’s beliefs about the duration of the shocks by clarifying that the changes in taxation and government spending only last for one year. For the government spending and taxation shocks, we clarify that the temporary nature of the shock is common knowledge by using the wording “the government announces”. Finally, many of our design choices are motivated by common modeling assumptions in DSGE models and by empirical evidence from VARs in order to ensure comparability of our survey responses to these external benchmarks. For example, empirical evidence on government spending shocks often focuses on defense spending as this type of spending does not affect the economy’s productivity and does not directly redistribute resources across the income distribution.

## 2.4 Additional variables

We elicit several additional variables in the representative survey that allow us to study determinants and predictors of beliefs about the effects of macroeconomic shocks. In Wave 1 of the experiment we collected beliefs about the propagation mechanisms of the shocks and three standard questions measuring financial literacy (Lusardi and Mitchell,

2014). In Wave 2 of the experiment we collected additional variables to capture respondents' evaluation of how important the inflation rate and the unemployment rate are for their own economic situation, whether people perceive the shock variables, inflation, and unemployment as good or bad, several questions testing the numeracy of respondents, as well as beliefs about supply-side mechanisms operating in the context of the taxation shock and the interest rate shock.

In both waves of the survey, we also collect data on gender, age, income, education, economic education, political affiliation as well as financial assets, real assets, and outstanding debt. Moreover, participants report whether they generally follow news on the national economy.

## 3 Results

### 3.1 Benchmarks from the empirical and the DSGE literature

We compile a set of quantitative benchmarks for each shock from the theoretical and empirical literature. This enables us to compare the forecasts of experts and the general population with how the macroeconomic literature conventionally assesses the effect of each shock on inflation and unemployment. The details of each set of calculations and the sources used are contained in Appendix C. Table 1 reports the benchmark changes for the unemployment rate and inflation from the theoretical and empirical literature. The benchmarks are also depicted in Figure 2 and we discuss their magnitude compared to the expert forecasts in the next subsection.

To ensure comparability, we first calculate the relative size of the shock in each paper relative to the corresponding shock in the vignettes. For instance, most studies on government spending consider a shock with a magnitude of 1 percent of GDP while the spending change in our vignette is approximately 0.5 percent of GDP. We then rescale accordingly the estimated responses of output and inflation in the papers until quarter 4. Since most papers focus on output as the main variable of real activity, we translate the responses into changes in the unemployment rate using Okun's Law. For the theoretical benchmarks, when possible, we consider as an immediate benchmark the most comparable shock in a model that is widely accepted as a standard medium-size New Keynesian DSGE model. Our main choice is Smets and Wouters (2007) and its extension



to unemployment dynamics in Galí et al. (2011). As theoretical benchmarks for government spending and tax rate shocks we also draw on the multipliers computed by Zubairy (2014). We base the theoretical estimates of the impact of oil price shocks on the results of Bodenstein et al. (2011) and Balke and Brown (2018). Our empirical benchmarks draw on numerous studies applying VAR estimations, where the shocks of interest are identified through a variety of methods, such as structural restrictions, sign and zero restrictions, and narrative approaches.

### 3.2 Expert predictions

We next characterize the experts' beliefs about the effects of macroeconomic shocks pooling responses from Wave 1 and 2 as we do not find any qualitative differences in predictions across waves (Table A14). The expert forecasts mainly serve two purposes: (i) to document the average point beliefs and disagreement within the profession and compare them to the literature benchmarks, and (ii) to provide another benchmark for the representative sample. In the analysis, we estimate the following equations for each of the four vignettes separately:

$$\Delta u_i = \beta_1 \text{Rise}_i + \beta_2 \text{Fall}_i + \varepsilon_i \quad (1)$$

$$\Delta \pi_i = \gamma_1 \text{Rise}_i + \gamma_2 \text{Fall}_i + \eta_i \quad (2)$$

$\Delta u_i$  denotes the difference in unemployment predictions between the rise/fall scenario and the baseline scenario ( $u_{i,rise/fall} - u_{i,baseline}$ ). Correspondingly,  $\Delta \pi_i$  denotes the difference in inflation predictions between the rise/fall scenario and the baseline scenario ( $\pi_{i,rise/fall} - \pi_{i,baseline}$ ). We employ robust standard errors throughout the paper and wherever applicable we cluster standard errors at the respondent level. Results are summarized in Panel A of Table 2 and in Figure 2.

**Oil price shock** Experts predict that both unemployment and inflation will be higher in response to an increase in the oil price and lower in response to a fall (Columns 1 and 2 in Table 2, Panel A). In particular, they predict an increase in unemployment of 0.24 percentage points and a rise in inflation of 0.45 percentage points in the scenario where

the oil price increases by \$30. In the scenario in which the oil price decreases by \$30, they predict that the unemployment rate will be lower by 0.13 percentage points, and that the inflation rate will be lower by 0.33 percentage points. The absolute size of these expected changes is below the theoretical and empirical benchmarks.

**Government spending shock** Experts predict that unemployment will be lower and inflation will be higher in response to an exogenous increase in government spending. The reverse pattern is obtained for the fall-scenario (Columns 3 and 4 in Table 2, Panel A). The experts predict a 0.31 percentage point lower unemployment rate and a 0.3 percentage point higher inflation rate in the rise-scenario. In the fall scenario, they predict that the unemployment rate will be higher by 0.3 percentage points and that the inflation rate will be lower by 0.22 percentage points.

The benchmark relationship for unemployment from the literature has the same sign as perceived by the experts, though the experts' beliefs exceed the benchmark. This difference is not large and the confidence intervals include the upper bound of the benchmark. However, the difference may appear larger when considering that the experts were surveyed at what is likely a peak of the business cycle. As shown by Auerbach and Gorodnichenko (2012), fiscal multipliers are empirically much closer to zero during business cycle peaks, while they tend to be largest during recessions.<sup>9</sup> With respect to inflation, the benchmark from the DSGE literature is in line with expert predictions qualitatively, although it is also smaller in size.

**Interest rate shock** Our experts predict that unemployment will be higher by 0.29 percentage points, while inflation will be lower by 0.15 percentage points in response to an unexpected increase in the interest rate. In the fall scenario, experts predict that unemployment will be lower by 0.19 percentage points, and that inflation will be higher by 0.16 percentage points.

The predictions for the change in unemployment after a monetary contraction are very close to the benchmark of 0.2 to 0.4 percentage points, while those for the expansion are just below the lower bound. Inflation predictions are also very close to the 0.15-0.20 percentage point change in the benchmark. Once again, considering the point of the busi-

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<sup>9</sup>On the theoretical side, Michaillat (2014) develops a new-Keynesian model where search frictions strongly reduce government multipliers during periods of low unemployment.

ness cycle in which the survey was conducted provides a broader perspective. As shown by Barnichon and Matthes (2016), when the labor market is tight, the unemployment response to monetary policy shocks may be muted while that of inflation is amplified. Taking this into account, the expert predictions may be even closer to the benchmarks.

**Tax shock** On average, experts think that unemployment will be higher and inflation will be lower in response to an increase in income taxes, with reversed patterns for the fall scenario (Columns 7 and 8 in Table 2, Panel A). A 0.22 percentage point higher unemployment rate and a 0.11 percentage point lower inflation are expected in response to the rise-scenario. For the fall-scenario, experts predict a 0.24 percentage point lower unemployment rate, and a 0.12 percentage point higher inflation rate.

The unemployment prediction is above the theoretical benchmark of 0.06 percentage points but is inside the 0.2 to 0.6 range from the empirical evidence. The empirical studies we reviewed focus on tax revenues rather than income tax rates, and may therefore not be very closely comparable. Experts believe that the responses of macro variables are stronger for government spending shocks than for tax shocks.<sup>10</sup> This view is consistent with theoretical work such as Zubairy (2014).

**Measuring disagreement** Finally, we study the extent of disagreement among experts in the different scenarios. The variances of the predicted changes in unemployment and inflation,  $\Delta u$  and  $\Delta \pi$ , are relatively small, highlighting that there is little disagreement among the experts (see Table A6 and Figure A.2).

**Result 1.** *Overall, experts' predictions are broadly consistent with the empirical and theoretical consensus for most of the shocks. The magnitudes of expert forecasts are broadly in the range of quantitative estimates from DSGE models and VAR evidence. Also, there is relatively little disagreement in expert forecasts.*

**Heterogeneity in the expert sample** Using the rich demographic background data from the World Economic Survey (Wave 2 of the expert survey), we also shed light on correlates of making predictions that are qualitatively consistent with the model and empirical benchmarks. Overall, we find relatively little heterogeneity in expert forecasts

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<sup>10</sup>Given that the government shock is approximately equal to 0.3% of GDP and the tax shock is close to 0.5% (see Appendix C for the calculation of these sizes), the difference would be even larger if the two shocks were scaled to the same magnitude.

by gender, age, and location of the experts (Figure A.9). However, respondents who work for policy institutions and those with a PhD are more likely to make predictions consistent with the benchmarks (see Table A4). Moreover, the predictions of experts based in the US are very similar to predictions from experts not based in the US (Table A5). We find no significant relationship between confidence and the accuracy of predictions as measured by the consensus forecasts among experts (Table A13).

### 3.3 Predictions from the representative sample

We continue with the forecasts from the general population. Panel B of Table 2 and Figure 2 display the predictions of the inflation and the unemployment rate under the different hypothetical scenarios. Throughout this section we report pooled results from both Wave 1 and Wave 2 as we do not find meaningful differences in responses across the waves (Table A14).

**Oil price shock** Respondents make qualitatively and quantitatively similar predictions to the experts: On average, they predict the unemployment rate to be 0.45 percentage points higher and the inflation rate to be a 0.67 percentage points higher in the scenario where the oil price rises by \$30. In the oil price fall-scenario, they expect the unemployment rate to be 0.21 percentage points lower and the inflation rate to be 0.33 percentage points lower.

**Government spending shock** Households' beliefs about how inflation responds to government spending changes is qualitatively consistent with expert beliefs. Households think that inflation will be lower by 0.26 percentage points in response to an exogenous reduction in government spending, and that it will be higher by 0.13 percentage points in response to an increase in government spending. Households on average think that unemployment responds neither to an increase nor to a decrease in government spending.

**Interest rate shock** While respondents think that unemployment will be 0.17 percentage points higher in response to a rise in interest rates, they expect it to remain unchanged in response to a decrease in interest rates. Respondents expect a 0.15 percentage point lower inflation rate in response to a fall in the federal funds target rate, which is at odds with the expert forecasts and theory. Even more striking is that households think that

an increase in the federal funds target rate will lead to a 0.19 percentage point higher inflation rate, again contrary to the benchmarks.

**Tax shock** Respondents think higher taxes will lead to a 0.3 percentage points higher unemployment rate, and that lower taxes will result in a 0.25 percentage point lower unemployment rate. However, they expect exogenous tax changes to influence inflation in the opposite direction of the expert forecasts. Specifically, they predict that a tax hike will result in a 0.21 percentage points higher inflation rate, while they forecast a 0.12 percentage point lower inflation rate in response to a tax cut.

**Disagreement** There is more disagreement among households than among experts. The standard deviations of the predicted changes in unemployment and inflation,  $\Delta u$  and  $\Delta\pi$ , are about twice as large as among experts (see Table A6).

**Result 2.** *While for the oil price shock and the government spending shock the general population expects responses of both unemployment and inflation that are qualitatively aligned with expert predictions, there are substantial deviations from experts' predictions in the interest rate and the tax shock vignettes. Households are much better at predicting unemployment than at predicting inflation. Finally, there is substantial heterogeneity in predictions in the representative panel.*

## 4 Mechanisms: accuracy of forecasts

In the vignettes, only 48% of all predictions from the general population are qualitatively in line with expert and literature benchmarks (see Figure 3). In this section we characterize different mechanisms that shape the accuracy of predictions of the representative sample. Understanding the determinants of forecast accuracy of households is critical for informing different theories of expectation formation and for characterizing heterogeneity in the formation of macroeconomic expectations in response to macroeconomic shocks. We define prediction accuracy as a dummy variable taking value one if the respondent predicts the shock to affect the unemployment/inflation rate in the same direction as the median expert. Figure 4 depicts regression coefficients of different potential determinants of prediction accuracy.

**Beliefs about propagation mechanisms** A potential determinant of people’s beliefs about the effects of macroeconomic shocks is their understanding of the underlying propagation mechanisms. For instance, do households understand how an oil price shock influences demand and supply? Do they understand how demand and supply affect inflation and unemployment? To better understand our respondents’ subjective models, we measure their beliefs about the propagation mechanisms through which aggregate shocks unfold. For instance, a positive oil price shock typically (i) increases production costs and (ii) reduces the purchasing power of households. This respectively shifts (iii) the supply curve and (iv) the demand curve to the left which, in turn, affects (v) inflation and (vi) unemployment. In the interest rate shock, it is important how the financing costs of firms (i.e. the costs of borrowing money) and the interest rates that households earn on savings or pay on loans are usually affected. In the income tax vignette, a pure demand-side shock, tax changes lead to a change in purchasing power which ultimately affects inflation and unemployment through aggregate demand.

In Wave 1 of the survey we elicit people’s beliefs about the causal direction of 14 relationships that should be relevant for the transmission of the four shocks we focus on. For example, to measure the perceived relation between the oil price and firms’ production costs, we ask our respondents: “How do firms’ production costs usually react if the oil price increases?”. The answer categories are: “they increase”; “they decrease”; “none of the above”. We focus on questions for which there is agreement on the sign of the relationship in the literature, which provides us with a benchmark.<sup>11</sup>

There is substantial variation across respondents in the accuracy of the responses to the questions on propagation mechanisms for all four shocks (Figure A.3). We calculate a score indicating the fraction of these 14 questions the respondent answered correctly. Holding above-median correct beliefs about propagation mechanisms increases forecast accuracy by 10 percentage points (Figure 4). Conditional on financial literacy, knowledge about propagation mechanisms strongly correlates with prediction accuracy in all vignettes (Table A7).<sup>12</sup>

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<sup>11</sup>Having a benchmark allows us to cross-randomize 70 percent of our respondents to receive a bonus payment of \$0.50 if a randomly selected question is answered correctly and, hence, to mitigate survey fatigue or inattention. The incentives, however, do not affect prediction accuracy. We ask all questions to all participants (randomly ordered), irrespective of which two vignettes they actually face.

<sup>12</sup>In unreported regressions we find no strong differences in the role of beliefs about specific propagation mechanisms in shaping forecast accuracy across vignettes.

**Financial literacy** Figure 4 shows that respondents with above median financial literacy are 7 percentage points more likely to make more accurate predictions in the vignettes. However, once we condition on people’s knowledge of propagation mechanisms of the macroeconomic shocks, financial literacy is not significantly related to the accuracy of macroeconomic forecasts except for predictions in the oil vignette (Table A7).

**Supply-side view of the economy** If households believe that higher income taxes or interest rates mainly affect inflation through higher costs for firms, this could explain why they perceive interest rate or tax hikes as inflationary. To measure respondents’ perceived relevance of supply-side mechanisms operating in the interest rate and the taxation shock scenarios, in Wave 2 we ask our respondents to what extent they agree with the following three statements: (i) Firms tend to pass on increases in production costs to consumers in the form of higher prices; (ii) Increases in income taxes tend to increase firms’ production costs; (iii) Increases in interest rates tend to increase firms’ production costs. We categorize individuals who agree to statements i) and ii)/iii) as believing in a supply-side effect of increases in income taxes/interest rates. There is substantial heterogeneity in people’s perceptions of the supply-side mechanisms operating in the context of interest rate and taxation shocks (Figure A.5). We find some heterogeneity in the predicted inflation responses by people’s perceived importance of the supply-side effects of the shocks (Figure 4 and Table A8). The prediction accuracy for inflation decreases by 12 percentage points for the income tax vignette if people have a supply-side view, but we see no effect of having a supply-side view on the prediction accuracy in the interest rate vignette (Panel B of Table A8).

**Rational inattention** Does low prediction accuracy arise from the fact that holding biased beliefs about the functioning of the macroeconomy is not very costly to households? To examine whether rational inattention is driving deviations of household from expert predictions, we measure our respondents’ beliefs about the relevance of unemployment and inflation for their own economic situation.<sup>13</sup> Specifically, we ask respondents about their agreement with the following two statements: (i) The US inflation rate is relevant

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<sup>13</sup>Macroeconomic models of rational inattention are usually concerned with inattention to the current state of economy (Maćkowiak and Wiederholt, 2015; Reis, 2006; Sims, 2003). If rational inattention was driving inaccurate predictions among our respondents, this would need to be inattention to the underlying structure of the economy.

for my own economic situation; (ii) The US unemployment rate is relevant for my own economic situation. Figure A.4 shows that there is substantial heterogeneity in the extent to which respondents perceive the inflation rate and the unemployment rate to be relevant for them personally. However, these measures of perceived relevance are uncorrelated with the fraction of correct predictions (Figure 4), suggesting that rational inattention is not the main driver of forecasts inaccuracy in our sample.

**Numeracy** Can a lack of numeracy explain deviations of household predictions from benchmarks? We measure our respondents' numeracy (see Appendix F) using seven questions that have been applied previously in the context of macroeconomic expectations and are collected in the Survey of Consumer Expectations (Armantier et al., 2017). We find no significant correlation of a dummy indicating above median numeracy with the fraction of correct predictions (Figure 4).

**Good-bad-heuristic** We also consider whether a simple heuristic, namely that good things lead to good things and bad things lead to bad things, which we refer to as the good-bad-heuristic (GBH), can explain the inaccuracy of predictions in the representative sample. The GBH hypothesis postulates that households perceiving two variables as both good or both bad (symmetric affective evaluation) are more likely to predict a positive co-movement between them, while predicting a movement in opposing directions if they perceive one variable as good and the other one as bad (asymmetric affective evaluation). Affective evaluations provide a particularly promising basis for heuristic extrapolation because emotional responses are known to be automatic, fast, and effortless and they typically exert a strong influence on behavior and reasoning (Kahneman, 2003; Loewenstein, 2000; Pham, 2007).

To test this hypothesis, we measure for each variable of interest (i.e. the four shock variables, unemployment, and inflation) whether respondents consider higher values as good or bad for the US economy and for their own household using 7-point scales, ranging from very bad (-3) to very good (3).<sup>14</sup> Figure A.6 highlights strong heterogeneity in affective evaluations of the different macroeconomic variables. For each combination of two variables (e.g. government spending and inflation) we create a dummy variable

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<sup>14</sup>Our evidence is related to small-scale survey evidence from psychology studying psychology students' understanding of the macroeconomy (Leiser and Aroch, 2009).



taking value one if respondents perceive both variables as at least somewhat bad (i.e. if the average of the personal and the economy-wide affective evaluation is negative for both variables) or if they perceive both variables as at least somewhat good (i.e. if the average of the personal and the economy-wide affective evaluation is positive for both variables). We use these dummy variables to construct predictions of respondents' answers in the vignettes assuming that they follow the GBH. For example, if someone perceives higher government spending as bad and higher inflation also as bad, then the GBH makes the prediction that people expect increases in inflation in response to an exogenous increase in government spending.<sup>15</sup>

We uncover a striking explanatory power of the good-bad-heuristic. The accuracy of predictions increases by 20 percentage points when the GBH makes a prediction that yields a qualitatively correct forecast (Figure 4). For instance, for the government spending scenario, respondents with a positive GBH score for spending and inflation would be more likely to make a qualitatively correct prediction for the response of inflation to a rise in federal spending. Panel A of Table 3 shows disaggregated results highlighting that the good-bad-heuristic is a powerful explanatory variable across vignettes. We leverage two sources of distinct variation for identification. First, we have within-individual variation, which relies on individuals evaluating different shock variables affectively in a different way, i.e. this variation arises from variation across vignettes. On top of that, we leverage variation within questions, which stems from the fact that different individuals have a different evaluation of the same shock variable. In Table 3 we show that individual fixed effects do not significantly affect the coefficient estimates, while question fixed effects reduce the size of the coefficient by half. This underscores the robustness of the results on the good-bad-heuristic.

What affects how macroeconomic variables are affectively encoded? Females, more numerate respondents, people with above-median age, and people with more debt are substantially less likely to evaluate higher values of inflation, unemployment, oil prices, the federal funds rate and the income taxes as good (Table A11). Holdings of real and financial assets are largely unrelated to affective evaluations. Individuals with higher incomes view higher values of unemployment, inflation, the oil price or the fed funds

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<sup>15</sup>It is worth noting that in testing the GBH hypothesis we do not assume that there is a "correct" affective relationship with respect to any variables. Our interest lies in examining the potential link between affective evaluations and predictions, where only the latter can be assessed as correct or incorrect.

rate as more positive, perhaps because they are less exposed to adverse macroeconomic shocks. Democrats are more likely to evaluate higher government spending and higher taxes as good.

Who uses the good-bad-heuristic? We create a dummy variable taking value one if a respondent's predictions are consistent with the predictions of the good-bad-heuristic. Most demographic variables have little predictive power for which respondents use the GBH. People who have an above-median age are more likely to make a prediction consistent with the good-bad-heuristic (Table A11).

Our findings on the good-bad-heuristic are related to a literature on extrapolation, which has shown that individuals extrapolate recent price changes (Bordalo et al., 2018, 2019) or extrapolate from their own situation to the macroeconomy (Kuchler and Zafar, 2019). The patterns in our data highlight a particular form of heuristic extrapolation across macroeconomic variables which depends on how the variables are affectively encoded, consistent with an important role for sentiment in expectation formation (Kamdar, 2018). Our results thus call for a more systematic measurement of how households affectively represent macroeconomic variables to better understand the formation of economic expectations.

**Political affiliation** One potential explanation for the inaccuracy of forecasts is that people's political ideology shapes their beliefs about how the economy is affected by the different shocks. Overall, we find no significant heterogeneity in responses to the vignettes and in accuracy of predictions by people's political affiliation, even in the government spending vignette (see Figure 4 and Table A12).

**Demographics** Figure 4 highlights that there are substantial differences in the accuracy of predictions across demographic groups. People with higher net wealth, older respondents, and college-educated respondents make a significantly higher fraction of correct forecasts, consistent with roles for cognitive limitations and learning over the life-cycle.

**Confidence** Confidence in predictions of the unemployment rate and the inflation rate among respondents from the representative sample is uncorrelated with the accuracy of their responses (Table A13 and Figure 4).

**Result 3.** *Taken together, our evidence highlights a quantitatively important role for the good-bad-heuristic compared to all other potential determinants of accuracy of predictions. Knowledge about propagation mechanisms and having a supply-side view regarding the shocks are also correlated with prediction accuracy, but numeracy, perceived relevance of macroeconomic variables, financial literacy, standard demographics as well as confidence are all only weakly correlated with the prediction accuracy in the vignettes.*

## 5 Robustness

In this section we discuss a series of robustness checks.

**Misperceived endogeneity of interest rate shock** In the vignette on the interest rate shock we stress that the change in the Fed funds rate does not occur due to a change in the Fed’s assessment of economic conditions. However, there may still be a concern that respondents in the representative sample think that higher interest rates indicate that the Fed is reacting to a rise in inflation, and therefore predict higher inflation. Since we anchor people on the current level of inflation, this could only be the case if respondents think that the Fed is reacting to a change in the outlook for future inflation. To address this concern, in Wave 2 we elicit subjective beliefs about how the Fed usually adjusts interest rates to (i) an unexpected increase in the outlook for inflation and (ii) an unexpected increase in the outlook for unemployment. To do so we prompt our respondents to “imagine that the FOMC changes their outlook for inflation (unemployment) over the next 12 months due to data revisions, while there is no change in the outlook for unemployment (inflation). Specifically, the Fed believes that the inflation (unemployment) rate will be 0.25 percentage points higher than their initial estimate.” Thereafter, we measure people’s beliefs about how the Fed would adjust the federal funds rate. Figure A.7 shows that there is substantial heterogeneity in beliefs on how the Fed would adjust interest rates in response to unexpected changes in inflation and unemployment. If our results were driven by respondents attributing a higher Fed funds rate to a change in the Fed’s outlook for inflation, we would expect stronger predicted increases in inflation in response to a positive interest rate shock for respondents who believe that the Fed more strongly raises interest rates in response to a higher outlook for the inflation rate. However, there is no significant heterogeneity and, if anything, the patterns go in the opposite prediction of

what would be predicted by this potential confound (Table A17).

**Incentives for vignettes** To examine the role of effort and attention in responses to the hypothetical vignettes, we provide a random subset of respondents with monetary incentives in Wave 1 of the consumer survey. We inform these respondents that we asked economic experts the same questions they will be asked and that for one randomly selected question, they can earn an additional \$0.50 if their response is at most 0.2 percentage points away from the average expert response.<sup>16</sup>

Incentives moderately increase the accuracy of predictions of inflation by 4 percentage points (Table A16 Column 1), while the prediction accuracy regarding unemployment is completely unaffected (Column 2). In a joint test, no effect of incentives on accuracy can be detected (Column 4), even though incentivized respondents spend roughly 40 seconds longer in the vignettes – a 25% increase in response time (Column 6). To rule out that incentivizing participants to match the experts’ average response introduces a bias in the predictions, we interact the incentive dummy with a measure of perceived objectivity and accuracy of experts. The effect of incentives on the accuracy of responses does not significantly vary with this measure of trust in experts (Panel B of Table A16).

**Order effects** To account for potential order effects, we randomize both the order of vignettes as well as the order in which unemployment or inflation questions are elicited. There are no significant order effects for the sample of experts from Wave 1 (Table A15).<sup>17</sup> Figure A.8 shows our main results for consumers pooling across Waves 1 and 2, separately for the full sample, the responses to the first vignette faced by each respondent, and the responses to the first question in the first vignette. The figure highlights that the responses are very similar, indicating a limited relevance of order effects, even though a highly powered formal test shows statistical evidence of some small order effects (Table A15).

**Attention to the survey** Figure A.8 also displays our main results for consumers pooling across Waves 1 and 2 separately for (i) the pooled sample, (ii) for a restricted sample excluding the upper and lower 10% tails in the survey time distribution, (iii) for a

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<sup>16</sup>\$0.50 corresponds to approximately one third of the show-up fee for respondents and is thus a relatively sizeable amount for respondents.

<sup>17</sup>The randomization of order was not feasible in the World Economic Survey (experts Wave 2).

restricted sample excluding the 20% of respondents with the largest absolute difference in predictions in the baseline scenarios across the two vignettes to which they responded.<sup>18</sup> Our figure highlights very similar patterns for those three different samples, suggesting that a lack of attention does not account for the patterns observed in the consumer survey.

**Wave effects** We conducted both our household and expert surveys in two separate waves which included slightly different instructions as discussed in Section 2. There are no significant differences across waves in our household survey or in our expert survey (Table A14). This suggests that the small changes in wording and the timing of the data collection across waves do not strongly affect the predictions.

## 6 Implications

In this section we discuss the implications of our findings for macroeconomic models of expectation formation and for the design of fiscal and monetary policy.

**Modeling the expectation formation mechanism** A recent research effort tries to incorporate more realistic assumptions on the expectation formation mechanism into macroeconomic models. What are the implications of our findings for this literature?

First, standard models assume that economic agents agree on the true model of the economy. This also holds for models of imperfect information, in which agents may disagree about the current state of the economy, but agree on its structure (Mankiw and Reis, 2002; Wiederholt, 2015; Woodford, 2003). These assumptions are at odds with the substantial disagreement in household predictions about the effects of all shocks in our survey. This finding lends support to a class of models in which households are uncertain and may disagree about structural parameters of the economy (Evans and Honkapohja, 2012; Milani, 2007; Orphanides and Williams, 2005).

Second, while there is substantial disagreement among our respondents across shocks, average predictions about the inflation response to government spending shocks and oil price shocks and about the unemployment response to all shocks are qualitatively aligned

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<sup>18</sup>Given that the baseline scenarios ask respondents to assume no change in the shock variable of interest, large differences in predictions between the two baseline scenarios each respondent faced could indicate inattention or random response behavior.

with benchmarks. This suggests that the assumption that households form their expectations in line with the underlying model may be a reasonable first approximation to the average household's beliefs in these contexts.

Third, households predict movements in inflation in response to monetary policy shocks and tax shocks in the opposite direction compared to standard models. Which models could generate such beliefs? Behavioral macroeconomic models featuring rational inattention (Maćkowiak and Wiederholt, 2015; Reis, 2006; Sims, 2003), k-level thinking (Farhi and Werning, 2017), no higher-order beliefs (Angeletos and Lian, 2017), or myopia (Gabaix, 2018) all entail that agents' expectations of future macroeconomic fluctuations are somewhat muted in magnitude, but the sign of the predicted responses of inflation and output to shocks are consistent with the model's equilibrium. Our findings on the explanatory power of the good-bad-heuristic call for models which feature a role for economic agents' affective judgment in shaping their macroeconomic expectations. Extrapolation across macroeconomic variables according to affective evaluation parallels the extrapolation of recent price trends or personal circumstances which has been documented by the literature (Bordalo et al., 2018, 2019; Kuchler and Zafar, 2019). Our findings on the GBH are also consistent with recent evidence showing that higher inflation expectations lead firms to *decrease* investment expenditure (Coibion et al., 2019c) and households to *reduce* their spending on durable goods (Coibion et al., 2019a).

**Fiscal and monetary policy-making** Our findings also have several implications for policymakers. For instance, on average households expect unemployment to fall in response to a tax cut but not after a government spending stimulus. This could lead to differential consumption responses to the announcement of different types of fiscal policies. Moreover, households' difficulties in predicting changes in inflation in response to government and central bank policies highlight the importance of communication. Different communication strategies could crucially influence the effectiveness of fiscal and monetary policy (Blinder et al., 2008; Coibion et al., 2019b; Haldane and McMahon, 2018). Finally, our finding of substantial heterogeneity in households' beliefs about macroeconomic relationships implies a large degree of variation in the effectiveness of monetary policy and fiscal policy in shifting expectations and behavior for different subpopulations of interest.

## 7 Conclusion

Drawing on a sample of experts and a large representative sample of the US population, we provide evidence on beliefs about the unemployment and inflation responses to four different macroeconomic shocks: an oil price shock, a monetary policy shock, a government spending shock, and a tax shock.

We establish a series of novel results: First, the expert predictions are both qualitatively and quantitatively aligned with the predictions from standard models and there is relatively little disagreement among experts. Second, we find substantial heterogeneity in responses to the vignettes in the representative panel. While for the oil price shock and the government spending shock experts and households expect rather similar responses of unemployment and inflation, there are substantial deviations in households' predictions from those of experts in the interest rate and the tax shock vignettes. In general, households' predictions about unemployment are largely in line with experts' predictions, while households find it more difficult to make accurate predictions about inflation. Third, we show that a large fraction of deviations of household predictions from expert predictions can be explained by the use of a simple heuristic which we label the "good-bad-heuristic". According to this heuristic, households who perceive two variables as both good or both bad predict that these two variables co-move. Our findings thus call for a more systematic measurement of people's mental representations of macroeconomic variables to better understand the formation of their economic expectations.

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# Main Figures

Figure 1: Overview of the survey structure and the structure of the vignettes

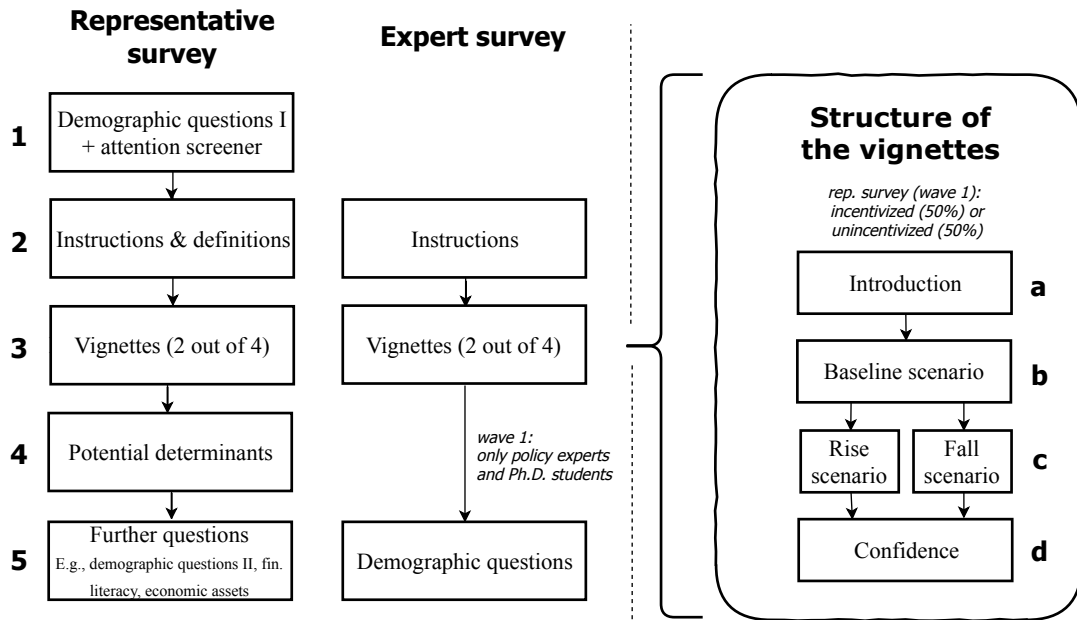
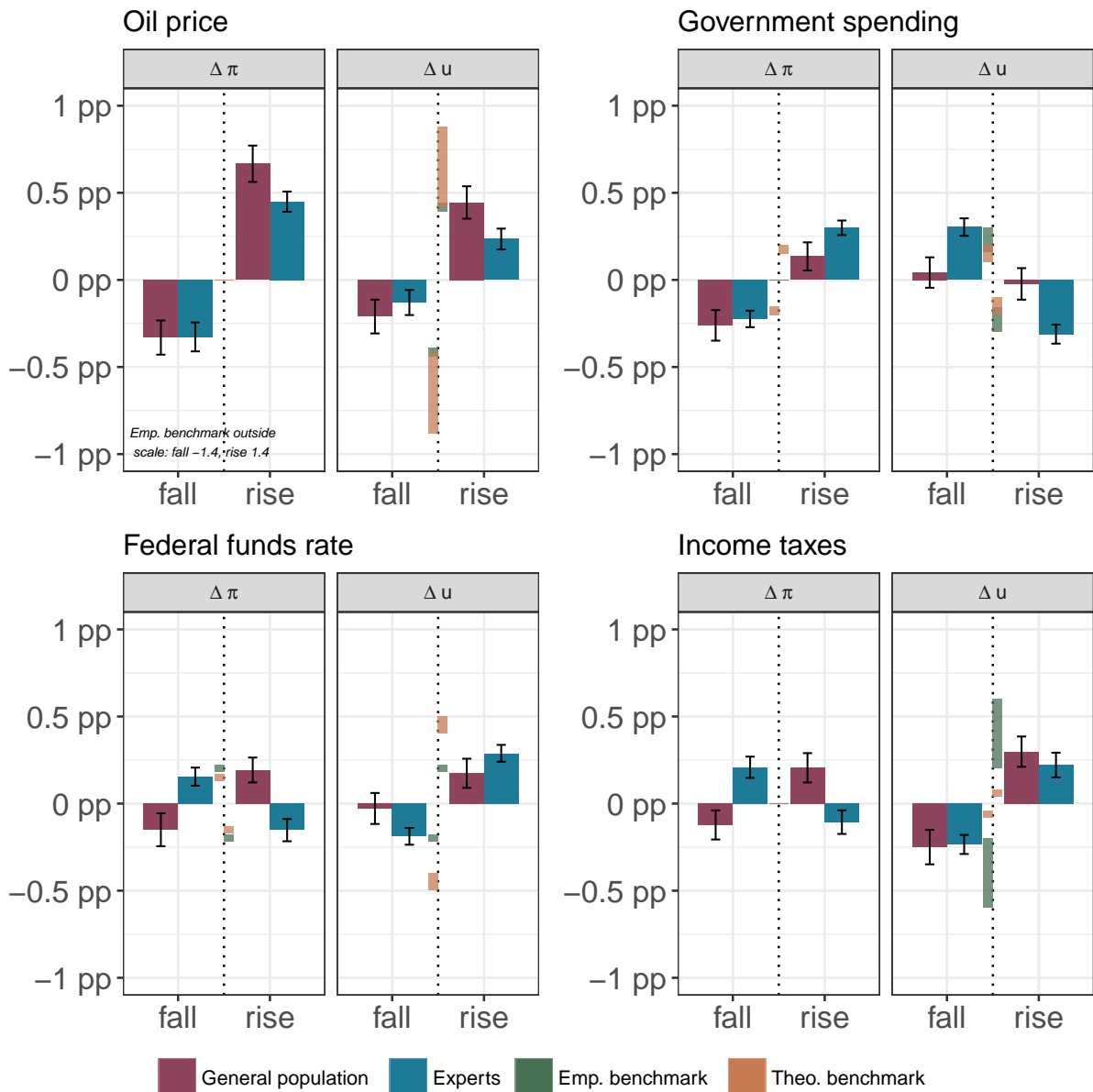


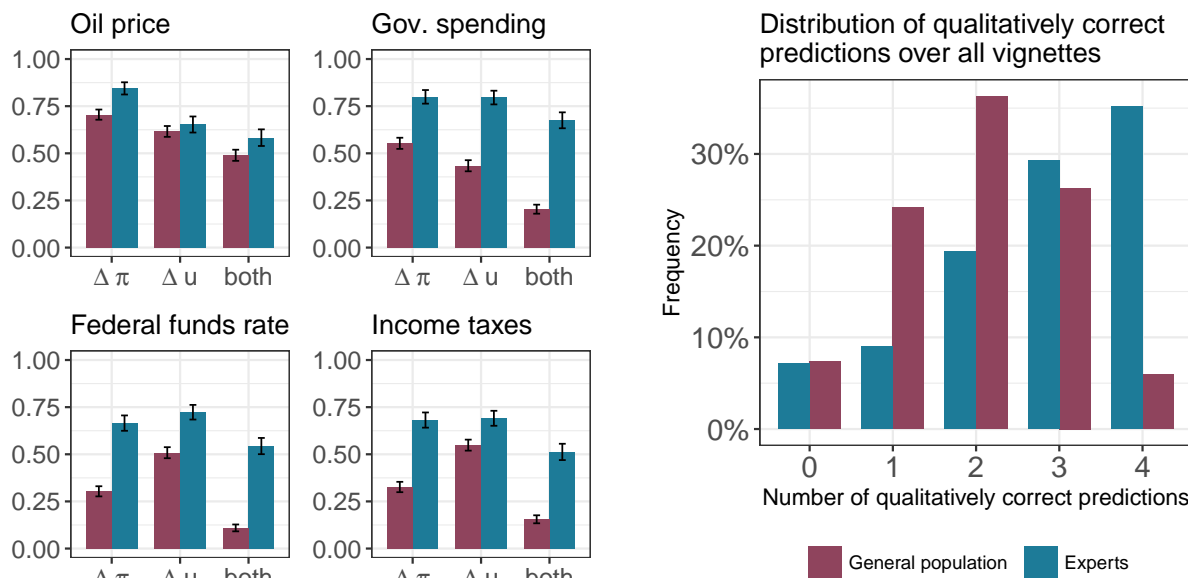


Figure 2: Beliefs about the effects of different shocks (with 95% CI)



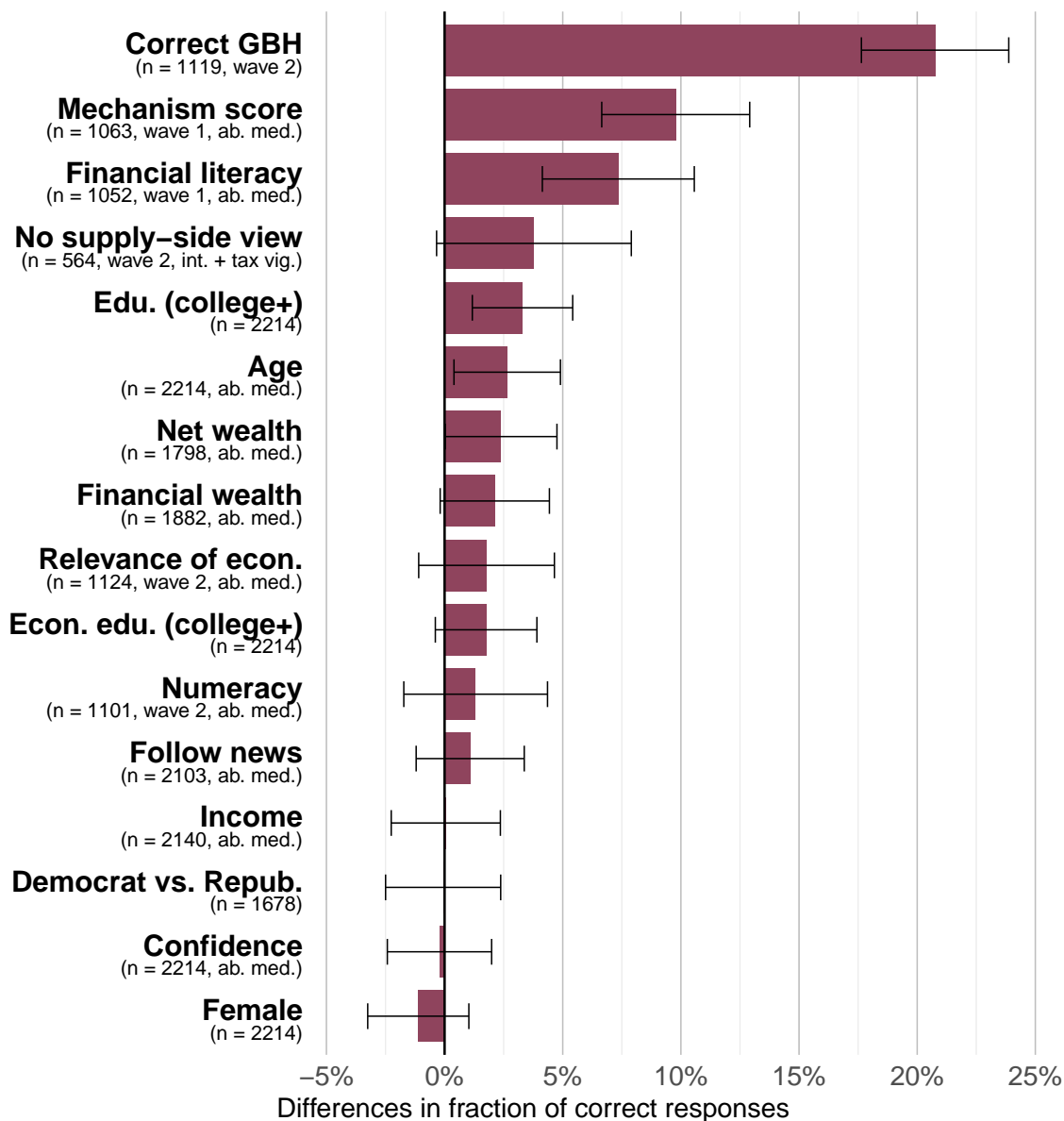
*Notes:* This figure provides an overview of beliefs about the effects of macroeconomic shocks on the unemployment rate and the inflation rate for the “rise” and “fall” scenarios for each of the different vignettes separately. The red bars show the mean responses in the representative sample, while the blue bars show the responses from our expert survey. Error bars display 95% confidence intervals using standard errors clustered at the respondent level.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta \pi$  denotes the expected change in the inflation rate compared to the baseline scenario.

Figure 3: Distribution of qualitatively correct forecasts among experts and the general population



*Notes:* This figure shows which fraction of the predictions from experts or the general population are qualitatively in line with the median expert prediction. The left panel depicts the fraction of correct responses (and their 95% confidence intervals using standard errors clustered at the respondent level) for each vignette and for inflation and unemployment separately. The third column, “both” shows how many respondents got both the unemployment and the inflation prediction right. The right panel presents the frequency distribution of total correct responses over all vignettes. It ranges from 0 to 4 because respondents predict four changes in total (2 vignettes  $\times$  unemployment/inflation).

Figure 4: Correlates of qualitatively correct responses of the general population (with 95% CI)



*Notes:* This figure presents the effect of various covariates on qualitative accuracy of the vignette forecasts in the representative online panel. A predicted change is viewed as qualitatively correct if it is in line with the median expert response. The effects are estimated in bivariate regressions. The fraction of correctly predicted changes is regressed on each binary covariate. 95% confidence intervals using standard errors clustered at the respondent level are displayed. The underlying sample size is reported in parentheses. If a covariate is available only in a specific wave, this is reported. “ab. med.” denotes an indicator variable for above-median values. “Correct GBH” denotes an indicator taking value 1 if the respondents’ good-bad-heuristic makes the correct prediction. For more details, see section 4. “No supply-side view” denotes an indicator taking value 1 if a respondent (correctly) does not perceive the shock as a supply-side shock. This analysis relies on responses to the interest rate and income tax rate scenarios only. The estimate results from within-vignette regressions, too. See section 4 for more details.

# Main Tables

Table 1: Benchmarks for the sign and size of the effects of different shocks

Shock		Unemployment Response		Inflation Response	
		Sign	Value (p.p.)	Sign	Value (p.p.)
Oil price rise (55% higher price)	Theory	+	0.42 to 0.88		
	Empirical	+	0.42	+	1.4
Government spending rise (2.4% higher growth rate)	Theory	–	–0.1 to –0.2	+	0.15 to 0.2
	Empirical	–	–0.16 to –0.3		
Interest rate rise (0.5 b.p. higher rate)	Theory	+	0.4 to 0.5	–	–0.15
	Empirical	+	0.2	–	–0.2
Tax rate rise (1 p.p. higher rates)	Theory	+	0.06		
	Empirical	+	0.2 to 0.6		

*Notes:* The table reports the benchmark changes in the unemployment rate and the inflation rate four quarters after the shock from the theoretical and empirical literature. The values are adjusted to be comparable to the size of the shocks in our survey. Empty fields indicate that – to the best of our knowledge – there is no robust and rigorous evidence on the effect of a given shock on the respective outcome variable of interest. Appendix C contains details on the papers surveyed for this exercise and the calculations used to derive the values.

Table 2: Beliefs about the effects of different shocks

<b>Panel A: Experts</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.327*** (0.042)	-0.130*** (0.037)	-0.224*** (0.024)	0.303*** (0.026)	0.155*** (0.027)	-0.188*** (0.025)	0.209*** (0.031)	-0.235*** (0.028)
rise	0.449*** (0.030)	0.235*** (0.030)	0.299*** (0.021)	-0.311*** (0.028)	-0.152*** (0.033)	0.289*** (0.025)	-0.107*** (0.035)	0.221*** (0.036)
<b>p-values from additional tests</b>								
(i) fall $\neq$ rise	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
(ii)  fall  $\neq$  rise	0.858	0.596	0.088	0.566	0.106	0.055	0.657	0.331
Observations	482	481	474	475	517	513	515	521
R <sup>2</sup>	0.333	0.120	0.373	0.352	0.096	0.270	0.093	0.164
<b>Panel B: General Population</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.331*** (0.050)	-0.210*** (0.049)	-0.261*** (0.045)	0.042 (0.045)	-0.150*** (0.048)	-0.028 (0.045)	-0.122*** (0.043)	-0.250*** (0.051)
rise	0.667*** (0.053)	0.445*** (0.047)	0.135*** (0.041)	-0.023 (0.046)	0.193*** (0.037)	0.174*** (0.043)	0.206*** (0.043)	0.298*** (0.044)
<b>p-values from additional tests</b>								
(i) fall $\neq$ rise	<0.001	<0.001	<0.001	0.31	<0.001	0.001	<0.001	<0.001
(ii)  fall  $\neq$  rise	0.007	0.643	0.089	0.694	0.054	0.418	0.257	0.634
(iii) $\neq$ exp.: fall	0.954	0.192	0.467	<0.001	<0.001	0.002	<0.001	0.794
(iv) $\neq$ exp.: rise	<0.001	<0.001	<0.001	<0.001	<0.001	0.02	<0.001	0.18
Observations	1,099	1,099	1,085	1,085	1,123	1,123	1,121	1,121
R <sup>2</sup>	0.159	0.085	0.042	0.001	0.029	0.014	0.027	0.056

*Notes:* This table provides an overview of beliefs about the effect of the different shocks on the unemployment rate and the inflation rate for the “rise” and “fall” scenarios for each of the different vignettes separately. Panel A provides evidence from the expert sample. Panel B displays responses from the representative online panel.  $\Delta u$  denotes the predicted change in the unemployment rate compared to the baseline scenario.  $\Delta\pi$  denotes the predicted change in the inflation rate compared to the baseline scenario. Additionally, p-values from the following regressions are reported: (i) tests whether there is a difference between rise and fall predictions, (ii) tests whether there is a difference in the absolute size of rise and fall predictions, (iii) tests whether there is a difference in fall predictions between experts and the general population, (iv) repeats this test for rise predictions. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table 3: Evidence for the Good-Bad-Heuristic

Panel A: Effect on accuracy for each vignette								
	pooled over all questions				with question FE			
	oil✓ (1)	gov.✓ (2)	fed.✓ (3)	tax✓ (4)	oil✓ (5)	gov.✓ (6)	fed.✓ (7)	tax✓ (8)
GBH cor.	0.130*** (0.039)	0.147*** (0.031)	0.155*** (0.032)	0.217*** (0.031)	0.132*** (0.038)	0.115*** (0.035)	0.048 (0.039)	0.084** (0.039)
Constant	0.571*** (0.035)	0.440*** (0.018)	0.357*** (0.018)	0.365*** (0.018)	0.608*** (0.036)	0.485*** (0.030)	0.306*** (0.020)	0.310*** (0.020)
Question FE?	No	No	No	No	Yes	Yes	Yes	Yes
Obs.	1,110	1,118	1,114	1,134	1,110	1,118	1,114	1,134
R <sup>2</sup>	0.014	0.021	0.024	0.045	0.020	0.024	0.048	0.074

Panel B: Effect on accuracy pooled over all vignettes						
	pooled over all questions			with question FE		
	all✓ (1)	all✓ (2)	all✓ (3)	all✓ (4)	all✓ (5)	all✓ (6)
GBH correct	0.208*** (0.016)	0.204*** (0.018)	0.221*** (0.021)	0.096*** (0.019)	0.099*** (0.022)	0.096*** (0.026)
Constant	0.408*** (0.010)	0.602*** (0.145)	0.834*** (0.016)	0.515*** (0.025)	0.710*** (0.144)	0.894*** (0.036)
Question FE?	No	No	No	Yes	Yes	Yes
Controls?	No	Yes	-	No	Yes	-
Ind. FE?	No	No	Yes	No	No	Yes
Obs.	4,476	3,580	4,476	4,476	3,580	4,476
R <sup>2</sup>	0.043	0.044	0.279	0.078	0.073	0.309

Panel C: Effect on forecasts pooled over all vignettes				
	pooled over all questions		with question FE	
	$\Delta\pi$ (1)	$\Delta u$ (2)	$\Delta\pi$ (3)	$\Delta u$ (4)
fall	-0.215*** (0.059)	-0.040 (0.075)	-0.289*** (0.068)	-0.066 (0.083)
rise	0.158*** (0.061)	0.048 (0.070)	0.088 (0.068)	0.018 (0.080)
fall×GBH pos.	-0.050 (0.072)	-0.142* (0.086)	-0.060 (0.072)	-0.155* (0.086)
rise×GBH pos.	0.176** (0.071)	0.278*** (0.079)	0.163** (0.071)	0.271*** (0.080)
Question FE?	No	No	Yes	Yes
Obs.	2,238	2,238	2,238	2,238
R <sup>2</sup>	0.054	0.034	0.056	0.037

*Notes:* This table reports two tests of the Good-Bad-Heuristic (GBH). In panels A and B forecast accuracy is regressed on a dummy (*GBH correct*) taking value one if a participant's GBH makes the correct forecast. The outcome variables is the proportion of forecasts are qualitatively correct, i.e. in line with the median expert response (e.g. *oil✓* for the two forecasts in the oil vignette or *all✓* for all of the four forecasts). Thus, the coefficients can be interpreted as the effect of a correct GBH on the probability of a qualitatively correct forecast. Panel A conducts the analysis vignette by vignette. Panel B pools over all vignettes. Panel C summarizes the effect of the GBH on raw forecasts.  $\Delta u$  and  $\Delta\pi$  denote the expected changes in the unemployment rate and the inflation rate compared to the baseline scenario. *GBH pos.* is a dummy that takes value 1 if the GBH predicts a positive change in the outcome variable. Question FE indicate fixed effects for each vignette-rate combination. Controls (Panel B) include age, education, log income, net wealth (inverse hyperbolic sine transformation), log financial wealth, gender, numeracy, news consumption, the perceived relevance of macroeconomic conditions for the personal situation, and political affiliation. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

# Online Appendix: Subjective Models of the Macroeconomy: Evidence from Experts and a Representative Sample

Peter Andre<sup>1</sup>     Carlo Pizzinelli<sup>2</sup>

Christopher Roth<sup>3</sup>     Johannes Wohlfart<sup>4</sup>

## Summary of the online Appendix

Section A provides additional figures. Figure A.1 provides an overview of the raw data in the different scenarios. Figure A.2 displays violin plots for the expert and consumer predictions. Figure A.3 shows descriptive evidence regarding people's beliefs about propagation mechanisms. Figure A.4 shows descriptive evidence regarding respondents' perceptions of the relevance of inflation and unemployment for their own household. Figure A.5 displays descriptives regarding people's perceptions of the supply-side channels through which the interest rate shock and the income taxation shock could operate. Figure A.7 provides descriptive evidence regarding subjective interest rate rules. Figure A.8 graphically displays the household predictions for different subsamples of respondents.

Section B provides additional tables. Table A1 shows an overview of the four surveys that we conducted. Tables A2 and A3 provide summary statistics for the covariates of the representative online panel and the expert sample respectively. Tables A4 and A5 shed light on heterogeneity in expert predictions. Table A6 displays the variance in responses across the vignettes separately for consumers and experts. Table A7 analyzes the distribution of correct responses. Table A8 shows heterogeneous results by people's perception of the supply-side effects of the macroeconomic shocks. Table A9 tests for the relevance of rational inattention. Table A10 correlates demographics with a dummy for making predictions that are consistent with the good-bad-heuristic. Table A11 displays correlates of the affective evaluations of different macroeconomic variables. Table

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<sup>4</sup>Johannes Wohlfart, Department of Economics, University of Copenhagen, e-mail: johannes.wohlfart@gmx.de

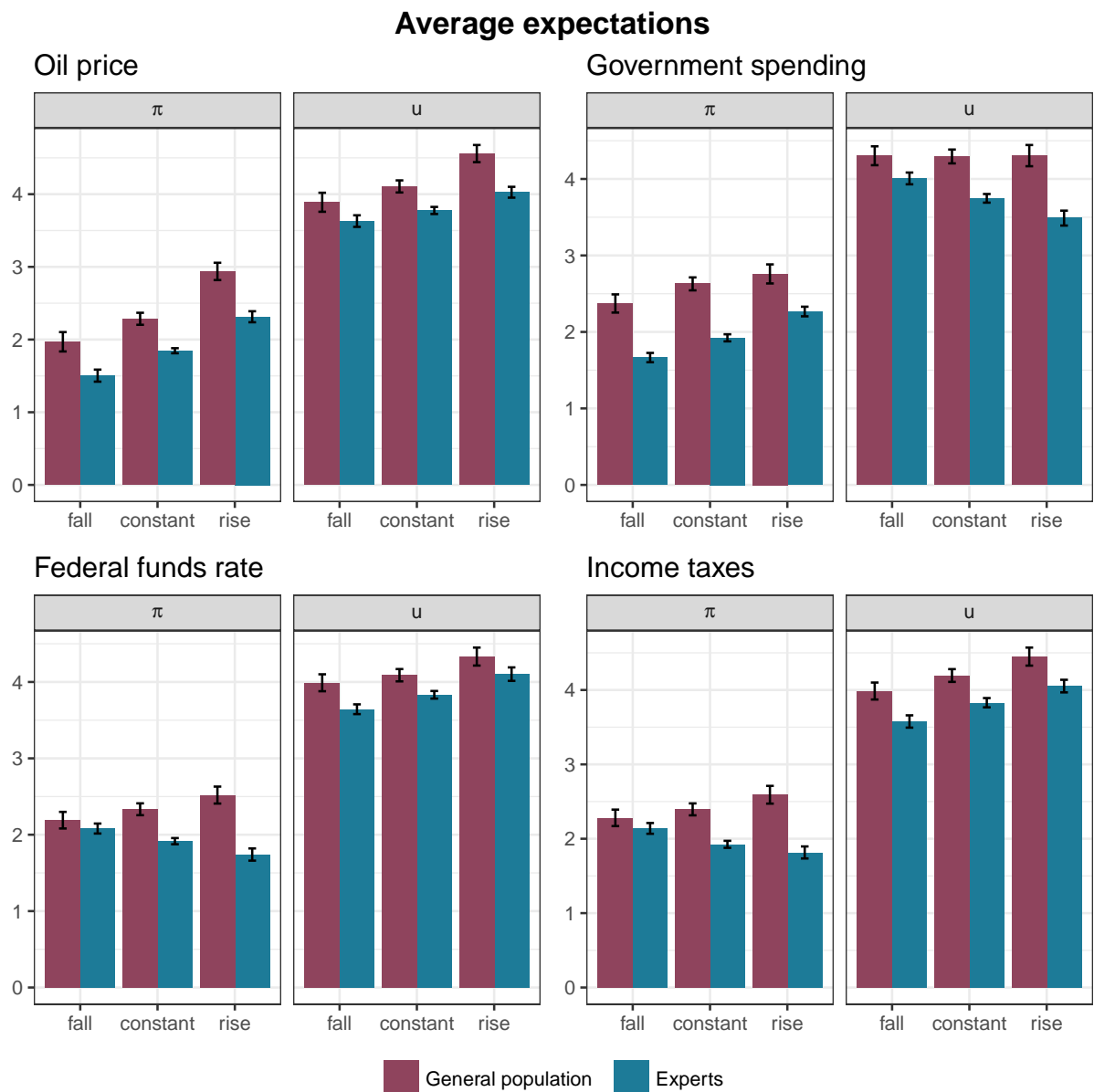
A12 examines whether people's political affiliation significantly affects responses to the vignettes. Table A13 correlates measured confidence with the accuracy of predictions. Table A14 tests for the relevance of wave effects. Table A15 displays tests for order effects. Table A16 displays the effect of incentives. Table A17 displays heterogeneous responses to the vignettes by people's perception of how interest rates would respond to changes in expected inflation and unemployment.

Section C provides details on the empirical and theoretical literature used to derive the benchmarks for changes in unemployment and inflation in response to shocks. Section D provides additional details on recruitment in Wave 1 of expert survey. Section E provides a full set of experimental instructions for Wave 1 of the survey with the representative online panel. Section F provides a full set of experimental instructions for Wave 2 of the survey with the representative online panel.



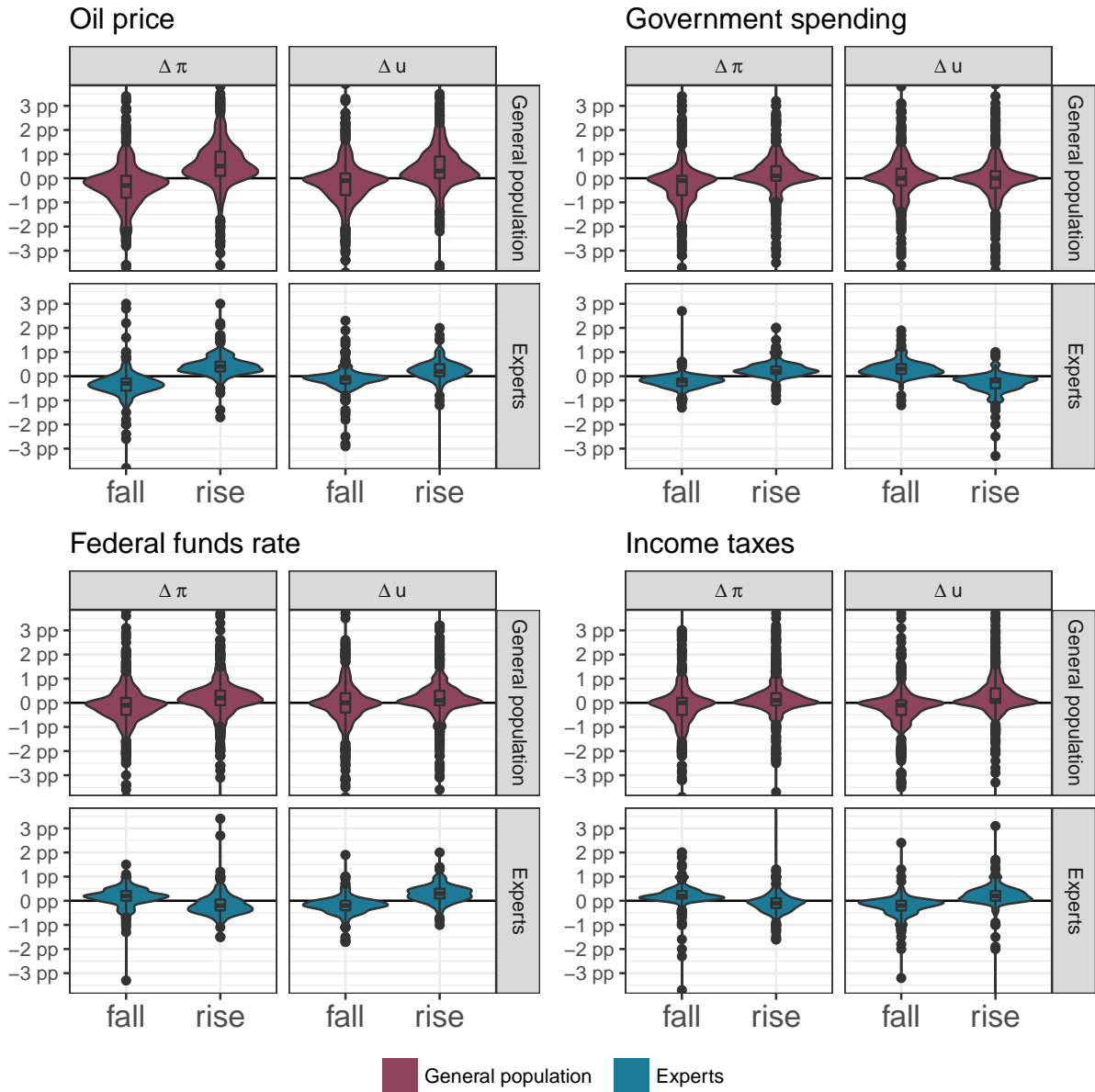
# A Additional figures

Figure A.1: Overview of raw data: Predictions



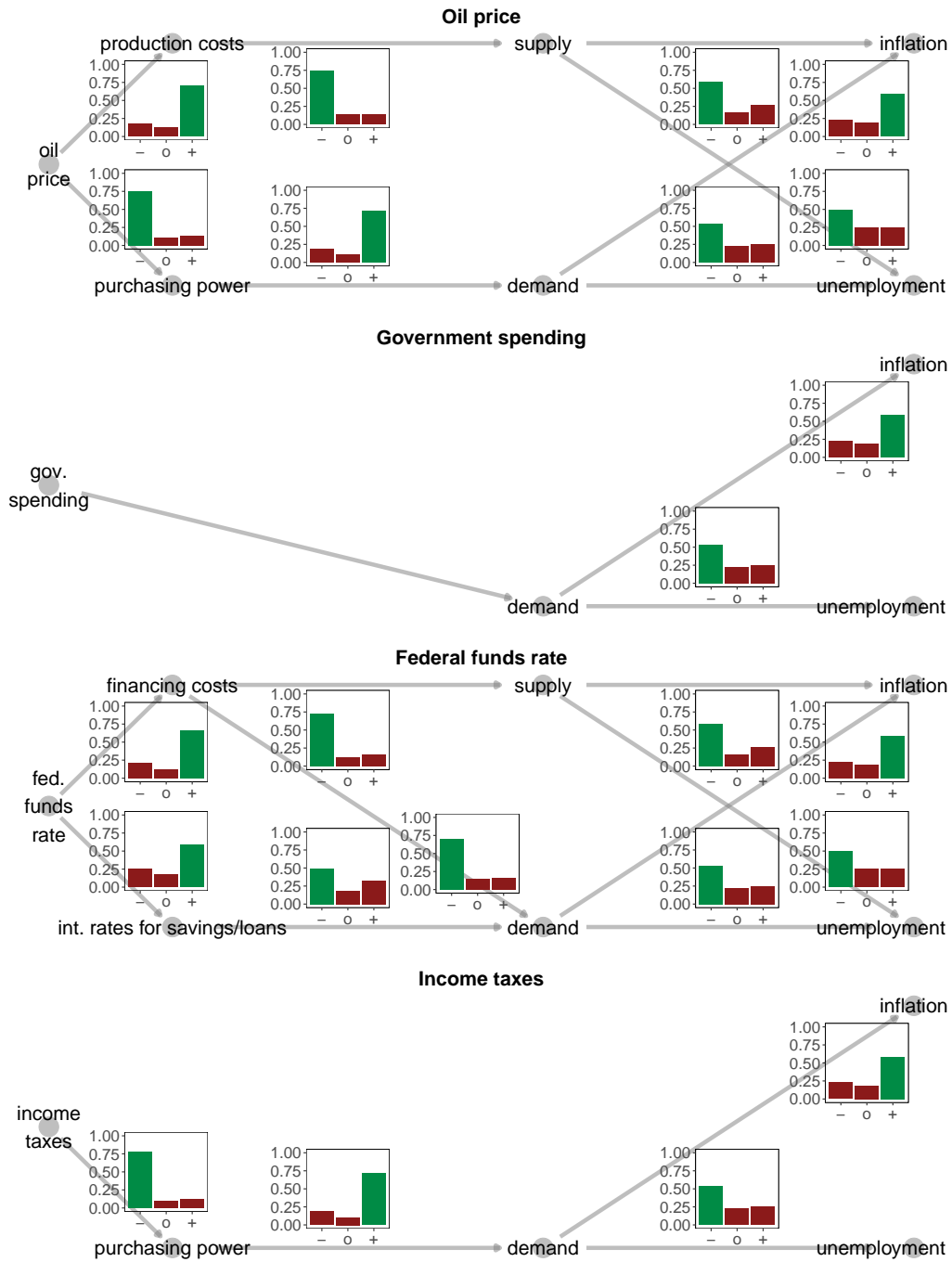
*Notes:* This figure plots mean predicted levels of unemployment and inflation by experts and respondents from the representative samples across the different vignettes and scenarios.

Figure A.2: Violin plot: Beliefs about the effects of different shocks



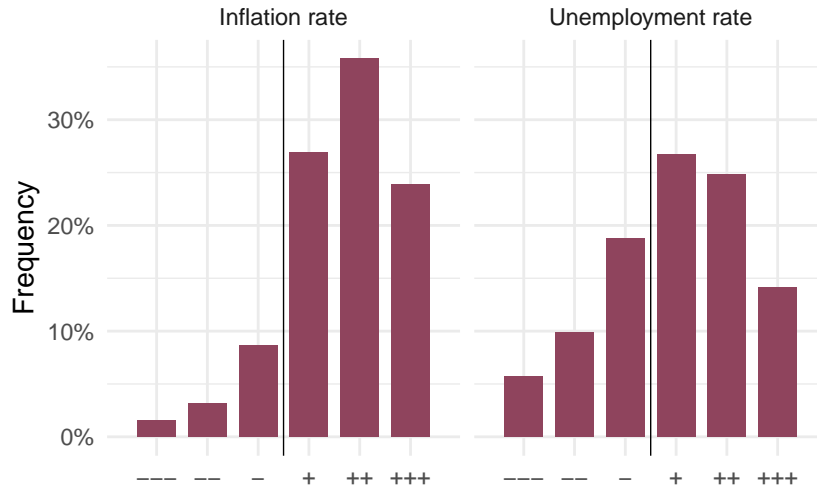
*Notes:* This figure displays violin plots of beliefs about the effects of shocks on the unemployment rate and the inflation rate for the “rise” and “fall” scenarios for each of the different vignettes separately.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta \pi$  denotes the expected change in the inflation rate compared to the baseline scenario.

Figure A.3: Beliefs about propagation mechanisms



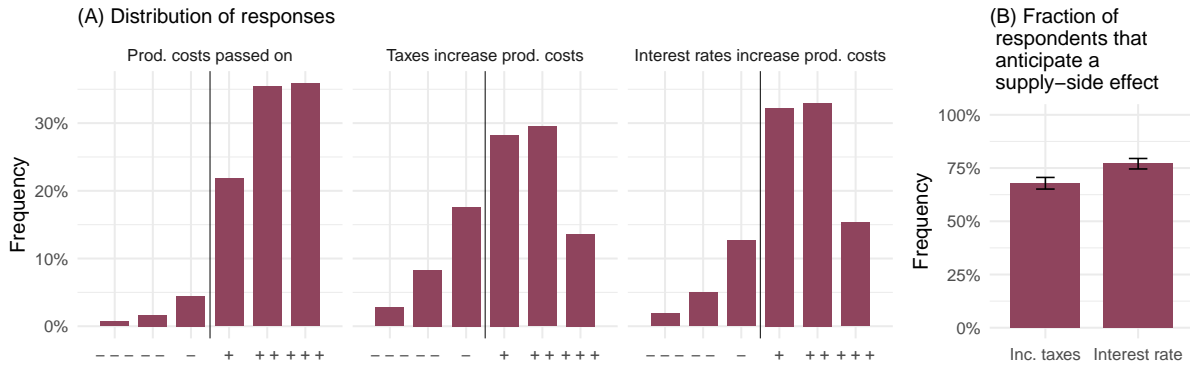
*Notes:* This figure uses data from the representative online panel and shows people’s responses to the propagation mechanism questions related to all four vignettes. “+” indicates that people perceive a positive association between two variables; “-” indicates that people perceive a negative association between two variables. “o” indicates that people perceive neither a positive nor a negative association. The green bars show the fractions of correct responses, while the red bars show the fractions of incorrect responses for each of the questions separately.

Figure A.4: Descriptive statistics: Rational inattention



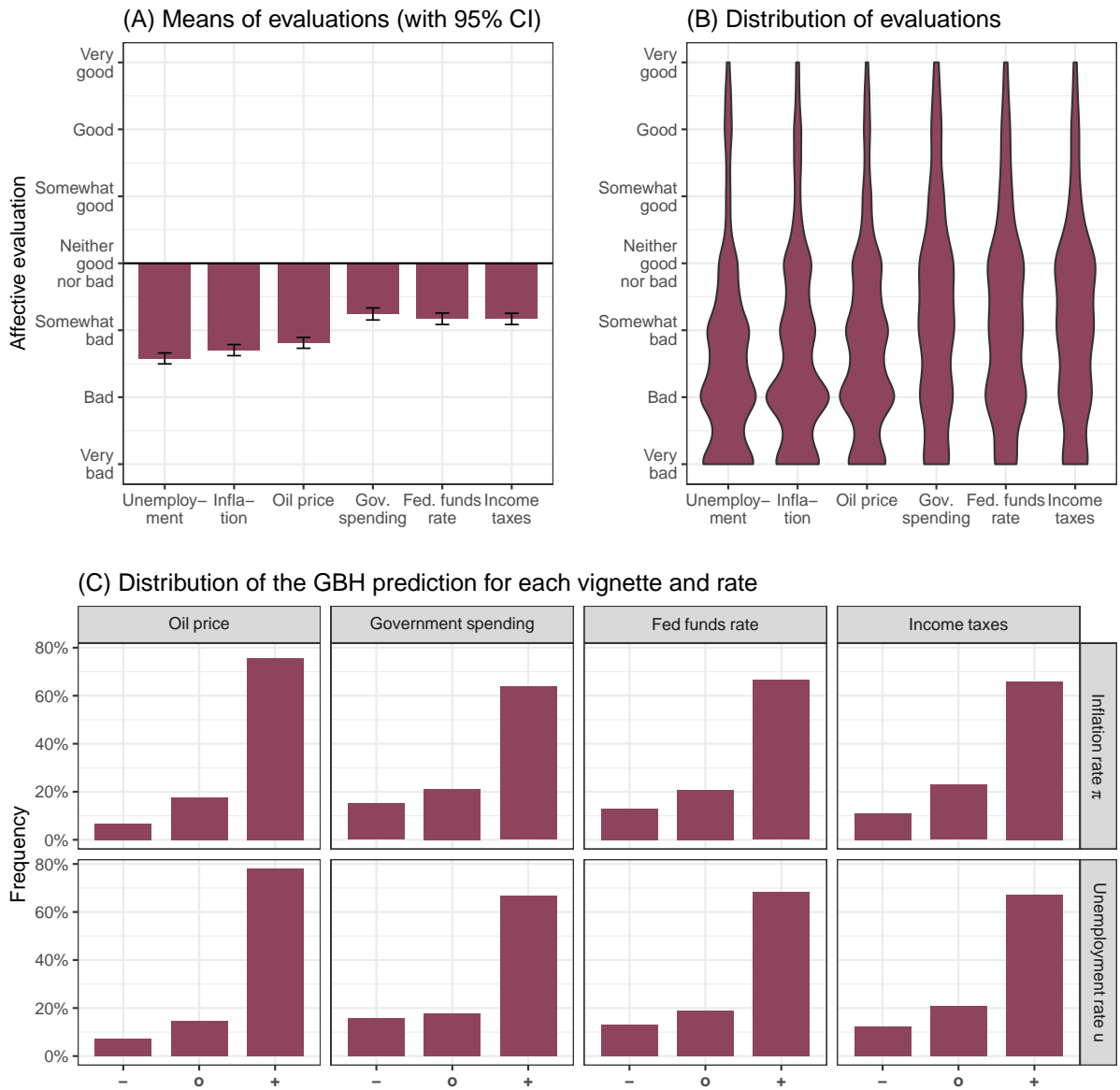
*Notes:* The figure presents the distribution of responses to the two rational inattention questions. The questions measure agreement with the statements: (i) The US inflation rate is relevant for my own economic situation. (ii) The US unemployment rate is relevant for my own economic situation. The answers are coded as follows: +++: strongly agree, ++: agree, +: somewhat agree, - somewhat disagree, --: disagree, ---: strongly disagree.

Figure A.5: Descriptive statistics: Supply-side view of the economy



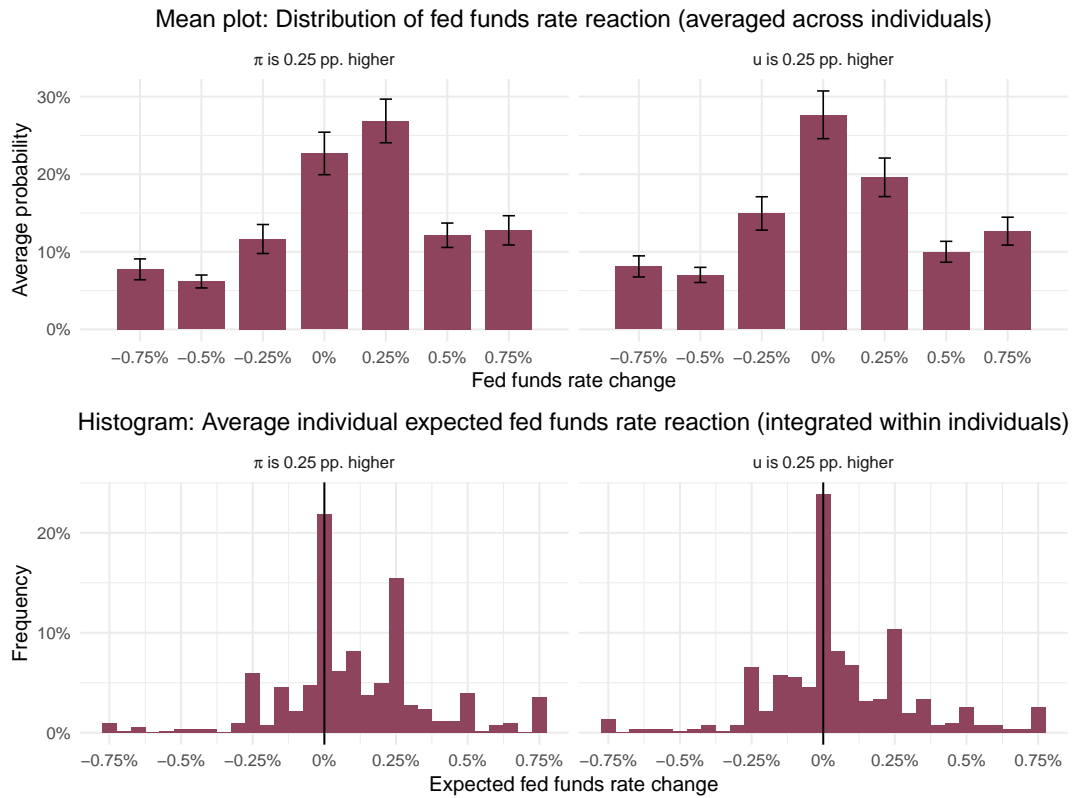
*Notes:* Panel A presents the distribution of responses to the three supply-side questions. The questions measure agreement with the statements: (i) Firms tend to pass on increases in production costs to consumers in the form of higher prices. (ii) Increases in income taxes tend to increase firms' production costs. (iii) Increases in interest rates tend to increase firms' production costs. The answers are coded as follows: +++: strongly agree, ++: agree, +: somewhat agree, - somewhat disagree, --: disagree, ---: strongly disagree. Panel B displays the fraction of respondents that believe in a supply-side effect, i.e. agree with statements (i) and (ii) for the income taxes case and statements (i) and (iii) for the interest rate case.

Figure A.6: Descriptive statistics: Good-Bad-Heuristic



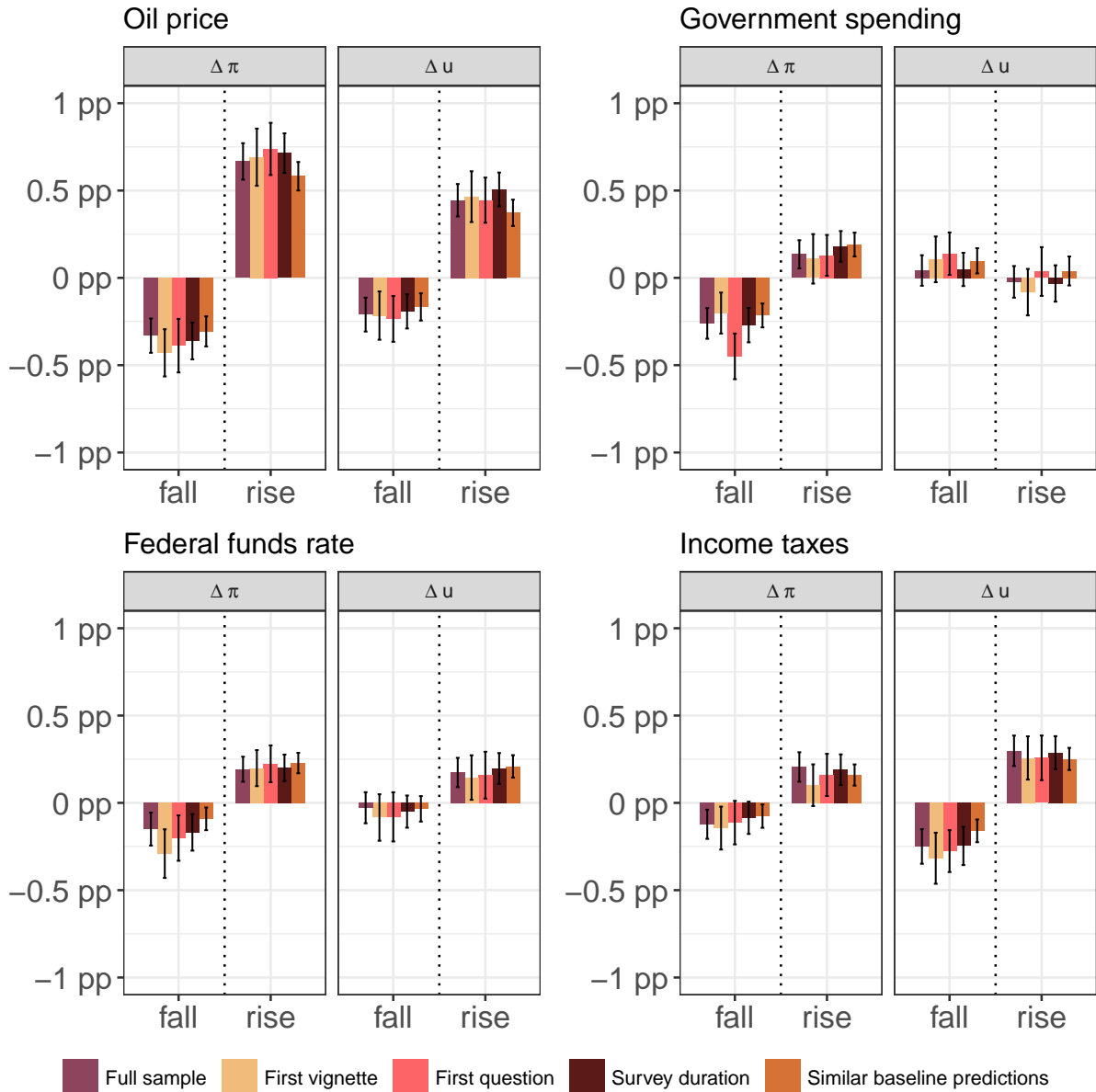
Notes: Panel A presents the average affective evaluation of the different variables (with 95% CI) and panel B its distribution. Panel C displays how many respondents' GBH predicts an increase (+), a decrease (-), or no change (o) of unemployment or inflation across vignettes. For a discussion, see 4.

Figure A.7: Descriptive statistics for the subjective interest rate rules



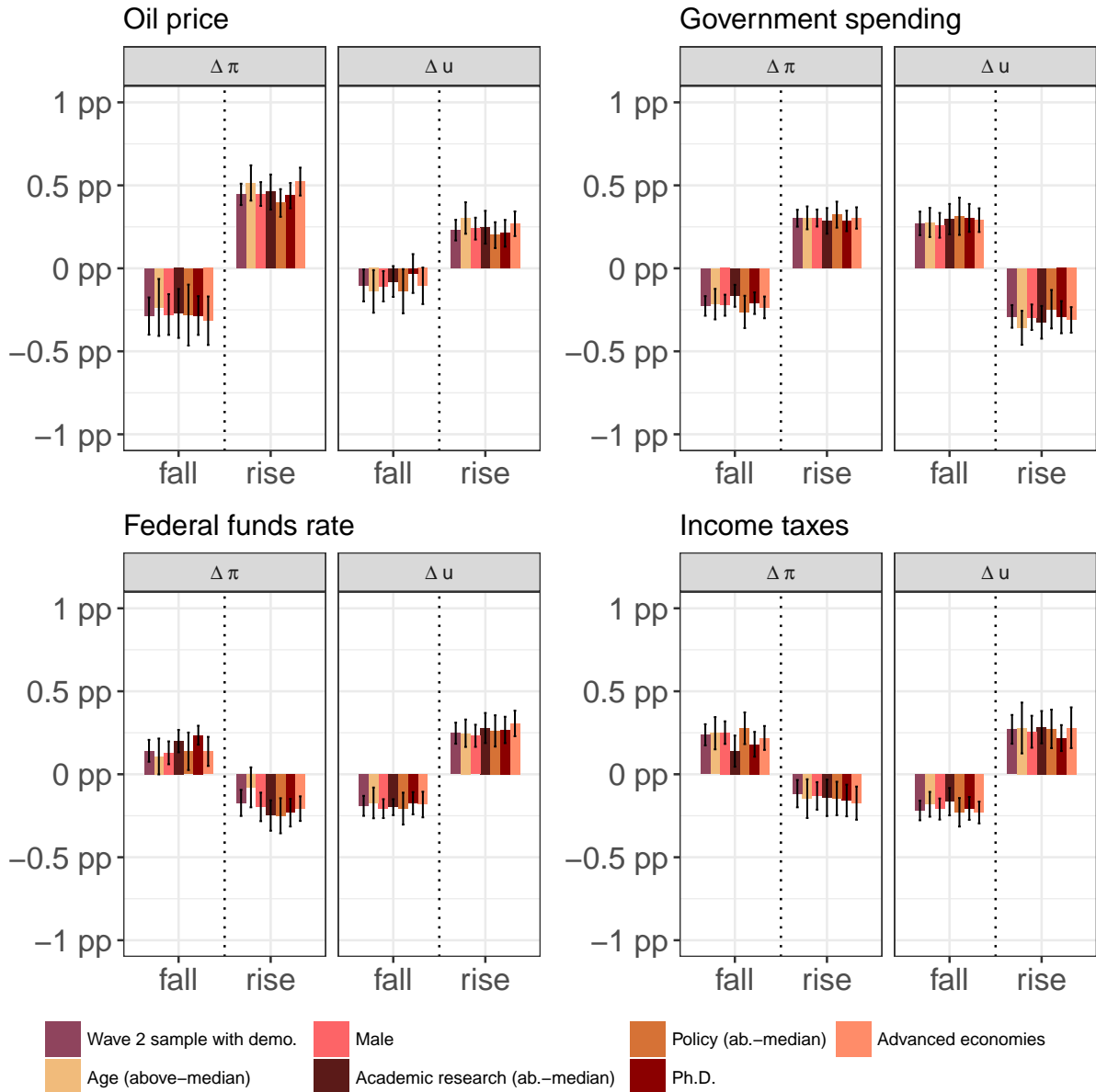
*Notes:* This figure analyzes the distribution of responses to the subjective interest rate rule questions in Wave 2 of the general population sample. Respondents were asked to estimate the likelihood of different federal funds target rate changes in response to a 0.25 pp. higher inflation or unemployment rate. For each possible federal funds target rate reaction, the “Mean plot” summarizes the average probability assigned to this event (averaged across individuals). The histogram plots individual-level means of expected changes in the federal funds target rate in response to increases in inflation or unemployment.

Figure A.8: Procedural robustness of results (with 95% CI)



*Notes:* This figure provides an overview of procedural robustness checks that repeat the main analysis for different subsamples. It plots predicted changes in the unemployment rate and the inflation rate for the “rise” and “fall” scenarios for each of the different vignettes separately. Error bars show 95% confidence intervals using standard errors that are clustered at the respondent level.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta \pi$  denotes the expected change in the inflation rate compared to the baseline scenario. “Full sample” denotes the full sample and, thus, replicates the results of figure 2. “First vignette” contains only the responses to the first vignette, while “First question” focuses only on responses to the first forecast question (in both vignettes). “Survey duration” excludes both 10% tails in the survey duration distribution, and “Similar baseline prediction” excludes the 20% respondents with the largest absolute difference in baseline predictions across the two vignettes they responded to.

Figure A.9: Heterogeneity in experts' forecasts (with 95% CI)



*Notes:* This figure provides an overview of forecast heterogeneity for the expert wave 2 sample for which data on background characteristics is available ( $n = 596$ ). It repeats the main analysis for different subsamples and plots expected changes in the unemployment rate and the inflation rate for the “rise” and “fall” scenarios for each of the different vignettes separately. Error bars show the 95% confidence intervals.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta \pi$  denotes the expected change in the inflation rate compared to the baseline scenario. “Wave 2 sample with demo.” denotes the full sample that satisfies the conditions mentioned above. “Age (above-median)” contains only respondents with above-median age. “Male” contains only male respondents. “Academic research (ab.-median)” focuses on respondents that spend an above-median percentage of their working time on academic research, while “Policy (ab.-median)” restricts the sample to those who do an above-median amount of policy work. “Ph.D.” contains only respondents with a Ph.D., and “Advanced economies” contains only respondents that are registered at the WES to make forecasts about an advanced economy (as classified by the IMF).



## B Additional tables

Table A1: Overview of experiments

Experiment	Sample	Treatments Arms	Mechanism Questions
Consumers Wave 1 (February/March 2019) (N=1,063)	Representative online panel (in terms of age, income, region, gender, and education) in collaboration with Research Now	Hypothetical vignettes on oil price shock, government spending shock, interest rate shock and tax shock	Beliefs about propagation mechanisms, financial literacy
Consumers Wave 2 (July 2019) (N=1,151)	Representative online panel (in terms of age, income, region, gender, and education) in collaboration with Lucid	Hypothetical vignettes on oil price shock, government spending shock, interest rate shock and tax shock	Good-bad heuristic, rational inattention, numeracy, beliefs about supply-side mechanisms, subjective interest rate rule
Experts Wave 1 (February/March 2019) (N=179)	Experts recruited via email invitation (for details see Section D)	Hypothetical vignettes on oil price shock, government spending shock, interest rate shock and tax shock	None
Experts Wave 2 (July 2019) (N=908)	Experts recruited via the ifo World Economic Survey	Hypothetical vignettes on oil price shock, government spending shock, interest rate shock and tax shock	None

*Notes:* This table provides an overview of the different conducted experiments.

Table A2: Summary statistics: Covariates in the general population sample

<b>Variable</b>	<b>ACS (2017)</b>	<b>Rep. online panel</b>
Female	51%	55%
Age	47.43	46.41
At least bachelor's degree	30%	32%
Household net income (median)	65700	62500
Northeast	18%	21%
Midwest	21%	22%
South	38%	41%
West	24%	16%

*Notes:* This table compares the distributions of individual characteristics in our sample with those in the American Community Survey (ACS) 2017.

Table A3: Summary statistics: Covariates in the expert sample

<b>Variable</b>	<b>Wave 1</b>	<b>Wave 2 (WES)</b>
Female	26%	14%
Age (median)		52
Policy institution	16%	16%
Academia	83%	56%
Bank or company	0%	16%
Full professor	21%	
PhD student	18%	
Field of study: economics		84%
Field of study: business		7%
Ph.D.		65%
Region: Western Europe		42%
Region: Eastern Europe		12%
Region: CIS		7%
Region: North America		8%
Region: Latin America		10%
Region: Africa		7%
Region: Near East		2%
Region: Asia		10%
Region: Oceania		2%

*Notes:* This table provides an overview of the covariates of the expert sample. Different covariates were collected in the two waves. Moreover, demographic data is not available for all respondents.

Table A4: Heterogeneity in forecast accuracy among experts

	$\Delta\pi\checkmark$ (1)	$\Delta u\checkmark$ (2)	all $\checkmark$ (3)
age (ab.-median)	-0.031 (0.029)	0.028 (0.030)	-0.002 (0.024)
female	-0.043 (0.049)	0.001 (0.044)	-0.021 (0.035)
policy (ab.-median)	0.066** (0.030)	0.057* (0.030)	0.062** (0.024)
research (ab.-median)	0.006 (0.034)	0.028 (0.034)	0.017 (0.028)
Ph.D.	0.089** (0.035)	0.013 (0.035)	0.051* (0.029)
advanced economy	0.006 (0.031)	0.059* (0.031)	0.033 (0.025)
avg. confidence (ab.- median)	-0.037 (0.031)	-0.039 (0.033)	-0.038 (0.026)
Observations	525	525	525
R <sup>2</sup>	0.036	0.018	0.031

*Notes:* This table displays predictors of forecast accuracy among experts from the wave 2 sample that responded to all forecast questions and for whom data on background characteristics is available. A forecasted change is viewed as qualitatively correct if it is in line with the median response and the macroeconomic benchmark estimates. For each expert,  $\Delta\pi\checkmark$  measures the fraction of correct inflation forecasts (out of 2),  $\Delta u\checkmark$  the fraction of correct unemployment forecasts (out of 2), and *all* $\checkmark$  the overall fraction of correct forecasts (out of 4). Thus, the coefficients can be interpreted as the effects on the probability of a qualitatively correct forecast. The predictors include above-median dummies in age, time spent on policy work, time spent on research work, and average expressed confidence as well as indicators for female respondents, respondents with a Ph.D. and respondents from advanced economies (IMF classification). Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A5: Do US experts make more accurate forecasts?

	$\Delta\pi\checkmark$ (1)	$\Delta u\checkmark$ (2)	all $\checkmark$ (3)
US	-0.071 (0.044)	-0.043 (0.041)	-0.057 (0.035)
Constant	0.758*** (0.012)	0.717*** (0.012)	0.738*** (0.010)
Observations	862	862	862
R <sup>2</sup>	0.003	0.001	0.003

*Notes:* This table analyzes whether experts from the US make more accurate forecasts in the hypothetical vignettes about the US economy. A predicted change is viewed as qualitatively correct if it is qualitatively in line with the median response and the macroeconomic benchmark estimates. For each expert,  $\Delta\pi\checkmark$  measures the fraction of correct inflation forecasts (out of 2),  $\Delta u\checkmark$  the fraction of correct unemployment forecasts (out of 2), and *all* $\checkmark$  the overall fraction of correct forecasts (out of 4). Thus, the coefficients can be interpreted as the effect on the probability of a qualitatively correct forecast. An expert is classified as “US” if he or she works at a US institution (Wave 1,  $n = 33$ ) or is registered to make regular forecasts about the US economy in the ifo World economic survey (Wave 2,  $n = 52$ ). Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A6: Disagreement in predicted changes in unemployment and inflation

	$\Delta\pi$			$\Delta u$		
	$\sigma_{experts}$	$\sigma_{gen. pop.}$	$p$	$\sigma_{experts}$	$\sigma_{gen. pop.}$	$p$
oil price – rise	0.28	0.74	<0.01	0.27	0.64	<0.01
oil price – fall	0.32	0.71	<0.01	0.28	0.69	<0.01
gov. spend. – rise	0.22	0.54	<0.01	0.27	0.61	<0.01
gov. spend. – fall	0.20	0.61	<0.01	0.24	0.63	<0.01
fed. funds rate – rise	0.31	0.52	<0.01	0.27	0.55	<0.01
fed. funds rate – fall	0.28	0.59	<0.01	0.25	0.63	<0.01
inc. taxes – rise	0.29	0.52	<0.01	0.26	0.55	<0.01
inc. taxes – fall	0.25	0.58	<0.01	0.27	0.56	<0.01
weighted mean	0.27	0.60		0.26	0.61	

*Notes:* This table reports the standard deviation of expert forecasts and forecasts from the general population as well as p-values from a Levene’s test of equality of variance (trimmed, median-based, bootstrapped) for each rise or fall scenario. The data is trimmed by 0.05 percentage points on both tails to reduce the influence of outliers. The last row presents the average within-scenario standard deviation, weighted by the differential number of respondents across scenarios.

Table A7: Understanding of propagation mechanisms and qualitative accuracy of forecasts

Panel A: For each vignette												
	oil price			gov. spending			fed. funds rate			income taxes		
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
MS	0.120*** (0.022)	0.079*** (0.024)	0.090*** (0.022)	0.058** (0.026)	0.057** (0.025)	0.039** (0.019)	-0.008 (0.024)	0.070*** (0.024)	0.030** (0.014)	0.031 (0.024)	0.052* (0.027)	0.038** (0.017)
fin. lit.	0.050** (0.023)	0.060** (0.025)	0.083*** (0.025)	-0.012 (0.026)	0.013 (0.025)	0.013 (0.020)	0.001 (0.024)	-0.027 (0.026)	-0.018 (0.017)	0.003 (0.024)	-0.011 (0.026)	-0.006 (0.018)
Constant	0.712*** (0.019)	0.596*** (0.021)	0.470*** (0.021)	0.553*** (0.022)	0.423*** (0.022)	0.212*** (0.018)	0.293*** (0.020)	0.492*** (0.021)	0.113*** (0.014)	0.333*** (0.020)	0.514*** (0.022)	0.156*** (0.016)
Obs.	521	521	521	508	508	508	543	543	543	532	532	532
R <sup>2</sup>	0.120	0.066	0.097	0.012	0.019	0.015	0.000	0.014	0.006	0.004	0.008	0.008

Panel B: Pooled over all vignettes									
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	all $\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	all $\checkmark$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
MS	0.047*** (0.012)	0.067*** (0.013)	0.049*** (0.010)	0.057*** (0.009)	0.040*** (0.015)	0.061*** (0.015)	0.050*** (0.011)	0.051*** (0.011)	
fin. lit.	0.010 (0.013)	0.008 (0.013)	0.017 (0.011)	0.009 (0.010)	0.009 (0.015)	-0.000 (0.016)	0.013 (0.013)	0.005 (0.012)	
Constant	0.468*** (0.011)	0.506*** (0.011)	0.235*** (0.009)	0.487*** (0.008)	0.402** (0.180)	0.421** (0.196)	0.111 (0.160)	0.411*** (0.135)	
Add. ctrl?	-	-	-	-	✓	✓	✓	✓	
Obs.	1,052	1,052	1,052	1,052	870	870	870	870	
R <sup>2</sup>	0.022	0.036	0.037	0.055	0.022	0.043	0.042	0.052	

*Notes:* This table analyzes the relationship between responding correctly to the propagation mechanism questions and making qualitatively correct vignette forecasts. A vignette forecast is viewed as qualitatively correct if it is in line with the median expert response. *MS* is the standardized number of correctly answered mechanism questions. *fin. lit.* is the standardized number of correct answers in the standard three-item financial literacy test. The coefficients can be read as the percentage point increase in correct forecasts associated with a 1 standard deviation increase in *MS* (or *fin. lit.*).

Panel A conducts the analyze for each vignette separately. The outcome variables ( $\Delta\pi\checkmark$ ,  $\Delta u\checkmark$ , both $\checkmark$ ) are binary and indicate whether a vignette forecast (for the inflation rate, the unemployment rate, or both rates jointly) is correct. Panel B performs an analysis pooled over all vignettes. Here,  $\Delta\pi\checkmark$  measures the fraction of correct inflation forecasts (out of 2),  $\Delta u\checkmark$  the fraction of correct unemployment forecasts (out of 2), both $\checkmark$  the fraction of vignettes in which both forecasts are correct (out of 2), and all $\checkmark$  the overall fraction of correct forecasts (out of 4). Controls (Panel B) include age, education, log income, net wealth (inverse hyperbolic sine transformation), log financial wealth, gender and news consumption. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A8: Effect of having a supply-side view on vignette forecasts

Panel A: The effect of having a supply-side view on forecasts						
	fed. funds rate		income taxes		both vignettes	
	$\Delta\pi$ (1)	$\Delta u$ (2)	$\Delta\pi$ (3)	$\Delta u$ (4)	$\Delta\pi$ (5)	$\Delta u$ (6)
fall	-0.195 (0.142)	0.102 (0.151)	-0.027 (0.104)	-0.154 (0.123)	-0.088 (0.086)	-0.061 (0.098)
rise	0.197* (0.104)	0.152 (0.135)	0.162 (0.168)	0.297** (0.143)	0.178* (0.099)	0.232** (0.106)
fall×int supply	0.001 (0.163)	-0.148 (0.169)				
rise×int supply	-0.010 (0.126)	0.034 (0.151)				
fall×tax supply			-0.217 (0.135)	-0.271* (0.159)		
rise×tax supply			0.070 (0.183)	0.058 (0.162)		
fall×supply					-0.130 (0.102)	-0.165 (0.115)
rise×supply					0.031 (0.110)	0.034 (0.119)
Obs.	557	557	571	571	1,128	1,128
R <sup>2</sup>	0.031	0.016	0.031	0.072	0.030	0.036

Panel B: The effect of having a supply-side view on forecast accuracy									
	fed. funds rate			income taxes			both vignettes		
	$\Delta\pi\checkmark$ (1)	$\Delta u\checkmark$ (2)	all $\checkmark$ (3)	$\Delta\pi\checkmark$ (4)	$\Delta u\checkmark$ (5)	all $\checkmark$ (6)	$\Delta\pi\checkmark$ (7)	$\Delta u\checkmark$ (8)	all $\checkmark$ (9)
int supply	-0.008 (0.048)	0.003 (0.051)	-0.003 (0.031)						
tax sup.				-0.116*** (0.043)	-0.001 (0.044)	-0.058** (0.029)			
supply							-0.070** (0.032)	-0.006 (0.034)	-0.038* (0.021)
Constant	0.317*** (0.042)	0.520*** (0.045)	0.419*** (0.027)	0.401*** (0.036)	0.577*** (0.037)	0.489*** (0.024)	0.367*** (0.027)	0.554*** (0.029)	0.461*** (0.018)
Obs.	557	557	557	571	571	571	1,128	1,128	1,128
R <sup>2</sup>	0.000	0.000	0.000	0.013	0.000	0.007	0.004	0.000	0.003

*Notes:* This table reports regressions that test whether having a supply-side view of the economy affects vignette forecasts. *int/tax supply* are dummies taking value one if the respondent thinks that the shock (fed. funds rate / income taxes) increases production costs *and* that firms pass this on to consumers. Columns 5 and 6 in panel A as well as 7 to 9 in panel B report estimates with data pooled over both vignettes and clustered-standard errors on the respondent level. Here, *supply* indicates a supply-side view for the vignette at hand.

Panel A analyzes the effect of having a supply-side view on the predicted changes of the inflation and unemployment rate. Panel B analyzes the effect on forecast accuracy. A vignette forecast is viewed as qualitatively accurate if it is in line with the median expert response. The outcome variables  $\Delta\pi\checkmark$  and  $\Delta u\checkmark$  are binary and indicate whether a vignette forecast (for the inflation rate, the unemployment rate) is correct. *all $\checkmark$*  takes value zero if no forecast in a vignette is correct, 0.5 if exactly one forecast is correct, and 1 if both forecasts are correct. Thus, the coefficients can be interpreted as the effect of having a supply-side view on the probability of making a qualitatively correct forecast. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A9: Effect of rational (in)attention on forecast accuracy

	Only inflation forecast			Only unemployment forecast			Pooled		
	$\Delta\pi\checkmark$ (1)	$\Delta\pi\checkmark$ (2)	$\Delta\pi\checkmark$ (3)	$\Delta u\checkmark$ (4)	$\Delta u\checkmark$ (5)	$\Delta u\checkmark$ (6)	all $\checkmark$ (7)	all $\checkmark$ (8)	all $\checkmark$ (9)
$\pi$ relevant	0.035* (0.021)			0.010 (0.022)			0.022 (0.015)		
$u$ relevant		0.030 (0.021)			-0.022 (0.022)			0.004 (0.015)	
index			0.055*** (0.021)			-0.019 (0.022)			0.018 (0.015)
Constant	0.452*** (0.017)	0.461*** (0.013)	0.444*** (0.015)	0.540*** (0.017)	0.554*** (0.014)	0.556*** (0.016)	0.496*** (0.011)	0.507*** (0.009)	0.500*** (0.011)
Obs.	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124
R <sup>2</sup>	0.002	0.002	0.006	0.000	0.001	0.001	0.002	0.000	0.001

*Notes:* This table reports regressions of forecast accuracy on three measures of respondents' perceived relevance of macroeconomic variables for their own situation. A vignette forecast is viewed as qualitatively accurate if it is in line with the median expert response. For each individual,  $\Delta\pi\checkmark$  measures the fraction of correct inflation forecasts (out of 2),  $\Delta u\checkmark$  the fraction of correct unemployment forecasts (out of 2), and *all* $\checkmark$  the overall fraction of correct forecasts (out of 4).  $\pi$  *relevant* is a dummy that takes value 1 if a respondent agrees or strongly agrees with the statement "The US inflation rate is relevant for my own economic situation.".  $u$  *relevant* is an analogous variable for the unemployment rate. *index* is a combined binary measure that takes value one for respondents with above-median agreement to the two statements. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.



Table A10: Who uses the Good-Bad-Heuristic?

	Follows GBH
age (above-median)	0.058** (0.023)
female	0.003 (0.020)
college+	-0.002 (0.021)
income (above-median)	-0.031 (0.022)
net wealth (above-median)	0.016 (0.022)
numeracy (above-median)	0.030 (0.021)
Constant	0.466*** (0.023)
Observations	895
R <sup>2</sup>	0.015

*Notes:* This table analyzes who uses the Good-Bad-Heuristic (GBH). The outcome variable is the fraction of an individual's forecasts that are in line with his/her GBH (out of four forecasts in total). Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A11: Heterogeneity in affective evaluations

	inflation	unemployment	oil price	gov. spending	fed. funds rate	income taxes
	(1)	(2)	(3)	(4)	(5)	(6)
female	-0.053** (0.023)	-0.063*** (0.021)	-0.019 (0.023)	-0.096*** (0.030)	-0.011 (0.028)	-0.060** (0.027)
age	-0.091*** (0.019)	-0.078*** (0.016)	-0.087*** (0.019)	-0.065** (0.031)	-0.096*** (0.028)	-0.104*** (0.024)
college+	-0.006 (0.024)	-0.001 (0.020)	0.023 (0.025)	0.047 (0.032)	0.049* (0.029)	0.032 (0.031)
econ. coll.+	0.020 (0.024)	0.024 (0.020)	0.030 (0.024)	0.050 (0.032)	0.049 (0.030)	0.025 (0.031)
numeracy	-0.096*** (0.019)	-0.089*** (0.017)	-0.071*** (0.021)	0.029 (0.031)	-0.046 (0.028)	-0.044* (0.027)
log income	0.050*** (0.016)	0.067*** (0.014)	0.060*** (0.017)	0.021 (0.022)	0.067*** (0.019)	0.016 (0.020)
log real est. wealth	-0.002 (0.002)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.003)	-0.003 (0.003)	-0.002 (0.003)
log debt	-0.008*** (0.002)	-0.005** (0.002)	-0.011*** (0.002)	-0.003 (0.003)	-0.010*** (0.003)	-0.009*** (0.003)
log fin. wealth	-0.005* (0.003)	-0.005* (0.002)	-0.004 (0.003)	-0.002 (0.003)	0.002 (0.003)	-0.004 (0.003)
rat. inatt.	0.004 (0.021)	-0.017 (0.018)	-0.028 (0.021)	0.014 (0.028)	0.009 (0.027)	-0.060** (0.026)
democrat	0.006 (0.021)	0.011 (0.019)	0.002 (0.022)	0.104*** (0.029)	0.018 (0.027)	0.064** (0.026)
avg. conf.	0.089*** (0.021)	0.082*** (0.020)	0.108*** (0.022)	0.050* (0.029)	0.068** (0.028)	0.082*** (0.027)
Constant	-0.284* (0.167)	-0.506*** (0.139)	-0.396** (0.174)	-0.014 (0.222)	-0.487** (0.199)	0.122 (0.214)
Observations	895	895	895	895	895	895
R <sup>2</sup>	0.127	0.136	0.140	0.066	0.084	0.097

*Notes:* This table studies heterogeneity in affective evaluations of the six variables (inflation, unemployment, oil price, government spending, federal funds rate and income tax rates). All affective evaluations are measured on scales from -3 (very bad) to 3 (very good) and represent the average rating across the two subitems (personal and economy-wide evaluation). Explanatory variables include indicators for being female, above-median age, college education (or higher), economics education on college level (or higher), an above-median numeracy score, an above-median rational inattention score, being a Democrat (versus Republican or independent), and an above-median average forecast confidence. Moreover, log income, log real estate wealth, log debt, and log financial wealth are included, where 1 is added to include zeros. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A12: Political heterogeneity in forecasts

Panel A: Political heterogeneity in forecasts								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.362*** (0.072)	-0.117 (0.083)	-0.253*** (0.069)	0.143** (0.066)	-0.139* (0.082)	-0.054 (0.075)	-0.160** (0.067)	-0.190** (0.079)
rise	0.614*** (0.089)	0.448*** (0.084)	0.147** (0.070)	-0.026 (0.073)	0.083 (0.066)	0.166** (0.073)	0.232*** (0.057)	0.381*** (0.070)
fall×democrat	0.119 (0.109)	-0.108 (0.110)	0.006 (0.110)	-0.130 (0.104)	0.001 (0.115)	0.087 (0.106)	0.025 (0.101)	-0.150 (0.124)
rise×democrat	0.118 (0.125)	-0.001 (0.110)	-0.114 (0.095)	0.006 (0.103)	0.208** (0.089)	0.089 (0.097)	-0.062 (0.089)	-0.201** (0.095)
<i>Joint F-test does not detect a significant effect of democrat.</i>								
p = 0.211								
Observations	839	839	827	827	834	834	856	856
R <sup>2</sup>	0.161	0.086	0.033	0.005	0.030	0.023	0.032	0.060

Panel B: Political heterogeneity in forecast accuracy								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
democrat	-0.033 (0.031)	0.012 (0.034)	0.001 (0.035)	0.013 (0.035)	-0.046 (0.032)	-0.004 (0.035)	0.015 (0.032)	-0.006 (0.034)
Constant	0.728*** (0.023)	0.608*** (0.025)	0.543*** (0.025)	0.432*** (0.024)	0.332*** (0.023)	0.522*** (0.025)	0.314*** (0.023)	0.549*** (0.024)
<i>Joint F-test does not detect a significant effect of democrat.</i>								
p = 0.823								
Observations	839	839	827	827	834	834	856	856
R <sup>2</sup>	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000

*Notes:* This table provides an overview of political heterogeneity in forecasts in the representative sample. Respondents for whom data on political affiliation is missing or who respond that they are Independent are excluded. Panel A displays predicted changes in unemployment and inflation for each of the different vignettes separately.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta\pi$  denotes the expected change in the inflation rate compared to the baseline scenario. Panel B displays differences in forecast accuracy. The outcome variables ( $\Delta\pi\checkmark$ ,  $\Delta u\checkmark$ , both  $\checkmark$ ) are binary and indicate whether a vignette forecast (for the inflation rate, the unemployment rate, or both rates jointly) is correct. A vignette forecast is viewed as qualitatively correct if it is in line with the median expert response. Both panels report a joint F-test that results from SUR regressions with respondent-level clustered standard errors and tests for an overall zero effect of *democrat*. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A13: Confidence and prediction accuracy

<b>Panel A: Experts</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
confidence	0.026 (0.023)	0.042 (0.030)	-0.023 (0.025)	0.035 (0.026)	-0.017 (0.030)	0.027 (0.026)	-0.011 (0.029)	0.050* (0.027)
Constant	0.846*** (0.016)	0.660*** (0.022)	0.799*** (0.019)	0.797*** (0.018)	0.665*** (0.021)	0.726*** (0.020)	0.681*** (0.021)	0.700*** (0.020)
Observations	481	478	474	472	516	509	514	513
R <sup>2</sup>	0.003	0.004	0.002	0.004	0.001	0.002	0.000	0.007

<b>Panel B: General population</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$	$\Delta\pi\checkmark$	$\Delta u\checkmark$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
confidence	0.002 (0.016)	-0.027 (0.017)	-0.024 (0.016)	-0.011 (0.016)	0.019 (0.015)	0.037** (0.016)	0.036** (0.015)	0.024 (0.016)
Constant	0.705*** (0.014)	0.618*** (0.015)	0.554*** (0.015)	0.435*** (0.015)	0.303*** (0.014)	0.507*** (0.015)	0.325*** (0.014)	0.547*** (0.015)
Observations	1,099	1,099	1,085	1,085	1,123	1,123	1,121	1,121
R <sup>2</sup>	0.000	0.003	0.002	0.000	0.001	0.005	0.005	0.002

<b>Panel C: Determinants of confidence in general population</b>					
	avg. confidence	avg. confidence: oil price	avg. confidence: gov. spending	avg. confidence: fed. funds rate	avg. confidence: income taxes
	(1)	(2)	(3)	(4)	(5)
female	-0.381*** (0.037)	-0.334*** (0.053)	-0.440*** (0.055)	-0.442*** (0.054)	-0.320*** (0.056)
age	-0.002* (0.001)	-0.000 (0.002)	-0.002 (0.002)	0.000 (0.002)	-0.005*** (0.002)
std. ln(inc.)	0.055*** (0.019)	0.073*** (0.028)	0.048 (0.030)	0.077*** (0.028)	0.022 (0.029)
college	0.004 (0.038)	-0.024 (0.055)	0.033 (0.058)	-0.023 (0.056)	0.024 (0.058)
Constant	0.351*** (0.064)	0.250*** (0.094)	0.409*** (0.096)	0.283*** (0.093)	0.474*** (0.100)
Observations	2,140	1,064	1,055	1,075	1,086
R <sup>2</sup>	0.057	0.046	0.068	0.070	0.039

*Notes:* This table assesses the role of confidence in the predictions across vignettes. A forecast is classified as “correct” if it follows the same qualitative direction as the median expert forecast. Confidence is measured on a 5-point scale reaching from -2 to 2. Panel A shows how confidence affects prediction accuracy among experts. Panel B shows how confidence affects prediction accuracy in the representative sample. Panel C displays the determinants of confidence (averaged over confidence in inflation and unemployment forecasts) in the representative sample separately for each shock. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A14: Robustness: Wave effects

<b>Panel A: Experts</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.502*** (0.091)	-0.168** (0.077)	-0.283*** (0.032)	0.337*** (0.055)	0.165** (0.068)	-0.156** (0.074)	0.198*** (0.072)	-0.228*** (0.045)
rise	0.496*** (0.057)	0.294*** (0.056)	0.369*** (0.067)	-0.336*** (0.062)	-0.255*** (0.054)	0.364*** (0.044)	-0.181*** (0.054)	0.260*** (0.046)
fall×wave 2	0.216** (0.103)	0.047 (0.087)	0.075* (0.043)	-0.043 (0.062)	-0.012 (0.074)	-0.038 (0.078)	0.013 (0.080)	-0.008 (0.055)
rise×wave 2	-0.059 (0.066)	-0.075 (0.067)	-0.082 (0.070)	0.029 (0.069)	0.124* (0.066)	-0.092* (0.053)	0.091 (0.067)	-0.047 (0.063)
<i>Joint F-test does not detect a significant effect of wave.</i>								
p = 0.305								
Observations	482	481	474	475	517	513	515	521
R <sup>2</sup>	0.341	0.122	0.378	0.353	0.100	0.274	0.095	0.164

<b>Panel B: General Population</b>								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.319*** (0.069)	-0.244*** (0.068)	-0.224*** (0.058)	0.075 (0.061)	-0.121* (0.067)	-0.038 (0.062)	-0.058 (0.050)	-0.170*** (0.057)
rise	0.773*** (0.078)	0.419*** (0.062)	0.100 (0.062)	-0.048 (0.059)	0.184*** (0.044)	0.161*** (0.061)	0.191*** (0.052)	0.263*** (0.059)
fall×wave 2	-0.022 (0.100)	0.062 (0.098)	-0.072 (0.089)	-0.062 (0.089)	-0.057 (0.096)	0.019 (0.091)	-0.118 (0.083)	-0.147 (0.098)
rise×wave 2	-0.212** (0.106)	0.051 (0.095)	0.065 (0.083)	0.047 (0.091)	0.017 (0.073)	0.025 (0.086)	0.029 (0.086)	0.069 (0.089)
<i>Joint F-test does not detect a significant effect of wave.</i>								
p = 0.620								
Observations	1,099	1,099	1,085	1,085	1,123	1,123	1,121	1,121
R <sup>2</sup>	0.162	0.086	0.043	0.002	0.029	0.014	0.029	0.058

*Notes:* This table provides an overview of differences in forecasts across survey waves. Panel A uses data from the expert sample. Panel B uses data from the general population sample.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta\pi$  denotes the expected change in the inflation rate compared to the baseline scenario. *wave 2* is an indicator taking value one if a respondent participates in the second wave of the data collection. Both panels report a joint F-test that results from SUR regressions with respondent-level clustered standard errors and tests for an overall zero effect of *wave 2*. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A15: Robustness: Vignette and question order effects

Panel A: Order effects on forecasts of experts								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.670*** (0.108)	-0.109 (0.088)	-0.323*** (0.053)	0.384*** (0.084)	0.150 (0.113)	-0.264** (0.123)	0.227** (0.112)	-0.270*** (0.087)
rise	0.588*** (0.095)	0.115 (0.105)	0.364*** (0.093)	-0.160* (0.085)	-0.335*** (0.118)	0.331*** (0.096)	-0.223*** (0.065)	0.219*** (0.062)
fall $\times$ u. first	0.133 (0.195)	-0.070 (0.159)	-0.038 (0.063)	-0.024 (0.117)	-0.043 (0.129)	0.139 (0.133)	-0.137 (0.167)	0.067 (0.096)
rise $\times$ u. first	-0.148 (0.116)	0.093 (0.107)	-0.059 (0.140)	-0.176 (0.139)	0.079 (0.121)	0.061 (0.099)	0.290** (0.123)	-0.096 (0.114)
fall $\times$ 2nd vig.	0.196 (0.198)	-0.045 (0.164)	0.113* (0.064)	-0.067 (0.116)	0.079 (0.130)	0.071 (0.134)	0.104 (0.162)	0.013 (0.092)
rise $\times$ 2nd vig.	-0.029 (0.118)	0.277*** (0.107)	0.063 (0.147)	-0.224* (0.134)	0.106 (0.116)	0.010 (0.097)	-0.174 (0.109)	0.143 (0.106)
<i>Joint F-tests.</i>								
u. first	p = 0.521							
2nd vig.	p = 0.122							
Observations	95	95	85	85	85	85	90	90
R <sup>2</sup>	0.513	0.272	0.519	0.473	0.236	0.342	0.222	0.412

Panel B: Order effects on forecasts of general population								
	oil price		gov. spending		fed. funds rate		income taxes	
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
fall	-0.487*** (0.092)	-0.192** (0.081)	-0.391*** (0.075)	0.001 (0.080)	-0.325*** (0.079)	-0.025 (0.069)	-0.136* (0.081)	-0.293*** (0.100)
rise	0.761*** (0.097)	0.464*** (0.091)	0.103 (0.088)	-0.131* (0.080)	0.231*** (0.065)	0.159** (0.068)	0.059 (0.079)	0.293*** (0.075)
fall $\times$ u. first	0.117 (0.099)	-0.049 (0.099)	0.361*** (0.089)	0.200** (0.089)	0.071 (0.097)	-0.122 (0.091)	-0.015 (0.086)	-0.044 (0.102)
rise $\times$ u. first	-0.142 (0.107)	0.001 (0.095)	0.013 (0.082)	0.108 (0.093)	-0.063 (0.073)	-0.028 (0.085)	0.092 (0.085)	-0.078 (0.089)
fall $\times$ 2nd vig.	0.192* (0.100)	0.011 (0.099)	-0.113 (0.088)	-0.122 (0.089)	0.292*** (0.096)	0.130 (0.091)	0.045 (0.085)	0.139 (0.100)
rise $\times$ 2nd vig.	-0.047 (0.106)	-0.042 (0.095)	0.049 (0.085)	0.111 (0.092)	-0.015 (0.073)	0.058 (0.085)	0.201** (0.085)	0.082 (0.089)
<i>Joint F-tests.</i>								
u. first	p = 0.007							
2nd vig.	p = 0.066							
Observations	1,099	1,099	1,085	1,085	1,123	1,123	1,121	1,121
R <sup>2</sup>	0.164	0.086	0.059	0.010	0.040	0.018	0.033	0.059

*Notes:* This table provides an overview of vignette and question order effects on the forecasts. Panel A uses data from Wave 1 of the expert sample. Panel B uses data from the general population sample.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta\pi$  denotes the expected change in the inflation rate compared to the baseline scenario. *u. first* is an indicator taking value one if a respondent first answered the unemployment forecast question and then the inflation forecast question. *2nd vig.* is an indicator taking value one if the forecast corresponds to the second vignette that a respondent faced. Both panels report joint F-tests that results from SUR regressions with respondent-level clustered standard errors and test for overall zero effects of *u. first* and *2nd vig.* Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A16: Robustness: Incentive effects

<b>Panel A: Incentives</b>						
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	all $\checkmark$	time instructions	time vignettes
	(1)	(2)	(3)	(4)	(5)	(6)
incentives	0.044** (0.022)	-0.000 (0.023)	0.038** (0.019)	0.022 (0.016)	-0.537 (10.361)	38.589*** (13.236)
Constant	0.447*** (0.015)	0.508*** (0.017)	0.216*** (0.013)	0.477*** (0.011)	112.689*** (9.261)	165.001*** (6.490)
Observations	1,063	1,063	1,063	1,063	1,063	1,063
R <sup>2</sup>	0.004	0.000	0.004	0.002	0.000	0.008

<b>Panel B: Incentives crossed with subjective perception of expert accuracy</b>						
	$\Delta\pi\checkmark$	$\Delta u\checkmark$	both $\checkmark$	all $\checkmark$	time instructions	time vignettes
	(1)	(2)	(3)	(4)	(5)	(6)
incentives	0.040* (0.022)	0.001 (0.023)	0.038** (0.019)	0.020 (0.016)	-1.128 (10.555)	38.692*** (13.029)
exp. acc.	0.006 (0.015)	-0.015 (0.017)	0.012 (0.013)	-0.005 (0.012)	7.261 (7.068)	5.663 (4.976)
incentives $\times$ exp. acc.	-0.017 (0.022)	-0.007 (0.024)	-0.029 (0.018)	-0.012 (0.017)	0.246 (9.717)	7.697 (17.501)
Constant	0.449*** (0.015)	0.506*** (0.017)	0.217*** (0.013)	0.477*** (0.011)	113.222*** (9.502)	165.118*** (6.577)
Observations	1,049	1,049	1,049	1,049	1,049	1,049
R <sup>2</sup>	0.004	0.003	0.006	0.003	0.002	0.010

<b>Panel C: Incentives for the mechanism questions</b>		
	total mechanism score	time mechanism questions
	(1)	(2)
incentives	0.027 (0.066)	13.637 (14.873)
Constant	-0.019 (0.055)	234.530*** (11.090)
Observations	1,063	1,063
R <sup>2</sup>	0.000	0.001

*Notes:* This table provides an overview of the effect of monetary incentives on the response behavior of the general population in Wave 1. Panel A displays the effect on forecast accuracy and response times. *incentives* constitutes a binary variable that takes value one for incentivized respondents. For each individual,  $\Delta\pi\checkmark$  measures the fraction of correct inflation forecasts (out of 2),  $\Delta u\checkmark$  the fraction of correct unemployment forecasts (out of 2), *both $\checkmark$*  the fraction of vignettes in which both forecasts are correct (out of 2), and *all $\checkmark$*  the overall fraction of correct forecasts (out of 4). Thus, the coefficients can be interpreted as the effect of incentives on the probability of a qualitatively correct forecast. Columns 5 and 6 show effects on the time spent reading the instructions and the total time spent on the vignettes. Panel B controls for the respondents' perceived accuracy of experts (*exp. acc.*, standardized) to rule out that incentives might be ineffective merely because expert forecasts are perceived as inaccurate. Panel C studies the effect of incentives on response accuracy to the mechanism propagation questions. *total mechanism score* denotes the standardized number of correctly answered mechanism questions, *time mechanism questions* measures the time spent for answering the mechanism questions. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.

Table A17: Misperceived endogeneity of interest rate shock

Panel A: Binary monetary policy reaction				
	fed. funds rate			
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)
fall	-0.358*** (0.114)	-0.046 (0.087)	-0.407*** (0.127)	-0.054 (0.098)
rise	0.164 (0.100)	0.249*** (0.092)	0.155 (0.118)	0.190 (0.124)
fall $\times 1(\alpha > 0)$	0.257* (0.150)		0.216 (0.147)	0.017 (0.148)
rise $\times 1(\alpha > 0)$	0.046 (0.128)		0.039 (0.131)	0.125 (0.128)
fall $\times 1(\beta > 0)$		0.071 (0.131)	0.145 (0.145)	0.066 (0.146)
rise $\times 1(\beta > 0)$		-0.113 (0.127)	0.028 (0.126)	-0.144 (0.122)
Obs.	503	503	503	503
R <sup>2</sup>	0.039	0.020	0.041	0.022

Panel B: Expected monetary policy reaction				
	fed. funds rate			
	$\Delta\pi$	$\Delta u$	$\Delta\pi$	$\Delta u$
	(1)	(2)	(3)	(4)
fall	-0.304*** (0.080)	-0.014 (0.066)	-0.309*** (0.081)	-0.060 (0.071)
rise	0.178*** (0.068)	0.198*** (0.067)	0.176** (0.070)	0.183*** (0.071)
fall $\times \alpha/4$	0.860** (0.355)		0.761** (0.334)	0.526* (0.270)
rise $\times \alpha/4$	0.135 (0.230)		0.093 (0.234)	0.194 (0.249)
fall $\times \beta/4$		0.061 (0.285)	0.234 (0.304)	-0.146 (0.266)
rise $\times \beta/4$		-0.048 (0.231)	0.135 (0.262)	-0.114 (0.241)
Obs.	503	503	503	503
R <sup>2</sup>	0.052	0.018	0.054	0.026

*Notes:* This table reports regressions that test for misperception of the interest rate shock as an endogenous reaction of the Fed to a changed outlook in inflation.  $\Delta u$  denotes the expected change in the unemployment rate compared to the baseline scenario.  $\Delta\pi$  denotes the expected change in the inflation rate compared to the baseline scenario. Panel A regresses both variables on  $1(\alpha > 0)$  – a dummy taking value one if the respondent believes that the Fed would increase the federal funds target rate in response to an unexpected increase in the outlook for future inflation – and  $1(\beta > 0)$  – a dummy taking value one if the respondent believes that the Fed would increase the federal funds target rate in response to an unexpected increase in the outlook for future unemployment. Panel B reports uses  $\alpha$  and  $\beta$  which constitute estimates of the coefficients in the forward-looking interest rate rule. They are divided by 4 because the inflation and unemployment outlook change by 0.25 percentage points (rather than 1 pp.) in the survey questions. Standard errors clustered at the respondent level are in parentheses. \* denotes significance at 10 pct., \*\* at 5 pct., and \*\*\* at 1 pct. level.



## C Details on the derivation of the theoretical and empirical benchmarks

In this sections we provide details on the sources, the assumptions, and calculations used to turn the empirical and theoretical evidence on each shock into comparable multipliers, as outlined in section 3.1. We use an Okun’s Law coefficient of -0.4, based on Ball et al. (2017), which implies a 0.4 percentage point rise in unemployment associated to a 1 percent fall in output over the course of a year. Below,  $\Delta y_4$  indicates a percent fall in output over four quarters, and  $\Delta\pi_4$  and  $\Delta u_4$  are the respective four quarter changes of inflation and the unemployment rate in percentage points.<sup>5</sup> In each case, the following five key steps are involved: 1) identifying the size of the shock in the source paper(s), 2) identifying the size of the response of the variables of interest in the source paper(s), 3) determining the size of the shock in the vignettes, 4) rescaling the shocks from the source papers to be of the same size as those from the vignettes, 5) translating output changes into unemployment changes when needed. All calculations contain a small degree of approximation.

**Oil price** Blanchard and Galí (2010) show that since 1984, a date conventionally considered as the beginning of the Great Moderation, the response of the US economy to oil price fluctuations has become milder. We thus derive our benchmark from the authors’ post-1984 VAR results. As shown in Table 1, the benchmark unemployment rate change for an oil price rise of \$30 is 0.4 to 0.45 percentage points. For inflation, we derive an empirical benchmark rise of 1.25 to 1.5 percentage points.

We choose two papers as theoretical references: Bodenstein et al. (2011) and Balke and Brown (2018). Both papers model the effect of shocks to oil supply outside the US. While the former paper models the US as a purely oil-importing country, the latter treats the US as both oil-producing and oil-importing, providing us with a theoretical benchmark effect ranging from 0.35 to 0.8 percentage points (see Table 1). Neither of these papers studies the impact of oil price shocks on domestic inflation.

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<sup>5</sup>In the case of government and tax shocks in the model of Galí et al. (2011), the responses of output and unemployment exhibited very low persistence, likely due to the specification of the shock process itself. We therefore opted for using the average change over for four quarters rather than the change in the fourth quarter only.

**Oil price - Empirical** Source: Blanchard and Galí (2010), Figure 1, Panel B (i.e. post-84). 1) Shock is 10% change in price. 2)  $\Delta y = -0.2$ ,  $\Delta \pi = 0.25$ . 3) Size of shock in vignette 55 percent (Wave 2) 56 percent (Wave 1) so we approximately multiply the original shocks by 5.5. 4)  $\Delta y = -1.1$ ,  $\Delta \pi = 1.4$ . 5) Okun's Law:  $\Delta u = 0.425$ .

**Oil price - Theory** Source: Bodenstein et al. (2011), Figure 2. 1) Shock is 8% change in price 2)  $\Delta y = -0.15$ . 3) Size of shock in vignette 55 percent (Wave 2) 56 percent (Wave 1) so we approximately multiply the original shocks by 7. 4)  $\Delta y = -1.05$  5) Okun's Law:  $\Delta u = 0.42$ .

Source: Balke and Brown (2018), Figure 3. 1) Shock is 2.5% change in price 2)  $\Delta y = -0.1$ . 3) Size of shock in vignette 55 percent (Wave 2) 56 percent (Wave 1) so we approximately multiply the original shocks by 22. 4)  $\Delta y = -2.2$  5) Okun's Law:  $\Delta u = 0.88$ .

**Government spending** Regarding the effect of the government spending increases on unemployment, we compute an empirical reference range of -0.1 to -0.2 percentage points (Auerbach and Gorodnichenko, 2012; Blanchard and Perotti, 2002; Ramey, 2011). No results are available for the effect on inflation. On the theoretical side, we interpret the exogenous spending shock in Smets and Wouters (2007) and Galí et al. (2011) as a government spending shock. A third source is the government spending shock in Zubairy (2014).<sup>6</sup> The theoretical reference range of values for the change in unemployment after a rise in spending of 0.5 percent of GDP, reported in Table 1, is between -0.1 to -0.2 percentage points, while the benchmark rise in inflation is 0.15 to 0.2 percentage points.

**Government spending - Empirical** Source: Blanchard and Perotti (2002), Ramey (2011) and sources therein, Auerbach and Gorodnichenko (2012). 1) Shock is 1% of GDP 2)  $\Delta y = 0.8$  to 1.5. 3) Size of shock in vignette is 2.4% of 4.2 trillion of government spending. US 2018 GDP is 20.89 trillion according to the Bureau of Economic Analysis, so the shock is about 2.4% of 20% of GDP, which is 0.5% of GDP. So we divide the original shock by 2. 4)  $\Delta y = 0.4$  to 0.75. 5) Okun's Law:  $\Delta u = -0.16$  to -0.3.

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<sup>6</sup>Note that we do not use this paper as a benchmark for the response of inflation. Although inflation dynamics resulting from fiscal policy are embedded in the model, they are not discussed in detail by the author.

**Government spending - Theory** Source: Galí et al. (2011), Figure 3. 1) Size of shock is 0.47, with exogenous spending formulated in percent of output, so it can be interpreted as 0.5% of GDP. 2)  $\Delta u=-0.1$ ,  $\Delta\pi=0.2$ . 3) The shock in the vignette is very similar in size, so there is no need to scale it. 4)  $\Delta u=-0.1$ ,  $\Delta\pi=0.2$ .

Source: Smets and Wouters (2007), Figure 2. 1) Size of shock is 0.5, with exogenous spending formulated in percent of output, so it can be interpreted as 0.5% of GDP. 2)  $\Delta y=0.3$ ,  $\Delta\pi=0.15$ . 3) The shock in the vignette is very similar in size, so there is no need to scale it. 4)  $\Delta y=0.3$ ,  $\Delta\pi = 0.15$ . 5) Okun's Law:  $\Delta u=-0.12$

Source: Zubairy (2014), Table 2. 1) Size of shock is 1% of GDP. 2)  $\Delta y=1$ . 3) Divide by 2 to make it comparable to the vignette. 4)  $\Delta y=0.5$ . 5) Okun's Law:  $\Delta u=-0.2$

**Monetary policy** Arias et al. (2019) gives an empirical benchmark effect of 0.2 percentage points on unemployment and 0.2 percentage points on inflation for our federal funds rate rise by 50 basis points. This is largely in line with a large and consistent body of VAR evidence since the late 1990's (Bernanke and Mihov, 1998; Bernanke et al., 2005; Christiano et al., 1999; Primiceri, 2005; Romer and Romer, 2004; Stock and Watson, 2001; Uhlig, 2005). As a theoretical reference, we again use Smets and Wouters (2007) and Galí et al. (2011) and arrive at a benchmark of 0.4 to 0.5 percentage points for unemployment and a benchmark of -0.15 percentage points for inflation.

**Monetary policy - Empirical** Source: Arias et al. (2019) Figure 5 (i.e. estimation on full post-WWII sample, imposing a zero restriction on the systematic response of monetary policy to commodity prices). 1) Shock size is 0.25 percentage points. 2)  $\Delta y=-0.25$ ,  $\Delta\pi=-0.1$ . 3) To make the shock comparable to the vignette, we multiply by 2. 4)  $\Delta y=-0.5$ ,  $\Delta\pi=-0.2$ . 5) Okun's Law:  $\Delta u=0.2$ .

**Monetary policy - Theory** Source: Galí et al. (2011), Figure 3. 1) Size of shock is 0.15 percentage points 2)  $\Delta u=-0.15$ ,  $\Delta\pi=-0.05$ . 3) We approximately multiply by 3.3 to make it comparable to the vignette. 4)  $\Delta u=0.5$ ,  $\Delta\pi=-0.16$ .

Source: Smets and Wouters (2007), Figure 2. 1) Size of shock is 0.175. 2)  $\Delta y=-0.35$ ,  $\Delta\pi=-0.05$ . 3) We approximately multiply by 3 to make it comparable to the vignette. 4)  $\Delta y=-1$ ,  $\Delta\pi =-0.15$ . 5) Okun's Law:  $\Delta u=0.4$

**Income tax rate** The empirical benchmark for the unemployment change in response to the increase in the income tax rate by 1 percentage point on average ranges between 0.2 and 0.6 percentage points (Blanchard and Perotti, 2002; Favero and Giavazzi, 2012; Mertens and Ravn, 2012, 2014; Perotti, 2012; Romer and Romer, 2010). To our knowledge, the only paper modeling the impact of labor income tax rate fluctuations in a New Keynesian model is Zubairy (2014). For the theoretical benchmark of the effect on unemployment, we derive a value of 0.06.<sup>7</sup>

**Tax rate change - Empirical** Source: Blanchard and Perotti (2002), Romer and Romer (2010), Favero and Giavazzi (2012), Mertens and Ravn (2012, 2014), and Perotti (2012). 1) Shock size is a 1 percent of GDP increase in tax revenue. 2) Range of empirical output multipliers at 4 to 6 quarters is 1 to 3 percent of GDP. 3) The shock size in the vignette is approximately 0.5 percent of GDP. So we divide by 2 to make the shock comparable to the vignette. 4)  $\Delta y=0.5$  to 1.5. 5) Okun's Law: 0.2 to 0.6.

**Tax rate change - Theory** Source: Zubairy (2014), Table 2. 1) Size of shock is 1 percent of GDP. 2)  $\Delta y=0.32$ . 3) Divide by 2 to make it comparable to the vignette. 4)  $\Delta y=0.15$ . 5) Okun's Law:  $\Delta u=-0.06$ .

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<sup>7</sup>Once again, we do not use this paper as a benchmark for the response of inflation. Although inflation dynamics resulting from fiscal policy are embedded in the model, they are not discussed in detail by the author.

## D Details on the expert survey (Wave 1)

We compiled a list of participants of the following conferences:

- SITE Macroeconomics of Uncertainty and Volatility (2018, 2017, 2016)
- SITE Macroeconomics and Inequality (2018)
- Cowles Macro Conference (2018, 2017, 2016)
- NBER Annual Conference on Macroeconomics (2018, 2017, 2016)
- ifo Conference on “Macroeconomics and Survey Data” (2018, 2017, 2016)
- Venice Summer Institute on Expectation Formation (2018)
- Workshop on Subjective Expectations NY Fed (2016)

We also recruited a sample of graduate students in macroeconomics from the following institutions:

- University of Bonn
- Goethe University Frankfurt
- University of Oxford

Finally, we also recruited a sample of economists from the following policy institutions:

- The Federal Reserve Board, Washington D.C.
- The International Monetary Fund, Washington D.C.
- Bank for International Settlements, Basel
- Deutsche Bundesbank, Frankfurt
- European Central Bank, Frankfurt
- ifo centre, Munich

Below is a list of the institutions that our experts (from Wave 1) have as one of their main institution: Kellogg School of Management, Northwestern University, University of Cologne, Haverford College, University of Minnesota, Ross School of Business, University of Michigan, Federal Reserve Bank of Boston, University of Amsterdam, Boston University, Questrom School of Business, Federal Reserve Bank of St. Louis, Goethe University Frankfurt, LMU Munich, University of Notre Dame, University of California San Diego, University of Oxford, Temple University, International Monetary Fund, University of Toronto, Carleton University, Yale University, Federal Reserve Board, University of Copenhagen, University of Bologna, Georgia Institute of Technology Atlanta, Statistics Norway, Deutsche Bundesbank, Frankfurt School of Finance & Management, Johns Hopkins University, Baltimore, Brandeis University, Federal Reserve Bank of Cleveland, Bank of England, MIT Sloan School of Management, Rand Corporation, University of Copenhagen, International Monetary Fund, Swiss National Bank, Boston College, University of Reading, UNC Kenan-Flagler Business School, Bonn Graduate School of Economics, Institute for Employment Research Friedrich-Alexander University (FAU) Erlangen-Nuremberg, College of Business Clemson University, ifo Institute Munich, Stockholm University, Banque de France, University of Nantes, Uppsala University, World Bank, University of St.Gallen, Austrian Institute of Economic Research, Copenhagen Business School, Federal Reserve Bank of Minneapolis, NYU Stern School of Business, University of Bonn, Mannheim University, University of Manchester, University College London, University of Lausanne, Arizona State University, University of Birmingham, Federal Reserve Bank of Chicago, European Central Bank, Bank for International Settlements, Basel, University of Maryland, Amsterdam School of Economics, Columbia University, Christian Albrechts University at Kiel, Princeton University, Stockholm School of Economics, University of Chicago Booth School of Business, University of Warwick, Leibniz University Hannover, University of Heidelberg, University of Copenhagen, Northwestern University, New York University, Federal Reserve Bank of Minneapolis, Indiana University, Karlsruhe Institute of Technology.

# E Experimental instructions: Wave 1 (February/March 2019)

## Introductory explanations

### About this study

This study is about your **beliefs about the future development of the US economy**, in particular the **unemployment rate** and the **inflation rate**.

Your first task will be to estimate the future development of both of these rates in hypothetical scenarios.



## Incentive explanation

### About this study

**You can earn additional panel points based on the accuracy of your responses in this first task.**

We have asked economic experts the same questions you will be asked. They were also invited to assess the future development of the unemployment and inflation rate under the same scenarios that you will encounter. They have provided us with their best predictions of the most likely development of both variables in the different scenarios.

To encourage accuracy, you may earn additional panel points if your responses are close to the experts' responses.

Specifically, your response to one randomly selected question will be compared to the experts' responses. If your response is at most 0.2 percentage points away from the average response of the experts, you will earn additional panel points equivalent to the value of \$0.50.

Thus, throughout the survey please keep in mind that **the more accurate your responses, the higher the chance is that you earn additional panel points.**

(Possible rewards will be calculated and transferred a few weeks after the survey is completed.)



## Explanation on how to respond

### How to respond

In the following, we will often ask you how high you think the unemployment and inflation rates will be in the future. You will respond on scales that look as follows:



The default positions of the sliders correspond to the current level of the respective rates. The unemployment rate is currently at 4.0%. The inflation rate is currently at 1.6%.

To answer a question, move the slider to the desired value. If you think that the rate will stay at its current value, simply click on the slider so that your response is registered. Your response will also be displayed in numbers on the right side of the slider.

Finally, please note that the scale for the unemployment rate ranges from 0% to 10%, while the scale for the inflation rate ranges from -2% to 8% to account for the possibility of deflation.



The main part of the survey begins when you press on the next button. Please try to **make your responses as accurate as possible**.

**It is very important for the success of our research that you answer to the best of your knowledge and read the questions very carefully before answering.**





## Definitions

The **unemployment rate** is a measure of the amount of unemployment in a country. It is defined as the fraction of people who are unemployed out of all people that are willing to work, or, put differently, the percentage of people who are willing to work that do not have a job. The current unemployment rate in the United States is 4.0%. This means that 4.0% of Americans who are willing to work are unemployed. In other words, out of 1000 Americans who want to work, 40 do not have a job.

The **inflation rate** measures how much prices in the economy rise from year to year. It is defined as the yearly growth of the general price level of goods and services. The current inflation rate in the United States is 1.6%. This means that, on average, prices for goods and services rose by 1.6% in the last 12 months which is to say that a typical bundle of goods and services that cost \$1000 last year costs \$1016 today. If the inflation rate is negative, it is referred to as deflation. This means that goods and services become less expensive from one year to the next.



# Oil price vignette

## Oil price: introduction

### The price of crude oil

The following scenarios deal with the price of crude oil. In the last week, the price of one barrel of crude oil averaged \$54.



## Oil price: baseline scenario

We would like you to think about the following hypothetical scenario.

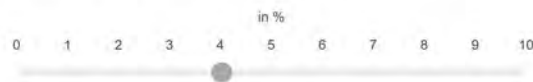
### Scenario: Oil price stays constant

Imagine that the average **price of crude oil stays constant** over the next 12 months. That is, on average, the price of oil over the next 12 months will be the same as the current price.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

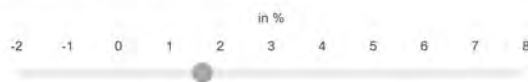
*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Oil price: fall scenario

We would like you to think about the following hypothetical scenario.

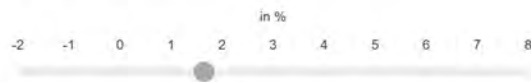
### Scenario: Oil price falls

Imagine the average **price of crude oil** unexpectedly **falls** due to improvements in the local production technology in the Middle East. On average, the price will be \$30 lower **for the next 12 months** than the current price. That is, the price will be on average \$24 for the next 12 months.

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

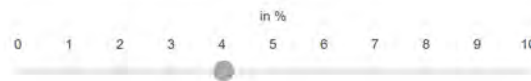
*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



## Oil price: rise scenario

We would like you to think about the following hypothetical scenario.

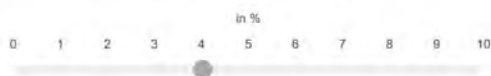
### Scenario: Oil price rises

Imagine the average **price of crude oil** unexpectedly **rises** due to a problem with the local production technology in the Middle East. On average, the price will be **\$30 higher for the next 12 months** than the current price. That is, the price will be on average **\$84 for the next 12 months**.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

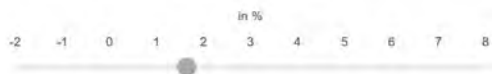
*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Oil price: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with the **oil price**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident



# Government spending vignette

## Government spending vignette: introduction

### Federal government spending

The following scenarios deal with yearly federal government spending. In the 2018 financial year, the federal government spent roughly \$4.2 trillion on diverse issues such as social security, health, military, or education. This amounts to roughly 1/3 of the value of all final goods and services produced by the US economy in one year (known as the gross domestic product).

Government spending typically increases every year, reflecting the general growth of the economy. For the last 50 years, for instance, it increased by an average of 2.9% each year.



## Government spending: baseline scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows as usual

Imagine **federal government spending grows as usual** over the next 12 months. That is, it grows at a rate that equals the usual growth that took place in the previous years.

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



## Government spending: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows less

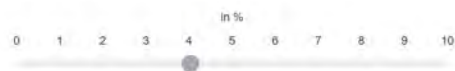
Imagine **federal government spending** unexpectedly **grows to a smaller extent** than usual over the next 12 months due to **cuts in spending** on defense. In particular, it grows by 2.4 percentage points less than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending cut.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%.*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%.*



## Government spending: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows more

Imagine **federal government spending** unexpectedly **grows to a larger extent** than usual over the next 12 months due to a newly announced **spending program** on defense. In particular, it grows by 2.4 percentage points more than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending program.

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

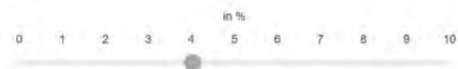
*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



## Government spending: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with **total government spending**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident



# Interest rate vignette

## Interest rate vignette: introduction

### The federal funds target rate

The following scenarios deal with the federal funds target rate. This is the most **important interest rate in the economy**. The value of the rate influences how “costly” it is for banks to acquire money, thereby influencing interest rates on other important financial products such as savings accounts, consumer loans, mortgages, or loans to firms.

The federal funds target rate is the interest rate frequently discussed in the news. It is set by the Federal Open Market Committee (FOMC), which normally meets eight times a year. Currently, the rate is 2.5%.



## Interest rate: baseline scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate stays constant

Imagine the **federal funds target rate** stays **constant**. That is, in its next meeting, the Federal Open Market Committee announces that it will keep the rate constant.

Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*





## Interest rate: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate falls

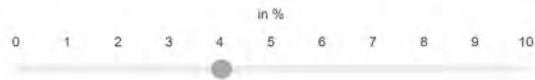
Imagine the **federal funds target rate** is unexpectedly **0.5 percentage points lower**. That is, in its next meeting, the Federal Open Market Committee announces that it is reducing the rate from 2.5% to 2%.

Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

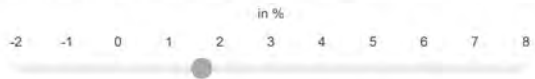
*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Interest rate: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate rises

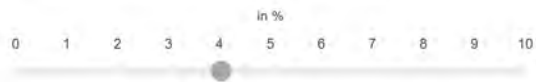
Imagine the **federal funds target rate** is unexpectedly **0.5 percentage points higher**. That is, in its next meeting, the Federal Open Market Committee announces that it is raising the rate from 2.5% to 3%.

Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

Note: The default position of the slider is the current level of the unemployment rate: 4.0%



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

Note: The default position of the slider is the current level of the inflation rate: 1.6%



## Interest rate: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with the **federal funds target rate**.

How confident are you in your predictions for the **unemployment rate**?

- Not confident at all    Not confident    Somewhat confident    Confident    Very Confident
- 

How confident are you in your predictions for the **inflation rate**?

- Not confident at all    Not confident    Somewhat confident    Confident    Very Confident
-

# Taxation vignette

## Taxation vignette: introduction

### The federal income tax rates

The following scenarios deal with the income tax rates in the US. The tax rates specify the percentage of their income that households need to pay to the federal government. At present, a typical household pays 21.1 percent of its income to the federal government in taxes.



## Taxation: baseline scenario

We would like you to think about the following hypothetical scenario.

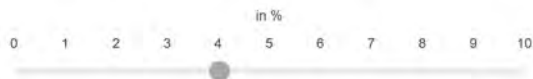
### Scenario: Income tax rates stay constant

Imagine that **income tax rates stay constant** for all US citizens over the next 12 months.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Taxation: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Income tax rates decrease

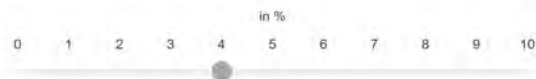
Imagine that **income tax rates** are **1 percentage point lower** for all US citizens over the next 12 months. This means that the typical US household would **pay about \$400 less in taxes**.

The government announces: The tax change is temporary and occurs despite no changes in the government's assessment of the economic conditions. Moreover, government spending does not change in response to the tax cut.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Taxation: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Income tax rates increase

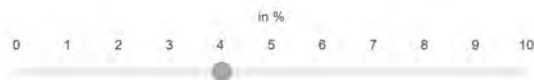
Imagine that **income tax rates** are **1 percentage point higher** for all US citizens over the next 12 months. This means that the typical US household would **pay about \$400 more in taxes**.

The government announces: The tax change is temporary and occurs despite no changes in the government's assessment of the economic conditions. Moreover, government spending does not change in response to the tax increase.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

Note: The default position of the slider is the current level of the unemployment rate: 4.0%



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

Note: The default position of the slider is the current level of the inflation rate: 1.6%



## Taxation: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with **income tax rates**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident



# Example vignette with incentives

## Government spending: baseline scenario - with incentives

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows as usual

Imagine **federal government spending grows as usual** over the next 12 months. That is, it grows at a rate that equals the usual growth that took place in the previous years.

**Reminder:** If your answer to the following questions is at most 0.2 percentage points away from the average responses of the experts, you can earn additional panel points.

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

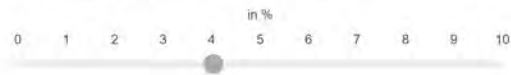
Note: The default position of the slider is the current level of the inflation rate: 1.6%



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

Note: The default position of the slider is the current level of the unemployment rate: 4.0%



## Government spending: fall scenario - with incentives

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows less

Imagine **federal government spending** unexpectedly **grows to a smaller extent** than usual over the next 12 months due to **cuts in spending** on defense. In particular, it grows by 2.4 percentage points less than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending cut.

**Reminder.** If your answer to the following questions is at most 0.2 percentage points away from the average responses of the experts, you can earn additional panel points.

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

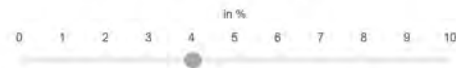
*Note: The default position of the slider is the current level of the inflation rate: 1.6%.*



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%.*





## Government spending: rise scenario - with incentives

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows more

Imagine **federal government spending** unexpectedly **grows to a larger extent** than usual over the next 12 months due to a newly announced **spending program** on defense. In particular, it grows by 2.4 percentage points more than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending program.

*Reminder: If your answer to the following questions is at most 0.2 percentage points away from the average responses of the experts, you can earn additional panel points.*

### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

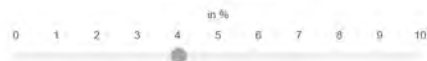
*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 4.0%*





## Beliefs about propagation mechanisms

How does the minimum wage level usually react if house prices increase?

- It increases.
- It decreases.
- Neither of the above.

How does households' overall demand for products in the economy usually react if households' capacity to purchase products (purchasing power) increases?

- Households are willing to buy **more** products and/or also willing to buy at **higher** prices.
- Households are willing to buy **fewer** products and/or only willing to buy at **lower** prices.
- Neither of the above.

How does households' capacity to purchase products (purchasing power) usually react if income tax rates increase?

- It decreases.
- It increases.
- Neither of the above.

How does firms' overall supply of products in the economy usually react if production costs increase?

- Firms are willing to supply **more** products and/or also willing to sell at **lower** prices.
- Firms are willing to supply **fewer** products and/or only willing to sell at **higher** prices.
- Neither of the above.

How does households' capacity to purchase products (purchasing power) usually react if the oil price increases?

- It increases.
- It decreases.
- Neither of the above.

How do the interest rates that households earn on savings or pay on loans usually react if the federal funds target rate increases?

- They increase.
- They decrease.
- Neither of the above.

How does the inflation rate usually react if households, firms, or the government are willing to buy more products and/or also willing to buy at higher prices?

- It decreases.
- It increases.
- Neither of the above.

How do tariffs (duties levied on imported or exported goods) usually react if the population size increases?

- They decrease.
- They increase.
- Neither of the above.

How does the inflation rate usually react if firms are willing to supply more products and/or also willing to sell at lower prices?

- It increases.
- It decreases.
- Neither of the above.

How does firms' overall demand for products in the economy usually react if the financing costs of firms (i.e. the costs of borrowing money) rise?

- Firms are willing to buy **more** investment goods and/or also willing to buy at **higher** prices.
- Firms are willing to buy **fewer** investment goods and/or only willing to buy at **lower** prices.
- Neither of the above.

How do firms' production costs usually react if the oil price increases?

- They increase.
- They decrease.
- Neither of the above.

How does the unemployment rate usually react if households, firms, or the government are willing to buy more products and/or also willing to buy at higher prices?

- It increases.
- It decreases.
- Neither of the above.

How does firms' overall supply of products in the economy usually react if the financing costs of firms (i.e. the costs of borrowing money) increase?

- Firms are willing to supply **fewer** products and/or only willing to sell at **higher** prices.
- Firms are willing to supply **more** products and/or also willing to sell at **lower** prices.
- Neither of the above.

How do the financing costs of firms (i.e. the costs of borrowing money) usually react if the federal funds target rate increases?

- They decrease.
- They increase.
- Neither of the above.

How does the unemployment rate usually react if firms are willing to supply more products and/or also willing to sell at lower prices?

- It decreases.
- It increases.
- Neither of the above.

How does households' overall demand for products in the economy usually react if the interest rates that households earn on savings and pay on loans rise?

- Households are willing to buy **more** products and/or also willing to buy at **higher** prices.
- Households are willing to buy **fewer** products and/or only willing to buy at **lower** prices.
- Neither of the above.

## Financial literacy

**We now would like to ask you some questions on financial topics.**

Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than \$102
- Exactly \$102
- Less than \$102
- Do not know

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- More than today
- Exactly the same
- Less than today
- Do not know

Please tell me whether this statement is true or false: "Buying a single company's stock usually provides a safer return than a stock mutual fund."

- True
- False
- Do not know



# F Experimental instructions: Wave 2 (July 2019)

## Oil price vignette

### Oil price: introduction

#### The price of crude oil

The following scenarios deal with the price of crude oil. In the two weeks before the editorial deadline of the survey (20th of June), the price of one barrel of crude oil averaged \$53.

### Oil price: baseline scenario

We would like you to think about the following hypothetical scenario.

#### Scenario: Oil price stays constant

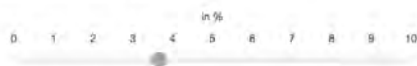
Imagine that the average price of crude oil stays constant over the next 12 months. That is, on average, the price of oil over the next 12 months will be the same as the current price.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

#### Unemployment rate

Under this scenario, what do you think the US unemployment rate will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



#### Inflation rate

Under this scenario, what do you think the US inflation rate will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Oil price: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Oil price rises

Imagine the average **price of crude oil** unexpectedly **rises** due to a problem with the local production technology in the Middle East. On average, the price will be **\$30 higher for the next 12 months** than the current price.

**Reminder:** Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with the **oil price**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident



## Oil price: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Oil price falls

Imagine the average price of crude oil unexpectedly falls due to improvements in the local production technology in the Middle East. On average, the price will be \$ lower for the next 12 months than the current price.

**Reminder:** Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.

### Unemployment rate

Under this scenario, what do you think the US unemployment rate will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%.*



### Inflation rate

Under this scenario, what do you think the US inflation rate will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%.*



## Oil price: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with the oil price.

How confident are you in your predictions for the unemployment rate?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

How confident are you in your predictions for the inflation rate?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident



# Government spending vignette

## Government spending vignette: introduction

### Federal government spending

The following scenarios deal with yearly federal government spending. In the 2018 fiscal year, the federal government spent roughly \$4.1 trillion on diverse issues such as social security, health, military, or education. This amounts to roughly 1/3 of the value of all final goods and services produced by the US economy in one year (known as the gross domestic product).

Government spending typically increases every year, reflecting the general growth of the economy. For the last 50 years, for instance, it increased by an average of 2.9% each year.



## Government spending: baseline scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows as usual

Imagine **federal government spending grows as usual** over the next 12 months. That is, total government spending grows at a rate that equals the usual growth that took place in the previous years.

**Reminder:** Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.6%*



## Government spending: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows less

Imagine **federal government spending** unexpectedly **grows to a smaller extent** than usual over the next 12 months due to **cuts in spending** on defense. In particular, total government spending grows by **percentage points less** than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending cut.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*





## Government spending: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Government spending grows more

Imagine **federal government spending** unexpectedly **grows to a larger extent** than usual over the next 12 months due to a newly announced **spending program** on defense. In particular, total government spending grows by 2.4 percentage points more than the usual growth that took place in the previous years.

The government announces: The change is temporary and occurs despite no changes in the government's assessment of national security or economic conditions. Moreover, federal taxes do not change in response to the spending program.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Government spending: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with **total government spending**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all   Not confident   Somewhat confident   Confident   Very Confident




# Interest rate vignette

## Interest rate vignette: introduction

**The federal funds target rate**

The following scenarios deal with the federal funds target rate. This is the most **important interest rate in the economy**. The value of the rate influences how "costly" it is for banks to acquire money, thereby influencing interest rates on other important financial products such as savings accounts, consumer loans, mortgages, or loans to firms.

The federal funds target rate is the interest rate frequently discussed in the news. It is set by the Federal Open Market Committee (FOMC), which normally meets eight times a year. Currently, the rate is 2.5%.



## Interest rate: baseline scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate stays constant

Imagine the **federal funds target rate** stays **constant**. That is, in its next meeting, the Federal Open Market Committee announces that it will keep the rate constant at 2.5%.

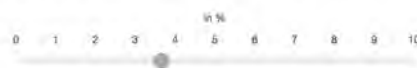
Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

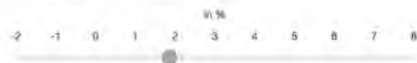
*Note: The default position of the slider is the current level of the unemployment rate: 3.6%.*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%.*



## Interest rate: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate falls

Imagine the **federal funds target rate** is unexpectedly **percentage points lower**. That is, in its next meeting, the Federal Open Market Committee announces that it is reducing the rate from % to %.

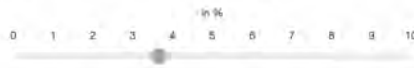
Imagine the committee announces it does so with no changes in their assessment of the economic conditions.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Interest rate: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Federal funds target rate rises

Imagine the **federal funds target rate** is unexpectedly **0.5 percentage points higher**. That is, in its next meeting, the Federal Open Market Committee announces that it is raising the rate from 2.5% to 3%.

Imagine the committee announces it does so with no changes in their **assessment of the economic conditions**.

**Reminder:** Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Interest rate: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with the **federal funds target rate**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

How confident are you in your predictions for the **inflation rate**?


Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

# Taxation vignette

## Taxation vignette: introduction

**The federal income tax rates**

The following scenarios deal with the income tax rates in the US. The tax rates specify the percentage of their income that households need to pay to the federal government. At present, a typical household pays 21.1 percent of its income to the federal government in taxes.



## Taxation: baseline scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Income tax rates stay constant

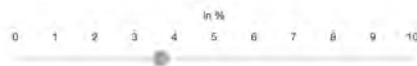
Imagine that **income tax rates stay constant** for all households in the US over the next 12 months.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Taxation: fall scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Income tax rates decrease

Imagine that **income tax rates** are unexpectedly **lower** for all households in the US over the next 12 months. This means that the typical US household would **pay about \$ less in taxes**.

The government announces: The tax change is temporary and occurs despite no changes in the government's assessment of the economic conditions. Moreover, **government spending does not change** in response to the tax cut.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Taxation: rise scenario

We would like you to think about the following hypothetical scenario.

### Scenario: Income tax rates decrease

Imagine that **income tax rates** are unexpectedly **1 percentage point lower** for all households in the US over the next 12 months. This means that the typical US household would **pay about \$400 less in taxes**.

The government announces: The tax change is temporary and occurs despite no changes in the government's assessment of the economic conditions. Moreover, government spending does not change in response to the tax cut.

*Reminder: Please account for the actions of policymakers that you would expect in this scenario and include them in your predictions.*

### Unemployment rate

Under this scenario, what do you think the US **unemployment rate** will be 12 months from now?

*Note: The default position of the slider is the current level of the unemployment rate: 3.6%*



### Inflation rate

Under this scenario, what do you think the US **inflation rate** will be over the next 12 months?

*Note: The default position of the slider is the current level of the inflation rate: 1.8%*



## Taxation: confidence

### Your confidence in your responses

We would like to ask you about your confidence in your responses to the preceding scenarios that dealt with **income tax rates**.

How confident are you in your predictions for the **unemployment rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident

How confident are you in your predictions for the **inflation rate**?

Not confident at all    Not confident    Somewhat confident    Confident    Very Confident



## Good-bad-heuristic (GBH)

In your view, are **high rates of inflation** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your view, are **high rates of unemployment** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your view, is a **high oil price** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your view, is **high government spending** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your view, are **high interest rates** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your view, are **high income taxes** good or bad for ...?

	Very good	Good	Somewhat good	Neither good nor bad	Somewhat bad	Bad	Very bad
... your household.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... the US economy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Numeracy

Next we would like to ask you seven questions to see how people use numbers in everyday life. Please answer the following questions by filling in the blank.

In a sale, a shop is selling all items at half price. Before the sale, a sofa costs \$300. How much will it cost in the sale?

Let's say you have \$200 in a savings account. The account earns ten per cent interest per year. Interest accrues at each anniversary of the account. If you never withdraw money or interest payments, how much will you have in the account at the end of two years?

In the BIG BUCKS LOTTERY, the chances of winning a \$10.00 prize are 1%. What is your best guess about how many people would win a \$10.00 prize if 1,000 people each buy a single ticket from BIG BUCKS?

If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease?

The chance of getting a viral infection is 0.0005. Out of 10,000 people, about how many of them are expected to get infected?

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?

- More than today
- Exactly the same
- Less than today

Please tell me whether this statement is true or false: Buying a single company's stock usually provides a safer return than a stock mutual fund.

- True
- False

## Rational inattention

To what extent do you agree with the following statements?

The **US inflation rate** is relevant for my own economic situation.

- | Fully disagree        | Disagree              | Rather disagree       | Rather agree          | Agree                 | Fully agree           |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The **US unemployment rate** is relevant for my own economic situation.

- | Fully disagree        | Disagree              | Rather disagree       | Rather agree          | Agree                 | Fully agree           |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

## Supply-side view

To what extent do you agree with the following statements?

Increases in income taxes tend to increase firms' production costs.

Fully disagree    Disagree    Rather disagree    Rather agree    Agree    Fully agree

Increases in interest rates tend to increase firms' production costs.

Fully disagree    Disagree    Rather disagree    Rather agree    Agree    Fully agree

Firms tend to pass on increases in production costs to consumers in the form of higher prices.

Fully disagree    Disagree    Rather disagree    Rather agree    Agree    Fully agree

## Subjective Interest Rate Rule

Recall that the **Federal Open Market Committee (FOMC)** determines the level of the federal funds target rate -- the most important interest rate in the economy.

Imagine that the **FOMC changes their outlook for unemployment** over the next 12 months due to data revisions, while there is no change in the outlook for inflation. Specifically, the Fed believes that the unemployment rate will be **0.25 percentage points higher** than their initial estimate.

What do you think is the percent chance that the FOMC will decide to ...

*Note: Your responses must add up to 100%.*

increase the federal funds target rate by 0.75 percentage points.	<input type="text" value="0"/> %
increase the federal funds target rate by 0.5 percentage points.	<input type="text" value="0"/> %
increase the federal funds target rate by 0.25 percentage points.	<input type="text" value="0"/> %
not change the federal funds target rate.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.25 percentage points.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.5 percentage points.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.75 percentage points.	<input type="text" value="0"/> %
Total	<input type="text" value="0"/> %

Imagine that the **FOMC changes their outlook for inflation** over the next 12 months due to data revisions, while there is no change in the outlook for unemployment. Specifically, the Fed believes that the inflation rate will be **0.25 percentage points higher** than their initial estimate.

What do you think is the percent chance that the FOMC will decide to ...

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increase the federal funds target rate by 0.25 percentage points.	<input type="text" value="0"/> %
not change the federal funds target rate.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.25 percentage points.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.5 percentage points.	<input type="text" value="0"/> %
decrease the federal funds target rate by 0.75 percentage points.	<input type="text" value="0"/> %
Total	<input type="text" value="0"/> %