Uncertainty and Information Acquisition: Evidence from Firms and Households

By
HEINER MIKOSCH CHRISTOPHER ROTH SAMAD SARFERAZ JOHANNES WOHLFART*

We leverage the small open economy Switzerland as a testing ground for basic premises of macroeconomic models of endogenous information acquisition, using tailored surveys of firms and households. Firms and households perceiving a greater exposure to exchange rate fluctuations acquire more information about the exchange rate. Moreover, higher perceived costs of acquiring or processing information are associated with lower levels of information acquisition. Finally, an exogenous increase in the perceived uncertainty of the exchange rate increases firms' demand for a report about exchange rate developments, but not households'. Our findings inform the modeling of information frictions in macroeconomics.

Keywords: Information acquisition, Uncertainty, Expectation formation, Firms, Households.
JEL Classification: D83, D84, E71

* Heiner Mikosch, KOF Swiss Economic Institute and ETH Zurich, e-mail: mikosch@kof.ethz.ch; Christopher Roth, University of Cologne, ECONtribute, briq, CESifo, CEPR, CAGE Warwick, C-SEB, Max-Planck Institute for Collective Goods Bonn, e-mail: roth@wiso.uni-koeln.de; Samad Sarferaz, KOF Swiss Economic Institute and ETH Zurich, e-mail: sarferaz@kof.ethz.ch; Johannes Wohlfart, Department of Economics and CEBI, University of Copenhagen, CESifo, Danish Finance Institute, e-mail: johannes.wohlfart@econ.ku.dk. We would like to thank Peter Andre, Klaus Abberger, Felix Chopra, Thomas Graeber, Ingar Haaland, Lukas Hensel, Sonja Settele, Daphné Skandalis, Peter Norman Sørensen, Andreas Stegman and seminar audiences at ZEW Mannheim, the Japanese Empirical Economics Seminar, UC Dublin, the University of Copenhagen, the University of Cologne, the Nuremberg Research Seminar in Economics, the Berlin Behavioral Economics Seminar and the Bocconi Finance Seminar, as well as conference participants at the Workshop on Subjective Expectations and the 11th ifo Conference on Macroeconomics and Survey Data for useful comments. Apoorv Kanoongo provided excellent research assistance. We received ethics approval from the University of Warwick. The activities of the Center for Economic Behavior and Inequality (CEBI) are financed by the Danish National Research Foundation, grant DNRF134. Support from the Danish Finance Institute (DFI) is gratefully acknowledged. Roth: Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2126/1-390838866.

I. Introduction

Information frictions are central to theories of macroeconomic expectation formation. In several influential models, information frictions are assumed to be exogenous (Carroll, 2003; Mankiw and Reis, 2002; Mankiw et al., 2003; Woodford, 2003). This stands in contrast to models of endogenous information acquisition, in which economic agents have a limited capacity to acquire or process information and choose how much and which types of information to acquire (Mackowiak and Wiederholt, 2009; Reis, 2006; Sims, 2003). As a result, an economic agent's demand for a specific piece of information increases in the importance of the variable of interest for the agent's payoff function, decreases in the cognitive costs of information acquisition and processing, and responds to changes in economic conditions. For instance, a central prediction of these models is that an increase in uncertainty of a variable of interest leads economic agents to acquire more information about this variable. The way information frictions are modeled has important implications for the transmission of shocks and policies (Angeletos and Lian, 2018; Ball et al., 2005; Paciello and Wiederholt, 2014; Wiederholt, 2015).

In this paper, we test several basic predictions of models of endogenous information acquisition by studying how information acquisition about the future development of the exchange rate is related to (i) exposure to exchange rate risk, (ii) perceived information acquisition and processing costs, and (iii) the perceived uncertainty surrounding the exchange rate. We conduct surveys among firm managers and households from the small open economy Switzerland.[1] Exchange rate movements play an important role for Swiss firms, as they directly affect product demand of exporting firms and input costs of importing firms. Moreover, they indirectly affect the wage and employment prospects of households working for those firms, and shape households' cost of living through their pass-through to retail prices. Depending on their exposure, holding more precise beliefs about exchange rate movements should allow firms and households to make better economic choices, such as decisions about production, pricing, investment and hiring for firms, or decisions about saving, job search and portfolio allocation for households. Thus, the context of exchange rate developments in Switzerland offers a setting in which information acquisition is relevant for high-stakes economic decisions, especially for firms.

We first establish two sets of descriptive facts consistent with the basic prediction that agents more exposed to exchange rate movements acquire more information. First, firms report a greater importance of the exchange rate for their own situation than households, which is reflected in the acquisition of more exchange rate information over the three months before our survey. Firms also hold more accurate and less dispersed beliefs about past exchange rate move-

[1] For convenience and in line with the convention in macroeconomics, we often refer to participants in the firm survey as "firms" instead of "firm managers", and refer to their beliefs as "firms' beliefs".

ments, and are more confident in these beliefs. Similarly, their expectations about the future exchange rate are less dispersed and more closely aligned with expert forecasts compared to households'. Second, within our samples of firms and households, information acquisition about the exchange rate is positively associated with various proxies for exposure to exchange rate risk. For instance, firms with a higher share of revenue earned through exports to the euro area and firms importing input goods from the euro area acquire more information about the exchange rate of the Swiss franc to the euro. Similarly, households that do more shopping abroad or that work for an exporting firm acquire more information about the exchange rate.

Next, we provide evidence consistent with the prediction of models of endogenous information acquisition that perceived higher costs of acquiring and processing information are associated with lower levels of information acquisition. Employing survey questions directly eliciting these perceived costs, we detect strong negative correlations with acquisition of exchange rate information within our household sample.

The most central part of our surveys are simple experiments designed to examine the causal effect of perceived exchange rate uncertainty on information demand. We first provide all respondents with information about the CHF-euro exchange rate at the time of the survey and with a no-change forecast of the *level* of the exchange rate 12 months after the survey. Then, respondents are randomly assigned to receive differential truthful expert forecasts about the probability mass that the exchange rate will fall into a narrow interval around the forecast of its level. Respondents in the high uncertainty arm receive an expert forecast indicating that the percent chance that one year after the survey the exchange rate will be close to its current realization is 30%, while respondents in the low uncertainty arm receive a forecast indicating that this chance is 90%. Then, we elicit all respondents' posterior beliefs about exchange rate uncertainty. Moreover, we measure their demand for an exclusive special report about the future development of the exchange rate provided by the most renowned economic forecasting institute in Switzerland.

Our approach provides a non-deceptive way of generating exogenous variation in the second moment of people's beliefs, holding fixed the first moment. By comparing information demand between the high and the low uncertainty arm we can obtain causal evidence on the role of perceived uncertainty in driving information demand. Our experimental design overcomes issues related to omitted variable bias, reverse causality or measurement error, which could bias correlational estimates in an unknown direction.

In both arms, respondents update their beliefs about the probability that the exchange rate falls into a narrow interval around its current and predicted future level, which is reflected in an increase in the perceived standard deviation of the future exchange rate. Both firms and households put a weight of around 15% on the provided signal. We detect no effect on the means of the individu-

ally perceived distributions, suggesting that our intervention works as intended. Moreover, firms' demand for the special report on the exchange rate increases substantially in response to exogenously higher exchange rate uncertainty, consistent with models of endogenous information acquisition. For households, demand for this special report is inelastic to perceived exchange rate uncertainty.

We contribute to a literature on the sources and consequences of information frictions in macroeconomic expectation formation (Andre et al., 2021, 2022; Coibion and Gorodnichenko, 2012, 2015). Information frictions offer an explanation for the widely documented disagreement in macroeconomic expectations across agents (Coibion et al., 2018; Giglio et al., 2021; Mankiw et al., 2003). Models of endogenous information acquisition, such as models of rational inattention, explain information frictions as arising endogenously from a trade-off between the costs and benefits of acquiring information (Mackowiak et al., 2021). Consistent with these models, our evidence highlights important roles for stake size and information acquisition and processing costs in shaping information demand. However, the prediction that information acquisition responds to changes in (perceived) economic conditions, such as changes in uncertainty of the variable of interest, only finds support in our firm sample but not in our household sample. One possible way of modeling information acquisition consistent with our findings would be to allow firms to endogenously decide what information to acquire in every period, while households in period zero endogenously decide about future information acquisition but do not re-adjust in later periods.

Only few papers have provided direct causal evidence on the predictions of theories of macroeconomic information acquisition in applied settings. Roth et al. (2021) show that US households who learn of a higher exposure to unemployment risk during recessions increase their demand for an expert forecast about the likelihood of a recession, in line with information acquisition depending on stake size. Fuster et al. (2020) show that US households' information acquisition regarding future home price developments increases in exogenously higher monetary incentives for prediction accuracy. Beyond testing for rational motives of information acquisition, Faia et al. (2021) and Chopra et al. (2021) provide evidence consistent with confirmation bias in information selection, and D'Acunto et al. (2021) show that committee diversity matters for acquisition of Fed-related information by under-represented groups.[2] Our paper advances this literature in two ways: first, we provide novel evidence on the effects of uncertainty on information acquisition. Second, we provide new causal evidence on drivers of firms' information demand.

Other papers have used observational data to study the drivers of information frictions. Coibion et al. (2018) document that firms' knowledge about recent inflation is systematically correlated with proxies for their incentives to process or track such information. Our findings are consistent with work by Coibion and Gorodnichenko (2015), who show that information frictions are most pro-

[2]For a review of the literature on information acquisition in applied settings, see Capozza et al. (2022).

nounced for less volatile macroeconomic variables, that beliefs about most variables adjust more slowly to shocks during the period of the Great Moderation, and that the rigidity of expectations drops during recessions, when volatility is higher. Our paper provides evidence of a behavioral mechanism that could be underlying these time-series patterns.

Our paper also relates to a growing literature on the measurement and consequences of macroeconomic uncertainty (Baker et al., 2016; Bloom, 2009; Bloom et al., 2018). Bachmann et al. (2013) use survey data to construct proxies for time-varying business-level uncertainty. Bachmann et al. (2021) study how firms' uncertainty about sales growth is related to changes in sales growth. Bachmann et al. (2020) document an important role for Knightian uncertainty among firms. Coibion et al. (2021) use an information provision experiment to study how macroeconomic uncertainty affects spending decisions of households, while Kumar et al. (2022) use a similar setup to study the role of macroeconomic uncertainty in firm decisions. Dibiasi et al. (2021) use hypothetical survey questions to study firms' responses to uncertainty shocks. Our study is different from these papers in its focus on testing the prediction of models of endogenous information acquisition.

II. Samples and survey overview

A. Samples

We first describe the different samples we collected. Online Appendix Table A.1 provides an overview of the different data collections.

FIRM SAMPLE. — We designed a tailored module, which was part of the March/April 2020 wave of the KOF Swiss Economic Institute Investment Survey, a quarterly survey of firms in Switzerland on topics such as business confidence and investment, which aims to be representative of the Swiss economy. The respondents are usually higher-level managers. This dataset has been used in prior research in economics (Drechsel et al., 2015). At the end of the regular survey, respondents were invited to participate in a special module on managerial decision-making. Thus, firm managers did not know that our module was concerned with the exchange rate, and were not aware of being part of an experiment.

Out of the 2,821 firm managers participating in the March/April 2020 survey wave, 1,183 also responded to at least some of our questions. In our main analysis we focus on responses collected until March 20th, before a major outbreak of the coronavirus in Switzerland. We demonstrate the robustness of our findings to changing the cutoff date and to using the full sample below. Out of the 679 responses collected until March 20th, we drop nine respondents who give non-sensible estimates of past realizations of macroeconomic variables (e.g. an

exchange rate of 50,000 CHF per euro), which may indicate inattention to the survey. We also drop 80 participants who did not respond to any outcome question of interest.

Online Appendix Table A.2 displays summary statistics for the remaining 576 firms used in our main analysis, including benchmarks from the full sample of 2,821 firms who participated in the March/April 2020 wave of the KOF Investment Survey. The firm size distribution in our final sample is heavily skewed, with the average firm having 210 employees and the median firm having 41 employees. 37% of firms are in manufacturing, while 22% are in consumer services and 34% in business services. The firms in our final sample are somewhat larger compared to the full sample in terms of both number of employees and overall investment expenditure. They are also somewhat more likely to be in manufacturing or business services, and somewhat less likely to be in consumer services. The geographic composition is similar to the full sample. The table also demonstrates that the sample is balanced across the two experimental arms described below.

HOUSEHOLD SAMPLES. — We conducted our surveys in collaboration with the online panel provider Dynata, which is widely used in the social sciences (de Quidt et al., 2018). The surveys were conducted in March 2020 (Wave 1) and in September 2021 (Wave 2). Wave 1 of the household survey was conducted at the same time as the firm survey. All respondents to Wave 1 completed the survey until March 20th, such that responses should not be majorly affected by the outbreak of the pandemic. Due to restrictions by the survey provider we only invited individuals from the German-speaking part of Switzerland.

A total of 522 individuals completed Wave 1 at least until the first outcome question, while 1,028 completed Wave 2 at least until the first outcome question. At the median, respondents spent 19.9 and 17.2 minutes responding to Wave 1 and Wave 2 of the household survey, respectively. We drop observations in the top and bottom percentiles of response time, as very short or very long response time may indicate inattention to the survey.[3] Online Appendix Table A.3 provides summary statistics of the 510 respondents from Wave 1 and the 1,006 respondents from Wave 2 in our final samples, including benchmarks from the Swiss Household Panel (SHP), a representative household survey. Wave 2 of our survey is roughly representative of the German-speaking Swiss population in terms of gender, age, employment status, education and household income. Wave 1 features a somewhat lower average age and a lower fraction of retirees compared to the population, but is otherwise similar. Table A.3 also includes balance checks for the two experimental arms in the survey, which are described below. There are slight differences in terms of the shares of stockowners and of employees in export-oriented firms across experimental arms in Wave 1, but the

[3] We have no information on response time in the firm survey.

samples are otherwise balanced. To address any concern about imbalances, we include a set of controls in our estimations.

B. Survey overview

In what follows, we provide a brief overview of the content of our surveys. We describe the survey questions used in the analysis in more detail at the relevant places throughout the paper. The full sets of instructions can be found in online Appendix C. The firm survey and the two waves of the household survey are very similar, but differ somewhat in the included background questions, the questions about potential determinants of information acquisition, and smaller aspects of the experimental design. Throughout the paper, we indicate which survey wave is used for the presented piece of evidence.

We start by eliciting a set of basic beliefs related to the CHF-euro exchange rate. In particular, respondents report their beliefs about past and future realizations of the exchange rate, as well as their confidence in these beliefs. Subsequently, we ask respondents how important they consider the CHF-euro exchange rate, the unemployment rate and the inflation rate to be for the economic situation of their firm or of their household.

The surveys continue with an experimental module, in which respondents are exposed to an information treatment shifting their perceived exchange rate uncertainty and are offered access to a special report about the exchange rate to be published three months later. The experimental design is described in detail in Section IV below.

Finally, participants report how often they acquired different macroeconomic information in the three months before the survey and answer some background questions.

III. Descriptive evidence: Stake size and perceived costs

Models of endogenous information acquisition predict that agents demand more information about a variable if the variable is more important in their payoff function, and that higher perceived costs of acquiring or processing information result in lower information acquisition. In this section, we first compare the information acquisition of households with that of firms, for which exchange rate movements should be more important. We then examine how information acquisition varies with different proxies for stake size within our samples of firms and households. Finally, we examine how households' perceived information acquisition and processing costs are correlated with the amount of information they acquire. The evidence presented in this section does not allow for causal statements, but highlights to what extent the correlational patterns in the data are consistent with models of endogenous information acquisition.

A. *Information acquisition of firms and households*

PERCEIVED IMPORTANCE. — We start by comparing information acquisition between households and firms, using Wave 1 of the household survey, which was conducted at the same time as the firm survey. Both households and firms rate the importance of the exchange rate, the inflation rate, and the unemployment rate for their own situation on five-point categorical scales. Figure 1 Panels A-C show the cumulative distributions of responses for each variable separately for households and for firms. Firms are more likely than households to consider the exchange rate to be important for their own situation. For instance, 59% of firm managers "rather agree" or "fully agree" that the exchange rate is important for their situation, while this fraction is 44% among households. Firms attach substantially higher importance to the exchange rate than to inflation and unemployment, while for households these differences across variables are less pronounced. This underscores that firms in the export-oriented economy Switzerland perceive particularly high stakes in being informed about exchange rate movements. Households perceive somewhat lower stakes, potentially because they are partially insured against the repercussions of exchange rate movements through their employer.

INFORMATION ACQUISITION. — Households and firms are asked the following question: "How frequently did you gather information about [...] in the last 3 months before taking this survey"? The response scale ranges from "daily" to "not at all". Figure 1 Panels D-F display the cumulative distributions of responses for the different macroeconomic variables separately for households and firms. Firms acquire substantially more information about the exchange rate than households. For instance, almost half of the respondents to the firm survey acquire information about the exchange rate at a weekly frequency or more often, while among households this fraction is less than 20%. This is consistent with the greater perceived importance of the exchange rate for own economic outcomes among firms (see Figure 1 Panel A). Naturally, firms and households also differ along other dimensions, such as information acquisition and processing costs, which could contribute to higher information acquisition among firms.

The figure also reveals that firms acquire more information about inflation and unemployment than do households. Moreover, both firms and households report higher information acquisition about the exchange rate than about inflation or unemployment. While this is consistent with potentially higher stakes of being informed about the exchange rate than about other variables, it could also be driven by the higher frequency at which new data on the exchange rate becomes available.

RECALL AND EXPECTATIONS OF EXCHANGE RATE REALIZATIONS. — Differences in information acquisition should be reflected in differences in beliefs about past

and future exchange rate realizations. For instance, models of information frictions, such as sticky information models or rational inattention models, posit that, all else equal, a higher frequency of updating information sets or obtaining less noisy signals about the economy should reduce the dispersion of expectations and bring expectations closer to objective benchmarks.

Online Appendix Figure A.1 plots the distributions of households' and firms' recollection of the average exchange rates in the years 2013, 2016 and 2019 – seven years, four years, and one year before participating in the survey – including the actual realizations. The figure also displays the distributions of firms' and households' expectations about future realizations of the exchange rate in March 2021 and March 2022 – one and two years after the survey.[4] We compare these distributions to the median expert forecasts taken from a survey of professional forecasters conducted by the KOF Economic Institute shortly before our household and firm surveys. Online Appendix Table A.4 provides different quantitative measures of biases and dispersion of beliefs about past and future exchange rate realizations among households and among firms.

There is substantially more disagreement among households than among firms for beliefs at every horizon, according to standard deviation, interquartile range and the difference between the 90th and the 10th percentile across respondents. For instance, the interquartile range of beliefs about the average exchange in 2016 is 0.14 CHF among households and 0.09 CHF among firms. Moreover, firms display significantly lower mean absolute deviations from the benchmarks compared to households at all horizons. For instance, the mean absolute deviation of beliefs from the actual exchange rate realization in 2016 is 0.12 CHF among households, and only 0.06 CHF among firms.

Finally, online Appendix Figure A.2 shows that firms are more confident than households in their recall of past exchange rate realizations, while the difference is less pronounced for confidence in expectations about the future. The lower dispersion and greater similarity of beliefs to benchmarks as well as the higher confidence are consistent with firms acquiring more information, potentially due to higher stakes.

B. Stake size and information acquisition within samples of firms and households

We next examine how information acquisition varies with different proxies for stake size within our samples of firms and households. For households, we focus on data from Wave 2, as it contains particularly rich measures of respondents' stakes related to exchange rate movements.[5] We again use our measure of information acquisition over the three months before taking the survey, and now assign values one to six to the different response options (ranging from "not

[4] We winsorize beliefs about the exchange rate at 0.8 and 1.6 CHF per euro to account for outliers.

[5] A subset of these measures are also available for Wave 1. For this subset, the patterns are very similar across the two waves. The results based on data from Wave 1 are omitted for brevity's sake.

at all" to "daily") and standardize it using the mean and standard deviation in the respective sample. Figure 2 shows binned scatter plots of the association of information acquisition with different proxies for stake size, partialing out a set of controls, including measures of information processing and acquisition costs in the household sample.[6] All of the partial correlations displayed in the figure are statistically significant at the 1-% level.

Figure 2 Panel A shows a strong and highly significant positive correlation between firm managers' information acquisition about the exchange rate over the three months before taking the survey and their self-reported overall importance of exchange rate movements for economic outcomes of their firm. Panel B demonstrates similar patterns using the fraction of firm revenue generated through exports to the euro area as a proxy for exposure to exchange rate risk. Specifically, a 10 p.p. higher share of exports to the euro area is associated with a 0.11 standard deviation higher information acquisition.

Panels C to H show results for the household sample. Panel C displays a strong and highly statistically significant positive relationship between information acquisition and households' perceived overall importance of exchange rate movements for their own economic outcomes. Panel D confirms this relationship using the respondent's estimate of her employer's share of revenue earned through exports to the euro area as proxy for stake size. In particular, a 10 p.p. higher share of exports to the euro area of the respondent's firm is associated with a 0.09 standard deviation higher information acquisition before the survey. Panel E highlights that employees of firms that import goods from the euro area, whose costs depend on the exchange rate, acquire significantly more exchange rate-related information. The higher information acquisition among employees of exporting and importing firms is consistent with a role for exchange rate movements in shaping people's perceived labor income risk.

In addition, we exploit the fact that due to the higher price level in Switzerland, many Swiss individuals regularly go shopping in the neighboring countries, which belong to the euro area (Auer et al., 2021b). Movements in the exchange rate are of direct importance to the cost of living faced by these individuals. Consistent with this, individuals who live fewer car minutes away from the closest border acquire more exchange rate information (Panel F) and acquisition of exchange rate information is positively associated with the number of times a household went shopping in the euro area in the three months before the survey (Panel G). Finally, individuals that have traveled more often to the euro area over the 12 months before taking the survey report significantly higher levels of information acquisition (Panel H).

Taken together, our first main result is the following:

RESULT 1: *Firms perceive a greater exposure to the exchange rate than households, which is reflected in higher information acquisition, lower belief dispersion and smaller*

[6] Throughout the paper, we code missings in the control variables as zeros and include dummies indicating missings in the different controls.

distance of beliefs to objective benchmarks. Moreover, within our samples of firms and households, information acquisition increases in several proxies for exposure to exchange rate risk. These patterns are consistent with higher stake size leading agents to acquire more information – a core prediction of macroeconomic models of endogenous information acquisition.

Online Appendix Figure A.3 confirms the patterns on firms' and households' self-reported exposure and information acquisition in the contexts of inflation and unemployment.

C. *Information acquisition and processing costs of households*

Another core prediction of models of endogenous information acquisition is that the perceived costs of acquiring and processing information negatively affect information demand. Instead of using proxies for actual processing costs such as IQ, we directly measure *perceived* information processing and acquisition costs in Wave 2 of the household survey.[7] To elicit perceived information acquisition costs, we ask respondents to imagine that they wanted to inform themselves about the development of the economy (e.g., exchange rate fluctuations) in Switzerland. We then ask them how difficult it would be for them to find relevant information about the development of the economy. To elicit perceived processing costs, we ask our respondents how difficult they typically find it to understand and interpret information about the economy (e.g., exchange rate fluctuations).

Table 1 shows that information acquisition and processing costs are strongly negatively associated with the amount of information respondents acquired over the previous three months. Specifically, a one standard deviation increase in perceived acquisition costs is associated with a 0.17 standard deviations reduction in information acquisition (column 1), while a one standard deviation higher cost of processing information is associated with a 0.29 standard deviations lower information acquisition (column 4). The magnitudes remain almost unchanged if we control for holding a high school degree and the respondent's score in a short numeracy test (columns 2 and 5) – proxies for actual costs of acquiring and processing information faced by the respondents. Indeed, perceived information acquisition and processing costs are only weakly correlated with holding a high school degree and the respondent's numeracy score.[8] The partial correlation of information acquisition with perceived costs is stronger than the partial correlation with proxies for actual costs, and is robust to adding more control variables including a measure of stake size (columns 3 and 6). Finally, when jointly including acquisition and processing costs, only processing costs remain significant (column 7). While this suggests that processing costs are potentially more

[7] It was not possible to include such measures in our firm survey.

[8] The bivarate correlation coefficient of perceived processing (acquisition) costs with holding a high school degree is -0.067 (-0.074), and the correlation coefficient with the respondent's numeracy score is -0.005 (0.033).

important in shaping information demand, this result should be interpreted cautiously given the high correlation between perceived acquisition and perceived processing costs (bivariate correlation coefficient of 0.605).

Taken together, our second main result is the following:

RESULT 2: *Households who perceive higher costs of acquiring or processing information acquire significantly less exchange rate-related information, consistent with models of endogenous information acquisition.*

The evidence reported in this section is purely descriptive, and exchange rate exposure and perceived information acquisition and processing costs could be correlated with other factors influencing information demand. In the next section we provide causal evidence on another prediction of models of endogenous information acquisition.

IV. Experimental evidence: Uncertainty and information acquisition

Theories of endogenous information acquisition predict that an increase in the perceived uncertainty of the variable of interest leads agents to acquire more information about that variable. Correlational estimates of the relationship between perceived uncertainty and information demand could be biased in a direction that is unclear ex-ante. First, omitted variables, such as cognitive abilities, could drive both perceived uncertainty and demand for information. Second, reverse causality is plausibly important, given that holding more information may reduce people's perceived uncertainty. Finally, (classical) measurement error in perceived uncertainty could lead to attenuation bias of coefficient estimates. In this section, we overcome these issues using an experiment that allows us to study the causal effect of perceived uncertainty on information demand.

A. Experimental design

We focus the design description on the firm survey, which was conducted in March 2020. The design of Wave 2 of the household survey is very similar except for slight differences in the belief elicitations and the information treatment, reflecting the different date (September 2021) and the different level of the exchange rate at the time of the survey (1.09 CHF per euro in September 2021 vs 1.06 CHF per euro in March 2020). Crucially, these two surveys include an identical measure of respondents' post-treatment demand for exchange rate information. The experimental design used in Wave 1 of the household survey, which was conducted simultaneously with the firm survey in March 2020, uses a somewhat different outcome measure, as is explained in more detail below. Online Appendix C provides the full set of experimental instructions.

PRIOR BELIEFS. — We start by informing all respondents that the KOF macroeconomic model predicts that the exchange rate will be 1.06 CHF per euro on aver-

age in March 2021, one year after the survey, equivalent to a no-change forecast.[9] We provide this information to hold constant the first moment of respondents' beliefs across treatment arms. We then ask them to estimate the percent chance that the CHF-EUR exchange rate in March 2021 will on average be somewhere between 1.04 CHF per euro and 1.08 CHF per euro, i.e., within a range of +/-0.02 CHF around the KOF forecast of its level. This provides us with a proxy for the respondent's prior perception of exchange rate uncertainty.

INFORMATION TREATMENT. — To experimentally manipulate respondents' perceived exchange rate uncertainty, we randomly assign them into two groups of equal size. Respondents then receive one of two truthful forecasts, which are taken from surveys of professional forecasters run by the KOF institute shortly before our surveys of households and firms. Specifically, our respondents receive the following message:

> According to an expert that regularly participates in the KOF expert surveys on economic forecasts, the probability that the CHF-EUR exchange rate in March 2021 will on average be somewhere between 1.04 CHF per euro and 1.08 CHF per euro is **90% [30%]**.
>
> This means that according to this expert, with a probability of **10% [70%]** the CHF-EUR exchange rate will be on average somewhere outside this range (i.e. above 1.08 CHF per EUR or below 1.04 CHF per EUR).

where the probability that the exchange rate will be between 1.04 and 1.08 CHF per euro is 90% in the low uncertainty treatment and 30% in the high uncertainty treatment.[10] Assuming that the future exchange rate is normally distributed around its current value, a 30% probability that the exchange rate will be in the range 1.04–1.08 then implies a standard deviation of the exchange rate of 0.052. In contrast, if the probability is 90%, the implied exchange rate standard deviation is 0.012. Both numbers are below the standard deviation of historical 12-month changes in the exchange rate of 0.069 (see Table 2).

Our experimental design employs an active control group, i.e., all participants are provided with (differential) information to generate differences in beliefs, which we can use to study the causal effect of perceived uncertainty on information demand. This has several advantages compared to an alternative design that provides a random subset of respondents with information and another subset (a passive control group) with no information. First, receiving information

[9] In Wave 2 of the household survey, which was conducted in September 2021, respondents are given a no-change forecast of an average exchange rate of 1.09 CHF per euro in September 2022. In line with this, all the CHF values mentioned in the rest of the design description are higher by 0.03 CHF in Wave 2 of the household survey, and all calendar dates mentioned in the instructions are moved into the future by one and a half years.

[10] The probabilities provided in the different arms are identical for Wave 2 of the household survey conducted in September 2021, where similar forecasts were available in the corresponding expert survey.

about the future development of the exchange rate increases the stock of exchange rate-related information respondents have available. Second, receiving information makes the exchange rate salient to respondents. Both of these issues by themselves could affect respondents' demand for exchange rate information, and are therefore particularly relevant when information acquisition is the main outcome of interest. In our active control group design, these effects should be constant across treatment arms. Third, identification in the alternative design hinges on the respondent's prior belief, which determines the expected direction and strength of the information treatment. Prior beliefs, however, are likely correlated with other characteristics, such as cognitive abilities, which may themselves affect individuals' demand for information and its elasticity to perceived uncertainty. In our design, where all respondents are provided with (differential) information, the identifying variation is orthogonal to prior beliefs.

MEASURING BELIEF UPDATING. — The goal of our experimental manipulation is to shift the second moment of respondents' beliefs about the future exchange rate, leaving the first moment unchanged. We thus need to measure the full density distribution of each respondents' posterior beliefs about the exchange rate. Following state-of-the-art measurement techniques proposed by Manski (2017), we elicit the respondents' perceived probabilities that the average exchange rate in March 2021 will fall into one of five bins, which are mutually exclusive and collectively exhaustive.[11]

MEASURING THE DEMAND FOR INFORMATION. — Then, we measure respondents' demand for exclusive information about the exchange rate:

> The KOF offers the participants in this survey exclusive access to one of three new detailed special reports. These special reports will be compiled and sent out in June 2020, and will account for all relevant developments until this point.
>
> You can now decide whether you would like to receive one of these special reports, and if so, which one of these three special reports you would like to receive. These special reports will not be made publicly available.

We further explain to our respondents that the special reports contain an exclusive expert interview, exclusive model predictions and details on expert forecasts. We also tell them that there are in total three special reports, one for the exchange rate, one for the inflation rate, and one for the unemployment rate.

[11] We use the following five bins in the firm survey in March 2020: less than 0.94 CHF; between 0.94 and 1.04 CHF; between 1.04 and 1.08 CHF; between 1.08 and 1.18 CHF; more than 1.18 CHF. Those values are shifted upward by 0.03 CHF for our household survey in September 2021 due to the somewhat higher exchange rate.

Moreover, we emphasize that they can only receive one of the three special analyses. Respondents to the firm survey are informed that they will receive their selected report from the KOF institute three months after the survey, while respondents to the household survey are told that they can sign up for a reminder email from the survey provider and they receive a link to a website where the report will be published.[12] Then our respondents choose which of the three reports they would like to receive, or whether they prefer not to receive any report.

Our measure of information acquisition captures changes in behavior along two margins. First, respondents can decide whether to receive any report at all. While a report potentially provides valuable information, these benefits likely vary across respondents. Respondents who perceive only moderate benefits may decide not to receive any report because of anticipated time and cognitive costs or because they have a preference for not receiving too many emails. Second, participants can choose between forecasts on three different variables – aggregate unemployment, inflation and the exchange rate. Thus, the opportunity cost of receiving a particular report is to not receive any of the other two reports. These features capture two theoretically relevant margins of information acquisition in models of endogenous information acquisition: First, agents choose how much attention to pay overall, e.g., how much time to spend on collecting information. Second, agents choose how to allocate attention across different signals.

Our measure of information demand has several notable features: First, the KOF economic institute is well-known and highly reputable in Switzerland, which means that respondents will likely perceive the report as containing credible and trustworthy information. Second, we explicitly tell respondents that the reports will not be made publicly available, which implies that there is no concern that respondents think they can get access to the reports through alternative ways than our survey. Third, since the reports will be released a few months after the time of the survey and will account for all relevant developments until this point, respondents will not perceive the reports as containing only information that they may have already acquired at the time of the survey.

Online Appendix Table A.5 shows that respondents' demand for the different reports is strongly positively correlated with self-reported information acquisition about the exchange rate, inflation and unemployment over the three months prior to the survey.

SUMMARY. — Taken together, our design provides a non-deceptive way of generating exogenous variation in the second moment of people's beliefs, holding fixed the first moment. By comparing the demand for information between re-

[12] At the end of Wave 2 of the household survey, 51% of respondents who previously chose to receive a report (corresponding to 29% of the full sample) indicate that, on top of the link to the website, they want to receive a reminder message once the report is published. This underscores the high interest among our respondents in receiving the information.

spondents in the high and the low uncertainty arm we can obtain causal evidence on the role of perceived uncertainty in driving information demand.

B. *Results on exchange rate expectations*

PRIOR BELIEFS ABOUT EXCHANGE RATE UNCERTAINTY. — We start by presenting firms' and households' prior beliefs about exchange rate uncertainty. Table 2 column 1 shows that, on average, both households and firms attach a likelihood of around 69% to the event that the exchange rate will stay close (i.e., within +/- 0.02 CHF per euro) to its current realization. This in turn means that respondents' prior beliefs are somewhat closer to the information provided in the low uncertainty arm (90%) than to the information in the high uncertainty arm (30%). Moreover, respondents' beliefs are higher than average experts' beliefs (37% in February 2020 and 35% in September 2021) and a historical benchmark based on actual 12-month changes in the exchange rate from the period January 1999 to July 2022 (23%). Similarly, Table 2 column 2 shows that the average standard deviation implied by respondents' beliefs when assuming a normal distribution for each respondent is lower among households and firms compared to both experts and historical data.

BELIEF UPDATING ABOUT EXCHANGE RATE UNCERTAINTY. — We quantify the degree of updating in response to the expert forecasts by regressing the difference between respondents' posterior and prior perceived probability that the exchange rate falls into the interval of +/- 0.02 CHF per euro around its current realization – updating_i – on the "shock", defined as the difference between the professional forecast and a respondent's prior:

$$\text{shock}_i = \begin{cases} 30 - \text{prior}_i & \text{if} \quad \text{High Uncertainty}_i = 1 \\ 90 - \text{prior}_i & \text{if} \quad \text{High Uncertainty}_i = 0 \end{cases}$$

where $\text{High Uncertainty}_i$ is an indicator taking value one for individuals who received the professional forecast attaching 30% probability to the state where the exchange rate would remain close to the status quo, and value zero for respondents receiving the professional forecast attaching 90% probability to this event.

Following Roth and Wohlfart (2020), we assume that agents' prior beliefs follow beta distributions and that the loss functions are quadratic. Under these assumptions, respondents should follow a linear learning rule, $\text{updating}_i = \alpha_1 \text{shock}_i$, where α_1 lies in the interval [0,1]. One concern is that respondents that hold higher priors, and are subject to a more negative shock, mechanically display more negative changes in their expectations, since probabilities are bounded between 0% and 100%. To avoid such mechanical correlations, we control linearly for respondents' prior belief. Moreover, we include a vector of ad-

ditional control variables, $\mathbf{X}_i$, which increases our power to precisely estimate learning rates.[13] We thus estimate the following equation using OLS:

$$\text{updating}_i = \alpha_0 + \alpha_1 \text{shock}_i + \alpha_2 \text{prior}_i + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i \quad (1)$$

where ε_i is an idiosyncratic error term. Throughout, we employ robust standard errors.

Columns 1 and 4 of Table 3 show that both households' and firms' beliefs move towards the professional forecasts. The average estimated learning rate is 0.15 for firms ($s.e. = 0.03$) and 0.14 for households ($s.e. = 0.03$). These learning rates are relatively low compared to previous literature (Haaland et al., 2021), potentially due to the volatile environment at the time of our surveys. The fact that respondents only partially update towards the forecasts is consistent with agents perceiving one professional forecast to be a relatively noisy signal about future exchange rate uncertainty.

We next turn to heterogeneity in learning from the professional forecasts. We examine whether individuals put differential weight on signals that are higher or lower than their prior belief. We interact the individual-specific shock with a dummy variable taking value one if $\text{shock}_i > 0$, and zero otherwise. Columns 2 and 5 of Table 3 show that there is no asymmetric updating from relatively positive and relatively negative signals. Moreover, Columns 3 and 6 of Table 3 show that there is no significant heterogeneity in learning rates by the absolute level of prior beliefs. Finally, in unreported regressions we find that the weight respondents put on the prior belief when reporting their posterior does not differ systematically between the two treatment arms in both the firm sample ($p = 0.350$) and the household sample ($p = 0.277$), suggesting that our respondents do not put differential weight on the signals provided in the two arms.

DIFFERENCES IN POSTERIOR EXCHANGE RATE EXPECTATIONS. — We next turn to differences in post-treatment beliefs about future exchange rate realizations across the two arms – the first stage generated by our treatment. Figure 3 Panels A and B show the average posterior probabilities firm managers and households assign to different future realizations in the low and high uncertainty arms. In both arms, firms and households assign the highest probability to the bin in the middle, which contains the no-change forecast. We had provided this as the forecast of the KOF macroeconomic model to all respondents before the belief

[13] For firms, $\mathbf{X}_i$ includes the firm's share of revenue earned through exports to the euro area, the perceived importance of the exchange rate for the firm's situation, the respondent's prior expectations about the exchange rate in March 2021 and in March 2022, and the respondent's confidence in these predictions. For households, the controls include the respondent's employer's share of revenue earned through exports to the euro area (coding non-employed respondents as zero), the z-scored perceived importance of the exchange rate for the respondent's household, the respondents' prior expectations about the exchange rate in September 2022 and in September 2023, the respondents' confidence in these predictions, a dummy variable for being employed, as well as a dummy variable for stockownership.

elicitation.[14] To quantify the (differential) effect of being assigned to the high uncertainty instead of the low uncertainty arm on different properties of respondents' posterior beliefs about the exchange rate, we estimate specifications of the following type:

$$\text{Posterior}_i = \alpha_0 + \alpha_1 \text{High Uncertainty} + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i \tag{2}$$

We estimate this specification for the probability masses assigned by respondents to all five bins of potential future exchange rate realizations, for the mean over a respondent's subjective distribution and for the standard deviation over the distribution. Following previous literature (Bailey et al., 2018), the mean and the standard deviation are constructed using the midpoints of the bins.[15] $\mathbf{X}_i$ contains the same control variables as included in equation 1. ε_i is the error term.

Table 4 Panel A reveals that the high uncertainty treatment generates a significant increase in exchange rate uncertainty as measured by the standard deviation of firm managers' subjective distribution by 0.006 CHF per euro ($s.e. = 0.002$), compared to an average standard deviation of 0.052 CHF in the low uncertainty arm. At the same time, there is no effect on the expected level as measured by the mean of the distribution. The difference in the perceived standard deviation across the two arms is about one tenth of the standard deviation of actual historical changes in the exchange rate over 12-month periods of 0.069 CHF per euro (Table 2). For households, Table 5 Panel A highlights that the treatment generates a significant increase in the perceived standard deviation by 0.005 CHF ($s.e. = 0.002$), compared to an average perceived standard deviation of 0.055 CHF per euro in the low uncertainty arm. Thus, the first-stage effect on perceived uncertainty is similar in size as among firms. Moreover, as in the firm sample, there is no effect on the mean of respondents' subjective distributions over future exchange rate realizations. These patterns suggest that our experimental manipulation works as intended: it generates a significant shift in perceptions of the second moment, while holding constant the first moment of respondents' beliefs.

[14] While we elicit priors only for the probability mass falling into the central bin, the posteriors are elicited for five bins, which potentially leads to differential framing effects (Benjamin et al., 2017). Thus, differences between the average levels of priors and posteriors should be interpreted cautiously.

[15] For firms, we assign 0.89 and 1.23 to the extreme bins of "less than 0.94 CHF per euro" and "more than 1.18 CHF per euro", respectively. For households, we assign 0.86 and 1.26 to the extreme bins of "less than 0.97 CHF per euro" and "more than 1.21 CHF per euro". Our results are not sensitive to varying these values. Moreover, in Appendix Table A.6 we compare a respondent's perceived standard deviation calculated based on the midpoints with the standard deviation implied only by the central bin of the belief elicitation (+/-0.02 CHF around the current level of the exchange rate) and assuming a normal distribution for each respondent. The two standard deviations are only weakly positively correlated, with an R-squared of 0.02 for households and 0.05 for firms. We also compare first-stage treatment effects on the perceived standard deviation obtained from the two different measures. The coefficient estimates go into the same direction but are somewhat smaller and more noisy when using the standard deviation based only on the central bin, consistent with higher measurement error. These findings highlight the value of eliciting probabilistic beliefs for more than just one bin.

C. Results on information acquisition

On average across our two experimental arms, the exchange rate reports are the most popular reports among both firms (48%) and households (29%), while smaller fractions choose the inflation report (10% among firms and 18% among households) or the unemployment report (12% among firms and 11% among households). This confirms the high relevance of exchange rate-related information for households and firms in Switzerland. The fraction choosing no report is higher among households than among firms (42% vs 30%).

We analyze the effects of receiving the high uncertainty treatment on information demand using the following simple specification:

$$\text{Info Demand}_i = \alpha_0 + \beta_1 \text{High Uncertainty}_i + \mathbf{\Pi}^T \mathbf{X}_i + \varepsilon_i \tag{3}$$

where Info Demand$_i$ is a dummy variable for choosing the exchange rate report, a dummy for choosing the inflation report, a dummy for selecting the unemployment report, a dummy for selecting a non-exchange rate report, or a dummy indicating a preference for not receiving any report.

Consistent with models of endogenous information acquisition, Figure 3 Panel C and Table 4 Panel B show that firm managers exhibit an 8 p.p. ($s.e. = 0.039$) higher demand for the exchange rate report in the high uncertainty condition, compared to a fraction of 44% in the low uncertainty arm. This effect is driven by a reduction in the share of firm managers not wanting to receive any report at all by 6.7 p.p. ($s.e. = 0.038$) in the high uncertainty treatment arm compared to a fraction of 33% among respondents in the low uncertainty condition. There are only muted and non-significant effects on firms' tendency to select the inflation or the unemployment report. As shown in Figure 3 Panel D and Table 5 Panel B, households' likelihood of choosing the different special reports does not differ significantly between the high and low uncertainty treatments. Thus, households' demand for exchange rate information seems to be inelastic to perceived uncertainty.

IV ESTIMATES. — To assess economic magnitudes, we employ an instrumental variable approach. Specifically, we instrument respondents' endogenous posterior perceived probability that the exchange rate will fall into the interval of +/- 0.02 CHF per euro around its current level with a dummy for being assigned to the high uncertainty treatment.[16]

Table 4 Panel C shows that, among firms, a 1 p.p. increase in the perceived likelihood that the exchange rate will stay close to its current level is associated with a 0.89 p.p. lower demand for the exchange rate report ($s.e. = 0.478$). This implies that a one standard deviation (24.18 p.p.) increase in the perceived probability

[16]The first-stage F-stat in the instrumental variables estimator is 18.72 in the firm sample and 26.88 in the household sample, suggesting a sufficiently strong first stage.

is associated with a 21.50 p.p. reduction in the tendency to select the exchange rate report – corresponding to about 43% of a standard deviation in the tendency to select the exchange rate report. This suggests a relatively large magnitude of effects in the firm sample. Table 5 Panel C shows that a 1 p.p. increase in the perceived likelihood that the exchange rate will stay close to its current level is associated with a 0.06 p.p. lower demand for a report on the exchange rate among households ($s.e. = 0.306$). This highlights that, in the household sample, the effects are of small economic magnitude.

NON-EXPERIMENTAL ESTIMATES. — How do our causal estimates compare to non-experimental correlations between posterior beliefs about exchange rate uncertainty and demand for the reports? Table 4 Panel D and Table 5 Panel D display the OLS counterparts to the IV estimations reported in Panel C of these tables. In both the household and the firm sample, the estimated effects go in the same direction as our experimental estimates, but are of small economic magnitude and not significantly different from zero.

The differences between the experimental and the non-experimental estimates in the firm sample could be due to biases in the OLS estimates due to reverse causality, omitted variables and measurement error in posterior beliefs. We believe that omitted variable bias is a particularly important confound in our setting. For example, it seems plausible that firm managers that acquire less information in general – e.g., because they operate in sectors with a low exposure to exchange rate fluctuations – both are more uncertain about the world and at the same time exhibit lower demand for information in the context of our survey. This type of omitted variable bias could strongly attenuate the non-experimental estimates. Moreover, (classical) measurement error in posterior beliefs may further attenuate the estimated effects. These issues highlight the value of an experiment that generates exogenous variation in individuals' uncertainty.

ROBUSTNESS. — Online Appendix Table A.7 shows robustness checks of our experimental results from the firm sample. Our findings remain similar if we use no controls (Panel B), or a more parsimonious (Panel C) or a more extensive (Panel D) set of controls than in the main specifications. Moreover, our results are similar if we only use responses collected until March 10th (before the WHO declared the coronavirus to be a pandemic, Panel E) or until March 15th (before the Swiss parliament decided on measures to contain the spread of the virus, Panel F). Moreover, our results are robust to using the full available sample, i.e., including the responses collected until April 30th (Panel G). Effects using this sample remain economically and statistically significant, although both first stage and reduced form somewhat decrease in size.

Similarly, Table A.8 demonstrates the robustness of the experimental results in the household sample. The results are almost identical using no controls (Panel

B), a parsimonious (Panel C) or a more extensive (Panel D) set of controls. Finally, Table A.9 demonstrates the robustness of the reduced-form results from both households and firms to employing Logit instead of OLS.

SUMMARY. — Taken together, our third main result is the following:

RESULT 3: *Firms' demand for exchange rate information increases in exogenously higher perceived exchange rate uncertainty, in line with models of endogenous information acquisition. Households' demand for exchange rate information is inelastic to perceived exchange rate uncertainty.*

D. Robustness to using an alternative measure of households' information demand

One concern with our experimental results for the household sample is that the exchange rate plausibly affects a fraction of Swiss households mostly through its effects on the unemployment rate and inflation (Auer et al., 2021a; Cravino and Levchenko, 2017). A higher perceived exchange rate uncertainty might therefore lead to a rationally higher demand for information about inflation or unemployment among groups of households, leading to a muted average effect on demand for the exchange rate report.

We address this concern based on Wave 1 of the household survey. The experimental design in Wave 1 is almost identical to the design in Wave 2 and the design for firms. The key difference is a somewhat different measurement of information demand. Specifically, we elicit households' willingness to pay to receive the special report on the exchange rate using a multiple price list. Households make a series of choices between a varying amount of money and receiving the report. They are told that 10% of participants will be selected at random and will have one randomly selected choice implemented. Selected households that obtain the report receive a link to a website where the special report will be published three months later and can also register for a reminder email.

46% of respondents exhibit a positive willingness to pay for the exchange rate report, and among those, the average willingness to pay is 2.64 CHF. Online Appendix Table A.5 shows that the willingness to pay for the exchange rate report is significantly positively associated with self-reported acquisition of exchange rate information over the three months prior to the survey.

We estimate specifications of the same type as for our main evidence. As shown in online Appendix Figure A.4 Panel A and online Appendix Table A.10 Panel A, respondents in the high uncertainty treatment attach higher probability to scenarios with stronger deviations from the status quo compared to respondents in the low uncertainty treatment. The high uncertainty treatment generates a significant increase of 0.014 CHF per euro in the perceived standard deviation ($s.e. = 0.002$), compared to an average perceived standard deviation of 0.052 CHF per euro in the low uncertainty arm. However, as shown in Table A.10 Panel B and Figure A.4 Panel B, households' willingness to pay for the special

report on the exchange rate does not differ significantly between the high and low uncertainty treatments. This is also reflected in estimates from IV and OLS specifications displayed in Panels C and D. Thus, also a measure of households' demand for exchange rate information that should be unaffected by changes in the demand for inflation or unemployment information is inelastic to perceived uncertainty.

This evidence from Wave 1 of the household survey also mitigates another concern: that differences in the timing between Wave 2 of the household survey (September 2021) and the firm survey (March 2020) are responsible for the differences in results across the two samples. We find muted effects of perceived uncertainty on households' information demand in a survey conducted at the same point in time as our firm survey.

E. Potential confounds

EXPERIMENTER DEMAND EFFECTS. — One concern with the experimental evidence could be that respondents in the high uncertainty and low uncertainty treatment arms hold different beliefs about the experimental hypothesis, and accordingly adjust their behavior. While demand effects are unlikely to be a major concern in online experiments (de Quidt et al., 2018), we elicit respondents' beliefs about the hypothesis the researchers aim to test in an open-ended question at the end of Wave 2 of the household survey. Less than 1% of participants correctly guess our interest in understanding how perceptions of uncertainty affect the demand for information. Most participants guess that the study tests for knowledge about the economy and the exchange rate. A large fraction of respondents indicate not knowing what hypothesis the researchers aim to test.

UPDATING ABOUT RELIABILITY OF EXPERT FORECASTS. — One potential confound is that our treatment may shift respondents' beliefs about the reliability and precision of forecasts by the KOF institute or of experts more generally. Specifically, respondents exposed to the high uncertainty treatment may subsequently view expert forecasts in general as less reliable. This would result in a lower demand for reports about macroeconomic developments. However, among firms, the demand for the exchange rate report increases, while the demand for the inflation and unemployment reports remains unchanged in response to the high uncertainty treatment. This mechanism therefore works in the opposite direction of our main findings, which thus - if anything - constitute a lower bound of the true effect.

PREDICTABILITY OF EXCHANGE RATE MOVEMENTS. — Another potential concern is that respondents may think that financial markets are efficient and therefore, at any point in time, the best forecast of the future exchange rate is its current level.

Accordingly, they may perceive the special report as containing no additional value beyond providing an update of the level of the exchange rate three months after the survey, which may result in a low demand for the report. However, respondents may not only care about the level of the exchange rate but about the full distribution of potential future exchange rate realizations, and they could perceive the report as providing valuable information about it. More importantly, respondents likely perceive some degree of predictability of the exchange rate going beyond the current level. Indeed, empirical evidence indicates that exchange rates only sluggishly adjust to shocks (Müller et al., 2021) and exhibit significant predictability (Bacchetta et al., 2009).

As shown above, our respondents exhibit high levels of baseline demand for the exchange rate report, suggesting that they view the report to contain valuable information.

EXTERNAL VALIDITY. — Finally, most of the participants in our March 2020 surveys completed the survey before the first major outbreak of the coronavirus in Switzerland and before the first measures were put in place by the Swiss parliament. However, the coronavirus was already prevalent in Italy and was substantially affecting the health care system and public life there. Thus, one could be worried that the special circumstances of the pandemic reduce the external validity of our findings. While we find similar results among households in our March 2020 wave and in our September 2021 wave – when a large fraction of the population had been vaccinated and the pandemic was affecting the health system less than before – our evidence on firms' information demand is restricted to our March 2020 wave. Future research should study the role of uncertainty in driving information demand among firms across different settings and outside the pandemic environment.

V. Implications and conclusion

We use the small open economy Switzerland as a testing ground for macroeconomic models of endogenous information acquisition. First, we show that firms perceive a greater exposure to the exchange rate than households, which is reflected in higher levels of information acquisition and less dispersed beliefs about the exchange rate. Moreover, within our samples of firms and households, information acquisition is strongly positively associated with different proxies for stake size. Second, households who perceive higher costs of acquiring or processing information acquire less information about the exchange rate. Finally, firms' demand for a report about exchange rate developments increases in exogenously higher perceived uncertainty of the exchange rate. Households' demand for the exchange rate report, however, is inelastic to exogenously higher perceived exchange rate uncertainty. Thus, we find broad support for the predictions of models of endogenous information acquisition, with the exception of the muted effect of perceived uncertainty on households' information demand.

What features would a model consistent with our findings have? On the firm side, agents could decide each period how much information to acquire by trading off costs and benefits of information acquisition. As a result, their information demand responds to changes in economic conditions, such as changes in uncertainty, in line with models of endogenous information acquisition, such as rational inattention models. On the household side, agents may decide in period zero about the frequency at which they update their information sets in future periods and not re-optimize their decision later. As a result, more exposed households and households who perceive lower information acquisition and processing costs acquire more information, but their information demand does not respond to changes in economic conditions.

Our results on the role of uncertainty provide causal evidence on a micro mechanism that could be driving the time-series findings by Coibion and Gorodnichenko (2015) that information frictions are more pronounced in less volatile contexts. While the findings by Coibion and Gorodnichenko (2015) focus on professional forecasters, we highlight that the underlying behavioral mechanism seems to be operating for firms but not for households. Reduced information frictions could increase the effectiveness of policies in changing firms' beliefs and decisions when uncertainty increases.

One potential limitation is that we mostly focus on the exchange rate and the small open economy Switzerland. While we believe that agents' decision-making should not differ fundamentally between our context and other settings, an interesting avenue for future research would be to study the role of perceived uncertainty in shaping information acquisition in the context of other variables and countries. Moreover, in light of our findings, it could be fruitful to collect panel data with direct measures of information acquisition to better understand to what extent agents' demand for information changes with economic circumstances.

From a methodological perspective, our approach of experimentally shifting the second moment of individuals' beliefs while keeping constant the first moment offers a widely applicable method to obtain clean causal evidence on the role of perceived uncertainty in driving belief formation and economic decision-making. For instance, our method could be used to test theories of precautionary saving or to study the role of the perceived riskiness of equity investments in driving portfolio choices of households.

REFERENCES

Andre, Peter, Carlo Pizzinelli, Christopher Roth, and Johannes Wohlfart, "Subjective Models of the Macroeconomy: Evidence from Experts and Representative Samples," *Review of Economic Studies*, 2021.

_ , Ingar Haaland, Christopher Roth, and Johannes Wohlfart, "Narratives about the Macroeconomy," *ECONtribute Discussion paper*, 2022, (127).

Angeletos, George-Marios and Chen Lian, "Forward Guidance Without Common Knowledge," *American Economic Review*, 2018, *108* (9), 2477–2512.

Auer, Raphael, Ariel Burstein, and Sarah M Lein, "Exchange Rates and Prices: Evidence from the 2015 Swiss Franc Appreciation," *American Economic Review*, 2021, *111* (2), 652–86.

_ , _ , Sarah Lein, and Jonathan Vogel, "Unequal Expenditure Switching: Evidence from Switzerland," *Working Paper*, 2021.

Bacchetta, Philippe, Elmar Mertens, and Eric Van Wincoop, "Predictability in Financial Markets: What Do Survey Expectations Tell Us?," *Journal of International Money and Finance*, 2009, *28* (3), 406–426.

Bachmann, Rüdiger, Kai Carstensen, Stefan Lautenbacher, and Martin Schneider, "Uncertainty is More than Risk – Survey Evidence on Knightian and Bayesian Firms," *Working Paper*, 2020.

_ , _ , _ , and _ , "Uncertainty and Change: Survey Evidence of Firms' Subjective Beliefs," *Working Paper*, 2021.

_ , Steffen Elstner, and Eric R Sims, "Uncertainty and Economic Activity: Evidence from Business Survey Data," *American Economic Journal: Macroeconomics*, 2013, *5* (2), 217–49.

Bailey, Michael, Eduardo Dávila, Theresa Kuchler, and Johannes Stroebel, "House Price Beliefs and Mortgage Leverage Choice," *Review of Economic Studies*, 2018.

Baker, Scott R, Nicholas Bloom, and Steven J Davis, "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, 2016, *131* (4), 1593–1636.

Ball, Laurence, N Gregory Mankiw, and Ricardo Reis, "Monetary Policy for Inattentive Economies," *Journal of Monetary Economics*, 2005, *52* (4), 703–725.

Benjamin, Daniel J, Don A Moore, and Matthew Rabin, "Biased Beliefs about Random Samples: Evidence from Two Integrated Experiments," *NBER Working Paper*, 2017.

Bloom, Nicholas, "The Impact of Uncertainty Shocks," *Econometrica*, 2009, *77* (3), 623–685.

_ , Max Floetotto, Nir Jaimovich, Itay Saporta-Eksten, and Stephen J Terry, "Really Uncertain Business Cycles," *Econometrica*, 2018, *86* (3), 1031–1065.

Capozza, Francesco, Ingar Haaland, Christopher Roth, and Johannes Wohlfart, "Recent Advances in Studies of News Consumption," Discussion paper, ECONtribute 2022.

Carroll, Christopher D, "Macroeconomic Expectations of Households and Professional Forecasters," *The Quarterly Journal of Economics*, 2003, *118* (1), 269–298.

Chopra, Felix, Ingar Haaland, Christopher Roth et al., "Do People Demand Fact-Checked News? Evidence From U.S. Democrats," *Journal of Public Economics*, 2021.

Coibion, Olivier and Yuriy Gorodnichenko, "What Can Survey Forecasts Tell us about Information Rigidities?," *Journal of Political Economy*, 2012, *120* (1), 116–159.

_ **and** _ , "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts," *The American Economic Review*, 2015, *105* (8), 2644–2678.

_ **, Dimitris Georgarakos, Yuriy Gorodnichenko, Geoff Kenny, and Michael Weber**, "The Effect of Macroeconomic Uncertainty on Household Spending," *Working Paper*, 2021.

_ **, Yuriy Gorodnichenko, and Saten Kumar**, "How Do Firms Form Their Expectations? New Survey Evidence," *American Economic Review*, 2018, *108* (9), 2671–2713.

Cravino, Javier and Andrei A Levchenko, "The Distributional Consequences of Large Devaluations," *American Economic Review*, 2017, *107* (11), 3477–3509.

D'Acunto, Francesco, Andreas Fuster, and Michael Weber, "Diverse Policy Committees Can Reach Underrepresented Groups," *Working Paper*, 2021.

de Quidt, Jonathan, Johannes Haushofer, and Christopher Roth, "Measuring and Bounding Experimenter Demand," *American Economic Review*, 2018, *108* (11), 3266–3302.

Dibiasi, Andreas, Heiner Mikosch, and Samad Sarferaz, "Uncertainty Shocks, Adjustment Costs and Firm Beliefs: Evidence From a Representative Survey," *KOF Working Paper*, 2021.

Drechsel, Dirk, Heiner Mikosch, Samad Sarferaz, and Matthias Bannert, "How Are Firms Affected by Exchange Rate Shocks? Evidence from Survey Based Impulse Responses," *Working Paper*, 2015.

Faia, Ester, Andreas Fuster, Vincenzo Pezone, and Basit Zafar, "Biases in Information Selection and Processing: Survey Evidence from the Pandemic," *Review of Economics and Statistics*, 2021.

Fuster, Andreas, Ricardo Perez-Truglia, Mirko Wiederholt, and Basit Zafar, "Expectations with Endogenous Information Acquisition: An Experimental Investigation," *The Review of Economics and Statistics*, 2020.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel, and Stephen Utkus, "Five Facts About Beliefs and Portfolios," *American Economic Review*, 2021, *111* (5), 1481–1522.

Haaland, Ingar, Christopher Roth, and Johannes Wohlfart, "Designing Information Provision Experiments," *Journal of Economic Literature*, 2021.

Kumar, Saten, Yuriy Gorodnichenko, and Olivier Coibion, "The Effect of Macroeconomic Uncertainty on Firm Decisions," *NBER Working Paper*, 2022.

Mackowiak, Bartosz and Mirko Wiederholt, "Optimal Sticky Prices under Rational Inattention," *American Economic Review*, 2009, *99* (3), 769–803.

_ , Filip Matejka, Mirko Wiederholt et al., "Rational Inattention: A Review," *Journal of Economic Literature*, 2021.

Mankiw, N Gregory and Ricardo Reis, "Sticky Information Versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve," *The Quarterly Journal of Economics*, 2002, *117* (4), 1295–1328.

_ , _ , and Justin Wolfers, "Disagreement About Inflation Expectations," *NBER Macroeconomics Annual*, 2003, *18*, 209–248.

Manski, Charles F, "Survey Measurement of Probabilistic Macroeconomic Expectations: Progress and Promise," *NBER Macroeconomics Annual 2017*, 2017.

Müller, Gernot J, Martin Wolf, and Thomas Hettig, "Delayed Overshooting: The Case for Information Rigidities," *Working Paper*, 2021.

Paciello, Luigi and Mirko Wiederholt, "Exogenous Information, Endogenous Information, and Optimal Monetary policy," *Review of Economic Studies*, 2014, *81* (1), 356–388.

Reis, Ricardo, "Inattentive Consumers," *Journal of Monetary Economics*, 2006, *53* (8), 1761–1800.

Roth, Christopher and Johannes Wohlfart, "How Do Expectations About the Macroeconomy Affect Personal Expectations and Behavior?," *Review of Economics and Statistics*, 2020, *102* (4), 731–748.

_ , Sonja Settele, and Johannes Wohlfart, "Risk Exposure and Acquisition of Macroeconomic Information," *American Economic Review: Insights*, 2021.

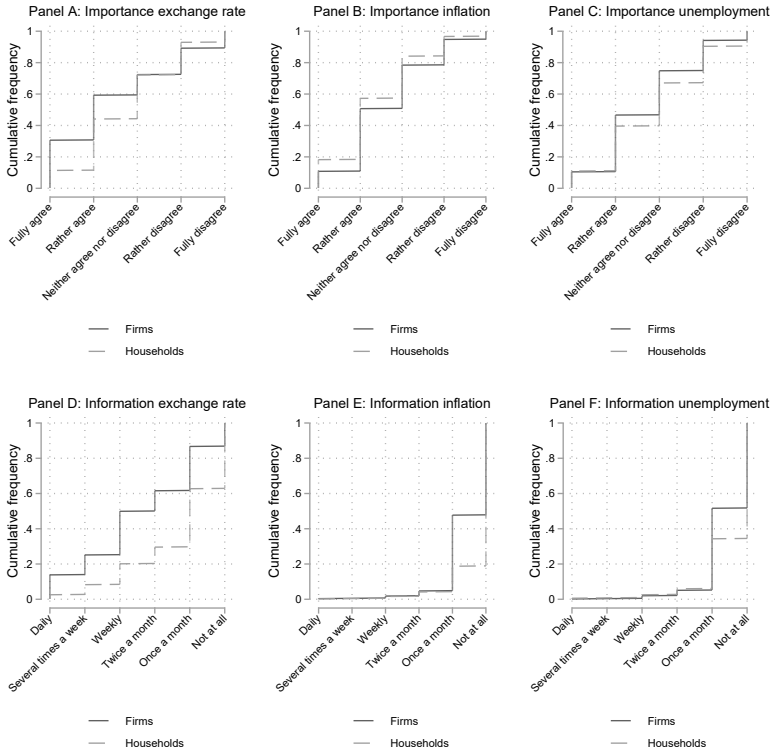
Sims, Christopher A, "Implications of Rational Inattention," *Journal of Monetary Economics*, 2003, *50* (3), 665–690.

Wiederholt, Mirko, "Empirical Properties of Inflation Expectations and the Zero Lower Bound," *Working Paper*, 2015.

Woodford, Michael, "Imperfect Common Knowledge and The Effects of Monetary Policy," in Philippe Aghion, Roman Frydman, Joseph E. Stiglitz, and Michael Woodford, eds., *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps*, Princeton, NJ: Princeton Univ. Press, 2003.

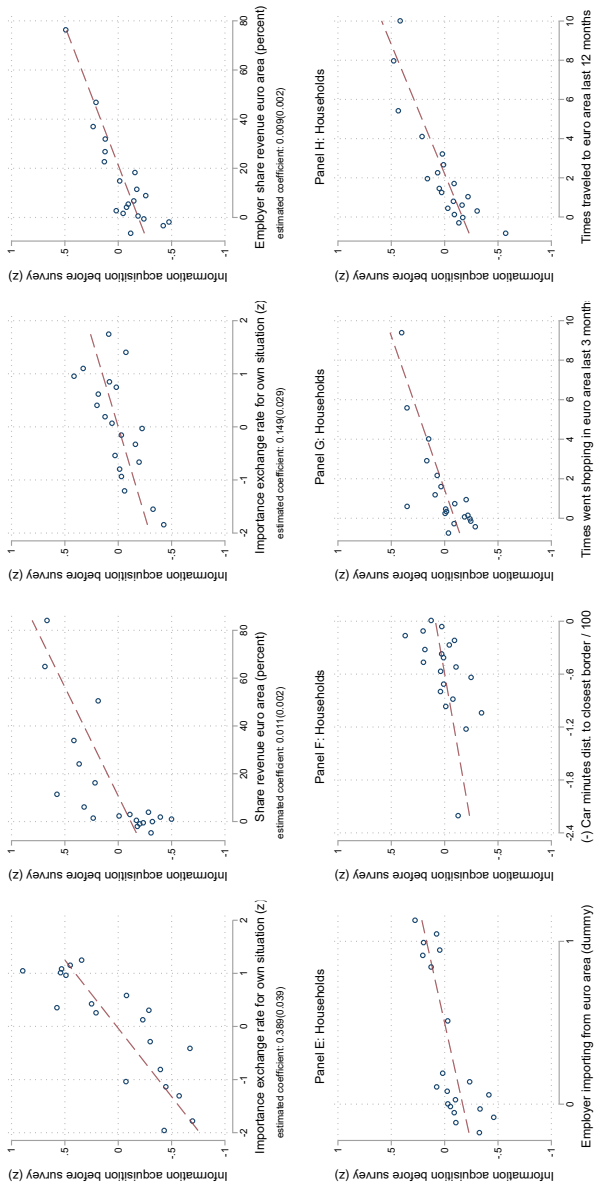
Main figures

FIGURE 1. PERCEIVED IMPORTANCE AND INFORMATION ACQUISITION FOR DIFFERENT MACROECONOMIC VARIABLES



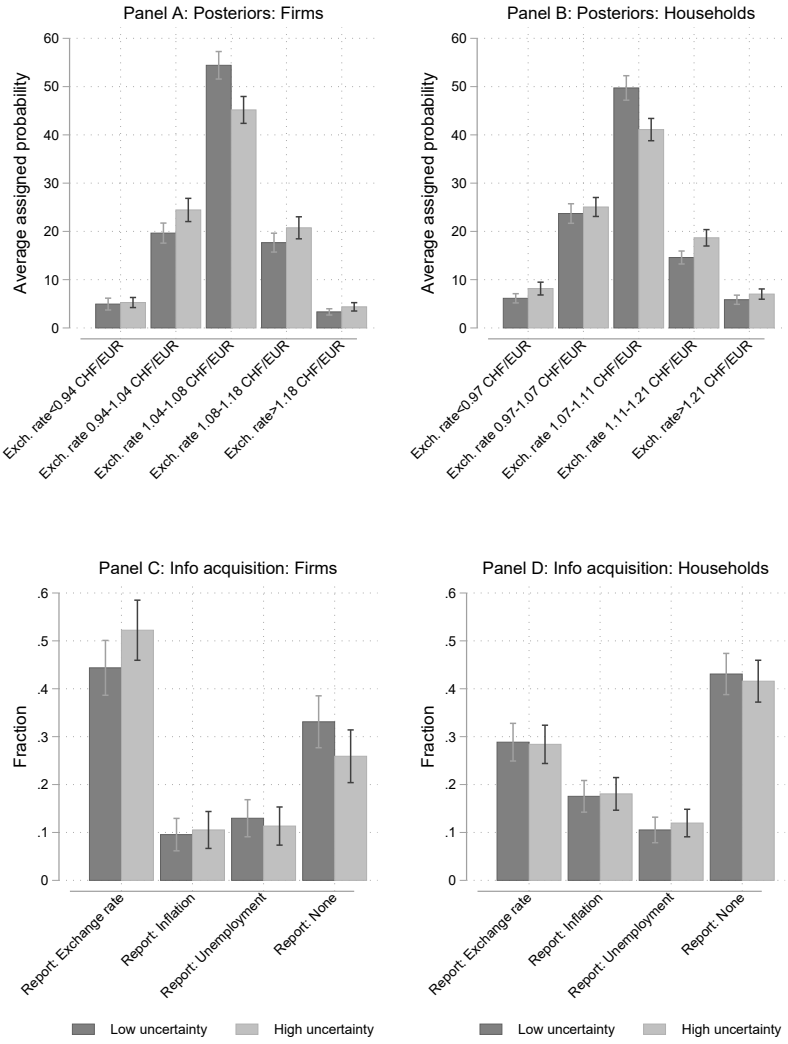
Notes: This figure displays cumulative distributions of respondents' subjective importance of different macroeconomic variables for their own economic outcomes and their acquisition of information on those variables. The figure focuses on the exchange rate (Panels A and D), the inflation rate (Panels B and E) and the unemployment rate (Panels C and F), and displays the distributions among firms (solid lines) and among respondents from Wave 1 of the household survey (dashed lines). The measures shown in Panels A-C are based on questions eliciting respondents' agreement on a scale ranging from "fully agree" to "fully disagree" to identical statements: "The [...] is important for the economic situation of my firm/household." The measures shown in Panels D-F are based on questions eliciting respondents' answers on a scale ranging ranging from "daily" to "not at all" to identical questions: "How frequently did you gather information about [...] in the last 3 months before taking this survey?"

FIGURE 2. STAKE SIZE AND ACQUISITION OF EXCHANGE RATE INFORMATION



Notes: This figure provides binned scatter plots on the relationship between stake size and acquisition of exchange rate information among firms (Panels A and B) and among respondents from Wave 2 of the household survey (Panels C-H). The variables on the y-axes are z-scored transformations of responses to the following question: "How frequently did you gather information about the exchange rate in the last 3 months before taking this survey?", with responses on a scale ranging from "not at all" to "daily". The variables on the x-axes are the following: the z-scored transformation of people's responses to the question "The exchange rate is important for the economic situation of my [firm/household]", with responses on a scale from "fully disagree" to "fully agree" (Panels A and C); the share of firm revenue generated through exports to the euro area (Panel B); the share of revenue the respondent's employer earns in the euro area, setting non-employed respondents to missing (Panel D); a dummy indicating whether a respondent's employer imports goods or services from the euro area, setting non-employed respondents to missing (Panel E); the negative of the minutes it takes by car to reach the closest border to the euro area from the respondent's household's residence, divided by 100 for readability (Panel F); the number of times the respondent went shopping in the euro area over the previous three months (Panel G); the number of times the respondent traveled to the euro area over the previous twelve months (Panel H). All estimations partial out a set of controls, including the log number of employees for firms and including a dummy for females, age, a dummy for holding at least a high school degree, z-scored measures of numeracy, perceived information acquisition costs and perceived information processing costs, log income, a dummy for employed respondents, and dummies for homeownership and stockownership for households. Robust standard errors are in parentheses.

FIGURE 3. EXPERIMENTAL EVIDENCE ON UNCERTAINTY AND ACQUISITION OF EXCHANGE RATE INFORMATION



Notes: This figure provides experimental evidence on the effect of perceived uncertainty on information acquisition in our sample of firms (Panels A and C) and in Wave 2 of the household survey (Panels B and D). Panels A and B show the average posterior probabilities respondents in the low and high uncertainty arms assign to different realizations of the exchange rate one year after the survey. Panels C and D display the fractions of respondents choosing the different reports or no report in the low and in the high uncertainty arms. The figure also displays standard error bands around the means.

Main tables

TABLE 1—PERCEIVED INFORMATION ACQUISITION AND PROCESSING COSTS AND ACQUISITION OF EXCHANGE RATE INFORMATION: HOUSEHOLDS

	Exchange rate info before survey (z)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Perceived information acquisition costs (z)	-0.172	-0.167	-0.073				0.041
	(0.033)	(0.033)	(0.031)				(0.035)
Perceived information processing costs (z)				-0.287	-0.287	-0.182	-0.206
				(0.032)	(0.031)	(0.031)	(0.036)
At least high school		0.136	0.092		0.114	0.083	0.082
		(0.066)	(0.062)		(0.063)	(0.061)	(0.061)
Numeracy score (z)		0.064	0.022		0.075	0.032	0.033
		(0.032)	(0.029)		(0.031)	(0.029)	(0.029)
Controls	No	No	Yes	No	No	Yes	Yes
R^2	0.03	0.04	0.18	0.08	0.09	0.20	0.20
Observations	1,006	1,006	1,006	1,006	1,006	1,006	1,006

Notes: This table provides correlational evidence on the relationship between perceived information acquisition and processing costs and information acquisition among respondents from Wave 2 of the household survey. The outcome is a z-scored measure of acquisition of information about the exchange rate over the three months prior to the survey. Perceived information acquisition costs are based on the following survey question: "Imagine that you wanted to inform yourself about the development of the economy (e.g. exchange rate fluctuations) in Switzerland. How difficult would it be for you to find relevant information about the development of the economy?", with responses on a scale from "very easy" to "very difficult". Perceived information processing costs are based on the question: "How difficult do you typically find it to understand and interpret information about the economy (e.g. exchange rate fluctuations)?", with responses on a scale from "Very easy" to "Very difficult". These variables are z-scored using their means and standard deviations in the sample. Columns 2-3 and 5-7 control for a dummy for holding at least a high school degree and a z-scored measure of numeracy. Columns 3, 6 and 7 additionally control for a dummy for females, age, log income, a dummy for employed respondents, dummies for homeownership and stockownership, and a z-scored measure of the perceived importance of the exchange rate for respondents' own outcomes. Robust standard errors are in parentheses.

TABLE 2—PRIOR PERCEIVED EXCHANGE RATE UNCERTAINTY COMPARED TO BENCHMARKS

	Exchange rate: Prob. +/-0.02 CHF from current	Exchange rate: SD change from current	Observations
	(1)	(2)	(3)
Firms (February 2020)	68.92	0.027	560
Households (September 2021)	69.28	0.040	1,006
Experts (February 2020)	37.48	0.052	18
Experts (September 2021)	34.55	0.045	11
Historical	22.97	0.069	271
Low uncertainty signal	90	0.012	
High uncertainty signal	30	0.052	

Notes: This table presents average prior beliefs about exchange rate movements among firms (conducted in March 2020) and respondents to Wave 2 of the household survey (conducted in September 2021) and average expert beliefs from expert surveys conducted in February 2020 and in September 2021. Column 1 focuses on the probability respondents assign to a state of the world where the exchange rate one year later falls into an interval of +/-0.02 CHF per euro around its current level. In addition, Column 1 presents the fraction of months between the introduction of the euro in January 1999 and July 2022 for which the exchange rate 12 months later fell into an interval of +/-0.02 CHF per euro around its current level as well as the signals provided in the two treatment arms. Column 2 displays the average standard deviation of the 12-months-ahead exchange rate implied by respondents' beliefs when assuming a normal distribution around the current level for each respondent. Column 2 also displays the standard deviation implied by the fraction of months the exchange rate 12 month later was close to its current level and the standard deviation implied by the two signals, again assuming normal distributions around the current level for comparability.

TABLE 3—UPDATING ABOUT EXCHANGE RATE UNCERTAINTY

	Updating					
	(1) Firms	(2) Firms	(3) Firms	(4) Households	(5) Households	(6) Households
Shock	0.152	0.139	0.204	0.141	0.170	0.149
	(0.031)	(0.050)	(0.082)	(0.028)	(0.042)	(0.073)
Shock $\times \mathbb{1}(\text{Shock} > 0)$		0.037			-0.085	
		(0.092)			(0.086)	
Shock $\times$ Prior			-0.001			-0.000
			(0.001)			(0.001)
Prior	-0.365	-0.357	-0.356	-0.492	-0.508	-0.490
	(0.050)	(0.044)	(0.048)	(0.043)	(0.043)	(0.043)
R^2	0.26	0.26	0.26	0.26	0.26	0.26
Observations	546	546	546	1,006	1,006	1,006

Notes: The table shows OLS estimates of the learning rate from the expert assessments of the probability that the exchange rate falls into the interval 1.04-1.08 CHF per euro (firms, columns 1-3) or the interval 1.07-1.11 CHF per euro (Wave 2 of the household survey, columns 4-6) based on specification 1. The outcome is the difference between a respondent's posterior and prior probability that the exchange rate falls into the relevant bin. The shock indicates the difference between the signal a respondent receives (90% in the low uncertainty arm, 30% in the high uncertainty arm) and the respondent's prior. The specifications in columns 2 and 5 also include an interaction term of the shock variable with a dummy indicating whether the shock is greater than zero. The specifications in columns 3 and 6 also include interaction terms of the shock variable with a respondent's prior. All specifications control for the z-scored perceived importance of the exchange rate for the respondents' own situation, winsorized prior expectations about the average exchange rate one and two years after the survey, and the respondents' z-scored confidence in their prior expectations about the future exchange rate. The estimations in columns 1-3 additionally control for the firm's share of revenue earned through exports to the euro area. The estimations in columns 4-6 additionally control for the respondent's employer's share of revenue earned through exports to the euro area (coding non-employed as zero), a dummy for employed respondents, and a dummy for stockownership. Robust standard errors are in parentheses.

TABLE 4—EXPERIMENTAL EVIDENCE: FIRMS

	Exchange rate: Mean	Exchange rate: SD	Exchange rate: Prob. ¡0.94 CHF	Exchange rate: Prob. 0.94-1.04 CHF	Exchange rate: Prob. 1.04-1.08 CHF	Exchange rate: Prob. 1.08-1.18 CHF	Exchange rate: Prob. ¿1.18 CHF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First stage							
High exchange rate uncertainty	0.001	0.006	0.362	4.454	-9.390	3.403	1.171
	(0.002)	(0.002)	(0.742)	(1.463)	(2.045)	(1.360)	(0.519)
Mean dep. var. (low uncertainty arm)	1.056	0.052	4.939	19.648	54.415	17.673	3.325
R^2	0.35	0.07	0.12	0.17	0.04	0.23	0.15
Observations	546	546	546	546	546	546	546
	Report: Exchange rate	Report: Inflation	Report: Unemp-loyment	Report: Any other (2)-(3)	Report: None		
	(1)	(2)	(3)	(4)	(5)		
Panel B: Reduced form							
High exchange rate uncertainty	0.083	0.007	-0.024	-0.016	-0.067		
	(0.039)	(0.026)	(0.028)	(0.035)	(0.038)		
Mean dep. var. (low uncertainty arm)	0.444	0.096	0.130	0.225	0.331		
R^2	0.22	0.04	0.06	0.09	0.09		
Observations	540	540	540	540	540		
Panel C: IV							
(Exchange rate: Prob.	-0.889	-0.071	0.280	0.209	0.679		
1.04-1.08 CHF) / 100	(0.478)	(0.291)	(0.313)	(0.392)	(0.447)		
First-stage F-stat	18.72	18.72	18.72	18.72	18.72		
R^2	0.06	0.04	0.01	0.07	-0.03		
Observations	530	530	530	530	530		
Panel D: OLS							
(Exchange rate: Prob.	-0.056	-0.005	-0.004	-0.009	0.065		
1.04-1.08 CHF) / 100	(0.078)	(0.052)	(0.057)	(0.072)	(0.079)		
R^2	0.22	0.04	0.05	0.09	0.08		
Observations	530	530	530	530	530		

Notes: This table provides experimental evidence on the effect of perceived uncertainty on information acquisition in our sample of firms. Panel A shows estimates of the first-stage specification (equation 2) measuring the effect of being randomly assigned to the high uncertainty arm on mean and standard deviation of the respondents' posterior subjective distribution over exchange rate realizations in March 2021, one year after the survey (columns 1-2), as well as posterior probabilities assigned to different bins into which the exchange rate may fall (columns 3-7). Panel B shows estimates of the reduced-form specification (equation 3) measuring the effect of being randomly assigned to the high uncertainty arm on dummy variables indicating which report the respondent selects (columns 1-3), whether any non-exchange rate report is selected (column 4), or whether no report is selected (column 5). Panel C shows instrumental variable estimates of the effect of the posterior perceived probability that the exchange rate falls into the interval 1.04-1.08 CHF per euro, which is instrumented with a dummy variable indicating whether a respondent is assigned to the high uncertainty treatment, on respondents' demand for the different reports. Panel D shows the corresponding OLS estimates. All specifications control for the firm's share of revenue earned through exports to the euro area, the z-scored perceived importance of the exchange rate for the firm's situation, winsorized prior expectations about the average exchange rate in March 2021 and in March 2022, and the respondents' z-scored confidence in their prior expectations about the future exchange rate. Robust standard errors are in parentheses.

TABLE 5—EXPERIMENTAL EVIDENCE: HOUSEHOLDS

	Exchange rate: Mean	Exchange rate: SD	Exchange rate: Prob. ¡0.97 CHF	Exchange rate: Prob. 0.97-1.07 CHF	Exchange rate: Prob. 1.07-1.11 CHF	Exchange rate: Prob. 1.11-1.21 CHF	Exchange rate: Prob. ¿1.21 CHF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First stage							
High exchange rate uncertainty	0.001	0.005	1.993	1.321	-8.995	4.228	1.453
	(0.002)	(0.002)	(0.804)	(1.413)	(1.735)	(1.068)	(0.690)
Mean dep. var. (low uncertainty arm)	1.083	0.055	6.137	23.702	49.721	14.593	5.847
R^2	0.15	0.05	0.06	0.04	0.05	0.08	0.12
Observations	1,006	1,006	1,006	1,006	1,006	1,006	1,006
	Report: Exchange rate	Report: Inflation	Report: Unemp-loyment	Report: Any other (2)-(3)	Report: None		
	(1)	(2)	(3)	(4)	(5)		
Panel B: Reduced form							
High exchange rate uncertainty	0.006	0.004	0.013	0.018	-0.024		
	(0.028)	(0.024)	(0.020)	(0.028)	(0.030)		
Mean dep. var. (low uncertainty arm)	0.288	0.175	0.105	0.281	0.431		
R^2	0.07	0.04	0.02	0.03	0.10		
Observations	1,006	1,006	1,006	1,006	1,006		
Panel C: IV							
(Exchange rate: Prob.	-0.066	-0.047	-0.149	-0.196	0.262		
1.07-1.11 CHF) / 100	(0.306)	(0.262)	(0.219)	(0.313)	(0.330)		
First-stage F-stat	26.88	26.88	26.88	26.88	26.88		
R^2	0.07	0.04	0.02	0.03	0.10		
Observations	1,006	1,006	1,006	1,006	1,006		
Panel D: OLS							
(Exchange rate: Prob.	-0.030	-0.002	-0.069	-0.071	0.101		
1.07-1.11 CHF) / 100	(0.049)	(0.041)	(0.035)	(0.050)	(0.055)		
R^2	0.07	0.04	0.03	0.04	0.10		
Observations	1,006	1,006	1,006	1,006	1,006		

Notes: This table provides experimental evidence on the effect of perceived uncertainty on information acquisition in our sample of respondents of Wave 2 of the household survey. Panel A shows estimates of the first-stage specification (equation 2) measuring the effect of being randomly assigned to the high uncertainty arm on mean and standard deviation of the respondents' posterior subjective distribution over exchange rate realizations in September 2022, one year after the survey (columns 1-2), as well as posterior probabilities assigned to different bins into which the exchange rate may fall (columns 3-7). Panel B shows estimates of the reduced-form specification (equation 3) measuring the effect of being randomly assigned to the high uncertainty arm on dummy variables indicating which report the respondent selects (columns 1-3), whether any non-exchange rate report is selected (column 4), or whether no report is selected (column 5). Panel C shows instrumental variable estimates of the effect of the posterior perceived probability that the exchange rate falls into the interval 1.07-1.11 CHF per euro, which is instrumented with a dummy variable indicating whether a respondent is assigned to the high uncertainty treatment, on respondents' demand for the different reports. Panel D shows the corresponding OLS estimates. All specifications control for the respondent's employer's share of revenue earned through exports to the euro area (coding non-employed as zero), the z-scored perceived importance of the exchange rate for the household's situation, winsorized prior expectations about the average exchange rate in September 2022 and in September 2023, the respondents' z-scored confidence in their prior expectations about the future exchange rate, a dummy for employed respondents, and a dummy for stockownership. Robust standard errors are in parentheses.