Effective Policy Communication: Targets versus Instruments*

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Abstract

Communication targeting households and firms has become a stand-alone policy tool of many central banks. But which forms of communication, if any, can reach ordinary people and manage their economic expectations effectively? In a large-scale randomized control trial, we show that communication manages expectations when it focuses on policy targets and objectives rather than on the instruments designed to reach such objectives. It is especially the least sophisticated demographic groups, whom central banks typically struggle to reach, who react more to target-based communication. When exposed to target-based communication, these groups are also more likely to believe that policies will benefit households and the economy. Target-based communication enhances policy effectiveness and contributes to strengthen the public's trust in central banks, which is crucial to ensure the effectiveness of their policies.

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I Introduction

The ECB needs to be understood by the markets that transmit its policy, but it also needs to be understood by the people whom it ultimately serves. People need to know that it is their central bank, and it is making policy with their interests at heart.

ECB President Christine Lagarde, 2019

Over the past decade or so, the FOMC has enhanced its communication practices to promote public understanding of its policy goals, strategy, and actions, as well as to foster democratic accountability.

Fed Vice Chair Richard Clarida, 2019

Policy communication has become an important measure in central banks' toolbox to manage households' and firms' expectations, which is especially crucial in times of low interest rates, when the scope of traditional monetary policy measures transmitted through financial markets and intermediaries is limited. This novel policy tool challenges one of central banking's tenets—the technicality of its communication, which has been so so tightly linked to the practice of monetary policy that "the esoteric nature of [central banking] is (...) revealed by an inherent impossibility to articulate its insights in explicit and intelligible words and sentences" (Brunner (1981); see also, e.g., Goodfriend (1986) and Greider (1989)). Using communication as a policy tool poses an unprecedented dilemma to central banks around the globe: which forms of communication, if any, can reach and affect the expectations of ordinary households, who do not understand and are uninterested in deciphering obscure policy statements? (See, e.g., Blinder (2009), Binder (2017), Andre, Pizzinelli, Roth, and Wohlfart (2019))

In this paper we draw on insights from macroeconomics, marketing, and social psychology to study which forms of communication can affect households' expectations and their interpretation of policy in line with the aims of policy makers. Inspired by recent work in macroeconomic theory (Angeletos and Sastry (2018)), we ask in particular if central banks should focus their communication on the instruments they adopt to reach policy targets (e.g., provide guidance about the path of interest rates) or if instead they should only discuss the policy targets themselves, as in Dr. Draghi's claim that the ECB would do "whatever it takes to preserve the Euro, and believe me, it will be enough."[1]

To tackle this question empirically, we designed a randomized information-provision experiment on a representative sample of Finnish men for whom we observe several

[1]This form of target communication satisfies the criteria of being "simple, crisp, and constructively imprecise" Angeletos (2020) proposes.

demographic characteristics, including a test-based measure of cognitive abilities. In this experiment, all subjects read policy statements coming from the same medium and the same source—the official twitter account of the Governor of the Bank of Finland, Dr. Olli Rehn. What varied across conditions was whether the (real) tweets subjects read consisted of target- or instrument-based policy communication. The target communication tweet stated: "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis" (tweeted on March 20^{th}, 2020). The instrument communication tweet stated: "New EUR750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank" (tweeted on March 18^{th}).[2]

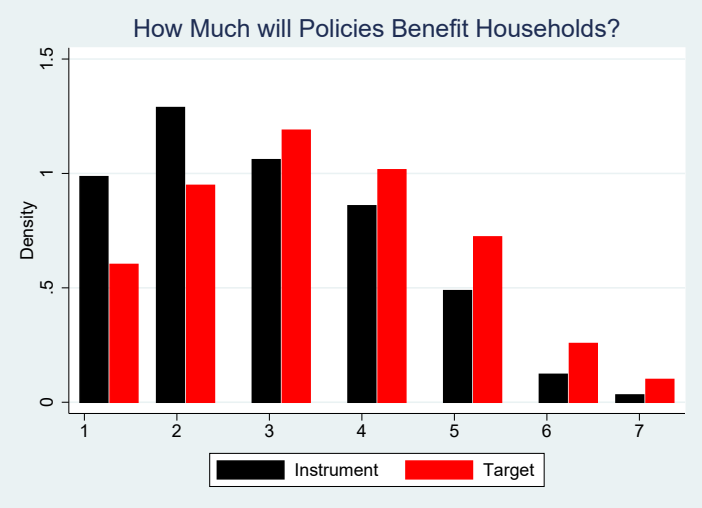
Figure 1 previews our findings. We overlay two histograms reporting the distribution of answers to whether respondents thought that the policies proposed by the ECB to overcome the COVID-19 crisis would not benefit households at all (1), would benefits households a lot (7), and the levels in between. Before answering, respondents were randomly exposed to instrument-based communication (black histogram) or target-based communication (red histogram): The target-communication histogram is shifted to the right relative to the instrument-communication one, which means that agents exposed to target communication were systematically more likely to believe that ECB policies would benefit households rather than agents exposed to instrument communication.

This qualitative fact begets the question of how target and instrument communication compare in managing agents' *quantitative* expectations, which is the ultimate goal of central banks. To answer this question, we elicited households' numerical income expectations both before and after the randomized information provision in a within-subject experimental design.[3]

[2]As we discuss in more detail below, our design also includes a control group of subjects who read a tweet by Dr. Rehn that also referred to a time of crisis in Finnish history but that was unrelated to economic policy or current events: "The January engagement created the spirit of Winter War 80 years ago. Memories do not live, but they do" (tweeted on January 20^{th}, 2020). This groups aims to capture any effects of the mere reading of information as well as being primed with a sense of crisis into subjects.

[3]As we discuss in more detail below, to avoid asking the same question twice, which could raise concerns about demand effects (Coibion et al. (2020); D'Acunto (2020a)), we first asked for a point estimate and then elicited a full probability distribution based on the wording of the New York Fed Survey of Consumer Expectations (see, e.g., Crump et al. (2020)).

Figure 1: **Target versus Instrument Communication**



This figure plots the shares of respondents who think that policies will not benefit households at all (1), will benefit households a lot (7), or expectations in between these extremes, separately for respondents randomly exposed to target and instrument communications. Target communication was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." Instrument communication was a tweet by Bank of Finland Governor Olli Rehn that the "New Euro 750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank." We measure normalized IQ using data from the official military entrance exam in Finland. We elicit whether policies benefit households on a seven-point Likert scale with 7 being policies benefit households extremely. We fielded the survey in June 2020.

We confirm the results about respondents' qualitative beliefs documented in Figure 1 when respondents update their quantitative income expectations: Target communication increases average monthly gross income expectations between EUR 70 and EUR 80 relative to the control group in the raw data as well as conditional on a rich set of observables such as age, marital status, income, employment status, location, education level, as well as direct measures of economic preferences, liquidity constraints, and financial literacy. The size of this effect, which is fully driven by (costless) target-communication adoption, aligns with recent fiscal policy measures to support household income such as the "80-Euro tax bonus" introduced in Italy in 2014, whose cost amounts to about EUR 9.5 billion per year.[4]

Contrary to target communication, exposing subjects to instrument communication does not results in any statistically significant forecast revision of household-income expectations, and the point estimates of the effect are less than half the size of the estimates of the effects of target communication.

[4]Because the bonus is granted based on a nominal household-income threshold, the number of recipients changes across fiscal years.

Note that, because none of the treatments nor the control condition contain any references to household-level income, a mechanical anchoring of expectations to externally induced values cannot drive our findings. Moreover, experimenter demand effects (De Quidt, Haushofer, and Roth (2018))—subjects behaving in line with what they think is the experimenters' hypothesis—are an unlikely explanation for our results, because each subject only faces one treatment condition. To guess the experimenters' hypothesis, subjects should be aware of the recent economic-theory work by Angeletos and Sastry (2018) and the debate summarized by Angeletos (2020), which, despite the relevance of this work in academic and policy circles, seems largely implausible.

After documenting that target and instrument communication have different abilities to manage consumers' income expectations, we assess the potential heterogeneity of the effects based on dimensions that earlier research suggest might matter. This exercise is motivated by policy makers' concern that traditional policy communication fails to reach less sophisticated households, who might find it too costly to gather and process technical information about economic policies (Coibion et al. (2019)). Recent empirical work echoes this concern by documenting that agents below the top of the distribution by cognitive abilities have more pessimistic expectations and are in general less responsive to economic policies (D'Acunto et al. (2019a,b, 2020)). Limited cognition has also been described by recent theoretical macro research as a relevant friction to the transmission and effectiveness of monetary policy (Farhi and Werning (2019), Gabaix (2020), Woodford (2018), Angeletos and Sastry (2018)).

Being able to test for the effects of providing communication to those agents who are harder to reach is crucial not only to understand the mechanisms of policy communication on beliefs and choice, but also from a policy perspective: If we found strong effects of target communication on harder-to-reach consumers, the recent efforts by central banks around the world to reach out more to such consumers such as through the *Fed listens* events that started in 2019 might be justified.[5] If, instead, the effects were stronger for consumers who already access economic and policy information from other sources, perhaps such efforts might be less worthwhile.

We split our sample by median cognitive abilities as measured by the Finnish Defense

[5]Fed officials started to meet with several groups such as unions, low-income households, and retirees to discuss the goals of central banking and to understand the needs and concerns of ordinary people. A summary of the results of these events can be found here: https://www.federalreserve.gov/publications/files/fedlistens-report-20200612.pdf.

Forces (FDF) through entry-week tests during the compulsory military service. For men with below median levels of IQ, we find that target communication increases income expectations by more than EUR 90 per month, which is 38% higher than the effect we estimate for subjects with above median IQ. The size of the treatment effect increases to EUR 160 when conditioning on observables that plausibly correlate with IQ. In this case, the effect we estimate is about three times as large as the conditional treatment effect for high-IQ men. Ultimately, target communication is not only more effective than instrument communication in managing the expectations of the average consumer but it helps especially with managing the expectations of the least sophisticated groups in the population.

An obvious channel that might explain why target communication is easier to understand is the cost of processing information. Keeping constant the exposure to some form of economic information, target communication might be easier to understand and process (intensive margin of communication) and hence might generate a stronger reaction, especially on the part of the least sophisticated consumers.

At the same time, a complementary channel involves the ability of target communication to reach the least sophisticated more (extensive margin of communication), irrespective of their understanding of such communication. To assess the role of this channel, we consider separately subjects who were already aware of the ECB policies discussed in Dr. Rehn's tweets before participating in our experiment and subjects who were unaware. For target communication, we find that the treatment effect on income expectations further increases among subjects that were unaware of the policy measure before the tweet relative to the overall sample, and especially for men below the median of the IQ distribution. Instead, irrespective of policy awareness and IQ, we find small effects of instrument communication on income expectations.

The last heterogeneity dimension we consider is consumers' prior income-change expectations. If less sophisticated consumers with more pessimistic expectations—the demographic group that central banks really want to reach to manage their expectations upward, especially in times of crisis—are indeed those who react most strongly to target communication, we should find the largest treatment effect in this subsample. And, indeed, the treatment effect of target communication is almost three times as large in this subsample than in the full sample. Target communication has instead a more muted effect on the beliefs of those with above-median prior income change expectations. This

latter result ensures that treating households with target communication does not turn them into overoptimistic or extrapolative agents. It also ensures that a mechanical mean reversion of expectations does not drive our results.

Overall, our results indicate that monetary policy communication can be a successful policy tool to manage ordinary households' expectations, but this effectiveness is enhanced when central banks emphasize the targets and aims of their policies rather than the specific policy measures with which they want to reach such aims.

Our experiment has merely scratched the surface of the role of different communication styles and rhetoric used by policy institutions on economic agents' beliefs. Additional research is necessary to better understand other features that might contribute to the effectiveness of target communication, such as the role of different types of media. Given the high level of unawareness of economic policy among our representative subject pool, central banks need to understand which media can deliver their target communication messages to the broader population to maximize its effectiveness.

A. Related Literature

Even though, over the last two decades, central banks' communication has become more open and clear, most of the communication efforts have been devoted to financial markets, their participants, and financial intermediaries. This focus rested on the premise that financial market participants and intermediaries would have reacted as intended by policy makers and their reactions would have percolated to households and firms through changing the incentives to spend, save, and borrow (Blinder et al. (2008) and Blinder and Krueger (2004)). For instance, Ehrmann and Fratzscher (2009), Lange et al. (2003), Swanson (Swanson), and Neuhierl and Weber (2019) show that increased transparency and communication does shape financial market expectations of future interest rates and reduce financial volatility.

More recently, though, and especially since the Great Recession, central banks around the world have recognized that in times of low interest rates households' and firms' choices should be influenced by managing the beliefs of these agents directly, because changing interest rates and hence the economic incentives of households and firms through intermediaries and financial markets was not viable anymore. For this reason, Blinder (2009) argues that "It may be time for both central banks and researchers to pay more

attention to communication with a very different audience: the general public" and continues "effective communication with the general public will surely have to be very different, in both content and style, than effective communication with the financial markets. It seems to me that, to date, few central banks have taken this task very seriously".

Recent research shows that, as predicted by Blinder (2009), not all forms of communication can effectively reach ordinary households. Haldane and McMahon (2018) discuss evidence from the UK that increased communication with the public has not increased the general knowledge of the pillars of monetary policy making since 2001. Haldane et al. (2020) argue theoretically that successful communication with the broader public should rely on "Explanation, Engagement and Education". D'Acunto et al. (2020) show in observational data that European households only update their inflation expectations following simple communication but not following complex communication. Lamla and Vinogradov (2019) run household surveys in the days before and after FOMC policy meetings and find that households do not change their beliefs about future inflation or interest rates. Their results are consistent with the fact that many households do not follow monetary policy announcements in their daily life and hence are not reached by traditional policy communication.

To assess the scope for communication to influence households directly, a series of recent papers rely on lab experiments and randomized control trials in surveys. Kryvtsov and Petersen (2020) conduct a lab experiment and find providing information of past interest rates has the strongest effect on the volatility of price and expenditure forecasts of individuals, contrary to forward-looking announcements. Binder and Rodrigue (2018), Armantier et al. (2016), Coibion et al. (2019), and Coibion et al. (2020) show in survey experiments that providing simple information about current and future inflation rates results in large forecast revisions of households but that relying on the media to transmit the information might be less effective because of a general level of distrust towards the media.

So far, though, we still do not understand which *types* of communication are effective in reaching households, rather than which informational content manages their beliefs. We contribute to assess this question by comparing the effectiveness of target- versus instrument-based communication following the theoretical framework of Angeletos and Sastry (2018) and Angeletos (2020). We are also the first ones to study heterogeneity

by measures of cognitive abilities that feature prominently in recent theoretical work in macroeconomics as a "human friction to the transmission of economic policy" (D'Acunto et al. (2019b)).

II Data

Our analysis uses three micro datasets that include individual-level information on economic expectations and cognitive abilities, as well as administrative information on household-level income.

A. Data on Cognitive Abilities

Finland has general conscription for men, which means all Finnish men between the ages of 18 and 60 are liable for military or non-military service. The share of men who do non-military service is only about 3% of all men who start military service.[6] Within the first weeks of the mandatory military service, Finnish men typically around the age of 19-20 have to participate in a series of tests. The FDF administer these tests and use the results to select candidates for possible officer training. Because ranking well in the IQ test provides a set of advantages in terms of quality of training and access to elite social networks, men have an incentive to perform as well as possible on the test (Grinblatt et al. (2011)).

The cognitive-ability test consists of 120 questions that focus on three areas – visuospatial, mathematical, and verbal. The FDF aggregates those scores into a composite measure of cognitive abilities, which we label collectively as IQ. The FDF standardizes IQ to follow a stanine distribution. Stanine (STAndard NINE) is a method of scaling test scores on a 9-point standard scale with a mean of 5 and a standard deviation of 2, approximating a normal distribution. The respondents with the lowest 4% of test scores are at least 1.75 standard deviations from the mean and are assigned a standardized IQ score of 1, and the 4% with the highest test scores are assigned a standardized IQ score of 9. Hence, most of the mass of our observations is around the median bin, whereas the extreme bins account for only a small part of the sample. We have test results for all participants from 1982 until 2009.

[6] Please see https://puolustusvoimat.fi/en/conscription for these and additional details.

Finland is a homogeneous country in terms of cultural background and opportunities. Access to education, including college education, is virtually for free. The country is also racially homogeneous (Grinblatt et al. (2011)). These features make the Finnish setting a desirable laboratory because our measures of IQ are unlikely to proxy for differences in cultural or environmental factors (D'Acunto et al. (2018)), which individuals could manipulate, but are more likely to reflect differences in innate abilities across individuals.

B. Survey Data on Expectations

The sampling of our subject pool started from the universe of Finnish men for which the FDF has administrative information on IQ. Statistics Finland recruited the subject pool, which was stratified by age and education levels to ensure a large overlap with our data on IQ.[7].

From early to mid-June 2020, Statistics Finland fielded a survey of consumers' expectations on the subject pool. The structure of the survey consisted of three parts. The first part of the survey elicited a few basic pieces of information, including proxies for respondent households' financial constraints, financial portfolios, annual income as of the end of 2019, and (prior) expected changes in average monthly gross household income from the end of 2019 to the end of 2020.

The second part of the survey consisted of a randomized information provision experiment. Given that some of the questions after the treatment aim to elicit the same beliefs as those before the treatment, the experimental part of the survey was introduced with a short introductory text to reduce the concerns about demand effects (De Quidt et al. (2018)): "We have just a few more questions. But before you give us your responses, we would like to provide you with some information. We will subsequently ask you again about your expectations. We are interested to see if this information will change your expectations or not. There is no right or wrong reaction: Whether this information changes your expectations or not is solely determined by your opinions, and any reaction or non-reaction is right as long as it reflects what you truly believe."

For the information treatment, the sample was randomly split into three groups. All three groups received information from the same sender, Governor Rehn of the Bank of Finland, and from the same medium, the Governor's official twitter account. Our design

[7]Note that Statistics Finland was not allowed to use IQ directly for stratification purposes

thus keeps constant the sender and medium of information. We only varied the content of the information that was provided to subjects.

The first group included control subjects who did not receive any information related to monetary policy. Because we fielded the survey during the global COVID-19 pandemic, we showed the control group a tweet by Dr. Rehn that discussed a period of crisis in Finnish history, so as to disentangle the sense of crisis that the policy-related tweets might have primed from the information that the same tweets included about policy. Note that our within-subject design allow testing directly whether the control condition changed subjects' beliefs by itself. Differencing out the (potential) change of beliefs in the control group would "purge" the information treatments' effects from the potential effect of priming a sense of crisis to subjects. For this reason, we did not include also an additional control group for which no sense of crisis was primed.[8]

The second group (target communication) read the following tweet that Dr. Rehn posted on March 20^{th} 2020: "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis". This tweet was inspired by a similar statement made by ECB President Christine Lagarde on the same day, and both statements were presumably inspired by the sentence by former ECB President Mario Draghi we reported in the introduction. This tweet represent a form of target communication in that no specific policy instruments are discussed, no technical jargon is used, and no specific numbers are provided in the tweet. Rather, the ultimate objective of ECB's policies is discussed—to minimize the financial damage of the COVID-19-induced crisis.

The third group (instrument communication) read the following tweet that Dr. Rehn posted on March 18^{th} 2020: "New EUR750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank". In this case, the tweet is a form of instrument communication in that it only discusses the policy instrument the ECB implemented (PEPP) as well as the overall size of this program, which represent a large amount for expert as well as presumably non-expert readers.

Finally, the last part of the survey, which was identical for all subjects irrespective of the experimental arm to which they were assigned, consisted mainly of follow-up

[8]We did not have an assessment from earlier research about the potential effect of priming a sense of crisis on control subjects' beliefs, and we do not end up detecting any economically or statistically significant change for this group.

questions. We asked how much subjects thought that the ECB's policy actions would benefit households on a seven-point Lickert scale. We then elicited expectations for household income changes in 2020 relative to 2019 using a full probability distribution like the New York Fed Survey of Consumer Expectations (see Armantier et al. (2016)). The remaining questions elicited subjects' financial and economic literacy and grocery duties within households following earlier survey designs (e.g., see D'Acunto et al. (2020)). The English translation of the full survey, which was administered in Finnish or Swedish based on the reported native language of each subject, is reported in the Online Appendix.

C. Data on Income from Tax Returns

Our data also include administrative income information for all Finnish full-time residents at the end of each calendar year, which we obtain through Statistics Finland. The information is collected from underlying sources across various agencies (Tax Administration, National Institute for Health and Welfare, Statistics Finland, Kela), administrative registers, and statistical repositories. The data contain information on individuals' labor and business incomes, received and paid income transfers, as well as overall household taxable assets and liabilities.

D. Descriptive Statistics

In terms of sample selection, we start out with 2,627 survey responses that we can merge with the data on cognitive abilities. We drop 141 observations because the response on income in the survey was more than EUR 100,000 higher than the registry-based income data: This gap might indicate that households reported their annual income in the survey rather than their average monthly income, which is what we had asked for. We asked for average monthly income because we also elicited changes in average monthly incomes in 2020 relative to 2019 both before and after the information treatment. None of our results change qualitatively or quantitatively if we do not drop these observations. Our final working sample contains 2,486 Finnish men for whom we observe survey responses, test-based measures of cognitive abilities, as well as administrative data from the tax authority. Out of those, 868 participants are in the control condition, 799 are in the target communication group, and 819 are in the instrument communication group.

Table 1 contains the descriptive statistics of the variables we use. We winsorize

all continuous variables at the 1 and 99 percent levels. On average, survey participants expected their average monthly income to fall by about EUR 90 in 2020 relative to 2019, they average monthly income was EUR 4,900, and their average age was 40. Forty five percent are married, 5.5% unemployed at the time of the survey, and about two thirds have kids. Most of the respondents live in urban areas. About 46% has a college degree and almost the whole sample declares being in charge of financial decisions for their households. In terms of financial literacy, 65% answer a compounding question correctly. About two thirds have a rainy day fund and less than one third (28%) had heard about the information we provided in the experiment beforehand.

Table A.1 in the online appendix provides the same descriptive statistics separately across treatment groups and shows that the survey treatment condition assignment was indeed orthogonal to all demographic observables.

III The Effects of Target vs. Instrument Communication

In this section, we describe the effects of target and instrument communication about central-bank policies on subjects' qualitative and quantitative economic expectations. The subsequent section focuses on understanding which demographics react more to each form of communication based on heterogeneity in terms of cognitive skills and other characteristics.

A. Qualitative Beliefs about Policy Effectiveness

As a first step, we consider agents' qualitative expectations to provide motivational evidence that is not affected by dimensions such as numeracy or the ability to think about probabilities (D'Acunto et al., 2020).

Both information treatments relate to the same policy interventions, i.e. those implemented by the ECB to overcome the negative economic shock due to the COVID-19 pandemic. This application is relevant in that it allows us to assess the effectiveness of communication at a time in which communication by central banks is an important policy tool. At the same time, none of our results are due to peculiarities of the COVID-19 crisis: because both forms of communications refer to the same policy interventions at the same

point in time, comparing the effects across the two information treatments washes away any component of agents' reaction due to specific features of the COVID-19 crisis.

Figure 1 in the introduction shows our univariate results for qualitative expectations. We overlay two histograms, each of which reports the distribution of answers to whether respondents think that the policies proposed by the ECB to overcome the COVID-19 crisis will not benefit households at all (1), will benefits households a lot (7), and the levels in between. The black histogram refers to respondents who were randomly exposed to instrument communication and the red histogram to those exposed to the target communication. The shape of the target-communication histogram resembles that of the instrument-communication histogram, but is shifted to the right: Subjects exposed to target communication believe that ECB policies will benefit households systematically more than respondents exposed to instrument communication.[9] To assess the magnitude of this effect, we can consider the differences in the mean of each distribution.[10] The average response in the target group is 3.29, whereas it is only 2.82 for the instrument-communication group. The difference across these averages (0.47) corresponds to more than 30% of the standard deviation of the distribution of this answer in the full sample.

Above we argued that qualitative expectations are important to study because they are not affected by numeracy or subjects' understanding of probabilities. Consistently, in Figure A.1 of the Online Appendix we show that the patterns in Figure 1 hold quite similarly if we compare the post-treatment expectations of subjects above and below the median IQ in the population. Irrespective of the level of their cognitive abilities, subjects exposed to target communication react more (and similarly) in terms of their qualitative expectations regarding the benefits of ECB's policies for households. As we document below, target communication is instead more effective in managing the quantitative expectations of lower-IQ subjects than higher-IQ subjects.

[9]Note that we have only elicited qualitative expectations after administering the experimental conditions, which is why we focus on the average cross-sectional differences across subjects rather than on within-subjects expectations updating.

[10]Not, though, that the numerical scale from 1 to 7 is not continuous and attaches integer values to 7 ranks in a Likert scale.

B. Quantitative Beliefs about Household Income Change

We move on to exploit the within-subject nature of our design and estimate the within-subject change in quantitative income expectations after the experimental manipulation relative to before (e.g., see D'Acunto (2020a)). Specifically, we compare the within-subject change in income expectations for subjects in each of the target and instrument communication treatments to the within-subject change in income expectations for subjects in the control condition, in a standard difference-in-differences identification strategy. To this aim, we estimate the following linear specification:

$$(\mathbb{E}^i_{posterior} - \mathbb{E}^i_{prior})\Delta income = \alpha + \beta_j \times Treatment_j + B \times \mathbf{X} + \varepsilon_i,$$

where $(\mathbb{E}^i_{posterior} - \mathbb{E}^i_{prior})\Delta income$ is the within-individual quantitative income forecast revision from before to after the information treatment, $Treatment_j$ is a dummy for whether the subject is in the target- or instrument-communication treatment relative to the control group, $\mathbf{X}$ is a vector of demographic variables including age, square of age, marital status, log of income, employment status, urban-rural residence, a dummy for whether the participant lives in the capital city (Helsinki), a college dummy, a dummy for whether the participants is involved in their households' grocery shopping (see D'Acunto et al. (2020)), as well as direct measures of risk preferences, liquidity constraints, and financial literacy.

Table 2 reports the difference-in-differences estimates for the target-communication treatment (columns (1)-(2)) and the instrument-communication treatment (columns (3)-(4)). Odd columns report the univariate estimates, whereas even columns report the multivariate estimates that partial out the set of demographic characteristics we observe. We find that target communication increases average monthly gross income expectations by EUR 74 in the univariate estimate and EUR 82.7 in the multivariate estimate. The fact that the size of the estimated treatment effects increases in the multivariate analysis even though we control for important determinants of economic expectations should not come as a surprise: the treatment conditions are almost perfectly randomized and hence subjects' demographic characteristics barely correlate with them.

To assuage the size of this effect, we can note that it aligns with the size of recent fiscal policy measures to support household income in the Euro area. For instance, consider the "80-Euro tax bonus" introduced in Italy in 2014, which hands out checks of EUR 80

per household member—the same size of income-expectations increase we estimate in our setting following possibly costless central bank communication. The bonus measure costs about EUR 9.5 billion per year in Italy.[11] Another way to gauge the size of the effect is to compare the average forecast revision to the average prior estimate on expected changes in monthly income in 2020 relative to 2019. The multivariate estimate of EUR 82.7 corresponds to more than 88% of the average expected drop in monthly income (see Table 1): Through a costless change in communication style, the expected income losses during a crisis period are almost completely offset.

Columns (3)-(4) of Table 2 show that exposing subjects to instrument communication barely leads to any forecast revisions of household-income expectations relative to the control group. In terms of size, the multivariate estimate is EUR 38, i.e. more than 50% smaller than the estimated multivariate treatment effect of target communication. Moreover, we cannot reject the null that this estimated treatment effect equals zero at any plausible level of statistical significance.

The (non-)effect we estimate for instrument communication is also important because it shows that our results are not driven the mere fact that subjects read a piece of information and are then asked about it. This concern, which is sometimes raised as a limitation of information-treatment experiments in economics, is barely relevant here, because we are comparing two instances in which subjects were similarly asked to read a piece of information but to which they reacted differently. It is not the act of reading information by itself that makes agents react, but the *type* of information agents read is crucial to communication's effectiveness in managing households' beliefs.

C. Anchoring and Demand Effects: A Concern in Our Setting?

Information treatments like the one we propose can raise concerns about anchoring effects, that is, by providing subjects with a number in the information treatment, subjects might converge their numerical expectations to such number that acts as a numerical anchor. The scope for anchoring is minimal in our setting for at least three reasons. First, we not only study quantitative expectations, but also qualitative expectations, which by definition do not display anchoring effects (e.g., see D'Acunto et al. (2020)). Second, one of our treatments—the target-based communication treatment—includes no mentions of any

[11] Because the bonus is granted based on a nominal household-income threshold, the number of recipients changes across fiscal years.

numbers and is in fact the treatment that produces the largest effects on belief updates. Finally, when we consider quantitative income expectations we ask about households' income, whereas the instrument-based communication treatment refers to an aggregate policy amount of several billion Euros for the whole European continent. The scales of these numbers are completely off and hence anchoring has no scope.

Demand effects are a second issue that might arise in a within-subject experimental designs like ours. Demand effects consist of the possibility that subjects guess the hypotheses the experimenters want to test and align their behavior to such hypotheses to please the experimenters, even though they would have not have aligned their behavior in a setting in which they were not observed by experimenters. Demand effects are also unlikely to be relevant for us, because each subject only faces one treatment condition. To guess the experimenters' hypothesis, subjects should be aware of the recent economic-theory work by Angeletos and Sastry (2018) and the debate summarized by Angeletos (2020), which, despite the relevance of this work in academic and policy circles, seems largely implausible.

IV Heterogeneous Effects of Target Communication

Our results so far reveal that communication that focuses on policies' targets—in our application, reducing the pernicious effects of the negative economic shock caused by the COVID-19 pandemic—rather than instruments—in our application, the PEPP program—appear to be more effective in managing agents' qualitative and quantitative expectations.

The main motivation to use direct communication as a policy tool is the need of reaching out to demographic groups that traditional central bank communication would not target directly—non-expert households. Because of the high degree of technicality, non-expert households might find it too costly to gather, process, and understand traditional central-bank press releases or other forms of communication about central banks' policies, such as articles in specialized media. Advocates of new forms of communication by central banks motivate this proposal with the need of reaching out not only to experts but also to less sophisticated consumers. For instance, in the words of the former governor of the Bank of England, Mr. Carney: "When you look at what we put out (...) expert audiences read them, understand, digest, and respond to them. That's true, but that's not the way to communicate with the general public, and it's not

a sustainable form of communicating in a world that has had enough experts."[12]

In our context, thus, a natural question to ask is whether the differential effects of target and instrument communication are heterogeneous in the cross section: If target communication was especially effective in managing the expectations of less sophisticated agents, its adoption by central banks would be even more compelling, because sophisticated agents might be already reached by the existing technical communication. Otherwise, the question of which forms of communication can reach the least sophisticated consumers in the population would remain open.

A. Agents' Sophistication: Cognitive Abilities

To proxy for sophistication, we consider subjects' cognitive abilities, which we can uniquely observe in our data. Earlier research has documented that test-based cognitive-ability scores help explain individuals' understanding of, processing of, and acting on information about economic policies (D'Acunto et al. (2019a,b, 2020)). Recent theoretical work in macroeconomics has also modeled limited cognition as a relevant friction to the transmission and effectiveness of monetary policy (Farhi and Werning (2019), Gabaix (2020), Woodford (2018), Angeletos and Sastry (2018)).

As discussed in the data section, we observe a direct measure of cognitive abilities based on the entry tests during the compulsory military service for all our subjects. We split our sample based on the median level of cognitive abilities (IQ) in the population and we repeat our baseline estimation of the treatment effect of target communication on belief updates separately for subjects below the median and above the median by IQ.

This analysis is motivated by the raw-data distributions of the posterior beliefs about income changes for subjects exposed to different forms of communication for subjects above and below the median IQ in the population (see Figure A.2 in the Online Appendix), for which the differential effect of target communication over instrument communication on beliefs appears to be larger for low-IQ subjects than high-IQ subjects.

Table 3 reports the results for this test. Columns (1)-(2) refer to the subsample of subjects below the median IQ in the population. For this subsample, the size of the estimated treatment effect of target communication ranges from EUR 95 in the raw data to EUR 163.6 conditional on observables. In both cases we can reject the null of no

[12]See the transcript of the Wall Street Journal's *Central-Bank Chiefs' Discussion in Frankfurt*, November 2017.

treatment effect at standard levels of significance. Comparing these estimates with those in columns (1)-(2) of Table 2 (EUR 75 and 82.7, respectively) reveals that the size of the estimated treatment effect is between 27% and 98% larger in the subsample of men below median IQ, relative to the average subject in the sample. The treatment effect of target communication is thus substantially larger for the least sophisticated half of the population in terms of cognitive abilities.

Not only is the effect of target communication especially large for subjects with below median IQ, but in fact we fail to estimate statistically significant effects for subjects with above median IQ (columns (3)-(4)), even though the point estimates are not negligible (EUR 63.4 and 53.4, respectively).

These results support the possibility that target communication is especially effective in managing the expectations of the least sophisticated agents in the population, which might be exactly those groups central bankers aim to reach when using communication as a policy tool (Grinblatt et al. (2011)).

B. Extensive vs. Intensive Margin of Information Provision: Awareness of Central Banks' Policies

The results by cognitive abilities raise an additional question: Why do less sophisticated subjects respond more to target communication than instrument communication, even though both forms of communication refer to the same policy and hence to the same ultimate objective?

On the one hand, target communication is undeniably easier to understand for less sophisticated agents, because it does not require any knowledge or understanding of technical terms, economic mechanisms, or the mechanics of monetary policy. It does not even require any numeracy skills, which instead are needed to assess the scope of policy instruments when they are described by central banks.[13] Therefore, conditional on exposing all agents to some form of information, target communication might have a stronger effect on agents' expectations because its easier intelligibility provides more information to them (intensive margin of information). In an extreme case, if instrument

[13]Of course, easier intelligibility does not necessarily translate into stronger reaction. To obtain a reaction, agents need to trust that the central bank will be able to implement the policy instruments needed to reach the target, and such trust might vary systematically across agents with different levels of sophistication. For an empirical analysis of this point, see D'Acunto et al. (2020).

communication was completely unintelligible to some agents, providing these agents with instrument communication would have no effect on their beliefs at all because it would be equivalent to providing them with no information whatsoever.

A complementary channel for the different effects of target and instrument communication involves the extensive margin of information provision: Because of the simplicity of its content, target communication might be more likely to be covered by traditional media and social media. To the extent that less sophisticated agents attend more to these sources of information rather than to technical central-bank statements, which seems plausible, the likelihood that less sophisticated agents are exposed to any form of information would be higher under target communication than under instrument communication. By construction, information experiments like ours cannot test for this extensive margin directly unless they included some form of cost of acquiring information and assumed that attending to different sources of information in the field implied paying different (cognitive) costs on the part of agents that are meaningfully captured by the experimental cost scheme (e.g., see Fuster et al. (2018)).

At the same time, our setting does allow for an indirect test for whether the extensive margin of information might have a role above and beyond the effect of the intensive margin. Specifically, we can exploit the fact that we elicited subjects' awareness of the information we provided before they entered the experiment, which we elicited after the experimental treatments were administered. In this way, we can compare the reaction of agents who were already aware of the information, i.e. for whom the extensive margin of information has no scope, to the reaction of agents who were not aware of the information, i.e. for whom the treatment provided both an extensive and intensive margin of information.[14]

Table 4 reports the results for repeating our baseline analysis for the subset of subjects who reported that they were not aware of the policies, and hence for whom the treatment provided both an extensive and intensive margin of information.

For target communication, we find that the treatment effect on income expectations is large and significant for subjects who were unaware of the policy measure before the experiment (columns (1)-(2)). Comparing the size of the estimated coefficients with those

[14]Note that if an agent was exposed to the information but does not recall such exposure or did not understand the information at all, they would respond that they were not aware of the information before the experiment. This case fits our interpretation: As long as the agent is not aware that he/she was exposed to information, the treatment affects them at both the extensive and intensive margins.

for the full sample, which also includes subjects to whom the treatment provided no extensive margin of information (see columns (1)-(2) of Table 2), we find that the effect of target communication on expectations for the group exposed to both margins is about 37% higher than the effect for the full sample. Based on the arguments discussed above, we interpret this (indirect) test as suggestive that target communication is likely to have effects on both the extensive and intensive margins of information provision.

Turning to instrument communication, columns (3)-(4) of Table 4 also have interesting implications regarding the margins of information provision: even when we focus on the set of agents that was exposed to no information at all before the experiment, instrument communication has only a small effect on their beliefs—the point estimate of the effect is positive but declines once we absorb demographic characteristics, and we cannot reject the null that the information treatment had no effect on these subjects' expectations. Under the lens of the arguments discussed above, these results seem to suggest that instrument communication provides neither a substantial intensive margin nor a substantial extensive margin of information.

In the rest of Table 4, we further focus on the subsamples of subjects who were not aware of any information about the ECB policies before the experiment and who have lower sophistication as captured by belonging to the bottom half of the population by IQ. We consider this split because in conditional summary statistics we find that awareness of policies as well as attendance to different sources of information about economic policies before the experiment does not correlate significantly with IQ once we absorb other demographic characteristics in our representative sample (see the even columns of Table A.2 in the Online Appendix). For this reason and because Table 3 documents a stronger effect of target communication for subjects with lower IQ, we thus assess whether the effects of target communication are especially large for agents who were unaware of the ECB policies before the experiment *and* have lower levels of IQ. And, indeed, we find that the point estimate of the effect is more than 30% larger for this subset of subjects (column (6)) relative to all unaware subjects (column (2)) and about 70% larger than the effect on the average subject exposed to target communication (column (2) of Table 2). Instead, even when focusing on unaware and low-IQ subjects, instrument communication does not appear to be able to manage expectations enough to reject the null of no effect whatsoever statistically.

C. Effects Across the Distribution of Prior Beliefs About Household Income Change

The last heterogeneity dimension we consider is the sign and size of subjects' income-change beliefs prior to the experimental treatment, which one could interpret as subjects' pessimism or optimism about future household income when they entered the experiment. This dimension is important, because certain demographics tend to hold systematically more pessimistic expectations about their households' income than others, whether in good or in bad times (D'Acunto et al. (2020)).

Because managing consumers' expectations upward in times of crisis such as the COVID-19 crisis is an especially important objective of central banks and an important reason to consider communication as a policy tool, we investigate whether target communication is able to manage the expectations not just of less sophisticated subjects, but especially of the less sophisticated subjects with the most depressed priors about their future households' income change. In Table 5, we propose our heterogeneous analysis after splitting the subsample of subjects below the median IQ in the sample in two additional groups based on their priors regarding their own households' income change over the following twelve months.

We find that the treatment effect of target communication is almost three times as large in this subsample than for the average agent in the sample (see columns (1)-(2) of Table 5). For those above the median based on prior beliefs, we fail to document a statistically significant effect of target communication. Even though the estimated coefficients are negative and their size is not negligible, the lack of statistical significance and the difference in size of the coefficients in columns (2) and (4), i.e., EUR 229 and EUR -161 per month, reassures us against the possibility that this heterogeneity test is only capturing a mechanical mean reversion of expectations after the experimental treatment.

Ultimately, these results suggest that target communication, contrary to instrument communication, might be especially effective in managing the expectations of consumers whose beliefs about future household income are more depressed during periods of economic crisis.

V Conclusion

Our large-scale randomized control trial shows that monetary policy communication can help central banks manage ordinary households' expectations, and especially the expectations of the least sophisticated and unaware households, as long as such communication focuses on policy targets and aims rather than on the specific policy measures with which central banks want to reach such aims.

Our work paves the way for more research in several directions. First, studying in more detail which styles and rhetoric policy institutions, and not only central banks, can use to effectively manage the beliefs of different groups of economic agents is an important and vastly open area of research for scholars in economics, marketing, social psychology, and rhetoric, and could produce interdisciplinary work across these areas (e.g., see D'Acunto (2020b)). Moreover, understanding which types of media can have different effects on different agents would be important to both the theoretical and practical design of effective economic policies.

Understanding whether policy makers can use recent technological advances in FinTech applications to reach out to consumers and manage their expectations directly without relying on the intermediation of the media (D'Acunto and Rossi (ming)), which might pollute policy messages through the lens of specific political views (Barone et al. (2015)), is also an important open question for researchers and policy makers.

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Table 1: **Descriptive Statistics**

This table reports descriptive statistics of our survey sample. We define all variables and list the relevant data sources in Section II. We fielded the survey in June 2020.

	Nobs	Mean	Std	P25	P50	P75		
$E^i_{prior}\Delta$ income	2,473	-93.7	823.3	-150.0	0.0	0.0		
$E^i_{posterior}\Delta$ income	2,441	-186.2	779.9	-387.5	-25.0	125.0		
$(\mathbb{E}^i_{posterior} - \mathbb{E}^i_{prior})\Delta$ income	2.44	-92.6	802.5	-271.9	0.0	125.0		
Age	2,476	40.4	10.0	32	41	49		
Log Income	2,149	8.5	0.7	8.2	8.6	8.9		
	Nobs	0	1	2	3	4	5	6
Married	2,486	1,366	1,120					
Unemployed	2,486	2,338	138					
Has Kids	2,334	826	1,508					
Urban	2,471	279	2,192					
Lives in Helsinki	2,476	1,649	827					
College Degree	2,255	1,227	1,028					
Grocery Shopper	2,254	1,343	911					
Financial Decision Maker	2,436	50	2,386					
Fin. Literacy	2,381	810	1,571					
Risk Tolerance	2,436	1,409	1,027					
Has a Rainy-Day Fund	2,486	876	1,610					
Policy Awareness	2,486	1,801	685					
Benefit Households	2,462	431	513	517	579	308	82	32

Table 2: **Forecast Revision for Household Income After Policy Communication: Target vs. Instrument Communication**

This table reports the average treatment effects of providing subjects randomly with different forms of policy communication on the forecast revisions for subjects' household monthly income relative to a control group of subjects who did not receive any information about economic policies. Columns (1) and (2) report the results for target communication, which was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." Columns (3) and (4) report the results for instrument communication, which was a tweet by Bank of Finland Governor Olli Rehn that the "New Euro 750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank." We fielded the survey in June 2020.

	Target Communication		Instrument Communication	
	(1)	(2)	(3)	(4)
Treated with Communication	75.0∗	82.7∗	62.5	39.2
	(40.9)	(45.1)	(40.4)	(45.8)
Age		−3.9		−0.8
		(21.0)		(21.1)
Age^2		0.1		−0.0
		(0.3)		(0.3)
Married		−1.3		76.6
		(53.5)		(54.2)
Log Income		59.9		19.9
		(49.3)		(49.6)
Unemployed		134.2		151.2
		(110.6)		(90.0)
Has Kids		−19.4		−49.5
		(51.7)		(49.5)
Urban		18.2		71.6
		(51.7)		(49.7)
Lives in Helsinki		−89.0		−125.3 ∗ ∗
		(52.5)		(53.7)
College Degree		−77.9		−42.0
		(50.8)		(51.0)
Grocery Shopper		10.6		−0.7
		(55.5)		(55.6)
Financial Decision Maker		−515.4 ∗ ∗		−73.7
		(247.53)		(271.5)
Fin. Literacy		5.7		−90.5∗
		(52.5)		(53.3)
Risk Tolerance		1.0		1.3
		(50.0)		(48.1)
Has a Rainy-Day Fund		−30.4		44.8
		(50.1)		(50.5)
Constant	−137.2 ∗ ∗	−74.2	−137.2 ∗ ∗	−149.1
	(30.9)	(548.7)	(30.9)	(571.1)
R^2	1,633	1,166	1,660	1,191
Nobs	0.002	0.022	0.001	0.015

Table 3: **Forecast Revision for Annual Income: Target Communication by IQ**

This table reports the average treatment effects of providing subjects randomly with target policy communication on the forecast revisions for subjects' household monthly income relative to a control group of subjects who did not receive any information about economic policies. Columns (1) and (2) report the results the subsample of respondents with below-median IQ levels and columns (3) and (4) report the results the subsample of respondents with above-median IQ levels. We use a test-based measure of IQ from the Finnish Defence Forces. Target communication was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." We fielded the survey in June 2020.

	Target Communication		Target Communication	
	Below-Median IQ		Above-Median IQ	
	(1)	(2)	(3)	(4)
Treated with Communication	95.0*	163.6***	63.4	53.4
	(50.8)	(63.6)	(47.1)	(51.0)
Controls in Table 2	X	X	X	X
R^2	0.002	0.030	0.001	0.026
Nobs	1,156	792	1,330	974

Table 4: **Forecast Revision for Annual Income: Target vs Instrument Communication, by Policy Awareness**

This table reports the average treatment effects of different forms of policy communication on the forecast revisions of average monthly incomes relative to a control group that did not receive any relevant information in a survey experiment by policy awareness and IQ. Columns (1)–(2) and (5)–(6) report the results for target communication which was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." Columns (3)–(4) and (7)–(8) report the results for target communication which was a tweet by Bank of Finland Governor Olli Rehn that the "New Euro 750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank." We use a test-based measure of IQ from the Finnish Defence Forces. We measure awareness of the policy by a survey question of whether participants were aware of the content of the tweet. We fielded the survey in June 2020.

	Target Communication		Instrument Communication		Target Communication		Instrument Communication	
	Unaware of Policy				Unaware & Below-Median IQ			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated with Communication	102.7 ∗ ∗ (42.5)	112.2 ∗ ∗ (41.4)	47.0 (48.0)	24.9 (56.7)	97.9∗ (50.3)	147.8 ∗ ∗ (57.2)	41.8 (59.0)	46.6 (67.5)
Controls in Table 2		X		X		X		X
R^2	0.004	0.027	0.001	0.020	0.002	0.031	0.000	0.030
Nobs	1,426	1,005	1,275	896	1,092	746	1,044	721

Table 5: **Forecast Revision for Annual Income: Target Communication by Prior Income Expectations & IQ**

This table reports the average treatment effects of target communication on the forecast revisions of average monthly incomes relative to a control group that did not receive any relevant information in a survey experiment by prior income expectations IQ. The target communication which was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." We split the sample by the median prior income expectations and use a test-based measure of IQ from the Finnish Defence Forces. We fielded the survey in June 2020.

	Target Communication		Target Communication	
	Low Prior & Below-Median IQ		High Prior & Below-Median IQ	
	(1)	(2)	(3)	(4)
Treated with Communication	143.5**	232.1***	-129.0	-165.8
	(53.9)	(66.4)	(98.6)	(126.4)
Controls in Table 2	X	X	X	X
R^2	0.005	0.038	0.001	0.033
Nobs	1,102	756	907	636

Online Appendix:

Effective Policy Communication: Target versus Instrument

Francesco D'Acunto, Daniel Hoang, Maritta Paloviita, and Michael Weber

Not for Publication

I Survey Questions

We now report the survey questions we fielded translated to English. The survey starts with a short introductory statement.

Welcome to the Bank of Finland Survey on Consumer Expectations and Economic Prospects during the current corona crisis!

In the survey, we ask about your perceptions of the current economic situation, your personal outlook and how the current Corona virus crisis affects your overall view of the economy, if at all. The responses are used to better understand the concerns and needs of the Finnish population, support policy-making, and ensure efficient and effective policy responses.

No special knowledge is required, and there are no right or wrong answers to the survey. It is important for us that you state your own opinion, not others' opinions, so please do not consult with others or look for external sources of information. Any answer is correct as long as it truly reflects your opinion!

Question 1 *How large is the size of your household, i.e. the group of people who live together with you, including you?*

Dropdown menu 1 to 10 or more

If Q1 $>$ 1

Question 2 *How many children and teenagers under 18 years old are there in your household?*

Dropdown menu 1 to 10 or more

Question 3 *Have you set aside emergency or rainy day funds that would cover your expenses for 3 months in case of sickness, job loss, economic downturn, or other emergencies?*

- Yes
- No

If Q3 = No

Question 4 *If you were to lose your main source of income (e.g. job, government benefits), do you think you could cover your expenses for 3 months by borrowing money, using savings, selling assets, or borrowing from friends/family?*

- Yes
- No

Question 5 *Does your household have total savings and financial investments (excluding real estate investments, like your house or rental property) worth more than one month of combined household income?*

- Yes
- No

If Q5 = Yes

Question 6 *Please indicate your best guess as to what percentage of your savings and financial wealth you invest in the following categories (excluding real estate investments, like your house or rental property). Put "0" if you do not invest in a given category.*

- Cash and bank deposits ... percent
- Stocks and mutual funds ... percent
- Private pension plans and life insurance policies ... percent
- Cryptocurrencies such as Bitcoin ... percent
- Other ... percent

Question 7 *Approximately how much did your household make in total gross income per month in the last year (2019)? (Please include retirement income, entrepreneurial income, student allowance, unemployment benefits, rental income, child allowances, dividends, etc.)*

... EUR per month

Question 8 *Do you think your household's average total gross income per month will increase or decrease in 2020 relative to 2019?*

- Increase

- Decrease
- Unchanged

If Q8 = Increase

Question 9 *How much higher do you think your household's average total gross income per month will be in 2020 relative to 2019?*

... EUR higher per month

If Q8 = Increase

Question 10 *How much lower do you think your household's average total gross income per month will be in 2020 relative to 2019?*

... EUR lower per month

Question 11 *Do you currently have a paid job and/or run your own business?*

- Yes
- No

If Q11 = No

Question 12 *Are you actively looking for a job and/or to start your own business?*

- Yes
- No

INFORMATION TREATMENTS.

We have just a few more questions. But before you give us your responses, we would like to provide you with some information. We will subsequently ask you again about your expectations. We are interested to see if this information will change your expectations or not. There is no right or wrong reaction: Whether this information changes your expectations or not is solely determined by your opinions, and any reaction or non-reaction is right as long as it reflects what you truly believe. The European Central Bank that is responsible for monetary policy in the whole Eurozone including Finland and the Finnish Financial and Insurance Supervisory Authority have recently

implemented several policy measures.

Control Group:

Bank of Finland Governor Rehn tweeted on January 20^{th}:

The January engagement created the spirit of Winter War 80 years ago. Memories do not live, but they do.

Treatment Group Target Communication:

Bank of Finland Governor Rehn tweeted on March 20^{th}:

The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis.

Treatment Group Instrument Communication:

Bank of Finland Governor Rehn tweeted on March 18^{th}:

New EUR750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank.

Question 13 *Were you aware of the information*

[Slider from 1 to 7 with 1 Totally unaware and 7 Totally aware]

Question 14 *How much do you think Finnish households might benefit from the recent policy actions?*

[Slider from 1 to 7 with 1 will not benefit at all to 7 will benefit extremely]

Now we would like to ask you again about the rate of inflation/deflation.

Question 15 *What do you think is the percent chance that your household's monthly total gross income will change by the following amounts on average over the next twelve months compared to the last twelve months? Based on your answer to question 7, your average monthly gross income in 2019 was approximately XX Euros (Note to programmer: please report answer to question 7). For example, numbers like:*
Between 2 and 5 percent may indicate "almost no chance" 18 percent or so may mean "not much chance" Between 47 and 52 percent chance may be a "pretty even chance" 83 percent or so may mean a "very good chance" Between 95 and 98 percent chance may be "almost certain"
What do you think is the percent chance that, ***over the next 12 months your total average monthly household gross income*** *...*

- will fall by more than EUR 3.000
- will fall between EUR 2.500 and EUR 3.000
- will fall between EUR 2.000 and EUR 2.500
- will fall between EUR 1.500 and EUR 2.000
- will fall between EUR 1.000 and EUR 1.500
- will fall between EUR 500 and EUR 1.000
- will fall between EUR 250 and EUR 500
- will fall between EUR 0 and EUR 250
- will rise between EUR 0 and EUR 250
- will rise between EUR 250 and EUR 500
- will rise between EUR 500 and EUR 1.000
- will rise between EUR 1.000 and EUR 1.500
- will rise between EUR 1.500 and EUR 2.000
- will rise between EUR 2.000 and EUR 2.500
- will rise between EUR 2.500 and EUR 3.000
- will rise by more than EUR 3.000

Question 16 *Who typically does the grocery shopping in your household? (Please select one)*

- I do almost all of the grocery shopping for my household
- I share the grocery shopping rather equally with somebody else in my household

- I almost never do the grocery shopping for my household

Now, we would like to ask your opinions about the value of money over time.

Question 17 *Let's say you have EUR200 in a savings account. The account earns 10% interest per year. If you never withdraw money or interest payments, how much will you have in the account at the end of 2 years?*

... EUR

Question 18 *Which of the following best describes how financial decisions are made in your household?*

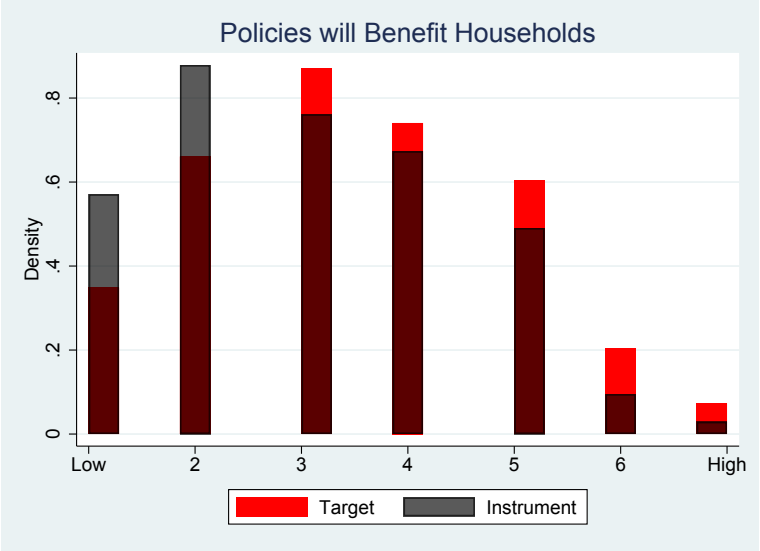
- Someone else in my household makes most financial decisions
- I share financial decisions equally with someone else in my household
- I make almost all financial decisions myself

Question 19 *On a scale from 1 to 7, how would you rate your willingness to take risks regarding financial matters?*

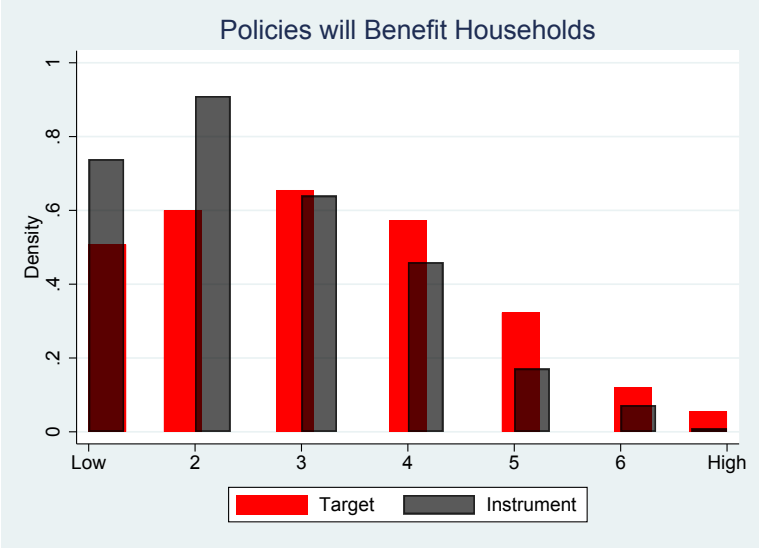
[Slider from 1 to 7 with 1 Not willing at all and 7 Very willing]

Figure A.1: **Policy Benefits Households: Target versus Instrument Communication by IQ**

Panel A: High IQ



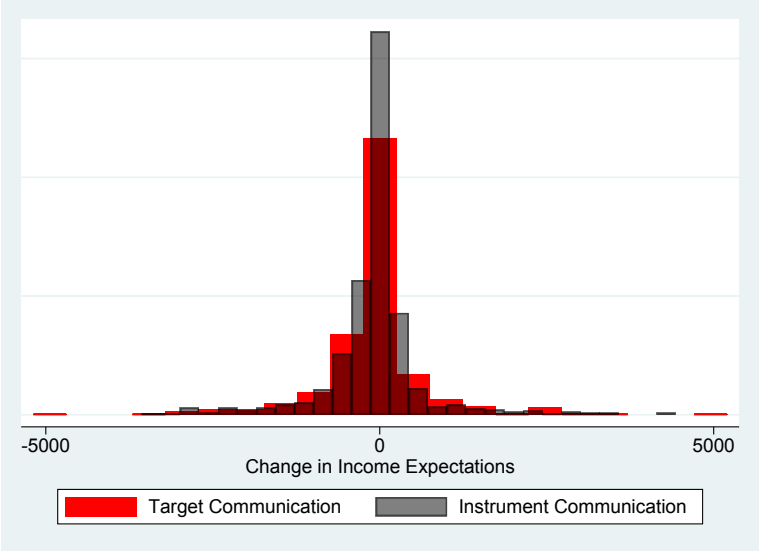
Panel B: Low IQ



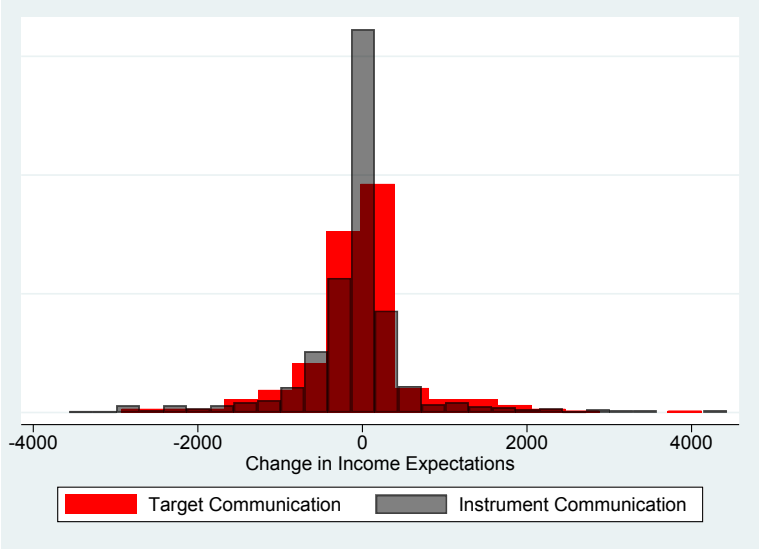
This figure plots the density of whether target and instrument communication benefit households in a survey experiment by IQ. Target communication was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." Instrument communication which was a tweet by Bank of Finland Governor Olli Rehn that the "New Euro 750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank." We use a test-based measure of IQ from the Finnish Defence Forces. We elicit whether policies benefit households on a seven-point Likert scale with 7 being policies benefit households extremely. We fielded the survey in June 2020.

Figure A.2: **Posterior Expected Income Change Across Treatment & by IQ**

Panel A: High IQ



Panel B: Low IQ



This figure plots the change in expected income changes by different forms of policy communication by IQ. Target communication was a tweet by Bank of Finland Governor Olli Rehn that the "The European Central Bank will do whatever is necessary to minimize the financial damage to citizens caused by the corona crisis." Instrument communication which was a tweet by Bank of Finland Governor Olli Rehn that the "New Euro 750 billion Pandemic Emergency Programme (PEPP) launched by the European Central Bank." We use a test-based measure of IQ from the Finnish Defence Forces. We fielded the survey in June 2020.

Table A.1: **Descriptive Statistics by Treatment Arm**

This table reports descriptive statistics of our survey sample by treatment arms and control group. We define all variables and list the relevant data sources in Section II. We fielded the survey in June 2020.

	Control			Target			Instrument		
	Nobs	Mean	Std	Nobs	Mean	Std	Nobs	Mean	Std
$E^i_{prior}\Delta$ income	865	-92.2	846	792	-123.9	838.1	816	-66.2	783.3
$E^i_{posterior}\Delta$ income	853	-232.1	817.5	781	-182.2	787	807	-141.5	728.9
$(\mathbb{E}^i_{posterior} - \mathbb{E}^i_{prior})\Delta$ income	853	-137.2	901.9	780.0	-62.2	748.2	807	-74.8	738.0
Age	864	40.1	10.2	795	40.6	9.7	817	40.5	9.9
Log Income	743	8.5	0.7	697	8.5	0.7	709	8.5	0.7
	Nobs	0 [%]	1 [%]	Nobs	0 [%]	1 [%]	Nobs	0 [%]	1 [%]
Married	868	56.2	43.8	799	55.6	44.4	819	53.0	47.0
Unemployed	864	93.8	6.3	795	95.1	4.9	817	94.5	5.5
Has Kids	811	35.9	64.1	754	35.5	64.5	769	34.7	75.3
Urban	862	10.6	89.4	793	12.2	87.8	816	11.2	88.9
Lives in Helsinki	864	66.7	33.3	795	65.4	34.6	817	67.7	32.3
College Degree	788	56.0	44.0	725	53.4	46.6	742	53.8	46.2
Grocery Shopper	788	57.5	42.5	713	59.8	40.3	753	61.6	38.4
Financial Decision Maker	850	2.6	97.4	779	1.5	98.5	807	2.0	98.0
Fin. Literacy	821	32.8	67.2	767	35.3	64.7	793	34.1	66.0
Risk Tolerance	850	58.8	41.2	779	56.5	43.5	807	58.12	41.9
Has a Rainy-Day Fund	868	37.1	62.9	799	33.4	66.6	819	35.0	532.0

Table A.2: **Policy Awareness and Information Sources by IQ**

This table reports the effects of IQ on the awareness of policy actions and the sources of information about economic and business conditions. We use a test-based measure of IQ from the Finnish Defence Forces. We measure awareness of the policy by a survey question of whether participants were aware of the content of the tweet by Bank of Finland Governor Olli Rehn. We elicit information sources in the survey via asking respondents to choose up to three information sources for economic and business conditions from a pre-specified list. We fielded the survey in June 2020.

	Awareness		Newspapers		News Programs on TV		Other TV Programs		Internet	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
IQ	0.070***	−0.0072	0.134***	0.067	−0.038**	−0.034	−0.059***	−0.038*	0.028*	0.032
	(0.018)	(0.0153)	(0.019)	(0.025)	(0.019)	(0.024)	(0.015)	(0.020)	(0.016)	(0.022)
Demographics		X		X		X		X		X
R^2	0.006	0.045	0.020	0.045	0.002	0.108	0.007	0.052	0.001	0.045
Nobs	2,486	1,758	2,462	1,758	2,462	1,758	2,462	1,758	2,462	1,758