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Does Quantitative Easing Affect People's Personal Financial Situation and Economic Inequality? The View of the German Population

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Does Quantitative Easing Affect People's Personal Financial Situation and Economic Inequality?

The View of the German Population

Abstract

Using representative survey data collected in 2018, I study how laypersons in Germany perceive the effects of quantitative easing (QE) on their personal financial situation and on national economic inequality. Almost 40% think that their economic situation is unaffected by QE, whereas 20% and 6% believe that QE has made them worse off or better off, respectively. Regarding economic inequality, about one-third of the population is of the opinion that QE contributes to inequality, only 10% think it does not, and 13% cannot perceive an impact. These groups with the different views are characterised using multivariate ordered logit models. First, respondents who feel that their personal economic situation has deteriorated as a result of QE tend to be savers, those with better objective knowledge about monetary policy affairs, and older people, whereas those who feel their situation has improved have more trust in the ECB and support conservative (CDU/CSU) parties. Second, the view that QE increases economic inequality in Germany is favoured by Left Party supporters, East Germans, and those with a relatively high level of monetary policy knowledge, whereas those who have more trust in the ECB have the opposite view. Third, persons with a high level of monetary policy knowledge, more formal education, and clear political preferences are more likely to answer the questions on the effects of QE.

Keywords: Economic inequality, income distribution, quantitative easing, QE, monetary policy, ECB, population survey, Germany

JEL codes: E58, E71, D31, Z1

1. Introduction

The issue of economic inequality has become a hot topic in mainstream academic literature. A major contributor to this discussion is Piketty (2014), who claims that, historically, economic inequality is the norm rather than the exception and that after a massive reduction in economic inequality following World War II, it is rising again. He also puts forward several mechanisms explaining why a market economy necessarily generates economic inequality, for example, because the return on capital is larger than the national income growth rate. However, other researchers (Acemoglu and Robinson 2014; Goés 2016) do not agree with this hypothesis and related empirical research shows no positive relationship between economic freedom and market inequality (Sturm and de Haan 2015). Bernanke (2015) claims that long-term economic factors, such as globalisation or technological progress, play a crucial role in the rise in inequality, whereas economic policy does not have much influence. In contrast, Atkinson (2015) argues that the increase in inequality is due to a roll-back of the welfare state in the 1980s and sees a lot of potential for economic policy as a way of achieving a more equal economic distribution.

Monetary policy, however, is rarely considered a major determinant of economic inequality. For instance, in line with the dominant view of money's long-term neutrality Bernanke (2015) states that 'the effects of monetary policy on inequality are almost certainly modest and transient'. However, this view has recently been challenged along several dimensions, as signalled by an unprecedented increase in mainstream academic research analysing the relationship between monetary policy and economic inequality. Summarising the extant literature, Colciago et al. (2018) mention three general propagation mechanisms and a number of specific transmission channels for how monetary policy could affect the relative economic position of individuals. The three general mechanisms are (i) an income effect due to changes in interest rates affecting borrowers and savers in opposite directions, (ii) a wealth effect resulting from changes in financial market prices, and (iii) a substitution effect arising from an alteration of the relative price between current and future consumption.

Paralleling the academic debate is a public debate, which is also characterised by contrasting viewpoints. For instance, an article in the *Financial Times* (Marshall 2015) argues that monetary policy exacerbates inequality; Bryant (2019) asks whether quantitative easing (QE) contributed to income inequality. Focussing on the European situation, Aizawa and Bradlow (2016) demand that ECB President Draghi acknowledge QE's (partial) responsibility for greater European inequality. Similar positions can be found in the German media.

In fact, however, we know almost nothing about how laypersons view the effects of monetary policy on their own income situation or on national income inequality. Filling this gap with a focus on monetary policy in the form of QE is the focus of the present paper. Using representative survey data collected in 2018, I investigate how people in Germany perceive the effects of QE on their personal financial situation and on economic inequality. This study thereby contributes to the growing literature on how laypersons' perceive economic policies (see, e.g., Blinder and Krueger 2004), especially with respect to monetary policy (see, e.g., van der Cruysen et al. 2015; Hayo and Neumeier 2020a). It provides central banks, specifically the ECB, with unique knowledge about how a core economic policy is viewed by the population and whether there is potential for increasing the public's support of it. Finally, discovering how individual economic decision makers assess the situation may provide valuable input in the controversy among experts regarding the actual effects of QE.

I find that almost 40% of Germans think that their economic situation is unaffected by QE, whereas 20% and 6% believe that QE has made them worse off or better off, respectively. In terms of economic inequality, about one-third of the population is of the opinion that QE contributes to inequality, only 10% think it does not, and 13% cannot perceive an impact. The respective views are characterised

using multivariate ordered logit models. First, respondents who feel that their personal economic situation has deteriorated as a result of QE tend to be savers, those with better objective knowledge about monetary policy affairs, and older people, whereas those who feel their situation has improved have more trust in the ECB and support conservative (CDU/CSU) parties. Second, the view that QE increases economic inequality in Germany is favoured by Left Party supporters, East Germans, and those with a relatively high level of monetary policy knowledge, whereas those who have more trust in the ECB have the opposite view. Third, persons with a high level of monetary policy knowledge, more formal education, and clear preferences for political parties are more likely to answer the questions on the effects of QE.

The remainder of the paper is structured as follows. Section 2 discusses academic research on the relationship between monetary policy and inequality and shows how economic inequality developed in Germany. In Section 3, the survey is described and analysed descriptively. Multivariate ordered logit models are used in Section 4 to study the characteristics of respondents who associate themselves with specific positions regarding the effects of QE on their income situation and economic inequality more generally. Section 5 investigates those respondents who felt unable to answer the questions on the effects of QE. Section 6 concludes.

2. Literature and Background

In light of Colciago et al.'s (2018) up-to-date survey of the literature on the effects of monetary policy on inequality, I will highlight only some very recent contributions to this field. Focussing on a monetary dynamic general equilibrium model with endogenous credit market participation, Ait Lahcen and Gomis-Porqueras (2020) discover that limited access to basic financial services can lead to consumption inequality. By providing liquidity, monetary policy creates a pecuniary externality, which can result in an inefficiently high consumption level by those agents that have access to this liquidity. Cravino et al. (2018) show that the prices of the goods consumed by high-income households are less volatile than those of the goods consumed by middle-income households. Inasmuch as monetary policy affects the relative prices of the goods consumed at different points on the income distribution, such policy can have distributional consequences. In their analysis of the distributional effects of monetary policy, Bunn et al. (2018) employ UK household panel data. They conclude that the effect of monetary policy on income and wealth inequality has been small. Albert and Gómez-Fernández (2018) combine micro and macro data on the US and find that expansionary monetary policy shocks increase the wealth of both the richest and the poorest households: the relatively rich profit from soaring stock prices; the relatively poor experience an improvement in their debt position. The middle class tends to benefit the least from these sort of shocks. Combining macro and micro data in a sample of euro area countries, De Luigi et al. (2019) study the influence of the ECB's unconventional monetary policy on the wealth distribution of households. When using wealth inequality indicators, which are sensitive to changes at the tails of the wealth distribution, they report an inequality-increasing effect for the majority of the countries. However, only very small effects are found when using Gini coefficients. In their study, an important factor influencing the inequality impact of monetary policy is that about one-third of European households do not hold financial or housing wealth and, thus, are not directly affected by the asset price channel.

Using a long time series on France, Berisha et al. (2019) analyse factors influencing within-group and between-group income inequalities. With regard to capital income, inflation initially leads to higher inequality but decreases it in the long term. In terms of labour income, they find that higher inflation leads to lower inequality. Employing data from the Japan Household Panel Survey, Israel and Latsos (2019) study the effect of conventional and unconventional monetary policy on income inequality in Japan. They discover that expansionary monetary policy in Japan reduced the gender pay gap, but

increased the education pay gap; it has had no significant impact on the age pay gap. At a theoretical level, Ferrara and Tirelli (2019) investigate disinflation and inequality in a two-agent New Keynesian model, finding two main transition channels. First, lower inflation softens the cash in advance constraint on firms' working capital, which raises labour demand and lowers inequality. Second, disinflation raises dividends, which increases inequality. Mumtaz and Theophilopoulou (2019) employ monthly household-level data from the UK to construct measures of wealth inequality. Analysing the dynamic relationship between monetary policy and wealth inequality suggests that expansionary monetary policy shocks are transmitted through changes in net property and financial wealth and, thereby, lead to higher wealth inequality and contribute to its fluctuations. Evginides and Fasianos (2020), also using UK household data, conclude that unconventional monetary policy shocks have long-lasting effects on wealth inequality. Finally, Ma (2020) constructs a heterogeneous-agent New Keynesian economy with indivisible labour and shows that monetary policy shocks can have distributional consequences due to substantial heterogeneity in labour supply elasticity across households. Using US state-level panel data, he finds empirical evidence supporting his theoretical finding.

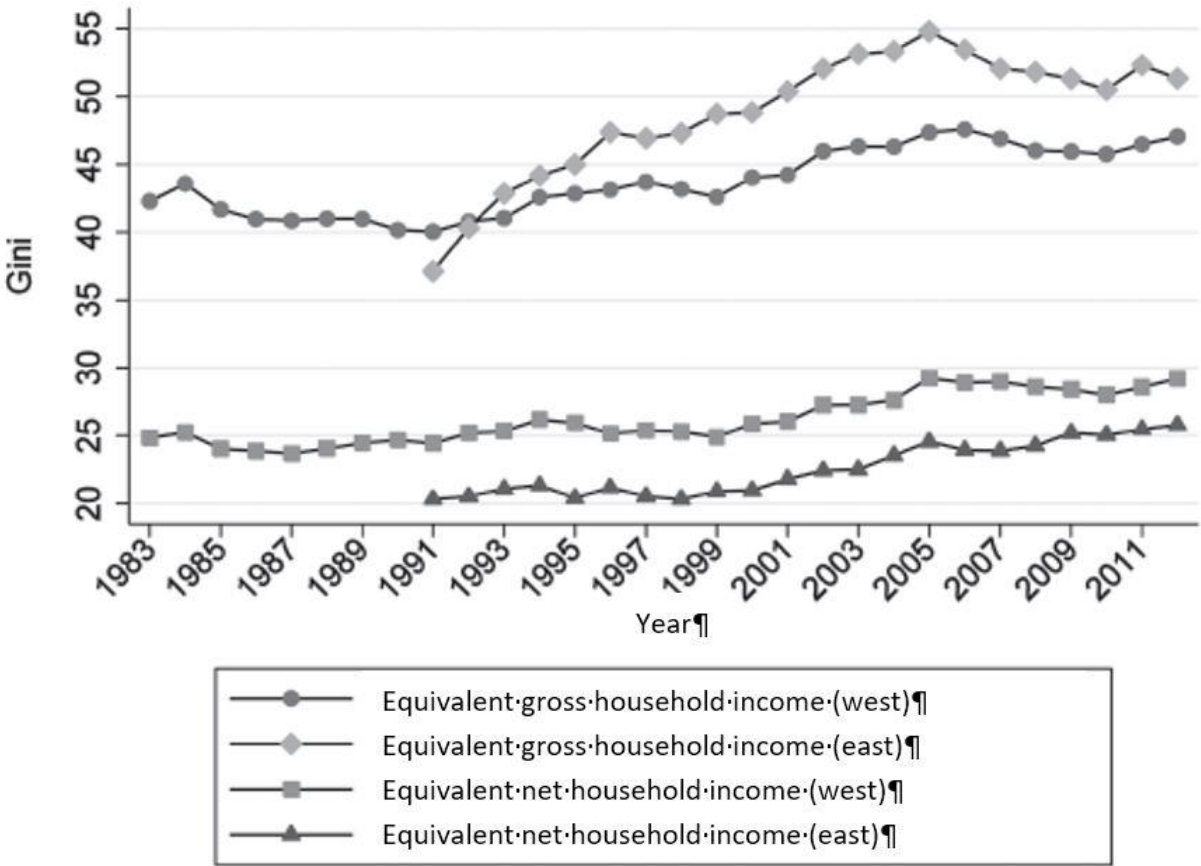
The distributional aspects of monetary policy are also widely discussed in the popular German press (German titles translated into English by the author). One of the main newspapers, the *Frankfurter Allgemeine Zeitung* (2016) carried the headline: 'Monetary policy: Bundesbank downplays distributional effects'. A headline found in another important newspaper, the *Süddeutsche Zeitung* (2016), read: 'Monetary policy: Cheap money increases inequality'. Emphasising the ECB's contribution to inequality, the *Frankfurter Rundschau* (2014) called the ECB the 'bank of the rich'. In contrast, *Die Welt* (2016) published an article entitled 'The fairy tale of evil cheap money', in which the idea that ECB monetary policy fosters inequality was criticised. In a column in the weekly newspaper *Die Zeit*, Fratzscher (2018) took an even stronger position in that direction by writing that ECB monetary policy has contributed to a reduction in economic inequality. In the economic and business newspaper *Handelsblatt*, a featured guest comment by Guillaume Duval (2019) argued that the ECB's unconventional monetary policy, even if it is necessary due to the German focus on fiscal stability, mainly hits the poor and the middle class.

Nonetheless, we still know very little about how the population perceives these effects. I am aware of only one study that considers households attitudes on these issues. Bunn et al. (2017) briefly analyse UK households' perceptions from a survey conducted by the Bank of England in April 2017. Older households appear to be the main group that feels that lower interest rates have made them worse off. As a reason for why their income situation was affected, respondents primarily mention lower interest payments (about 75%) or lower receipts (about 90%). Changes in pensions and house prices are noted by about 30% of the UK population.

For some background on the debate in Germany, a quick look at its income distribution will be helpful. Based on the socio-economic panel (SOEP), Corneo (2015) sets out the development of gross and net equivalent household income for East and West Germany over the period 1983–2012 and this is illustrated in Figure 1. Several conclusions can be drawn. First, there is a roughly 40% lower inequality in net incomes compared to gross incomes. Hence, income redistribution has strong effects in Germany. Second, there are notable regional differences in income inequality, which, however, switch position when moving from gross income inequality, which is higher in East Germany, to net income inequality, which is higher in West Germany. Third, for Germany as a whole, gross income inequality rose from the early 1990s until the mid-2000s, whereas net income inequality only visibly increased over the period 2000 to 2005. However, note that both gross and net inequality in East Germany continued to rise.

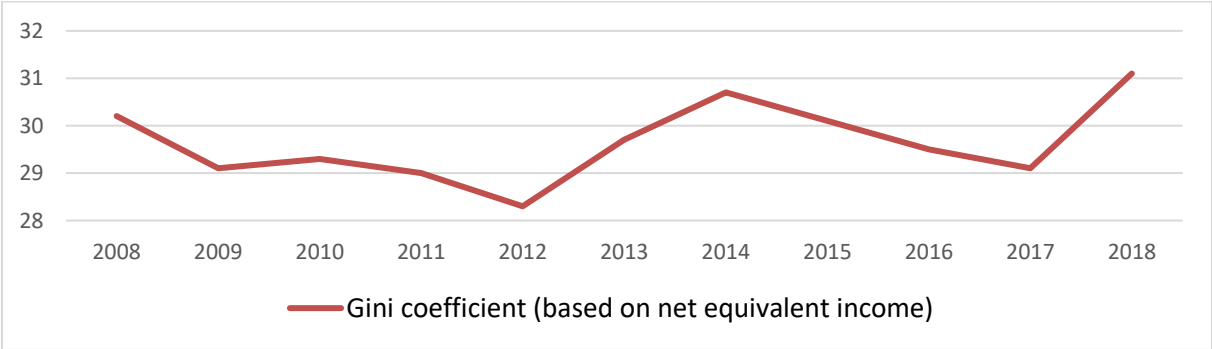
Biewen and Juhasz (2012), without explicitly taking monetary policy into account, put forward three explanations for the observed increase in German net income inequality: a rise in unemployment, greater dispersion of market incomes, and a reduction in income tax. Biewen et al. (2019) claim that income inequality did not increase any further after 2005 and argue that the reduction in unemployment and a lower dispersion of annual market incomes contributed to breaking the trend.

Figure 1: Gini coefficient for equivalent household income in East and West Germany



The Institute of Economic and Social Research (Wirtschafts- und Sozialwissenschaftliches Institut 2019), which studied SOEP data up through 2016, reached a different conclusion. It argues that income inequality continued rising even after 2005. None of these studies take monetary policy into consideration. Figure 2 shows the Gini coefficient during and after the financial and economic crisis period.

Figure 2: Gini coefficient (based on net equivalent income) in Germany from 2008 to 2018



Source: Destatis (2019).

There appears to be a downward trend in net income inequality until 2012 and then a see-saw movement. Assuming that the value of the (still preliminary) last data point is correct, then there was a notable hike in inequality from 2017 to 2018, that is, right before the population survey used in this paper was conducted.

3. Data and Descriptive Statistics

I measure Germans' appraisal of the distributional consequences of the ECB's unconventional monetary policy with unique and novel survey data. More information about the survey can be found in the documentation paper (Hayo et al. 2018). The survey questions were part of an omnibus survey administered between 6 February and 2 March 2018 by Gesellschaft für Konsumforschung (GfK). GfK is the largest private survey research company in Germany. The sample consists of 2,015 representatively selected persons from the German population aged 14 or above. Methodologically, the survey is based on quota sampling. The survey questions were asked in face-to-face interviews using pen-pads, which, in light of the topic's complexity, is the preferred choice. Pen-pads make it possible for interviewees to enter sensitive information, for example, income or political preferences, without the interviewer's knowledge, leading to more reliable answers. The questions were pre-tested and GfK's survey quality control encompasses contact checks, address comparisons, sampling tests, and qualitative checks of the final interviews.

Taking into account the difficulty of the topic, we introduce it at the beginning of the relevant part of the questionnaire (Hayo et al. 2018 contains the original German questions). Pre-testing indicated that providing context information is important for eliciting meaningful answers.

Introduction: During and after the financial crisis, the European Central Bank (ECB) markedly changed its monetary policy. For instance, the interest rate that commercial banks pay for borrowing money from the ECB has been lowered substantially. This interest rate fell from 4% in June 2007 before the financial crisis to 0% in March 2016, which is also the current value. Moreover, since March 2015, the ECB purchases a substantial number of government bonds as part of its 'unconventional' monetary policy measures and thus increases the available liquidity in the economy.

Still, such an introduction can provide only a partial picture. For instance, the phrase 'and thus increases the available liquidity in the economy' covers only one aspect of QE. However, in public opinion surveys, it is important to keep questions and context as simple as possible; otherwise, laypersons become overtaxed. Put differently, there is always a trade-off between scientific and everyday language. Note that respondents have the chance to answer 'don't know'. For complex topics, providing this option is crucial to avoid biases due to 'non-attitudes' (Zaller 1992).

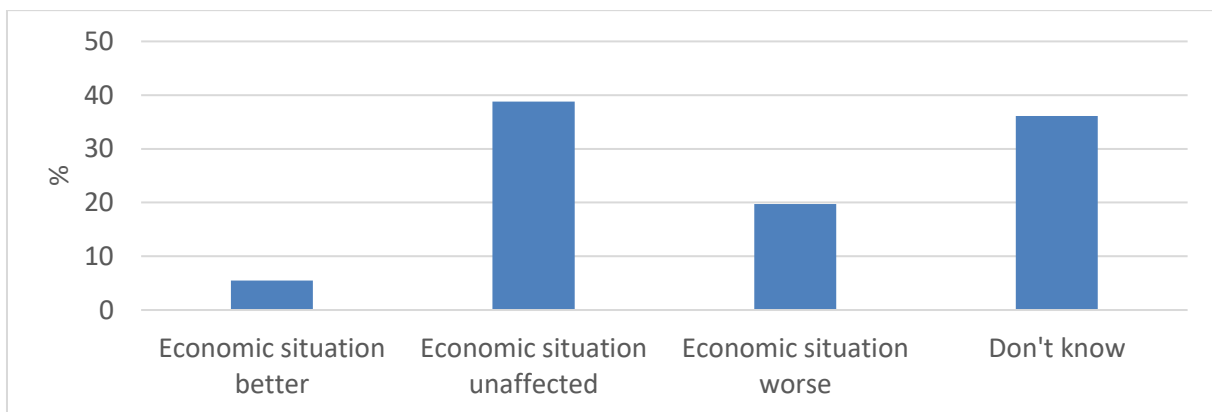
To arrive at a better understanding of how laypersons perceive the impact of monetary policy on inequality, I asked two questions. The first question centres on the issue of how people assess the impact of QE on their personal economic situation. It asks them to compare the adoption of QE with a (counterfactual) situation of no monetary policy change. Emphasising the importance of personal circumstances for individual attitudes and decisions is often called an 'egotropic' approach.

Q1) After implementation of these monetary policy measures, has your economic situation become better or worse compared to when the ECB conducted its normal (that is, pre-crisis) monetary policy? In particular, when the ECB was charging 4% interest and had not implemented ‘unconventional’ monetary policy measures.

- a) As a result of the ECB’s measures, my economic situation is better compared to under pre-crisis monetary policy.
- b) The ECB’s monetary policy measures have no influence on my economic situation.
- c) As a result of the ECB’s measures, my economic situation is worse compared to under pre-crisis monetary policy.
- d) Don’t know.

Figure 3 shows the answer frequencies for Q1. The largest share of respondents, almost 40%, think that their economic situation is unaffected by QE. Almost 20% believe that QE has made them worse off, whereas less than 6% have the opposite impression. More than one-third of the population (36%) is unsure about the impact of QE on their economic situation.

Figure 3: Answer frequencies to Q1: Has QE made the personal economic situation better or worse?



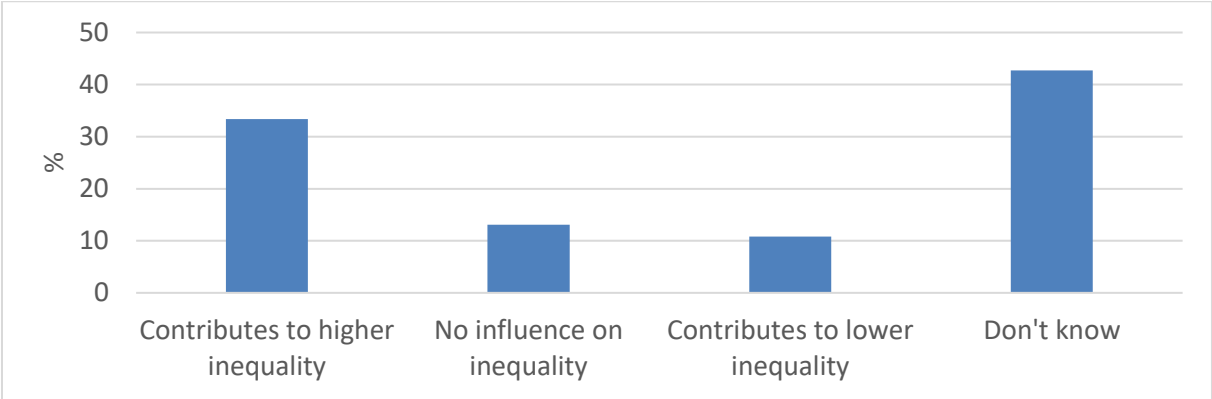
The second question approaches the issues from a ‘sociotropic’ perspective, that is, it enquires into the individual’s assessment of the situation for society at large. Respondents were requested to provide their assessment of whether QE contributed to income inequality in Germany. Compared to Q1, answering this question may be even more demanding, as not even professional observers agree on the issue (see the discussion above).

Q2) Do you have the impression that the ECB’s monetary policy during and after the financial crisis has affected the income and wealth distribution in Germany and, if yes, how?

- a) It contributes to increasing economic inequality.
- b) It has no influence on economic inequality.
- c) It contributes to reducing economic inequality.
- d) Don’t know.

Figure 4 shows the results for Q2. One in three respondents is of the opinion that QE contributed to inequality. Roughly 10% think that QE helped lower inequality and 13% cannot perceive an impact. The largest share of respondents (43%) selected ‘don’t know’, perhaps not surprising, considering the complexity of the question.

Figure 4: Answer frequencies to Q2: Has QE contributed to general economic inequality?



4. Analysing Attitudes Towards the Effects of QE

Using multivariate ordered logit regression models, this section studies which types of people have the opinions presented above. The first part of the analysis relies on two dependent variables. The egotropic dimension reflecting Q1 is defined as ‘QE Improves Personal Situation’ and coded as 1 ‘Economic situation is worse after QE’, 2 ‘No change in my economic situation’, and 3 ‘Economic situation is better compared to monetary policy not reacting to the crisis’. The sociotropic dimension captured by Q2 is used as the dependent variable ‘QE Increases Inequality’ and coded as 1 ‘Contributes to higher economic inequality’, 2 ‘No influence on economic inequality’, and 3 ‘Contributes to lower economic inequality’.

Since the analysis is primarily exploratory, I start with a very general model containing a variety of potentially relevant factors and then reduce the model size using a consistent general-to-specific modelling approach (Hendry 1993) so as to improve estimation efficiency. Given the sample size, statistical inference takes place at a 5% nominal significance level, which strikes a compromise between Type I and Type II errors (Leamer 1978). Up to 54 indicators spanning six dimensions are employed, the influence of which is estimated jointly in a general model. Considering all possibly relevant variables takes into account both omitted variable bias and standard-error-decreasing complementarity (Hayo 2018). The indicators cover the following dimensions:

(i) *Economic Situation*: (1) Household net income per capita (alternatively net personal income);¹ (2) Lower-middle income quartile; (3) Upper-middle income quartile; (4) Upper income quartile; (5) Saver; (6) Borrower; (7) Satisfaction with his/her economic situation; (8) Own house; (9) Own flat.

(ii) *Monetary Policy Knowledge*: (10) Objective knowledge; (11) Subjective knowledge; (12) Inflation information treatment; Inflation information source: (13) Newspaper; (14) Radio/TV; (15) Friends, family, or colleagues; (16) Internet or social networks; (17) Other source; (18) Does not keep up-to-date with the inflation rate.

(iii) *Central Bank Trust*: (19) Trust in ECB.

¹ Since about 20% of the observations are missing for household and personal income, they are imputed using a regression approach and five rounds of imputations. All results are robust to using personal income rather than household per capita income (available on request).

(iv) *Political Preferences and Attitudes*: Vote intention for (20) Alternative for Germany (AfD); (21) Conservatives (CDU/CSU); (22) Greens; (23) Left Party; (24) Liberals (FDP); (25) Social-Democrats (SPD); (26) Public choice view of the political process.

(v) *Socio-Demographic Indicators*: (27) Female; (28) Age; Marriage status: (29) Single; (30) Partner; (31) Married; Formal education: (32) Certified apprenticeship; (33) Secondary school; (34) University-entrance diploma; (35) University degree; (36) Trade union member; Employment categories: (37) Blue collar; (38) White collar; (39) Public servant; (04) Self-employed; (41) Farmer; (42) Employed full time; (43) Employed part time; (44) Unemployed; (45) Nonworking; (46) Housewife; (47) Apprenticeship; (48) Community size; (49) East Germany; (50) No Internet access; (51) Number of children.

(vi) *Psychological Indicators*: (52) Risk propensity; Time preferences: (53) Future-oriented time preference; (54) Short-run impatience.

Model 1 in Table 1 provides estimates of the reduced model resulting from the testing-down process (restriction: $F(47, 2.2e+06) = 1.2$). Seven variables are significant predictors of how respondents assess the impact of QE on their personal economic situation. King and Roberts (2015) argue that sizable deviations between normal standard errors and robust standard errors are a sign of model misspecification. Model 2 of Table 1 shows that employing normal rather than robust standard errors makes no difference. Model 3 applies population weights to the observations and 'Inflation information source: Internet/social networks' and 'Community size' lose significance. Eliminating 47 variables made 77 additional observations available for estimating the reduced model. In Model 4, the increased sample size is used to check whether the model is robust to including these out-of-sample observations. The resulting coefficients are similar to the previous ones. Thus, five indicators are robustly significant across the different models and I will concentrate on those when interpreting the estimation results.

Table 1: Explaining Q1, the perceived effect of QE on the respondents' economic situation

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	SEs	Coef.	SEs	Coef.	SEs	Coef.	SEs
i) Economic Situation								
Saver	-0.46**	0.13	-0.46**	0.13	-0.54**	0.14	-0.41**	0.13
ii) Monetary Policy Knowledge								
Objective knowledge	-0.21**	0.05	-0.21**	0.05	-0.19**	0.06	-0.21**	0.05
Inflation information source: Internet/social networks	-0.53**	0.21	-0.53**	0.22	-0.39	0.23	-0.58**	0.20
iii) Central Bank Trust								
Trust in ECB	0.75**	0.06	0.75**	0.06	0.82**	0.07	0.78**	0.06
iv) Political Preferences and Attitudes								
Conservatives (CDU/CSU)	0.61**	0.14	0.61**	0.14	0.68**	0.15	0.59**	0.14
v) Socio-Demographic Indicators								
Age	-0.01**	0.003	-0.01**	0.004	-0.01**	0.004	-0.01**	0.003
Community size	0.06*	0.02	0.06*	0.02	0.03	0.02	0.06*	0.02
vi) Psychological Indicators								
Cut value 1	0.22	0.28	0.22	0.28	0.23	0.30	0.28	0.28
Cut value 2	3.82	0.31	3.82	0.31	3.93	0.33	3.92	0.31
No. of observations	1,261		1,261		1,261		1,338	
Test of joint significance	Chi ² (7)=227**		Chi ² (7)=253**		F(7,1254) = 28**		Chi ² (7)=244**	
Pseudo-R ²	0.11		0.11		n.a.		0.12	

Notes: Estimator: ordered logit. White (1980) robust standard errors are employed, except for Model 2, which uses normal standard errors, and Model 3, which uses population weights. * and ** indicate significance at a 5% and 1% level, respectively.

For estimation efficiency reasons, average marginal effects are based on Model 4 and set out in Table 2. A saver has a 8 (4) percentage point (pp) higher (lower) probability of selecting that her/his personal economic situation is worse (better). As discussed above, savers being made worse off by QE is in line with arguments put forward by economists and has been very much in the focus of German media reports. Respondents favouring the conservative parties (CDU/CSU) are 11 pp less likely to feel worse off. With a 6 pp greater likelihood, they claim to be better off than supporters of other parties or non-voters. This suggests that the perceived impact of QE on personal economic situation is related to a respondent's political stance. In particular, conservatives feel relatively better off. This is a somewhat astonishing result seeing that the ECB's QE programme has received a great deal of criticism from this side of the political spectrum (see, e.g., WirtschaftsWoche 2016). However, given that this is a *ceteris*

paribus result, one interpretation would be that after controlling for their potential losses as savers, politically conservative respondents perceive themselves to have benefitted from QE.

Table 2: Average marginal effects for the robustly significant variables from Model 4 of Table 1 (in percentage points)

Variables	Worse after QE	No change after QE	Better after QE
Saver	8	-4	-4
Objective knowledge	4	-2	-2
Trust in ECB	-14	7	6
Conservatives (CDU/CSU)	-11	6	5

Notes: The significance levels for the marginal effects are the same as the ones for the variables in Model 4 of Table 1.

To proxy the magnitude of a realistic change in the variables that are not dummies, I consider a one standard deviation change. A one standard deviation higher level of ‘Trust in ECB’ (roughly one unit) decreases (increases) the probability of feeling worse (better) off as a consequence of QE by 14 pp (6 pp). This finding supports the conjecture in Hayo and Neuenkirch’s (2014) study of central bank trust in Germany that people view a central bank’s policy more positively if they have a higher degree of trust in the bank. However, ‘Trust in ECB’ is a variable that might be endogenous with regard to the perceived impact of QE. To assess whether the significance of ‘Trust in ECB’ is driven by endogeneity, I re-estimate Model 4 using a two-stage least square regression. As instruments, I employ the variables identified by Hayo and Neuenkirch (2014) as relevant for explaining Germans’ ECB trust.² The first-stage regression yields a fairly large and significant joint F-test ($F(9,1322)=14^{**}$), which suggests the instruments are reasonably strong. Moreover, the Sargan test cannot reject orthogonality of the instruments ($\text{Chi}^2(8)=8.5$) and neither can Wooldridge’s (1995) robust score test for endogeneity ($\text{Chi}^2(1)=0.16$). After instrumenting ‘Trust in ECB’, the variable remains significantly positive at a 1% level of significance. Thus, the relationship between central bank trust and the respondents’ perception of the impact of QE on their economic situation is unlikely driven by endogeneity.

A one standard deviation increase in ‘Objective knowledge’ (roughly one unit) is associated with a 4 pp (2 pp) higher (lower) likelihood of choosing ‘worse off’ (‘better off’). Hence, the more sophisticated segment of the German population with regard to monetary policy views the impact of QE on personal financial situation rather negatively. However, while statistically very significant, the magnitude of this effect is relatively small, not least because the variance of that variable is not particularly high. Finally, a one standard deviation increase in ‘Age’ (roughly 18 years) increases (decreases) the probability of feeling worse (better) off as a consequence of QE by less than 4 pp (2 pp). Hence, the effect of age is relatively small, too.

Moving to the sociotropic perspective, I analyse the perceived impact of QE on economic inequality. Applying the testing-down restriction ($F(50,100225.9) = 1.0$) results in Model 5 of Table 3. As before, the robustness of the estimates is ascertained.

Table 3: Explaining Q2, the perception that QE reduces economic inequality

	Model 5	Model 6	Model 7	Model 8
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² Instruments are: ‘Objective knowledge’, ‘Subjective Knowledge’, Inflation information source: ‘Newspaper’, ‘Female’, ‘Number of children’, ‘Community size’, Formal education: ‘Certified apprenticeship’, ‘Secondary school’, ‘University-entrance diploma’, ‘University degree’, and ‘Age’. Due to its unavailability in the current survey, an indicator for ‘Institutional trust’ was not included as an instrument. I rely on a linear model, as instrumental variable regressions in the case of ordered logit models are extremely difficult. An OLS regression of Model 4 confirms that signs and significances remain unchanged.

Variables	Robust SEs		Normal SEs		Population weights		Larger sample	
	Coef.	SEs	Coef.	SEs	Coef.	SEs	Coef.	SEs
i) Economic Situation								
ii) Monetary Policy Knowledge								
Objective knowledge	-0.25**	0.05	-0.25**	0.05	-0.23**	0.05	-0.23**	0.05
iii) Central Bank Trust								
Trust in ECB	0.38**	0.06	0.38**	0.06	0.37**	0.07	0.36**	0.06
iv) Political Preferences and Attitudes								
Left Party (Die Linke)	-0.54*	0.23	-0.54*	0.23	-0.67*	0.25	-0.49*	0.22
v) Socio-Demographic Indicators								
East Germany	-0.31*	0.15	-0.31*	0.14	-0.31*	0.16	-0.32*	0.14
vi) Psychological Indicators								
Cut value 1	0.77	0.26	0.77	0.20	0.20	0.29	0.72	0.19
Cut value 2	2.09	0.28	2.09	0.21	1.56	0.30	2.00	0.21
No. of observations	1,148		1,148		1,148		1,239	
Test of joint significance	Chi ² (4)=77**		Chi ² (4)=87**		F(5,1143)=14**		Chi ² (4)=76**	
Pseudo-R ²	0.04		0.04		n.a.		0.04	

Notes: Estimator: ordered logit. White (1980) robust standard errors are employed except for Model 6, which uses normal standard errors, and Model 7, which uses population weights. * and ** indicate significance at a 5% and 1% level, respectively.

In interpreting the estimated relationships using average marginal effects in Table 4, I draw on the results from Model 8, which is based on 91 additional observations compared to the sample utilised in estimating the general model.

Table 4: Average marginal effects for the robustly significant variables from Model 8 of Table 3 (in percentage points)

Variables	Increases inequality	No effect on inequality	Reduces inequality
Objective knowledge	5	-2	-3
Trust in ECB	-8	3	5
Left Party (Die Linke)	11	-4	-7
East Germany	7	-3	-5

Notes: The significance levels for the marginal effects are the same as the ones for the variables in Model 7 of Table 3.

Three characteristics make it more likely that respondents choose the answer that QE increases economic inequality. Favouring the Left Party leads to an 11 pp (7 pp) higher (lower) probability of adopting that position, which is the largest effect in this regression. This perception of respondents is in line with the Left Party's stance on the ECB as an institution, which is that it acts in the interests of the richer part of society and financial markets. For East Germans, the corresponding values are 7 pp and 5 pp, respectively. This subjective perception of ECB monetary policy increasing inequality is

consistent with the development of income inequality shown in Figure 1. Although net income inequality has been stable in the western part of Germany after 2005, it continued rising in the east even after the financial crisis.

Increasing 'Objective knowledge' by one standard deviation yields a 5 pp (3 pp) higher (lower) likelihood of agreeing that QE facilitates higher economic inequality. In contrast, respondents characterised by a high degree of trust in the ECB have a greater likelihood of believing that QE reduces inequality. A one standard deviation increase in 'Trust in ECB' lowers (increases) the likelihood of selecting 'Increases inequality' ('Reduces inequality') by 8 pp (5 pp). As before, I employ instrumental variable estimation to investigate whether this result might be due to endogeneity (see Footnote 2). There is no evidence of weak instruments (first-stage regression joint F-test: $F(10,1225)=14^{**}$). Moreover, the Sargan test is insignificant ($\text{Chi}^2(9)=10$) and so is Wooldridge's (1995) robust score test for endogeneity ($\text{Chi}^2(1)=2.7$). 'Trust in ECB' remains significantly positive at a 1% level of significance in the instrumental variable model. Consistent with the findings on the personal economic situation, the relationship between central bank trust and the respondents' perception of the effects of QE on inequality does not appear to be due to endogeneity.

The direction of association of the two variables that are significant in both egotropic and sociotropic perspectives with the perception of the ECB's QE programmes is consistent. People with greater objective knowledge feel personally worse off and perceive greater social inequality, too, whereas those with higher trust in the ECB report the opposite. To some extent, the findings are in line with the results of a survey experiment reported by Cruces et al. (2013), namely, that relatively richer people tend to underestimate their position in the national income distribution and vice versa. Here, there is evidence of a constellation, where better-informed respondents but not financially better-off ones believe themselves to be worse off.

5. Who Is Unsure About the Impact of QE on Personal Income and Inequality?

As noted in Section 2, about 36% and 43% of respondents, respectively, could not answer questions about the impact of QE on their personal economic situation or on economic inequality. To learn more about this large group, I use logit regressions, with those answering 'don't know' coded as 1 and those providing an answer coded as 0.

Table 5 sets out the estimation results after the general-to-specific modelling process. Commencing the analysis with the 'don't know' answers to Q1, that is, regarding the effect of QE on personal economic situation, Model 9 provides average marginal effects for the reduced model (testing-down restriction: $F(40,444023)=1.1$), keeping the number of observations consistent with the general model. Model 10 re-estimates the reduced model with 170 additional observations that became available from restricting the number of variables. Studying 'don't know' answers to Q2 yields a similar outcome (testing-down restriction: $F(39,356409.5)=1.0$), with Model 12 employing 198 additional observations. Again, estimation results are robust.

Since most results are so similar across 'don't know' answers to Q1 and Q2, they are discussed together. Both objective as well as subjective knowledge are negatively related to 'don't know' answers. Increasing objective (subjective) knowledge by one standard deviation raises the likelihood of not answering by 10 (5) pp. The same hike in terms of ECB trust is associated with a much smaller negative response of only 3 pp. A similar magnitude, but with a different sign, is found when increasing people's public choice view of the political process by one standard deviation. Greater effects are generally observed for changes in dummy variables. However, note that these magnitudes cannot be directly compared, as shifting a dummy from 0 to 1 typically implies a more notable change than one standard deviation. Negative coefficients are found for most political parties, indicating that those

respondents who are able to make up their mind with regard to their political preferences are also more likely to come up with answers to the questions on the effects of QE. The probability of ‘don’t know’ answers decreases for CDU/CSU, AfD, Left Party, and Greens by about 11 pp, 11 pp, 16 pp, and 8 pp, respectively. Older people tend to answer the QE questions more frequently than younger ones, but the effect is very small. For each decade in age, the likelihood of answering increases by roughly 1 pp.

Table 5: Explaining ‘don’t know’ answers to Q1 and Q2: average marginal effects (in percentage points)

Variables	Model 9	Model 10	Model 11	Model 12
	Q1: Don’t know answer Marginal effect		Q2: Don’t know answer Marginal effect	
i) Economic Situation				
ii) Monetary Policy Knowledge				
Objective knowledge	-10**	-10**	-10**	-10**
Subjective knowledge	-4**	-4**	-4**	-4**
iii) Central Bank Trust				
Trust in ECB	-3*	-3*	-3*	-3**
iv) Political Preferences and Attitudes				
CDU/CSU	-11**	-11**	-11**	-11**
AfD	-12**	-11**	-11**	-11**
Left Party (Die Linke)	-16**	-16**	-16**	-17**
Greens	-7*	-8*	-7*	-8*
Public choice view of the political process	3**	2**	3**	2*
v) Socio-Demographic Indicators				
Age	-0.2*	-0.1*	-0.2**	-0.1*
Certified apprenticeship	-10*	-11**	-10**	-11**
Secondary school	-15**	-15**	-15**	-16**
University-entrance diploma	-19**	-20**	-20**	-21**
University degree	-22**	-25**	-23**	-26**
Community size		n.a.	1*	1*
vi) Psychological Indicators				
No. of observations	1,845	2,015	1,817	2,015
Test of joint significance	Chi ² (13) = 294**	Chi ² (13) = 281**	Chi ² (14) = 240**	Chi ² (14) = 284**
Pseudo-R ²	0.13	0.14	0.13	0.14

Notes: Estimator: logit. White (1980) robust standard errors are employed. * and ** indicate significance at a 5% and 1% level, respectively.

Finally, there is an approximately linear response in terms of formal level of education, with the likelihood of not answering Q1 or Q2 decreasing by about 11 pp (certified apprenticeship), 15 pp (secondary school), 20 pp (university-entrance diploma), and 25 pp (university degree). There is one additional factor involved in the 'don't know' answers to Q2, but the effect is tiny: a one standard deviation hike in community size increases the likelihood of answering 'don't know' by 1 pp. Overall, the interpretation of these results is straightforward: less sophisticated and politically engaged persons—as proxied by low monetary policy knowledge, little formal education, and unspecific political party preferences—tend not to be able to answer the QE questions. This confirms that the analysis in Section 4 is based on meaningful answers rather than non-attitudes.

6. Conclusion

There is widespread debate over the effects of QE on economic inequality, both within academia and in the general media. To date, there is no consensus on the issue. Using representative survey data collected in Germany in 2018, the present study investigates how *laypersons* perceive the effects of the ECB's unconventional monetary policy on their personal financial situation as well as with regard to economic inequality.

Descriptive analyses show that almost 40% of Germans do not think that their economic situation is affected by QE. In contrast, about 20% believe that QE has made them worse off and only 6% think that it has made them better off. As to whether QE has contributed to economic inequality in Germany, about one-third of the population is of the opinion that QE contributed to inequality, only 10% think the opposite, and 13% cannot perceive an impact.

The analysis then proceeds to employ multivariate ordered logit models to characterise the respective groups. A wide variety of potentially relevant dimensions are considered by means of 48 individual indicators: (i) Economic Situation, (ii) Monetary Policy Knowledge, (iii) Central Bank Trust, (iv) Political Preferences and Attitudes, (v) Socio-Demographic Indicators, and (vi) Psychological Indicators.

Those respondents who feel that their economic situation has deteriorated as a result of QE are, on average, savers, those with better objective knowledge about monetary policy, and older people. While the negative effect of QE on savers is frequently mentioned in the economics literature and media discussions, it is noteworthy that more monetary-policy-literate laypersons also perceive themselves worse off. The result on older people is consistent with findings reported by Bunn et al. (2017) for UK households. However, here, the magnitude is relatively small. Those Germans who believe that they are personally better off have relatively more trust in the ECB and are supporters of conservative (CDU/CSU) parties. When measuring the magnitude of the influence of non-dummy explanatory variables by a one standard deviation change, the effects are of medium size. However, when considering extreme constellations, the size of the effects can be quite large. For instance, a saver with 'perfect' monetary policy knowledge has a 30 pp higher probability of feeling worse off as a result of QE compared to a non-saver who has zero monetary policy knowledge, whereas a CDU/CSU supporter with maximum trust in the ECB has an 80 pp greater likelihood of feeling better off compared to a supporter of another political party with minimum trust in the ECB.

Left Party supporters and East Germans tend to believe that QE contributes to economic inequality in Germany. This perception coincides with rising economic inequality in East Germany, as measured by the Gini index. Thus, it is conceivable that people attribute this hike to QE. Again, respondents with higher objective monetary policy knowledge believe that QE contributes to economic inequality. As before, the magnitudes are of medium size when proxying the influence of non-dummy variables by one standard deviation. However, if we allow for the full range of variation, the size of these effects is notable. For instance, a Left Party supporter with 'perfect' monetary policy knowledge living in East

Germany has a roughly 45 pp higher likelihood of saying that QE contributes to economic inequality compared to a West German who does not vote for the Left Party and has no monetary policy knowledge. Quite the reverse perception is found for respondents characterised by a high degree of trust in the ECB, also consistent with regard to the findings on personal economic situation, with maximum trust decreasing the likelihood of stating that QE contributes to inequality by about 20 pp compared to minimal trust. Thus, the direction of association of ECB trust and monetary policy sophistication with the distributional consequences of the ECB's QE programmes is consistent across egotropic and sociotropic perspectives.

The last part of the analysis studies the substantial number of people—roughly 40%—who did not answer the questions relating QE to their personal economic situation or national inequality. I discover clear evidence that more sophisticated and politically engaged persons—described by a high level of monetary policy knowledge, more formal education, and clear political preferences—tend to be able to answer the QE questions. Not only is the statistical significance of the estimated effects high, but also their potential magnitude. For instance, a person with a university degree, 'perfect' objective knowledge, and a Left Party preference has a roughly 80 percentage point greater likelihood of answering the QE questions compared to a person who received only basic education, knows nothing about monetary policy, and has no clear party preference.

Thus, among the group of Germans who can form an opinion on the distributional aspects of European monetary policy, there is clear evidence in favour of the position that monetary policy contributes to economic inequality. Moreover, this position is particularly supported by the best-informed laypersons, which will make it hard for the ECB to change this perspective with education programmes. The central bank could try to increase people's trust in itself, but, as shown in Hayo and Neuenkirch (2014) for Germany and Hayo and Neumeier (2020b) for New Zealand, objective knowledge appears to be an important factor for central bank trust, too. Therefore, it is not obvious how the ECB could change the current perception of QE as contributing to economic inequality. On the other hand, the economic situation in Germany in 2018 was very different than that of the Mediterranean members of the euro area and it is unclear whether the findings reported here are representative for the euro area as a whole. Hence, it would be insightful to compare the perceptions of these populations with those of the Germans.

Finally, following Abadie (2020), it is interesting to mention some of the variables that were *not* significant in either the egotropic or sociotropic perspective on QE. First, there is no evidence that absolute or relative per capita income matters, so the perception of QE's impact appears to be independent of households' income level or position in the income distribution. Second, it does not seem to matter whether people are homeowners, that is, hold real assets, as only their net saving position is significant. Third, an information treatment in the form of a graph showing the ECB's performance with regard to inflation has no impact on respondents' evaluations. Fourth, potentially relevant variables, such as gender or job-related variables, are insignificant. Fifth, age appears to be irrelevant for people's assessment of QE's impact on national inequality. Sixth, none of the psychological factors—risk attitude or time preferences—survive the testing-down process. And, seventh, neither does the source of information about inflation. Thus, a number of variables that are deemed relevant by economists do not appear to be relevant in the eyes of the population.

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Appendix

Table A1: Variable definitions and descriptive statistics

Variable	Coding	Mean	Std. Dev.	Min	Max
<i>Dependent variables</i>					
<i>Q1: Perceived Effect of QE on the Respondents' Economic Situation</i>	Coded as 1 'Economic situation worse after QE', 2 'No change after QE', 3 'Economic situation better after QE'.	1.81	0.59	1	3
<i>Q1: Don't Know</i>	Dummy. Coded as 1 if respondent answered 'don't know' to Q1.	0.34	0.47	1	0
<i>Q2: Perception that QE Reduces Economic Inequality</i>	Coded as 1 'Increases economic inequality', 2 'No effect on economic inequality', 3 'Reduces economic inequality'.	1.63	0.78	1	3
<i>Q2: Don't Know</i>	Dummy. Coded as 1 if respondent answered 'don't know' to Q2.	0.34	0.47	1	0
<i>Explanatory variables</i>					
<i>(i) 'Economic Situation'</i>					
(1) Household net income per capita	Per capita household net income in euro per month. Based on an ordinal 11-point scale. 508 observations were added through 5 rounds of imputations using: Age, Female, Household size, Number of children, Head of household, Current occupation of head of household, Family status, Education of respondent, Education of head of household, Occupational situation of head of household, Occupational situation of respondent, Home ownership, Social class, Community size, Household income as estimated by interviewer. Descriptive statistics for imputation round 5 (similar for Personal net income in robustness check).	1265	600	62	4500
(2) Upper-middle-income quartile	Based on Household net income per capita (and Personal net income in robustness check).	0.12	0.32	0	1
(3) Lower-middle-income quartile	Based on Household net income per capita (and Personal net income in robustness check).	0.18	0.38	0	1
(4) Upper-income quartile	Based on Household net income per capita (and Personal net income in robustness check).	0.21	0.41	0	1

(5) Saver	Dummy.	0.64	0.48	0	1
(6) Borrower	Dummy.	0.20	0.40	0	1
(7) Satisfaction with economic situation	Likert scale from 'absolutely dissatisfied' (coded 1) to 'absolutely satisfied' (coded 5).	2.67	0.92	1	5
(8) Own house	Dummy.	0.44	0.50	0	1
(9) Own flat	Dummy	0.07	0.25	0	1
<i>(ii) 'Monetary Policy Knowledge'</i>					
(10) Subjective knowledge	Likert scale from 'very poor' (coded 1) to 'very good' (coded 5).	1.33	1.21	0	4
(11) Objective knowledge	Sum of correct answers on questions about the monetary policy objective of the ECB, the main refinancing rate, conduct of monetary policy, and responsibility for interest rate setting.	2.25	0.99	1	5
(12) Inflation information treatment	Dummy. A graph with the ECB inflation performance was shown to one-half of the respondents on a random basis.	0.50	0.50	0	1
(13) Newspaper	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.12	0.34	0	1
(14) Radio/TV	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.26	0.44	0	1
(15) Friends, family, or colleagues	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.08	0.27	0	1
(16) The Internet or social networks	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.06	0.23	0	1
(17) Other source	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.02	0.14	0	1
(18) Does not keep up-to-date with the inflation rate	Dummy. Coded as 1 if this is the respondent's main source of information for forming expectations about the future rate of inflation.	0.18	0.38	0	1

<i>(iii) Central Bank Trust</i>	Likert scale from 'no trust' (coded 1) to 'very much trust' (coded 5).	2.62	1.00	1	5
<i>(iv) Political Preferences and Attitudes:</i>					
(20) Alternative for Germany (AfD)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.11	0.31	0	1
(21) Conservatives (CDU/CSU)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.24	0.43	0	1
(22) Greens (Die Grünen)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.10	0.30	0	1
(23) Left Party (Die Linke)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.08	0.27	0	1
(24) Liberals (FDP)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.07	0.25	0	1
(25) Social-Democrats (SPD)	Dummy. Coded as 1 if the respondent would vote for this party if federal elections were held this Sunday.	0.17	0.37	0	1
(26) Public choice view of the political process	Public expenditures are spent according to the actual needs of the population vs. the mayor uses public money to increase his/her re-election chances. Coded from (-2) 'definitely public needs' to (2) 'definitely re-election chances'.	3.12	1.17	1	5
<i>(v) Socio-Demographic Indicators</i>					
(27) Female	Dummy. Coded as 1 if respondent is female.	0.53	0.50	0	1
(28) Age	Age in years.	50.6	18.3	14	94
(29) Single	Dummy. Coded as 1 if this is the respondent's marriage status.	0.23	0.42	0	1
(30) Partner	Dummy. Coded as 1 if this is the respondent's marriage status.	0.11	0.31	0	1

(31) Married	Dummy. Coded as 1 if this is the respondent's marriage status.	0.48	0.50	0	1
(32) Certified apprenticeship	Dummy. Coded as 1 if this is the respondent's formal education.	0.30	0.46	0	1
(33) Secondary school	Dummy. Coded as 1 if this is the respondent's formal education.	0.41	0.49	0	1
(34) University-entrance diploma	Dummy. Coded as 1 if this is the respondent's formal education.	0.13	0.33	0	1
(35) University degree	Dummy. Coded as 1 if this is the respondent's formal education.	0.10	0.30	0	1
(36) Trade union member	Dummy. Coded as 1 if respondent is a member of a trade union.	0.08	0.26	0	1
(37) Blue collar	Dummy. Coded as 1 if this is the respondent's employment category.	0.12	0.33	0	1
(38) White collar	Dummy. Coded as 1 if this is the respondent's employment category.	0.35	0.48	0	1
(39) Public servant	Dummy. Coded as 1 if this is the respondent's employment category.	0.02	0.13	0	1
(40) Self-employed	Dummy. Coded as 1 if this is the respondent's employment category.	0.06	0.24	0	1
(41) Farmer	Dummy. Coded as 1 if this is the respondent's employment category.	0.002	0.05	0	1
(42) Employed full time	Dummy. Coded as 1 if this is the respondent's employment category.	0.44	0.50	0	1
(43) Employed part time	Dummy. Coded as 1 if this is the respondent's employment category.	0.13	0.33	0	1
(44) Unemployed	Dummy. Coded as 1 if this is the respondent's employment category.	0.03	0.16	0	1
(45) Nonworking	Dummy. Coded as 1 if this is the respondent's employment category..	0.29	0.45	0	1
(46) Housewife	Dummy. Coded as 1 if this is the respondent's employment category.	0.04	0.19	0	0.04
(47) Apprenticeship	Dummy. Coded as 1 if this is the respondent's employment category.	0.02	0.15	0	0.02
(48) Community size	Number of inhabitants of community where respondents lives, coded 1 '0–1,999', 2 '2,000–2,999', 3 '3,000–4,999', 4 '5,000–9,999', 5 '10,000–19,999', 6 '20,000–49,999', 7 '50,000–99,999', 8 '100,000–199,999', 9 '200,000–499,999', 10 '500,000 +'.	5.98	2.60	1	5.98

(49) East Germany	Dummy. Coded as 1 if respondent is from East Germany.	0.24	0.43	0	0.24
(50) No Internet access	Dummy. Coded as 1 if respondent has no Internet access.	0.15	0.36	0	0.15
(51) Number of children	Number of respondent's children.	1.14	1.16	0	6
<hr/> <i>(vi) Psychological Indicators</i>					
(52) Risk propensity	Continuous variable that varies between -1 (maximum risk aversion) and +1 (maximum risk propensity). We assessed the interviewees' risk preferences by confronting the interviewees with the choice of either receiving a safe payoff or taking part in a lottery (see Hayo et al. 2018).	0.11	0.67	-1	1
(53) Future-oriented time preference	Continuous variable running from 0 (completely impatient) to 1 (completely patient). Based on a survey experiment (see Hayo et al. 2018).	102.97	86.54	0	200
(54) Short-run impatience	Continuous variable, higher values indicate a greater degree of hyperbolic discounting. Based on a survey experiment (see Hayo et al. 2018).	10.77	38.41	-67	200