Joint Discussion Paper Series in Economics

by the Universities of

Aachen · Gießen · Göttingen
Kassel · Marburg · Siegen

ISSN 1867-3678

No. 11-2015

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Nr. 2015/7

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This version: 20 April 2015

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* Thanks to Florian Neumeier, Matthias Neuenkirch, and Pierre Siklos, as well as participants at the Annual Meeting of the German Economic Society 2014 in Hamburg, at the MAGKS Workshop in Rauischholzhausen in March 2014, and at the MACIE Research Seminar in Marburg in December 2013 for their helpful comments. The usual disclaimer applies.

The Influence of Media Use on Laymen's Monetary Policy Knowledge in Germany

Abstract

We analyse German citizens' knowledge about monetary policy and the European Central Bank (ECB), as well as the public's use of mass communication media to obtain information about the ECB. We employ a unique representative public opinion survey of German households conducted in 2011. We find that a person's desire to be informed about the ECB, together with the use of various media channels to keep informed, are decisive for both (i) the person's perception of how much he or she knows about the ECB and (ii) the person's actual knowledge. The media-related influence varies by level of education and is stronger for subjective knowledge. Women are significantly less interested in and knowledgeable about the ECB. We conclude that the ECB is not only well advised to continue with education programmes designed to convince the public of the importance of knowing about monetary policy, but to take the gender-specific differences into account in doing so.

Keywords: ECB, Economic knowledge, Subjective knowledge, Information

JEL: A20, E52, E58

I. Introduction

Private and public institutions all over the world are becoming increasingly aware of how important it is for a country's citizens to have at least basic economic and financial knowledge. Government agencies, consumer advocate organizations, and even commercial financial service providers offer educational programmes designed to improve the public's understanding of key economic concepts and enhance consumers' ability to make wise financial decisions (Gnan et al. 2007). Central banks figure prominently in this undertaking: at least 30 central banks offer their own financial education products and also support other organisations engaged in similar endeavours (for a detailed overview of central bank education programmes, see Fluch 2007).

Central bank support and encouragement of economic and financial education can be interpreted as 'a form of enlightened self-interest' (Minehan 2006). From a central bank's perspective, as Cathy Minehan, former president of the Federal Reserve Bank of Boston, put it, an 'informed public—a public that understands our role in the economy—will be far more likely to understand and accept the reasoning behind the difficult decisions that central banks sometimes have to make. Moreover, monetary policy must consider such matters as inflation expectations … so as we make and implement policy, public understanding of economic and financial matters is very helpful' (Minehan 2006). Generally speaking, central banks have many good reasons for promoting public knowledge, including increasing the effectiveness of monetary policy, ensuring the smooth functioning of financial markets, supporting sustainable economic policies, and improving economic and financial skills as a public good. Achieving these objectives can enhance a central bank's reputation and lead to greater acceptance of its actions (Gnan et al. 2007, see also Carvalho and Nechio 2014).

An increasingly complex economic environment, involving, for example, financial market liberalisation, policy reforms in retirement saving, and the financial crisis, makes saving and investment decisions more difficult for consumers (Bucher-Koenen and Ziegelmeyer 2011, Jappelli 2010, Lusardi and Mitchell 2014). Thus, a great many authors have begun to analyse laymen's abilities to meet the challenges of a market economy, such as day-to-day management of financial resources or long-term contracts for retirement planning. Financial literacy, as it is often called, aims at 'peoples' ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions' (Lusardi and Mitchell 2014, 6). These compe-

tencies are then linked to practical financial behaviour so as to discover the value of better economic knowledge.[1]

To be financially literate, an individual needs not only knowledge and skills, but also needs to be motivated and understand various key concepts of economics and money management (Remund 2010). Hence, being able to appropriately cope with personal economic problems requires both 'domain-specific knowledge' and 'metacognitive knowledge' (van Sickle 1992). The former is the type of knowledge researchers have in mind when surveying financial and economic education. Domain-specific knowledge encompasses 'declarative knowledge', i.e., definitions of economic concepts and specific factual information, and 'procedural knowledge', i.e., knowledge of how to use this information for decision-making.[2]

Following van Sickle's (1992) approach, researchers analyse people's knowledge about facts and concepts in various economic domains, for instance, banking, monetary policy, trade, and public finance. In general, a person's level of economic knowledge depends on socio-demographic characteristics, e.g., sex, age, income, educational background, and political ideology (Blinder and Krueger 2004, van der Cruijsen et al. 2010, Walstad 1997), and interest in and use of external information (Blinder and Krueger 2004, van der Cruijsen et al. 2010).

Knowledge about monetary policy making, e.g., the relationship between a policy interest rate and inflation, is found to influence people's inflation expectations (Carvalho and Nechio 2014), and so does knowledge about the ECB's policy objective (van der Cruijsen et al. 2010) as well as knowledge about the bank's transparency practices (van der Cruijsen and Eijffinger 2010). The higher the level of economic knowledge among laymen, the more likely they are to hold views similar to those of economists, e.g., on banking supervision (van der Cruijsen et al. 2013), the federal budget deficit (Blinder and Krueger 2004, Walstad 1997), the usefulness of trade (Walstad 1997, Walstad and Rebeck 2002), and market-oriented policy reforms (Vranceanu and Barthélémy 2011). Furthermore, greater economic knowledge increases public support for policy and deepens public trust in institutions such as, e.g., the European Monetary Union (Hayo

[1] The positive view of financial education is criticised by Steiner (2001), who argues that even consumers lacking knowledge about economic theory can make reasonable financial decisions as 'to be ignorant of economic theory is not the same as being ignorant in economic matters' (Steiner 2001, 447).

[2] In contrast, metacognitive knowledge refers to general ways of thinking (e.g., cognitive self-management strategies) and is less domain-specific. See van Sickle (1992) for a detailed distinction between different types of knowledge.

1999) and the ECB (Ehrmann et al. 2013, Hayo and Neuenkirch 2014, van der Cruijsen and Eijffinger 2010).

However, despite their potential to increase knowledge and financial literacy, financial education programmes often fail to substantially improve financial decision-making, chiefly because they focus solely on a person's objective level of knowledge (Hadar et al. 2013). This is not a new problem; consumer research, for instance, explicitly distinguishes between actual knowledge, defined as 'accurate stored information', and a person's subjective knowledge, which is his or her 'belief about that state of knowledge' (e.g., Moorman et al. 2004). Each of these types of knowledge influences behaviour in a distinct way. Studies suggest that there is an interplay between subjective knowledge and information search (Brucks 1985, Moorman et al. 2004, Raju et al. 1995), risk taking (Kwon and Lee 2009, Wang 2009), and practical financial decisions (Hadar et al. 2013, Robb and Woodyard 2011). Sometimes, the influence of perceived knowledge on behaviour is even stronger than that of factual knowledge (Ellen 1994, Robb and Woodyard 2011). Moreover, the correlations between subjective and objective knowledge differ widely across studies, depending on the type of subject matter, measurement, and sample (Carlson et al. 2009). Indeed, Alba and Hutchinson (2000) show that an agreement between objective and subjective assessment of information used in decision-making ('knowledge calibration') is rarely achieved.

In this paper, we contribute to several fields: economic knowledge, financial literacy, central bank communication, and consumer research. This is the first paper to analyse German citizens' (perception of) knowledge about monetary policy and the ECB, and their use of mass media to obtain information about the ECB. More precisely, we provide insight into how the public understands the relationship between inflation and the ECB's main refinancing rate as well as into the public's awareness (or not) of the ECB's main objective and its political independence. As procedural knowledge (i.e., knowledge of how to make reasonable decisions) is typically based on declarative knowledge (i.e., knowledge about domain-specific concepts and facts), the type of knowledge we consider here can be seen as a precondition for making mindful financial decisions. Given that a person's own perception of her knowledge plays an important role in her decisions, we add a measure of subjective monetary policy knowledge to our analysis.

In addition, we want to discover the extent to which people use different media channels (e.g., newspapers, magazines, or television) to inform themselves about the ECB. While the ECB itself engages in economic education and communicates with the

public, media coverage of the ECB is likely to have some impact on laymen's knowledge base, too. For instance, previous studies report a distinct media influence on inflation expectations (e.g., Dräger 2011, Lamla and Lein 2014) and on public support for the ECB (Hayo and Neuenkirch 2014). As a consequence, we relate information search indicators to both subjective and objective monetary policy knowledge.

Our analysis is based on a specially designed representative survey of German households that was conducted on our behalf in autumn 2011 by Gesellschaft für Konsumforschung (GfK), one of the biggest German private institutes specialising in collecting public opinion data. We adapt the general framework for interdependencies between media use and economic knowledge developed by Blinder and Krueger (2004) to our specific questions. Methodically, we employ (ordered) probit regressions to study the following research questions. First, which factors make it more likely that a person uses mass media to inform himself about the ECB? Second, does the use of different media channels influence a person's knowledge about the ECB itself and about monetary policy in general? Third, are there different patterns between obtaining subjective and objective knowledge?

Our results indicate that a fundamental desire to be informed about monetary policy is key to both information search and knowledge. The use of different media channels, e.g., reading newspapers or watching television, has a significantly positive influence on both types of knowledge. However, the influence is stronger and more robust for subjective knowledge. Women are notably less interested in and knowledgeable about monetary policy. We conclude that to be successful, future education efforts should focus on arousing interest in the topic. Moreover, central banks and other agencies concerned with improving monetary policy knowledge should make a special effort to reach women. In addition, it is important to account for a person's own perception of what he knows or has learned. Subjective knowledge is particularly vulnerable to media influences, and also plays a central role in financial decision-making.

The remainder of this paper is organised as follows. Section 2 describes the conceptual framework and the empirical methodology. Section 3 introduces the survey and the data. Section 4 sets out and discusses the results. Section 5 concludes.

II. Framework and Empirical Methodology

Our theoretical framework builds on Blinder and Krueger's (2004) study of public knowledge about economic issues in the United States. Those authors assume that the direction and frequency of an individual's information search is determined by education, desire to be informed, self-interest, and political ideology. The information gleaned from the search, together with education and desire to be informed, then determines people's knowledge of an issue. The original equations of the framework are

$$D_i = f(ED_i, SI_i, ID_i, \boldsymbol{X}_i) + e_{1i}, \quad (1)$$

$$\boldsymbol{S}_i = g(ED_i, D_i, SI_i, ID_i, \boldsymbol{X}_i) + e_{2i}, \quad (2)$$

$$K_i = h(ED_i, D_i, \boldsymbol{S}_i, Q_i, \boldsymbol{X}_i) + e_{3i}, \quad (3)$$

where D is the desire to be informed, ED is education, SI is self-interest, ID is ideology, **X** is a vector of socio-demographic variables, **S** is a vector representing the various sources of information that the individual uses, Q is an indicator of the quantity of information, and K denotes level of knowledge. Van der Cruijsen et al. (2010) employ this framework to study knowledge about the ECB's policy objective in the Netherlands.

However, despite its general usefulness, we believe the Blinder and Krueger (2004) framework has some drawbacks. First, the approach does not incorporate the concept of self-declared knowledge. To address this shortcoming, we use both objective and subjective knowledge as dependent variables in Equation (3). Second, it is likely that a person's reasons for relying on a particular media source for information about a topic are not independent from reasons for relying on another source. Consequently, we account for possible correlations across Equation (2) in our empirical analysis. Third, a similar argument applies to our modification of Equation (3), as we do not treat the two equations for subjective and objective knowledge as being independent.

These modifications result in the following three equations:

$$D_i = a(ED_i, SI_i, ID_i, \boldsymbol{X}_i) + u_i, \quad (4)$$

$$\boldsymbol{S}_{ni} = b(ED_i, D_i, SI_i, ID_i, \boldsymbol{X}_i) + v_{ni}, \qquad n = 1, \dots, 6 \quad (5)$$

$$\boldsymbol{K}_{mi} = c(ED_i, D_i, \boldsymbol{S}_{ni}, \boldsymbol{X}_i) + w_{mi}, \qquad n = 1, \dots, 6;\ m = 1, 2 \quad (6)$$

where n describes six different media channels, and m defines the type of knowledge (subjective or objective). We use maximum likelihood estimation for ordered responses and assume that the disturbances are normally distributed across observations.

In a first step, Equations (4) to (6) are estimated separately. In a second step, we estimate a seemingly unrelated regression model for Equation (5), where we allow

$v_{1i,}v_{2i,} \ldots, v_{6i}$ to be correlated across equations. Similarly, we estimate Equation (6) and allow $w_{1i,}w_{2i}$ to be correlated across equations, too. Comparing the estimates from the two steps makes it possible to assess the importance of the independence assumption.

III. Survey and Data

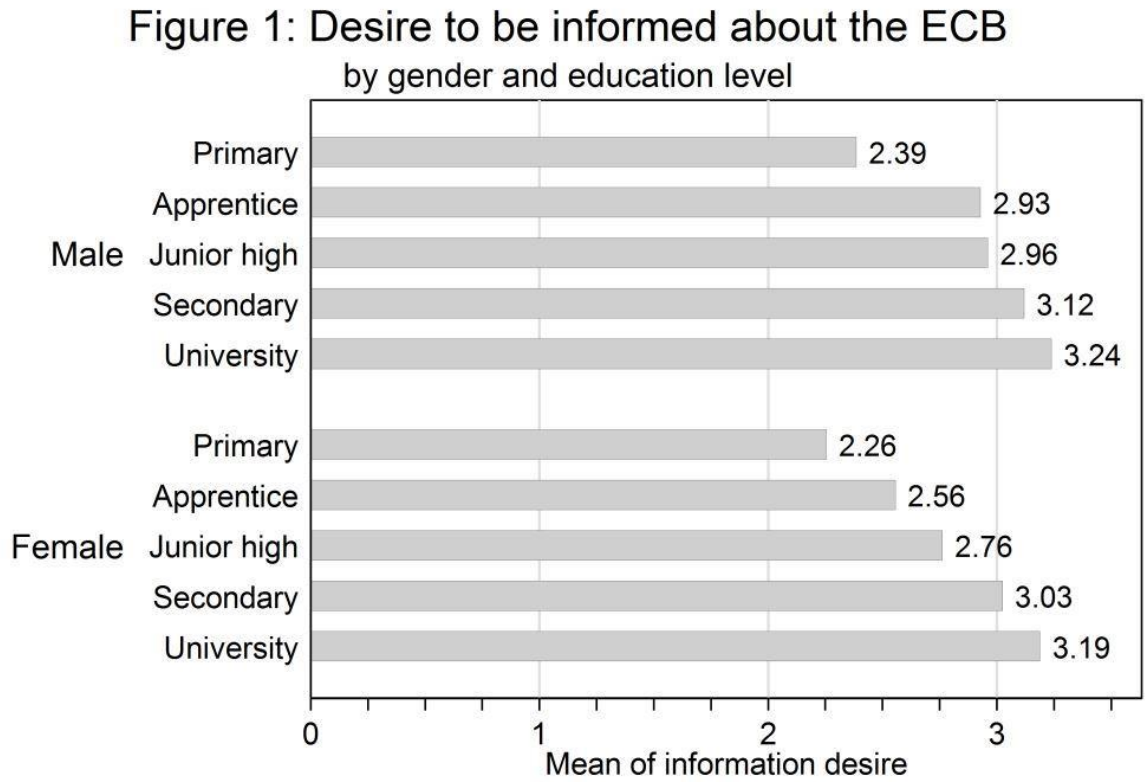
We use data from a unique survey of German households (population aged 14 years and older), conducted on our behalf by GfK. In October 2011, 2,006 respondents completed a structured questionnaire during face-to-face interviews with the help of pen pads. The questionnaire includes several questions on the importance of information about different topics, asks about information search behaviour, poses one question on the respondents' own assessment of their knowledge about the ECB, and three questions on factual knowledge about the ECB and monetary policy. Tables A1 and A2 in the Appendix contain summary statistics and the survey questions used in our analysis, respectively. A detailed description of the complete survey can be found in Neuenkirch (2015).

To measure a person's desire for information about the ECB (D_i in the framework), we asked respondents whether they find it personally important to be informed about six national and international institutions (the German parliament (Bundestag), German Bundesbank, European Union, United Nations, International Monetary Fund, and ECB). Respondents indicated the importance on a scale from 1 ('not important at all') to 5 ('very important'). Overall, the desire to be informed about these institutions is rather moderate. On average, information about the German Bundestag is ranked highest (mean 3.2), whereas the ECB is ranked in the middle (mean 2.8) of these institutions. However, the desire to be informed about the ECB differs significantly across subgroups of the population. Men (mean 3) state a higher interest in ECB issues than do women (mean 2.7),[3] and the desire to be informed increases with education level.[4]

Figure 1 shows comparisons of mean values for male and female respondents with different education levels. It is apparent that the gender difference is mainly driven by respondents with lower education levels.[5] Male and female respondents with secondary

[3] A mean comparison test indicates a difference with a p-value of 0.00.
[4] Mean comparison tests result in significant differences ($\alpha = 0.05$) between university and junior high degree, secondary education and junior high degree, junior high degree and primary education, and between apprentice and primary education.
[5] Mean comparison tests show significant differences ($\alpha = 0.05$) between men and women with junior high degree or completed apprentice.

education and/or a university degree are similar when it comes to their interest in the ECB.



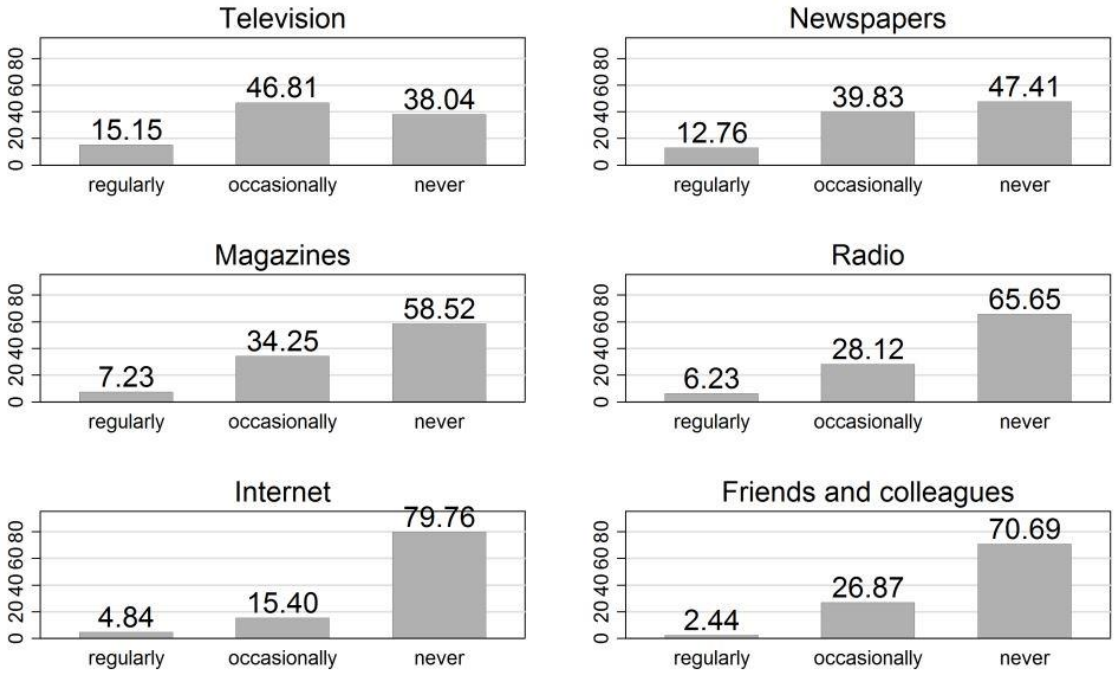
To measure the use of mass media for obtaining ECB information (S_{ni} in the framework), we asked our respondents to what extent they watch television, read newspapers or magazines, listen to the radio, use the internet, or talk to friends, colleagues, and relatives to inform themselves about the ECB. For every source given, the respondents were required to specify whether they use the source regularly, occasionally, or never for the stated purpose. Given the moderate desire to be informed about the ECB, it is not surprising that one out of three respondents does not use any type of media source to obtain ECB information (31 per cent). On average, respondents use two sources, and at least 25 per cent of our respondents rely on four or more media sources to inform themselves about the ECB.[6]

Figure 2 shows the frequency of media use in more detail. Watching television is the most important source, as 62 per cent of all respondents say that they use it occasionally

[6] The constructed indicator measures whether a respondent uses each source at least occasionally and ranges from 0 (no source ever used) to 6. It has a mean value of 2.4, and the 75th percentile is 4.

or regularly to obtain information about the ECB. Television is followed by newspapers (53 per cent) and magazines (41 per cent).

Figure 2: Frequency of media use to obtain ECB information
in per cent of all respondents



Notes: N = 2006.

The vast majority of respondents (80 per cent) never use the internet to obtain information about the ECB. Only 5 per cent of the respondents have visited the ECB's website. But when we asked about overall internet use, only 25 per cent indicate that they never use the internet, and the majority (62 per cent) use the internet at least several times a week. However, even within this subgroup of frequent internet users, 70 per cent say that they never search the internet for information about the ECB. This result is not driven by older respondents. Comparing two age cohorts within the subgroup of frequent internet users, we find that of those who are 60 years and older, at least 44 per cent employ the internet occasionally or regularly to find ECB information, whereas only 32 per cent of internet users aged between 25 and 39 years rely on this information channel.[7] These results confirm the moderate importance of ECB information compared to other topics based on respondents' information desire. In addition, the comparison between overall and specific internet usage shows that the respondents appear to grasp

[7] Proportions differ significantly from each other with a p-value of 0.013.

the meaning of our media questions, as they clearly differentiate between these two uses.

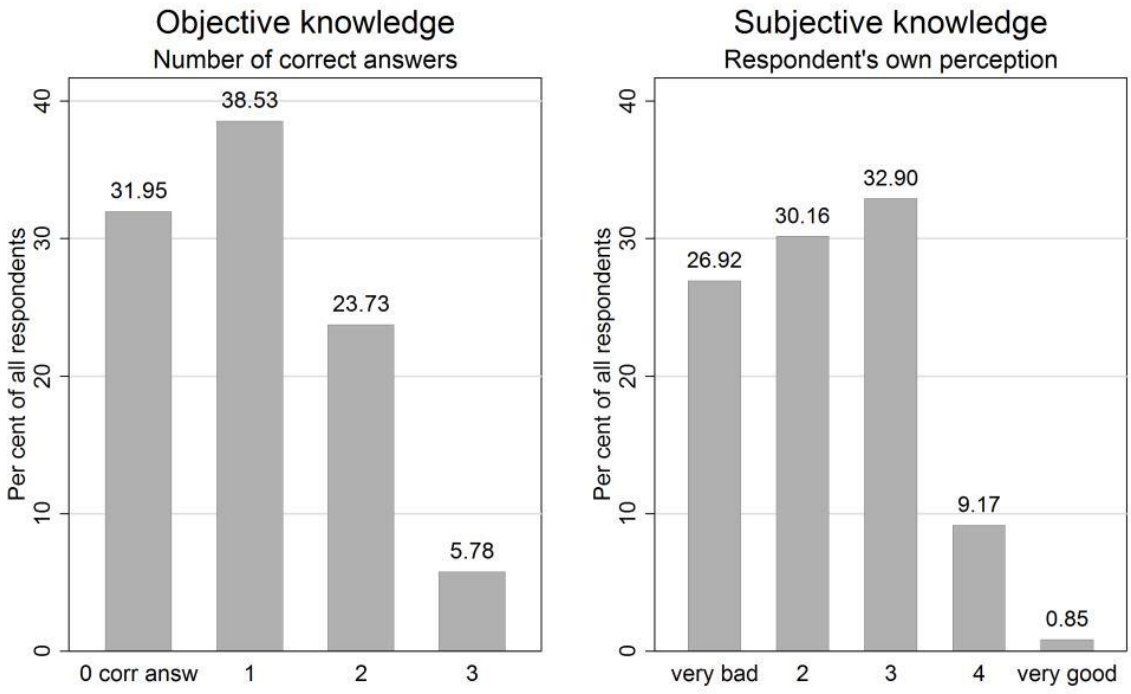
The questionnaire includes four questions on economic knowledge. To measure objective knowledge (K_{1i} in the framework), we use three questions; each of them is accompanied by a choice of answers, only one of which is correct, and a 'don't know' option. To measure the degree of subjective knowledge (K_{2i} in the framework), respondents were asked to rate their own knowledge about the ECB from 1 ('very bad') to 5 ('very good').[8] The left-hand panel of Figure 3 shows the distribution of responses for the number of correct answers to the factual questions and the right-hand panel the results for subjective knowledge. As the figure reveals, our respondents do not claim to know much about the ECB: the average answer is 'bad' (mean 2.3); only 10 per cent declare their knowledge to be either good or very good. The respondents' personal evaluation of their knowledge seems to match their actual knowledge. Only 6 per cent are able to answer all questions correctly, and one out of three respondents did not answer any questions correctly. From those claiming to have 'good' knowledge about the ECB, at least 40 per cent are able to answer two or three questions correctly. However, the correlation coefficient of subjective knowledge and the number of correct answers is only 0.18,[9] indicating that the connection between the two types of knowledge is not that strong.

Analysing each factual question separately yields additional insight into Germans' monetary policy knowledge. Two of the questions involve important ECB design features, namely, its mandate and independence. First, the respondents were asked about the ECB's main policy objective. Second, they were asked to identify who is responsible for setting the key interest rates in the euro area. Fifty per cent of our sample knows the ECB's main objective, but only 34 per cent of the respondents are aware that European governments are not supposed to have a say in setting the ECB's key interest rates. Our third question deals with the general functioning of monetary policy. In framing the question, we briefly described a scenario involving strong inflation expectations in the euro area. The respondent was then asked to decide whether the key interest rates should fall, rise, or remain constant. The majority of respondents wrongly decided to

[8] Note that respondents were asked to rate their own knowledge about the ECB before they knew that we would ask for information desire and factual knowledge about this specific topic.
[9] Spearman's rank correlation coefficient is 0.18, with a p-value of 0.00.

lower the interest rate; only 20 per cent chose to increase the rate in the face of future inflationary pressures.

Figure 3: Knowledge about the ECB



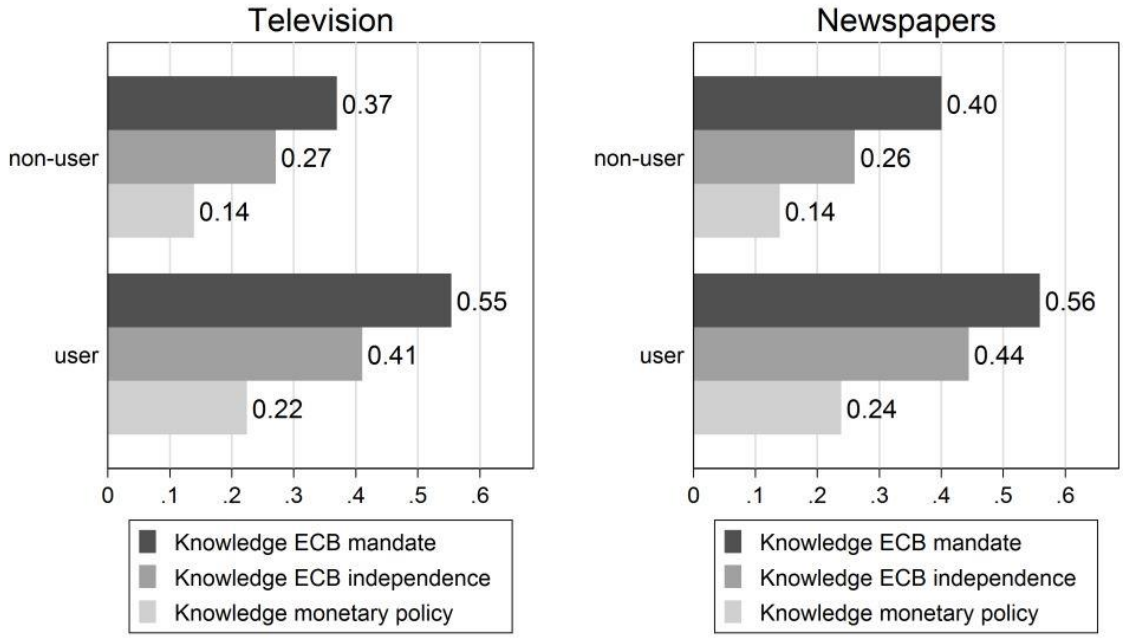
Notes: N = 2006, objective knowledge is measured by an index based on three factual questions, subjective knowledge is measured by respondents' own assessment from 1 -very bad- to 5 -very good-.

The distribution of answers to the factual knowledge questions differs with intensity of media use. Compared to people who do not inform themselves about the ECB, interviewees who use the media more frequently choose the correct answer significantly more often. Figure 4 shows the percentage of correct answers to specific knowledge questions for users and nonusers of the two most important media sources—television and newspapers. The probability of correctly answering the question about the ECB's mandate is 18 percentage points (pp) higher for respondents who inform themselves at least occasionally via television and 16 pp higher for newspaper readers. The same holds for a respondent's knowledge about the independence of the ECB in setting its interest rates (14 pp for television, 18 pp for newspapers). Although the knowledge advantage for understanding the general functioning of monetary policy is only 9 pp for viewers (10 pp for readers), the difference is, again, highly significant.[10]

[10] All statements are based on mean comparison tests with a p-value of 0.00.

Figure 4: Media use and objective knowledge

Correct answers by media channels



Notes: N = 2006, frequencies of correct answers to three different factual knowledge questions in per cent of respondents that (do not) rely on Television/ Newspapers to obtain ECB information.

IV. Results

IV.1 Baseline Results: Desire to be Informed About the ECB

We start our regression analysis by estimating Equation (4) to explore determinants of the respondents' desire to be informed about the ECB. Table 1 shows average marginal effects (AME) for all five categories, based on an ordered probit regression. All the key variables in the framework exert a significant influence. A person's education level and his self-interest, as well as his political orientation, are all positively related to the desire to be informed about the ECB.

Overall, education seems to have the strongest influence; the effect increases significantly with each education level. Compared to respondents with primary education, those with a university degree have a 13 pp higher probability of stating that ECB information is 'important' to them (category 4).

Blinder and Krueger (2004) operationalise a person's self-interest by using her income. Although this approach may be questionable for other economic issues, ECB decisions can have far-reaching consequences for everyone holding money.

Table 1 Desire to be informed about the ECB

		1 Not important at all		2		3		4		5 Very important	
Education	Apprentice	-0.071	[0.042]	**-0.016**	[0.008]	0.022	[0.015]	0.043	[0.024]	**0.022**	[0.011]
	Junior high	**-0.119**	[0.042]	**-0.033**	[0.008]	**0.030**	[0.015]	**0.077**	[0.024]	**0.045**	[0.012]
	Secondary	**-0.173**	[0.045]	**-0.061**	[0.014]	0.027	[0.016]	**0.121**	[0.028]	**0.087**	[0.021]
	University	**-0.184**	[0.044]	**-0.068**	[0.014]	0.023	[0.016]	**0.130**	[0.028]	**0.098**	[0.021]
Self-interest	€1,500-2,499	**-0.051**	[0.023]	**-0.017**	[0.008]	0.009	[0.005]	**0.035**	[0.016]	**0.024**	[0.011]
	€2,500-3,499	**-0.066**	[0.027]	**-0.023**	[0.010]	**0.010**	[0.005]	**0.046**	[0.019]	**0.033**	[0.013]
	≥ €3,500	**-0.080**	[0.029]	**-0.030**	[0.011]	**0.010**	[0.005]	**0.057**	[0.021]	**0.043**	[0.016]
Ideology	Conservative	**-0.097**	[0.021]	**-0.040**	[0.009]	0.008	[0.004]	**0.072**	[0.016]	**0.056**	[0.013]
	Left	**-0.048**	[0.020]	**-0.016**	[0.007]	**0.009**	[0.004]	**0.033**	[0.014]	**0.022**	[0.009]
	Other	-0.015	[0.052]	-0.005	[0.016]	0.004	[0.011]	0.010	[0.035]	0.006	[0.022]
Age		-0.001	[0.001]	-0.0003	[0.0003]	0.0001	[0.0001]	0.001	[0.001]	0.0005	[0.0004]
Sex	Female	**0.073**	[0.015]	**0.029**	[0.007]	**-0.007**	[0.003]	**-0.053**	[0.012]	**-0.041**	[0.009]
Germany	East	0.034	[0.020]	0.012	[0.007]	-0.005	[0.003]	-0.024	[0.014]	-0.018	[0.010]
Urbanisation	Large city	-0.007	[0.017]	-0.003	[0.007]	0.001	[0.002]	0.005	[0.012]	0.004	[0.010]
Family status	With partner	0.028	[0.019]	0.011	[0.007]	-0.003	[0.002]	-0.020	[0.013]	-0.016	[0.011]
Occupation	Unemployed	0.061	[0.038]	0.019	[0.010]	-0.012	[0.010]	-0.041	[0.024]	-0.028	[0.015]
	Retired	-0.001	[0.026]	-0.001	[0.010]	0.000	[0.002]	0.001	[0.019]	0.001	[0.015]
	Homemaker	-0.012	[0.034]	-0.005	[0.014]	0.001	[0.002]	0.008	[0.025]	0.007	[0.021]
	In training	0.035	[0.034]	0.012	[0.011]	-0.005	[0.007]	-0.024	[0.023]	-0.018	[0.015]

Notes: Average marginal effects [Huber/White standard errors] are shown based on an ordered probit regression. Bold effects indicate significance at the 5 per cent level. N = 1,354. Base categories are as follows: primary (education); ≤ €1,499 (self-interest); no ideology (ideology); male (sex); West Germany (Germany); ≤ 99,999 residents (urbanisation); without partner (family status); employed (occupation).

Therefore, we employ net household income as an indicator for self-interest in ECB-related topics.[11] There is a significantly positive relationship between a person's monthly household net income and his desire to be informed about the ECB. Compared to the lowest income group, the likelihood of answering that ECB information is 'important' (category 4) is almost 6 pp higher for persons with incomes over €3,500 per month.

Ideology has considerable influence on a respondent's evaluation of ECB information. However, it is not the particular party preference that matters, but whether one has a clear political orientation. Supporters of rather right-wing parties (i.e., CDU, CSU, FDP) and supporters of rather left-wing parties (i.e., SPD, Greens, Left Party) both have significantly more interest in the ECB than respondents who do not support any political party.[12] In terms of the magnitude of the effect, however, the conservatives' desire to be informed is twice as high as that of supporters of left-wing parties. The probability of selecting the highest category ('very important') is almost 6 pp higher for supporters of CDU/CSU/FDP compared to non-ideologists, whereas it is only 2 pp higher for SPD/Greens/Left Party supporters.

Sex is the only socio-demographic control variable that has a significant effect on information desire. Female respondents report a notably lower desire to be informed compared to their male counterparts. For women, the probability of saying that information about the ECB is 'not important at all' (category 1) is over 7 pp higher than it is for men.

IV.2 Baseline Results: Sources of Information to be Informed About the ECB

To learn more about the use of the various ECB information channels, we continue our regression analysis by estimating Equation (5). To economise on space, Table 2a shows coefficients of ordered probit regressions only for the use of magazines, radio, internet, and friends, colleagues, or relatives. Table 2b provides AME of ordered probit regressions for television and newspapers, the two sources most frequently used by our respondents, for the two extreme categories of 'never used' (category 1) and 'regularly used' (category 3).

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[11] We tested alternative measures of self-interest. In our sample, it does not matter if someone is a borrower or saver or how he evaluates his own economic situation. The only other variable with a significant influence is residential property (a dummy variable measuring a respondent's ownership of a flat or a house); it has a significantly positive effect on the desire to be informed about the ECB.

[12] We are not able to estimate separate coefficients for every single party, as the number of observations for some of them is too few for estimation purposes.

Table 2a Sources of information to be informed about the ECB

		Magazines		Radio		Internet		Friends, ...	
Education	Apprentice	**0.376**	[0.155]	-0.019	[0.145]	0.350	[0.250]	-0.035	[0.144]
	Junior high	**0.665**	[0.155]	0.261	[0.146]	**0.756**	[0.242]	0.037	[0.144]
	Secondary	**0.697**	[0.178]	0.321	[0.170]	**1.006**	[0.256]	0.253	[0.180]
	University	**1.008**	[0.181]	**0.563**	[0.171]	**1.305**	[0.259]	0.097	[0.176]
ECB information desire	2	**0.667**	[0.132]	**0.522**	[0.137]	**0.406**	[0.172]	**0.466**	[0.141]
	3	**0.905**	[0.118]	**0.813**	[0.121]	**0.481**	[0.152]	**0.635**	[0.124]
	4	**1.318**	[0.124]	**1.175**	[0.126]	**0.922**	[0.152]	**0.906**	[0.128]
	Very important	**1.706**	[0.163]	**1.434**	[0.157]	**1.380**	[0.172]	**1.171**	[0.151]
Self-interest	€1,500-2,499	-0.002	[0.105]	-0.193	[0.106]	0.048	[0.133]	-0.120	[0.108]
	€2,500-3,499	0.075	[0.121]	-0.163	[0.121]	0.070	[0.150]	-0.080	[0.125]
	≥ €3,500	0.161	[0.135]	-0.226	[0.133]	0.066	[0.160]	0.090	[0.144]
Ideology	Conservative	0.179	[0.094]	-0.083	[0.099]	0.211	[0.112]	0.021	[0.102]
	Left	0.153	[0.081]	0.056	[0.084]	-0.081	[0.104]	0.096	[0.088]
	Other	0.139	[0.189]	-0.104	[0.205]	0.192	[0.207]	-0.218	[0.211]
Age		0.006	[0.003]	0.006	[0.003]	**-0.019**	[0.004]	-0.002	[0.003]
Sex	Female	**-0.346**	[0.071]	**-0.228**	[0.074]	**-0.296**	[0.086]	-0.141	[0.076]
Germany	East	-0.166	[0.086]	-0.021	[0.086]	-0.088	[0.102]	0.132	[0.088]
Urbanisation	Large city	**0.150**	[0.074]	-0.013	[0.077]	**0.175**	[0.088]	-0.021	[0.079]
Family status	With partner	-0.104	[0.088]	-0.088	[0.090]	0.009	[0.107]	-0.096	[0.093]
Occupation	Unemployed	-0.143	[0.179]	-0.080	[0.173]	0.174	[0.209]	-0.033	[0.168]
	Retired	0.128	[0.126]	0.229	[0.122]	0.170	[0.158]	0.192	[0.127]
	Homemaker	0.006	[0.166]	0.266	[0.170]	0.208	[0.175]	0.195	[0.160]
	In training	0.218	[0.167]	0.162	[0.173]	0.082	[0.184]	0.089	[0.175]

Notes: Coefficients [Huber/White standard errors] of ordered probit regressions are shown. Bold coefficients indicate significance at the 5 per cent level. N = 1,354. Base categories are as follows: primary (education); 1 'very bad' (information desire); ≤ €1,499 (self-interest); no ideology (ideology); male (sex); West Germany (Germany); ≤ 99,999 residents (urbanisation); without partner (family status); employed (occupation).

Table 2b Sources of information to be informed about the ECB

		Television				Newspapers			
		Never		Regularly		Never		Regularly	
Education	Apprentice	**-0.107**	[0.050]	**0.052**	[0.021]	-0.038	[0.044]	0.015	[0.018]
	Junior high	**-0.154**	[0.050]	**0.081**	[0.022]	**-0.123**	[0.045]	**0.058**	[0.019]
	Secondary	**-0.165**	[0.056]	**0.089**	[0.029]	**-0.141**	[0.052]	**0.069**	[0.025]
	University	**-0.196**	[0.056]	**0.113**	[0.031]	**-0.162**	[0.055]	**0.082**	[0.028]
ECB information desire	2	**-0.266**	[0.042]	**0.074**	[0.013]	**-0.206**	[0.040]	**0.050**	[0.011]
	3	**-0.357**	[0.037]	**0.123**	[0.014]	**-0.307**	[0.035]	**0.092**	[0.011]
	4	**-0.461**	[0.037]	**0.207**	[0.020]	**-0.430**	[0.037]	**0.167**	[0.018]
	Very important	**-0.549**	[0.039]	**0.325**	[0.041]	**-0.503**	[0.046]	**0.231**	[0.036]
Self-interest	€1,500-2,499	0.015	[0.032]	-0.009	[0.020]	-0.031	[0.032]	0.015	[0.015]
	€2,500-3,499	-0.022	[0.036]	0.015	[0.024]	-0.065	[0.037]	0.033	[0.019]
	≥ €3,500	-0.008	[0.042]	0.005	[0.027]	**-0.096**	[0.041]	**0.052**	[0.022]
Ideology	Conservative	-0.007	[0.029]	0.005	[0.018]	-0.037	[0.030]	0.019	[0.015]
	Left	-0.021	[0.025]	0.014	[0.016]	**-0.056**	[0.026]	**0.029**	[0.014]
	Other	0.040	[0.054]	-0.023	[0.030]	**0.163**	[0.061]	**-0.061**	[0.019]
Age		-0.002	[0.001]	0.001	[0.001]	**-0.006**	[0.001]	**0.003**	[0.001]
Sex	Female	**0.085**	[0.021]	**-0.055**	[0.014]	**0.138**	[0.023]	**-0.072**	[0.012]
Germany	East	0.032	[0.026]	-0.021	[0.016]	**0.065**	[0.027]	**-0.033**	[0.013]
Urbanisation	Large city	-0.026	[0.022]	0.018	[0.015]	-0.027	[0.024]	0.015	[0.013]
Family status	With partner	0.022	[0.026]	-0.014	[0.017]	0.033	[0.026]	-0.018	[0.014]
Occupation	Unemployed	-0.032	[0.050]	0.020	[0.033]	0.010	[0.053]	-0.005	[0.027]
	Retired	**-0.072**	[0.035]	0.049	[0.026]	-0.011	[0.037]	0.006	[0.020]
	Homemaker	-0.037	[0.053]	0.024	[0.036]	-0.038	[0.051]	0.021	[0.029]
	In training	-0.040	[0.049]	0.025	[0.033]	-0.071	[0.053]	0.041	[0.034]

Notes: Average marginal effects [Huber/White standard errors] are shown based on ordered probit regressions. Bold effects indicate significance at the 5 per cent level. N = 1,354. Base categories are as follows: primary (education); 1 'very bad' (information desire); ≤ €1,499 (self-interest); no ideology (ideology); male (sex); West Germany (Germany); ≤ 99,999 residents (urbanisation); without partner (family status); employed (occupation).

The desire to be informed is a key determinant of media use, as it is the only variable explaining the use of all sources. The effects are not only highly significant, but their magnitude increases continuously in information desire. Interest in ECB-related topics notably changes the use probability of all media sources. For example, a respondent with a weak desire for information (category 2) has a 27 pp lower probability of not watching television to obtain ECB information compared to a respondent for whom such information is 'not important at all' (category 1). The AME decrease by roughly 10 pp with each desire category, until for persons with the highest information desire (category 5) the likelihood of not watching television is 55 pp lower. Similar effects are found for newspaper readers, where the probability of not reading is 21 pp lower for respondents with a weak desire for information (category 2); again, the AME decrease by roughly 10 pp with each desire category up to 33 pp.

Relying on media sources to obtain ECB information is positively related to a respondent's educational background; in particular, the frequency of reading newspapers and magazines increases with higher levels of education. Compared to a person with primary education, the probability of regular newspaper use is 8 pp higher for someone with a university degree and 6 pp higher for respondents with a junior high degree. Similarly, the probability of regularly reading a magazine to find information about the ECB is 10 pp higher for university respondents and 5 pp higher for junior high respondents compared to those with primary education. The probabilities of (not) relying on television or (not) using the internet for ECB information also increase (decrease) significantly with additional educational attainment.

Blinder and Krueger's (2004) indicator for self-interest has little influence on media use. Compared to the lowest income group, the probability of reading newspapers on a regular basis (of never reading newspapers) to obtain ECB information is 5 pp higher (10 pp lower) for respondents with very high incomes (more than €3,500). Moreover, only newspaper usage is related to a respondent's ideology. People who support a left-wing party have a 5 pp higher (10 pp lower) probability of regularly using (of never using) newspapers for obtaining ECB information compared to people with no clear ideology. In contrast, supporting one of the extreme parties significantly lowers the frequency of reading a newspaper for this purpose.

Among the group of control variables, sex once again plays an important role. Women use almost every ECB information source significantly less frequently than do men. The only exception is talking to friends, colleagues, and relatives. For instance, the likeli-

hood of never reading a newspaper for ECB information is 14 pp higher for female interviewees than it is for men. East Germans read newspapers for ECB information significantly less frequently than do West German respondents. Living in a city with more than 100,000 residents is significantly positively related to the frequency of reading magazines and online search. Being older decreases the probability of using the internet for getting ECB information.

IV.3 Baseline Results: Knowledge About the ECB and Monetary Policy

We now turn to the results for subjective and objective knowledge. Table 3a shows average marginal effects for selected categories of both knowledge types, again based on ordered probit regressions.[13] Regarding objective knowledge, a person's education level, his desire to be informed about the ECB, and his use of information sources to keep informed are decisive for explaining the number of correct answers. The more educated a person, the higher her knowledge score. However, only the effects for the highest education levels are significant at the 5 per cent level. University graduates and those with secondary education have a 5 pp and 4 pp, respectively, higher likelihood of giving three correct answers than do respondents with only primary education. Compared to those with primary education, the probability of giving no correct answer is 14 pp (12 pp) lower for university respondents (secondary education respondents). Information desire also has a positive impact on objective knowledge, but only two out of four categories have a significant influence. Compared to respondents in the lowest category, those with a moderate desire to be informed about the ECB (category 3) have a 4 pp higher probability of answering two questions correctly. This probability is 6 pp higher for respondents having a strong desire for ECB information (category 4).

Comparing these findings with the regression results for subjective knowledge, both education and information desire seem to have an even stronger influence. There are again increasing effects for education but now they are significant for all education levels. The same holds for the effects of the desire to be informed about the ECB. For instance, the probability that a respondent evaluates his own knowledge as 'very bad' (category 1) is 6 pp lower for persons with an apprenticeship compared to those with primary education; this probability then decreases to 14 pp for persons with a university degree.

[13] AME for the remaining categories can be found in Table A3 in the Appendix.

Table 3a Monetary policy knowledge

		Objective knowledge						Subjective knowledge			
		0 correct answers		2 correct answers		3 correct answers		1 'very bad'		4 'good'	
Education	Apprentice	-0.011	[0.036]	0.006	[0.022]	0.003	[0.008]	**-0.062**	[0.031]	**0.022**	[0.010]
	Junior high	-0.056	[0.036]	0.035	[0.023]	0.015	[0.009]	**-0.119**	[0.031]	**0.050**	[0.011]
	Secondary	**-0.122**	[0.041]	**0.081**	[0.027]	**0.041**	[0.014]	**-0.133**	[0.035]	**0.059**	[0.014]
	University	**-0.141**	[0.042]	**0.095**	[0.028]	**0.051**	[0.016]	**-0.141**	[0.034]	**0.064**	[0.015]
ECB information desire	2	-0.048	[0.029]	0.030	[0.018]	0.013	[0.008]	**-0.227**	[0.033]	**0.034**	[0.006]
	3	**-0.058**	[0.027]	**0.037**	[0.017]	**0.016**	[0.007]	**-0.320**	[0.031]	**0.068**	[0.006]
	4	**-0.090**	[0.030]	**0.059**	[0.019]	**0.027**	[0.009]	**-0.403**	[0.031]	**0.126**	[0.011]
	Very important	-0.069	[0.037]	0.044	[0.024]	0.020	[0.011]	**-0.441**	[0.032]	**0.173**	[0.022]
Media sources	Television	**-0.080**	[0.025]	**0.052**	[0.016]	**0.023**	[0.007]	**-0.067**	[0.020]	**0.031**	[0.008]
	Newspapers	**-0.111**	[0.024]	**0.073**	[0.016]	**0.033**	[0.007]	**-0.046**	[0.018]	**0.023**	[0.009]
	Magazines	0.018	[0.023]	-0.012	[0.014]	-0.006	[0.007]	**-0.056**	[0.016]	**0.029**	[0.008]
	Radio	0.0003	[0.023]	-0.0002	[0.015]	-0.0001	[0.007]	-0.028	[0.015]	0.015	[0.008]
	Internet	0.014	[0.025]	-0.009	[0.016]	-0.005	[0.008]	**-0.059**	[0.016]	**0.034**	[0.010]
	Friends	0.006	[0.022]	-0.004	[0.014]	-0.002	[0.007]	**-0.038**	[0.014]	**0.021**	[0.008]
Age		**-0.002**	[0.001]	**0.001**	[0.001]	**0.001**	[0.0003]	0.0005	[0.001]	-0.0002	[0.0003]
Sex	Female	**0.047**	[0.017]	**-0.031**	[0.012]	**-0.015**	[0.006]	**0.041**	[0.013]	**-0.022**	[0.007]
Germany	East	-0.006	[0.020]	0.004	[0.013]	0.002	[0.007]	**0.045**	[0.016]	**-0.022**	[0.007]
Urbanisation	Large city	-0.005	[0.019]	0.003	[0.012]	0.001	[0.006]	0.003	[0.013]	-0.002	[0.007]
Family status	With partner	0.013	[0.018]	-0.009	[0.012]	-0.004	[0.006]	0.002	[0.013]	-0.001	[0.007]
Occupation	Unemployed	**0.080**	[0.039]	**-0.050**	[0.023]	**-0.023**	[0.010]	-0.017	[0.028]	0.009	[0.016]
	Retired	**0.073**	[0.031]	**-0.046**	[0.019]	**-0.022**	[0.008]	-0.013	[0.020]	0.007	[0.011]
	Homemaker	0.011	[0.035]	-0.007	[0.023]	-0.004	[0.012]	0.007	[0.034]	-0.004	[0.017]
	In training	-0.021	[0.039]	0.014	[0.026]	0.008	[0.016]	0.011	[0.029]	-0.005	[0.014]

Notes: N = 1,975. See notes to Tables 1 and 2b.

Similarly, the 'very bad' probability is 23 pp lower for persons with weak information desire (category 2) compared to persons who evaluate ECB information as 'not important at all', and it decreases to 44 pp for persons with a very strong information desire (category 5).

In general, media use has a significant impact on both knowledge types but, again, the effects differ between the two. Whereas television viewers and newspaper readers have significantly higher objective knowledge scores, other media sources have no effect on the number of correct answers. In contrast, all media sources (exception: radio) have a significantly positive influence on subjective knowledge. The probability of claiming 'good' knowledge about the ECB (category 4) is 3 pp higher for persons who read magazines or use the internet and 2 pp higher for persons who talk with their friends, colleagues, or relatives about the ECB compared to non-users. However, the magnitude of the other media effects is greater for objective knowledge than for subjective knowledge. The probability of giving no correct answers decreases by 11 pp for newspaper readers (8 pp for television viewers); in contrast, the probability for the lowest subjective knowledge level (category 1) only decreases by 5 pp for newspapers readers (7 pp for television viewers).

Gender has a noteworthy effect on both knowledge types. The likelihood of giving no correct answers is 5 pp higher for women. Similarly, female interviewees have a 4 pp higher probability of evaluating their own ECB knowledge as 'very bad' (category 1). However, these gender differences could be driven by underlying factors relating to other socio-demographic characteristics. For instance, the number of women in our sample aged 49 and below who have secondary education is more than three times the number of women 50 years and older who have this level of education. Similarly, as our regressions find female respondents to be less interested in the ECB and to inform themselves less frequently on the subject, the gender effect could be driven by women with very weak information desire who do not read newspapers or watch television for ECB information. Hence, it seems appropriate to estimate conditional gender effects on subjective and objective knowledge.

It turns out that the gender effect for both types of knowledge is significant at the 1 per cent level even when we control for age, education, information desire, and media use, either separately or jointly. Table 3b shows average marginal effects for female respondents at different ages, education and information desire levels, and newspaper consumption. Compared to a man of the same age, the probability of giving no correct

Table 3b Conditional gender effects on monetary policy knowledge

Explanatory variables conditioned on 'Female'				Average marginal effect			
				Objective knowledge		Subjective knowledge	
Education	Age	ECB information desire	Newspapers	0	2	1	4
				correct answers		'very bad'	'good'
Primary				**0.051**	**-0.031**	**0.048**	**-0.015**
Apprentice				**0.050**	**-0.031**	**0.045**	**-0.019**
Junior high				**0.047**	**-0.032**	**0.040**	**-0.023**
Secondary				**0.042**	**-0.031**	**0.039**	**-0.024**
University				**0.040**	**-0.030**	**0.038**	**-0.025**
	20 years			**0.050**	**-0.030**	**0.040**	**-0.022**
	40 years			**0.048**	**-0.031**	**0.041**	**-0.022**
	60 years			**0.045**	**-0.031**	**0.042**	**-0.021**
		Not important at all		**0.051**	**-0.031**	**0.061**	**-0.004**
		2		**0.048**	**-0.031**	**0.053**	**-0.014**
		3		**0.047**	**-0.031**	**0.043**	**-0.022**
		4		**0.045**	**-0.031**	**0.031**	**-0.031**
		Very important		**0.046**	**-0.031**	**0.023**	**-0.036**
			Non-user	**0.052**	**-0.031**	**0.044**	**-0.019**
			User	**0.044**	**-0.032**	**0.040**	**-0.023**
Primary	20 years	4	User	**0.050**	**-0.033**	**0.038**	**-0.025**
Secondary	20 years	4	User	**0.040**	**-0.032**	**0.020**	**-0.039**
Primary	40 years	4	User	**0.047**	**-0.033**	**0.039**	**-0.024**
Secondary	40 years	4	User	**0.036**	**-0.029**	**0.021**	**-0.038**
Primary	60 years	4	User	**0.044**	**-0.033**	**0.041**	**-0.023**
Secondary	60 years	4	User	**0.032**	**-0.025**	**0.023**	**-0.037**

Notes: Average marginal effects of 'Female' at specific values of the covariates education, age, ECB information desire, and newspaper use, based on ordered probit regressions, are shown. All effects are significant at the 1 per cent level.

answers (of two correct answers) is 5 pp higher (3 pp lower) for women in all of the three age groups considered here. Similarly, compared to a male respondent with the same education level, female respondents have a 4 to 5 pp higher (3 pp lower) probability of no correct answers (of two correct answers). The same holds for women with different degrees of desire for ECB information and for female newspaper readers compared to their male counterparts. The gender effects on objective knowledge are significantly different at the 1 per cent level for every possible combination of age, education level, information desire, and newspaper use. For instance, compared to a man with the same attributes, the probability of giving no correct answers is 4 pp higher for a 20 year old woman with secondary education who is interested in the ECB and reads newspapers to inform herself about this central bank.

Concerning subjective knowledge, we again find highly significant gender differences across all subgroups and combinations.[14] For instance, compared to a man with the same attributes, the probability of rating her knowledge as 'good' (category 4) is 4 pp lower for a woman with the same characteristics as in our example above. It is interesting to note that the gender difference in the respondents' own perceptions of their knowledge decreases with higher information desire. Compared to a man with the weakest information desire, the probability of answering 'very bad knowledge' (category 1) is 6 pp higher for a woman with the weakest information desire. Compared to a man with the strongest information desire, the probability of reporting 'very bad knowledge' (category 1) is only 2 pp higher for a woman with the strongest information desire. As we did not find a similar pattern when studying the respondents' factual knowledge, this suggests that particularly disinterested men tend to overestimate their own monetary policy knowledge.

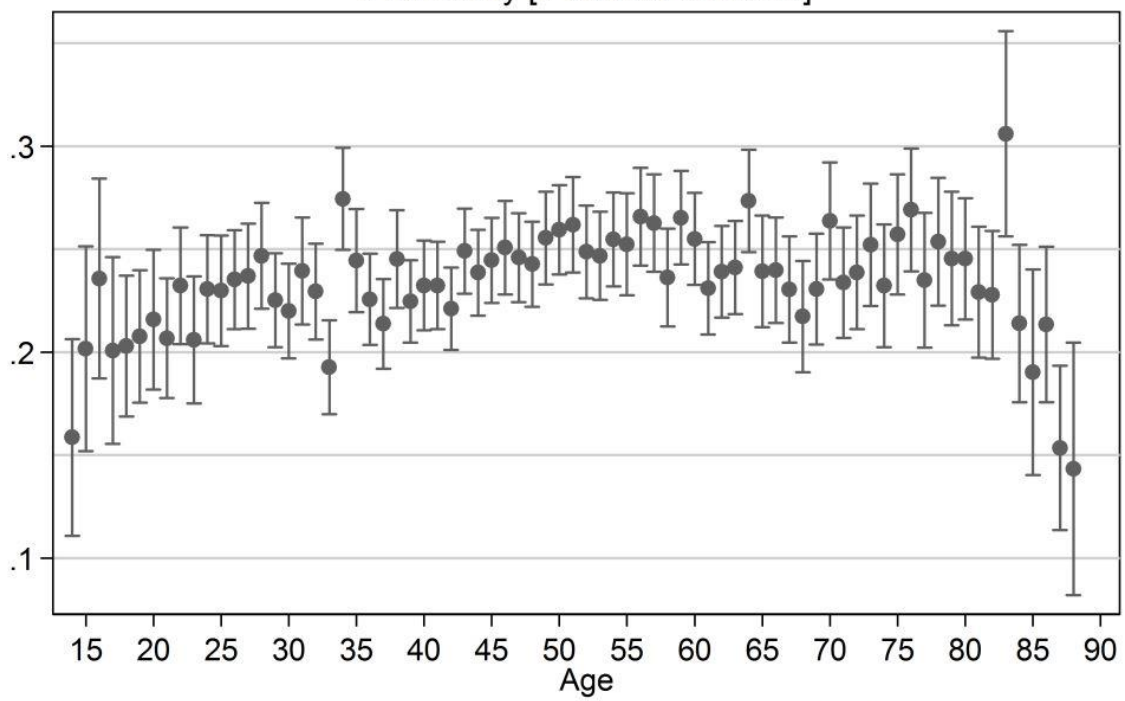
Other socio-demographic characteristics tend to influence either one of the knowledge types or the other, but not both. East Germans tend to underestimate their level of ECB knowledge. Although their own knowledge assessment is significantly less favourable compared to that of their West German counterparts, we find no significant 'East German effect' in our objective knowledge results. Although East German respondents have a 5 pp higher probability of saying that their ECB knowledge is 'very bad' (category 1), in fact, they answer the questions correctly about on a par with the West

[14] All possible combinations of two, three, and four control variables yield significant differences between men and women. However, to save space, we only show separate and joint effects for all of them in Table 3b. Omitted results are available on request.

Germans. Subjective knowledge levels do not differ between occupation groups. However, unemployed or retired people have significantly less objective knowledge . Compared to an employed respondent, an unemployed respondent (a retired respondent) has an 8 pp (7 pp) higher probability of answering none of the questions correctly.

A respondent's age has a significantly positive impact on objective knowledge, albeit its magnitude is very small. However, in microeconometric studies, it is often found that age has nonlinear effects. To reveal possible nonlinearities, Figure 5 shows predictive probabilities of answering two of our questions correctly along the age structure of our sample. It turns out that the relationship between knowledge and age is of an inverted u-shape, with a maximum at around 56 years. For an 18-year-old respondent, the probability of answering two questions correctly is only 20 per cent; for a 50-year-old respondent, this probability is 26 per cent.[15]

Figure 5: Objective knowledge by age



Notes: N = 1975, predictive margins with 95% CI based on an ordered probit regression.

IV.4 Further Results: Seemingly Unrelated Regressions (SUR)

Next, we explore whether the residuals in the equations are correlated with each other and whether these correlations alter our results. For instance, it seems likely that a per-

[15] Note that the number of observations is fairly small at the lower and upper ends of the age distribution.

son's reasons for relying on newspapers for information about the ECB and those for relying on magazines for the same purpose are not independent of each other. We thus re-estimate Equation (2) (see Tables 2a and 2b), but now allow $v_{1i,}v_{2i,} \ldots, v_{6i}$ to be correlated across equations with correlation coefficients ρ_{12} to ρ_{56}. Similarly, we estimate Equation (3) again to discover determinants of subjective and objective knowledge (see Table 3a); here, we now allow w_{1i} and w_{2i} to be correlated with correlation coefficient ρ_{12}.

Table 4 shows all estimated correlation coefficients with 95 per cent confidence intervals.

Table 4 SUR regressions—correlations across equations

	Newspapers	Magazines	Radio	Internet	Friends
Television	**0.71**	**0.67**	**0.68**	**0.59**	**0.55**
	[0.66; 0.75]	[0.62; 72]	[0.62; 0.72]	[0.52; 0.66]	[0.48; 0.61]
	Newspapers	**0.65**	**0.67**	**0.51**	**0.51**
		[0.59; 0.70]	[0.61; 0.71]	[0.43; 0.58]	[0.44; 0.57]
		Magazines	**0.57**	**0.56**	**0.56**
			[0.50; 0.63]	[0.49; 0.63]	[0.50; 0.62]
	Objective Knowledge		**Radio**	**0.587**	**0.58**
				[0.52; 0.65]	[0.51; 0.63]
Subjective knowledge	0.04			**Internet**	**0.56**
	[-0.02; 0.09]				[0.48; 0.63]

Notes: Pairwise error term correlation coefficients across equations [95 per cent confidence intervals] are shown based on seemingly unrelated ordered probit regressions. N = 1,354 (sources of information) and 1,975 (knowledge).

We discover significant correlations between the residuals of Equation (2) for all media sources used to obtain information about the ECB. The estimated correlation coefficients vary between 0.5 and 0.7; the highest correlation is between the newspaper equation and the television equation (ρ = 0.7). In contrast, the correlation coefficient between the equations for the two knowledge types is small and not significant at a level of 5 per cent.

When controlling for the error correlation across equations in a SUR framework, some estimates change sufficiently enough to affect our baseline results. Several control variables exert a significant influence on media use. Table A4 in the Appendix shows coefficients of SUR ordered logistic regressions for Equation (2). Ideology now significantly influences reading magazines for ECB information, as conservatives read them

more frequently than do people with no clear political orientation. Frequency of magazine reading increases with age. Finally, the gender difference is now evident for all six information sources, as female respondents have a significantly lower probability of talking to friends, colleagues, and relatives about the ECB. The magnitude of the effects changes, too, but the difference in the AME between independent and SUR regressions is always smaller than 1 pp. Table A5 provides SUR AME for television and newspapers, the two sources most frequently used by our respondents, and focuses on the two extreme categories of 'never used' (category 1) and 'regularly used' (category 3).[16] For instance, in an independent regression, the probability of regularly reading newspapers for ECB information is 23 pp higher for a person with a very strong information desire compared to a person with a very weak information desire. In comparison, the probability is almost 24 pp when using the estimates from a SUR regression.

V. Conclusions

In this paper, we study German citizens' knowledge about the functioning of monetary policy and the ECB, and also investigate the public's use of mass communication media to obtain information about the ECB. We look into the factors that influence ordinary people's objective knowledge about (i) the relationship between inflation and the ECB's main refinancing rate, (ii) the ECB's main objective, and (iii) the ECB's political independence, as well as their own perceived level of knowledge (subjective knowledge).

Our analysis is based on a specially designed representative survey of German households conducted on our behalf in autumn 2011 by GfK. We adapt the general framework for interdependencies between media use and economic knowledge developed by Blinder and Krueger (2004). Methodically, we employ ordered probit regressions to study interdependencies between Germans' information search behaviour, measured by a person's desire to be informed about the ECB and his use of different media sources, and his subjective and objective knowledge about monetary policy and the ECB, measured with a set of multiple-choice questions.

First, regarding subjective knowledge, we find that Germans do not claim to know very much about monetary policy or the ECB. The majority of respondents evaluate their own ECB knowledge as either bad or very bad. On an aggregate level, this is reflected in the level of objective knowledge, as one out of every three respondents did not answer

[16] Corresponding AME for independent regressions can be found in Table 2b.

even one of our factual knowledge questions correctly. Fifty per cent of our sample knows the ECB's main objective; but only 34 per cent of respondents are aware of the fact that European governments do not have a say in setting the ECB's key interest rates. Compared to the information desire expressed with respect to other institutions, Germans have limited interest in ECB information. If people do search for information about the ECB, they do so mainly by watching television and reading newspapers.

Second, a person's education, income, and political orientation are all positively related to the desire to be informed about the ECB. Higher levels of education and higher household net income both lead to more interest in monetary policy. Compared to non-ideologists, people with a clear party preference have a significantly stronger desire for information about the ECB. However, interest in the ECB is twice as high for supporters of more conservative parties compared to supporters of more socialist parties. A person's desire to be informed is a key determinant of his information search behaviour; furthermore, reliance on different media sources for obtaining ECB information is positively related to educational background. We also find significant differences in search behaviour between men and women; all media sources are used significantly less frequent by female respondents.

Third, a person's desire to be informed about the ECB, along with his use of information sources, are decisive for his level of subjective and objective knowledge about the ECB. We find the influence of information desire to be stronger for subjective than for objective knowledge. Moreover, the impact of media sources differs between the two types of knowledge. Using all channels (exception: radio) has a significantly positive influence on respondents' perceptions of their own knowledge, but it is only television viewers and newspapers readers who have significantly better factual knowledge about monetary policy and the ECB.

Fourth, a respondent's sex has important effects on both objective and subjective knowledge. Women evaluate their own knowledge as poor more frequently than do men. And, indeed, women are significantly less educated on monetary policy issues than are men. In both cases, the gender effect holds even when controlling for age, education, information desire, and media use of the women. A comparison of subjective and objective knowledge suggests that it is particularly men with low interest in the ECB who tend to overestimate their own knowledge compared to women. Age is positively related to objective knowledge, where the knowledge distribution along the age structure is of an inverted-u shape. Our findings on age and sex differences in objective knowledge are in

line with previous studies on financial literacy (Lusardi and Mitchell 2014). However, our findings on the relationship between objective and subjective knowledge are novel to the extant literature.

Fifth, seemingly unrelated regressions (SUR) for the use of all six media sources indicate significantly positive correlations of error terms across equations. In three cases, SUR estimation leads to the finding of additional statistical significance for categories of control variables. The magnitude of the effects changes slightly, but the difference in average marginal effects is always smaller than 1 pp. In contrast, SUR estimation for subjective and objective knowledge shows no significant error term correlation across the two equations.

To conclude, it appears that educating the general public about monetary policy issues should focus on arousing an interest in the subject. Uninterested citizens are unlikely to expend any effort on learning about the topic, no matter how many sources of information are available for this purpose. Central bank education programmes should take this fact into account and as a first step try to interest the public in the importance of understanding monetary policy, before explaining any specific policy in detail.

However, even those already interested in monetary policy may not be easy to teach. Another challenge for monetary policy education is that subjective and objective knowledge are related, but distinct, concepts that do not necessarily coincide. Watching television or reading newspapers to obtain information about the ECB likely increases a person's level of subjective knowledge. Yet in many cases, subjective and objective knowledge levels are not closely aligned, which implies that some people are systematically overconfident about their knowledge, whereas others have too little confidence in what they know. This may have serious consequences for economic decision-making in that both groups may tend to make financial decisions that are less than optimal. Thus, education programmes should take this fact into account and help people to realistically gauge their knowledge level when making economic decisions and alert them to the possibly inappropriate influence the mass media can have on thinking about important financial decisions.

Last, but not least, the challenges of, first, arousing interest in monetary policy, and, second, teaching people to understand it for their own benefit, become even more difficult in light of this study's findings in regard to women. Women are not only less interested in monetary policy issues than men, but they also have a lower level of factual

knowledge. This finding holds even for women who are either young or well-educated or both. We thus advise that education on monetary policy be targeted to specific subgroups rather than take the usual one-size-fits-all approach. In spite of all these challenges, and given that numerous studies find a clear positive relationship between economic knowledge and wise financial decision making (Lusardi and Mitchell 2014), central banks and other institutions are well advised to increase their educational efforts.

VI. References

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VII. Appendix

Table A1 Summary statistics

Variable	N	Min	Max	Mean	Stand. dev.
Age	2,006	14	97	47.75	17.62
ECB information desire	2,006	1 'not important at all'	5 'very important'	2.82	1.22
Education	1,976	1 'primary education'	5 'university degree'	2.82	1.04
Family status	2,006	0 'without partner'	1 'with partner'	0.60	0.49
Friends, colleagues, and relatives	2,006	1 'never used'	3 'regularly used'	1.32	0.52
Sex	2,006	0 'male'	1 'female'	0.54	0.50
Germany	2,006	0 'West Germany'	1 'East Germany'	0.24	0.43
Ideology	1,669	0 'no ideology'	3 'other'	1.14	0.92
Internet	2,006	1 'never used'	3 'regularly used'	1.25	0.53
Knowledge ECB decision	2,006	0 'wrong answer/don't know'	1 'correct answer'	0.36	0.48
Knowledge ECB mandate	2,006	0 'wrong answer/don't know'	1 'correct answer'	0.48	0.50
Knowledge monetary policy	2,006	0 'wrong answer/don't know'	1 'correct answer'	0.19	0.39
Magazines	2,006	1 'never used'	3 'regularly used'	1.49	0.63
Newspapers	2,006	1 'never used'	3 'regularly used'	1.65	0.69
Objective knowledge	2,006	0 'correct answers'	3 'correct answers'	1.03	0.89
Occupation	2,005	1 'employed'	5 'in training'	2.03	1.33
Radio	2,006	1 'never used'	3 'regularly used'	1.41	0.60
Self-interest	1,597	1 '≤ €1,499'	4 '≥ €3,500'	2.28	1.01
Subjective knowledge	2,006	1 'very bad'	5 'very good'	2.27	0.98
Television	2,006	1 'never used'	3 'regularly used'	1.77	0.69
Urbanisation	2,006	0 '< 100,000 residents'	1 '≥ 100,000 residents'	0.28	0.45

Table A2 Questionnaire

Knowledge

Subjective knowledge
The monetary policy of all countries in the euro area is managed by the European Central Bank (ECB). How do you rate your own knowledge about the ECB? Value 1 means that your knowledge is very bad. Value 5 means that your knowledge is very good. You may grade your opinion with the values in between.

( )	1	'very bad'
( )	2	
( )	3	
( )	4	
( )	5	'very good'

Knowledge ECB mandate
Which of the following objectives is, from your point of view, the main objective of the ECB? The main objective of the ECB is to …

( ) … promote growth in the euro area
( ) … fight unemployment in the euro area
( ) … maintain price stability in the euro area
( ) … provide credit to European Union member states
( ) … control the euro/US dollar exchange rate
( ) Don't know

Knowledge monetary policy
Private banks borrow liquidity from the ECB at a given interest rate. Assume that prices in the euro area are expected to increase strongly. How do you think the interest rate should be set?

( ) Decrease interest rate
( ) Keep interest rate constant
( ) Increase interest rate
( ) Don't know

Knowledge ECB decision
Who is responsible for setting this interest rate?

( ) The ECB, independently of euro area governments
( ) The ECB, euro area governments have to agree afterwards
( ) The ECB together with euro area governments
( ) The euro area governments, with the ECB executing the decisions
( ) Don't know

Media use

Desire to be informed about the ECB

How important is it for you personally to be informed about the following institutions? Value 1 means that it is not important at all for you to be informed. Value 5 means that it is very important for you to be informed. You may grade your opinion with the values in between.

	1 'not important at all'	2	3	4	5 'very important'
German Bundestag	( )	( )	( )	( )	( )
European Union	( )	( )	( )	( )	( )
United Nations	( )	( )	( )	( )	( )
German Bundesbank	( )	( )	( )	( )	( )
European Central Bank	( )	( )	( )	( )	( )
International Monetary Fund	( )	( )	( )	( )	( )

Use of media sources

How many times do you use the following channels to inform yourself about the ECB?

	1 'never'	2 'occasionally'	3 'regularly'
Newspapers	( )	( )	( )
Magazines	( )	( )	( )
Radio	( )	( )	( )
Television	( )	( )	( )
Internet	( )	( )	( )
Relatives/friends/colleagues	( )	( )	( )

Notes: The order of the questions does not correspond to the original order in the survey.

Table A3 Monetary policy knowledge

		Objective knowledge						Subjective knowledge	
		1 correct answer		2 'bad'		3 'moderate'		5 'very good'	
Education	Apprentice	0.002	[0.006]	**-0.004**	[0.002]	**0.041**	[0.021]	**0.002**	[0.001]
	Junior high	0.005	[0.005]	**-0.017**	[0.003]	**0.079**	[0.021]	**0.006**	[0.002]
	Secondary	-0.0003	[0.007]	**-0.021**	[0.006]	**0.087**	[0.023]	**0.008**	[0.003]
	University	-0.005	[0.009]	**-0.024**	[0.007]	**0.093**	[0.023]	**0.009**	[0.003]
ECB information desire	2	0.005	[0.004]	**0.046**	[0.012]	**0.146**	[0.020]	**0.002**	[0.001]
	3	0.005	[0.004]	**0.027**	[0.012]	**0.221**	[0.020]	**0.004**	[0.001]
	4	0.004	[0.004]	-0.025	[0.014]	**0.290**	[0.022]	**0.012**	[0.003]
	Very important	0.005	[0.004]	**-0.068**	[0.022]	**0.316**	[0.023]	**0.020**	[0.006]
Media sources	Television	0.005	[0.003]	**-0.014**	[0.004]	**0.045**	[0.014]	**0.004**	[0.001]
	Newspapers	0.004	[0.003]	**-0.011**	[0.004]	**0.031**	[0.013]	**0.003**	[0.001]
	Magazines	-0.001	[0.001]	**-0.015**	[0.005]	**0.038**	[0.011]	**0.004**	[0.001]
	Radio	-0.00001	[0.001]	-0.007	[0.004]	0.018	[0.010]	0.002	[0.001]
	Internet	-0.001	[0.001]	**-0.018**	[0.006]	**0.038**	[0.011]	**0.005**	[0.002]
	Friends	-0.0002	[0.001]	**-0.010**	[0.004]	**0.025**	[0.009]	**0.003**	[0.001]
Age		0.0001	[0.0001]	0.0001	[0.0001]	-0.0003	[0.0004]	-0.00004	[0.00005]
Sex	Female	-0.001	[0.001]	**0.010**	[0.003]	**-0.026**	[0.008]	**-0.003**	[0.001]
Germany	East	0.0001	[0.0004]	**0.009**	[0.003]	**-0.029**	[0.010]	**-0.003**	[0.001]
Urbanisation	Large city	0.0001	[0.0004]	0.001	[0.003]	-0.002	[0.008]	-0.0003	[0.001]
Family status	With partner	-0.0003	[0.0005]	0.0004	[0.003]	-0.001	[0.008]	-0.0001	[0.001]
Occupation	Unemployed	-0.006	[0.006]	-0.004	[0.007]	0.011	[0.017]	0.002	[0.003]
	Retired	-0.005	[0.004]	-0.003	[0.005]	0.008	[0.012]	0.001	[0.002]
	Homemaker	0.0002	[0.0004]	0.002	[0.007]	-0.005	[0.022]	-0.001	[0.003]
	In training	-0.001	[0.004]	0.002	[0.006]	-0.007	[0.018]	-0.001	[0.002]

Table A4 Sources of information to be informed about the ECB—SUR regression coefficients

		Television	Newspapers	Magazines	Radio	Internet	Friends, …
Education	Apprentice	**0.323**	0.110	**0.363**	0.006	0.292	-0.039
	Junior high	**0.460**	**0.357**	**0.625**	0.251	**0.654**	0.007
	Secondary	**0.497**	**0.436**	**0.661**	0.316	**0.911**	0.235
	University	**0.576**	**0.481**	**0.965**	**0.577**	**1.196**	0.093
ECB information desire	2	**0.717**	**0.636**	**0.734**	**0.578**	**0.545**	**0.498**
	3	**0.969**	**0.908**	**0.976**	**0.883**	**0.664**	**0.682**
	4	**1.289**	**1.263**	**1.377**	**1.246**	**1.102**	**0.951**
	Very important	**1.643**	**1.494**	**1.761**	**1.486**	**1.494**	**1.192**
Self-interest	€1,500-2,499	-0.044	0.115	0.014	-0.157	0.102	-0.075
	€2,500-3,499	0.074	0.220	0.092	-0.122	0.138	-0.032
	≥ €3,500	0.021	**0.296**	0.152	-0.226	0.127	0.124
Ideology	Conservative	0.026	0.117	**0.191**	-0.041	**0.235**	0.041
	Left	0.067	**0.160**	0.144	0.052	-0.050	0.091
	Other	-0.144	**-0.548**	0.112	-0.104	0.167	-0.216
Age		0.006	**0.018**	**0.007**	0.007	**-0.016**	-0.001
Sex	Female	**-0.255**	**-0.412**	**-0.356**	**-0.252**	**-0.309**	**-0.161**
Germany	East	-0.097	**-0.193**	-0.143	-0.011	-0.029	0.141
Urbanisation	Large city	0.078	0.090	**0.158**	0.011	**0.167**	-0.015
Family status	With partner	-0.066	-0.093	-0.103	-0.095	-0.031	-0.112
Occupation	Unemployed	0.110	-0.069	-0.151	-0.098	0.188	-0.049
	Retired	**0.231**	0.022	0.089	0.172	0.121	0.149
	Homemaker	0.099	0.084	-0.061	0.231	0.119	0.135
	In training	0.109	0.243	0.206	0.143	0.074	0.063

Table A5 Sources of information to be informed about the ECB—SUR regression AME

		Television				Newspapers			
		Never		Regularly		Never		Regularly	
Education	Apprentice	**-0.111**	[0.051]	**0.055**	[0.023]	-0.036	[0.045]	0.016	[0.019]
	Junior high	**-0.156**	[0.051]	**0.084**	[0.023]	**-0.117**	[0.046]	**0.057**	[0.020]
	Secondary	**-0.169**	[0.058]	**0.093**	[0.030]	**-0.142**	[0.052]	**0.073**	[0.026]
	University	**-0.194**	[0.057]	**0.112**	[0.031]	**-0.157**	[0.054]	**0.082**	[0.028]
ECB information desire	2	**-0.268**	[0.042]	**0.078**	[0.014]	**-0.210**	[0.040]	**0.054**	[0.011]
	3	**-0.361**	[0.038]	**0.129**	[0.014]	**-0.310**	[0.035]	**0.097**	[0.011]
	4	**-0.464**	[0.037]	**0.213**	[0.020]	**-0.435**	[0.037]	**0.174**	[0.018]
	Very important	**-0.555**	[0.040]	**0.331**	[0.040]	**-0.507**	[0.045]	**0.238**	[0.035]
Self-interest	€1,500-2,499	0.015	[0.032]	-0.010	[0.021]	-0.038	[0.032]	0.019	[0.016]
	€2,500-3,499	-0.023	[0.037]	0.016	[0.025]	-0.072	[0.037]	**0.038**	[0.019]
	≥ €3,500	-0.006	[0.043]	0.004	[0.028]	**-0.097**	[0.042]	**0.052**	[0.023]
Ideology	Conservative	-0.008	[0.029]	0.005	[0.019]	-0.039	[0.030]	0.020	[0.016]
	Left	-0.022	[0.025]	0.015	[0.016]	**-0.053**	[0.026]	**0.028**	[0.014]
	Other	0.047	[0.055]	-0.027	[0.030]	**0.174**	[0.059]	**-0.067**	[0.019]
Age		-0.002	[0.001]	0.001	[0.001]	**-0.006**	[0.001]	**0.003**	[0.001]
Gender	Female	**0.084**	[0.021]	**-0.055**	[0.014]	**0.136**	[0.023]	**-0.073**	[0.012]
Germany	East	0.032	[0.026]	-0.020	[0.016]	**0.063**	[0.027]	**-0.033**	[0.013]
Urbanisation	Large city	-0.025	[0.023]	0.017	[0.015]	-0.029	[0.023]	0.016	[0.013]
Family status	With partner	0.021	[0.026]	-0.014	[0.018]	0.030	[0.026]	-0.016	[0.014]
Occupation	Unemployed	-0.035	[0.050]	0.023	[0.034]	0.022	[0.056]	-0.012	[0.028]
	Retired	**-0.074**	[0.036]	0.052	[0.027]	-0.007	[0.037]	0.004	[0.020]
	Homemaker	-0.033	[0.055]	0.021	[0.037]	-0.027	[0.053]	0.015	[0.030]
	In training	-0.036	[0.049]	0.023	[0.034]	-0.078	[0.051]	0.047	[0.035]