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Instinctive versus reflective trust in the European Central Bank

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Abstract

Political science research has established that trust in institutions, including central banks, is shaped by socio-economic and demographic factors, as well as by the assessment of institutional features and by slow-moving components such as culture. However, the role of cognitive processes has largely been neglected, especially in the analysis of central bank trust. In this paper we aim to address this gap focusing on the case of the European Central Bank (ECB). We introduce the concepts of "instinctive trust", which captures an on-the-spot judgement on the institution's trustworthiness, and of "reflective trust", which refers to a more pondered opinion on the matter. Using a survey experiment, we find that deeper consideration about the ECB promotes less trust in the institution compared to an on-the-spot judgement. This result is mainly driven by women, and in particular by those who say they possess a low understanding of the central bank's policies.

Keywords: Institutional trust, survey experiment, central bank

JEL Classification: C83, D83, E58, Z13

Non-technical summary

Trust in a central bank can be defined as the belief that the institution will carry out its mandate with competence and integrity, acting in the broader interest of the citizens it serves. A high level of public trust is fundamental for central banks, as it enhances the effectiveness of their policies. Moreover, trust is crucial for preserving central bank legitimacy. This is especially true in the case of the European Central Bank (ECB), which has the status of both an independent central bank and a supranational institution.

In the aftermath of the financial crisis, public trust deteriorated for several European institutions, including the ECB. In response to this phenomenon, more attention has been devoted to studying the determinants of institutional trust and identifying ways to restore it.

Political science research has established that trust in institutions, including central banks, is shaped by a number of factors: socio-economic and demographic factors, the assessment of institutional features like performance or integrity, as well as other slow-moving determinants such as culture. However, especially when it comes to central bank trust, the role of cognitive processes has largely been neglected. In this paper, we aim to address this gap. In particular, we introduce the concepts of "instinctive trust", which captures an on-the-spot judgement on the institution's trustworthiness, and of "reflective trust", which refers to a more pondered opinion on the matter. Focusing on the case of the ECB, we show that a difference between instinctive and reflective trust exists, try to assess why it does and finally highlight relevant implications for central banks and researchers in the field.

In practice, we use a survey experiment and randomise the position of the question on trust. One third of respondents give an answer at the beginning of the questionnaire, which constitutes our measure of instinctive trust. Another third of respondents faces the question in the middle of the questionnaire and the remaining third has it at the end, just before information on socio-demographic variables is collected. The responses of these last two groups provide a measure of reflective trust.

We find that the non-response rate halves over the course of the survey. Respondents who have the chance to reflect about the institution are more likely to develop and express an opinion on the ECB's trustworthiness compared to those who immediately face the question on trust. This process appears to penalise the ECB, as reflective trust is lower than instinctive trust. In other words, respondents who face the question on trust later in the survey are less likely to state that they trust the institution compared to the others. Only the respondents that complete the survey are considered in the analysis, so that results are not influenced by extraneous factors (e.g. different levels of patience across the treatment groups).

Additional analysis reveals important heterogeneities across gender and education levels. The decrease in non-response rates is common to all socio-demographic groups, although with differences in the size of the decline. However, the drop in the level of trust mainly occurs for women, in particular those with a low self-assessed knowledge about the ECB.

The results of this analysis have various implications. First, they point to the importance of boosting women's knowledge about the ECB, and at the same time promoting their confidence in such knowledge, as a way to improve trust in the institution. Moreover, from a methodological standpoint, the existence of different types of trust recommend particular care in survey design, as the positioning of the questions on trust determines which type of attitude is eventually measured. Similarly, researchers using pre-existing survey data should assess which type of trust they are employing in their analysis. Lastly, our results indicate that survey measures of institutional trust for women might be generally noisier than those for men, as they heavily depend on the context in which the opinion is expressed.

1 Introduction

In the last 20 years, institutional trust deteriorated significantly in the European continent and abroad (Algan et al. (2017); OECD (2017b)), and trust in the ECB was no exception (Ehrmann et al. (2013), Farvaque et al. (2017)). A lack of support for the central bank might increase politicians' incentives to criticise its policies and to exert pressures that constrain its independence Binder (2021)), and also impact its ability to steer inflation expectations (Christelis et al. (2020), Mellina and Schmidt (2018)). Hence the ECB - as well as other central banks around the world - has a strong incentive to preserve a high level of public trust.

In response to the post-crisis deterioration of trust, new efforts have been put in place to investigate its formation and, ultimately, find ways to restore it.

Trust in institutions, including central banks, has been explained by socio-economic and demographic factors as well as by the assessment of institutional features such as performance or integrity (Ehrmann et al. (2013), Murtin et al. (2018)), by trust in related bodies[1] and by other slow-moving determinants such as culture (Angino et al. (2021)). However, especially when it comes to analysing central bank trust, the role of cognitive processes has largely been neglected. As we show in this paper, whether people trust an institution or not also depends on the circumstances in which they are asked to express their view.

Institutional trust is traditionally elicited via surveys. Modern theories of public opinion reject the idea that survey answers are respondents' attempt to express a reasonably well-formed attitude on a given issue. Drawing from the cognitive psychology literature, they propose instead a view according to which individuals "carry around in their heads a mix of only partially consistent ideas and considerations" (Zaller and Feldman (1992)). When questioned, people call to mind a sample of these ideas, the most accessible ones in terms of recency or salience, and their survey responses end up reflecting this material.

In this paper we ask ourselves: how different are on-the-spot judgements on the ECB's trustworthiness compared to more pondered responses on the matter? Differences might exist both in the probability of expressing an opinion and in the type of opinion itself.

From a theoretical point of view, the way in which deeper consideration influences the probability of expressing an opinion is not clear-cut. On the one hand, having more time to think gives the respondents the chance to retrieve more information from memory and better arrange them. As a result, respondents might feel more comfortable taking a stance. At the same time, the retrieval of controversial material might end up burying the respondents under a cognitive overload and hindering them from forming an opinion, eventually leaving them

[1] For example, trust in the European Union and its institutions are correlated with trust in the European Central Bank (Hayo and Neuenkirch (2014)).

undecided. Similarly, once an opinion is expressed, it is unclear *a priori* whether respondents will tend to trust the ECB more or less in case they can reflect about the institution, as the quality of the material retrieved and the way respondents aggregate it to form an opinion could be more or less favourable to the institution.

Whether deeper consideration affects trust and response rates compared to an on-the-spot judgement and, if so, in which direction, remain open questions. Our aim is to tackle them empirically. In order to do so, we make use of a survey experiment.

In the ECB Knowledge and Attitudes (K&A) survey, conducted yearly in the nineteen countries of the euro area, we randomise the position of the question "Do you tend to trust or not to trust the ECB?" for different groups of respondents, placing it at the beginning, in the middle or at the end of the questionnaire. By doing so, we seek to elicit two different types of trust: one which captures an on-the-spot judgement on the ECB's trustworthiness, and another which refers to a more pondered opinion on the matter. We call them "instinctive trust" and "reflective trust", respectively.

We find that the non-response rate halves over the course of the survey. Respondents who have the chance to reflect about the institution are more likely to develop and express an opinion on the ECB's trustworthiness compared to those who immediately face the question on trust. At the same time, this process appears to penalise the ECB, as reflective trust is lower than instinctive trust. In other words, respondents who face the question on trust later in the survey are less likely to state that they trust the institution compared to the others.

Additional analysis reveals important heterogeneities across gender and education levels. The decrease in non-response rates is common to all socio-demographic groups, although with differences in the size of the decline. However, the drop in the level of trust mainly occurs for women. In particular, we show that this decline in trust for women is linked to the respondents' degree of self-assessed knowledge about the ECB. Women who profess little knowledge are the ones experiencing the decline in trust.

Our paper contributes to the literature on the determinants of institutional trust, specifically central bank trust, and speaks in particular on the importance of psychological factors. Methodologically, it ties with existing research that uses survey experiments to examine public perceptions and opinions in the central bank field.

The results of this analysis have various implications. First, they point to the importance of boosting women's knowledge about the ECB, and at the same time promoting their confidence in such knowledge, as a way to improve trust in the institution. Moreover, from a methodological standpoint, the existence of different types of trust recommend particular care in survey design, as the positioning of the questions on trust determines which type of attitude is eventually measured. Similarly, researchers using pre-existing survey data should

assess which type of trust they are employing in their analysis. Lastly, our results indicate that survey measures of institutional trust for women might be generally noisier than those for men, as they heavily depend on the context in which the opinion is expressed.

The paper is organised as follows. In Section 2 we review the literature on the relevance and determinants of central bank trust. Section 3 describes the data and the experimental design. Section 4 reviews the results and Section 5 provides several robustness checks. In Section 6 we discuss the results and their potential limitations. Finally, Section 7 draws conclusions and provides policy recommendations.

2 Literature review

Institutional trust can be defined as the citizens' belief that an institution will fulfil its mandate with competence and integrity, acting in pursuit of the broader benefit of society (OECD (2017b)). One of the forms of institutional trust that has increasingly attracted the attention of scholars, especially in economics, is trust in central banks. This interest is motivated by two main arguments.

The first one is that trust in a central bank plays a crucial role in the transmission of its monetary policy, as hypothesised by Ehrmann et al. (2013) and empirically tested by Mellina and Schmidt (2018) and Christelis et al. (2020) (see also Lamla et al. (2019)). Focusing on the case of the ECB, these papers find that higher trust in the central bank translates into a better ability to anchor household inflation expectations around its target, even when respondents' financial literacy and knowledge of the ECB objectives are controlled for. As such, trust influences the ECB's ability to deliver on its mandate.

More generally, as noted by Christelis et al. (2020), higher trust in a central bank is likely to improve confidence in the future state of the economy, affecting saving, consumption and investment decisions and thus boosting economic growth. This observation is in line with findings from the literature on the effects of social trust, i.e. trust in other people, and institutional trust on economic and social progress (Algan and Cahuc (2010),Bjørnskov (2017), Hwang (2017),Tabellini (2010),Zak and Knack (2001)).

The second reason why public trust is essential for central banks is linked to the legitimacy of the institution. This holds true in particular for the ECB, given its supranational and independent status. If one pillar of the ECB's legitimacy is constituted by its treaty-based mandate and accountability framework, which has been strengthened over the years (Fraccaroli et al. (2018)), the other one is public trust, a "form of de facto accountability" (Lastra et al. (2020)). Ehrmann and Fratzscher (2011) show that, when trust in the ECB plummets, the monetary policy preferences national politicians express tend to shift towards

growth and employment (i.e., away from price stability) and towards national economic performance (i.e., away from a euro area-wide perspective). National politicians might thus pressure the ECB to adapt its reaction function in the same direction. Similarly, Binder (2021) and Kaltenthaler et al. (2010) suggest that low levels of public trust might translate into political actions to erode the ECB's independence.

Given the importance of trust for central banks' success and legitimacy, a growing body of research has focused on identifying and understanding its determinants, both at the macro- and micro-level. Most of these studies have been focused on the determinants of trust in the ECB.

Among macroeconomic factors, the inflation rate consistently emerges as an important determinant of trust (Fischer and Hahn (2008), Farvaque et al. (2017)). Labour market developments and GDP, while not falling under the direct responsibility of the ECB, are also often found to be associated with trust in the institution (Fischer and Hahn (2008), Roth et al. (2014), Roth et al. (2016)), supporting the view that the public is subject to bounded rationality on these issues (Bursian and Fürth (2015)). In general, a more positive evaluation of, and expectations about, the economic situation appears to favour trust in the ECB (Farvaque et al. (2017),Gros and Roth (2010),Scalera and Dixon (2016)).

National financial conditions are also found to have an important impact on individual attitudes, with increasing sovereign bond yields, sovereign credit downgrade episodes, banking sector issues and the adoption of bail-out programmes likely to propel mistrust in the ECB (Wälti (2012), Ehrmann et al. (2013), Drakos et al. (2019)).

Stressing the role of the European identity of the ECB, Bergbauer et al. (2020) show that trust in the central bank is driven by citizens' evaluation of the EU's policy performance, whereas support for the euro is linked to European values and identity. Research has also highlighted that knowledge about the ECB is positively linked to trust (Ehrmann et al. (2013), Hayo and Neuenkirch (2014), Kaltenthaler et al. (2010)).

Virtually all papers that take socio-demographic characteristics into account show a strong positive relationship between higher education and higher trust. Differences also often emerge depending on income level and employment status, with people with lower income, unemployed and manual workers usually expressing lower levels of trust (Drakos et al. (2019), Farvaque et al. (2017)). Being on the left hand-side of the political spectrum is also usually associated with lower levels of trust (Farvaque et al. (2017), see Bursian and Fürth (2015) for the German public). Only some papers find significant differences between genders, age groups and marital status (Ehrmann et al. (2013), Farvaque et al. (2017), Kaltenthaler et al. (2010)). Most interestingly for our paper, these studies show that trust levels in the ECB are higher for men than for women.

However, limited attention has been paid to psychological aspects. One example is Van der Cruijsen and Eijffinger (2010), which show that the difference between actual and perceived transparency of the ECB hinges upon individual and psychological factors.

More closely related to this paper, Kril et al. (2016) study trust in the Bank of Israel building on a conceptualisation borrowed from psychology (in particular Castelfranchi and Falcone (2010)) which distinguishes between reason-based trust, i.e., "the result of a deliberate rational evaluation", and implicit trust, an intuitive, "unanalysed and automatic" appraisal (Castelfranchi and Falcone (2010)). The authors find that trust in the Bank of Israel is associated with various perceptions, like professionalism, transparency and social awareness, that are highly correlated among each other. They conclude that trust in the Bank of Israel is a manifestation of implicit trust. At the same time, they find that trust in the central bank's forecasts *specifically* is more reason-based and relies only on pertinent factors, such as the central bank's competence and independence from political power.

The distinction between two types of trust is present in our paper as well. While the concept of instinctive trust is comparable to the one of implicit trust, reflective trust does not necessarily correspond to reason-based trust. There is no guarantee that respondents who have more time to think about the ECB are more likely to judge the ECB's trustworthiness as rational agents compared to respondents who provide an on-the-spot judgement.

In order to elicit different types of trust, we rely on a survey experiment, "an experiment that is administered to a representative population sample" (Mutz (2011)). This approach has become common to shed light on the underlying mechanism of public opinion construction, especially in political science (Kuklinski et al. (2000), Sniderman and Theriault (2018)). The reason for the popularity of survey experiments is their ability to combine experiments' internal validity with the external validity of population-based samples. Indeed, the generalisability of survey experiment results to real-world scenarios has been investigated and broadly confirmed by several papers (Barabas and Jerit (2010), Hainmueller et al. (2015)).

In the strand of research focusing on the relationship between central banks and the public, survey experiments have been used to investigate how inflation expectations are formed (Armantier et al. (2016), Cavallo et al. (2017)) and how simplified central bank messages impact trust, understanding and inflation expectations (Baerg et al. (2018), Bholat et al. (2019)). Generally, these papers use as treatment the provision of randomised information. Our survey experiment plays instead with the placement of the question on trust or, said otherwise, the provision of time to reflect about the ECB.

Tourangeau et al. (2000) distinguishes four steps in the process of answering survey questions. First, respondents attempt to understand the question. Second, they retrieve pertinent information from memory. Next, they rework and aggregate such information to

form an opinion. Finally, they map their opinion onto the response options. By randomising the position of the question on trust, we aim to affect the second stage and the third stage of the answering process - the recollection of relevant material and the formation of the opinion.

3 Survey description

Our survey experiment makes use of two consecutive waves of the ECB K&A annual survey. This survey aims at investigating opinions and perceptions regarding the central bank among the general public as well as their media consumption habits. Interviews were carried out in the first halves of December 2017 and December 2018 by an external company. Around 1000 people above the age of 15 were surveyed in each country, except for the smallest ones where the sample was made of 500 respondents for each wave.[2] This sampling results in a total of 30,162 observations. All interviews were conducted over the phone in the country's official language(s).[3]

The questionnaire can be divided in three parts. It starts by asking whether the respondents have ever heard of the ECB, their National Central Bank, the ECB Banking Supervision and the Eurosystem. For ease of exposition, we consider these questions as "external" to the three parts that we are now going to describe.

Part 1 mainly focuses on attitudes and knowledge about the ECB. Respondents are asked about their general interest in the ECB's policies (on a scale from 1 - Very interested to 4 - Not interested at all). Then, they are asked to pick the items they consider the ECB's tasks or objectives from a list of ten. The list includes statements such as "To supervise euro area banks" or "To finance governments".[4] Next, using a scale from 1 to 4, respondents state whether or not they think that the ECB has an impact on their personal/family income, purchasing power, job/business, value of savings and investments, and on the economy as a whole.

Part 2 focuses on media consumption habits and opinions about the ECB. Respondents are first surveyed about where[5] and how often they hear about the ECB. Then they face a series of questions focused on which specific outlets are regularly followed for each media type (television, radio, printed and online press, social media). Finally, the survey goes back to investigate attitudes about the ECB asking respondents for their degree of self-assessed

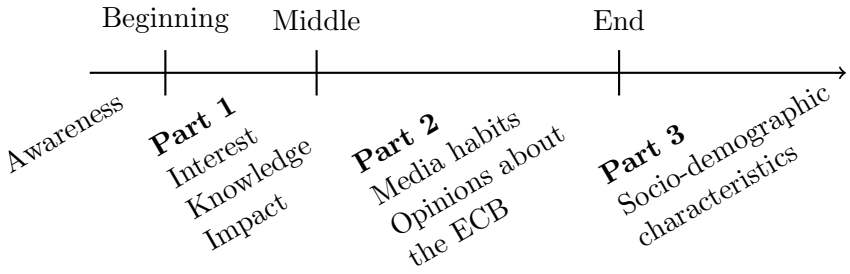
[2]This is the case of Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovenia.

[3]In Belgium, Estonia, Ireland, Latvia and Malta, questionnaires were available in more than one language.

[4]The items are "to stabilise the foregn exchange rate", "to issue banknotes", "to set the interest rates", "to support growth and unemployment", "to ensure financial stability", "to supervise euro area banks", "to help countries in financial difficulties", "to keep inflation at bay", "to give loans to banks" and "to finance governments". Rotation is used, so that the items are ordered differently for each participant.

[5]The list includes traditional and social media types, but also "Discussion with relatives, friend and colleagues".

Figure 3.1: Outline of the questionnaire



knowledge of the institution (on a scale from 1 to 10), and for their level of agreement or disagreement, first with a list of adjectives (e.g. "independent", "successful"), followed by a list of statements ("The ECB does what it says" or "The ECB assumes responsibility for its decisions"). The third and final part collects information on socio-demographic characteristics such as gender, age, education, area of residence and financial sophistication.

No new information is directly provided to the respondents during the questionnaire and no feedback is given on their answers. Nonetheless, we acknowledge that some questions can indirectly provide guidance. For instance, when asked to select the ECB's tasks and objectives from a list, respondents could infer that the ECB is not a commercial bank (even though one of the available option is "Other").

The outline of the questionnaire is exemplified by Figure 3.1. We randomise the position of the question on trust and place it at the beginning, that is, at the beginning of Part 1, right after the awareness questions; in the middle, between Part 1 and Part 2; or at the end, before the survey asks for sociodemographic characteristics in Part 3. The randomisation results in three groups of approximately equal size.

Table A1 in the Appendix reports descriptive statistics for an extensive set of socio-demographic characteristics and other information such as media consumption habits and economic/financial sophistication for each of the three groups. No statistically significant differences among them could be identified, confirming that the randomisation in terms of observables was successful.[6]

What about unobservable characteristics? It must be noted that our sample includes completed interviews only. Respondents in the sample might be different in terms of both observable and unobservable characteristics from people who dropped out midway or refused to take part in the survey. About these people, unfortunately, we have no information.

While the limitations stemming from this will be discussed in Section 6, there is little reason to believe that respondents who completed the survey and were randomly allocated

[6] Similar results are found at the country level. Tables are available from the authors upon request.

to different groups are different in terms of unobservables among each other. Said otherwise, unless the position of the question on trust itself affects the probability to remain in the sample, the internal validity of the experiment should not be threatened by attrition.[7]

The question on trust in the ECB, "Do you tend to trust or not to trust the European Central Bank?", is worded exactly as in the European Commission's Eurobarometer (EB) and has the same three answer options: "Tend to trust", "Tend not to trust", or "Do not know". The two surveys also share the same target population, namely citizens older than 15 years old. Yet, the level of net trust measured by the K&A survey for the euro area is significantly higher than the Eurobarometer one, in the range of 10-20 percentage points. We believe there are two main reasons for this. First, the surveys have different interview modalities, which make them not directly comparable: telephone calls using random digit dialing for the K&A, face-to-face interviews for the Eurobarometer. A second important difference is that, while the K&A survey exclusively focuses on the ECB, the Eurobarometer has a broader focus and the questions on trust in European institutions are lumped together. As Ehrmann et al. (2013) notes, this might affect participants' responses, in the sense that they might have the tendency to provide a collective answer rather than one for each individual institution. Nonetheless, the K&A trust measures at the country level are highly correlated with the Eurobarometer ones, providing strong evidence that the measures provide reliable information (see OECD (2017a)).[8]

4 Results

First, we analyse response rates for the question on trust at different points of the questionnaire. Being a European institution, the ECB is more distant from euro area citizens than local bodies. It is not directly subject to citizens' scrutiny via a voting procedure, unlike the European Parliament. It is thus plausible that not all respondents have had a chance, or a sound reason, to think thoroughly about their attitudes towards the ECB and to form an opinion about its trustworthiness before the interview.

There is no constraint on the amount of time respondents can spend answering any of the questions. However, common sense and social norms suggest that, even when conflicted, people provide an answer in a matter of seconds. Hence, when the questionnaire opens with the question on trust, the time for the recollection of the relevant material is bound to be

[7] For instance, we expect more impatient people to drop the survey earlier on, and this is likely to happen regardless of whether they have already faced the question on trust or not.

[8] When the question is directly comparable and surveys are high quality, OECD (2017a) suggests that the Pearson correlation coefficient should be above 0.8. We find that the correlation between national measures of net trust in the ECB over the two years considered is 0.87.

rather short. Conversely, respondents for which the question on trust arrives towards the end have more time to think about the institution and retrieve more material from memory.

To study the evolution of the response rate, we estimate the following model:

$$\begin{aligned} response_i &= \alpha + \beta_1 middle_i + \beta_2 end_i + u_i \\ &= \alpha + \beta position_i + u_i \end{aligned} \tag{1}$$

where $response_i$ is a binary variable capturing whether or not an opinion is expressed by individual i, and $position_i = [middle_i, end_i]$ contains the two dummies for the position of the question on trust in the survey.

Here, as well as in the remainder of the paper, we work with saturated models. In other words, we introduce as many parameters as there are distinct values that the conditional expectation function (CEF) can take. This feature has two consequences. First, as saturated models allow for a full description of the CEF, rather than for an approximation, a linear regression is suitable even with a limited dependent variable, as we are simply comparing levels of trust across different groups (Angrist and Pischke (2008)). Using a linear regression facilitates the interpretation of results, especially of interaction coefficients.

The second consequence of working with saturated models is that they call for the use of survey weights to estimate the population average causal effect, as explained in Solon et al. (2015). We report unweighted estimates in the Appendix, and discuss this and other robustness checks in Section 5.

Estimates for model 1 are displayed in Column (1) of Table 4.1. The first row reports the percentage of respondents expressing an opinion at the beginning of the survey, while the others report changes compared to this baseline and their respective t-statistics. The response rate for the question on trust in the ECB is 87.1% when it is placed at the beginning of the survey. After the first batch of questions, this probability increases to 92.5% and keeps growing: it nearly touches 95% when the question on trust is asked before Part 3. Both changes are statistically significant at the 0.1% level.

Hence, the non-response rate practically halves over the course of the survey. This suggests that, when given the time and facing the appropriate stimulus, nearly all respondents express an opinion about the ECB's trustworthiness. The opinion is newly developed over the course of the survey, or alternatively respondents may feel more confident in expressing their position after they have mentally retrieved more material about the ECB.

How does this opinion evolve? We analyse net trust, defined as the percentage of people who trust the ECB over the percentage of those who express an opinion on the matter.[9]

[9] See the Appendix for gross figures.

Table 4.1: Changes in response rates and levels of trust over the survey

	(1) Response	(2) Trust
Beginning	0.871***	0.607***
(Level)	(150.25)	(65.43)
Middle	0.054***	-0.027*
(Change)	(7.29)	(-2.10)
End	0.078***	-0.034**
(Change)	(11.16)	(-2.62)
N	30,126	26,950

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Hence, we disregard the overall 8.5% of non-respondents. We estimate a linear model with the same variables on the right-hand side of the equation as in 1:

$$trust_i = \alpha + \beta position_i + u_i \tag{2}$$

where the binary dependent variable $trust_i$ captures whether or not individual i trusts the ECB *given that an opinion is expressed*.

The survey implicity asks people to reflect on the impact the ECB has on their own lives, to think about its reputation. Any institution would probably hope that, as citizens ruminate about its work, the level of trust increases. This is not what we observe in Column (2) of Table 4.1. At the beginning of the survey, 60.7% of respondents say they trust the ECB: this is the level of instinctive trust. After Part 1, responses already get more critical. Trust declines to 58.0% in the middle and reaches 57.3% at the end. Only the change over Part 1 is statistically significant: the loss of trust occurs nearly immediately and does not continue over the rest of the survey.

These findings at the aggregate level mask important heterogeneities that we will explore in the next subsection

4.1 Exploring heterogeneity

The previous section showed that the response rate is higher and trust is lower at the end of the survey compared to the beginning. Here we explore whether the evolution of these two variables depends on invididual characteristics, namely gender and education.

As tempting as it may be, we do not use any variable derived from questions that appear

in Part 1 or Part 2 of the experiment to segment the sample at this stage. We cannot exclude, in fact, that the positioning of the question on trust has affected these responses, and controlling for such variables would create a post-treatment bias (see Montgomery et al. (2018)).[10]

Education is measured using the question: "How old were you when you stopped full-time education?". This question makes it easier to compare results across euro area countries than one asking for the highest education level completed. We recode responses and create a binary variable equal to 1 if the respondent has studied until or beyond the age of 20, and 0 otherwise. For those who are still studying, we use the same threshold. We take this as a proxy for college education. The interaction of college education and gender gives us four categories of approximately equal size.[11] Summary statistics are reported in Table A3 in the Appendix.

As done in the previous section, we consider response rates first. We run the following model:

$$response_i = \alpha + \beta position_i + \gamma x_i + \theta position \times x_i + u_i \tag{3}$$

Compared to 1, we add the vector of binary variables $x_i = [malecol_i, femnocol_i, femcol_i]$ - in which the variable takes value 1 if the person is male with college education, female without college education and female with college education, respectively, - and its interaction with the position vector. The resulting model is thus fully saturated.

Full results are displayed in Table A6, while in Table 4.1, based on the same regression, we highlight the changes in the response rate for each group.

All groups show an increasing trend, as it is evident in Figure 4.1. Only, college educated people seem to experience a milder growth compared to their counterparts, as the flatter lines show. Also, response rates for men follow an elbow curve, with the statistically significant increase only occurring during the first part of the survey. Response rates for women instead keep growing during Part 2: women may need to retrieve more material from memory before feeling comfortable in expressing an opinion on a given subject, or they could be slower in the process of recalling and of opinion formation.

Leaving aside changes in response rates, we focus now on their levels. When the question on trust in the ECB is placed at the beginning of the survey, men with college education exhibit the highest response rate (92.2%), followed by women with and men without col-

[10] Gaines et al. (2007) warns about this issue: "[...] the deliberate shuffling of questions in a cross-sectional survey can create multiple, intertwined experiments that speak to causal direction or at least to causal complexity. Assuming one-way causal relationships can be an error".

[11] We acknowledge the fact that people with college education are over-represented even after reweighting. This could be due to the imprecise proxy used for college education or to less educated people being more likely to drop out. Considering each socio-demographic group in isolation also attempts to mitigate this issue.

Figure 4.1: Evolution of response rate by socio-demographic group

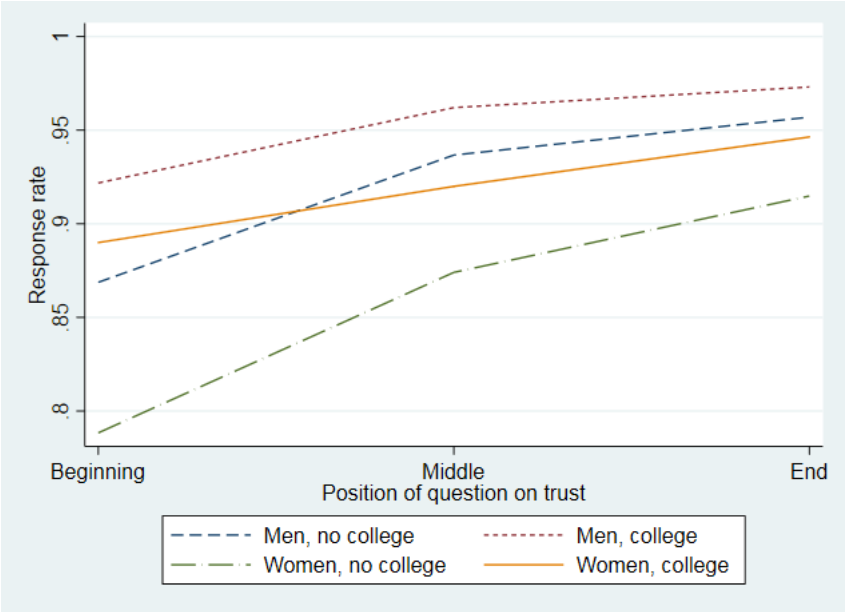


Table 4.2: Changes in response rates over the survey by socio-demographic group

Response	(1) All	(2) Men No college	(3) Men College	(4) Women No college	(5) Women College
Beginning	0.871***	0.869***	0.922***	0.788***	0.890***
	(150.25)	(63.77)	(109.27)	(55.11)	(86.24)
Middle	0.054***	0.068***	0.040***	0.086***	0.030*
	(7.29)	(4.18)	(3.99)	(4.65)	(2.16)
End	0.078***	0.088***	0.051***	0.126***	0.056***
	(11.16)	(5.84)	(5.38)	(7.14)	(4.26)

Notes: Excerpts derived by one single regression. Full results are displayed in A6. Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

lege education (89.0% and 86.9% respectively). The difference between these groups is not statistically significant. Women without college education display the lowest response rate, 78.8%. This ordering remains unchanged even when the question on trust is asked at the end, but at the same time, we observe the distance between response rates narrows.

This ranking finds additional confirmation when we look at Eurobarometer data.[12] Segmenting the sample according to gender and college education, we find that response rates to the question on trust in the ECB follow the same ordering that emerges in the K&A survey: men with college education are the most likely to express an opinion, women without college education are the least likely, and the remaining two groups are in between with similar figures. It is worth mentioning that the Eurobarometer response rates are remarkably similar to the K&A survey levels when the question on trust is asked at the beginning of the survey, both for 2017 and 2018.[13]

All in all, more educated people display higher response rates, in line with the claim by Hakhverdian and Mayne (2012) that education affects one's ability to evaluate the performance of governmental institutions, either via an increased attention to political and public affairs, a higher consumption of news or a greater tendency to undertake political activities that give the opportunity to learn about the quality of the institutions.[14]

As for gender, at every point in the survey, women tend to respond less often to the question on trust compared to their male counterparts. Whether this is due to a lower perceived knowledge of the topic at stake, or it is a general tendency - women being less assertive than men, all other things being equal - is an open question. The literature appears surprisingly sparse on this point and cannot offer much guidance. Related research on financial education suggests that, when it comes to economic matters, women tend to score lower than men across all age groups, and are more likely to answer "do not know" (OECD (2014)).

What do our data have to say on this? First, since we want to use self-assessed knowledge, in order to avoid the mutual causation problem described above, we exclude respondents who faced the question on trust in the ECB after self-assessed knowledge was elicited. These are respondents in the "End" treatment. Then we pool the observations from the two remaining treatments and estimate a simple linear model. The response variable is regressed on gender,

[12] We consider Eurobarometer 88.3 (November 2017) and Eurobarometer 90.3 (November 2018), whose fieldwork was carried out in a period similar to the K&A waves consider in our analysis.

[13] In the Eurobarometer 88.3 the response rate for men without college education is 87.4% (86.0% in the K&A 2017), for men with college education 93.0% (91.9% in the K&A), for women without college education 82.3% (80.5% in the K&A) and for women with college education 87.8% (91.5% in the K&A). In the Eurobarometer 90.3 the response rate for men without college education is 88.0% (87.6% in the K&A 2018), for men with college education 92.1% (92.4% in the K&A), for women without college education 81.9% (77.2% in the K&A) and for women with college education 86.4% (86.6% in the K&A).

[14] For additional references on this literature, see Hakhverdian and Mayne (2012).

college education, self-assessed and factual knowledge scores.[15]

This exercise shows that, even controlling for the two different types of knowledge, the coefficient on gender remains statistically significant (p-value<0.001). Also, self-assessed knowledge is positively linked to the likelihood of expressing an opinion (p-value<0.001). [16,17]

To investigate the relationship between gender and knowledge even further, we briefly consider the Eurobarometer questions asking for trust in various institutions and consider their response rates. For the ECB, we have found that men with college education are the most likely to give an opinion, women without college education the least. The same ranking extends to other supranational entities such as the European Parliament, the European Commission, the European Union and the United Nations. However, for national institutions - the parliament and the government -, the response rates are higher and similar across groups, with the sole exception of women without college education, who are only slightly less likely to express their views. Hence, proximity of the entity flattens the likelihood to express an opinion, and speaks in favour of the prominent role of perceived institutional knowledge.[18]

While this is not sufficient evidence to make strong claims, our findings suggest that both gender attitudes and differences in the degree of self-assessed knowledge play a role in the response rates gap.

Trust offers a much more heterogeneous picture, as it is evident from Figure 4.2.

As for the analysis of response rates, we estimate the following probit model:

$$trust_i = \alpha + \beta position_i + \gamma x_i + \theta position \times x_i + u_i \tag{4}$$

Three findings emerge from the results presented in Table 4.3. First, and most importantly for our research question, there is a substantial difference between genders when it comes to the evolution of trust. While men's trust appears stable, women's trust decreases markedly over the course of the survey. The loss of trust is around 7 percentage points for women with college education and 10 points for women without. The latter category

[15]The factual knowledge score is equal to the number of ECB's tasks and objectives correctly selected in Part 1. As the correctness of some of these items is hard to assess for the general public, we only use a balance subset of six tasks and objectives: "to ensure financial stability" (Correct), "to supervise euro area banks" (Correct), "to help countries in financial difficulties" (Wrong), "to keep inflation at bay" (Correct), "to give loans to banks" (Wrong), "to finance governments" (Wrong).

[16]The coefficient on factual knowledge is not statistically significant.

[17]Our precaution - excluding respondents in the "End" treatment - appears unnecessary, as regression results remain unchanged if the whole sample is considered instead.

[18]We are assuming that people's perceived knowledge is higher for national institutions than for supranational entities.

Figure 4.2: Evolution of trust by socio-demographic group

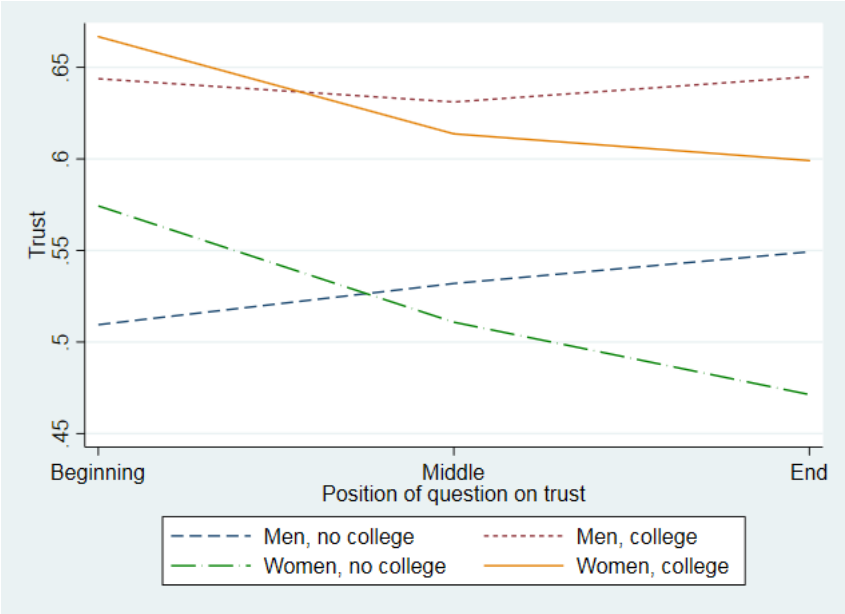


Table 4.3: Changes in levels of trust over the survey by socio-demographic group

Trust	(1) All	(2) Men No college	(3) Men College	(4) Women No college	(5) Women College
Beginning	0.607***	0.509***	0.644***	0.574***	0.667***
	(65.43)	(24.66)	(37.88)	(28.46)	(40.77)
Middle	-0.027*	0.023	-0.013	-0.063*	-0.053*
	(-2.10)	(0.78)	(-0.54)	(-2.29)	(-2.20)
End	-0.034**	0.040	0.001	-0.103***	-0.068**
	(-2.62)	(1.38)	(0.04)	(-3.64)	(-2.80)

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

goes from a consistent majority trusting the ECB at the beginning of the survey, to only a minority doing so at the end. The loss of trust for both groups of women occurs mainly in the first part of the survey, suggesting a fast process at work.

Second, women exhibit similar or higher levels of instinctive trust compared to their male equivalents, but end up with levels of reflective trust that are lower than their counterparts. The group ranking at the end of the survey sees men with college first, then men without college, women with college and finally women without college. This is in line with the group ranking that emerges from the Eurobarometer question. Levels of trust are instead much lower in the European Commission's survey, as previously mentioned.

The literature on gender and institutional trust, and public opinion more generally, is rather scarce. An old paper by Lægreid (1993) finds that women support the public sector more than men do, in line with our findings for instinctive trust. Turning to the behavioural economic domain, where trust games are extensively used to analyse interpersonal trust, results are mixed:[19] either gender has no effect, or men are found to trust more than women. Interestingly, Croson and Gneezy (2009) posits that the mixed results emerging in the laboratory are due to the greater sensitivity of women to the context in which they are called to act. In line with this observation, our findings suggest that survey measures of trust for women are likely to be noisier than those for men. Women's reported trust seems to depend markedly on the circumstances in which they are asked for it, similarly to what happens for experimental measures.

Third, a striking education divide emerges from Figure 4.2. College educated people, regardless of their gender, report substantially higher levels of trust compared to their less educated counterparts. Hakhverdian et al. (2012) suggests that education *per se* does not encourage or discourage institutional trust, but rather it affects one's ability to evaluate the performance of the governmental institutions. In the case of the ECB, people with college education seem to judge its performance rather favourably.

4.2 The role of perceived knowledge

Why should respondents change their opinion about the ECB over such a brief time span?[20] Our experiment allows us to look into the black box of opinion formation up to a certain point. We suggest that unstable attitudes toward the ECB are associated with a lower self-assessed knowledge about the institution.

To begin with, the subjective assessment of one's knowledge could be a proxy for knowl-

[19] See Haselhuhn et al. (2015).

[20] Of course, the between-subject methodology only allows us to compare average response rates and levels of trust for groups, and not for individual respondents.

edge itself. The relevant set of information available to those with a good understanding of the ECB's policies will be richer and better structured than for those who are less familiar with the central bank. We expect this set of information to be rather insensitive to cues coming from the questionnaire, like the fact that the ECB is not a commercial bank: an informed respondent should already know.

This does not imply that all those with a high perceived knowledge about the ECB possess a fully-fledged opinion on its trustworthiness at the beginning of the survey, and that the response rate should thus stay flat. We expect the set of information to be *better* structured, not "fully structured", and answering questions can still facilitate the opinion formation process.

Under the same hypothesis that perceived and factual knowledge are linked, we suspect that those with little understanding of the ECB's work could recall news or experiences related to economic outcomes that do not fall under the ECB's jurisdiction and yet, as these respondents ignore the limit of the ECB's mandate, they could praise - but most likely blame - the central bank for factors such as the labor market conditions.

A second way perceived knowledge could influence the evolution of trust is via a negative survey experience. The sense of unfamiliarity with the topic at stake could mount as questions follow one another. Under this hypothesis, realising that they do not know the ECB, respondents eventually "punish" it: and indeed, why should they trust something that they do not know?

The question on self-assessed knowledge lies in the second part of the questionnaire. In what follows we reduce the sample and consider again only respondents who face the question on trust in the ECB at the beginning or in the middle of the questionnaire, thus before the question on self-assessed knowledge. This allows us to study the impact of self-assessed knowledge on the evolution of trust without the fear of mutual causation, as explained in a previous section.

We build a binary variable out of the 10-point scale self-assessed knowledge: we recode as "low knowledge" the scores from 1 to 5, and as "high knowledge" those from 6 to 10. Summary statistics for the new variable are reported in Table 4.4. The vast majority of respondents say they have a low understanding of the ECB's policies, and this is especially true for women.

We estimate the following model:

$$\begin{aligned} trust_i = \alpha + \beta middle_i + \gamma x_i + \delta know_i + \\ \theta middle_i \times x_i + \lambda middle_i \times know_i + \mu x_i \times know_i + \\ \pi middle_i \times x_i \times know_i + u_i \end{aligned} \tag{5}$$

Table 4.4: Percentage of respondents with high perceived knowledge about the ECB by socio-demographic group

% High perceived knowledge	% of total sample	% excluding "End" respondents
Men without college	29.4	29.6
Men with college	46.6	46.7
Women without college	17.6	17.6
Women with college	24.0	23.8
All	30.0	30.0

Notes: Weighted statistics are reported.

where the right hand side features $know_i$, a binary variable equal to 1 if individual i claims to possess a high knowledge of the ECB, interacting with the variables describing the position of the question on trust, and respondents' gender and education. The most relevant results are highlighted in Table 4.5, while the full set can be found in Table A9.

For those with a high degree of awareness of the ECB's policies, reflective trust remains similar to instinctive trust regardless of gender or education. At the same time, more of them express an opinion at the end compared to the beginning of the survey.[21] It appears that the questionnaire encourages them to express their opinion, or to pick a side, but overall it does not affect the quality of such an opinion.

Among the less aware, we find a stark difference between women and men. Women who declare a low degree of knowledge experience a sizeable loss of trust, while men do not. This is valid for both levels of education. While explaining this gender difference is beyond the scope of the paper, we suspect that women feel more uncomfortable when reporting trust in an institution that they realise not to know, while men do not suffer such pressure. Regardless of the underlying explanation, our findings are somewhat consistent with the observation by Croson and Gneezy (2009) that women's behaviour is more variable than men's behaviour in the lab, and suggest that their hypothesis could be extended to survey experiments as well.

To sum up, the loss in trust observed at the aggregate level can be fully attributed to women who think they do not know much about the ECB. These women might be expressing distrust for the institution *because* they realise they do not know it.

It is worth observing that a higher degree of self-assessed knowledge is associated with more trust in all groups except for women with college education (see Table A10). Men without college education and a high perceived knowledge about the ECB trust it 16.4% more than those with low knowledge; for men with and women without college education

[21] These results are omitted for brevity, and can be obtained from the authors on request.

the difference is around 10%. Hence, a high degree of self-assessed knowledge does not only stabilise levels of trust for women, but it also shifts them upwards for nearly all groups.

Table 4.5: Evolution of trust by socio-demographic group and level of perceived knowledge about the ECB

Trust	(1) Men No college	(2) Men College	(3) Women No college	(4) Women College
Middle	0.031	0.018	-0.062*	-0.073**
if low knowledge	(0.91)	(0.56)	(-2.02)	(-2.60)
Middle	0.013	-0.044	-0.050	0.033
if high knowledge	(0.25)	(-1.33)	(-0.80)	(0.76)
N	17,637	17,637	17,637	17,637

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5 Robustness checks

In this section we check whether our results are sensitive to different specifications of the model. Results are reported in Tables A4 - A5 and A7 - A8.

In this battery of tables, the results for different robustness checks are compared with our preferred specification in Column (1). Column (2) reports unweighted estimates. In Column (3) we add both country and time fixed effect. In Columns (4) - (5) we estimate our preferred specification for 2017 and 2018 separately.

We start with general results for response rates. The effect of the positioning remains stable across all specifications, as shown in Table A4. The same holds true when looking at different socio-demographic groups in Table A7. The sole exception lies in results for women with college education using 2017 data, where the effect of the positioning is not present. We conclude that results for response rates are robust.

When it comes to trust, we see in A5 that the effect of placing the question in the middle of the questionnaire disappears in some specifications, while the coefficient on the variable *end* is much more robust. Only results for 2017 differ: both the direction and the size of the coefficient are consistent with all other specifications, but statistical significance is not

reached (p-value=0.107).

Regarding heterogeneity across socio-demographic groups, reported in Table A8, results for men are stable. Using unweighted estimates, the coefficients on *end* for men with college education becomes negative and statistically significant, suggesting that men in smaller countries experience a stronger loss of trust over the course of the survey.

When it comes to women, the effect of placing the question in the middle of the survey is rather unstable: the sign of the coefficient is consistently negative, but size and statistical significance vary. Using unweighted estimates smothers the coefficients, again pointing in the direction of different behaviours in small and large countries. Finally, we find that, for women with college education, 2018 data are the ones driving the decline in trust.

6 Discussion

While it is hard to draw firm conclusions using survey data, we argue that the use of a survey experiment is a step beyond simple descriptive analysis.

The results of this analysis indicate that deeper consideration about the ECB is associated with less trust in the institution compared to an on-the-spot judgement, and that this is the case particularly for women with low perceived knowledge of the ECB. The results provide suggestive evidence that boosting women's knowledge about the ECB, and at the same time promoting their confidence in such knowledge, might be a way to improve trust in the institution.

From a methodological point of view, our analysis suggests that researchers should be aware of the different types of trust that a survey can measure. For those who have the possibility to design their questionnaire, this means that a conscious decision on whether instinctive or reflective trust is the target variable should be made. For scholars using pre-existing data, it is important to consider the ordering of the questions and try to determine what type of trust has been elicited.

Our findings also highlight the higher volatility of trust measures for women, as they seem to depend heavily on the context in which such opinion is expressed. This suggests that survey measures collected for women are noisier than those collected for men, in line with previous studies.

As noted in previous sections, we only consider completed interviews. Our checks suggest that the randomisation of respondents in the three different groups has been effective when it comes to observable characteristic. This, coupled with the observation that the assignment to one of the three groups (and hence, the position of the question on trust) is unlikely to be correlated to the probability to drop out, reassure us about the internal validity of our

study.

We have no information about respondents who decide to drop out from the survey midway or who refused to take part to the survey in full. These people might differ in terms of unobservable characteristics from those who completed the survey: they could be more impatient, busier, or less interested in European affairs. Surely, we cannot exclude that such traits are linked to their levels of trust in the ECB, and our results might not extend to these parts of the population. At the same time, non-random attrition in survey data is a well-known concern in the field and by all means not limited to the present study. Moreover, as discussed in the literature review, research has provided encouraging results about the external validity of survey experiments.

Another question that the present work does not address due to data limitations concerns the duration of the effects that have been identified (see the discussion in Gaines et al. (2007)). While not directly comparable to our study, as we do not directly expose respondents to new information about the ECB but merely provide the opportunity to reflect about it, it might still be informative to consider the research on the duration of effects of news and mass communication (e.g. Lecheler and de Vreese (2016), Hill et al. (2013)). Findings are mixed and heavily context-dependent: often the bulk of the persuasive impact of the message disappears after only a few days, especially when the treatment is not repeated.

We cannot exclude that levels of trust revert to initial, instinctive levels after the end of the survey. At the same time, our experiment showed how shaky the foundations of trust are for certain demographic groups. Rather than mimicking a particular real-word scenario, our experiment should be seen as a diagnostic test that revealed the fragility of respondents' attitudes. In times where the institution is often featured in the political and economic debate, even the mere repeated exposure to the ECB - a prolonged occasion to reflect about the institution, as in our experiment - might erode trust. We leave to future research to ascertain for how long and under which circumstances respondents' trust remains at reflective levels.

Finally, understanding whether citizens are guided by instinctive or reflective trust in the ECB when they take economic decisions, or when they receive and interpret ECB's messages, is beyond the scope of this paper, and surely deserves further attention. At the same time, trust is also the layer on which the central bank's legitimacy rests. If not economic decisions, political ones might be influenced by such a fragile trust. In this respect, future research should examine whether the pattern we have identified is unique to the ECB or it is common to other institutions.

7 Conclusions

Trust in an institution is not a ready-made idea we can easily retrieve from a mental shelf of pre-formed opinions. It emerges from a cloud of material, from an unruly swarm of memories, and the manner in which it crystallises depends on the conditions of the process itself.

To prove this point, we used a survey experiment which randomised the position of the question on trust in the ECB at the beginning, in the middle and at the end of our questionnaire, and studied the evolution of the response rate and of the level of trust.

We find that more and more people form and express an opinion over the course of the survey: they manage to recall and organise the relevant material rather fast, escaping the hurdle of a cognitive overload. At the same time, the reflective process does not promote trust in the ECB. On the contrary, the longer respondents think, the less they trust the institution. This finding should encourage researchers to acknowledge the existence of different types of trust and to explicitly state which one is featured in their analysis.

While the response rate improves for all socio-demographic groups - with some variations as to the size and speed of the process -, the loss of trust only occurs for women. In particular, it only happens for women who feel they do not know much about the institution. This is a ripe opportunity for the ECB to intervene with ad-hoc communication efforts. The challenge is to speak to an audience that has always been outside the central banks' communication comfort zone (see the speech by Haldane (2017)). There is plenty of room for improvement: around 80% of women in our sample state they know little about the ECB. And the benefits of boosting public understanding do not end here: as data have shown, an adequate degree of self-assessed knowledge is linked with higher levels of trust in virtually all socio-demographic groups considered.

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A Annex

Table A1: Randomisation check

% unless indicated otherwise	Beginning	Middle	End	All
Female	51.0	52.2	51.0	51.4
College education	55.9	57.4	56.0	56.4
Age (years)	50.5	50.3	49.7	50.2
Employed	54.0	53.0	54.5	53.8
Non employed	12.2	13.4	12.0	12.6
Retired	29.1	28.4	27.6	28.4
Student	4.7	5.2	5.9	5.2
Rural area	30.2	30.3	29.8	30.1
Urban area	44.4	44.8	46.2	45.1
Metropolitan area	25.4	24.9	23.9	24.8
Television as regular news source	87.3	87.8	88.1	87.7
Radio as regular news source	70.7	69.8	70.2	70.3
Print press as regular news source	54.7	53.4	55.2	54.4
Online press as regular news source	56.3	57.4	57.4	57.0
Social media as regular news source	38.3	39.7	40.1	39.4
Interested in economic/financial news	58.9	58.8	59.4	59.0
Educational background in economics	17.2	18.0	17.3	17.5
Investor	23.2	21.7	24.1	23.0
Degree of financial sophistication (scale 0-2)	1.1	1.1	1.1	1.1
N	30126			

If we consider gross trust instead of net trust (A2), we clearly see that the decline of 7.8% in non-responses over the whole course of the survey distributes unevenly between trust (+1.5%) and distrust (+6.3%). The relative size of these increases causes net trust to go down.

Table A2: Evolution of gross trust

	Beginning	Middle	End
Trust	52.9	53.6	54.4
Don't trust	34.2	38.8	40.5
Don't know	12.9	7.5	5.1

Table A3: Size of socio-demographic groups

	% of sample
Men without college	21.3
Men with college	28.2
Women without college	23.6
Women with college	26.9

Notes: Weighted statistics are reported.

Table A4: Evolution of the response rate
Robustness checks

	(1)	(2)	(3)	(4)	(5)
	Weighted	Unweighted	Fixed Effects	Year 2017	Year 2018
Middle	0.054***	0.057***	0.053***	0.045***	0.062***
	(7.29)	(12.32)	(7.28)	(4.46)	(5.80)
End	0.078***	0.075***	0.078***	0.073***	0.082***
	(11.16)	(17.10)	(11.21)	(7.61)	(8.16)
Constant	0.871***	0.851***	0.895***	0.880***	0.862***
	(150.25)	(239.64)	(139.84)	(112.47)	(101.04)
N	30,126	30,126	30,126	15,018	15,108
Weighted	Yes	No	Yes	Yes	Yes
Time/Country FE	No	No	Yes	No	No
Year	Both	Both	Both	2017	2018

Notes: Heteroskedastic standard errors used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A5: Evolution of trust
Robustness checks

	(1)	(2)	(3)	(4)	(5)
	Weighted	Unweighted	Fixed Effects	Year 2017	Year 2018
Middle	-0.027*	-0.008	-0.026*	-0.019	-0.036
	(-2.10)	(-1.10)	(-2.10)	(-1.03)	(-1.93)
End	-0.034**	-0.022**	-0.035**	-0.030	-0.039*
	(-2.62)	(-3.07)	(-2.62)	(-1.61)	(-2.10)
Constant	0.607***	0.653***	0.653***	0.604***	0.611***
	(65.43)	(126.98)	(40.16)	(46.17)	(46.38)
N	26,950	26,950	26,950	13,493	13,457
Weighted	Yes	No	Yes	Yes	Yes
Time/Country FE	No	No	Yes	No	No
Year	Both	Both	Both	2017	2018

Notes: Heteroskedastic standard errors used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A6: Evolution of response rates and trust by socio-demographic group
Preferred specifications

	(1) Response	(2) Trust
College	0.053***	0.134***
	(3.31)	(5.02)
Female	-0.080***	0.065*
	(-4.07)	(2.25)
College × Female	0.049*	-0.042
	(2.04)	(-1.12)
Middle	0.068***	0.023
	(4.18)	(0.78)
End	0.088***	0.040
	(5.84)	(1.38)
College × Middle	-0.028	-0.035
	(-1.45)	(-0.95)
College × End	-0.037*	-0.039
	(-2.07)	(-1.05)
Female × Middle	0.018	-0.086*
	(0.72)	(-2.15)
Female × End	0.038	-0.143***
	(1.64)	(-3.54)
College × Female × Middle	-0.028	0.046
	(-0.93)	(0.87)
College × Female × End	-0.033	0.074
	(-1.17)	(1.41)
Constant	0.869***	0.509***
	(63.77)	(24.66)
N	30,126	26,950

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A7: Evolution of response rates by socio-demographic group
Robustness checks

	(1) Weighted	(2) Unweighted	(3) Fixed Effects	(4) Year 2017	(5) Year 2018
			Men without college		
Middle	0.068***	0.070***	0.068***	0.080***	0.057*
	(4.18)	(7.17)	(4.20)	(3.48)	(2.46)
End	0.088***	0.082***	0.089***	0.105***	0.073***
	(5.84)	(8.64)	(5.89)	(4.83)	(3.50)
Constant	0.869***	0.848***	0.892***	0.860***	0.877***
	(63.77)	(109.98)	(59.07)	(42.63)	(47.60)
			Men with college		
Middle	0.040***	0.034***	0.040***	0.048**	0.033*
	(3.99)	(5.11)	(3.99)	(3.18)	(2.44)
End	0.051***	0.049***	0.051***	0.058***	0.044***
	(5.38)	(7.89)	(5.41)	(4.25)	(3.30)
Constant	0.922***	0.917***	0.942***	0.919***	0.925***
	(109.27)	(175.79)	(87.72)	(73.32)	(82.60)
			Women without college		
Middle	0.086***	0.091***	0.087***	0.069**	0.102***
	(4.65)	(7.95)	(4.77)	(2.75)	(3.78)
End	0.126***	0.115***	0.126***	0.122***	0.130***
	(7.14)	(10.33)	(7.17)	(5.27)	(4.85)
Constant	0.788***	0.759***	0.812***	0.805***	0.772***
	(55.11)	(86.95)	(53.58)	(42.26)	(36.40)
			Women with college		
Middle	0.030*	0.037***	0.028*	-0.000	0.060**
	(2.16)	(4.22)	(2.04)	(-0.01)	(2.86)
End	0.056***	0.060***	0.056***	0.026	0.086***
	(4.26)	(7.32)	(4.26)	(1.36)	(4.64)
Constant	0.890***	0.866***	0.911***	0.915***	0.866***
	(86.24)	(132.45)	(77.52)	(76.44)	(52.40)
N	30,126	30,126	30,126	15,018	15,108
Weighted	Yes	No	Yes	Yes	Yes
Time/Country FE	No	No	Yes	No	No
Year	Both	Both	Both	2017	2018

Notes: Heteroskedastic standard errors used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A8: Evolution of trust by socio-demographic group
Robustness checks

	(1) Weighted	(2) Unweighted	(3) Fixed Effects	(4) Year 2017	(5) Year 2018
			Men without college		
Middle	0.023	0.022	0.021	0.007	0.036
	(0.78)	(1.38)	(0.75)	(0.17)	(0.90)
End	0.040	0.020	0.038	0.011	0.065
	(1.38)	(1.24)	(1.34)	(0.27)	(1.62)
Constant	0.509***	0.602***	0.549***	0.527***	0.494***
	(24.66)	(52.76)	(22.23)	(17.68)	(17.18)
			Men with college		
Middle	-0.013	-0.009	-0.011	0.002	-0.028
	(-0.54)	(-0.75)	(-0.48)	(0.06)	(-0.82)
End	0.001	-0.029*	-0.000	0.001	0.002
	(0.04)	(-2.33)	(-0.01)	(0.02)	(0.06)
Constant	0.644***	0.711***	0.684***	0.637***	0.651***
	(37.88)	(79.26)	(32.11)	(26.39)	(27.26)
			Women without college		
Middle	-0.063*	-0.022	-0.062*	-0.058	-0.069
	(-2.29)	(-1.35)	(-2.25)	(-1.50)	(-1.74)
End	-0.103***	-0.046**	-0.101***	-0.103**	-0.102*
	(-3.64)	(-2.86)	(-3.59)	(-2.61)	(-2.52)
Constant	0.574***	0.586***	0.612***	0.566***	0.583***
	(28.46)	(50.77)	(25.38)	(20.08)	(20.17)
			Women with college		
Middle	-0.053*	-0.017	-0.051*	-0.029	-0.078*
	(-2.20)	(-1.24)	(-2.13)	(-0.86)	(-2.25)
End	-0.068**	-0.024	-0.070**	-0.025	-0.110**
	(-2.80)	(-1.81)	(-2.90)	(-0.72)	(-3.19)
Constant	0.667***	0.681***	0.708***	0.651***	0.683***
	(40.77)	(70.95)	(33.33)	(28.25)	(29.46)
N	30,126	30,126	30,126	15,018	15,108
Weighted	Yes	No	Yes	Yes	Yes
Time/Country FE	No	No	Yes	No	No
Year	Both	Both	Both	2017	2018

Notes: Heteroskedastic standard errors used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A9: Evolution of trust by socio-demographic group and perceived ECB knowledge

	(1) Trust
Middle	0.031
	(0.91)
High knowledge	0.164***
	(3.75)
Middle × High knowledge	-0.018
	(-0.29)
Female	0.097**
	(2.92)
Middle ×Female	-0.093*
	(-2.03)
High knowledge × Female	-0.066
	(-1.00)
Middle × High knowledge × Female	0.030
	(0.33)
College	0.133***
	(3.87)
Middle × College	-0.013
	(-0.27)
High knowledge × College	-0.053
	(-0.96)
Middle × High knowledge × College	-0.045
	(-0.58)
Female × College	-0.034
	(-0.76)
Middle × Female × College	0.002
	(0.03)
High knowledge × Female ×College	0.005
	(0.05)
Middle × High knowledge × Female × College	0.139
	(1.19)
Constant	0.457***
	(18.75)
N	17,637

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Table A10: Trust by socio-demographic group
and perceived ECB knowledge

Trust	(1) Men No college	(2) Men College	(3) Women No college	(4) Women College
Beginning	0.457***	0.590***	0.554***	0.653***
	(18.75)	(24.42)	(24.49)	(33.86)
High knowledge	0.164***	0.111**	0.098*	0.050
	(3.75)	(3.29)	(2.00)	(1.38)
Middle	0.031	0.018	-0.062*	-0.073**
	(0.91)	(0.56)	(-2.02)	(-2.60)
Middle× High knowledge	-0.018	-0.063	0.013	0.107*
	(-0.29)	(-1.34)	(0.18)	(2.05)
Middle + Middle× High knowledge	0.013	-0.044	-0.050	0.033
	(0.25)	(-1.33)	(-0.80)	(0.76)
N	17,637	17,637	17,637	17,637

Notes: Heteroskedastic standard errors and euro area weights used. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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