



Pension reform preferences in Germany: Does information matter? [☆]

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ABSTRACT

Demographic change has an impact on pay-as-you-go pension systems. To maintain their financial sustainability, reforms are necessary, but often lack public support. Using representative survey data from Germany, we conduct a survey experiment to investigate whether salience or information about demographic change increases preferences for reforms in general and for specific reform measures. We find that salience and information provision increase the perceived necessity for reforms. Furthermore, salience increases preferences for raising the retirement age over other reform measures, while information provision reduces preferences for tax subsidies. In addition, we highlight the impact of prior beliefs on the treatment effects. As the salience and information treatments hardly differ, we conclude that it is not so much the information about the demographic change, which matters. Rather, being made aware of the challenges facing the pension system affects reform preferences.

1. Introduction

According to the OECD (2019), most Western societies are characterized by low fertility rates, while life expectancy has been steadily increasing. The resulting ageing of the population poses serious problems for the financial sustainability of pension systems, especially if they are pay-as-you-go systems and based on intergenerational redistribution. Reforms of the pension systems are needed to meet this challenge (Boersch-Supan et al., 2020). At the same time, they are a widely and often controversially discussed topic. In particular, reform measures that involve raising the retirement age often face strong public opposition. The strikes in France in 2023 are a case in point.

Our paper addresses the questions whether salience and information about demographic change affect preferences for pension reforms. We conduct a computer assisted telephone interview (CATI) study with a representative sample of 1000 respondents in Germany. The main feature is a survey experiment in which respondents are asked about their beliefs about demographic change in Germany for the years 2020 and 2050 (relative to 1990). Subsequently, respondents are asked about their preferences for pension reforms regarding the German statutory pension insurance in general as well as for specific reform measures. We distinguish between

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a treatment group that receives no information about demographic change, our salience group, and a treatment group that is informed about the projected development of demographic change, our information group. We contrast this with a control group that is neither asked about their beliefs about demographic change nor given any information about it. This experiment allows us to draw conclusions about the causal effect of salience and information on reform preferences.

The German pension system consists of three pillars, which are the public, the private and the occupational pillar. Similar to other (Western) countries, the statutory pension insurance, which is part of the public pillar, is organized as a pay-as-you-go system, implying that the contributions of the current working generation are used to pay the pension benefits of the current retired generation. Against the background of demographic change, the necessity for reforms to improve the financial sustainability is part of a wider public debate in Germany. Several reforms of the public pension system were implemented during the last decades to deal with the challenges that are linked to demographic change. More recent reforms include an increase in the retirement age from 65 to 67 until 2029. Other reforms, however, had opposing effects on the financial sustainability: One reform limited the increase in the contribution rate to a maximum of 20% until 2025 while keeping the pension level at 48% or above. Another reform reduced the retirement age to 63 for those with a working history of 45 years (Board of Academic Advisors, 2021).¹ Economic experts frequently push for more reform effort (Deutsche Bundesbank, 2019; German Council of Economic Experts, 2020) and focus on four reform measures, which are suitable to take the demographic change into account: increasing the retirement age, decreasing the pension level, increasing the contribution rate or increasing tax subsidies. While all four measures contribute to a more balanced budget of the public pension system, increasing tax subsidies presents an external source of financing and does not correspond to what we understand as a measure which increases the internal financial sustainability of the public pension system. For the sake of a clearer distinction, in the following, we will only consider the first three measures as measures which improve the financial sustainability of the German statutory pension insurance.

However, as discussed by Boeri and Tabellini (2012), the willingness to accept the need for reforms is rather limited. The questions of interest in this paper are whether acceptance can be increased by increasing the salience, understanding and knowledge of the functioning of the statutory pension insurance and the role of demographic change, and whether support for specific reform measures changes as a result of salience and/or information provision about demographic change.

In the literature on pensions, information provision has received some attention, but the role of salience has not yet been addressed much. Looking at literature focused on other topics, Bleemer and Zafar (2018) in the context of education show that providing information about college returns has a significant effect on intended college attendance, but the effect is driven by making information about returns more salient rather than by the information itself. In the context of migration, Barrera et al. (2020) use the French election in 2017 to test the effects of alternative facts, fact-checking and actual facts on voting preferences. They show that exposure to actual facts improves factual knowledge, but does not reduce support for candidates who provide false facts. On the contrary, the treatments that increase factual knowledge also increase the salience of the immigration issue. Overall, salience effects dominate information effects. Again in the context of migration, Alesina et al. (2023) show that making respondents think about immigration reduces support for redistribution and argue that this is due to the salience of immigration. While there is clear evidence for the effect of salience on issues such as migration and education, it is not clear whether the above findings also hold in the context of pensions and old-age security. We contribute by providing new insights into the impact of the salience of demographic change on preferences for pension reforms.

Returning to the literature about information provision in the context of pensions, two broad strands can be distinguished that examine information effects — one focusing on the impact on behavior and one on the impact on understanding and reform preferences. Research focusing on pension planning behavior finds that providing information about expected pension payments via annual letters has a positive effect on labor supply and retirement savings in Germany (Dolls et al., 2018), while receivers in the United States (US) who are more aware of their expected benefits do not change their retirement behavior (Mastrobuoni, 2011). However, a simplification of the choice related to a retirement savings plan increases plan participation in the US (Beshears et al., 2013). Angelici et al. (2022) find that if they show female survey respondents three short videos informing them about the pension system, the treated women are more interested in learning more about the pension system and are also significantly more likely to have additional savings in a pension fund. Evidence on the effects of peer information is mixed, however, since Duflo and Saez (2003) find positive effects on pension plan enrollment in the context of a benefit fair, while Beshears et al. (2015) find negative effects on savings when providing information on the savings of peers.

Our paper contributes to the second strand of the literature on the effect of providing information on understanding, knowledge and pension reform preferences. Some recent studies focusing on financial literacy and pension reforms use survey experiments to analyze the effect of information provision on understanding the pension system and on reform preferences. They find that information about changes in the pension system makes respondents think that the pension system is easier to understand after the reform (Finseraas and Jakobsson, 2014a). It also increases their actual understanding of the new pension system, but does not have an impact on their pension planning behavior (Finseraas and Jakobsson, 2014b). Furthermore, Finseraas et al. (2017) study the effect of information campaigns on short- and medium-term knowledge. They find that the effect of providing information does not persist four months after the intervention and therefore, they conclude that information only has a limited effect on increasing public knowledge about reforms. According to Fornero and Lo Prete (2019), a higher level of economic and financial knowledge reduces the electoral costs of enforcing reforms of the pension system. Although pension reforms are necessary, the acceptance of

¹ The retirement age for early-retirement for those with a working history of 45 years increases gradually to 65 years until 2029, while the general retirement age increases to 67.

pension reforms tends to be rather low and therefore might come at a cost for politicians in terms of a reduced reelection probability. The authors, however, do not find a significant relation between implementing a major pension reform and reelection for a sample of 21 advanced countries, including Germany, Italy and Denmark. In addition, they show that the electoral cost of a major pension reform is lower in countries where the level of economic and financial literacy is higher (Fornero and Lo Prete, 2019). This finding is in line with Boeri and Tabellini (2012) who find for Italy that more informed individuals also have a higher acceptance of pension reforms.

Furthermore, Gouveia (2017) studies the effect of providing information about the Portuguese social security system on the support for pension reforms that enhance the sustainability of the system. She finds, that the information treatment only has an impact on respondents who are treated the most, i.e. spent the most time reading the provided information. In addition, Kangas et al. (2022) find that explaining a Finnish pension reform to treated individuals by sending them an information letter increases their perceived overall fairness of the reform. But it does neither impact fairness views of individual parts of the reforms nor concerns about different aspects of the pension system. Furthermore, receiving the letter has no significant impact on the objective knowledge. Therefore, when implementing an information experiment, it is important to understand whether any treatment effect is due to improved knowledge or increased salience. This is the aim of this paper.

Another related study using a survey experiment is Naumann (2017), who evaluates the impact of reform pressure on welfare state support in Germany from a political science perspective. As part of the experiment, respondents are informed that demographic change is a risk for the financing of the statutory pension insurance in order to increase the perceived reform pressure. Following this experiment, respondents are asked about their most and least preferred reform proposal. He finds that treated individuals are less likely to oppose an increase of the retirement age.

We extend the experiment conducted by Naumann (2017) in two ways: First, we do not only inform respondents about the importance of demographic change, but also ask them about their prior beliefs, i.e. how they think the old-age to working-age ratio will develop. This allows us to analyze heterogeneous treatment effects based on prior beliefs. Second, other than Naumann (2017), we ask respondents about their preferred option for each of six pairwise policy comparisons derived from the four reform measures mentioned above. This allows us to analyze in a more detailed way the individual rankings of policy measures and how preferences are affected by the treatments.

A further contribution of our paper is that due to the sample composition, we have representative subsamples of East and West Germany and are therefore able to see, whether the effects of salience and information differ for the two parts of Germany. This question is especially relevant, since ageing is more advanced in East Germany. While the old-age dependency ratio in all West German states but one is below 40, the old-age dependency ratio in all East German states is above 40, with Berlin being the only exception (Destatis, 2019). In addition, the experience with the pension system is less pronounced in East Germany – especially for the older cohorts – as the pension system of the Western part of Germany was extended to the Eastern part only after German reunification.² For the last three decades, the system was not fully harmonized as far as the calculation of pension benefits was concerned. This has led to constant discontent as East Germans felt disadvantaged, and, finally in 2017, to legal steps towards full harmonization. Therefore, attitudes towards the statutory pension insurance and related reforms might differ between respondents from East and West Germany and this might also hold for the treatment effects.

We consider preferences towards reforms in general and towards specific reform measures. We find that salience and information provision on demographic change has (marginally) significant positive effects on the perceived reform necessity for respondents of the full sample, covering all of Germany, as well as for West German respondents. East German respondents on the other hand do not change their perceived reform necessity due to the salience treatment, but increase it when they receive the information treatment. When analyzing the treatment effects as a function of respondents' prior beliefs about the demographic change, we find for the full sample that overestimating the old-age dependency ratio for 2020 decreases both the salience and the information effect, while the effect is positive for the overestimating respondents in the control group. Overestimating the ratio for 2050, on the contrary, increases the salience effect significantly. Overall, however, we do not find significant differences between the two treatment groups, i.e. our salience group and our information group. We therefore conclude that individuals react to the increased salience of demographic change, which is part of the treatments of both groups, and not so much to the provided information. But differences exist when we compare the two treatment groups on the one hand and the control group on the other hand, where the latter serves as the baseline comparison. Contrary to the two treatment groups, individuals in the control group are only introduced to the topic of demographic change after answering the questions about their reform preferences. Demographic change does not seem salient to them.

To support the interpretation of a general lack of salience of pension issues among our respondents, we conduct a Google Trends analysis for the period of our survey. We find that, overall, there is no evidence that the issues of pension and demography are particularly salient for respondents from either West Germany or East Germany, which may also explain why the majority of respondents hold different beliefs about the development of demographic change than the forecasts suggest.³

Regarding the more specific reform measures, our main focus is on the most preferred option, increasing the tax subsidies, and the least preferred option, increasing the retirement age. We find that salience of demographic change increases the likelihood that respondents prefer an increase in the retirement age over a decrease in the pension level for the full sample as well as for

² After reunification, the pension system of the German Democratic Republic (GDR), which primarily aimed at securing a minimum pension level, was replaced by the wage- and contribution-based pension system of the Western part of Germany (BMAS, 2021).

³ See Appendix A.1 for a more detailed description of the analysis.

West German respondents. Overestimating the ratio for 2020 further adds to the positive treatment effect in some cases, while overestimating the ratio for 2050 has the opposite effect. Furthermore, the information treatment makes respondents more likely to prefer an increase in the contributions over an increase in tax subsidies to the statutory pension insurance for the full sample as well as for the West German subsamples when including interactions with the overestimation-dummies.

The remainder of the paper is organized as follows: Section 2 presents our experimental design as well as our hypotheses and our data basis and Section 3 provides some descriptive evidence. Section 4 introduces our method, while in Section 5 the treatment results for the perceived reform necessity and for the preferences towards specific reform measures are discussed. Finally, Section 6 concludes.

2. Design and hypotheses

2.1. Sample

Our analysis is based on a sample of 1000 German inhabitants of working age. The sample was collected by computer assisted telephone interviews (CATI), which were conducted by a professional survey company between November 2020 and May 2021 using the dual frame approach.⁴ Our sample is representative for East and West Germany, respectively, regarding age, gender and state of residence. With respect to education, our sample is more educated than the average population. Additionally, the share of respondents with a migration background equals the share in the East German population but is somewhat lower than the share for West Germany. Civil servants are excluded from the sample, since they are not part of the statutory pension insurance. The sample size of 1000 respondents should allow us to detect effects of a size of 0.19 of a standard deviation at the 10% significance level and of 0.21 of a standard deviation at the 5% significance level both with a power of 0.8. Following Cohen (1988), an effect size of 0.2 is considered a small effect size. This brings us in the range of the numbers put forward by Haaland et al. (2023) according to which information provision experiments should have at least a power of 0.8. We acknowledge, however, that we should be careful when interpreting the results of our subsample analyses (see Section 5 below).

We oversample respondents from East Germany and end up with 400 respondents from the Eastern part and 600 respondents from the Western part of Germany. Around half of the respondents are female and nearly half of them are aged 50 and above. Furthermore, one third graduated from university. The majority of the respondents is currently employed and half of the respondents are married. Additionally, two thirds of the respondents have children and the average household size is 2.55. Every seventh respondent has a migration background.

For the analysis in the following, we restrict our sample based on respondents' prior beliefs about demographic change and only include respondents with prior beliefs above the 5th and below the 95th percentile. By trimming the data in this way, we take outliers into account, where the probability is large that respondents did not understand the questions they were asked in the experiment (see Section 2.2 for a detailed explanation of the belief elicitation).⁵ In doing so, we follow Roth and Wohlfart (2020) who account for outliers in reported spending growth in a similar way.⁶ This reduces our sample to 881 observations. Additionally we exclude respondents for whom we do not have complete information on all control variables. This further reduces our sample to 849 respondents for the full sample. We do the same for the subsamples of East and West Germany and end up with 336 and 513 respondents respectively.⁷ We refer to this sample as the main sample. Tables A.1 and A.2 provide descriptions of all variables and Tables A.3–A.5. show descriptive statistics.

2.2. Experimental design and balance

We conduct a survey experiment to examine the relationship between salience or information about demographic change and pension reform preferences. The experiment consists of four stages (see Fig. 1 for a graphical overview): (1) the salience stage, in which we raise the salience of demographic change and elicit prior beliefs about it, (2) the information stage, in which we provide information about demographic change, (3) the reform stage, in which we ask respondents about their preferences for pension reform, and (4) the final stage, in which we elicit posterior beliefs about demographic change. Respondents are randomly assigned to a control group that only takes part in the reform stage, or to one of two treatment groups that differ in the information provided. In the following, we will explain each of these stages in more detail.

In the first stage, the salience stage, the two treatment groups (T1 and T2) are asked about their beliefs about demographic change. More precisely, the experiment introduces the fact that the German pension system is organized as a pay-as-you-go system and that it is therefore necessary to look at the ratio between people of retirement age and people of working age to assess the

⁴ The dual frame approach implies that both, landlines and mobile numbers were called.

⁵ To ensure that respondents understood the questions, we conducted cognitive interviews during the design phase of the survey (in addition to the pre-tests performed at the beginning of the field phase). In the cognitive interviews, we found that the majority of respondents gave plausible answers. Furthermore, respondents who gave answers that we considered potentially implausible did not misunderstand the question, but were convinced that the demographic situation would get much worse. We take this as an indication that it is not the wording of the question that is at issue, but rather respondents' general misunderstanding of demographic change. For this reason, we exclude these respondents.

⁶ They set values below the 2nd and above the 98th percentile to missing, but find that the results are similar if they use cutoffs at the 1st or 5th percentile. Like their results, our main results are robust when using different cut-offs, namely at the 1%, 2% and 3% levels.

⁷ The sample size might vary due to missing values in the outcome variables.

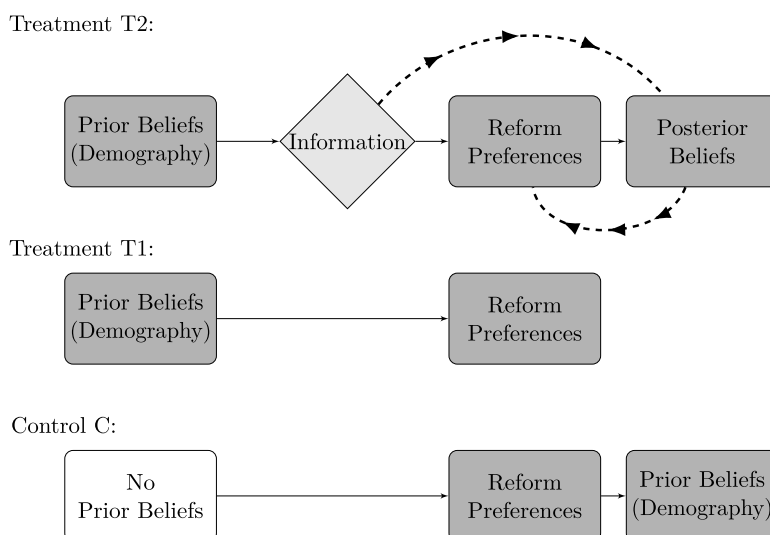


Fig. 1. Set-up of the information provision experiment.

system's financial sustainability. Before eliciting respondents' beliefs, we inform individuals in the treatment groups, that there were 24 people of retirement age for every 100 people of working age in the year 1990 (Destatis, 2019). We then ask about their beliefs about this ratio for the years 2020 and 2050 in order to evaluate how they view demographic change (see Appendix A.2 for the exact wording of the experiment).⁸ Respondents in the control group (C) are not asked about demographic change before answering the questions about their reform preferences and are therefore not actively confronted with the topic of demographic change until a later point in the survey, which means that they are not part of the first stage.

In the second stage, the information stage, respondents of treatment group 2 (T2) are provided with the correct ratios combined with feedback regarding their individual beliefs, i.e. whether the beliefs were too high, too low or quite accurate. For 2020, the correct value is 37 (Destatis, 2017). Respondents receive the feedback that their estimate was quite accurate when it was between 33 and 41. The correct value for 2050 is 55 (Destatis, 2017).⁹ Correspondingly, respondents receive the feedback that their estimate was quite accurate when they estimated a value between 51 and 59. We assume that by informing respondents about the correct ratios they update their beliefs and therefore form posterior beliefs that are closer to the correct values. Furthermore, we assume that this updating results in a shift of their reform preferences. Respondents of treatment group 1 (T1), on the contrary, do not receive any information about the correct ratios (and neither do respondents in the control group). This allows us to identify the role of salience in the framework of the experiment and compare it to the role of information (and to the control situation where neither salience nor information plays a role).

In the third stage, respondents in all three groups are asked about their reform preferences. This includes a general question about the perceived reform necessity as well as six questions about pairwise comparisons of the four specific reform measures mentioned above (see Tables A.1 and A.2 for the exact wording). In the fourth stage, at the very end of the survey, we elicit posterior beliefs about the old-age dependency ratio of respondents of treatment group 2 only. Again, neither respondents of the treatment group 1 (T1) nor of the control group are part of this stage. This elicitation allows us to investigate whether respondents in this group update their beliefs after the receipt of the demographic information.¹⁰

To see whether randomization to one of the three experimental groups was successful we conduct balance tests. For this, we consider the variables which we will also use in our empirical analysis as well as some additional variables: We include socio-economic characteristics (age, gender, residency in East/ West Germany, migration background, marital status, household size, children a well as employment status). We also look at education more broadly (school degree after 12 years, university degree) and at an "understanding index", which we construct from more specific questions about respondents' understanding of the statutory pension insurance (group of contributors/ sources of financing, use of contributions, determinants of pension payments etc.).¹¹ We further include variables about trust, risk as well as time and equality preference. Related to pension planning behavior, we further

⁸ As the survey was conducted at the end of 2020 and in the beginning of 2021, the prior beliefs for 2020 can be interpreted as beliefs about the current situation, while the prior beliefs for 2050 represent beliefs about the future development of the old-age dependency ratio.

⁹ We acknowledge that there is no "correct" value for 2050, as the old-age dependency ratio in 2050 can only be a projection into the future at this point in time and therefore depends on the assumptions made. For better readability in the following, we nevertheless refer to this value as correct.

¹⁰ We also ask respondents of the control group near the end of the survey about their prior beliefs for comparison with the prior beliefs of T1 and T2.

¹¹ In the survey, we ask respondents 14 questions related to their understanding of the statutory pension insurance. Based on psychometric analyses according to classical test theory and item-response theory (Baginski et al., 2023), we exclude three questions from the original index. All questions are shown in Tables A.1 and A.2. Our main results are robust to the inclusion of all 14 understanding questions.

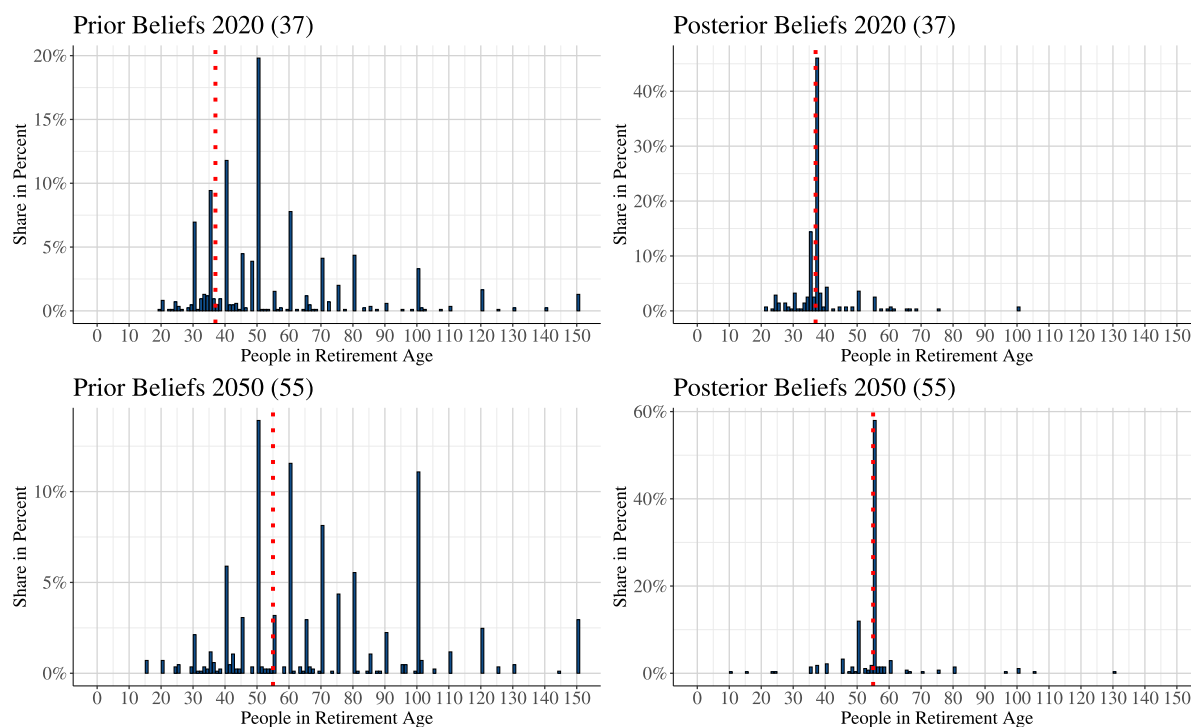


Fig. 2. Prior and posterior beliefs.

Notes: The figures show prior beliefs of the survey respondents about the old-age dependency ratio for the years 2020 and 2050. The left-hand side displays the prior beliefs of our main sample for the year 2020 (top) and 2050 (bottom). On the right-hand side the posterior beliefs of treatment group T2, i.e. those who receive the correct information, are displayed. The dashed line indicates the correct value, i.e. 37 for the year 2020 and 55 for the year 2050. We exclude respondents with prior beliefs below the 5th or above the 95th percentile as well as respondents for whom we do not have complete information on the control variables. Therefore, for the full sample we exclude respondents whose prior beliefs for 2020 are below 19 or above 159 or whose prior beliefs for 2050 are below 15 or above 201. Note that the figures only show estimates between 0 and 150. There are 35 respondents (of whom 15 are in T2) who estimate that the ratio for 2050 is above 150, who are part of the main sample, but not included in the 2050 graphs.

add variables which capture if respondents look optimistic at their life in old age, if they are interested in the topic of pension planning, if they have gathered information about their retirement income and if they pay contributions to the statutory pension insurance (see Tables A.1 and A.2 for the variable description). As the three groups are well balanced regarding the most important characteristics (see Table A.3 for the full sample and Tables A.4 and A.5 for the East and West German subsamples), this allows us to interpret our results causally. However, we will add control variables in most specifications for further robustness and to increase the precision of the estimates.

2.3. Prior beliefs

Fig. 2 displays the prior beliefs of our main sample for respondents in all three experimental groups on the left-hand side and the posterior beliefs of respondents in treatment group T2, i.e. respondents who received the information treatment, on the right-hand side (see Fig. A.1 in the Appendix for a presentation of the prior beliefs by group). The figures for the prior beliefs show that the majority of respondents overestimated demographic change. To be more precise, for our trimmed sample we find that for 2020 around one fourth of respondents hold prior beliefs in the range of being “quite accurate”, while nearly two thirds overestimate the old-age dependency ratio for 2020 and only 11 % underestimate the ratio. The mean value of the 2020 prior beliefs is 53.6 with a standard deviation of 23.6 and a median of 50. For 2050, the picture looks a bit more diverse. While only 4.6% of the respondents hold prior beliefs which are considered “quite accurate”, about one third underestimates the ratio for 2050 and the remaining 62.5% overestimate the ratio. For 2050 the mean value of the prior beliefs is 73.8 with a standard deviation of 36.5 and a median of 65. More than half of the respondents (457) overestimate the old-age dependency ratio for both years.¹² The larger standard deviation for the prior beliefs for 2050 gives some indication that respondents are more uncertain about the ratio for 2050 than the ratio for 2020.

The prior beliefs show that there are large misperceptions about the development of the old-age dependency ratio. Many respondents have in common that they overestimate this ratio and thus demographic change. One possible explanation is that

¹² When considering the non-trimmed sample, the mean of prior beliefs for 2020 is 72.3, and the mean of prior belief for 2050 is 88.2.

Table 1
Comparison of over- and underestimators.

	(1) All	(2) Under	(3) Correct	(4) Over	(5) Correct vs. Under p-value	(6) Correct vs. Over p-value	(7) Over ≤ 100 Mean	(8) Over > 100 Mean	(9) Over ≤ 100 vs. >100 p-value
	Mean	Mean	Mean	Mean					
Age old (50+)	0.46	0.53	0.47	0.45	0.32	0.55	0.46	0.27	0.02**
Female	0.50	0.50	0.41	0.54	0.16	0.00***	0.53	0.65	0.15
East	0.40	0.43	0.39	0.40	0.52	0.73	0.39	0.51	0.14
Educ: 12th grade	0.55	0.59	0.54	0.54	0.48	0.99	0.54	0.59	0.50
Educ: uni	0.35	0.33	0.36	0.34	0.61	0.66	0.34	0.41	0.41
Risk attitude	3.06	2.93	3.06	3.09	0.47	0.82	3.09	3.11	0.94
Trust: finance	3.83	3.69	3.95	3.80	0.18	0.22	3.79	3.84	0.87
Trust: own decision	5.15	5.13	5.29	5.10	0.38	0.11	5.07	5.46	0.13
Children	0.67	0.67	0.67	0.67	0.95	0.97	0.67	0.62	0.54
Employed	0.84	0.83	0.85	0.83	0.60	0.47	0.83	0.81	0.72
Migration background	0.14	0.21	0.12	0.14	0.02**	0.45	0.13	0.16	0.63
Married	0.52	0.51	0.57	0.49	0.34	0.06*	0.50	0.43	0.44
Household size	2.54	2.50	2.67	2.50	0.30	0.10	2.49	2.54	0.84
Trust: public	4.45	4.56	4.57	4.38	0.96	0.16	4.36	4.70	0.25
Time preference	2.93	3.05	2.91	2.92	0.50	0.92	2.90	3.19	0.35
Equality preference	5.00	5.22	4.77	5.06	0.05**	0.04**	5.06	5.16	0.73
Contributions SPI	0.88	0.88	0.92	0.86	0.23	0.02**	0.86	0.95	0.13
Optimism old-age	0.57	0.53	0.63	0.55	0.12	0.06*	0.56	0.49	0.40
Interest topic	4.77	4.63	4.79	4.78	0.47	0.97	4.83	4.19	0.04**
Old-age income	0.76	0.80	0.80	0.74	0.89	0.06*	0.74	0.73	0.89
Beliefs certain	3.80	3.61	3.96	3.76	0.06*	0.10*	3.79	3.41	0.12
Understanding Index	7.56	7.26	7.86	7.48	0.03**	0.02**	7.52	6.95	0.10
Observations	849	94	225	530	319	755	493	37	530

Notes: The table shows the comparison of respondents who overestimate, underestimate or correctly estimate the old-age to working age ratio for the year 2020. While the correct value for 2020 was 37 we define all those answers as correct that lie between 33 and 41. Answers below 33 are therefore defined as underestimation and answers above 41 are defined as overestimation.

the topic of demographic change is not very salient in the German population as suggested by the Google Trends analysis. Another possible explanation is that respondents are salient about demographic change in general but lack precise knowledge.¹³ To assess the relevance of this explanation, we focus on two aspects. First, we consider respondents' self-reported certainty about their estimates (7-point Likert scale with 1 indicating large uncertainty and 7 large certainty). The mean value is 3.8 with a standard deviation of 1.5 suggesting that uncertainty is not that high on average. Second, we inquire if respondents have a good understanding of the German statutory pension system as captured by our understanding index. The mean value is 7.56 with a standard deviation of 2.12. On average, out of 11 questions, respondents answered more than seven questions correctly. This does not indicate that the average level of understanding is low. But the averages in both cases may hide important differences across those who, ex ante, correctly estimated the old-age dependency ratio and those who under- or overestimated this ratio.

To better understand the likely drivers of the differences in beliefs – and the possible role of salience and information, we compare the groups of respondents who underestimate, correctly estimate or overestimate demographic change (see Table 1). For easier comparison and because the old-age dependency ratio for 2050 is only a projection into the future and therefore more uncertain, we focus on the beliefs about the dependency ratio for the year 2020 and perform t-tests on the variable means. We see that respondents with correct beliefs compared to underestimators have less often a migration background. They have a better understanding of the statutory pension insurance as captured by the understanding index and they are – rightly – more certain that their estimates are correct. They also state a lower preference for equality. When we compare respondents with correct beliefs with overestimators, the former again have a lower preference for equality, a better understanding of the statutory pension insurance and are more certain that their estimates are correct. Those with a correct estimate are more likely to be currently paying contributions to the statutory pension system and seem to be better informed about their individual situation in old age, having already gathered information about how much income they will receive in retirement. Interestingly, they are also more optimistic about their life in old age. Furthermore, they are more often married (and consistently live in larger households), while they are less often female.

As the group of overestimators is relatively large, we want to inquire further if there are important heterogeneities within this group. For this, we consider separately two subgroups – one group with a belief about the dependency ratio below 100 and one with a belief above 100 (an estimate above 100 means that there are more people aged 65 years and over than aged 20 to 64). We only find significant differences for age and interest in the topic of pension planning, with those who less strongly overestimate the dependency ratio being older and stating a larger interest. There are also larger differences in the mean values for gender, East/West

¹³ It might be the case that people have heard that demographic change poses a challenge to the German pension system. With the “baby boomer” generation about to retire, this is an issue that regularly appears in the media. However, if they are only exposed to this general information and do not take the time to get more detailed information, they may perceive the problem as more serious and thus overestimate the old-age dependency ratio, even though the salience seems low.

and the understanding index, but they are not significant. There is however the caveat that the group of strong overestimators is rather small.¹⁴

Overall, we see that the groups do not differ in terms of their educational background. We acknowledge, however, some differences in the salience proxies “Interest topic” and “Old-age income” as well as in the understanding of the statutory pension system and the certainty of the estimates. However, salience and knowledge seem to be related, so it might not be possible to make a clear distinction about the main drivers of the observed misperceptions (lack of salience or lack of information) for the different groups. The design of our experiment should, however, enable us get some insights whether respondents adjust their preference due to salience or due to information.

For the posterior beliefs of treatment group T2, it can be seen that the majority of respondents who received information of the correct ratios indeed update their beliefs. The mean values for the posterior beliefs are 38.90 (2020, standard deviation of 18.12) and 55.86 (2050, standard deviation of 17.79), respectively. When we additionally check the within-subject belief updating using a t-test, the results confirm that respondents in treatment group T2 significantly update their beliefs for both years (p -value 0.00).

2.4. Hypotheses

Our setting is meant to capture the salience effect via treatment T1 and the information effect – in addition to the salience effect – via treatment T2. Consequently, when comparing treatment group T1 with control group C, we hypothesize that creating salience of demographic change leads to a larger preference for reforms in general as well as to a larger preference for specific reform measures that positively affect the financial sustainability of the statutory pension insurance. We expect the effects to be larger for higher prior beliefs, as respondents with a higher estimate of demographic change are expected to view the situation as more serious and therefore should have a stronger preference towards reforms in general and towards specific reforms that improve the financial sustainability.

When comparing treatment group T2 with control group C, we hypothesize that the effect of providing the correct information depends on the prior beliefs about demographic change, i.e. whether respondents overestimated or underestimated the change. In case of underestimation, we expect an increase in the preferences for reforms in general as well as for reform measures that support the financial sustainability of the statutory pension insurance. Respondents learn that aging of the German population is more serious than they believed. Following an analogous line of reasoning, in the case of overestimation we expect that the correct information reduces the preference for reforms in general as well as for specific reform measures targeted at financial sustainability. Respondents are informed that the situation is less serious. Therefore, reforms might no longer seem to be so necessary.

Furthermore, a comparison of the two treatment groups allows identifying the role of the information effect beyond the salience effect. With the chosen experimental design, we are thus able to address the question of salience versus information provision and highlight changes caused by differences in prior beliefs.

Our hypotheses are based on the assumption that respondents make use of their general understanding of the statutory pension system to formulate their reform preferences. This includes the role of demographic change given that the statutory pension system in Germany is constructed as a pay-as-you-go system. As indicated in Fig. 1, eliciting prior beliefs is assumed to affect reform preferences by making demographic change salience (see treatments T1 and T2). In addition, information provision can affect the reform preferences (see treatment T2).

Our analysis will tell us if increasing salience leads to the hypothesized adjustments. Furthermore, it will also allow assessing the link between information provision and preferences. We are in particular interested in understanding if information provision has an effect on reform preferences that goes beyond the salience effect. For the latter, two steps are required: First, information must lead to updated beliefs and, second, the updated beliefs must lead to changed reform preferences. Both steps can work differently for different respondents. A high confidence in their own estimates can hinder the updating, while a high level of optimism regarding their life in old age can work against an adjustment of reform preferences even in the presence of belief updating. The level of understanding of the statutory pension system, in addition, can affect how the information is digested and thus how preferences are adjusted.

We will not be able to disentangle the different steps in all detail. However, a comparison of the results for the salience group (T1) and the information group (T2) will give some indications of the additional role of information provision beyond salience (see Section 5 below). For respondents receiving the information treatment (T2), we also have information on their posterior beliefs. Conducting t-tests comparing prior and posterior beliefs for this group by gender, age, but also by certainty about prior beliefs, optimism about life in old age and understanding of the statutory pension insurance, we see that respondents update their beliefs regardless of the above characteristics. Furthermore, we also see that both respondents who initially overestimate the old-age dependency ratios and respondents who initially underestimate them update their beliefs. So, there is tentative evidence for the first of the two steps mentioned above. For the second step, we will have to rely on indirect evidence. Once we know the effect of treatment T2, and given what we know about belief updating, we can draw some conclusions about the link between updated beliefs and adjusted preferences. We will also consider any differences between the effects of providing information for the 2020 and the 2050 ratios. The larger uncertainty of the respondents about the 2050 ratio (as evidenced by the larger standard deviation, see Fig. 2) and the larger uncertainty associated with the information we provide (as it is only a projection) combined with the longer time horizon might lead to a smaller treatment effect compared to providing information about the 2020 ratio.

¹⁴ When we consider the full sample with 1000 observations and compare overestimators with prior beliefs above and below 100 we find that respondents who hold prior beliefs above 100 are significantly more likely to be young and female. Furthermore, they hold a higher equality preference and they have lower understanding of the statutory pension insurance.

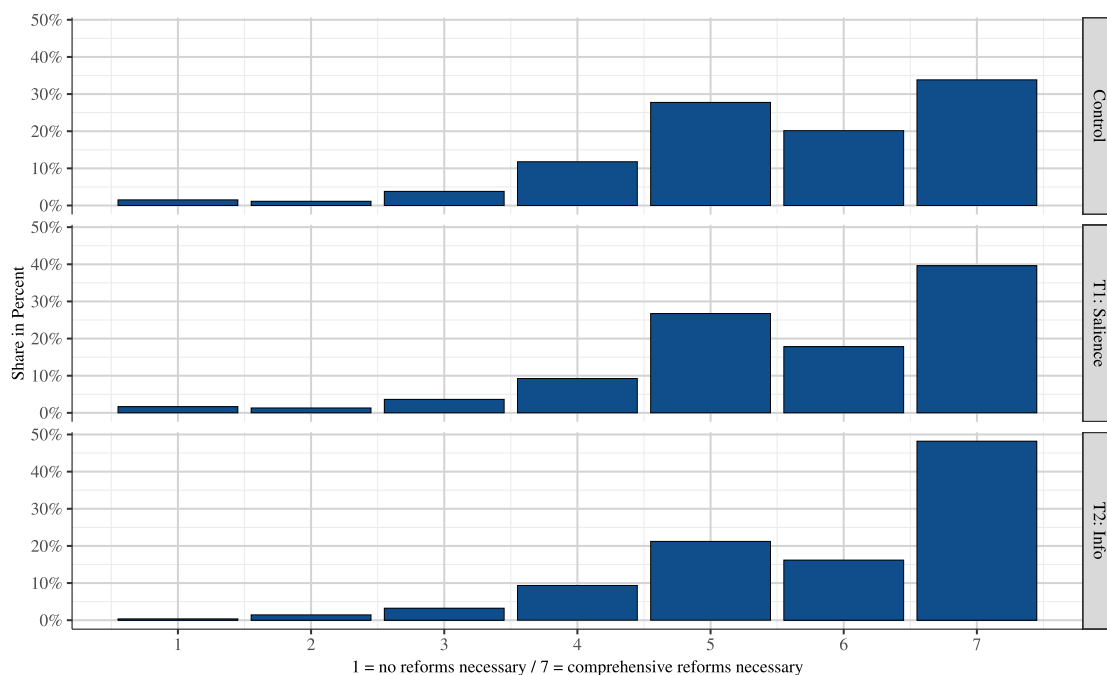


Fig. 3. Reform necessity by experimental group.

Notes: The figure shows the perceived reform necessity of all respondents in the main sample by experimental group. Responses are measured on a 7 point Likert scale from 1 “no reforms necessary” to 7 “comprehensive reforms necessary”.

3. Descriptives

For our analysis, we focus on two types of outcomes as already discussed above: perceived reform necessity and preferences towards specific reform measures. To capture the perceived reform necessity we ask respondents whether they think that reforms are necessary for the German pension system. Answers are measured on a 7 point Likert scale, where 1 stands for “no reforms necessary” while 7 stands for “comprehensive reforms necessary”. Fig. 3 shows the distributions of the answers by experimental group. From the figure it becomes obvious that all respondents, including respondents in the control group, think that reforms are necessary to some extent. Over all groups only 22 respondents give a value of 1 or 2, implying that they do not see any necessity of reforms of the German pension system. The mean value for the control group is 5.59 with a standard deviation of 1.35 and 5.70 (1.38) for T1 and 5.89 (1.33) for T2, respectively.

Additionally, we asked respondents to indicate which reform measure they would prefer if they had to choose between two options. These reform measures comprise increasing the retirement age (*age*), decreasing the pension level (*level*), increasing contributions (*contribution*) and increasing the tax subsidy to the statutory pension insurance (*tax*) (see Tables A.1 and A.2 for the exact wording). Respondents stated their preferences for each of the six pairs which result from the four options. This allows us to create individual rankings for the four measures, including the most and the least preferred measures, while it also allows us to shed light on the individual comparisons. Overall 577 respondents of our main sample provided answers for all six questions in a consistent way.¹⁵ Additionally, we identify further 128 respondents for the most preferred measure who always prefer one measure over the three other measures. In an analogous way, we identify 68 additional respondents for the least preferred measure. This results in 705 observations for the most preferred pension reform measure and 645 observations for the least preferred one. The number of consistent answers appears to be quite high. This might be partially due to the fact that respondents strongly prefer increasing the tax subsidy while, at the same time, they strongly oppose an increase in the retirement age. Fig. 4 illustrates this for the control group, i.e. in the absence of any treatment effects. The part on the left depicts the distribution for the most preferred reform measure and the part on the right for the least preferred reform measure. While the figure for the most preferred measure shows that a large majority of around 60% of respondents in the control group prefers increasing the tax subsidy, the figure for the least preferred measure shows that nearly the same share ranks an increase in the retirement age as their least preferred measure.

As we have discussed above (see the Introduction), for the next few years at least, the *level* and the *contribution* measures are no policy options. Similarly, the current government has ruled out a further increase of the retirement age (Federal Government, 2021). Balancing the budget of the statutory pension insurance at the moment happens mostly via tax subsidies, which turns out as the most preferred policy measure also in our sample.

¹⁵ We say that someone responds consistently when we can identify a clear preference ranking for the measures based on the six pairwise comparisons.

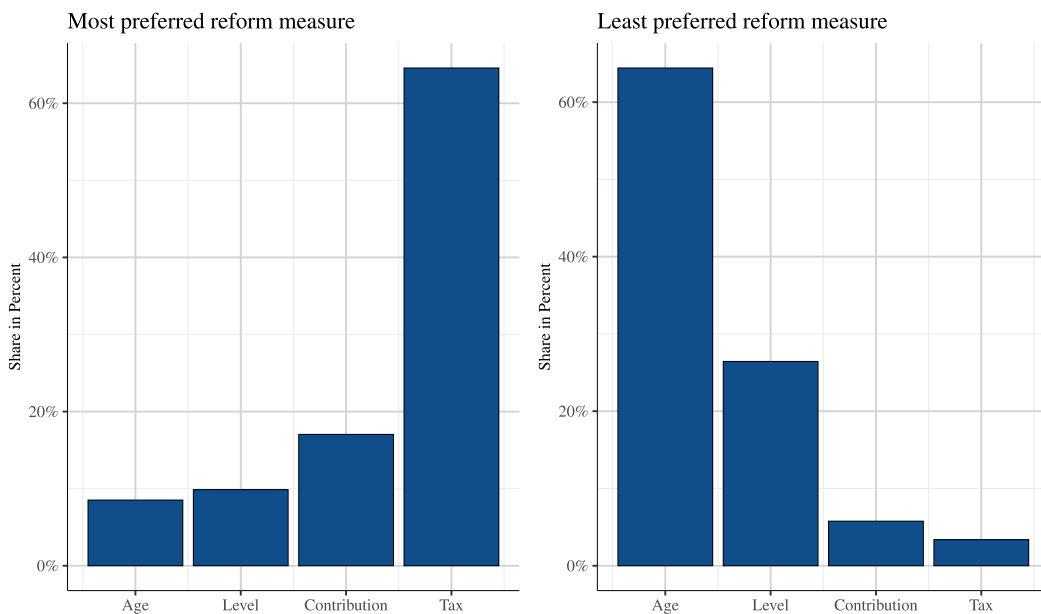


Fig. 4. Most and least preferred reform measures.
Notes: This figure shows which measure out of the four reform measures is the most (left) or least (right) preferred reform measure of the control group. Preferences were calculated based on the answers to the six questions about the pairwise comparisons.

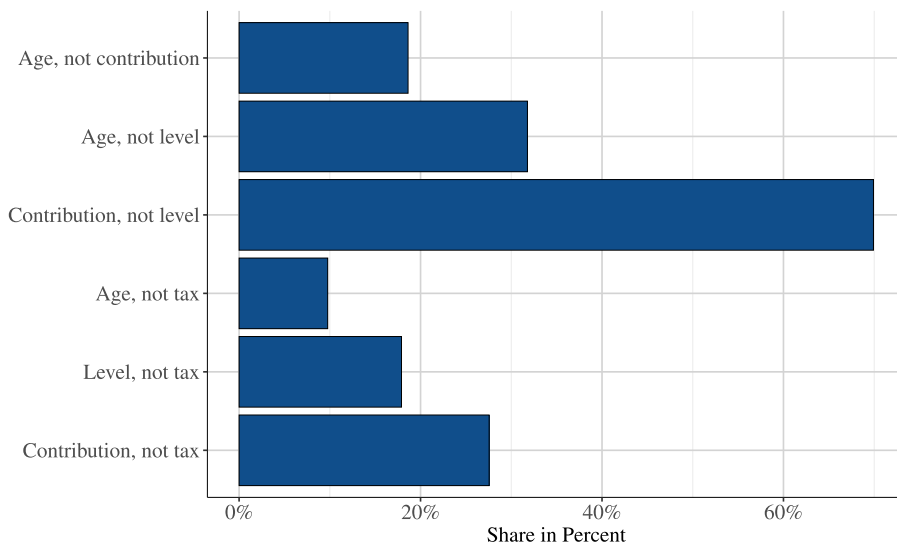


Fig. 5. Specific reform measures.
Notes: This figure shows the preferences of respondents in the control group for each of the pairwise comparisons of the specific reform measures.

Table 2
Outcomes - Mean values.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	West/ East			Age: Below 50/ 50+			Male/ Female		
	West	East	p-Value	Below 50	50+	p-Value	Male	Female	p-Value
Reform necessity	5.537	5.673	0.428	5.591	5.588	0.985	5.559	5.618	0.726
Age, not contribution	0.222	0.128	0.064*	0.180	0.193	0.785	0.240	0.135	0.035**
Age, not level	0.345	0.275	0.262	0.308	0.328	0.752	0.374	0.264	0.072*
Contribution, not level	0.702	0.695	0.904	0.702	0.697	0.934	0.758	0.643	0.049**
Age, not tax	0.127	0.051	0.048**	0.107	0.088	0.613	0.151	0.046	0.005***
Level, not tax	0.161	0.208	0.345	0.202	0.156	0.345	0.184	0.174	0.839
Contribution, not tax	0.272	0.281	0.876	0.311	0.238	0.195	0.331	0.220	0.050**

Notes: The table shows the comparison of respondents in the control group using t-tests for East/ West, age and gender. Every third column displays the p-value indicating whether the difference between the two mean values is significant; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The *age* measure, on the contrary, which is favored by Deutsche Bundesbank (2019) and German Council of Economic Experts (2020) among others, is the least preferred option. Consequently, it is important to understand if a survey experiment, which focuses on demographic change, is able to change the preference for reforms, in general, and the preference for the *age* or the *tax* measures more specifically.

When it comes to the specific measures, Fig. 5 shows the control group’s responses for each of the six pairwise comparisons. Here, the comparisons without the *tax* option come first. From the figure it becomes clear, that a majority of respondents would rather increase contributions, decrease the pension level or increase tax subsidies than increase the retirement age. In general, respondents would rather increase tax subsidies to the statutory pension insurance than changing the retirement age, the pension level or the contributions. Obviously, this reflects the insights from Fig. 4. When asked whether they prefer an increase in contribution payments or a decrease in the pension level, a majority of around 70% prefers an increase in contributions.

In terms of heterogeneity, Table 2 sheds light on differences and similarities for the control group between respondents in East and West Germany, respondents aged 50 or above compared to respondents below the age of 50 and between male and female respondents. Regarding the comparison of East and West German respondents, the table suggests that the responses are quite similar. However, West German respondents are significantly more likely to prefer an increase in the retirement age over an increase in contributions and over an increase in tax subsidies. When comparing respondents based on their age, we do not find any significant differences in the responses dependent on whether a respondent is above or below the age of 50. Male and female respondents, on the other hand, seem to differ quite a bit. Male respondents are significantly more likely to have a preference for increasing the retirement age over increasing contributions as well as over increasing tax subsidies compared to female respondents. Furthermore, male respondents in the control group also have a significantly higher preference for increasing contributions instead of increasing tax subsidies.

4. Method

For estimating the causal effect of our survey experiment, we use Eq. (1)

$$y_i = \gamma_0 + \gamma_1 T1_i + \gamma_2 T2_i + \gamma^T X_i + \varepsilon_i \tag{1}$$

where y_i denotes our outcome variables for individual i , which capture different reform preferences. $T1_i$ and $T2_i$ denote the treatment indicators for both treatment arms, respectively, which are dummy variables that are equal to 1 if a respondent is part of the respective treatment group. ε_i denotes the error term.

$$y_i = \gamma_0 + \gamma_1 T1_i + \gamma_2 T2_i + \gamma_3 T1_i \times P_i^{2020} + \gamma_4 T2_i \times P_i^{2020} + \gamma_5 P_i^{2020} + \gamma_6 T1_i \times P_i^{2050} + \gamma_7 T2_i \times P_i^{2050} + \gamma_8 P_i^{2050} + \gamma^T X_i + \varepsilon_i \tag{2}$$

In Eq. (2), we include interactions of the treatment indicators and a dummy variable P_i^j , which indicates whether a respondent overestimated the old-age dependency ratio in $j = 2020, 2050$.¹⁶

Since our sample is well balanced over the three treatment groups we do not need to include control variables. To see the sensitivity of our result, however, we show main results with and without control variables. The variable X_i indicates the vector of control variables, which include socio-economic controls for age, gender, residency in East/ West Germany, migration background, children as well as employment and marital status. We also consider education (school degree after 12 years), certainty about prior beliefs and the “understanding index”. We further include variables about trust in public institutions, time and equality preference. Related to pension planning behavior, we further add variables which capture if respondents look optimistic at their life in old age, if they are interested in the topic of pension planning, if they have gathered information about their retirement income and if they pay contributions to the statutory pension insurance (see Tables A.1 and A.2 for the variable description).

¹⁶ The definition of overestimation is based on the feedback respondents in T2 receive. Therefore, prior beliefs above 41 for 2020 and above 59 for 2050 are coded as overestimation.

5. Results

5.1. Necessity of reforms – main results

First, we evaluate the effect of our treatment on respondents' preference for reforms of the German public pension system in general as described in Section 3. We standardize the outcome variable using the mean and standard deviation of the control group. The results are presented in Table 3. Panel A of the table presents the results for the full sample and Panels B and C present the effects for the East and West German subsamples, respectively. While columns (1) and (2) show the pure treatment effects, columns (3) and (4) show the treatment effects interacted with dummy variables, which capture whether respondents overestimated the old-age dependency ratio for 2020 or 2050, respectively.¹⁷

Regarding the salience treatment (T1), we find for the full sample that salience of the topic leads to a marginally significant increase in the perceived reform necessity of 15.2% of a standard deviation when including control variables (Panel A, column 2). This finding is in line with research by Bleemer and Zafar (2018), Barrera et al. (2020) and Alesina et al. (2023) who all show that making an issue salient already shifts respondents' preferences, independent of actual information. Making respondents aware of demographic change – an issue that comes up in the media every now and then – thus should increase their perceived necessity for pension reforms. Similarly to the salience treatment (T1), the information treatment (T2) has a positive and significant effect of 18.6% of a standard deviation.

Looking separately at respondents who overestimate demographic change and those who do not (Panel A, column 4), we find that respondents who overestimate neither the old-age dependency ratio for 2020 nor the ratio for 2050 increase their perceived reform necessity after receiving the information treatment, while we observe no effect of the salience treatment for these respondents. If we focus on overestimating respondents in the salience group (T1), we find that overestimating the ratio for 2020 has a marginally significant negative effect on the salience effect, while overestimating the ratio for 2050 significantly increases the salience effect. The findings for 2020 are not in line with our hypothesis, while the findings for 2050 are. The overall salience effect for respondents who either overestimate only the ratio for 2050 or who overestimate both ratios is positive and (marginally) significant. Taking this perspective, the findings are consistent with our hypothesis that overestimating individuals who believe that demographic change is even more serious than it actually is and who do not receive information that corrects their beliefs should increase their reform preferences once we make the issue salient to them.

Focusing on the information effect (T2), we again see that overestimating the ratio for 2020 has a negative effect on the information treatment effect. Overestimating the ratio for 2050 has no significant effect on the information treatment effect. The findings for 2020 are in line with our hypothesis. When overestimating respondents learn that demographic change is less serious than they believed, they reduce their preferences for reforms. For 2050, the results are not in line with our hypothesis. A possible explanation for this could be that the prior beliefs for 2050, but also the information which we provide are more uncertain. Therefore, respondents might react more to the salience of this information than to the information itself.

When focusing on the East German respondents (Panel B), we do not find a significant effect of the salience treatment (T1). But we find that the information treatment (T2) marginally significantly increases the perceived reform necessity by 21.7% of a standard deviation when including controls (Panel B, column 2). When we focus explicitly on heterogeneous differences of respondents who do (not) overestimate, we do not observe significant effects of overestimating the old-age dependency ratios for 2020 and 2050 on either the salience or the information effect. For the West German respondents (Panel C) on the other hand, we find similar results as for the full sample. The most notable difference is that the interaction of overestimation of the old-age dependency ratio in 2020 and the information treatment (T2) is no longer significant and neither is the baseline information effect.¹⁸

As the results for the two treatments show similar patterns, we want to see if the salience and the information treatments lead to significantly different results. Therefore, we run our analysis again excluding the control group and using the salience group as the baseline (see Table A.6). The results for the full sample indicate that there is no significant treatment effect when comparing the salience group (T1) to the group, which in addition receives the information treatment (T2). This does not change, when we include the interaction of the treatment indicator with the overestimation-dummies (Panel A). The results for West German respondents are very similar to those for the full sample (Panel C). For East German respondents, however, we find that the information treatment increases respondents' perceived reform necessity by 23.2% of a standard deviation when including control variables compared to the salience treatment (Panel B, column 2). The interaction with the overestimation indicators (Panel B, column 4) shows that there are no significant differences in the treatment responses based on overestimation when control variables are included. Again, because of the smaller sample size, we must be cautious in interpreting our results.

Overall, the results for the two treatments barely differ significantly and neither do they differ when interacted with the overestimating-dummies for the old-age dependency ratio. Our evidence, on the contrary, points towards a difference between the control group on the one hand and individuals in any of the two treatment groups on the other hand. This is contrary to our hypotheses. We need, however, to take one important difference in the set-up of the survey experiment into account: Individuals in the control group are only asked about their prior beliefs after the question about their reform preference (see Fig. 1). Only then are they explicitly induced to think about demographic change. Individuals in any of the two treatment groups have to think

¹⁷ We present here average treatment effects (ATE). We acknowledge that the information treatment can only shift prior beliefs for those who, ex-ante, under- or overestimated demographic change. We check if results change if we exclude those with correct prior beliefs; the results hold.

¹⁸ As the number of observations in the subsamples for East and West German respondents becomes smaller compared to the full sample, we have to interpret these results with caution.

Table 3
Necessity of reforms.

	(1)	(2)	(3)	(4)
	Reform necessity			
Panel A: Full Sample				
T1: Saliency	0.138 (0.087)	0.152* (0.085)	0.126 (0.162)	0.108 (0.156)
T2: Information	0.195** (0.089)	0.186** (0.085)	0.296* (0.160)	0.295** (0.150)
Overest 2020			0.267* (0.147)	0.278* (0.142)
T1: Saliency × Overest 2020			−0.352 (0.217)	−0.374* (0.217)
T2: Info × Overest 2020			−0.411* (0.225)	−0.426* (0.219)
Overest 2050			−0.095 (0.146)	−0.178 (0.145)
T1: Saliency × Overest 2050			0.377* (0.222)	0.453** (0.226)
T2: Info × Overest 2050			0.254 (0.228)	0.264 (0.223)
Controls	No	Yes	No	Yes
Observations	845	845	845	845
Panel B: East Germany				
T1: Saliency	−0.072 (0.131)	−0.039 (0.128)	−0.161 (0.249)	−0.078 (0.239)
T2: Information	0.236* (0.132)	0.217* (0.129)	0.395* (0.230)	0.355 (0.219)
Overest 2020			0.145 (0.265)	0.220 (0.236)
T1: Saliency × Overest 2020			0.161 (0.348)	0.035 (0.327)
T2: Info × Overest 2020			−0.472 (0.333)	−0.491 (0.305)
Overest 2050			0.068 (0.276)	−0.076 (0.249)
T1: Saliency × Overest 2050			−0.019 (0.350)	0.034 (0.334)
T2: Info × Overest 2050			0.223 (0.347)	0.281 (0.313)
Controls	No	Yes	No	Yes
Observations	333	333	333	333
Panel C: West Germany				
T1: Saliency	0.167 (0.104)	0.186* (0.103)	0.115 (0.195)	0.089 (0.192)
T2: Information	0.186* (0.104)	0.185* (0.100)	0.257 (0.187)	0.260 (0.178)
Overest 2020			0.255 (0.175)	0.257 (0.170)
T1: Saliency × Overest 2020			−0.471* (0.272)	−0.484* (0.271)
T2: Info × Overest 2020			−0.304 (0.281)	−0.308 (0.277)
Overest 2050			−0.133 (0.174)	−0.211 (0.175)
T1: Saliency × Overest 2050			0.560** (0.279)	0.649** (0.283)
T2: Info × Overest 2050			0.201 (0.282)	0.206 (0.282)
Controls	No	Yes	No	Yes
Observations	512	512	512	512

Notes: The table shows the treatment effects on perceived reform necessity. Reform necessity is measured on a 7-point Likert scale and it is standardized using mean and standard deviation of the control group. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

about demographic change already before the reform question, i.e. demographic change is made salient to them. Overestimating individuals seem to see a large old-age dependency ratio for 2020 – no matter if corrected in treatment T2 or uncorrected in treatment T1 – not as a reason for more reforms. We can only speculate about the underlying reasons. Possibly, they consider the present situation of the statutory pension insurance. While there are discussions about problems of the financial sustainability in the next years and decades, there are no indications of an immediate financial difficulty: The contribution rate has been unchanged at 18.6% since 2018 and old-age pension payments have increased every year — in July 2020, i.e. the year relevant for the survey, the rise was 3.45% in West Germany and 4.20% in East Germany (Fasshauer, 2021).¹⁹ Thinking about the ratio for 2050, on the contrary, seems to make respondents aware that demographic change is not a short-term phenomenon. Overestimating individuals thus seem to see a large dependency ratio as making reforms more necessary. As there might be differences across age groups and gender regarding the impact of short-term and long-term demographic change, we consider possible heterogeneous treatment effects in the following.

5.2. Necessity of reforms – further heterogeneity analysis

Additionally to the analyses for the full sample as well as for the subsamples of East and West German respondents, we analyze treatment effects dependent on age and gender of the respondents. Obviously, younger and older individuals can be expected to view the statutory pension insurance and its reform necessity differently as the years as contributors and the time until retirement differ. Similarly, the different employment biographies and the difference in the accumulated pension claims of men and women can also affect their preferences for reforms differently. Here we are interested in whether the treatments have a differential effect on the subgroups' reform preferences. The results are shown in Table 4. As the sub-sample analysis again reduces our number of observations, the sample size caveats mentioned above also apply here.

When analyzing the treatment effects for different age groups, we split our sample into two groups of relatively equal size, where one group covers respondents aged 50 and older and the other group covers respondents aged 18 to 49. We find a positive and significant treatment effect for both treatments for respondents above the age of 50 (Table 4, Panel A, column 1). When interacting the treatment variables with the overestimation-dummies for 2020 and 2050, respectively, we see a pattern similar to the one for the full sample (see Table 3). Overestimation of the old-age dependency ratio for 2020 significantly reduces both, the salience and the information effect. Overestimating the ratio for 2050 on the other hand has a significantly positive effect on the salience effect as well as on the information effect. Older respondents who overestimate the old-age dependency ratio for 2050 agree significantly more that reforms of the statutory pension insurance are necessary (Panel A, column 2). In both cases, the results for the two treatments do not differ as before, while we find a difference compared to the control group. We observe that some of the results differ from our hypotheses in a way similar to what we found for the full sample (see Table 3). For the salience treatment (T1), we hypothesized that overestimation would increase the perceived reform necessity, whereas for the information treatment (T2), we hypothesized that overestimation would decrease the perceived reform necessity when receiving the information. We refer to the discussion about possible explanations in the previous section. For respondents below the age of 50, on the other hand, we do not find any significant treatment effects (Panel A, columns 3 and 4).

The results for the West German respondents (Table 4, Panel C) are very similar to those for the full sample (see Panel A). For East German respondents, the results look very different, however. In this subsample, respondents above the age of 50 do not react to the treatments, neither with nor without including interactions with the overestimation-dummies (Panel B, columns 1 and 2). The young respondents below the age of 50, however, react to the treatments. For the pure treatment effect, young respondents are 33.7% of a standard deviation more likely to think that reforms are necessary after being informed about the correct old-age dependency ratios (Panel B, column 3). When we include the interaction with the overestimation-dummies, we find a significant negative effect of overestimating the old-age dependency ratio 2020 on the information effect. For young respondents who overestimate the ratio for 2050, we find a significant positive effect on the salience treatment effect (Panel B, column 4).

Furthermore, we are interested in treatment effects for male and female respondents separately (Table 4). As indicated by our results without interactions (Panel A, column 5), female respondents do not change their perceived reform necessity significantly if they are treated. However, when we include the interaction of the treatment variables with the overestimation-dummies, we find a significant negative effect of overestimating the old-age dependency ratio for 2020 on both treatment effects. Female respondents who receive the salience treatment and overestimate the ratio for 2020 significantly reduce their agreement with the statement that reforms are necessary, while their agreement in the salience treatment and the information treatment increases, if they overestimate the ratio for 2050 (Panel A, column 6). Again, the results are similar to those we found for the full sample (see Table 3). For male respondents, we find that the treatments significantly increase their perceived reform necessity by 22.4% (T1) and 29.6% (T2) of a standard deviation, respectively (Panel A, column 7). When we interact the treatment variables with the dummy variables indicating overestimation of the 2020 or 2050 old-age dependency ratio, respectively, we do not find that overestimation significantly impacts the treatment effects (Panel A, column 8). Summing up, female respondents seem to respond to the treatments, but non-overestimating and overestimating respondents do so differently. For male respondents, on the contrary, overestimation seems to have less of an impact on the treatment effects.

In the subsample of East German respondents (Panel B), we find no pure treatment effects for either female or for male respondents nor do we find significant differences for overestimating respondents. The results for West German respondents (Panel C) are again very similar to those of the full sample (see Panel A).

¹⁹ Rising tax-financed transfers to the statutory pension insurance might not be so present in people's minds.

Table 4
Necessity of reforms (heterogeneity).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Reform necessity							
	Age: 50+		Age: below 50		Female		Male	
Panel A: Full Sample								
T1: Saliency	0.289** (0.129)	0.337 (0.249)	0.036 (0.110)	-0.099 (0.208)	0.052 (0.119)	0.192 (0.222)	0.224* (0.124)	0.070 (0.228)
T2: Information	0.273** (0.128)	0.342 (0.241)	0.120 (0.112)	0.269 (0.202)	0.111 (0.116)	0.363* (0.216)	0.296** (0.129)	0.317 (0.218)
Overest 2020		0.325 (0.220)		0.287 (0.193)		0.523*** (0.164)		-0.042 (0.215)
T1: Saliency × Overest 2020		-0.676** (0.335)		-0.217 (0.270)		-0.891*** (0.278)		0.226 (0.331)
T2: Info × Overest 2020		-0.710** (0.310)		-0.116 (0.314)		-0.549* (0.287)		-0.231 (0.315)
Overest 2050		-0.253 (0.217)		-0.187 (0.196)		-0.420** (0.169)		0.162 (0.220)
T1: Saliency × Overest 2050		0.602* (0.358)		0.449 (0.275)		0.691** (0.299)		0.028 (0.334)
T2: Info × Overest 2050		0.606** (0.307)		-0.094 (0.315)		0.226 (0.293)		0.201 (0.322)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	393	393	452	452	421	421	424	424
Panel B: East Germany								
T1: Saliency	0.044 (0.222)	0.063 (0.409)	-0.004 (0.162)	-0.184 (0.274)	0.078 (0.191)	0.036 (0.374)	-0.138 (0.180)	-0.141 (0.356)
T2: Information	0.094 (0.211)	0.110 (0.350)	0.337** (0.162)	0.666** (0.305)	0.114 (0.205)	0.263 (0.360)	0.283 (0.177)	0.309 (0.324)
Overest 2020		-0.022 (0.342)		0.721** (0.278)		0.343 (0.388)		0.183 (0.324)
T1: Saliency × Overest 2020		0.152 (0.453)		-0.486 (0.383)		-0.296 (0.475)		0.152 (0.462)
T2: Info × Overest 2020		-0.184 (0.486)		-0.987*** (0.360)		-0.493 (0.535)		-0.580 (0.419)
Overest 2050		0.127 (0.363)		-0.526** (0.265)		-0.436 (0.403)		0.083 (0.344)
T1: Saliency × Overest 2050		-0.186 (0.491)		0.768** (0.372)		0.422 (0.507)		-0.162 (0.454)
T2: Info × Overest 2050		0.131 (0.493)		0.538 (0.342)		0.300 (0.473)		0.471 (0.437)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	152	152	181	181	159	159	174	174
Panel C: West Germany								
T1: Saliency	0.397** (0.154)	0.461 (0.311)	0.006 (0.139)	-0.215 (0.257)	0.032 (0.146)	0.098 (0.272)	0.308** (0.150)	0.104 (0.281)
T2: Information	0.352** (0.153)	0.463 (0.292)	0.075 (0.138)	0.159 (0.245)	0.116 (0.134)	0.347 (0.264)	0.299* (0.155)	0.261 (0.258)
Overest 2020		0.434 (0.268)		0.184 (0.238)		0.546*** (0.187)		-0.136 (0.260)
T1: Saliency × Overest 2020		-0.999** (0.426)		-0.153 (0.333)		-1.031*** (0.355)		0.130 (0.427)
T2: Info × Overest 2020		-0.749* (0.382)		0.126 (0.417)		-0.499 (0.354)		-0.038 (0.392)
Overest 2050		-0.349 (0.263)		-0.179 (0.249)		-0.475** (0.196)		0.191 (0.268)
T1: Saliency × Overest 2050		0.894* (0.457)		0.540 (0.344)		0.931** (0.379)		0.217 (0.431)
T2: Info × Overest 2050		0.592 (0.376)		-0.211 (0.434)		0.218 (0.367)		0.110 (0.401)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	240	240	272	272	262	262	250	250

Notes: The table shows the treatment effects on perceived reform necessity. Reform necessity is measured on a 7-point Likert scale and it is standardized using mean and standard deviation of the control group. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Therefore, for the full sample as well as for the West German subsample, we conclude, that our treatments mainly affect older respondents above the age of 50 as well as female respondents, while the effects on younger respondents are mostly insignificant. For the East Germany subsample, the results are different and indicate that mainly young respondents, i.e. respondents below the age of 50, react to the treatments.

5.3. Preferences towards specific reforms

Besides the general perceived necessity of reforms, we are also interested in specific reform measures. As already presented in Section 3, we make use of respondents' answers to six pairwise comparisons of four reform measures.

Table 5 displays the results for the three reform measures increasing the retirement age (*age*), decreasing the pension level (*level*) and increasing the contribution payments to the statutory pension insurance (*contribution*), but abstracts from an increase in the tax subsidy for the moment. Considering the comparison *age, not level*, we find for the full sample (Panel A) that treatment T1, i.e. the treatment which increases salience of the demographic change without providing the correct information, significantly increases the probability that respondents choose an increase in the retirement age over a decrease in the pension level by up to 11.9 percentage points. When interacting the treatments with the dummy variables indicating overestimation of the old-age dependency ratios, we find a similar positive effect, however somewhat less significant, for the non-overestimating respondents while overestimating the 2050 ratio significantly decreases the treatment effects of both, the information and the salience treatment, by 21.2 percentage points (T1) and 24.4 percentage points (T2), respectively (Panel A, column 4).

When analyzing the subsamples of East and West German respondents, the results are quite different from each other. While East German respondents do not change their preferences when considering *age, not level*, they react to the information treatment (T2) when it comes to their preferences about *age, not contribution*. While overestimation of the 2020 ratio increases their preference for increasing the retirement age over increasing contributions after being informed about the correct ratio, overestimating the 2050 ratio has a marginally significant negative effect on the information treatment (Panel B, column 2). For the question whether they prefer increasing the contributions or decreasing the pension level (*contribution, not level*), the results suggest that overestimating the old-age dependency ratio for 2050 has a marginally significant negative treatment effect on the effect of the salience treatment (Panel B, column 6). The effects for West German respondents on the other hand are rather similar to those for the full sample. Respondents mainly change their preferences due to the treatments when considering the comparison *age, not level*. Receiving the salience treatment (T1) makes West German respondents 13.9 percentage points more likely to prefer an increase in the retirement age over a decrease of the pension level (Panel C, column 3). When interacting the treatment effects with the overestimation-dummies, the results show that overestimating the old-age dependency ratio for 2020 significantly increases the salience effect, while overestimating the ratio for 2050 has a significant negative effect on both treatments (Panel C, column 4). In addition, we also find that overestimation of the ratio for 2050 significantly increases the preference for *contribution, not level*, when respondents receive the information treatment (Panel C, column 6).

Adding the measure to increase the tax subsidy (*tax*) for the statutory pension insurance (Table 6) – the measure most preferred by more than 60% of the respondents in the control group (see Fig. 4), we find for the full sample that both treatments make it significantly more likely that respondents prefer an increase in the retirement age over an increase in the tax subsidy (*age, not tax*, Panel A, column 1). When including the interaction with the overestimation-dummies, we do not find significant differences in treatment effects (Panel A, column 2). In addition, we find that the information treatment (T2) has a significant positive effect on the preference to choose an increase in contributions over an increase in tax subsidies for non-overestimating respondents (*contribution, not tax*, Panel A, column 6). Again, the interactions of the treatments with the overestimation-dummies are not significant.

When analyzing the treatment effects separately for respondents from East and West Germany, we find that the salience treatment (T1) has a marginally significant positive effect on the likelihood that respondents from East Germany prefer an increase in the retirement age over an increase in tax subsidies (Panel B, column 1). Additionally, the information treatment (T2) has a positive and marginally significant effect on the likelihood that West German respondents choose increasing contributions over increasing tax subsidies when interactions are included, implying that these effects are driven by non-overestimating respondents (Panel C, column 6). For all the results of the East/West sub-sample analysis, the sample size caveats mentioned above apply again.

The results of the treatments for the preferences towards specific reforms are partially in line with our hypothesis: We hypothesized that receiving the salience treatment (T1) increases the preferences for reform measures that positively affect the financial sustainability of the statutory pension insurance. This is what we find for an increase in the retirement age (see, in particular, the comparison *age, not tax* in Table 6), while we do not find support for this hypothesis when comparing a decrease in the pension level or an increase in contributions to an increase in tax subsidies (*level, not tax* and *contribution, not tax* in Table 6). Since an increase in the retirement age is by far the least preferred reform measure, there is the largest scope for a (slight) shift in preferences by (some of) the respondents when they become more salient of demographic change. In addition, we hypothesized that the information effect depends on the overestimation of the old-age dependency ratio. We find for the old-age dependency ratio for 2050 that the information treatment reduces preferences for the *age* measure when compared to the *contribution* or *level* measures and increases preferences for *contribution* compared to *level*. One possible explanation for this could be that the *age* measure is seen as the widest reaching (and most unpopular) option; if respondents learn that they have overestimated demographic change, they may prefer other reform options more.

Similar to the question about the perceived reform necessity, we are also interested whether the effect of the information treatment (T2) significantly differs from the effect of the salience treatment (T1) for the six pairwise comparisons. Therefore, we run our analysis again, excluding the control group and using the salience group as the benchmark. From Tables A.7 and A.8, we

Table 5
Pension reform measures.

	(1)	(2)	(3)	(4)	(5)	(6)
	Age, not contribution		Age, not level		Contribution, not level	
Panel A: Full Sample						
T1: Saliency	0.025 (0.038)	0.029 (0.066)	0.119*** (0.045)	0.150* (0.079)	0.068* (0.041)	0.041 (0.071)
T2: Information	0.048 (0.041)	0.083 (0.075)	0.035 (0.047)	0.084 (0.085)	0.044 (0.043)	-0.007 (0.075)
Overest 2020		-0.089 (0.065)		-0.106 (0.084)		-0.018 (0.075)
T1: Saliency × Overest 2020		0.014 (0.093)		0.155 (0.120)		0.041 (0.104)
T2: Info × Overest 2020		0.153 (0.099)		0.162 (0.119)		-0.122 (0.107)
Overest 2050		0.105* (0.061)		0.135* (0.080)		-0.027 (0.074)
T1: Saliency × Overest 2050		-0.028 (0.090)		-0.212* (0.116)		0.002 (0.101)
T2: Info × Overest 2050		-0.211** (0.099)		-0.244** (0.117)		0.198* (0.108)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	787	787	746	746	777	777
Panel B: East Germany						
T1: Saliency	0.046 (0.051)	-0.026 (0.090)	0.031 (0.065)	0.059 (0.108)	0.002 (0.064)	0.164 (0.115)
T2: Information	0.046 (0.055)	-0.024 (0.099)	0.036 (0.065)	0.129 (0.121)	0.016 (0.064)	0.128 (0.117)
Overest 2020		-0.130 (0.086)		0.143 (0.096)		-0.118 (0.114)
T1: Saliency × Overest 2020		0.044 (0.125)		-0.183 (0.154)		0.089 (0.161)
T2: Info × Overest 2020		0.324*** (0.124)		-0.175 (0.155)		0.074 (0.160)
Overest 2050		0.105 (0.076)		-0.100 (0.100)		0.291** (0.113)
T1: Saliency × Overest 2050		0.066 (0.117)		0.143 (0.155)		-0.356** (0.155)
T2: Info × Overest 2050		-0.218* (0.129)		0.036 (0.156)		-0.257 (0.160)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	307	307	294	294	307	307
Panel C: West Germany						
T1: Saliency	0.033 (0.045)	0.059 (0.080)	0.139** (0.054)	0.187** (0.094)	0.080* (0.048)	0.020 (0.087)
T2: Information	0.050 (0.048)	0.098 (0.088)	0.026 (0.055)	0.079 (0.099)	0.055 (0.051)	-0.038 (0.089)
Overest 2020		-0.084 (0.077)		-0.148 (0.101)		0.014 (0.087)
T1: Saliency × Overest 2020		0.006 (0.116)		0.238* (0.144)		0.027 (0.127)
T2: Info × Overest 2020		0.075 (0.126)		0.223 (0.150)		-0.170 (0.129)
Overest 2050		0.108 (0.073)		0.206** (0.096)		-0.114 (0.085)
T1: Saliency × Overest 2050		-0.057 (0.112)		-0.327** (0.139)		0.072 (0.123)
T2: Info × Overest 2050		-0.158 (0.125)		-0.318** (0.147)		0.312** (0.130)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	481	481	452	452	470	470

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level and increasing contributions to the statutory pension insurance. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6
Pension reform measures (incl. tax subsidies).

	(1)	(2)	(3)	(4)	(5)	(6)
	Age, not tax		Level, not tax		Contribution, not tax	
Panel A: Full Sample						
T1: Saliency	0.064** (0.032)	0.054 (0.059)	-0.031 (0.035)	0.002 (0.053)	0.027 (0.042)	0.028 (0.070)
T2: Information	0.057* (0.032)	0.084 (0.066)	0.020 (0.037)	0.088 (0.065)	0.067 (0.044)	0.159** (0.076)
Overest 2020		0.002 (0.042)		0.015 (0.045)		-0.021 (0.086)
T1: Saliency × Overest 2020		0.021 (0.086)		0.057 (0.089)		0.003 (0.118)
T2: Info × Overest 2020		0.019 (0.068)		-0.090 (0.093)		-0.112 (0.120)
Overest 2050		-0.036 (0.041)		0.053 (0.044)		0.033 (0.086)
T1: Saliency × Overest 2050		-0.003 (0.085)		-0.106 (0.090)		-0.006 (0.119)
T2: Info × Overest 2050		-0.060 (0.068)		-0.020 (0.090)		-0.037 (0.120)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	821	821	811	811	811	811
Panel B: East Germany						
T1: Saliency	0.066* (0.038)	0.012 (0.076)	-0.040 (0.055)	-0.117 (0.093)	-0.037 (0.063)	0.027 (0.104)
T2: Information	0.060 (0.040)	-0.001 (0.087)	-0.010 (0.059)	-0.128 (0.101)	0.011 (0.066)	0.069 (0.109)
Overest 2020		-0.046 (0.045)		-0.122 (0.122)		-0.198* (0.117)
T1: Saliency × Overest 2020		-0.077 (0.103)		0.193 (0.154)		0.097 (0.159)
T2: Info × Overest 2020		0.048 (0.078)		0.198 (0.149)		0.047 (0.162)
Overest 2050		-0.038 (0.038)		0.045 (0.117)		0.272** (0.111)
T1: Saliency × Overest 2050		0.166 (0.102)		-0.073 (0.147)		-0.218 (0.152)
T2: Info × Overest 2050		0.051 (0.078)		-0.017 (0.148)		-0.150 (0.156)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	320	320	316	316	318	318
Panel C: West Germany						
T1: Saliency	0.074* (0.039)	0.085 (0.073)	-0.024 (0.040)	0.046 (0.065)	0.039 (0.050)	0.070 (0.085)
T2: Information	0.055 (0.038)	0.106 (0.077)	0.018 (0.042)	0.117 (0.074)	0.063 (0.051)	0.161* (0.090)
Overest 2020		0.019 (0.051)		0.035 (0.047)		0.008 (0.102)
T1: Saliency × Overest 2020		0.069 (0.106)		0.017 (0.112)		-0.003 (0.148)
T2: Info × Overest 2020		-0.006 (0.081)		-0.162 (0.113)		-0.104 (0.148)
Overest 2050		-0.040 (0.052)		0.058 (0.046)		0.013 (0.103)
T1: Saliency × Overest 2050		-0.083 (0.106)		-0.123 (0.111)		-0.045 (0.150)
T2: Info × Overest 2050		-0.072 (0.082)		0.001 (0.109)		-0.056 (0.149)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	501	501	496	496	493	493

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level, increasing contributions to the statutory pension insurance or increasing tax subsidies. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

conclude, that there are a few significant differences between the two treatment groups for the full sample (Panel A). The most obvious difference is that respondents who receive the information treatment are less likely to have a preference for increasing the retirement age over the pension level (Table A.7, Panel A, column 3). The same is true for West German respondents (Panel C, column 3). East German respondents on the other hand, do not seem to change their preference for this specific trade-off due to receiving the information. They do however change their preferences when it comes to the question whether they would prefer an increase in the retirement age over an increase in contribution, if the interaction with overestimation is included. In particular, overestimation of the old-age dependency ratio for 2020 has a positive effect on the treatment effect and makes East German respondents significantly more likely to prefer an increase in the retirement age, while overestimation of the ratio for 2050 has a negative effect on the treatment effect and also on the preference for increasing the retirement age (Table A.7, Panel B, column 2). Table A.8 shows no significant differences between the salience and the information treatment for any of the tax questions.

Overall, we find tentative evidence that the treatments, which make respondents think about demographic change before answering the reform questions, increase preferences for the reform measure *age*, which is the measure least preferred by more than 60% of the control group (see Fig. 4) compared to the *level*, *contribution* or *tax* measures. A treatment effect in favor of increasing the retirement age shows up for both non-overestimating respondents and respondents who overestimate the ratio for 2020 depending on the specific pairwise comparison. Treatment effects interacted with overestimation of the ratio for 2050 are, however, negative, if significant. Furthermore, there is also tentative evidence that the treatments make the reform measure *tax* less preferred for some of the subsamples considered.

As we expect effects to differ across age and gender at least for some of the pairwise comparisons (cf. Table 2), we also consider corresponding subsamples for the full sample similarly to Section 5.2 acknowledging that this again reduces our sample size. Table A.9 presents results for the two age groups. Results do not differ much across age-groups, however. Effects for overestimating respondents mainly show up for the older age-group if at all. When considering the gender subsamples (Table A.10), treatment effects can mostly be found for the female group. The salience treatment (and less so the information treatment) makes them prefer more the *age* measure compared to the *level* or *tax* measure and also increases their preference for the *contribution* measure versus the *tax* measure.

6. Conclusion

In this paper, we use a survey experiment to analyze the effect of salience and information about demographic change on preferences towards pension reforms regarding the German statutory pension insurance. For the experiment, we ask survey respondents about their beliefs of the old-age dependency ratio for the years 2020 and 2050. Our analysis shows that the majority of respondents overestimates at least one of the two values. This implies that people in Germany overestimate demographic change, i.e. they think that the situation is more serious than it actually is. Against this background, we are particularly interested in seeing whether our treatment, which provides information on demographic change, can change the acceptance of reforms of the public pension system in general and whether results change when we distinguish between underestimating and overestimating respondents.

Regarding the perceived general reform necessity, we find that both the salience and the information treatment (marginally) significantly increase the perceived necessity for reform of the German statutory pension insurance. When considering interaction effects with a dummy-variable indicating overestimation of the old-age dependency ratio for each of the two years, it becomes clear that overestimation of the ratio for 2020 leads to a reduction of both treatment effects, while overestimating the ratio for 2050 increases the salience effect. Thinking about this ratio seems to make the latter subgroup of overestimators aware that demographic change is not a short-term phenomenon, while the information for 2020 only provides them with information about the current situation. In terms of heterogeneity between respondents above or below the age of 50, we find suggestive evidence that both treatments significantly increase the perceived reform necessity of respondents aged 50 or above in the full sample as well as for West German respondents. In East Germany on the other hand we find that only respondents below the age of 50 react to the information treatment.

For the specific reform measures both the salience and the information treatment have significant effects on respondents preferences towards reforms — especially when we consider the least preferred measure (*age*) and the most preferred one (*tax*). The salience effect points towards an increased preference for a higher retirement age to avoid a reduction of the pension level or an increase in tax subsidies. The information treatment on the other hand points towards a stronger preference for increasing contributions instead of increasing tax subsidies.

Overall, the results imply that making respondents aware of demographic change and giving them correct information about the topic can increase the likelihood that they choose reform measures that work towards increasing the financial sustainability of the German statutory pension insurance. Especially increasing the retirement age is not very popular among the general public, which underlines the relevance of our findings. Since our results also suggest that the effect of the salience treatment barely differs from the effect of the information treatment, we interpret our findings such that it is not (so much) the concrete information about the demographic challenge, which matters. Rather, being made aware of the challenges of the pension system impacts reform preferences. This includes making the longer-term dimension more salient, i.e. highlighting that this is not a short-term phenomenon where keeping the status quo is among the options. Therefore, it is important that people understand the broader picture to support policy reforms, while detailed information might not add to their support. This point is even more relevant if it is not possible to distinguish between individuals based on their prior beliefs. As we have underlined, overestimators can be expected to updated

their beliefs differently than underestimators with possible consequences for how they adjust their reform preferences. This provides some guidelines for communication and (financial) education and highlights the benefits of targeted communication.

If we relate this discussion back to the question of the feasibility of pension reforms, we have to acknowledge that there is already a high level of agreement among the respondents – even in the absence of any treatment – that reforms are necessary (see Fig. 3 for the control group).²⁰ The treatments increase this support for general reform preferences even more. At the same time, support is much lower for the specific reform measures that we consider to be measures to improve financial sustainability. When asked about these reform measures, individual interests seem to become more important and dominate the views on the general challenges facing the system. Given the way our treatments are designed in this study, they manage to slightly change preferences, but they are unlikely to shift majorities. Our study can therefore be seen as a first step. Further steps towards a more comprehensive analysis of the best communication that increases salience and possibly information are needed.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Google Trends Analysis and information provision experiment

A.1. Google Trends Analysis

We conduct a Google Trends Analysis for the time period of our survey, i.e. November 2020 until May 2021. We analyze the general terms “pension” (*Rente*) and “demographic change” (*demografischer Wandel*) as well as three of the specific reform measures that we will focus on in our study, i.e. increase of the “retirement age” (*Renteneintrittsalter*), decrease of the “pension level” (*Rentenniveau*) and increase of the “pension contribution rate” (*Beitragssatz Rente*). Following Stephens-Davidowitz (2014), we compare these terms with more general search terms such as “migraine”, “sweater”, “soccer” and *Tagesschau* (a popular German news program). The analysis suggests that the search frequency for “pension” during this period was slightly smaller than for “sweater”, but in a similar range, and larger than for “migraine”. Compared to “Tagesschau” and “soccer” the search for “pension” was significantly less frequent. The more specific term “demographic change” and the terms related to the specific reform measures were searched much less frequently. Comparing East and West Germany, the Google Trends analysis suggests that some issues, namely “pension level” as well as “retirement age”, may be more salient in East Germany. However, there seems to be no difference in the salience of demographic change. The analysis seems to suggest, that neither pension topics nor demography are very salient for Germans.

A.2. Information provision experiment

Wording of belief elicitation questions

Old-age provision in Germany is based on the idea that the working generation finances the pensions of people in retirement. Therefore it is important to look at the ratio of people of retirement age starting from 65 years of age to people of working age between 20 and 64 years of age. In the year 1990, there were 24 people of retirement age for every 100 people of working age.

What do you estimate: in 2020, how many people of retirement age are there for every 100 people of working age?

And what do you estimate: in 2050, how many people of retirement age will be there for every 100 people of working age?

Feedback + Information (Treatment group T2)

You have estimated *xyz* for 2020 and *abc* for 2050 [insert estimates here], the correct answers are 37 for the year 2020 and 55 for the year 2050. There are thus currently about three people of working age for every person of retirement age, and there will be more and more people of retirement age and fewer and fewer people of working age.

Estimation *xyz* (2020):

- Correct (33 – 41): So your estimate of *xyz* for the year 2020 was quite accurate.
- Overestimated (41 <): So your estimate of *xyz* for the year 2020 was too high.
- Underestimated (< 33): So your estimate of *xyz* for the year 2020 was too low.

Estimation *abc* (2050):

²⁰ The mean of the control group is 5.59 (std of 1.35), while the mean of the salience group is 5.70 (std of 1.38) and the mean of the information group is 5.89 (std of 1.33).

- Correct (51 – 59): So your estimate of *abc* for the year 2050 was quite accurate.
- Overestimated (59 <): So your estimate of *abc* for the year 2050 was too high.
- Underestimated (< 51): So your estimate of *abc* for the year 2050 was too low.

Appendix B. Relevant variables

See [Tables A.1](#) and [A.2](#).

Appendix C. Balance

See [Tables A.3–A.5](#) and [Fig. A.1](#).

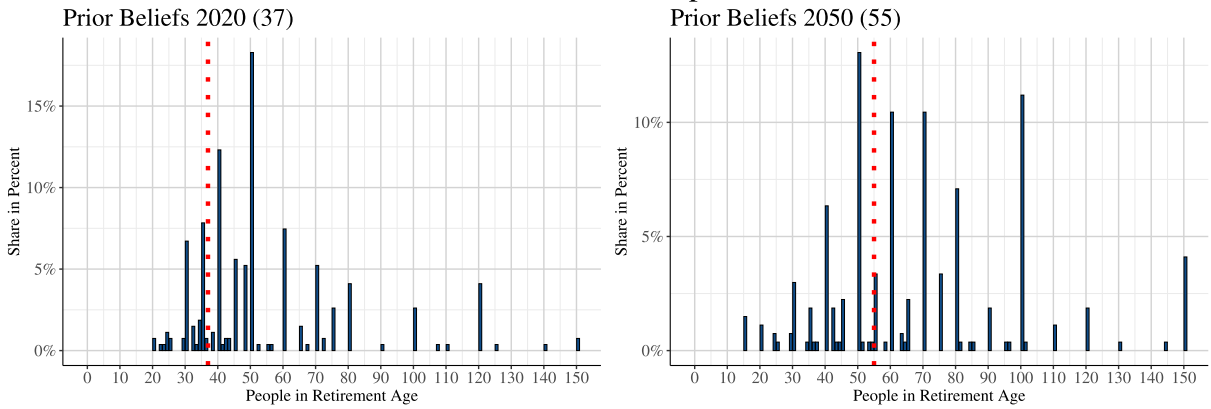
Appendix D. Saliency vs. information

See [Tables A.6–A.8](#).

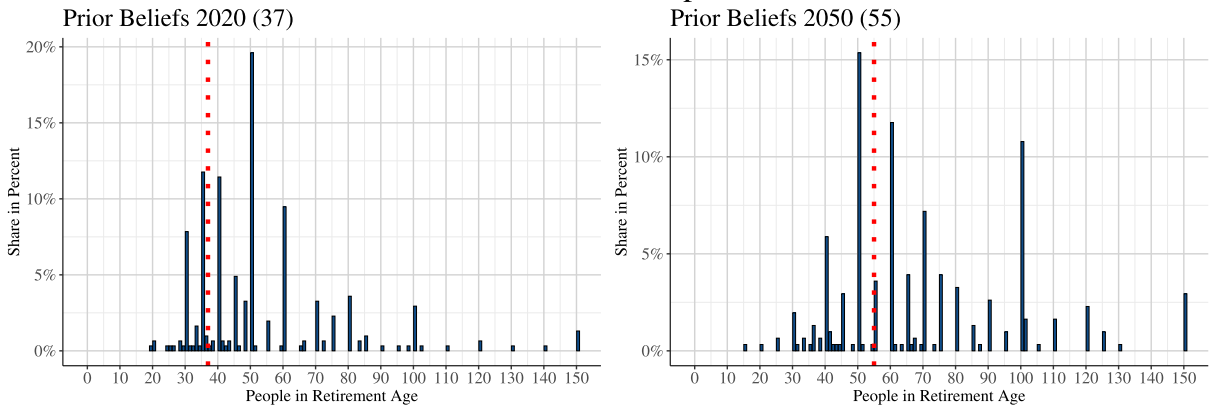
Appendix E. Preferences towards specific reforms - further heterogeneity analysis

See [Tables A.9](#) and [A.10](#).

Control Group



Treatment Group T1



Treatment Group T2

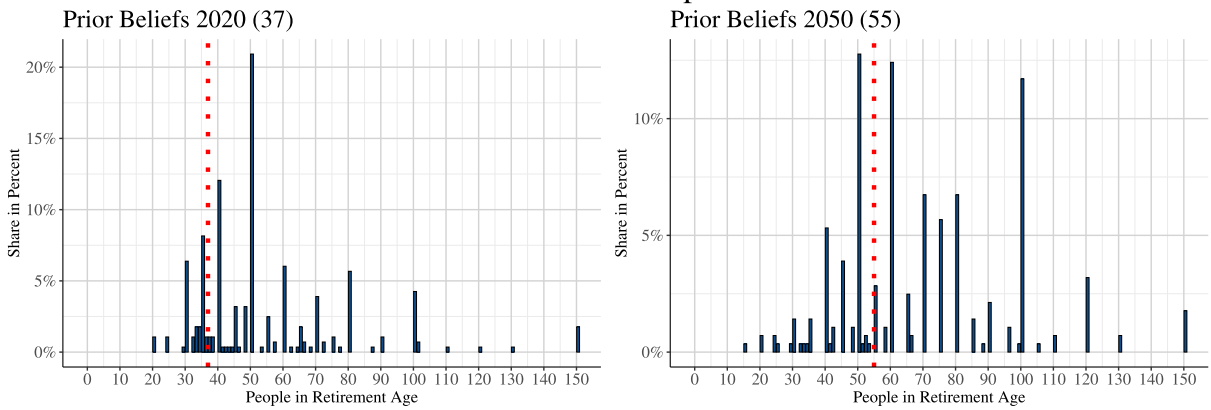


Fig. A.1. Prior beliefs by group: control, T1 and T2.

Table A.1
Descriptive overview of variables.

Variable name	Type	Description
Reform variables		
Reform necessity	Numerical (1–7)	Perceived reform necessity based on the question “Do you think that reforms are necessary for the German pension system?” With answer options from 1 “no reforms necessary” to 7 “comprehensive reforms necessary”.
Age, not contribution	Dummy	=1, if increasing the retirement age is preferred over increasing contributions based on the question “Should the retirement age be raised or the contribution rate be increased?”
Age, not level	Dummy	= 1, if increasing the retirement age is preferred over decreasing the pension level based on the question “Should the retirement age be increased or the pension level be decreased?”
Contribution, not level	Dummy	= 1, if increasing the contributions is preferred over decreasing the pension level based on the question “Should the contribution rate be increased or the pension level be decreased?”
Age, not tax	Dummy	= 1, if increasing the retirement age is preferred over increasing the tax subsidy based on the question “Should the tax-financed federal subsidy to the statutory pension insurance be increased or the retirement age be increased?”
Level, not tax	Dummy	= 1, if decreasing the pension level is preferred over increasing the tax subsidy based on the question “Should the tax-financed federal subsidy to the statutory pension insurance be increased or the contribution rate be increased?”
Contribution, not tax	Dummy	= 1, if increasing the contribution rate is preferred over increasing the tax subsidy based on the question “Should the tax-financed federal subsidy to the statutory pension insurance be increased or the pension level be lowered?”
Individual characteristics		
Age old (50+)	Dummy	= 1, if age is 50 or above
Female	Dummy	= 1, if gender is female
East	Dummy	= 1, if respondent lives in East Germany
Educ: 12th grade	Dummy	= 1, if school degree after 12th grade
Educ: uni	Dummy	= 1, if respondent has an university degree
Risk attitude	Numerical (1–7)	“How willing are you to take risks in money and financial matters?” Answer options range from 1 “not at all willing to take risks” to 7 “very willing to take risks”
Trust: finance	Numerical (1–7)	Trust in private financial service providers based on the question “Do you think that banks, insurance companies and other financial service providers in Germany can be trusted?” Answer options range from 1 “I do not trust them at all” to 7 “I trust them completely”
Trust: own decision	Numerical (1–7)	Trust in own decisions based on the question “How much do you trust yourself in making the right decisions for your pension planning?” Answer options range from 1 “not at all” to 7 “fully”
Children	Dummy	= 1, if respondent has children
Employed	Dummy	= 1, if employed
Migration background	Dummy	= 1, if respondent has migration background
Married	Dummy	= 1, if respondent is married or in a registered same-sex partnership
Household size	Numerical	Number of people in the household
Trust: public	Numerical (1–7)	Trust in public institutions based on the question “Do you think that the public institutions in Germany relevant to old-age pension, such as the German Pension Insurance or the Federal Ministry of Labor and Social Affairs, can be trusted?” Answer options range from 1 “I do not trust them at all” to 7 “I trust them completely”
Time preference	Numerical (1–7)	Time preference based on the question “Since you don’t know how long you will live, you should rather spend your money to-day than save for old age.” Answer options range from 1 “do not agree at all” to 7 “agree completely”.
Equality preference	Numerical (1–7)	Equality Preference based on the question “The state should ensure greater equality of financial living conditions in old age.” Answer options range from 1 “do not agree at all” to 7 “agree completely”.
Contributions SPI	Dummy	= 1, if respondent pays contributions to the statutory pension insurance
Optimism old-age	Dummy	= 1, if respondent states that they look quite optimistic or more optimistic than pessimistic at their life in old age
Interest topic	Numerical (1–7)	Interest in Old-age provision based on the question “How interested are you in the topic of pension planning?” Answer options range from 1 “no interest at all” to 7 “very high interest”
Old-age income	Dummy	= 1 if the respondents answers yes to the question “Have you already gathered information about how much income you will receive in retirement?”
Understanding index	Numerical (0–11)	Number of correct answers to 11 questions about the German statutory pension insurance - The individual components of the understanding indicator are shown in Table A.2
Beliefs certain	Numerical (1–7)	Certainty about prior beliefs based on the question “And how certain are you about your estimate?” Answer options range from 1 “very uncertain” to 7 “very certain”

Table A.2

Descriptive overview of understanding variables.

Understanding Index: Questions

Q1. Now we are interested in the contributions to the statutory pension insurance. Please indicate whether you think the following statements apply or do not apply.
 Reply options: Applies, Does not apply, Don't know

Q1.a In Germany all persons, whether they are self-employed or not, are obliged to pay contributions to the statutory pension insurance.
 Q1.b In Germany, contributions to the statutory pension insurance are paid in full by employees.
 Q1.c In Germany, civil servants are obliged to pay contributions to the statutory pension insurance.
 Q1.d In Germany, taxpayers contribute to financing of the statutory pension insurance.*

Q2. And what do you think happens to the contributions paid into the statutory pension insurance? Please state again whether you think these statements apply or do not apply.
 Reply options: Applies, Does not apply, Don't know

Q2.a The contributions are saved by the statutory pension insurance in a secured account for every insured person.
 Q2.b The contributions are invested by the statutory pension insurance on the capital market.
 Q2.c The contributions are used to achieve a more equitable distribution between retirees with lower income and those with higher income.
 Q2.d The contributions are used to finance the pension payments to the persons who are currently retired.

Q3. The following part is about the paid out pension amount. Please tell me whether you think that the following factors have a large influence on how much pension income someone receives from the statutory pension insurance. Please answer YES if you think they have a large influence and NO if this is not the case.
 Reply options: Yes, No, Don't know

Q3.a The way the 'Deutsche Rentenversicherung' (i.e., the German statutory pension agency invests the contributions has a large influence on how much pension income someone receives from the statutory pension insurance.
 Q3.b The development of interest rates on the capital market has a large influence on how much pension income someone receives from the statutory pension insurance
 Q3.c The amount of the last income before retirement has a large influence on how much pension income someone receives from the statutory pension insurance
 Q3.d The administration costs of the 'Deutsche Rentenversicherung' have a large influence on how much pension income someone receives from the statutory pension insurance.
 Q3.e The own income in relation to the average income has a large influence on how much pension income someone receives from the statutory pension insurance.^a
 Q3.f The amount of contributions paid by an insured person has a large influence on how much pension income someone receives from the statutory pension insurance.^a

^a Indicates variables that were not used for the calculation of the understanding index (see Baginski et al. (2023) for details).

Table A.3
Balance tests - Germany.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	C	T1	C vs. T1	T2	C vs. T2	T1 vs. T2
	Mean	Mean	Mean	p-Value	Mean	p-Value	p-Value
Age old (50+)	0.46	0.50	0.45	0.23	0.45	0.28	0.92
Female	0.50	0.52	0.49	0.48	0.50	0.72	0.72
East	0.40	0.39	0.42	0.47	0.39	0.88	0.56
Educ: 12th grade	0.55	0.55	0.52	0.40	0.57	0.67	0.20
Educ: uni	0.35	0.35	0.34	0.72	0.35	0.96	0.75
Risk attitude	3.06	3.10	2.99	0.39	3.11	0.95	0.35
Trust: finance	3.83	3.78	3.85	0.65	3.84	0.66	0.99
Trust: own decision	5.15	5.18	5.14	0.72	5.13	0.69	0.96
Children	0.67	0.70	0.64	0.14	0.66	0.36	0.58
Employed	0.84	0.83	0.84	0.75	0.84	0.68	0.91
Migration background	0.14	0.13	0.16	0.33	0.13	0.99	0.32
Married	0.52	0.56	0.53	0.44	0.46	0.02**	0.10
Household size	2.54	2.59	2.50	0.42	2.54	0.68	0.69
Trust: public	4.45	4.38	4.52	0.35	4.45	0.63	0.65
Time preference	2.93	3.04	2.89	0.33	2.87	0.26	0.89
Equality preference	5.00	5.03	5.00	0.86	4.99	0.79	0.93
Contributions SPI	0.88	0.88	0.87	0.71	0.89	0.70	0.44
Optimism old-age	0.57	0.57	0.58	0.84	0.56	0.73	0.57
Interest topic	4.77	4.73	4.70	0.79	4.87	0.38	0.23
Old-age income	0.76	0.78	0.76	0.45	0.75	0.35	0.84
Beliefs certain	3.80	3.73	3.87	0.27	3.79	0.65	0.52
Understanding index	7.56	7.50	7.54	0.81	7.62	0.49	0.67
Observations	849	264	305	569	280	544	585

Notes: This table shows the mean for the full sample as well as for each of the experimental groups. Furthermore, p-values of the comparison between groups resulting from t-tests are shown; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4
Balance tests - East Germany.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	C	T1	C vs. T1	T2	C vs. T2	T1 vs. T2
	Mean	Mean	Mean	p-Value	Mean	p-Value	p-Value
Age old (50+)	0.45	0.46	0.45	0.81	0.45	0.78	0.96
Female	0.48	0.46	0.49	0.73	0.48	0.81	0.92
Educ: 12th grade	0.49	0.49	0.44	0.42	0.55	0.47	0.11
Educ: uni	0.32	0.38	0.31	0.23	0.29	0.16	0.79
Risk attitude	2.99	2.87	3.04	0.42	3.04	0.46	0.99
Trust: finance	3.78	3.59	3.90	0.16	3.82	0.28	0.72
Trust: own decision	5.06	5.20	4.87	0.10	5.15	0.77	0.16
Children	0.67	0.69	0.68	0.88	0.65	0.53	0.61
Employed	0.82	0.82	0.80	0.78	0.84	0.73	0.51
Migration background	0.10	0.06	0.13	0.10	0.09	0.41	0.39
Married	0.49	0.51	0.50	0.99	0.46	0.55	0.54
Household size	2.46	2.34	2.41	0.69	2.61	0.13	0.22
Trust: public	4.40	4.29	4.50	0.36	4.37	0.75	0.56
Time preference	3.04	3.07	3.19	0.65	2.83	0.32	0.12
Equality preference	5.13	5.11	5.16	0.85	5.11	0.99	0.83
Contributions SPI	0.90	0.91	0.87	0.41	0.92	0.82	0.27
Optimism old-age	0.49	0.49	0.48	0.83	0.51	0.84	0.66
Interest topic	4.76	4.72	4.59	0.60	5.00	0.23	0.05*
Old-age income	0.73	0.80	0.70	0.10*	0.71	0.14	0.89
Beliefs certain	3.79	3.57	3.92	0.09*	3.84	0.20	0.67
Understanding Index	7.46	7.47	7.27	0.49	7.67	0.50	0.17
Observations	336	99	127	226	110	209	237

Notes: This table shows the mean for the East German sample as well as for each of the experimental groups. Furthermore, p-values of the comparison between groups resulting from t-tests are shown; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5
Balance tests - West Germany.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	C	T1	C vs. T1	T2	C vs. T2	T1 vs. T2
	Mean	Mean	Mean	p-Value	Mean	p-Value	p-Value
Age old (50+)	0.47	0.51	0.44	0.21	0.45	0.26	0.91
Female	0.51	0.54	0.48	0.27	0.51	0.60	0.56
Educ: 12th grade	0.58	0.59	0.57	0.71	0.59	0.94	0.65
Educ: uni	0.36	0.33	0.36	0.67	0.39	0.27	0.48
Risk attitude	3.13	3.27	2.98	0.09*	3.15	0.49	0.31
Trust: finance	3.85	3.89	3.80	0.62	3.88	0.94	0.68
Trust: own decision	5.21	5.19	5.31	0.43	5.13	0.73	0.25
Children	0.67	0.71	0.62	0.09*	0.68	0.53	0.27
Employed	0.85	0.83	0.87	0.39	0.85	0.72	0.62
Migration background	0.17	0.17	0.18	0.80	0.15	0.61	0.43
Married	0.54	0.60	0.54	0.26	0.46	0.01***	0.12
Household size	2.61	2.76	2.57	0.18	2.51	0.08*	0.67
Trust: public	4.50	4.44	4.52	0.67	4.52	0.68	0.99
Time preference	2.88	3.02	2.73	0.13	2.89	0.49	0.40
Equality preference	4.93	5.02	4.89	0.52	4.89	0.54	0.98
Contributions SPI	0.87	0.87	0.87	0.96	0.88	0.85	0.89
Optimism old-age	0.62	0.62	0.64	0.60	0.59	0.62	0.30
Interest topic	4.76	4.72	4.77	0.82	4.78	0.79	0.96
Old-age income	0.78	0.77	0.80	0.52	0.78	0.89	0.61
Beliefs certain	3.79	3.80	3.82	0.90	3.75	0.74	0.64
Understanding Index	7.59	7.48	7.72	0.30	7.57	0.67	0.52
Observations	513	162	180	342	171	333	351

Notes: This table shows the mean for the West German sample as well as for each of the experimental groups. Furthermore, p-values of the comparison between groups resulting from t-tests are shown; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6
Necessity of reforms - salience vs. info.

	(1)	(2)	(3)	(4)
	Reform necessity			
Panel A: Full Sample				
T2: Info	0.057 (0.085)	0.036 (0.081)	0.171 (0.153)	0.152 (0.143)
Overest 2020			-0.085 (0.160)	-0.088 (0.162)
T2: Info × Overest 2020			-0.060 (0.234)	-0.052 (0.236)
Overest 2050			0.283* (0.166)	0.244 (0.168)
T2: Info × Overest 2050			-0.123 (0.241)	-0.134 (0.240)
Controls	No	Yes	No	Yes
Observations	582	582	582	582
Panel B: East Germany				
T2: Info	0.308** (0.129)	0.232* (0.127)	0.556** (0.249)	0.383 (0.236)
Overest 2020			0.306 (0.226)	0.163 (0.218)
T2: Info × Overest 2020			-0.633** (0.303)	-0.458 (0.288)
Overest 2050			0.049 (0.214)	0.009 (0.206)
T2: Info × Overest 2050			0.242 (0.300)	0.226 (0.301)
Controls	No	Yes	No	Yes
Observations	235	235	235	235
Panel C: West Germany				
T2: Info	0.020 (0.100)	0.013 (0.096)	0.142 (0.176)	0.121 (0.167)
Overest 2020			-0.217 (0.208)	-0.207 (0.203)
T2: Info × Overest 2020			0.168 (0.302)	0.193 (0.303)
Overest 2050			0.427* (0.218)	0.375* (0.210)
T2: Info × Overest 2050			-0.359 (0.311)	-0.358 (0.311)
Controls	No	Yes	No	Yes
Observations	350	350	350	350

Notes: The table shows the treatment effects on perceived reform necessity, where the salience group is used as the baseline. Reform necessity is measured on a 7-point Likert scale and it is standardized using mean and standard deviation of the control group. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95% or below the 5% percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7
Pension reform measures - salience vs. info.

	(1)	(2)	(3)	(4)	(5)	(6)
		Age, not contribution		Age, not level		Contribution, not level
Panel A: Full Sample						
T2: Info	0.014 (0.040)	0.048 (0.072)	-0.092** (0.045)	-0.067 (0.081)	-0.020 (0.040)	-0.044 (0.069)
Overest 2020		-0.083 (0.068)		0.054 (0.083)		0.040 (0.074)
T2: Info × Overest 2020		0.131 (0.099)		-0.008 (0.115)		-0.179* (0.103)
Overest 2050		0.084 (0.067)		-0.079 (0.085)		-0.034 (0.073)
T2: Info × Overest 2050		-0.180* (0.103)		-0.027 (0.119)		0.209** (0.105)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	540	540	510	510	531	531
Panel B: East Germany						
T2: Info	-0.003 (0.054)	0.007 (0.088)	0.025 (0.064)	0.100 (0.118)	0.013 (0.065)	-0.049 (0.119)
Overest 2020		-0.086 (0.093)		-0.011 (0.123)		-0.031 (0.117)
T2: Info × Overest 2020		0.266* (0.136)		-0.019 (0.174)		-0.011 (0.169)
Overest 2050		0.179** (0.086)		0.035 (0.122)		-0.069 (0.110)
T2: Info × Overest 2050		-0.285** (0.136)		-0.095 (0.171)		0.107 (0.162)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	215	215	205	205	214	214
Panel C: West Germany						
T2: Info	0.008 (0.047)	0.033 (0.083)	-0.125** (0.053)	-0.098 (0.093)	-0.019 (0.048)	-0.050 (0.079)
Overest 2020		-0.083 (0.087)		0.101 (0.101)		0.068 (0.094)
T2: Info × Overest 2020		0.046 (0.131)		-0.053 (0.146)		-0.232* (0.128)
Overest 2050		0.054 (0.087)		-0.124 (0.102)		-0.061 (0.094)
T2: Info × Overest 2050		-0.085 (0.136)		0.013 (0.151)		0.269** (0.130)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	328	328	307	307	319	319

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level and increasing contributions to the statutory pension insurance. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.8
Pension reform measures (incl. tax subsidies) - salience vs. info.

	(1)	(2)	(3)	(4)	(5)	(6)
	Age, not tax		Level, not tax		Contributions, not tax	
Panel A: Full Sample						
T2: Info	-0.009 (0.035)	0.032 (0.066)	0.047 (0.035)	0.083 (0.062)	0.046 (0.044)	0.143* (0.075)
Overest 2020		0.022 (0.077)		0.063 (0.077)		-0.012 (0.081)
T2: Info × Overest 2020		-0.003 (0.092)		-0.139 (0.111)		-0.112 (0.117)
Overest 2050		-0.040 (0.079)		-0.046 (0.079)		0.025 (0.082)
T2: Info × Overest 2050		-0.060 (0.094)		0.080 (0.113)		-0.045 (0.118)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	565	565	554	554	557	557
Panel B: East Germany						
T2: Info	-0.010 (0.047)	-0.012 (0.088)	0.037 (0.053)	0.000 (0.090)	0.044 (0.063)	0.039 (0.115)
Overest 2020		-0.116 (0.092)		0.086 (0.095)		-0.100 (0.107)
T2: Info × Overest 2020		0.109 (0.118)		-0.002 (0.134)		-0.062 (0.157)
Overest 2050		0.129 (0.093)		-0.024 (0.090)		0.059 (0.102)
T2: Info × Overest 2050		-0.107 (0.119)		0.054 (0.130)		0.076 (0.146)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	225	225	222	222	225	225
Panel C: West Germany						
T2: Info	-0.022 (0.041)	0.025 (0.079)	0.038 (0.041)	0.070 (0.072)	0.027 (0.052)	0.103 (0.090)
Overest 2020		0.090 (0.096)		0.039 (0.101)		0.010 (0.105)
T2: Info × Overest 2020		-0.084 (0.113)		-0.177 (0.141)		-0.097 (0.154)
Overest 2050		-0.127 (0.099)		-0.051 (0.105)		-0.033 (0.107)
T2: Info × Overest 2050		0.008 (0.116)		0.118 (0.145)		-0.029 (0.158)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	343	343	335	335	335	335

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level, increasing contributions to the statutory pension insurance or increasing tax subsidies. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95th or below the 5th percentile. For Panel A we are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.9
Pension reform measures - heterogeneity by age.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Age, not contrib.		Age, not level		Contrib., not level		Age, not tax		Level, not tax		Contrib., not tax	
Panel A: Age Below 50												
T1: Saliency	0.006 (0.051)	0.103 (0.089)	0.124** (0.062)	0.240** (0.105)	0.033 (0.057)	0.033 (0.093)	0.040 (0.043)	-0.011 (0.075)	-0.040 (0.051)	-0.003 (0.063)	-0.001 (0.057)	-0.002 (0.094)
T2: Information	0.022 (0.053)	0.081 (0.108)	0.073 (0.063)	0.148 (0.118)	0.029 (0.061)	-0.001 (0.105)	0.033 (0.042)	0.001 (0.090)	0.024 (0.055)	0.180* (0.107)	0.110* (0.061)	0.216** (0.110)
Overest 2020		-0.032 (0.071)		0.005 (0.122)		-0.114 (0.111)		-0.020 (0.049)		0.045 (0.065)		0.017 (0.125)
T1: Saliency × Overest 2020		-0.114 (0.116)		-0.005 (0.165)		0.103 (0.150)		0.099 (0.120)		-0.034 (0.122)		-0.119 (0.167)
T2: Info × Overest 2020		0.121 (0.129)		0.163 (0.158)		-0.018 (0.149)		0.021 (0.076)		-0.164 (0.124)		-0.166 (0.167)
Overest 2050		0.113 (0.069)		0.070 (0.119)		0.042 (0.112)		-0.011 (0.047)		0.070 (0.064)		-0.009 (0.125)
T1: Saliency × Overest 2050		-0.046 (0.116)		-0.187 (0.161)		-0.105 (0.151)		-0.017 (0.116)		-0.027 (0.121)		0.122 (0.166)
T2: Info × Overest 2050		-0.211 (0.136)		-0.273* (0.158)		0.063 (0.152)		0.029 (0.073)		-0.072 (0.123)		0.014 (0.168)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	430	430	408	408	426	426	444	444	437	437	442	442
Panel B: Age 50+												
T1: Saliency	0.045 (0.060)	-0.065 (0.106)	0.119* (0.067)	0.043 (0.123)	0.123** (0.057)	0.059 (0.106)	0.076 (0.049)	0.118 (0.098)	-0.033 (0.049)	0.011 (0.090)	0.082 (0.062)	0.110 (0.108)
T2: Information	0.075 (0.063)	0.056 (0.112)	-0.005 (0.070)	-0.021 (0.123)	0.090 (0.063)	0.046 (0.107)	0.066 (0.049)	0.139 (0.095)	-0.028 (0.052)	-0.029 (0.089)	0.038 (0.064)	0.119 (0.108)
Overest 2020		-0.167 (0.112)		-0.265** (0.118)		0.041 (0.106)		0.046 (0.065)		-0.031 (0.068)		-0.054 (0.115)
T1: Saliency × Overest 2020		0.189 (0.154)		0.362** (0.175)		0.062 (0.147)		-0.114 (0.115)		0.148 (0.122)		0.093 (0.162)
T2: Info × Overest 2020		0.211 (0.152)		0.210 (0.174)		-0.200 (0.156)		-0.012 (0.104)		0.027 (0.145)		-0.057 (0.170)
Overest 2050		0.091 (0.101)		0.218** (0.107)		-0.044 (0.103)		-0.089 (0.069)		0.057 (0.064)		0.061 (0.121)
T1: Saliency × Overest 2050		-0.023 (0.145)		-0.262 (0.169)		0.044 (0.140)		0.051 (0.119)		-0.210 (0.128)		-0.137 (0.170)
T2: Info × Overest 2050		-0.201 (0.145)		-0.222 (0.164)		0.279* (0.156)		-0.118 (0.108)		-0.022 (0.134)		-0.096 (0.172)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	357	357	338	338	351	351	377	377	374	374	369	369

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level and increasing contributions to the statutory pension insurance. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95% or below the 5% percentile. We are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10
Pension reform measures - heterogeneity by gender.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Age, not contrib.		Age, not level		Contrib., not level		Age, not tax		Level, not tax		Contrib., not tax	
Panel A: Male												
T1: Saliency	0.049 (0.062)	-0.012 (0.104)	0.113* (0.068)	0.140 (0.112)	0.026 (0.055)	0.038 (0.097)	0.030 (0.054)	-0.007 (0.090)	-0.016 (0.056)	0.026 (0.081)	-0.057 (0.061)	-0.100 (0.103)
T2: Information	0.003 (0.062)	0.030 (0.102)	0.022 (0.069)	0.069 (0.113)	-0.004 (0.059)	0.036 (0.100)	0.033 (0.052)	0.036 (0.092)	0.024 (0.055)	0.042 (0.087)	0.059 (0.064)	0.125 (0.108)
Overest 2020		-0.093 (0.098)		-0.198* (0.114)		-0.062 (0.100)		0.029 (0.076)		0.008 (0.065)		-0.051 (0.139)
T1: Saliency × Overest 2020		0.108 (0.154)		0.219 (0.177)		0.012 (0.136)		0.001 (0.165)		0.118 (0.137)		0.060 (0.199)
T2: Info × Overest 2020		0.133 (0.157)		0.210 (0.166)		-0.251* (0.143)		-0.006 (0.115)		0.046 (0.131)		-0.241 (0.170)
Overest 2050		0.012 (0.097)		0.206* (0.110)		0.036 (0.098)		-0.102 (0.080)		0.056 (0.059)		0.019 (0.139)
T1: Saliency × Overest 2050		-0.010 (0.151)		-0.271 (0.173)		-0.028 (0.130)		0.060 (0.166)		-0.189 (0.137)		0.014 (0.195)
T2: Info × Overest 2050		-0.198 (0.156)		-0.307* (0.162)		0.179 (0.142)		-0.011 (0.116)		-0.075 (0.127)		0.115 (0.169)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	398	398	375	375	394	394	417	417	412	412	415	415
Panel B: Female												
T1: Saliency	-0.007 (0.046)	0.067 (0.079)	0.144** (0.061)	0.214* (0.110)	0.085 (0.061)	0.030 (0.110)	0.101*** (0.038)	0.141* (0.078)	-0.050 (0.045)	-0.034 (0.069)	0.128** (0.059)	0.183* (0.102)
T2: Information	0.087* (0.053)	0.122 (0.110)	0.059 (0.064)	0.112 (0.134)	0.061 (0.064)	-0.083 (0.124)	0.087** (0.037)	0.124 (0.089)	0.019 (0.049)	0.139 (0.103)	0.077 (0.061)	0.163 (0.114)
Overest 2020		-0.073 (0.081)		0.004 (0.120)		0.050 (0.107)		-0.001 (0.039)		-0.009 (0.059)		-0.017 (0.108)
T1: Saliency × Overest 2020		-0.045 (0.111)		0.057 (0.164)		0.047 (0.154)		-0.002 (0.081)		0.049 (0.113)		-0.052 (0.145)
T2: Info × Overest 2020		0.181 (0.121)		0.126 (0.170)		-0.048 (0.151)		0.017 (0.067)		-0.191 (0.139)		0.063 (0.167)
Overest 2050		0.200*** (0.075)		0.075 (0.115)		-0.116 (0.103)		0.016 (0.037)		0.086 (0.062)		0.067 (0.109)
T1: Saliency × Overest 2050		-0.087 (0.101)		-0.165 (0.158)		0.048 (0.149)		-0.062 (0.079)		-0.077 (0.112)		-0.039 (0.150)
T2: Info × Overest 2050		-0.249** (0.126)		-0.204 (0.177)		0.259* (0.149)		-0.068 (0.072)		0.009 (0.130)		-0.186 (0.170)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	389	389	371	371	383	383	404	404	399	399	396	396

Notes: The table shows the treatment effects on the pairwise choices for increasing the retirement age, decreasing the pension level and increasing contributions to the statutory pension insurance. All outcome variables are binary variables. Control variables include Age old (50+), Female, East, Educ: 12th grade, Children, Married, Employed, Migration background, Trust: public, Time preference, Equality preference, Optimism old-age, Interest topic, Old-age income, Contributions SPI, Beliefs certain and the Understanding index. We drop outliers with prior beliefs above the 95% or below the 5% percentile. We are using a weight that balances the oversampling of respondents from East Germany. Robust standard errors are displayed in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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