The power of information nudges for individual sustainable investment: Empirical evidence from a framed field experiment

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Abstract

Based on data from a representative online survey among household financial decision makers in Germany that comprised an incentivized framed field experiment, this paper empirically examines whether different information frames can nudge individuals to invest more sustainably. By distinguishing between financial, impact, and social norm information frames, our incentive compatible discrete choice experiment refers to revealed decisions among different bond funds. In line with previous studies, our econometric analysis with mixed logit models reveals a strong positive willingness to pay (WTP) for sustainable investment products. In particular, our empirical analysis shows that some information nudges matter: Financial and impact information significantly increase the WTP for sustainability. These results suggest that investors should be provided with financial and impact information to foster sustainable investments. Our analysis of heterogeneous treatment effects reveals that respondents with low financial literacy, low trust in scientists, and high altruism are particularly responsive to some information. These results indicate that information provision should be adapted for specific groups of investors to increase sustainable investments. The provision of such information can lead to belief updates and reduce investment barriers for sustainable investments.

JEL: Q56, G11

Keywords: Sustainable investments; individual investors; information nudges; framed field experiment

1. Introduction

Individual sustainable investment¹ is driven by both pecuniary and non-pecuniary motives such as social preferences (e.g., Heeb et al., 2022; Hartzmark and Sussman, 2019; Riedl and Smeets, 2017). Moreover, information plays an important role in enabling sustainable investments (e.g., Glac, 2009). A lack of information can prevent individuals from expressing their preferences (Anderson and Robinson, 2021). Knowledge about sustainable financial products leads to a higher level of engagement in such products (Filippini et al., 2021). Too high information costs and little knowledge of sustainable investments are thus important barriers preventing retail investors from taking up such types of investments (e.g., Gutsche and Zwergel, 2020). Yet, little is known about which type of information might decrease these barriers, update beliefs, and thus mobilize retail investors to invest in a sustainable manner. Accordingly, this study aims to empirically analyze a) the extent to which different information (frames) affect sustainable investment at the individual level and b) which investor types (in terms of wealth, financial literacy, environmental awareness, altruism, and trust in scientist) respond the most to which type of information.

We thus connect to previous studies showing that different information (frames) affects individual sustainable investment behavior. Døskeland and Pedersen (2016) find that customers of a Norwegian bank more strongly increase their engagement in responsible investments when they receive information on potential financial rather than environmental benefits associated with such investments. Glac (2009) shows, using a student sample, that financial and expressive framing significantly influences the probability of investing sustainably, and in case of the financial framing also the willingness to sacrifice return. Given the very specific target groups in these previous studies, it is an empirical question whether similar effects can be found for a broader group of retail investors. This research adds on to other research in the financial field that displays the relevance of information on individuals' decisions. Bertrand and Morse (2011), for example, shows that framing information differently reduces borrowing.

In addition, none of these previous settings allow to obtain a comprehensive picture of specific investor groups responding to different information frames. Our objective is to answer the question if different investor groups respond differently to certain information. Døskeland and Pedersen (2021) deliver first results by using their natural field experiment to examine how

¹ Sustainable investment is understood as umbrella term for sustainable, responsible, ethical, social and environmental investment and all other investment processes that take the influence of ESG (environmental, social and governance) criteria into account for their financial analyses (Liang and Renneboog, 2017)

different investors in terms of wealth respond to different arguments. They find that investors of high wealth are more responsive to financial information rather than moral information, whereas this is not the case for less wealthy investors. Thus, we first try to replicate the results of Døskeland and Pedersen (2021) regarding wealth for our three information frames. Moreover, given the importance of information costs as barrier for sustainable investments, the reaction of financially (il-)literate persons to different information frames is highly relevant. Adding on to this, it is reasonable to assume that investors with high levels of environmental awareness are more strongly mobilized by information on the (environmental) impact of sustainable investments. Additionally, as social preferences can explain investors' motivation to invest sustainably (e.g., Riedl and Smeets, 2017), we include altruism as a part of social preferences. Furthermore, as distrust in providers of sustainable investment products can be a further barrier for these kinds of investments (Gutsche and Zwergel, 2020), the responsiveness of individuals with different levels of trust in scientists to different information frames need to be further examined.

This study is based on a representative online survey including an incentivized investment experiment among about 1600 households' financial decision makers in Germany conducted between May and July 2021. In the investment experiment, respondents were randomly assigned to one of four different groups, namely the a) control group, b) *financial information group*, c) *impact information group*, and d) *social norm group* and received different group specific information prior to their investment decisions. Afterwards, all respondents were endowed with \in 500 and chose six times among four real bond funds which are traded on the market. Respondents were further informed that ten of them will be randomly drawn after every respondent completed the survey and that for these ten respondents one of their six decisions will be realized. The payoff for each respondent is determined by the selling price of their investment after a one-year holding period net of fees. This incentivization mechanism was implemented to ensure that the respondents were aware of the consequentiality of their choices (e.g., Bauer et al., 2021) and thus make their decisions generalizable to real-life behavior.

We see that, on average, respondents in all four groups are willing to pay higher fees for bond funds with higher sustainability performance. Individuals in both the financial information and impact information group even have a significantly additional mean willingness to pay (WTP) for sustainability compared to the control group, but not individuals in the social norm information group. This implies that presenting investors with financial or impact information prior to their investments can increase their investments in sustainable investment products, since it increases the respondents' utility for sustainable investments. Moreover, we find that financial literacy, altruism, as well as trust in scientists impact the responsiveness to certain frames. Wealth does not seem to impact the WTP for sustainability resulting from the information they saw. For respondents with moderate to low financial literacy, seeing impact or social norm information leads to an additional WTP for sustainability. Respondents that have low trust in scientists and have seen either one of the three information have an additional WTP for sustainability. Environmental awareness of respondents does not seem to determine additional WTP for sustainability depending on presented information. Respondents with a high level of altruism have an additional WTP for sustainability after seeing impact information. For respondents with low trust in scientists, providing them with any kind of the three information increases their evaluation of sustainability. Targeting these specific groups of investors with the aforementioned information that generate additional WTP for sustainability, can increase these investors' investments in sustainable bond funds, as they will be enabled to elicit their preferences for sustainability more precisely. Overall, our results show that barriers towards sustainable investments can be diminished by presenting respondents with suitable information prior to their investment decisions.

This study makes three key contributions. First, we disentangle the relevance of pecuniary and non-pecuniary motives for (sustainable) investment decisions of individuals in a framed field experiment. We extend previous studies that were either based on student samples (Glac, 2009) or did not include a control group (Døskeland and Pedersen, 2016). Second, we build on studies from environmental economics showing the importance of information, and in particular information about social norms, on prosocial or pro-environmental behavior. For example, Allcott (2011) shows that providing households with Home Energy Reports which contain information about the household's energy consumption in relation to their neighbor's energy consumption, thus offers a social descriptive norm, can decrease energy consumption. Bernard et al. (2022) conclude that showing individuals information on possibilities to tackle climate change can increase individuals' willingness to pay for CO₂ offsetting. In their setting, showing peer information, so information on the social norm, is as effective as showing similar information framed as scientific research. Interestingly, Beshears et al. (2015) find discouraging effects of the presence of peer information on retirement savings. Gutsche et al. (2019) transferred the concept of social norms to a socially responsible investment (SRI) context to analyze the relevance of contextual factors on the share invested in SRI, finding a positive link between social norms and SRI. Nonetheless, their results are only based on correlations. Therefore, it is an interesting question if there is a causal effect of social norm information on (sustainable) investment decisions, and how they perform in comparison to other information frames. Third, our study is the first to give a broader overview over which type of investor is most responsive to certain information. Døskeland and Pedersen (2021) show that wealth affects responsiveness towards different information. We are adding on to their work by further including wealth, financial literacy, environmental awareness, altruism, and trust in scientists in our analysis. The results of this study can be used to advise policy makers and practitioners on the kind of information they should use to inform individual investors to increase sustainable investments. Furthermore, our results can be used to increase reactions towards sustainable investments by targeting specific groups of investors with certain information.

The remainder is structured as follows: Section 2 describes the survey, the experimental and the variables which form the basis for this analysis. Section 3 discusses the estimation results and section 4 concludes.

2. Data, experiment, and variables

2.1 Recruitment process and survey structure

The basis for our empirical analysis is a large-scale computer-assisted online survey among 1,622 households' financial decision makers in Germany. The survey was conducted in cooperation with the German market research institute Psyma+Consultic GmbH (Psyma) between May and July 2021. Among other tasks, Psyma was responsible in particular for programming the questionnaire, conducting the online survey, and recruiting the respondents from an own online panel, comprising more than 80,000 individuals in Germany at the age of at least 15 years. The incentive system for the panelists is based on bonus points on the membership account, whereby the corresponding payments are usually done via cash transfers or vouchers.

We follow Gutsche and Ziegler (2019) to select the criteria defining our target group of households' financial decision makers. Accordingly, we focus on persons who are at least 18 years of age, mainly or equally responsible for financial affairs in the household, and familiar with investment activities. In line with Gutsche and Ziegler (2019), we assume that individuals are familiar with investment activities when they are currently invested in, had invested in, or have extensively informed themselves about capital markets products such as stocks, equity funds, bonds, or other investment products with variables returns. To obtain a representative sample as closely as possible, we divided the recruitment process into two steps. Since we had prior information on the distribution of typical socio-demographic characteristics in terms of

age, gender, and region of main residence of the desired target group based on a pilot study, Psyma recruited individuals according to these quotas in the first step. In the second step, we implemented screening questions to obtain the relevant sample of households' financial decision makers. Respondents who did not meet the aforementioned criteria were withdrawn from further participation in the survey. In addition, Psyma implemented quality checks (e.g., regarding systematic response patterns) on all completed questionnaires throughout the field phase. Low-quality interviews, i.e., those that indicated that respondents were not reading or answering the questions adequately, due to systematic responses or too short completion time, were excluded from the sample and new respondents were re-recruited accordingly.

Comparing the distributions of our sample in terms of age, gender, and region with the corresponding distributions in the general population in Germany, we see that the regional distribution in particular is very similar (see Table A.1 in the appendix). However, we also see expected differences in terms of age and gender. The average age of our respondents is 48.45 years and men in particular are overrepresented in our sample with a share of about 62%. In addition to the factors, we used to invite respondents (i.e., age, gender, and region), 36.3% of the respondents have a university degree and the median class of the monthly household income in the sample ranges from less than $500 \notin$ to $10,000 \notin$ and more. Thus, the respondents have a higher level of education and higher income on average than the general population. These investor characteristics are in line with the characteristics of investors in previous studies (e.g., Guiso, Sapienza, and Zingales, 2008; Kaustia and Torstila, 2011; van Rooij, Lusardi, and Alessie, 2011; Riedl and Smeets, 2017; Choi and Robertson, 2020).

The survey consisted of ten different parts (A-J). Part A allowed us to identify the target group by using screening questions as described above. Part B comprised questions on individual investment and consumption behavior. Part C comprised questions about individual economic preferences and attitudes. Part D contained the heart of our survey, the investment experiment. We describe the experimental design in the following section. Part E aimed at obtaining further background information on the respondents' sustainable investment behavior and knowledge. This part particularly contained measures to capture individual financial performance perceptions concerning sustainable investments. Part F consisted of questions on low-emission infrastructure. Part G comprised questions on financial literacy, energy literacy, and a cognitive reflection test. The final parts (i.e., Part H, Part I, and Part J) covered further questions on the socio-demographic background of our respondents. The median time to complete the survey across all respondents was about 29.84 minutes.

2.2 Experimental design

In our experiment, we basically followed previous experimental studies in this research field and conducted a discrete choice experiment (e.g., Gutsche and Ziegler, 2019; Lagerkvist et al., 2020). That is, respondents were repeatedly asked to make investment decisions by choosing one of four available investment options. Accordingly, at the beginning of the investment experiment, respondents first learned that on the following pages they would see six times four different actively managed bond funds available on the financial market. In addition, they were informed that such funds are investments that invest a majority of their assets in a portfolio of corporate bonds and public bonds, and may also include other items such as cash and other financial products (e.g., derivatives). All of the funds considered would reinvest their earnings in the fund, be traded in euros (\in), invest the majority of their portfolio in corporate bonds, and have very similar risk and return profiles. Respondents were also informed that in each of these six decision situations, they should indicate which of the four bond funds they would like to acquire for an investment amount of 500 \in .

To make choices incentive-compatible, we used a probabilistic approach in line with, for example, Dohmen et al. (2011), Diederich and Goeschl (2017), or Kirchler et al. (2018). Accordingly, we further informed the respondents that ten of them would be randomly chosen after the survey and that for these ten respondents one of their six decisions would be randomly drawn and realized after the end of the survey in xx 2021. Respondents were further informed that they would receive the current value of the bond fund after a holding period of one year. For further illustration, we presented two examples of how the payoff would be calculated. For example, in the event that the value of the bond fund increased to $550 \notin$ by xx 2022, $550 \notin$ net of applicable fees would be paid out. Similarly, in the event that the value of the bond fund fees. Respondents were also guaranteed that all this information was true and that they were completely free in their decisions.

On the next screen, we briefly explained the properties of the bond funds available for selection (see Table 1). The choice of attributes is based on previous similar experiments in this area (e.g., Gutsche and Ziegler, 2019; Lagerkvist et al., 2020). The bond funds differ in the amount of fees (in % of the investment amount) that would be incurred in total during the one-year investment period. These fees include the front-end load and the management fees of the respective bond fund. The bond funds further vary regarding whether sustainability criteria (i.e., environmental, social and/or governance criteria) are included in addition to financial criteria in their

composition or construction. Following Hartmark and Sussman (2019), we use the Morningstar Sustainability Rating as indicator for a fund's sustainability performance. Accordingly, respondents were informed that the strength of the funds' sustainability performance varied from "very low" to "very high" on a five-point scale based on ratings by a financial information and analysis firm. In doing so, we have deliberately not disclosed the specific sustainability rating in order to exclude any latent preferences towards Morningstar or the Morningstar Sustainability Rating. The bond funds are further distinguishable in terms of their average return in the years 2019 and 2020 (in %). Moreover, the bond funds differ with respect to the share of the countries from which the issuers of the invested bonds (e.g., corporate or public) originate. The percentage share of countries of the European Union (EU) is indicated.

<insert Table 1 here >

To examine how different information affects individual preferences for sustainable investments, we then randomly assigned respondents into four experimental groups, namely a control group and three treatment groups. Respondents in the control group did not receive any additional information and directly saw the first of their six consecutive investment decisions, as illustrated in Figure 1. The other five choice sets followed on the next pages. The choice sets of the three treatment groups were structured in the same way as in the control group. However, the three treatment groups first received group-specific information based on three scientific studies from the field of sustainable finance before they were asked to make their six investment decisions (see Figures B.1 to B.3 in the appendix as examples for the three treatment groups).

< insert Figure 1 here >

Respondents in the *financial information group* received the information that sustainable investments can perform superior compared to conventional investments (see Table 2 for this concrete statement and the statements for the other two treatment groups). We formulated this statement based on the study by Friede et al. (2015). While we only showed this statement on the main page, respondents were additionally able to access further information about the underlying study in the form of a short summary as well as the study itself via a link shown under this statement. Analogously, respondents in the *impact information group* were given the information that by considering sustainability criteria, investors can encourage companies to act more sustainably. We derived this statement based on the study by Kölbel et al. (2020) and have tried to use a sentence structure as similar as possible to that in the first statement. Finally, respondents in the *social norm information group* received the information that investors often consider sustainability criteria when making investment decisions. The corresponding

statement is based on a survey study by Gutsche (2019) and is also shown in Table 2. Respondents in treatment groups two and three were also able to access further information about the underlying study or the study itself via a link.

In each of the six choice sets, respondents were presented four different unlabeled bond funds drawn out of a universe of 16 real bond funds. The names of the actual bond funds were hidden to prevent respondents from obtaining additional information. We therefore avoided that respondents' familiarity with certain fund providers' names, origin, or other products impacts their choices. We additionally ensured that the corresponding bond funds were available for individual investors on the German market, either at a stock exchange or directly from the provider of the bond fund. In addition, the bond fund universe is constructed such that the attribute levels of the different attributes (see Table 1) were almost uncorrelated with each other.² Concerning the strength of sustainability and in line with Hartzmark and Sussman (2019), four of the 16 bonds funds have a very low strength of sustainability (i.e., one globus according to the Morningstar Sustainability Rating), four a rather low strength (two globes), four a rather high strength (four globes), and five a high strength (five globes). Moreover, and as already explained before, we only considered actively managed bond funds which invest a majority of their assets in a portfolio of corporate and public bonds, but could also include other positions such as cash and other financial products (e.g., derivatives). All the bond funds considered accumulate their earnings, are traded in euros, and have very similar risk and return profiles.

2.3 Variables

2.3.1 Experiment variables

To capture the respondents' investment choices, we construct the variable *Bond fund choice* that takes the value of one for the bond fund chosen by the respondent in the corresponding choice set, and zero for all non-chosen alternatives. To analyze respondents' preferences towards different characteristics, we additionally construct several variables to capture the bond funds' attributes and their levels, as reported in Table 1. The values of the respective attributes correspond to the values of the 16 actual bond funds that are included in the experiment. The variable *Fees* captures the value of the corresponding attribute in % of the investment amount for the respective alternative that can be incurred during the one-year investment period.³ Accordingly, the variable *Fees* ranges between 0.51% and 6.85%. We further create the dummy

² As the attribute values of real bond funds were included, it was not possible to make the correlations exactly zero.

³ The variable *Fees* comprises both the issuing premium and the management fee of the respective bond fund.

variable *High sustainability rating* that takes the value of one for bond funds that are equipped with a "rather high" or "very high" sustainability rating, and zero if the sustainability rating of the respective fund is "rather low" or "very low." The variable *Annual returns in the past two years* corresponds to the attribute levels for the bond funds' average return in percent in the years 2019 and 2020 and thus ranges between 0.025% and 12.75%. Finally, the variable *Share of bond issuers from the EU* the percentage share of issuers of bonds held by the fund that are from countries of the EU. The variable thus ranges between 0.00% and 55.09%.

<insert Table 1 >

To identify potential effects of the different information provided, we create a dummy variable for each treatment group: The variable *control group* takes the value of one when a participant received no further information on sustainable investments, and zero otherwise. The variable *financial information group* takes the value of one if a participant received additional information on the financial performance of sustainable compared to conventional investments, and zero otherwise. The variable *impact information group* takes the value of one when a participant was assigned to the group receiving additional information on the potential impact investing sustainably, and zero otherwise. Finally, the variable *social norm information group* takes the value of one when a participant received additional information on the sustainable investment behavior of other individual investors, and zero otherwise.

2.3.2. Survey variables

Wealth

In line with Døskeland and Pedersen (2021) we include a measure for wealth, as they find that wealth has an impact on the responsiveness towards different information, in particular on the responsiveness towards financial information. The respondents were asked to indicate the value of all their investable financial resources. This includes the value of their bank or securities accounts, but not their real estate or company property. They were able to specify their investable financial resources according to nine different categories ranging from \notin 0 to over \notin 100,000.⁴ In addition, they were able to not disclose their investable financial resources. We

⁴ Category 1 includes investable financial resources in the amount of $\notin 0$. The investable financial resources in category 2 ranges between more than $\notin 0$ and less than $\notin 1,000$, between more than $\notin 1,000$ and less than $\notin 5,000$ in category 3, between more than $\notin 5,000$ and less than $\notin 10,000$ in category 4, between more than $\notin 10,000$ and less than $\notin 25,000$ in category 5, between more than $\notin 25,000$ and less than $\notin 50,000$ and less than $\notin 75,000$ in category 7, between $\notin 75,000$ and less than $\notin 100,000$ in category 8, and more than $\notin 100,000$ in category 9.

then create a dummy variable based on the calculation of the median that takes the value one if respondents have more than \notin 25,000 of investable financial resources and zero if their investable financial resources are below \notin 25,000.

Financial literacy

Moreover, we include *financial literacy* to analyze if investors react differently depending on their financial knowledge. Respondents had to answer three experimental questions on interest, inflation, and stock risk in line with those in Lusardi and Mitchell (2017) and Van Rooij et al. (2011). The value of *financial literacy* can vary between zero and three as it represents the number of correctly answered questions. We create a dummy variable that takes the value one if all three questions have been answered correctly and the value zero if not all questions have been answered correctly and the influence of high financial literacy.

Environmental awareness

Furthermore, we include the *NEP* (*New Ecological Paradigm*) scale to measure the impact of environmental awareness on the perception of information. Our *NEP* scales are not based on all 15 items according to Dunlap et al. (2000), but rather on only six items. This procedure is in line with Whitmarsh (2008, 2011), who shows by means of pilot studies that many respondents had difficulties to interpret the remaining nine *NEP* items. As a consequence, the following six statements are considered: "Humans have the right to modify the natural environment to suit their needs", "humans are severely abusing the planet", "plants and animals have the same right to exist as humans", "nature is strong enough to cope with the impacts of modern industrial nations", "humans were meant to rule over the rest of nature", and "the balance of nature is very delicate and easily upset". The respondents were asked how strongly they agree with these statements on a symmetric scale with five ordered response categories, i.e., "totally disagree", "rather disagree", "undecided", "rather agree", and "totally agree". Based on these six items, we construct two different *NEP* scales.

In line with, for example, Schwirplies and Ziegler (2016), the *NEP* scale is constructed on the basis of six dummy variables. For a positively worded statement, the corresponding dummy variables take the value one if a respondent rather or totally agrees with the statement. In the case of negatively worded statements, the dummy variables take the value one if a respondent rather or strongly disagrees. The variable *NEP* is designed by adding up the single values of the six dummy variables and thus can vary between zero and six. Higher values imply a higher environmental awareness. The dummy variable *environmental awareness* is created that takes the value one if the aforementioned variable takes the value 6 and zero otherwise.

Altruism

As social preferences are often used to explain sustainable investment motivations (e.g., Riedl and Smeets, 2017), we include altruism as a part of social preferences. We capture altruism using validated survey questions from the Global Preferences Survey Module. Accordingly, we ask the question "How willing are you to give to good causes without expecting anything in return?". Respondents were able to indicate their willingness on a 5-point Likert scale ranging from 1 "completely unwilling" to 5 "completely willing." Based on this scale, we construct the dummy variable *Altruism* that takes the value one for respondents who indicated "completely willing" and "rather willing" and the value zero for the responses "undecided", "rather unwilling", or "completely unwilling".

Trust in Scientists

Since the absence of trust is frequently mentioned as a barrier for sustainable investments, we include a measure for trust in our analysis. We create the variable *Trust in scientists* which represents a specific measure of trust, as the information we provide the respondents with is based on scientific studies. Thus, we hypothesis that respondents with a high trust in scientists most likely will respond differently to information resulting from scientific studies than respondents with low trust in scientists. To create the variable *Trust in Scientists* respondents had to rate their level of trust in scientists on a 5 point-scale ranging from "Do not trust at all" to "completely trust". We than construct a dummy variable based on this scale that takes the value one if respondents rated their trust in scientists with either "completely trust" or "trust rather strongly" and zero if respondents rated their trust in scientists with "undecided", "trust rather weak", or "do not trust at all". We find a significant positive correlation between a general measure of trust which rates the agreement to the statement "I suspect that people have only the best intentions." on a 5-point Likert scale and the specific measure of trust in scientists.

2.4 Sample characteristics and randomization

More detailed information on descriptive statistics of the explanatory variables for the whole sample as well as for the four different information groups can be found in the upper part of Table 2.

< insert Table 2 here >

The average amount of investable financial resources respondents in our sample have at their disposal is within category 5 between over €10,000 and up to €25,000. On average, respondents

answered 2.4 questions on financial literacy correctly. The mean environmental awareness in this sample is 4.6. 65.5% of the respondent in our sample indicated their level of altruism, hence their willingness to give to good causes without expecting anything in return with "completely willing" or "rather willing". On average 72.6% of the respondents in our sample indicated their trust in scientists with either "completely trust" or "trust rather strongly".

The respondents in our sample are mostly male, as only 37.9% are female. In addition, 36.3% have at least a university degree. We further calculate the equivalized income of the households. According to the OECD, we divide the indicated monthly household income by the number of people living in the household.⁵ The equivalized income in our sample is \notin 2,103.88.

Our objective was to guarantee representativeness with regard to age, gender, and main residence for the general population in Germany. As stated above Psyma implemented quotas for the respective variables. To verify if the randomization process was successful, we apply a mean comparison t-test. The bottom part of table 2 reports the differences in means between the four information groups. On the basis of 48 comparisons, we expect between zero and one difference to be significantly different from zero at the one percent significance level, about two to three differences to be significantly different from zero at the five percent significance level, and about four to five differences to be significantly different from zero at the five percent significance level. Table 2 reveals that no difference is significantly different at the one percent significance level, and six differences are significantly different at the ten percent significance level, and six differences are significantly different at the ten percent significance level. Therefore, the number of significant differences is lower as statistically expected. This finding suggests a successful randomization of respondents into treatment groups. As we can see no significant differences in means for the variables age, gender, and main residence, and according to the other results in table 2, we consider our randomization successful.

⁵ More precisely, the equivalized income according to the OECD (accessible via <u>https://www.oecd.org/economy/growth/OECD-Note-EquivalenceScales.pdf</u>) is calculated by diving the income by a measure that assigns a value of 1 to the first household member, a value of 0.7 to each additional adult, and a value of 0.5 to each child.

3. Econometric analysis

3.1 Which information frames are most effective to nudge investors towards sustainable investments?

To answer our first research question, we base our analysis on mixed logit models in the willingness to pay space (e.g., Train and Weeks, 2005). This approach allows us to directly interpret effects as WTP. The variable *Bond fund choice* serves as dependent variable. Our first estimations for all four information groups show a significant positive WTP for sustainability irrespective of the group affiliation.

< Insert Table 4 >

We see that respondents in the control group are on average willing to pay higher fees if the fund has a high or very high sustainability rating instead of a low or very low one. The financial information group shows with 6.788 percent the highest WTP for sustainability, followed by the impact information group with a WTP of 6.383 percent. The WTP in the social norm information group (5.785 percent) differs only slightly from the WTP in the control group (5.488 percent). This means that respondents are willing to sacrifice a large share of their return in order to benefit from higher sustainability of their bond funds. Nonetheless, we also find a high preference heterogeneity shown by high estimated standard deviations for sustainability in all four groups, meaning that some respondents have a very high WTP for sustainability, whereas it can be quite low for other respondents. Thus, preferences for sustainability can be quite different among the respondents. This is fundamentally consistent with previous findings by Hartzmark and Sussman (2019), which show that investors allocate more money towards funds with a high sustainability rating and less towards funds with a low sustainability rating, once information on sustainability becomes more easily available due to the introduction of the Morningstar Sustainability Rating. Hence, they value sustainability. Moreover, these results can be compared with the results of Bernard et al. (2022). In their research they also find that providing individuals with information on ways to tackle climate change, regardless of the frame of the information, so if it is frames as peer information or information from scientific research, leads to more pro-environmental choices of individuals. The level of willingness to pay is also similar to those found by Gutsche and Ziegler (2019) with respect to equity mutual funds.

The results for the other variables are as expected. We find significant positive WTPs over all four groups for yearly returns in the past two years, as well as for share of issuers of bonds from

EU. Hence, investors of all groups chase past returns and are willing to pay higher fees for them. The slight preference for higher share of issuers from the EU suggest a home bias or familiarity bias. The estimated mean parameter for fees, as expected, is negative. To verify these estimates we apply a robustness check in which we estimate the same model using correlated coefficients in the preference space. This estimation is consistent with our previous results.

With respect to our core research question, we see no significant difference from the control group when respondents received information about the investment behavior of other investors. That is, compared to other studies in the area of environmentally relevant behavior (e.g., Allcott, 2011; Goldstein et al., 2008) or prosocial behavior (e.g., Krupka and Weber, 2009), we find no evidence of a positive effect of a social descriptive norm. However, we also do not see a "discouragement effect" like in Beshears et al. (2015). This could be explained by the fact that financial investments are in general a more private matter, decisions are generally unobservable by others, and it is still common practice to receive investment advice from professionals rather than from friends or acquaintances. Hence, social influences on these kinds of decisions might not be very strong.

However, a significantly higher WTP for a high sustainability rating is shown when respondents have received information about the possible financial performance of sustainable investments or potential impact in advance. Respondents in the financial information group have an additional WTP of 0.607 percentage points compared to the control group. This result is partly in line with Døskeland and Pedersen (2016) who also find that respondent receiving financial information show a higher engagement in sustainable investments. This finding is the result of a belief update regarding return expectations of sustainable investments as our post-experiment check described in section 2.2 shows. Learning that sustainable investments likely perform equally good or even better than conventional investments, might have convinced investors of the worth of these kinds of investments. Respondent in the impact information group even have an additional WTP of 0.952 percentage points compared to the control group. Thus, respondents seem to receive additional utility from being informed about the direct impact of their investment compared to having a less obvious impact. This is in line with previous research. Barber et al. (2021) show that investors are willing to sacrifice return for their investment to have an impact.

A robustness check using the continuous variable *Strength of sustainability* instead of the dummy variable *High sustainability*, delivers similar results. These results give us insight into

motives for money channels, as it implies that different information are worth different amounts. Consultants might try to skim (see Laudi et al., 2021).

Result 1: Respondents show an additional significant positive WTP for financial and impact information group. They do not have an additional significant WTP for the social norm information. Thus, financial and impact information can be used to nudge investors to invest more sustainably.

3.2 Which investors are most responsive to which kind of information?

In a next step, we apply our mixed logit models with interaction terms in different split samples to analyze if different investor groups have different WTPs for certain kinds of information. This approach is in accordance with Cardella et al. (2022) who also run a split sample analysis to examine whether the effect of information provision of different power-generating sources on the choice of voluntary green-power plans varies within different groups of individuals. As describe above Døskeland and Pedersen (2021) use a similar approach by dividing their sample in high wealth investors and low wealth investors. These results will allow us to draw conclusion concerning the responsiveness of different investor types towards the respective information in comparison to receiving no information at all prior to the investment decision. We create split samples for the variables *wealth*, *financial literacy*, *environmental awareness*, *altruism*, as well as *trust in scientists*.

<insert Table 5 >

The split sample for wealth is constructed similarly to Døskeland and Pedersen (2021). Respondents are assigned to the two samples depending on whether their investable financial resources are above or below the median category. We see a positive significant WTP for sustainability in both samples. However, there is no significant additional WTP in the different information groups. Hence, receiving information does not increase the WTP for sustainability compared to receiving no information for investors of different wealth. Wealth has no impact on the responsiveness towards certain information regarding the evaluation of sustainability.

Result 2a: Respondents of different wealth have a significant WTP for sustainability. No additional WTP is generated because of the different information respondents see in both split samples.

The split samples for financial literacy are constructed based on the dummy variable we created for *financial literacy* which takes the value one if all three financial literacy questions are

answered correctly and zero otherwise. Hence, we create a sample for respondents with a high financial literacy and a sample for respondents with moderate to low financial literacy. Again, we see a positive WTP for sustainability in both split samples. However, we do not find any significant effects of the interaction terms in the high financial literacy sample. The results indicate that respondents with high financial literacy do not respond particularly to any information. This finding suggests that respondents that score high on financial literacy are already aware of these kinds of information and thus do not have an additional WTP for it. This hypothesis can be supported by our data. Respondents who answered all three financial literacy questions correctly are not only more likely to have heard of sustainable investment and currently hold sustainable investments, but they are also more likely to hold a higher share of their investments in sustainable products. ⁶ However, respondents with moderate to low financial literacy have a higher WTP in the impact information and the social norm information group. Apparently, subjects with lower financial knowledge fall back on social and impact information, as this information is more tangible, and they are probably not able to interpret the other given information correctly.

Results 2b: Respondents of different financial literacy have a significant WTP for sustainability. Respondents with moderate to low financial literacy are more responsive towards impact and social norm information.

Moreover, we created a sample for very environmentally aware individuals and one including respondents with less environmental awareness. For this classification we use the variable *NEP*. Respondents with a *NEP* score of six belong to the sample of very environmentally aware individuals, whereas the other respondents belong to the group of less environmentally aware individuals. We find a significant WTP for sustainability in both groups differing in environmental awareness. Nonetheless, for both samples, respondents do not significantly respond to any of the given information. In a robustness check we create further samples for green policy orientation. This robustness check supports our results. Environmental awareness does not seem to drive the responsiveness towards certain information about financial products.

Result 2c: Respondents of different environmental awareness have a significant WTP for sustainability. No additional WTP is generated because of the different information respondents see in both split samples.

⁶ Results are available upon request.

As social preferences have an impact on sustainable investment motivations (e.g., Riedl and Smeets, 2017), we further examine split samples for respondents with different altruistic motives. We base our split samples on the variable scale which results in one sample for respondents with high altruistic motives and one sample for respondents with low altruistic motives. We find a significant positive WTP for sustainability in both split samples. Respondents with a high level of altruism have a higher WTP for sustainability than respondents with a low level of altruism. This WTP of respondents with high levels of altruism even increases when they see impact information. As we measured *Altruism* with the agreement to the statement "How willing are you to give to good causes without expecting anything in return?" this measure of social preference puts giving something for a good cause and willingness for return sacrifice in the focus. The impact information we provide them with can in particular respond to the "giving something for a good cause" mentality of these individuals. By showing a positive WTP for this kind of information respondents symbolize that they do not expect anything in return for fostering this impact. We do not find any significant additional WTP in the sample of respondents with low levels of altruism.

Result 2d: Respondents of different levels of altruism have a significant WTP for sustainability. Respondents with a high level of altruism are more responsive towards impact information.

Studies in the financial field find a positive relation between trust and investment (e.g., Bottazzi et al., 2016; Guiso et al., 2008). Gutsche and Zwergel (2020) conclude that trust in providers can be seen as a barrier for sustainable investments. This raises the question if specific forms of trust, i.e., trust in specific institutions, play a role for sustainable investments. We include the specific measure trust in scientists in our analysis to see if, depending on the level of trust, respondents react differently to specific information. We use this measure, as the information we provide the respondents with is based on scientific studies.⁷ We create split samples according to the variable scale of *Trust in scientists*. Hence, we have one sample of respondents who rather or completely trust scientists and one sample of respondents who have weak trust, do not trust scientists at all, or who are undecided.

We find significant positive WTPs for sustainability in both samples. The estimated WTP is higher in the sample of respondents with high trust in scientists than in the sample of respondents with low trust in scientists. As general trust is positively correlated with trust in scientists, we can conclude that a higher level of trust leads to a higher WTP for sustainability.

⁷ We additionally estimate WTPs in a mixed logit model with split samples for a variable of general trust with slightly differing assumptions. This model shows a significant positive WTP for sustainability in both split samples of general trust. There is no additional WTP for sustainability in any information group.

For the sample of respondents that have high trust in scientists, we do not find any significant additional WTP for any of the interaction terms for the information groups. However, respondents that do not trust in scientists, are more responsive in all information groups compared to the control group, thus have in all information groups an additional significant positive WTP for sustainability. This result supposes that providing investors with information from scientific studies increases their WTP for sustainable investments regardless their lack of trust in scientists. As we do not refer to any specific science when asking for trust in scientists, it might be possible that especially due to the current COVID-19 pandemic, respondents when asked automatically think of medicine as the currently most salient science. In these times, a lot of individuals are confused about which information to trust. This confusion might be reflected in our measure of trust in scientists. Nonetheless, seeing scientific information on sustainable investments might lead respondents to a belief update. It seems like it is necessary to analyze different forms of trust regarding sustainable investments, as results can differ from the measure for general trust. Thus, this framing approach could be used to decrease this barrier of trust for sustainable investments and nudge investors towards these kinds of investments.

Result 2e: Respondents of different trust in scientists have a significant WTP for sustainability. Respondents low trust in scientists are more responsive towards financial, impact, and social norm information.

4. Conclusion

In this paper we empirically analyze which different information (frames) affect sustainable investment at the individual level and which investor types (in terms of wealth, financial literacy, environmental awareness, altruism, and trust in scientists) react to which kind of information. To this end, we examine data from a large-scale lab-in-the-field experiment among experienced household financial decision makers in Germany during May to July 2021. We find a general positive WTP for sustainability over all four groups for sustainability. Individuals in the financial information and in the impact information group have a significantly higher WTP for sustainability compared to the control group, but not the social norm information group. These results allow us to disentangle the relevance of pecuniary and non-pecuniary motives for (sustainable) investment decisions of individuals. Providing individual investors with this kind of information might reduce barriers towards sustainable investments. Consequently, these results can be used to advise policy makers and practitioners on the kind of information they should use to inform individual investors to increase sustainable investments and the utility investors gain from such information.

We also analyze heterogeneous treatment effects using split samples, and find that financial literacy, altruism, as well as trust in scientists impact the responsiveness to certain frames. Respondents with moderate to low financial literacy have a higher WTP for sustainability in the impact and social norm information group. Respondents with a high level of altruism have a higher additional WTP for sustainability in the impact information group. In addition, respondents that have low trust in scientists have a higher WTP for sustainability in all three information groups. Environmental awareness, as well as wealth do not impact responsiveness. Thus, our study is the first to give a broader overview over which type of investor is most responsive to certain information. These results can help investors to better express their preferences for sustainability, and hence can be used to increase reactions towards sustainable investments by targeting specific groups of investors with certain information.

As these results show that social norm information can increase the probability of specific respondents to invest sustainably, caution is advised. As displayed in Banerjee (1992) and Bikhchandani et al. (1992), considering information about the decision of others for one's own decision can lead to herd behavior. In case of herd behavior, investors blindly follow other investors without considering their own information. This behavior can imply disastrous consequences.

Since the information in our study is based on scientific research, future research should consider different information frames, i.e., information from different sources that convey this kind of information. The information of social norms for example might be more influential when communicated in a less official context. Moreover, as conceptualized in Filippini et al. (2021), such experiments like ours could greatly benefit from implementing a measure of sustainable finance literacy instead of solely relying on the general measure of financial literacy. Furthermore, it would be interesting to see if putting emphasis on certain parts of sustainability, i.e., framing the information exclusively with regard to a social or environmental or governance perspective, have different effects on the probability to invest sustainably. In addition, it might be interesting to see if investors respond equally to similar information if different investment products like shares or ETFs are the base of the investment experiment instead of bond funds which investors might be less familiar with. This approach would allow us to generalize the effectiveness of information frames on financial products.

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Tables

Attribute	Description	Attribute levels
Fees	The bond funds differ in the amount of fees (proportionate to the investment amount in %) incurred in total during the one-year investment period.	0.51% - 6.85%
Strength of sustainability	Individual bond funds differ in the extent to which sustainability criteria (i.e., environmental, social, and/or governance criteria) are included in addition to financial criteria in their composition or construction. The strength of sustainability varies on the basis of ratings by a financial information and analysis company on a five-point scale between "very low" and "very high."	Very low, rather low, rather high, very high
Annual return in the last two years	The bond funds differ in terms of average annual return in 2019 and 2020 (in %).	0.025% - 12.75%
Share of bond issuers from the EU	The bond funds differ in the countries from which the issuers of the invested bonds (e.g., corporate or public) originate. The percentage share of countries from the European Union (EU) is indicated. The remaining share refers to issuers of bonds not from the EU, as well as cash, and other financial products (e.g., derivatives).	0.00% - 55.09%

Table 1: Attributes and attribute levels in the discrete choice experiment

Note: This table shows the attributes that characterize the bond funds in our investment, a detailed description, and the respective attribute levels.

	Mean (standard deviation)							
	Full sample	Control group(C)	Financial information group (T1)	Impact information group (T2)	Social norm information group (T3)			
Wealth	25.000€ -	25.000€ -	25.000€ -	25.000€ -	25.000€ -			
	50.000€	50.000€	50.000€	50.000€	50.000€			
	(2.636)	(2.605)	(2.670)	(2.624)	(2.649)			
Financial literacy	2.365	2.047	2.374	2.372	2.307			
	(0.844)	(0.806)	(0.839)	(0.845)	(0.883)			
Environmental	4.576	4.520	4.531	4.672	4.582			
awareness	(1.609)	(1.651)	(1.672)	(1.607)	(1.503)			
Altruism	0.655	0.672	0.668	0.667	0.612			
	(0.476)	(0.470)	(0.471)	(0.472)	(0.488)			
Trust in scientists	0.726	0.748	0.693	0.761	0.700			
	(0.446)	(0.435)	(0.462)	(0.427)	(0.459)			
Return expectations	0.305	0.275	0.374	0.303	0.270			
	(0.460)	(0.447)	(0.484)	(0.460)	(0.445)			
Female	0.379	0.350	0.364	0.399	0.403			
	(0.485)	(0.478)	(0.482)	(0.490)	(0.491)			
Age	48.445	48.632	48.209	48.567	48.366			
	(17.583)	(17.551)	(17.691)	(17.900)	(17.247)			
High education	0.363	0.365	0.354	0.374	0.356			
	(0.481)	(0.482)	(0.479)	(0.485)	(0.479)			
Equivalized income	2,103.878	2,125.787	2,113.390	1,994.710	2,169.225			
	(1,175.762)	(1,017.850)	(1,319.162)	(913.610)	(1,371.514)			
Number of respondents	1,622	408	401	406	407			

Table 2: Sample characteristics

	C versus T1	C versus T2	C versus T3	T1 versus T2	T1 versus T3	T2 versus T3
	12.397	131.078	-43.438	-118.681	55.835	174.516
Equivalized income	(0.102)	(1.256)	(-0.346)	(-0.957)	(0.395)	(1.360)
F in an ai al 114 ano an	0.033	0.035	0.099*	-0.002	-0.067	-0.065
Financial interacy	(0.567)	(0.604)	(1.684)	(-0.036)	(-1.104)	(-1.069)
Environmental	-0.012	-0.153	-0.063	0.141	0.051	-0.090
awareness	(-0.099)	(-1.338)	(-0.567)	(1.224)	(0.457)	(-0.826)
A 1/m	0.003	0.004	0.060*	-0.001	-0.057*	-0.056*
Altruisiii	(0.098)	(0.124)	(1.781)	(-0.025)	(-1.675)	(-1.655)
Truct in acientists	0.054*	-0.014	0.047	0.068**	0.007	-0.061*
Trust in scientists	(1.722)	(-0.448)	(1.511)	(2.167)	(0.216)	(-1.957)
Eamala	-0.014	-0.049	-0.052	0.035	0.039	0.004
remaie	(-0.403)	(-1.430)	(-1.546)	(1.021)	(1.135)	(0.114)
A	0.423	0.066	0.266	0.357	0.157	-0.200
Age	(0.341)	(0.053)	(0.218)	(0.285)	(0.127)	(-0.163)
II: alter adverse time	0.011	-0.009	0.009	0.020	0.002	-0.018
righ education	(0.328)	(-0.271)	(0.265)	(0.598)	(0.064)	(-0.536)
Number of respondents	809	814	815	807	808	813

Difference in means (t-statistics)

Note: Wealth refers to the sample median class of the investable financial resources of the household measured according to nine categories. Respondents could also choose "not specified". The nine categories respond to the following levels: Category 1 "€0", category 2 "between more than €0 and less than €1,000", category 3 "between more than €1,000 and less than €5,000", category 4 "between more than €5,000 and less than €10,000", category 5 "between more than €10,000 and less than €25,000", category 6 "between more than €25,000 and less than €50,000", category 7 "between more than €50,000 and less than €75,000", category 8 "between €75,000 and less than €100,000", and category 9 "more than €100,000". Financial literacy refers to the number of correctly answered questions among three experimental questions on interest, inflation, and stock risk to measure financial knowledge. Financial literacy is constructed on the basis of three dummy variables. Adding up the single values of the three dummy variables, financial literacy can vary between 0 and 3. Environmental awareness refers to the average of an index that is based on the agreement to six statements "Humans have the right to modify the natural environment to suit their needs," "humans are severely abusing the planet," "plants and animals have the same right to exist as humans," "nature is strong enough to cope with the impacts of modern industrial nations," "humans were meant to rule over the rest of nature," and "the balance of nature is very delicate and easily upset." Respondents were asked how strongly they agree with these statements using the five ordered response categories "totally disagree," "rather disagree," "undecided," "rather agree," and "totally agree." The NEP index is then constructed on the basis of six dummy variables. For a positively worded statement, the corresponding dummy variables take the value one if a respondent rather or totally agrees with the statement and vice versa in the case of negatively worded statement. Adding up the single values of the six dummy variables yields the NEP index which can therefore vary between 0 and 6. Altruism refers to the sample mean of agreement with the statement "How willing are you to give to good causes without expecting anything in return?" which is measured within the categories ranging from "completely unwilling" to "completely willing". Trust in scientists refers to the share of respondents that indicated "completely trust" or "rather trust" when asked when asked to rate their trust in scientists a 5-point scale ranging from "completely distrust" to "completely trust". Female refers to the share of respondents in the sample who are female. Age refers to the average age of respondents in the sample. High education refers to the share of respondents in the sample that has at least university degree. * (**, ***) means that the difference in the means between the experimental groups on the basis of a mean comparison t-test is different from zero at the 10 % (5 %, 1 %) significance level, respectively.

Table 3. Average v	values of return	expectations across	all four	· information	grouns
Table 5. Average	values of return	expectations across	s an ioui	mormation	groups

	Difference in means (t-statistics)								
	C versus T1	C versus T2	C versus T3	T1 versus T2	T1 versus T3	T2 versus T3			
Datum appartations	-0.100***	-0.028	0.004	-0.071**	-0.104***	-0.033			
Return expectations	(-3.039)	(-0.895)	(0.136)	(-2.138)	(-3.173)	(-1.030)			

Note: Return expectations refers to the share of respondents that indicated their answer on the question "How high do you estimate the return of sustainable investments compared to conventional investments?" on a 5-point scale ranging from "much lower" to "much higher" with "much higher" or "somewhat higher". Respondents could also choose "don't know". * (**, ***) means that the difference in the means between the experimental groups on the basis of a mean comparison t-test is different from zero at the 10 % (5 %, 1 %) significance level, respectively.

Explanatory variables	Bond fun	d choice
_	Mean of the parameter (z-statistics)	Standard deviation of the parameter (z-statistics)
High sustainability rating x	0.607**	-
financial information group	(2.07)	
High sustainability rating x	0.952**	-
impact information group	(2.18)	
High sustainability rating x	0.360	-
social norm information group	(0.63)	
High sustainability rating	5.779***	5.000***
	(19.18)	(19.71)
Annual return in the past two	0.798***	0.438***
years	(20.93)	(10.34)
Share of bond issuers from the	0.030***	0.060***
EU	(7.33)	(4.65)
Fees	-1.039***	1.213***
	(-20.97)	(18.09)
Number of respondents	38,9	028
(number of choices)	(9,7	32)

 Table 4: Estimation results across all respondents

Note: This table reports the estimation results of a mixed logit estimation based on all six decisions of all respondents. The dependent variable in the models is the bond fund choice in the respective choice set. As explanatory variables, we consider the attributes of the bond funds Strength of sustainability, Yearly returns in the past two years, Share of issuers of bonds from EU, and Fees. We assume these attributes to be random. We additionally include interaction terms between the dummy variable High sustainability and the three information groups which take the value of one if the respondent's affiliation to the information group is financial, impact, or social norm, and zero otherwise. All variables are defined in Section 2.3. *** (**, *) indicates that the estimated parameters are significantly different from zero at the 1% (5%, 10%) significance level.

Table 5: Estimation results across different subsamples

	We	ealth	Financia	l literacy	Environmen	tal awareness	Altruism		Trust in	scientists
	High	Low	High	Low	High	Low	High	Low	High	Low
Mean of the parameter										
High sustainability rating x	-0.0626	0.153	0.295	1.569	0.815	0.274	0.522	0.871	-0.009	0.777*
financial information group	(-0.0326)	(0.213)	(0.660)	(1.593)	(0.580)	(0.308)	(0.919)	(0.427)	(-0.0140)	(1.941)
High sustainability rating x	0.156	0.511	0.674	2.060**	1.477	0.387	1.503***	-0.103	0.513	1.197***
impact information group	(0.0845)	(0.713)	(1.359)	(2.309)	(1.123)	(0.876)	(2.627)	(-0.0573)	(0.873)	(3.841)
High sustainability rating x	-0.886	0.463	-0.628	2.125**	0.082	0.093	0.061	-0.175	-0.563	2.074***
social norm information group	(-0.503)	(0.738)	(-0.914)	(1.989)	(0.070)	(0.149)	(0.144)	(-0.194)	(-1.084)	(3.286)
High sustainability rating	5.843***	6.348***	5.647***	5.923***	7.289***	4.911***	7.379***	3.522***	6.533***	3.918***
	(3.970)	(11.02)	(13.58)	(14.54)	(6.145)	(9.605)	(12.79)	(4.085)	(12.53)	(19.59)
Annual return in the past two	0.717***	0.762***	0.810***	0.778***	0.778***	0.776***	0.779***	0.806***	0.809***	0.714***
years	(20.01)	(17.79)	(19.29)	(7.441)	(14.59)	(13.27)	(16.58)	(8.245)	(21.35)	(17.83)
Share of bond issuers from	0.0264***	0.0247***	0.033***	0.030***	0.042***	0.021***	0.040***	0.020***	0.033***	0.026***
the EU	(6.432)	(6.050)	(9.440)	(4.518)	(6.977)	(5.685)	(9.023)	(3.677)	(8.407)	(3.650)
Fees	-0.923***	-1.383***	-0.648***	-1.680***	-0.938***	-1.097***	-1.096***	-0.934***	-0.955***	-1.238***
	(-13.36)	(-21.45)	(-10.78)	(-17.39)	(-12.05)	(-15.10)	(-16.77)	(-10.46)	(-16.83)	(-13.81)
Standard deviation of the parameter										
High sustainability rating	5.002***	5.157***	4.352***	6.836***	5.097***	4.591***	5.495***	3.846***	4.993***	5.087***
	(-7.270)	(11.12)	(14.27)	(7.535)	(13.51)	(11.56)	(13.14)	(8.745)	(20.96)	(8.526)

Annual return in the past two	-	-	0.353***	0.691***	0.371***	0.530***	0.489***	0.407***	0.428***	0.423***
years			(8.274)	(7.971)	(4.817)	(13.73)	(14.26)	(3.364)	(9.426)	(10.04)
Share of bond issuers from	-	-	0.050***	0.078***	0.072***	0.047***	0.072***	0.038***	0.058***	0.061***
the EU			(12.78)	(5.986)	(10.41)	(12.63)	(9.077)	(3.804)	(9.760)	(4.868)
Fees	1.102***	1.123***	0.877***	1.349***	1.005***	1.334***	1.176***	1.315***	1.154***	1.310***
	(11.78)	(14.96)	(12.60)	(9.150)	(10.81)	(11.07)	(14.86)	(9.563)	(14.47)	(7.676)
Number of observations	14,616	19,224	21,912	17,016	15,576	23,352	25,488	13,440	28,248	10,680
(number of decisions)	(3654)	(4806)	(5,478)	(4,254)	(3,894)	(5,838)	(6,372)	(3,360)	(7,062)	(2,670)

Note: This table reports the estimation results of mixed logit estimations based on all six decisions of all respondents for ten split samples. The dependent variable in the models is the bond fund choice in the respective choice set. As explanatory variables, we consider the attributes of the bond funds Strength of sustainability, Yearly returns in the past two years, Share of issuers of bonds from EU, and Fees. We assume these attributes to be random. We additionally include interaction terms between the dummy variable High sustainability and the three information groups which take the value of one if the respondent's affiliation to the information group is financial, impact, or social norm, and zero otherwise. All variables are defined in Section 2.3. The first two split samples are created according to a dummy variable of wealth which takes the value one if respondents' investable financial resources are above the median of the group and zero otherwise. The respondents in the high wealth sample are the respondents for which the created dummy variable takes the value one, whereas for respondents in the low wealth sample the dummy variable takes the value zero. For the mixed logit models in these split sample, we apply slightly different assumptions as the model did not converge with the assumptions we make for the other models. For these split sample we assume all attribute variables except for High sustainability rating to be fix. We allocate respondents to the high financial literacy split sample if they answered all three questions on financial literacy correctly. Respondents who answered less than three questions correctly are in the low financial literacy split sample. The split sample environmental awareness is created according to the variable NEP. Respondents in the high environmental awareness split sample have a NEP score of six, whereas respondents with lower NEP scores are in the low environmental split sample. The split sample for altruism and trust in scientists are based on the 5-point Likert-scale respondents had to answer the respective questions on. Respondents who answered the question "How willing are you to give to good causes without expecting anything in return?" with "completely willing" or "rather willing" are in the high altruism sample and respondents who chose one of the other three categories are in the low altruism sample. Respondents who indicated to "completely trust" or "rather trust" in scientists are in the high trust in scientists sample, whereas respondent who chose one of the other categories are in the low trust in scientists sample. *** (**, *) indicates that the estimated parameters are significantly different from zero at the 1% (5%, 10%) significance level. The values in brackets indicate z-statistics.

Figures

Geben Sie nun bitte in jeder der sechs Entscheidungssituationen an, welchen der vier angebotenen Anleihefonds Sie bei einem Anlagebetrag von 500€ erwerben möchten. Wählen Sie dazu bitte den von Ihnen gewünschten Fonds aus.

Um die Erläuterung eines Begriffes erneut einzusehen, klicken Sie bitte auf (?) neben dem jeweiligen Begriff oder auf den entsprechenden Begriff selbst.

	Anleihefonds 1	Anleihefonds 2	Anleihefonds 3	Anleihefonds 4
Gebühren (?)	3,81%	4,02%	0,44%	3,60%
Stärke der Nachhaltigkeit (?)	Sehr gering	Hoch	Gering	Sehr hoch
Jährliche Rendite in den letzten zwei Jahren (?)	12,75%	6,10%	8,75%	5,65%
Anteil der Emittenten von Anleihen aus der EU (?)	26,36%	59,32%	17,10%	72,93%
Ihre Auswahl	0	0	0	0
zurück weiter				

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Figure 1: Screenshot of an exemplary choice set in the control group

Screenshot showing the second screen of the experiment for the control group. It shows the first investment decision between four different randomly selected bond funds.

Appendix A: Additional figures

Geben Sie nun bitte in jeder der sechs Entscheidungssituationen an, welchen der vier angebotenen Anleihefonds Sie bei einem Anlagebetrag von 500€ erwerben möchten. Wählen Sie dazu bitte den von Ihnen gewünschten Fonds aus.

Für Ihre Entscheidung mag die folgende Information hilfreich sein:

In einer wissenschaftlichen Studie hat sich gezeigt, dass Investoren durch die Berücksichtigung von Nachhaltigkeitskriterien (d.h. ökologische, soziale und/oder Governance-Kriterien) in ihren Geldanlagen eine bessere finanzielle Performance erzielen können als mit herkömmlichen Geldanlagen (d.h. Anlagen, die Nachhaltigkeitskriterien nicht berücksichtigen).

Informationen zu dieser Studie und die Studie selbst finden Sie <u>hier</u>.

Um die Erläuterung eines Begriffes erneut einzusehen, klicken Sie bitte auf (?) neben dem jeweiligen Begriff oder auf den entsprechenden Begriff selbst.

	Anleihefonds 1	Anleihefonds 2	Anleihefonds 3	Anleihefonds 4
Gebühren (?)	6,67%	5,80%	0,51%	3,80%
Stärke der Nachhaltigkeit (?)	Sehr hoch	Sehr gering	Sehr gering	Hoch
Jährliche Rendite in den letzten zwei Jahren (?)	6,60%	1,20%	1,60%	0,25%
Anteil der Emittenten von Anleihen aus der EU (?)	49,10%	44,73%	71,40%	36,95%
Ihre Auswahl	0	0	0	0
zurück weiter				

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Figure 2: Screenshot of an exemplary choice set in the financial information group

Screenshot showing the second screen of the experiment for the financial information group. The first half shows the group specific information. The second half shows the first investment decision between four different randomly selected bond funds.

Geben Sie nun bitte in jeder der sechs Entscheidungssituationen an, welchen der vier angebotenen Anleihefonds Sie bei einem Anlagebetrag von 500€ erwerben möchten. Wählen Sie dazu bitte den von Ihnen gewünschten Fonds aus.

Für Ihre Entscheidung mag die folgende Information hilfreich sein:

In einer wissenschaftlichen Studie hat sich gezeigt, dass Investoren durch die Berücksichtigung von Nachhaltigkeitskriterien (d.h. ökologische, soziale und/oder Governance-Kriterien) in ihren Geldanlagen, Unternehmen dazu bringen können, nachhaltiger (d.h. ökologischer, sozialer und/oder ethischer) zu handeln.

Informationen zu dieser Studie und die Studie selbst finden Sie hier.

Um die Erläuterung eines Begriffes erneut einzusehen, klicken Sie bitte auf (?) neben dem jeweiligen Begriff oder auf den entsprechenden Begriff selbst.

	Anleihefonds 1	Anleihefonds 2	Anleihefonds 3	Anleihefonds 4
Gebühren (?)	3,81%	5,92%	6,67%	4,02%
Stärke der Nachhaltigkeit (?)	Sehr gering	Gering	Sehr hoch	Hoch
Jährliche Rendite in den letzten zwei Jahren (?)	12,75%	4,90%	6,60%	6,10%
Anteil der Emittenten von Anleihen aus der EU (?)	26,36%	47,20%	49,10%	59,32%
Ihre Auswahl	0	0	0	0
	9	0	0	0

... zurück weiter ...

Figure 3: Screenshot of an exemplary choice set in the impact information group

Screenshot showing the second screen of the experiment for the impact information group. The first half shows the group specific information. The second half shows the first investment decision between four different randomly selected bond funds.

Geben Sie nun bitte in jeder der sechs Entscheidungssituationen an, welchen der vier angebotenen Anleihefonds Sie bei einem Anlagebetrag von 500€ erwerben möchten. Wählen Sie dazu bitte den von Ihnen gewünschten Fonds aus.

Für Ihre Entscheidung mag die folgende Information hilfreich sein:

In einer wissenschaftlichen Studie hat sich gezeigt, dass Investoren häufig Nachhaltigkeitskriterien (d.h. ökologische, soziale und/oder Governance-Kriterien) in ihren Geldanlagen berücksichtigen.

Informationen zu dieser Studie und die Studie selbst finden Sie <u>hier.</u>

Um die Erläuterung eines Begriffes erneut einzusehen, klicken Sie bitte auf (?) neben dem jeweiligen Begriff oder auf den entsprechenden Begriff selbst.

	Anleihefonds 1	Anleihefonds 2	Anleihefonds 3	Anleihefonds 4
Gebühren (?)	4,02%	6,15%	6,53%	2,03%
Stärke der Nachhaltigkeit (?)	Hoch	Sehr hoch	Gering	Hoch
Jährliche Rendite in den letzten zwei Jahren (?)	6,10%	5,45%	6,65%	5,60%
Anteil der Emittenten von Anleihen aus der EU (?)	59,32%	55,12%	53,05%	30,11%
Ihre Auswahl	0	0	0	0
zurück weiter				



Figure 4: Screenshot of an exemplary choice set in the social norm information group

Screenshot showing the second screen of the experiment for the social norm information group. The first half shows the group specific information. The second half shows the first investment decision between four different randomly selected bond funds.