Do Investors Care about Impact?*

Florian Heeb[1], Julian F. Kölbel[1,2], Falko Paetzold[1,3], and Stefan Zeisberger[4,1]

January 5, 2022

Abstract

We assess how investors' willingness-to-pay (WTP) for sustainable investments responds to the impact of those investments, using a framed field experiment. While investors have a substantial WTP for sustainable investments, they do not pay more for more impact. This also holds for dedicated impact investors. When investors compare several sustainable investments, their WTP responds to differences in impact but not to the absolute level of impact. Investors experience positive emotions when choosing sustainable investments, irrespective of investments' impact. Our findings suggest that the WTP for sustainable investments is driven by an emotional rather than a calculative valuation of impact.

Keywords: Responsible investing, impact, externalities, scope neglect, pro-social preferences, behavioral finance

JEL classification: D62, G11, G41, Q56

*We thank Erol Bilecen, Timo Busch, Alain Cohn, Kornelia Fabisik, Jonathan Harris, Thorsten Hens, Coralie Jaunin, Pascal Kieren, Jan Schmitz, Julien Senn, Paul Smeets, Hersh Shefrin, Janneke Toussaint, Alexander Wagner, Utz Weitzel, Ziwei Zhao and participants of seminars and conferences at the Alliance for Research on Corporate Sustainability, Center for Sustainable Finance and Private Wealth Research Quarterly and Research Seminar, the Dutch Ministry of Finance, the Global Research Alliance for Sustainable Finance and Investment, the Junior European Finance Seminar, the Liechtenstein Sustainable Finance Workshop, the Max Planck Institute Bonn, the MPI for Research on Collective Goods Experimental Finance Workshop, Virtual Experimental Finance Workshop, the Society for Experimental Finance Annual Conference, German Finance Association, Bonn Household Finance Workshop, Radboud University, the Swiss Finance Institute Research Days, the Swiss Society for Financial Market Research, University of Exeter, and the University of Zurich for helpful comments and suggestions. We gratefully acknowledge financial and participant pool support from the Vereniging van Effectenbezitters (VEB). Florian Heeb was supported by a PRI FIR research award grant; Julian Kölbel by the BMW Foundation. We further thank the VEB and Armand Kersten, Toniic and Kristin Siegel, NEXUS and Tharald Nustad, Credit Suisse and James Gifford, Bank Vontobel and Daniel Grüneisen, Bank Julius Baer and Alessandro Anastassio, Tiedemann Advisors and Brad Harrison, and VALUEworks and Peter Wüthrich for providing support regarding data collection.

[1] Department of Banking and Finance, University of Zurich, Plattenstr. 14, 8032 Zurich, Switzerland.
[2] MIT Sloan School of Management, 100 Main Street, Cambridge, MA 02142, USA.

1 Introduction

Sustainable investing is seen as a mechanism for curbing negative externalities (Pástor, Stambaugh, and Taylor, 2021; Oehmke and Opp, 2019; Broccardo, Hart, and Zingales, 2020; Benabou and Tirole, 2010; Landier and Lovo, 2020). This mechanism is based on the assumption that a substantial pool of investors hold pro-social preferences. Indeed, recent research has demonstrated that pro-social preferences affect investment decisions (Riedl and Smeets, 2017), and that these preferences result in sizable, market-wide fund flows towards sustainable investments (Hartzmark and Sussman, 2019). Some investors show an explicit willingness-to-pay (WTP) for investments with "impact" (Barber, Morse, and Yasuda, 2021), which we define as a positive externality of an investment.

Standard decision theory would predict that investors are consequentialists, i.e. that the utility that investors derive from a sustainable investment is proportional to the impact of that investment.[1] This consequentialist view is also adopted widely in current theoretical models of sustainable investing. Yet research on charitable giving and public good valuation shows that individuals often display scope insensitivity, i.e. they are insensitive to the magnitude of their impact.[2] Potentially, scope insensitivity is prominent in sustainable investing decisions. This could undermine the effectiveness of sustainable finance as a whole, as the financial industry may not have an incentive to supply products with substantial impact. To shed light on this issue, we ask: How does investors' WTP for sustainable investments respond to the impact of these investments?

[3] EBS University of Business and Law, Rheingaustrasse 1 65375 Oestrich-Winkel, Germany.
[4] Institute for Management Research, Radboud University, Heyendaalseweg 141, 6525 AJ Nijmegen, the Netherlands.

[1] Traditional models of altruistic behavior often assume that individuals contribute to public goods because they derive utility from the well-being of others (Becker, 1974; Eckel and Grossman, 1996; Andreoni and Miller, 2002).
[2] See, for example, Karlan and Wood (2017); Metzger and Günther (2019); Desvousges, Johnson, Dunford, Boyle, Hudson, and Wilson (1992); Kahneman and Knetsch (1992).

We investigate this research question in a pre-registered, framed field experiment[3] with experienced investors. They choose between a sustainable investment with a quantified impact and a financially equivalent investment with zero impact. The investment choices are incentivized and consequential—that is, investors can gain real money, and their choices have real impact. Based on the investors' choices, we elicit their WTP for the sustainable investment in terms of additional fees they are willing to pay. We operationalize impact in the form of carbon dioxide (CO_2) emissions reductions and vary the impact of the sustainable investment by a factor of 10 between two treatment groups. We run the experiment in different variations with a panel of 527 experienced private investors as well as with a unique panel of 125 dedicated high-net-worth impact investors whom we recruited via impact investor networks and specialized wealth managers.

Our main experiment provides evidence that investors' WTP does not respond to the level of impact that a sustainable investment offers. As a starting point, we confirm that investors are willing to pay for a sustainable investment, which is in line with the findings of prior studies. However, investors' WTP does not significantly differ between an investment that saves 0.5 tons of CO_2 emissions and one that saves 5 tons. Thus, while our results suggest that investors care whether an investment has an impact or not, they do not seem to care about the magnitude of this impact.

We take several measures to ensure the robustness of this finding. First, we make sure that investors intuitively understand what a ton of CO_2 means and that the investment's impact is salient when investors make their choices. Most investors (95%) can exactly recall the impact of the investment after the choice experiment. Second, we confirm that investors are able to judge the magnitude of an investment's impact. Investors who were assigned to the sustainable investment with greater impact agree significantly more with the statement that the investment makes a relevant contribution to mitigating climate change. Third, to assure that our experimental

[3] According to the classification of Harrison and List (2004).

procedure can detect sensitivity in investor's WTP, we run a variation of the main experiment where we vary the investments' past financial performance instead of their impact. We can demonstrate that in this setting, investors' WTP is highly sensitive to differences in financial performance. Finally, we present evidence that the COVID-19 crisis is not driving our results, doing so by showing results of experiments that we ran with students before and after the onset of the pandemic.

Extending the main finding, we explore the reasons for the observed insensitivity to impact. First, our results may be due to the fact that investors lack experience in dealing with impact. To test this hypothesis, we repeat the experiment, but this time with a unique sample of high-net-worth impact investors who have substantial experience with impact investing. We find that investors in this sample are just as insensitive to impact as are the private investors in the main experiment. This suggests that the observed insensitivity to impact is not driven by a lack of experience, and that it is unlikely to disappear as more investors gain experience with sustainable investing.

Second, we investigate whether the ability to directly compare impact information increases investors' sensitivity to impact. To this end, we run our experiment in a joint evaluation setup, where investors receive information on the impact of each of two sustainable investments juxtaposed. The impact of each investment differs by a factor of 10. Yet investors' WTP is only 28 percent higher for the high-impact investment in this setting, even though it has a 900 percent higher impact. Furthermore, we show that in the joint evaluation setup investors' WTP does not depend on the absolute level of impact. If we reduce the impact of each investment by a factor of 10, investors' WTP stays almost identical. This indicates that investors consider impact information in order to identify superior options in a relative comparison. At the same time, it indicates that investors' WTP for sustainable investments depends strongly on the available (arbitrary) choice set and not on the absolute level of impact.

Third, we explore whether WTP for sustainable investments is driven by the emotional experience of choosing a sustainable option rather than a calculative appraisal of impact. Relying on a post-experiment survey, we find that investors' WTP is correlated with the level of positive emotions they experience when choosing the sustainable investment. The impact of the sustainable investment, however, does not influence these positive emotions. In a regression, we show that investors' WTP per ton of CO_2 is strongly correlated with the level of positive emotions, but not with investors' individual estimates of what it costs to save one ton of CO_2. This suggests that investors' valuation of impact is driven by feelings rather than by calculation. We also explain how an emotional valuation may reconcile the results of the main experiment and the joint evaluation extension.

Taking all our findings together, we suggest viewing the average pro-social investor as a "warm glow" optimizer,[4] rather than a consequentialist who optimizes the impact of her investments. Investors seem to have a pronounced WTP for the most sustainable option within the available choice set, as choosing this option maximizes their positive feelings. They respond to impact information by identifying which option is superior, but remain insensitive to the absolute level of impact. Ultimately, this view suggests that the positive emotions derived from choosing sustainable investments is an important driver behind the trend towards sustainable investing.

Our paper contributes to the literature that investigates the influence of pro-social preferences on investment decisions (Barber, Morse, and Yasuda, 2021; Riedl and Smeets, 2017; Hartzmark and Sussman, 2019; Bauer, Ruof, and Smeets, 2019). While we confirm previous findings of a substantial WTP for impact, our results show that this WTP does not scale with the level of impact that investments offer. Our results suggest that investors' valuation of sustainable investments is more akin to charitable giving than to financial optimization. While this phenomenon has been

[4]Models of "warm glow," or "impure" altruism focus on emotional valuation. They assume that individuals do not derive utility from the well-being of others, but from the emotional response to the act of behaving pro-socially (Andreoni, 1990).

shown in other contexts(Null, 2011; Karlan and Wood, 2017; Metzger and Günther, 2019; Hsee and Rottenstreich, 2004; Desvousges, Johnson, Dunford, Boyle, Hudson, and Wilson, 1992; Kahneman and Knetsch, 1992), it has not been demonstrated in the context of financial decision-making. In financial decisions, it might well be the case that investors approach the public good contributions in a more rational, consequentialist manner. Our results demonstrate, however, that scope neglect is also a relevant issue when individuals express their pro-social preference in an investment context.

Our work is also related to the literature that explores the role of emotions in financial decision-making (Finucane, Alhakami, Slovic, and Johnson, 2000; Slovic, Finucane, Peters, and MacGregor, 2007). Affective decision-making has been put forward as an explanation for several puzzles in financial markets, such as the home bias (Huberman, 2001; Coval and Moskowitz, 1999; Strong and Xu, 2003), or IPOs of glamorous companies (MacGregor, Slovic, Dreman, and Berry, 2000). Hartzmark and Sussman (2019) suggest that emotions may also drive investors' valuation of sustainable investments. We confirm that investors' WTP for sustainable investments is positively correlated with positive emotions they experience when choosing a sustainable investment option. This highlights that the role of emotions is important in the behavior of pro-social investors.

Finally, we challenge a key assumption in the literature that explores the effects of pro-social preferences on asset pricing. A growing number of theoretical papers model how pro-social investors influence asset prices, either because investors have a taste for "green" assets (Pástor, Stambaugh, and Taylor, 2021; Pedersen, Fitzgibbons, and Pomorski, 2020; Heinkel, Kraus, and Zechner, 2001) or because investors explicitly care about aggregate externalities (Broccardo, Hart, and Zingales, 2020; Oehmke and Opp, 2019). These models suggest that pro-social investors, by expressing their preferences in the financial market, incentivize companies to reduce externalities. In essence, these models assume that pro-social investors' utility increases with the impact of their investments, and that these investors make trade-offs between the financial performance and the impact of their invest-

ments. Our results challenge this assumption and suggest that pro-social investors are more likely to maximize financial performance while optimizing the warm glow that they derive from their choices. Modeling investor behavior in such a way would likely emphasize the importance of the structure of the sustainable investment industry, information asymmetry, and the way products are marketed to investors. Without measures in place that align the experience of warm glow with a product's underlying impact, sustainable investing may turn out to be a much less effective mechanism than previously thought for curbing externalities. Thus, future studies may yield important insights by modeling the behavior of pro-social investors in a way that explicitly reflects the role of warm glow.

Our paper is also related to three contemporary working papers. Humphrey, Kogan, Sagi, and Starks (2020) run an investment game where investment returns are positively or negatively linked to charitable benefits. They show that investors allocate less to investment options that entail negative effects on charities, but not more to those that entail positive effects. Although their paper addresses the positive/negative dichotomy and not different levels of impact, its results are consistent with ours in the sense that investors' valuation of externalities is not linear. Bonnefon, Landier, Sastry, and Thesmar (2019) implement an auction of claims on synthetic corporations that donate parts of their profits to charity. The paper finds that respondents' WTP scales with monetary contributions to charities in a linear relationship. Brodback, Günster, and Pouget (2020) employ initial public offerings of assets that have identical financial payoffs but differ in the intensity and timing of social responsibility. The authors find that participants' WTP increases with social responsibility, implemented as donations to a charity. Our findings may seem contradictory to those of Bonnefon, Landier, Sastry, and Thesmar (2019) and Brodback, Günster, and Pouget (2020), as in both of these experiments participants' WTP increases with positive externalities of investments. Yet, a key difference in the experimental setup is that in both studies externalities are expressed in monetary units and implemented as donations. This enables

participants to compare their impact one-to-one to the costs of sustainable investments. Expressing impact in monetary terms may be conducive to a calculative valuation of externalities (Hsee and Rottenstreich, 2004) and it relieves investors from the difficult task of valuing impacts. Our paper examines the case where externalities are not monetized, a feature that is widespread in the market for sustainable investment products. In this case, we find that WTP does not scale with the level of impact in a linear fashion, and suggest that investor's WTP is driven by an emotional valuation. Reading the findings of these different papers together suggests that monetizing impacts could be an effective measure to avoid scope insensitivity in sustainable investing.

In terms of practical implications, our results highlight that there is a severe risk of greenwashing in sustainable finance. The market for sustainable investing is expanding quickly, in 2018 surging past a total volume of USD 30 trillion (GSIA, 2019). This growth is raising hopes that sustainable investing might help tackle major societal challenges, such as curbing carbon emissions. However, the inconsistent WTP for impact that we demonstrate in this paper creates an incentive problem. If investors' WTP for sustainable investments scales with emotional warm glow rather than impact, financial institutions have an incentive to create products that offer warm glow rather than impact. This is especially the case when offering impact comes at a cost.[5] Furthermore, our results suggest that financial institutions have an incentive to structure their offerings in such a way that sustainable products with little impact stand out as the most impactful option available.[6] This incentive may result in a market for sustainable investment products that benefits investors in terms of warm glow and financial institutions in terms of profits, but fails to fulfill its potential for

[5] Although there are claims to the contrary, most theoretical models imply that pro-social investors need to accept lower financial performance in order to have impact (Oehmke and Opp, 2019; Heinkel, Kraus, and Zechner, 2001; Pástor, Stambaugh, and Taylor, 2021). In addition, there are—for sustainable investments—additional requirements for data and expertise that are likely to add to management fees.

[6] This is related to the broader problem that financial institutions have incentives to obfuscate the characteristics of retail products (for example, by artificially increasing complexity), with welfare decreasing consequences (Carlin and Manso, 2011; Célérier and Vallée, 2017).

solving societal problems. Indeed, in a framed field experiment, Weitzel, Laudi, and Smeets (2021) find that professional financial advisors actively exploit sustainability preferences of their clients.

2 Study Design

We address the question of investor sensitivity to impact, in framed field experiments and following a pre-registered experimental procedure.[7] All experiments were conducted between May and September 2020. Based on a series of investment decisions, we assess investors' WTP for a sustainable investment compared to that for a "conventional" investment. The sustainable investment has some level of impact, which we operationalize in terms of quantifiable carbon dioxide (CO_2) emission savings that are realized by investing in the product. The conventional investment has zero impact, but is otherwise equivalent. Both investment options are presented as mutual funds and correspond to real mutual funds. We realize the impact component of the sustainable investment by investing accordingly in verified carbon emission reduction projects (see Section A.1 for details). We measure investors' WTP in terms of the increased fees investors are willing to pay for the sustainable investment. Different subjects are treated with different versions of the sustainable investment, each time compared to the conventional one, allowing us to vary the amount of impact in a between-subjects design. Our independent variable is the impact of the sustainable investment measured in CO_2 savings, and the dependent variable is investors' WTP for this investment.

Figure 1 illustrates the experimental procedure we use to elicit investors' WTP in the main experiment. The procedure consists of four parts: instructions, information on investments, investment decisions, and a post-experiment survey.

[7]For pre-registration details, see https://aspredicted.org/w5f8i.pdf.

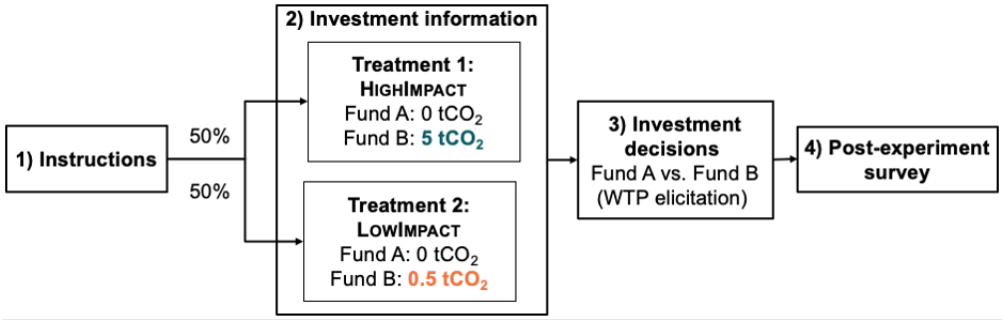


Figure 1. Experimental procedure of the main experiment. This figure provides an illustration of the experimental procedure we use in our main experiment.

2.1 Instructions and Incentives

In a first step, the investors receive detailed instructions on the investment decisions and on investor incentivization. We make sure that participants understand how the investment decisions work and that it is in their best interest to state their true preferences (see Figure A.1).

The investment decisions are incentivized with relatively high stakes. For 10 randomly selected investors, we make a real €1,000 investment on their behalf, based on their investment decisions. To guarantee that participants reveal their true WTP, we apply the Becker–DeGroot–Marschak (BDM) mechanism (Becker, Degroot, and Marschak, 1964), a standard procedure in the judgment and decision-making literature. Using the BDM mechanism, we determine in which investment to invest and a fee, which we deduct from the investment amount (see Section A.1 for the detailed procedure). After one year, we pay out the full value of this investment to the selected investors.

To familiarize investors with the decision procedure, we guide them through an example (see Figure A.2). We also require them to answer a brief quiz in order to check whether they

understand the potential consequences of their decisions. Investors who "fail" the quiz twice receive the correct answers and a short explanation.

2.2 Investment Information

In the second step, investors receive information about the financial performance and the impact of the two investment options. For each of the two investments, we provide information on the asset class, the market segment, the annualized return over the last three years, and the risk level according to Morningstar's risk rating, all of which are identical for both investments. For the sustainable investment option, we additionally provide information on how much CO_2 emissions a €1,000 investment saves (see Figure 2 for an example).

To make sure that respondents understand the impact information, we translate the CO_2 savings into more intuitively comprehensible figures. We present the information in terms of trees planted, kilometers of air travel, and daily emissions of an average EU citizen to facilitate the visualization of the indicated amount of CO_2 emissions savings. These are units that most respondents know from personal experience and can directly relate to. Also, to avoid experimenter demand effects, i.e., "changes in behavior by experimental subjects due to cues about what constitutes appropriate behavior" (Zizzo, 2010), we use an ambiguous framing of sustainable investing. In the information column on the right of Figure 2, we provide investors with arguments both for and against investing sustainably being socially desirable.

We randomly assign investors to one of two different treatments, HighImpact and LowImpact. In HighImpact, the sustainable investment saves 5 tons of CO_2, whereas in LowImpact it saves 0.5 tons of CO_2; so, 10 times less. To avoid ordering effects, we randomize whether the sustainable investment option is displayed on the screen's left or right side.

To guarantee that all relevant information is salient when the valuation decision is made, investors again need to answer a brief quiz on the past performance, the risk level, and the impact of the two investments (see Figure A.3 for a screenshot). Investors who twice fail to answer the quiz correctly receive the correct answers and a short explanation.[8]

	Fund A	**Fund B**	ℹ
Fund Category	US Large-Cap Blend Equity	US Large-Cap Blend Equity	**Asset class** and **market segment** in which the fund invests.
Annualized Return (3 years)	**6%**	**6%**	Average amount **earned** by an investment in the fund each year.
Morningstar™ Risk	Average Low Average High	Average Low Average High	Assesses the **variations** in a fund's monthly returns, compared to similar funds.
Climate Change	An investment of €1000 in this fund **saves 5000 kg of CO_2** emissions. This corresponds to: • The CO_2 saved by planting **30 trees.** • The CO_2 emissions of traveling **15000 km** by plane. • The CO_2 emissions caused by an EU citizen in **250 days**.	An investment in this fund does not save CO_2 emissions.	Some funds finance projects that **save CO_2 emissions.** Some experts argue that this is a valuable way of how investors can **contribute** to fighting climate change. Other experts argue that this is a **distraction** and may delay the policies needed to fight climate change (e.g., carbon taxes).

Data retrieved: 15-05-2020

Figure 2. Investment information in the main experiment. This figure provides a screenshot of the information the investors participating in our main experiment receive on the two investments if they are assigned to the HIGHIMPACT treatment. The investment information investors in the LOWIMPACT treatment receive is shown in Figure A.3.

[8]Excluding investors who fail twice in at least one of these quizzes does not substantially affect our results, as shown in Table A.1.

2.3 Investment Decisions and WTP Elicitation

In the third step, we elicit investors' WTP for the sustainable investment option. As the direct statement of a precise WTP is cognitively demanding for respondents and subject to noisy answers and outliers, we ask investors to make binary choices instead, which is the method most frequently used in the judgment and decision-making literature to measure (risk) preferences (Holt and Laury, 2014). Our respondents repeatedly choose between the sustainable investment and the conventional investment, which are labelled as investments A and B. For each investment we indicate a one-off fee, which we vary between consecutive choices depending on respondents' answers. Both investment options start with the same fee. If a participant prefers investment A, we increase the fee for investment A and ask again. Using the bisection method, also called the midweight method, which determines the step sizes for the fee adaptation, we minimize the number of consecutive choices needed to elicit an investor's WTP (see, e.g. Abdellaoui, 2000; van de Kuilen and Wakker, 2011). We provide an illustrative example in Figure A.4, and additional details on the implementation of the bisection method in Section A.1. Using this method we can determine the investors' WTP with a precision of €1.25 for the €1,000 investment through a series of seven choices.[9] To finally guarantee that our method yields each investor's true WTP, we afterwards ask respondents to confirm whether the elicited WTP actually reflects their true preferences. Respondents who do not agree with the elicited WTP are asked to repeat the procedure once, if they wish. We exclude investors who disagree with the elicited WTP and are unwilling to repeat the investment decisions.

[9]Some investors show a censored WTP for the sustainable investment: they do not deviate from the initially preferred investment in any of their seven choices. We thus cannot elicit their WTP for the sustainable investment from their choices. We additionally ask these investors to directly state their WTP for the sustainable investment. Table A.2 shows our main results excluding all investors with censored WTPs, showing that the exclusion of these investors does not have a material effect on our results.

2.4 Post-experiment Survey

After the investment decisions have been taken, respondents are asked to fill out a survey, which serves two purposes. First, we run a manipulation test to check whether investors understood and remember the investment information provided. We ask investors 1) to recall which investment had a higher impact and 2) how much impact the sustainable investment had exactly. Second, we ask questions about investors' financial expectations with regard to the investments, the feelings they associate with their choices, their perception of the impact of the sustainable investment, and their individual preferences, as well as their demographic characteristics. Table A.3 summarizes all variables elicited in the post-experiment survey.

2.5 Participants

We conduct our main experiment with a sample of experienced private investors. We recruit them from among the members of a Dutch investor protection interest group with some 40,000 members. The main activities of this group are the provision of independent information for investors and the coordination of lawsuits that aim to obtain compensation for groups of aggrieved shareholders. Its members hence have substantial experience of, and interest in, making investment decisions. For our experiments, we recruit 527 participants, which we henceforth call private investors. Of these participants, 219 take part in our main experiment; the remainder take part in two extensions of the main experiment. Table 1 shows the demographic characteristics and individual preferences of our sample of private investors in the main experiment. On average, our respondents are older and wealthier, and as a group have a higher share of males than that of the average of the Dutch population. Both treatment groups, HighImpact and LowImpact, are well balanced in terms of demographic variables and individual preferences.

Table 1
Preferences and demographics for the private investors, by treatment

This table presents the preferences and demographic variables of the sample of private investors in our main experiment, by impact treatment. Time preferences, risk preferences, and altruism are measured on a 10-point scale using an experimentally validated survey module introduced by Falk, Becker, Dohmen, Huffman, and Sunde (2016). In order to improve readability, we transform other variables to a scale from 0 to 10. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact ($n=97$)	HighImpact ($n=99$)	(HighImpact = LowImpact)
Risk preferences [0,10]	6.938	7.000	$p=0.307$
Time preferences [0,10]	7.361	7.485	$p=0.389$
Altruism [0,10]	6.588	6.455	$p=0.389$
Climate awareness [0,10]	7.423	7.677	$p=0.694$
Female [0,10]	0.103	0.131	$p=0.540$
Age	61.660	61.495	$p=0.700$
Income	€60,000–€74,999	€60,000–€74,999	$p=0.842$
Net worth	€200,000–€499,999	€200,000–€499,999	$p=0.887$
Highest education	Bachelor's degree	Bachelor's degree	$p=0.765$
Investment knowledge [0,10]	6.318	6.234	$p=0.661$

2.6 Data Processing

In our main experiment, we exclude from our analysis six investors as they do not agree with the statement "Climate change is a serious problem that needs to be solved"—that is to say, investors that state an agreement level of 3 or less on a scale of 1–7. CO_2 savings are an inappropriate measure of impact for these investors, and we cannot detect how their WTP for sustainable investments relates to impact. We exclude a further 17 investors as they explicitly disagree with the elicited WTP and are unwilling to repeat the investment decisions, as previously described.[10] This

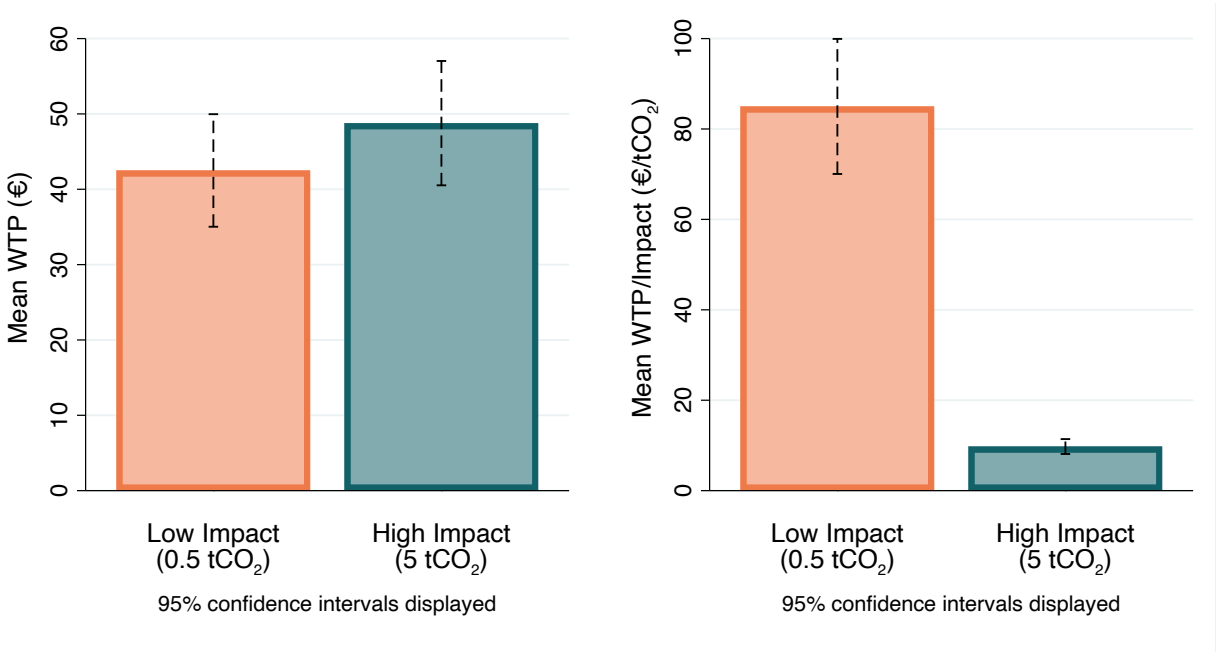
[10] We include 19 investors which disagree with the elicited WTP but are willing to repeat investment decisions. We use the WTP calculated based on the repeated investment decisions for these investors.

results in a final sample of 196 investors. To reduce the influence of extreme values, we winsorize all WTP values at the 5 percent and 95 percent levels, according to the pre-registered procedure.

3 Does WTP for Sustainable Investments Scale with Impact?

In our main experiment, we find that investors' WTP does not respond to impact. Of all the investors, 93 % prefer the sustainable investment when fees are equal to the conventional investment . Pooling investors in the LowImpact and the HighImpact treatment, the average WTP for the sustainable investment is €45.67 for a €1,000 investment. This indicates that there is a substantial WTP for sustainable investments, in line with the findings of the previous literature (Hong and Kacperczyk, 2009; Barber, Morse, and Yasuda, 2021).

However, when contrasting the treatments, we find that the level of impact of sustainable investments does not significantly affect investors' WTP. Panel A of Figure 3 shows investors' WTP for the sustainable investment, in the LowImpact and HighImpact treatments. There is no significant difference in the WTP for the sustainable investment between the two treatments ($p = 0.363$, Mann–Whitney U test). In the LowImpact treatment, investors have an average WTP of €42.49 for an investment that saves 0.5 tCO_2. In the HighImpact treatment, investors have an average WTP of €48.78 for an investment that saves 5 tCO_2. There is also no significant difference between the two treatments regarding the share of investors who prefer the sustainable investment ($p = 0.798$, Mann–Whitney U test). The detailed distribution of private investors' WTP for the sustainable investment is shown in Figure A.6 Panel A.



Panel A Panel B

Figure 3. Response of private investors' WTP to the impact of sustainable investments. This figure shows the results of our main experiment, which investigates how private investors' WTP for sustainable investments responds to the impact of these investments. Panel A: mean absolute WTP for the sustainable investment, by impact treatment. Panel B: mean relative WTP for the sustainable investment, per ton of CO_2 saved, by impact treatment.

Panel B of Figure 3 shows that the insensitivity observed leads to a substantial inconsistency in investors' WTP per unit of impact. Investors are willing to pay significantly more per tCO_2 saved in the LowImpact treatment than in the HighImpact treatment ($p<0.001$, Mann–Whitney U test). We observe a difference in the average WTP per ton of CO_2 of a factor of 9.7.

Differences in risk and return expectations for the sustainable investments between the HighImpact treatment and the LowImpact treatment could be driving the observed results. Our post-experiment survey provides, however, evidence that our results are not driven by different expectations about risk and return between the treatments, which might otherwise conceal the influence

Table 2
Results of the main experiment

This table presents the results of the main experiment. First, it shows private investor's absolute and relative WTP for the sustainable investment, as well as the share of investors that prefer the sustainable investment when fees are equal. The WTP is elicited using the experimental procedure as described in Section 2. Second, it shows the results of the post-experiment survey. In order to improve readability, we transform variables from the post-experiment survey to a scale from -10 to 10. For risk expectations, return expectations, and positive emotions, positive values indicate that investors have a more favorable view of the sustainable investment; negative ones that they have a more favorable view of the conventional investment. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments. Detailed variable descriptions can be found in Table A.3.

	Mean Values		**Mann–Whitney U test**
	LowImpact ($n=97$)	HighImpact ($n=99$)	(HighImpact = LowImpact)
Experimental Results			
WTP (€)	42.49	48.78	$p=0.363$
WTP/Impact (€/tCO$_2$)	81.25	8.38	$p<0.001$
Sustainable investment preference (%)	93.81	92.93	$p<0.999$
Post-experiment Survey Results			
Risk expectations [-10,10]	-0.526	-0.051	$p=0.382$
Return expectations [-10,10]	-0.312	-0.707	$p=0.348$
Positive emotions [-10,10]	6.134	6.465	$p=0.121$
Perceived investment impact [-10,10]	4.089	5.488	$p=0.003$
General relevance impact [-10,10]	3.643	4.276	$p=0.142$
General relevance impact level [-10,10]	2.474	2.896	$p=0.457$
Estimated cost of saving CO$_2$ (€/tCO$_2$)	94.55	102.43	$p=0.658$

of the investments' impact. As shown in Table 2, both risk expectations and return expectations do not significantly differ between the HighImpact treatment and the LowImpact treatment.

Taken together, we find that while investors have a substantial WTP for an investment with impact, their WTP does not respond to the level of impact. Our results show that investors' WTP is indifferent to an increase in an investment's impact by a factor of 10.

3.1 Robustness Checks

We corroborate this main finding in several robustness checks. First, we confirm that our results are not driven by a lack either of the salience or of the comprehensibility of the impact information provided. Second, we show that investors correctly perceive the larger impact as a more relevant contribution to preventing climate change. Third, we replicate the experiment, with a focus on past financial performance, ruling out that the detected insensitivity to impact is an artefact of our method for eliciting the WTP. Finally, we provide evidence that the COVID-19 crisis is unlikely to have affected our results substantially.

3.1.1 Is the Impact Information Salient and Comprehensible?

Relying on the post-experiment survey, we examine whether the impact information is salient and comprehensible. If investors were not sufficiently attentive to the information provided, or if investors were unable to evaluate the impact information, this may explain the observed insensitivity.

First, we find that the impact information provided to the investors was salient during the investment decisions. Once the investment decisions had been made, we asked all participants if they could remember the impact information. We find that 99 percent could correctly identify the sustainable investment, and that 95 percent could, in a free text field, accurately reproduce its exact level of impact in tCO_2.

Second, we observe that on average investors have made a realistic estimate of the value of saving a ton of CO_2 emissions. In the post-experiment survey, we ask investors for an estimate of the price of saving a ton of CO_2 emissions. On average, the investors' estimate of CO_2-saving costs is €98.55 per ton, with no significant difference between the HighImpact treatment and the LowImpact treatment ($p=0.658$, Mann–Whitney U test, 95% confidence interval: €77.08–€120.02).

This is higher than the CO_2 prices in the European Union Emissions Trading System during our data collection period, which fluctuated roughly between €25 and €30 during this period. The values stated by investors do, however, correspond relatively well to estimates of the cost society incurs from carbon emissions. Based on a recent survey of a broad panel of climate scientists and economists, Pindyck (2019) estimates that the social cost of emitting a ton of CO_2 lies between \$80 and \$200. Besides the fact that we translate the CO_2 savings of the investments into more intuitively comprehensive units, this finding indicates that the information provided enables investors to evaluate the level of impact of the investments.

Third, we show that investors are able to differentiate, with regard to the level of impact, between the two treatments. Once the investment decisions had been made, using a Likert scale we asked investors how they perceived the impact of the sustainable investment—so, whether they thought it makes a meaningful contribution to mitigating climate change ("Perceived investment impact" in Table 2). Overall, we find that investors had a positive opinion of the impact of the sustainable investment ($p < 0.001$, Wilcoxon signed-rank test). Importantly, we find that this opinion was significantly more positive in the HIGHIMPACT treatment than in the LOWIMPACT treatment ($p = 0.003$, Mann–Whitney U test; see Table 2). This provides further evidence that investors not only remember the impact figures, but are also able to evaluate impact magnitude, even without seeing alternative options.

3.1.2 Are Our Findings Aligned with What Investors Say Is Important to Them?

We compare investors' WTP for impact with investors' statements about the importance of impact. In the post-experimental survey, we ask two questions to this end. First, we ask investors how important it is to them that their investments contribute to halting climate change ("General

relevance impact" in Table 2). Second, we ask investors how important it is to them *how much* their investments contribute to halting climate change ("General relevance impact level" in Table 2).

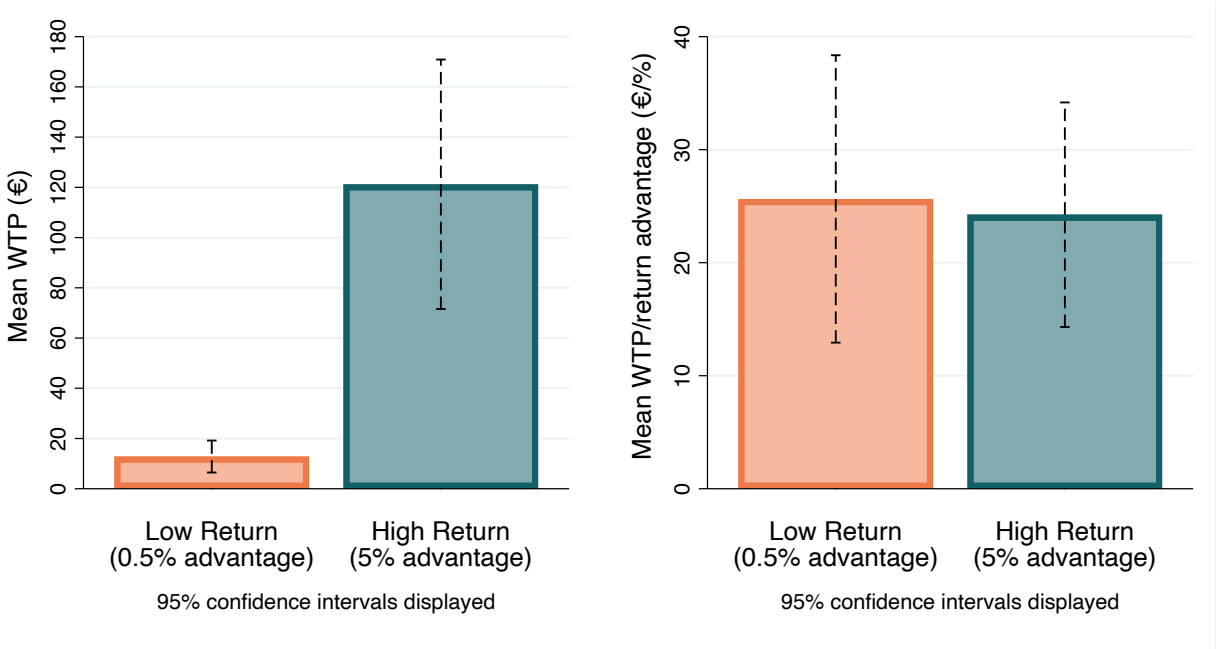
Investors assign importance both to that an investment has an impact and to how much impact an investment has ($p<0.001$, Wilcoxon signed-rank test). At the same time, investors assign higher importance to the question of *whether* their investments contribute to climate change mitigation than to the question of *how much* their investments contribute to climate change mitigation ($p<0.001$, Wilcoxon signed-rank test). While these statements cannot wholly explain the observed insensitivity, these results align with the fact that we find a substantial WTP for investments with some impact but do not detect any significant differences in WTP between different levels of impact.

3.1.3 Can Our Elicitation Method Detect Sensitivity?

In order to test the validity of our WTP elicitation method, we test whether our experimental design can measure investors' sensitivity to other investment characteristics. While so far only little is known about investors' sensitivity to impact, there is clear empirical evidence that investors are sensitive to mutual funds' past performance (e.g., Ivković and Weisbenner, 2009).

Therefore, we apply our experimental procedure to measure investors' WTP for past financial performance. Concretely, we vary the investments' past performance, rather than their impact, between the two treatments. In each treatment, the baseline option has a past performance of 5% per year. In the HighReturn treatment, the second investment outperforms the baseline by 5% (i.e., a total performance of 10% per year). In the LowReturn treatment, the second investment outperforms the baseline by only 0.5% (i.e., a total performance of 5.5% per year). Hence, in accordance with the main experiment, outperformance differs by a factor of 10 between the two treatments. We do not provide information on impact in this setup. Using the same recruitment campaign as

for the main experiment, we recruit a sample of 89 private investors who were randomly assigned to this robustness check.[11] Using the same method as in our main experiment, we measure investors' relative WTP for the outperforming investments in terms of additional fees they are willing to pay.



Panel A Panel B

Figure 4. Response of private investors' WTP to the level of outperformance of investments. This figure shows the results of an extension of our main experiment, investigating how private investors' WTP responds to the level of outperformance of investments. Panel A: mean absolute WTP for the investment with a higher past return, by treatment. Panel B: mean relative WTP for the investment with a higher past return, by treatment, expressed relative to outperformance in percentage points.

We observe that investors' WTP responds strongly to the past performance of investment options. Figure 4 shows that investors are willing to pay significantly more in the HIGHRETURN treatment than in the LOWRETURN treatment (Panel A), and have a consistent WTP per unit of improved past performance across the treatments (Panel B). The average WTP for the outperform-

[11] We exclude seven investors who explicitly disagree with the detected WTP and are unwilling to repeat the investment decisions.

ing investment is a factor of 9.5 higher in HIGHRETURN compared to investing in LOWRETURN: €121.22 vs. only €12.82 ($p < 0.001$, Mann–Whitney U test). This difference is almost exactly proportional to the outperformance, which differs by a factor of 10 between the treatments.

Based on these results, we conclude that our experimental design can detect investors' sensitivity when applied to past financial performance. This allows us to rule out that our original findings in the base experiment were due to a methodological artefact of our elicitation procedure. Hence, our finding that investors' WTP does not respond to different levels of impact also passes this robustness check.

3.1.4 Are Our Results Affected by the COVID-19 Crisis?

The COVID-19 crisis has been found to have affected investors' behavior in various ways (see, e.g., Ramelli and Wagner, 2020). As our data collection took place mid-2020, the pandemic may also have affected our results. To investigate the effect of the crisis, we make use of a preliminary version of our experiment, which we ran with 311 students at Radboud University in September 2019, well before the emergence of SARS-CoV-2. We repeated this experiment in September 2020, after the emergence of SARS-CoV-2, under the same conditions and with a corresponding sample of 243 students at Radboud University. We find no substantial differences between the results before and after the emergence of the virus. The detailed results can be found in Table A.4. In light of these results, it seems unlikely that COVID-19 had a substantial effect on our results.

3.2 Discussion

We find that investors are insensitive to impact when determining a WTP for sustainable investments. We provide substantial evidence that this finding is unlikely to result from methodological issues or from the fact that investors did not understand the impact information provided to them.

Our findings extend existing experimental studies in important ways. Prior studies have demonstrated that there is a WTP for sustainable investments (Riedl and Smeets, 2017; Bauer, Ruof, and Smeets, 2019; Barber, Morse, and Yasuda, 2021), and that there are substantial financial flows toward sustainable investment funds (Hartzmark and Sussman, 2019)[12]. However, these studies did not explore the fact that sustainable investment products can have different levels of impact. Our results suggest that investors have a substantial WTP for sustainable investments as a category, but do not adjust their WTP according to the impact of these investments.

This finding is in contrast with traditional models of altruistic behavior. These models assume that individuals are consequentialists, in the sense that they contribute to public goods because they derive utility from the level of the public good, beyond the direct benefit they experience themselves from the good (Becker, 1974; Eckel and Grossman, 1996; Andreoni and Miller, 2002). Such models, which are often labeled models of "pure" altruism, imply that the benefit an individual receives from a pro-social act depends on the act's impact on a public good. Thus, if pro-social investors were driven by pure altruism, we would expect their WTP for sustainable investments to increase with the impact of such investments. Yet, as our results show, even an increase in impact by a factor of 10 does not lead to a significant increase in investors' WTP. This observed behavior is not in line with a pure altruist decision-model.[13]

[12] Our results dovetail with the finding in Riedl and Smeets (2017) that pro-social preferences increase the likelihood to invest is sustainable funds, but do not increase the share of wealth invested in sustainable funds

[13] Possibly, pure altruism could explain the insensitivity we observe if the marginal societal utility of CO_2 emission savings is strongly decreasing. However, this seems unlikely in our setting. The "pure" altruist's marginal utility

Insensitivity to quantity has been demonstrated in other contexts, such as public good valuation and philanthropic donations. However, it is important to reconsider this phenomenon in the context of sustainable investing. First, the classic contingent valuation result by Desvousges, Johnson, Dunford, Boyle, Hudson, and Wilson (1992) that individuals are willing to pay roughly the same amount to save 2000, 20000, or 200000 birds rests on stated preferences. In a revealed preference setting where choices are consequential, individuals might evaluate their options more critically. Second, investment decisions tend to trigger a calculative decision-mode, and thus public goods may be considered differently when they are part of an investment choice. Third, theorists currently model the behavior of sustainable investors as if they were consequentialists. Fourth, two contemporaneous working papers find in their experimental setups that sustainable investors act like consequentialists (Bonnefon, Landier, Sastry, and Thesmar, 2019; Brodback, Günster, and Pouget, 2020). Against this backdrop, our rejection of the consequentialist view of sustainable investors is an important piece of evidence. In the following, we explore reasons why investors WTP does not respond to the level of impact.

is proportional to society's utility of an additional unit of impact. Thus, to explain the observed behaviour, one would have to assume that marginal societal utility is high up until 0.5 tons of CO_2 emissions savings and strongly decreases between 0.5 and 5 tons of CO_2 emissions savings. Such a case is hard to make from a societal perspective. A recent report by the United Nations Environment Programme (UNEP) concludes that annual global greenhouse gas emissions need to be reduced by 32 billion tCO_2 by 2030 if the internationally agreed target of limiting global warming to 1.5 degrees Celsius is to be reached (UNEP, 2020). In light of this emission reduction gap, it seems highly unlikely that the marginal societal benefit decreases substantially for impact levels below 5 tCO_2, which is the highest impact level we use in our experiment.

4 Exploring Reasons Why the WTP for Sustainable Investments Does Not Scale with Impact

From the existing literature, we identify three potential explanations for the observed behavior. First, investors may lack the knowledge or experience necessary to evaluate impact information in an investment context. Second, investors may only be able to discriminate products in terms of impact when they can directly compare several options. Third, investors' WTP may be driven by positive emotions, or, the "warm glow" that is associated with choosing a sustainable option, regardless of its impact.

4.1 Do Investors Lack the Necessary Experience to Evaluate the Impact of Investments?

Investors' lack of experience in evaluating impact information in an investment context could explain why their WTP for sustainable investments does not respond to the impact of those investments. We have already put several measures in place to ensure that investors understand the impact of the available investment options. Specifically, we translate the provided impact information into intuitively understandable units, and we check and find that investors remember that figure. Investors even correctly perceive the higher impact option as making a more meaningful contribution to climate change mitigation. So it seems that they understand what an investment's impact means. Nevertheless, investors may still be unable to value this impact in the context of an investment decision. Even if they are able to differentiate between the impact of planting three trees and the impact of planting 30 trees, they may still be unable to evaluate whether planting 30 trees has an impact that is meaningful for a €1,000 investment.

Studies in psychology find that an inability to evaluate attributes of a good can cause the valuation of that good to become insensitive to the level of these attributes (e.g., Hsee, 1996). If individuals cannot evaluate the level of an attribute, they may make a valuation that is not related to that level but instead to the perceived general importance of the attribute (Baron and Greene, 1996). The ability to evaluate the level of goods' attributes, meanwhile, tends to increase with experience (Hsee and Zhang, 2010).

To investigate the effect of experience on sensitivity to impact, we repeat our experiment with a unique sample of dedicated impact investors. We recruit this sample of impact investors through different channels: First, from among the alumni network of the University of Zurich's training programs for high-net-worth impact investors. Second, via two associations of high-net-worth impact investors.[14] Investors in these networks come together to share knowledge and participate in events on impact investing. Third, we recruited customers of five private banks and wealth advisors, who were identified as experienced impact investors by their advisers.[15] In total, we recruited 125 impact investors through these channels.[16] The final sample comprises 118 investors, as we excluded one investor who does not think climate change is a serious problem, and six investors who explicitly disagreed with the detected WTP and were unwilling to repeat the investment decisions.

All of the investors in this sample have indicated their intention to exert a positive impact with their investments, by taking courses, joining a network, or by instructing their advisors. Most have considerable experience in dealing with impact investments. While their individual levels of experience vary, we are confident that on average they have a much higher level of experience

[14] Toniic and the NEXUS Working Group on Impact Investments.

[15] Credit Suisse, Bank Vontobel, Bank Julius Baer, Tiedemann Advisors, and VALUEworks.

[16] Five impact investors participated in the experiment shortly after the end of the sampling period specified in the pre-registration. If we exactly follow the pre-registration procedure, the sample is slightly smaller ($n = 120$). However, the results do not substantially differ from those obtained with the full sample (see Figure A.5). As the sampling period does not seem to have an effect on our results, we analyze the entire sample.

than the sample of private investors we recruited for our main experiment. If lacking the ability to evaluate impact information drives insensitivity to impact, we would expect these impact investors to be more sensitive to impact than the private investors are.

Table 3 presents the sample characteristics of the impact investor sample. Compared to the private investors in the main experiment, the impact investors have greater wealth, state a higher level of investment experience, are younger, and the sample has a larger fraction of female investors. The median household net worth lies between €1 million and €10 million.[17] Regarding their preferences, the impact investors are more altruistic and have a stronger long-term orientation than our private investors. Again, both treatment groups, HighImpact and LowImpact, are well balanced in terms of demographic variables and individual preferences.

The results of our experiment with dedicated impact investors are overall very similar to those of the main experiment with private investors. We find that impact investors too have a substantial WTP for sustainable investments. Of all our impact investors, 97 percent prefer the sustainable investments when fees are equal. Pooling investors in the LowImpact and the HighImpact treatments, the average WTP for the sustainable investment is €49.01 for a €1,000 investment. This is slightly more than the figure for the private investors; the difference, however, is not significant ($p=0.096$, Mann–Whitney U test).

Further, we find that for impact investors too the level of impact of sustainable investments does not significantly affect their WTP. Figure 5, Panel A contrasts impact investors' WTP for sustainable investments between the LowImpact and HighImpact treatments. There is no significant difference in the WTP for the sustainable investment between the treatments ($p=0.767$, Mann–Whitney U test, Table 4). In the LowImpact treatment, impact investors have an average

[17] This figure may be an understatement in numerous cases, as many of the impact investors are embedded in family structures that collectively own much more, often several billion euros.

Table 3
Preferences and demographics for the impact investors, by treatment

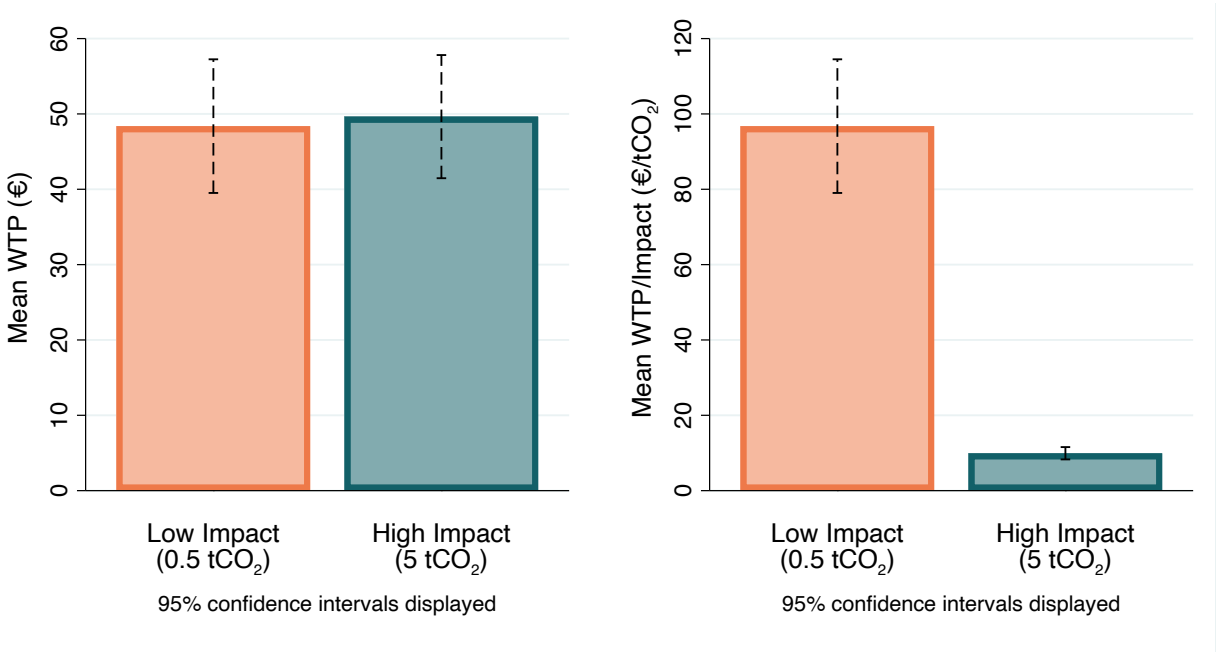
This table presents the preferences and demographic variables of our sample of impact investors, by impact treatment. Time preferences, risk preferences, and altruism are measured on a 10-point scale using an experimentally validated survey module introduced by Falk, Becker, Dohmen, Huffman, and Sunde (2016). In order to improve readability, we transform other variables to a scale from 0 to 10. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact ($n=59$)	HighImpact ($n=59$)	(HighImpact = LowImpact)
Risk preferences [0,10]	7.169	6.898	$p=0.521$
Time preferences [0,10]	8.508	8.068	$p=0.119$
Altruism [0,10]	7.763	7.169	$p=0.131$
Climate awareness [0,10]	9.096	8.983	$p=0.814$
Female [0,10]	0.356	0.407	$p=0.705$
Age	41.424	38.966	$p=0.456$
Income	€125,000–€149,999	€150,000–€174,999	$p=0.543$
Net worth	€1mn–€9.9mn	€1mn–€9.9mn	$p=0.931$
Highest education	Master's degree	Master's degree	$p=0.828$
Investment knowledge [0,10]	6.877	6.707	$p=0.650$

WTP of €48.38 for an investment that saves 0.5 tCO_2, while in the HighImpact treatment, the average WTP for an investment that saves 5 tCO_2 is €49.64. The distribution of impact investors' WTP for the sustainable investment can be found in Figure A.6 Panel B.

Figure 5, Panel B shows that for the impact investors too the WTP per unit of impact is inconsistent between the treatments. Impact investors are willing to pay significantly more per tCO_2 saved in the LowImpact treatment than in the HighImpact treatment ($p<0.001$, Mann–Whitney U test). The difference in the average WTP per ton of CO_2 is of a factor of 9.2.

As with the private investors, neither the risk nor the return expectations of impact investors differ significantly between the HighImpact treatment and the LowImpact treatment (Table 4). In comparison to the private investors the impact investors have more positive expectations



Panel A Panel B

Figure 5. Response of impact investors' WTP to the impact of sustainable investments. This figure shows the results of our experiment investigating how impact investors' WTP for sustainable investments responds to the impact of these investments. Panel A: mean absolute WTP for the sustainable investment, by impact treatment. Panel B: mean relative WTP for the sustainable investment, per ton of CO_2 saved, by impact treatment.

with regard to the financial performance of the sustainable investment. The impact investors expect the sustainable investment to have slightly better returns ($p=0.047$, Mann–Whitney U test) and lower risk ($p=0.006$, Mann–Whitney U test) than do the private investors.

Taken together, the results of our experiment with impact investors demonstrate that a lack of experience with evaluating the impact of investments is an unlikely explanation for the observed insensitivity to impact. We find that even dedicated and experienced impact investors do not respond via their WTP to different levels of investment impact. Even though they are certainly more experienced than the private investors when it comes to evaluating impact, they display the same behavior. We therefore conclude that it is not a mere lack of experience that drives

Table 4
Results of the experiment with impact investors

This table presents the results of the experiment with impact investors. First it shows impact investor's absolute and relative WTP for the sustainable investment, as well as the share of investors that prefer the sustainable investment when fees are equal. The WTP is elicited using the experimental procedure as described in Section 2. Second it shows the results of the post-experiment survey for the sample of impact investors. In order to improve readability, we transform variables from the post-experiment survey to a scale from -10 to 10. For risk expectations, return expectations, and positive emotions, positive values indicate that investors have a more favorable view of the sustainable investment, negative ones that they have a more favorable view of the conventional investment. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments. Detailed variable descriptions are in Table A.3.

	Mean Values		**Mann–Whitney U test**
	LowImpact (n=59)	HighImpact (n=59)	(HighImpact = LowImpact)
Experimental Results			
WTP (€)	48.38	49.64	p=0.767
WTP/Impact (€/tCO_2)	96.76	9.93	p<0.001
Sustainable investment preference (%)	96.61	98.31	p<0.999
Post-experiment Survey Results			
Risk expectations [-10,10]	0.678	0.593	p=0.991
Return expectations [-10,10]	0.169	0.254	p=0.952
Positive emotions [-10,10]	7.797	6.864	p=0.209
Perceived investment impact [-10,10]	3.898	5.085	p=0.314
General relevance impact [-10,10]	6.158	6.158	p=0.820
General relevance impact level [-10,10]	5.763	4.746	p=0.182
Estimated cost of saving CO_2 (€/tCO_2)	404.57	291.47	p=0.258

insensitivity to impact. This finding foreshadows one important implication—namely, that investor training and the building up of experience may not be sufficient to address the problems that come with the observed insensitivity to impact.

4.2 Does Comparability Increase Investors' Sensitivity to Impact?

The choice investors face in our main experiment corresponds to one that many retail investors face when their bank advisor offers them a binary choice between a conventional and a sustainable investment product. However, this may not necessarily correspond to the choice faced by more experienced investors, who can evaluate a broader set of investment options. As demonstrated by Hartzmark and Sussman (2019), these investors may consider information sources like the Morningstar Sustainability Rating, which allows them to compare a range of different investment options.

Research in psychology has shown that, under joint evaluation—that is, if there are alternative options that allow a relative comparison—individuals' evaluations tend to be more sensitive to quantitative attributes of a good (Hsee, Loewenstein, Blount, and Bazerman, 1999). Thus, investors' WTP may be more sensitive to impact in a joint evaluation setting.

To investigate the importance of relative comparison, we run our experiment in a joint evaluation setup. Investors receive information on three investments: Fund A has zero impact, Fund B has a comparatively low level of impact, and Fund C has a substantially higher level of impact. Figure 6 illustrates the experimental procedure of our joint evaluation extension. We divide investors into two treatments, which we denote as the HighImpactRange treatment and the LowImpactRange treatment. In the HighImpactRange treatment, Fund B saves 0.5 tCO_2 and Fund C saves 5 tCO_2. This corresponds to the impact values of the two treatments in our main experiment. In the LowImpactRange treatment, Fund B only saves 0.05 tCO_2 and Fund C only saves 0.5 tCO_2. Again, for each treatment we translate this impact into more intuitively comprehensible units, as shown in Figure 7 for the treatment HighImpactRange.

For each investor, we assess the WTP for Fund B and for Fund C one after the other relative to Fund A, using the same procedure as in the main experiment. Hence, once one WTP is

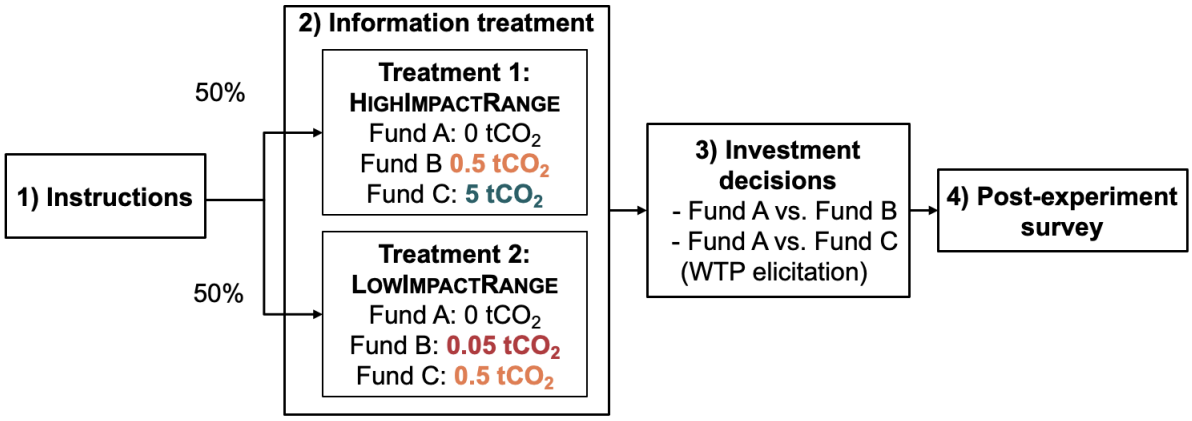


Figure 6. Experimental procedure of the joint evaluation extension. This figure provides an illustration of the experimental procedure we use in the joint evaluation extension of our main experiment.

determined, the participant goes through the same mechanism again with the other sustainable investment in comparison to Fund A. During both WTP elicitations, investors always see the information on all three investments as illustrated in Figure 7. We randomize the order in which we elicit the WTP for the two sustainable investments—that is to say, whether we first elicit the WTP for Fund B or for Fund C.

We run the experiment with 219 additional investors from the same recruitment campaign that we used for the main experiment. We exclude 11 investors who do not agree that climate change is a serious problem and 11 who explicitly disagree with the detected WTP and are unwilling to repeat the investment decisions. This results in a final sample of 197 investors.

The findings of the joint evaluation extension show that increased comparability leads to some sensitivity of investors' WTP to the impact of investments (Figure 8). The results of the HIGHIMPACTRANGE treatment, in which investors see the same sustainable investments we use in our main experiment, provide evidence that increased comparability leads to a significant difference in WTP between the two sustainable investments ($p < 0.001$, Wilcoxon signed-rank test). The

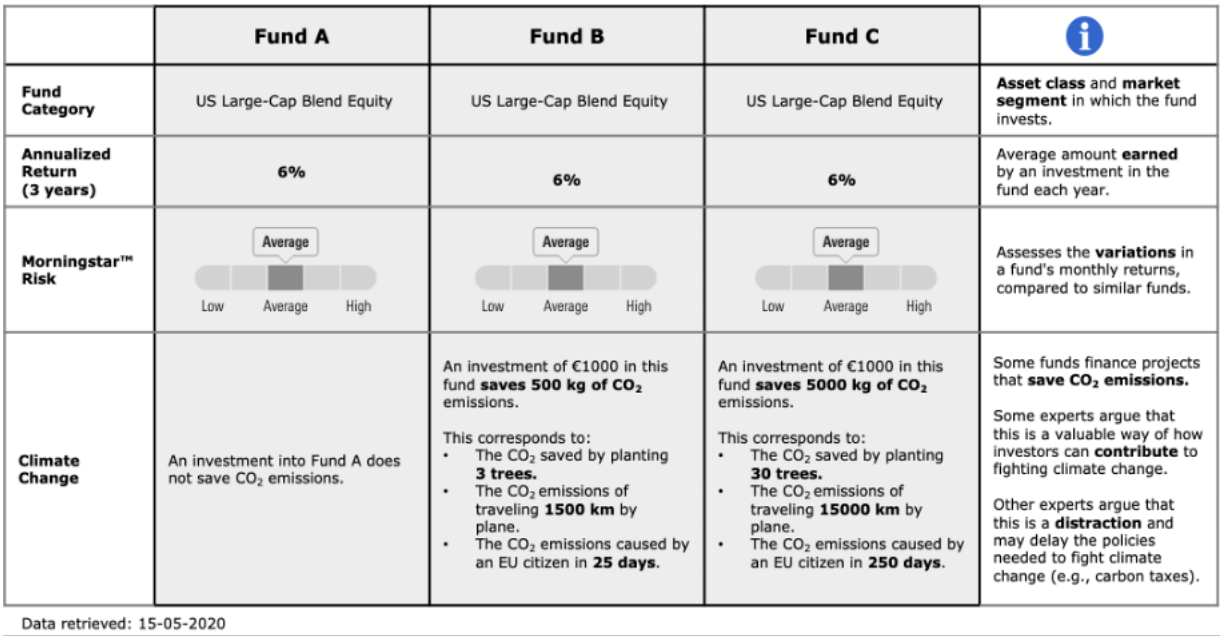


Figure 7. Screenshot of the investment information in the joint evaluation extension. This figure provides an example of the information the investors receive with regard to the three investments in the joint evaluation extension of our experiment. The screenshot corresponds to the investment information investors in the HIGHIMPACTRANGE treatment receive. The investment information investors in the LOWIMPACTRANGE treatment receive can be found in Figure A.5.

mean WTP is €31.09 for the sustainable investment that saves 0.5 tCO_2 and €40.07 for the sustainable investment that saves 5 tCO_2. While this hints to sensitivity to impact in the case of directly and easily comparable option, this sensitivity remains limited: an increase in impact by a factor of 10 increases investors' WTP by only 28 percent. Thus, the value investors assign to a unit of impact remains inconsistent; there is a significant difference in the WTP per unit of impact between the two available sustainable investments ($p < 0.001$, Wilcoxon signed-rank test).

The results in the LOWIMPACTRANGE treatment are of similar magnitude: investors' WTP for the sustainable investment that saves 0.05 tCO_2 is €28.01; the figure is €36.89 for the investment that saves 0.5 tCO_2. Despite the 10-fold difference in impact, we find no significant difference

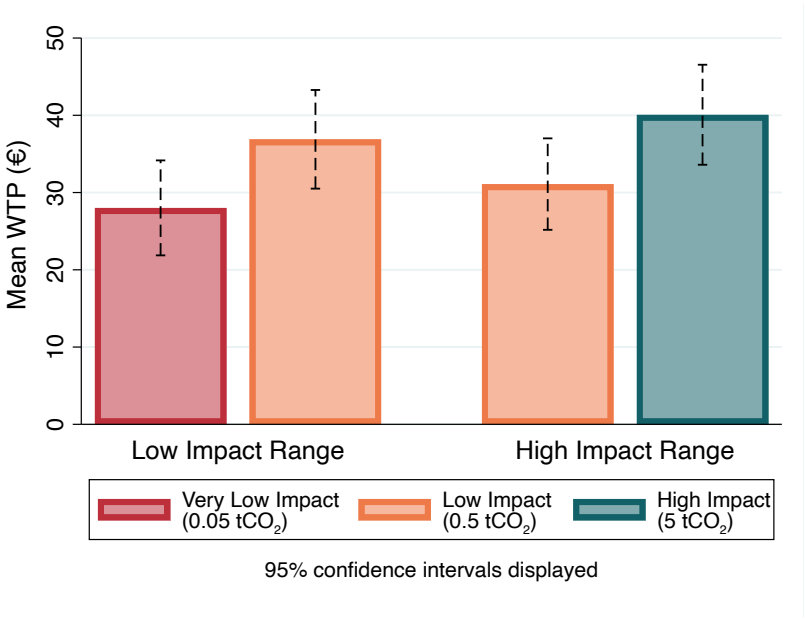


Figure 8. The effect of joint evaluation on private investors' response to impact. This figure shows the results of our experiment investigating how increased comparability affects the response of private investors' WTP to the impact of investments. The graph illustrates the mean WTP for the sustainable investments, by the investment's impact and treatment group.

if we compare the WTP for the more impactful sustainable investments (Fund A) between the HighImpactRange and the LowImpactRange treatment ($p=0.394$, Mann–Whitney U test). There is also no significant difference if we compare the WTP for the two investments with a lower impact (Fund B) between the HighImpactRange and the LowImpactRange treatment ($p=0.273$, Mann–Whitney U test).

Taken together, these results demonstrate that increased comparability leads to some level of sensitivity to the impact of available investment options. However, even with options to compare, investors' WTP for sustainable investments is still far from proportional to the impact of these investments. In our case, a clearly visible ten-fold increase in impact leads to approx. 30% higher WTP. Further, the range of impact of the available investment options—so, how much impact the

most and the least impactful investments have—strongly influences investors' WTP per unit of impact. This indicates that investors evaluate the impact of investments relative to other available options. As a consequence, investors' WTP strongly depends on the choice set.

4.3 Is investors' valuation of impact driven by emotion rather than calculation?

A third potential explanation for investors' insensitivity to impact is that their valuation is driven by the emotional experience of choosing the sustainable option rather than a calculation of the impacts that this choice generates. This idea is in accordance with models of "warm glow", where individuals' utility is unrelated to the level of the public good, but is related instead to an emotional response that comes from the pro-social act itself (Andreoni, 1989, 1990). Further, Hsee and Rottenstreich (2004) argue that when individuals value a good's characteristic based on emotional perception rather than calculative appraisal, their WTP tends to be a step function of the characteristic. They show, for example, that the willingness to donate money to save panda bears depends on the emotional importance of panda bears in general, not on the number of panda bears that will be saved. Applying this to our context, the emotional response to choosing a sustainable investment could explain the WTP for this sustainable investments.

Our post-experimental survey shows that choosing a sustainable investment feels good to investors (Table 5). We ask investors how good it feels to invest in the sustainable investment compared to in the non-sustainable one. Both private investors and impact investors report that it feels better to invest in the sustainable investment ($p<0.001$, Mann–Whitney U test). The impact investors report a higher level of positive emotions as a consequence of choosing the sustainable investment than do the private investors ($p=0.005$, Mann–Whitney U test). However, for both

private investors and impact investors the investment's impact does not affect these positive emotions. There is no significant difference in the reported positive emotions between HIGHIMPACT and LOWIMPACT for both samples. If these emotions drive investors' WTP for sustainable investments, it would explain why there is no difference in the WTP between the treatments.

Table 5
Positive emotions associated with investing sustainably

This table presents the self-stated emotions investors experience when choosing the sustainable investment, per treatment, and investor sample. Positive emotions are denoted on a scale of -10 to 10, where positive values indicate that it feels better for investors to choose the sustainable investment, and negative values that it feels better to choose the conventional investment. The first two columns report mean values of the self-stated positive emotions, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Positive Emotions [-10,10]		**Mann–Whitney U test**
	LOWIMPACT	HIGHIMPACT	(HIGHIMPACT = LOWIMPACT)
Private Investors	6.1	6.5	p=0.121
Impact Investors	7.8	6.9	p=0.209

Further, we show that investors' valuation of a unit of impact increases with positive emotions, but not with their cost estimate for a unit of impact. In Table 6, we regress investors' WTP per ton of CO_2 on the level of positive emotions investors experience and their estimate on the cost of saving a ton of CO_2. We find that for both private investors and impact investors, the WTP per ton of CO_2 significantly correlates with the level of reported positive emotions, but not with investors' estimate on the cost of saving CO_2. Consistent with our previous findings, also the impact treatment has a highly significant effect on investors' valuation of a unit of impact. The regression results suggest that investors' valuation of impact is strongly influenced by emotions. At the same time, the results suggest that calculative appraisal, where investors determine their WTP by estimating what might be an appropriate price for the impact that is offered to them, does not play an important role.

Table 6
Emotions and cost estimates as drivers of WTP

Ordinary least squares (OLS) regression with the WTP per ton of CO_2 as the dependent variable. The independent variables are the level of self-stated positive emotions investors experience when choosing the sustainable investment, investors' estimates of the cost of saving a ton of CO_2 emissions, and a treatment dummy variable taking the value of 0 for the LowImpact treatment and 1 for the HighImpact treatment.

	Model 1 Private Investors	Model 2 Impact Investors
	(1) WTP/t CO_2	(2) WTP/t CO_2
Positive emotions	4.34***	3.41**
	(0.97)	(1.23)
Estimated cost	0.03	−0.01
	(0.03)	(0.01)
Treatment	−77.73***	−86.58***
	(7.14)	(8.92)
Constant	56.25***	74.92***
	(8.15)	(11.80)
R^2	0.42	0.49
Observations	195	117

***$p<0.001$, **$p<0.01$, *$p<0.05$

An emotional valuation mode seems a reasonable explanation not only for the result of our main experiment but also for the results of the extensions. Regarding the role of experience, experience is expected to lead to an improved calculative valuation as subjects have a better frame of reference for pricing impact. However, when WTP depends mainly on the level of positive emotions, greater precision in estimating costs may be irrelevant. Regarding the role of comparability, "relative" emotional valuation could explain why in joint evaluation, investors respond to differences in impact but not to the absolute level of impact. In a direct comparison, it is obvious which option offers greater impact, thus in a calculative valuation mode, the WTP for the better option is likely to be greater. However, this may also be true in an emotional valuation mode. As argued by Hsee and Rottenstreich (2004), given a choice of saving two or three panda bears, it is easy to see that there is an emotional discount when saving only two pandas. In other words, the emotional response to the options may differ be-

cause the comparison provides a cue for which option is better. Along the same lines, Ferguson and Flynn (2016) propose a model of relative warm glow in which the warm glow individuals derive from choosing an option depends on how "good" this option is relative to other options in a given choice set. Such "relative" emotional valuation could explain why, in the joint evaluation setting, we see some response to differences in impact within each of our two choice sets, while investors' WTP does not significantly differ between the two choice sets, which differ greatly in the absolute level of impact.

Thus, the best explanation for our results throughout the paper is that investors' WTP for sustainable investments is driven by emotional experience or warm glow. Investors care about impact as a defining feature of sustainable investments since they have a substantial WTP for investments with impact. Yet they do not behave like consequentialists, and their behavior is hard to reconcile with decision models that rest on a calculative approach to pricing impact. On this basis, we suggest viewing pro-social investors as warm glow optimizers. In this view, pro-social investors are willing to pay for sustainable investments, but the amount they are willing to pay is determined by the emotional experience of choosing a sustainable investment rather than the actual impact of that investment.

5 Implications

A key implication of our results is that there may be incentives for greenwashing, or impact washing,[18] in the market for sustainable investment products. With an estimated size of USD 30 trillion assets under management (GSIA, 2019), the market for sustainable investment products

[18] Busch, Bruce-Clark, Derwall, Eccles, Hebb, Hoepner, Klein, Krueger, Paetzold, Scholtens, and Weber (2021) define impact-washing as "the dilution of the term impact investing using the term impact as a marketing tool to attract capital or boost reputations without actually focusing on material solutions to environmental and societal challenges."

is already substantial, and it is set to grow further. Assuming that sustainable investments may help to reduce negative externalities in the real economy, this rapid growth is promising.

However, our results illustrate that investors do not incorporate a sustainable investment product's actual impact in their WTP for that product. Instead, it appears they have a substantial WTP for the emotional warm glow that comes from choosing a sustainable investment. Assuming that impact is costly,[19] this creates an incentive for financial institutions to create products that optimize warm glow rather than impact. Furthermore, products may be marketed strategically in such a way that a sustainable product with relatively modest impact is presented as the best option in a given choice set. This would enable financial institutions to collect investors' WTP for sustainable investments, while avoiding the costs of creating investment products with substantial positive impact. In fact, studies examining the holdings of institutional investors find that the difference in the holdings between conventional and sustainable portfolios is minimal (Gibson, Glossner, Krueger, Matos, and Steffen, 2019). Although these are institutional investors, this is consistent with our finding that investors are satisfied with products that are marginally more sustainable than the baseline. Such investor behavior could result in a market for sustainable investment products that benefits investors in terms of warm glow and financial institutions in terms of fees, but falls well short of fulfilling its potential for solving important societal problems such as curbing carbon emissions to combat climate change.

Our findings also challenge an important assumption in the literature on asset pricing and sustainable finance. Several theoretical papers present models that explore the consequences of pro-social investors for asset prices (Oehmke and Opp, 2019; Broccardo, Hart, and Zingales, 2020; Fama and French, 2007). These models suggest that pro-social investors shift asset prices,

[19]Several economic models imply that pro-social investors need to accept lower financial performance in order to have impact (Oehmke and Opp, 2019; Heinkel, Kraus, and Zechner, 2001; Pástor, Stambaugh, and Taylor, 2021). In addition, there are additional requirements for data and expertise that are likely to add to product costs and fees.

and reward firms that reduce negative externalities with a lower cost of capital. An important assumption in these models, embedded in the utility function of investors, is that pro-social investors optimize between the cost and the impact of sustainable investment opportunities.

We find that such an assumption may be problematic. We suggest that rather than optimizing for impact, pro-social investors optimize for warm glow, which in turn depends on the way in which investment options are presented and marketed to them. As a consequence, the predictions of these models may be overly optimistic regarding the effect of pro-social preferences on asset prices and externalities. Rather than rewarding firms that effectively reduce negative externalities, investors with pro-social preferences may be rewarding financial intermediaries that design and market products that offer warm glow. Exploring the consequences of warm glow optimization for models that link pro-social preferences to asset prices is therefore an important avenue for future research.

On the bright side, our results provide cues for regulators that want to harness the growth of sustainable finance to tackle societal challenges. The high WTP we show for financial products with impact indicates that pro-social investors offer substantial potential with regard to mobilizing capital to address such challenges. To effectively tap this potential, however, regulators need to connect this WTP for sustainable investments to relevant outcomes. Our results suggest that investors with pro-social preferences have the greatest WTP for options that have the greatest impact in a given choice set. This is in line with the observation made by Hartzmark and Sussman (2019), who find that by far the strongest inflows are into funds that attain the maximum of five "globes" in Morningstar's Sustainability Rating for mutual funds. Thus, ensuring that investors can compare the impact of investments may help to realign investors' WTP for sustainable investments to real-world outcomes. A promising way of doing this could be by promoting impact labels or ratings for investment products. In Europe, a number of labeling initiatives to this end are already

established, and our results underscore the fundamental importance of such efforts.[20] In the US, however, there is currently no established label for sustainable investment products.

However, while we show that, from among several options available for comparison, investors prefer products with superior impact, we also reveal that investors do not consider how large each option's impact is on an absolute scale. Our findings demonstrate that investors have a substantial WTP even for investments with a rather modest impact if these are the most impactful investments at hand. Investors seem not to be in a position to judge whether the best option available offers meaningful impact in an absolute sense. Thus, regulators should also ensure that impact labels and ratings are aligned with societal goals, by ensuring, for example, that a product receiving a high score in a climate rating is actually aligned with limiting global warming to 1.5° Celsius, the international goal agreed at the Paris climate summit in 2015.

Another potential solution arises from the comparison between our results and those of Bonnefon, Landier, Sastry, and Thesmar (2019) and Brodback, Günster, and Pouget (2020). In their experiments, it appears that investors consistently value impacts if these are expressed in monetary terms. Of course, monetizing environmental and social impacts is difficult and the typical ESG product is far from providing such a figure. However, efforts to provide such figures are underway.[21] Equipped with monetized impact measurements, investors may indeed one day behave as consequentialists who adjust their WTP to the level of impact that a product offers to them.

[20] There are eight different sustainability labels provided by NGOs for funds in Europe; there is the Morningstar Sustainability Rating, described in Hartzmark and Sussman (2019); and there is an ongoing effort by the European Union to develop an "ecolabel" for sustainable investment products.

[21] See, e.g., https://www.hbs.edu/impact-weighted-accounts/Pages/default.aspx

6 Conclusion

We present evidence that investors' willingness-to-pay for sustainable investments is largely independent of the real-world impact of such investments. We arrive at this result for both experienced private investors and dedicated high-net-worth impact investors. Being able to exclude a series of alternative explanations, we suggest that pro-social investors are best understood as warm glow optimizers who prefer investments that feel good rather than as consequentialists who derive utility from optimizing their real-world impact.

Our findings have important implications for modeling investors' pro-social preferences in asset pricing and for policy makers who want to harness the growing demand for sustainable investments in order to support societal goals. Current theoretical models routinely assume pro-social investors to be consequentialists. Incorporating the importance of warm glow for decision-making might affect these models' conclusions. For policy makers, our findings indicate a risk of greenwashing by providers of financial products and a potential equilibrium of "light green" products. This is particularly relevant against the backdrop of achieving internationally agreed sustainability goals, and given the fact that we observe our results even for experienced and dedicated impact investors.

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A Appendix

A.1 Detailed Procedure WTP Elicitation and Incentivization

A.1.1 WTP Elicitation

We elicit investors' WTP for the sustainable investment through a series of seven binary choices between Fund A and Fund B. In the first choice, both Funds A and B feature an up-front fee of €10, which will be deducted from the €1000 investment. This first choice reveals which investment option investors prefer if fees are equal. For the sake of explaining the procedure, assume an investor initially chooses Fund A, and that this is the sustainable option.[22] In the next step, we add €40 to the fee for Fund A, so that the investor now has the choice between Fund A with a fee of €50, and Fund B with a fee of €10. If an investor switches to Fund B under these conditions, we deduct €20 from the fee for Fund A in the following choice. In this case, the investor now faces a choice between Fund A with a fee of €30, and Fund B with a fee of €10. If, rather, an investor still prefers Fund A, we add another €20 to the fee for Fund A in the following choice, so that the investor has the choice between Fund A with a fee of €70, and Fund B with a fee of €10. We repeat this procedure over four additional choices, dividing the amount we deduct from or add to the fee for Fund A by a factor of two in each consecutive round. During each choice, all information on the two investments is visible to the investors.

After these seven choices, we calculate the midpoint between the highest fee the investor is willing to accept for Fund A and the lowest fee for Fund A, at which the investor decided to switch to Fund B. We calculate the investor's WTP for Fund A as this midpoint minus the baseline fee of

[22] Note that we randomize whether Fund A or Fund B corresponds to the sustainable investment, to avoid ordering effects.

€10. For investors that prefer Fund B in the initial choice, we proceed accordingly by varying the fees for Fund B. If that is the investment without impact, we elicit the WTP for this investment in the same way as described above, but we use the negative of this value as the investor's WTP for the sustainable investment. This procedure allows us to measure WTP values ranging from €-78.125 to €+78.125 with a precision of €1.25.

A.1.2 Incentivization

After we have elicited each participant's stated WTP for his or her preferred investment we draw a random amount between the highest and lowest WTP that we can detect with our design, that is, between €-78.125 and €+78.125. If this random amount is smaller than the elicited WTP, we invest €1,000 in the investor's chosen investment, deducting the randomly drawn amount. If the random amount is larger than or equal to the elicited WTP, we invest €1,000 in the other investment, as is standard in the BDM mechanism. This is to ensure that investors have no incentive to deviate from their true preferences (Becker, Degroot, and Marschak, 1964).

A.1.3 Impact Realization

We realize the impact component of the selected investment by purchasing the corresponding amount of carbon credits from a verified greenhouse gas emission reduction project. Such projects save greenhouse gas emissions, which are measured in tons of CO_2 equivalents, according to standardized methodologies (e.g., as defined by the Verified Carbon Standard or the Gold Standard). All emission savings are verified by an independent third party. As it has been questioned in various cases whether investments into emission reduction projects lead to the claimed emission savings (Alexeew, Bergset, Meyer, Petersen, Schneider, and Unger, 2010), we

implement our emission savings with a project that avoids methane emissions from organic waste treatment in Vietnam.[23] In a report commissioned by the European Commission, Cames, Harthan, Füssler, Lazarus, Lee, Erickson, and Spalding-Fecher (2016) conclude that, as opposed to other project types, methane reduction projects are highly likely to cause the claimed emission reductions.

Table A.1
Main results, excluding investors who fail the comprehension quizzes

This table presents private investors' absolute and relative WTP for the sustainable fund, as elicited in the main experiment, but excluding investors who twice fail in at least one of the two quizzes that test their comprehension of the information that is provided to them. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact (n=91)	HighImpact (n=94)	(HighImpact = LowImpact)
WTP (€)	42.66	48.77	p=0.383
WTP/Impact (€/tCO_2)	85.32	9.75	p=0.001

Table A.2
Main results excluding investors with censored WTPs

This table presents private investor's absolute and relative WTP for the sustainable investment, as elicited in the main experiment, excluding investors with censored WTP. Investors' WTP is censored if they do not deviate from the initially preferred investment in all seven investment choices. We cannot elicit the WTP directly for the choices of these investors. We additionally ask these investors to state their WTP for the sustainable investment. These stated values are excluded in the results presented in this table. For each treatment group, the mean WTP is lower when excluding investors with censored WTPs, reflecting the right-skewed distribution of elicited WTP. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact (n=81)	HighImpact (n=74)	(HighImpact = LowImpact)
WTP (€)	30.24	28.22	p=0.903
WTP/Impact (€/tCO_2)	60.48	5.64	p=0.001

[23] For more detailed information on the project, see https://market.southpole.com/home/offset-emissions/project-details/71.

Table A.3
Definition of variables elicited in the post-experiment survey

This table shows the definitions and measurement of the variables we elicit in our post-experiment survey.

Variable	Measure
Risk expectations	Answer to the question "How do you expect that Fund A and Fund B compare in terms of risk?" on a 5-point scale from "It feels much better to invest in Fund A" to "Investing in Fund B is much riskier." Values are normalized to a scale from -10 to 10, where positive values indicate that investors expect the sustainable investment to be less risky, and negative ones that they expect the conventional investment to be less risky.
Return expectations	Answer to the question "How do you expect that Fund A and Fund B compare in terms of return?" on a 5-point scale from "Fund A will deliver a much higher return" to "Fund B will deliver a much higher return." Values are normalized to a scale from -10 to 10, where positive values indicate that investors expect the sustainable investment to deliver higher returns, and negative ones that they expect the conventional investment to deliver higher returns.
Positive emotions	Answer to the question "How do Fund A and Fund B compare in terms of how it feels to invest in the fund?" on a 5-point scale from "It feels much better to invest in Fund A" to "It feels much better to invest in Fund B." Values are normalized to a scale from -10 to 10, where positive values indicate that it feels better for investors to choose the sustainable investment, and negative values that it feels better to choose the conventional investment.
Perceived investment impact	Agreement with the statement "Investing in Fund [A,B] makes a relevant contribution to fighting climate change," on a 7-point Likert scale. Values are normalized to a scale from -10 to 10.
General relevance impact	Agreement with the statement "When investing, it is important to me whether I contribute to fighting climate change," on a 7-point Likert scale. Values are normalized to a scale from -10 to 10.
General relevance impact level	Agreement with the statement "When investing, it is important to me *how much* I contribute to fighting climate change," on a 7-point Likert scale, where [A,B] corresponds to the sustainable investment. Values are normalized to a scale from -10 to 10.
Estimated cost of saving 1,000 kg of CO_2	Answer to the question "What do you think: What are the average costs of saving 1,000 kg of CO_2 emissions (in €)?" To reduce the influence of extreme values, values are winsorized at the 5% and 95% levels.
Risk preferences	Answer the question "In general, how willing or unwilling are you to take risks?" on a 10-point scale (1 = "Completely unwilling to take risks." 10 = "Very willing to take risks"), according to the experimentally validated survey module by Falk, Becker, Dohmen, Huffman, and Sunde (2016).
Time preferences	Answer the question "How willing are you to give up something that is beneficial for you today in order to benefit more from that thing in the future?" on a 10-point scale (1 = "Completely unwilling." 10 = "Very willing to do so"), following Falk, Becker, Dohmen, Huffman, and Sunde (2016).
Altruism	Answer to the question "How do you assess your willingness to share with others without expecting anything in return?" on a 10-point scale (1 = "Completely unwilling to share." 10 = "Very willing to share"), following Falk, Becker, Dohmen, Huffman, and Sunde (2016).
Climate awareness	Agreement with the statement "Climate change is a serious problem that needs to be solved," on a 7-point Likert scale. Values are normalized to a scale from -10 to 10.
Female	The dummy variable Female takes the value of 1 if the investor states her gender as *Female* from among the options *Female*, *Male*, and *Other*, and zero if not.
Age	Investor's self-stated age.
Income	Self-reported annual household income, with options ranging from "less than €10,000" to "€200,000 or more," in steps of €5,000.
Net worth	Self-reported household net worth, with seven options ranging from "less than €50,000" to "more than €10 million."
Highest education	Self-reported highest degree or level of schooling the investor has completed.
Investment knowledge	Agreement with the statement "Compared to the average of the population, my investment knowledge is good," on a 7-point Likert scale (1 = "Strongly disagree." 7 = "Strongly agree"), following Dorn and Huberman (2005) and Riedl and Smeets (2017). Values are normalized to a scale from 0 to 10.

Table A.4
WTP before and after the onset of the COVID-19 crisis

This table reports the results of a preliminary version of our experiment, which we ran with students at Radboud University in September 2019, well before the emergence of SARS-CoV-2, as well as in September 2020. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact	HighImpact	(HighImpact = LowImpact)
September 2019			
N	159	152	
WTP (€)	27.64	29.82	$p=0.533$
WTP/Impact (€/tCO_2)	55.28	5.96	$p<0.001$
September 2020			
N	119	123	
WTP (€)	32.03	27.85	$p=0.262$
WTP/Impact (€/tCO_2)	64.04	5.57	$p<0.001$

Table A.5
Results for the impact investors during the pre-registration period

This table presents investors' absolute and relative WTP for the sustainable investment, as elicited in our experiment with the sample of impact investors, strictly following the pre-registered procedure and thereby excluding five investors who participated in the experiment starting more than three months after its launch. The first two columns report mean values of the variables, by impact treatment; the third column reports p-values of a Mann–Whitney U test, testing for differences between the two treatments.

	Mean Values		**Mann–Whitney U test**
	LowImpact ($n=56$)	HighImpact ($n=57$)	(HighImpact = LowImpact)
WTP (€)	48.79	49.45	$p=0.850$
WTP/Impact (€/tCO_2)	97.59	9.89	$p<0.001$

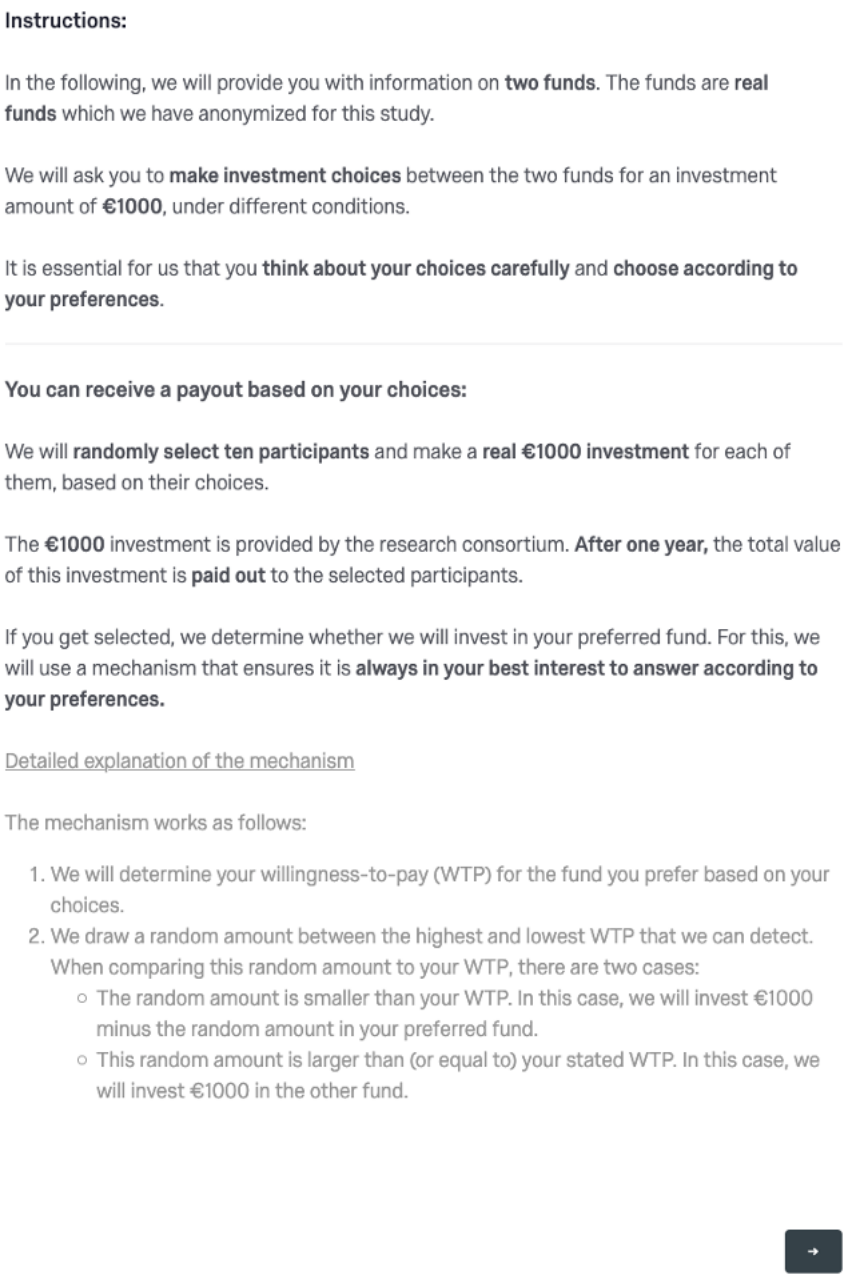


Figure A.1. Instructions. This figure shows a screenshot of the instructions that investors receive.

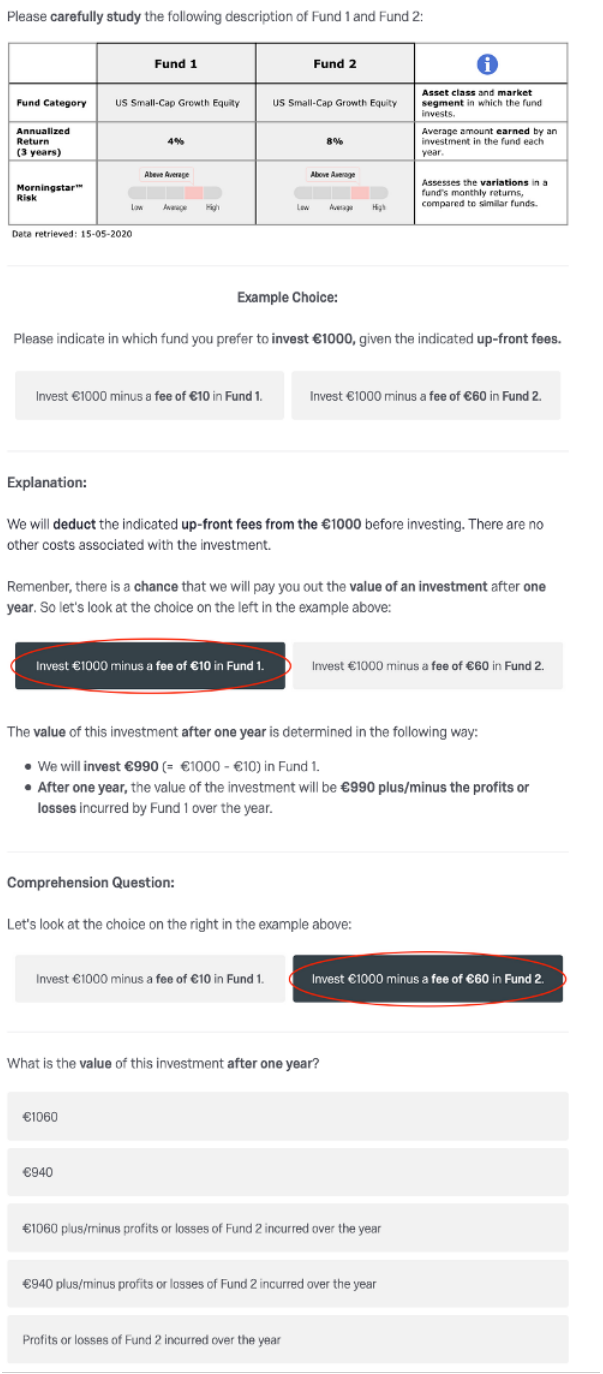
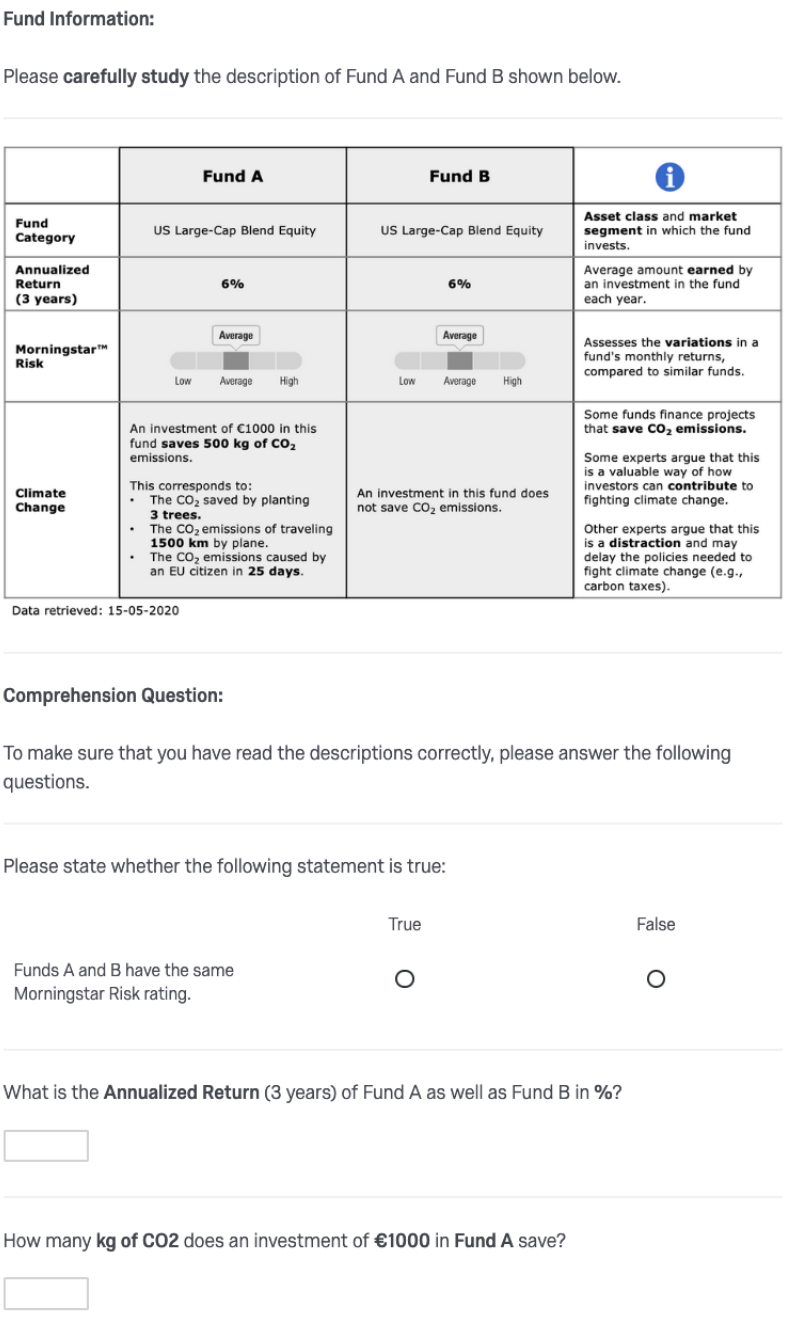


Figure A.2. Example choice. This figure shows a screenshot of the quiz investors take before the investment decisions.



Fund Information:

Please **carefully study** the description of Fund A and Fund B shown below.

	Fund A	Fund B	ℹ
Fund Category	US Large-Cap Blend Equity	US Large-Cap Blend Equity	**Asset class** and **market segment** in which the fund invests.
Annualized Return (3 years)	**6%**	**6%**	Average amount **earned** by an investment in the fund each year.
Morningstar™ Risk	Average Low Average High	Average Low Average High	Assesses the **variations** in a fund's monthly returns, compared to similar funds.
Climate Change	An investment of €1000 in this fund **saves 500 kg of CO_2** emissions. This corresponds to: • The CO_2 saved by planting **3 trees.** • The CO_2 emissions of traveling **1500 km** by plane. • The CO_2 emissions caused by an EU citizen in **25 days**.	An investment in this fund does not save CO_2 emissions.	Some funds finance projects that **save CO_2 emissions.** Some experts argue that this is a valuable way of how investors can **contribute** to fighting climate change. Other experts argue that this is a **distraction** and may delay the policies needed to fight climate change (e.g., carbon taxes).

Data retrieved: 15-05-2020

Comprehension Question:

To make sure that you have read the descriptions correctly, please answer the following questions.

Please state whether the following statement is true:

	True	False
Funds A and B have the same Morningstar Risk rating.	○	○

What is the **Annualized Return** (3 years) of Fund A as well as Fund B in **%**?

How many **kg of CO2** does an investment of **€1000** in **Fund A** save?

Figure A.3. Investment information and comprehension quiz. This figure provides a screenshot of the information the investors participating in our main experiment receive on the two investments if they are assigned to the LowImpact treatment, as well as of the comprehension quiz investors have to answer if they are to continue.

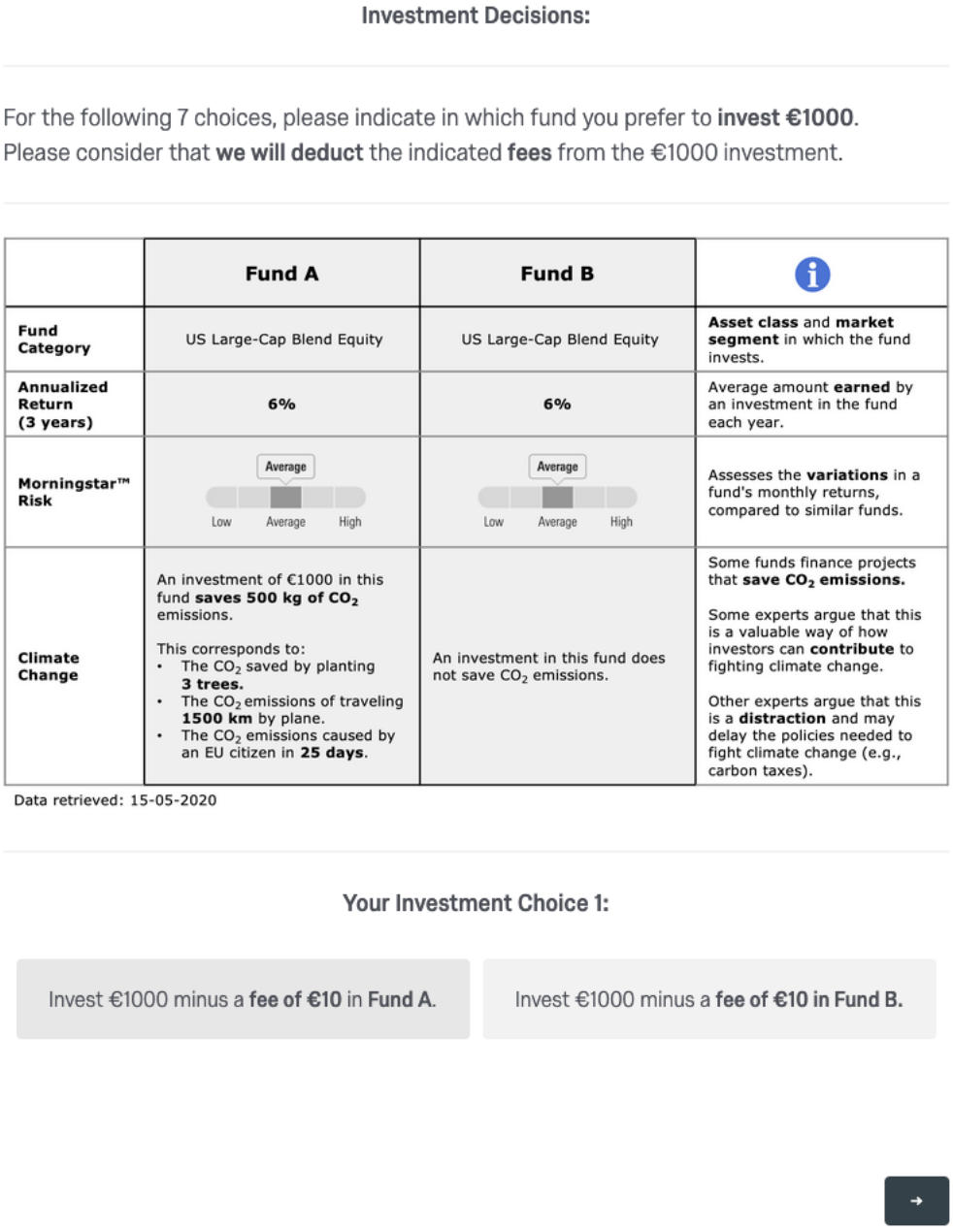
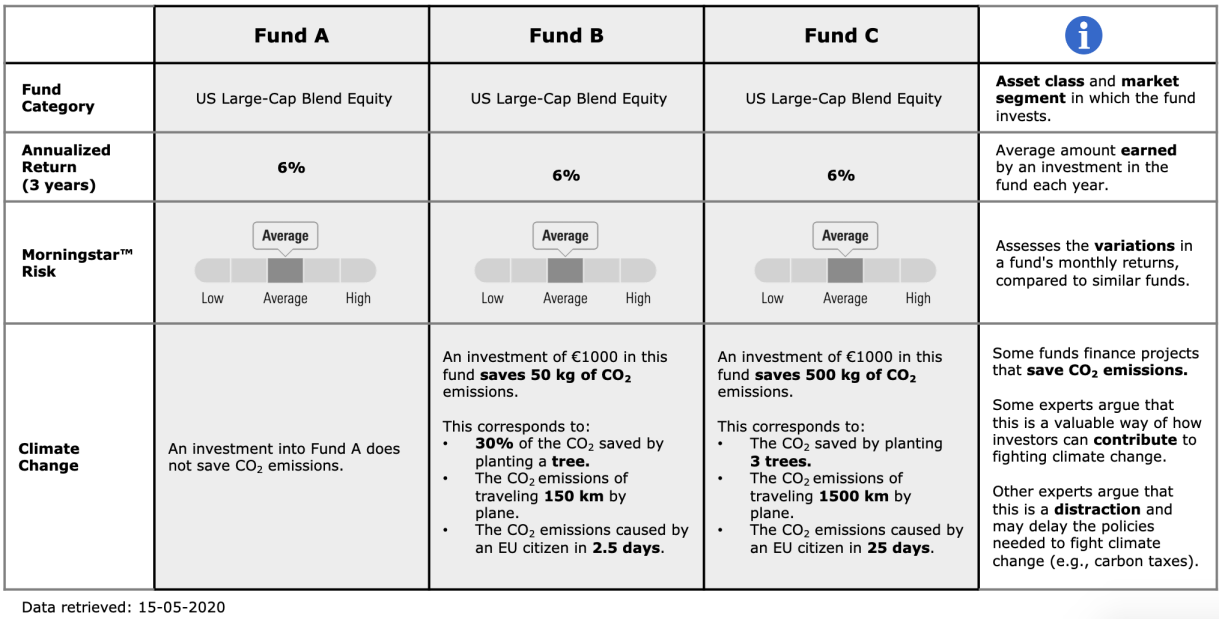


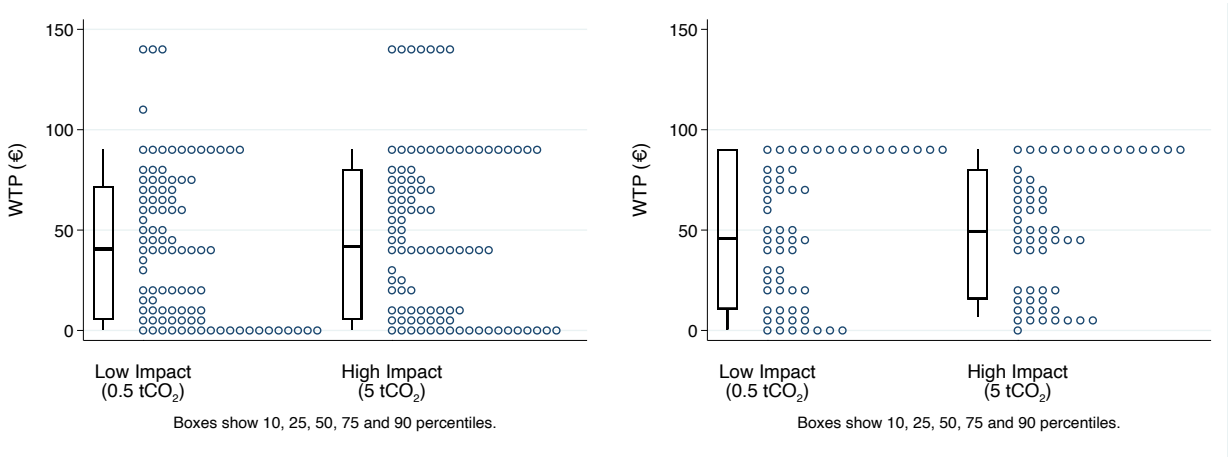
Figure A.4. Investment choice. This figure shows a screenshot that provides an example of the investment choices the investors face.



	Fund A	Fund B	Fund C	
Fund Category	US Large-Cap Blend Equity	US Large-Cap Blend Equity	US Large-Cap Blend Equity	**Asset class** and **market segment** in which the fund invests.
Annualized Return (3 years)	**6%**	**6%**	**6%**	Average amount **earned** by an investment in the fund each year.
Morningstar™ Risk	Average Low Average High	Average Low Average High	Average Low Average High	Assesses the **variations** in a fund's monthly returns, compared to similar funds.
Climate Change	An investment into Fund A does not save CO_2 emissions.	An investment of €1000 in this fund **saves 50 kg of CO_2** emissions. This corresponds to: • **30%** of the CO_2 saved by planting a **tree.** • The CO_2 emissions of traveling **150 km** by plane. • The CO_2 emissions caused by an EU citizen in **2.5 days**.	An investment of €1000 in this fund **saves 500 kg of CO_2** emissions. This corresponds to: • The CO_2 saved by planting **3 trees.** • The CO_2 emissions of traveling **1500 km** by plane. • The CO_2 emissions caused by an EU citizen in **25 days**.	Some funds finance projects that **save CO_2 emissions.** Some experts argue that this is a valuable way of how investors can **contribute** to fighting climate change. Other experts argue that this is a **distraction** and may delay the policies needed to fight climate change (e.g., carbon taxes).

Data retrieved: 15-05-2020

Figure A.5. Screenshot of the investment information in the joint evaluation extension. This figure provides an example of the information the investors receive in the joint evaluation extension of our experiment on the three investment options. The screenshot corresponds to the investment information investors in the LowImpactRange treatment receive.



Panel A: Private Investors

Panel B: Impact Investors

Figure A.6. Distribution of investors' WTP for sustainable investments. This figure shows the distribution of investors' WTP for the sustainable investments, as elicited in both our main experiment with private investors and in the experiment with impact investors, by impact treatment. Panel A: Private investors' WTP for the sustainable investment. Panel B: Impact investors' WTP for the sustainable investment.