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Alix Auzepy, Christina E. Bannier, Florian Gärtner

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Center for Financial Studies | Goethe University | Theodor-W.-Adorno-Platz 3 | 60323 Frankfurt am Main | Germany
| Phone +49 69 798 30050 | info-cfs@hof.uni-frankfurt.de | www.gfk-cfs.de

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Looking beyond ESG preferences: The role of sustainable finance literacy in sustainable investing

Alix Auzepy* Christina E. Bannier† Florian Gärtner‡

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Abstract

We assess how sustainable finance literacy affects people's sustainable investment behavior, using a pre-registered experiment. We find that an increase in sustainable finance literacy leads to a 4 to 5% increase in the probability of investing sustainably. This effect is moderated by sustainability preferences. In the absence of moderate sustainability preferences, any additional increase in sustainable finance literacy is at minimum irrelevant, and we find some evidence that it might even reduce sustainable investments. Our findings underscore the role of knowledge in shaping sustainable investment decisions, highlighting the importance of factors beyond sustainability preferences.

JEL Classification: G11, G18, G53

Keywords: Sustainable finance literacy, sustainable investments, behavioral finance, SFDR, MIFID

*University of Giessen, Licher Str. 62, 35394 Giessen, Germany. E-mail: Alix.Auzepy@wirtschaft.uni-giessen.de

†University of Giessen, Licher Str. 62, 35394 Giessen, Germany. E-mail: Christina.Bannier@wirtschaft.uni-giessen.de

‡University of Giessen, Licher Str. 66, 35394 Giessen, Germany. E-mail: Florian.Gärtner@wirtschaft.uni-giessen.de

1 Introduction

The number of sustainable investment products, i.e., products considering environmental, social and governance (ESG) factors in portfolio selection and management, has risen substantially in recent years (GSIA, 2021).[1] However, according to a study by the German Institute for Retirement Provision, there exists "widespread uncertainty about how retail investors understand and evaluate sustainable investments and how these affect their investment decisions in detail" (DIA, 2020).

While retail investors often express a clear preference for sustainable choices, sustainable finance products currently account for only a small portion of their portfolios (DIA, 2020). In surveys, investors frequently cite a lack of product transparency and insufficient knowledge as barriers to sustainable investing (DIA, 2020; Dumas and Louche, 2015; Friede et al., 2015; Gutsche and Zwergel, 2020; Phillips and Johnson, 2019). In fact, retail investors wanting to invest sustainably are often faced with complex and at times intransparent information. As a result, making sustainable investment decisions typically involves additional layers of information complexity that prevent these investors from being able to align their investment choices with their stated sustainability preferences (Filippini et al., 2023; Paetzold and Busch, 2014; Anderson and Robinson, 2021).

Financial decisions in general are largely influenced by specific knowledge and experience (Lusardi and Mitchell, 2014). Consequently, it is reasonable to infer that sustainable financial decisions require not only financial knowledge, but also a solid understanding of the sustainability criteria applied to corresponding financial products. For example, a person who has a comprehensive understanding of ESG is more likely to respond to ESG information and make investment decisions based on such information than someone who has never heard of the acronym. Following Filippini et al. (2023), we refer to this concept as "sustainable finance literacy", which these authors define as the "knowledge of regulations, norms, and standards about financial products that have sustainable characteristics". In this paper, we explore the effects of sustainable finance liter-

[1] In this paper, the terms "sustainable investments", "sustainable funds", "sustainable financial products", "ESG funds", "ESG financial products" etc. are all used synonymously. In addition, we use terms such as "sustainable investing", "ESG investing", "sustainable investment decisions" and "sustainable investment behavior" synonymously.

acy on sustainable investing. Motivated by the importance of preferences for investment decisions (Bauer et al., 2021; Brodback et al., 2019; Hong and Kostovetsky, 2012; Riedl and Smeets, 2017; von Wallis and Klein, 2014), we also examine the relationship between sustainability preferences and sustainable finance literacy, and their role in shaping sustainable investment behavior.

To investigate the causal effect of sustainable finance literacy on ESG investing, we run a pre-registered experiment with a large sample of German participants. We randomly assign our participants either to a treatment group, which receives a brochure with simple information on key aspects of sustainable investing, or to a control group, which does not receive any information. The information in the brochure focuses on three key dimensions: ESG criteria, sustainable investment strategies, and regulation of sustainable investments in the European Union (EU), and is thus consistent with Filippini et al. (2023)'s definition of sustainable finance literacy.

In the context of our experiment, participants in both treatments, i.e., the brochure treatment and the control treatment, have to make four investment decisions. For each round of investment decision, they have to choose one out of three funds from a given selection of sustainable and conventional funds. Investment decisions are incentivized by a bonus mechanism that leads to potential real payoffs for the participants. The funds to choose from are actual financial products. We present these funds using the web interface of a large direct bank offering retail banking products and services.[2] In addition to a variety of financial information, this web interface also provides sustainability information for each fund. Finally, we include several questions aimed at measuring not only sustainable finance literacy, but also other important factors influencing sustainable investment decisions, including financial literacy, economic and sustainability preferences, environmental literacy, and perceived impact (Lusardi and Mitchell, 2014; Falk et al., 2023; Anderson and Robinson, 2021; Heeb et al., 2022).

German retail investors are particularly well-suited to study the effects of sustainable finance literacy on investment decisions as they are directly impacted by the Sustainable Finance Disclosure Regulation (SFDR). This regulation, which applies to all financial firms that market their

[2]We use the interface of ING-DiBa AG, which is part of the Dutch ING Group.

financial products in the European Union (EU), classifies financial products such as mutual funds and exchange-traded funds (ETFs) according to the extent to which ESG objectives are pursued and promoted. This categorization is reviewed and enforced by the German Federal Financial Supervisory Authority (BaFin). One key objective of this regulation is to increase transparency of sustainable investment products and provide investors with additional ESG-related information. In our experiment, this regulation allows us to verifiably differentiate between conventional and ESG funds, which is necessary for the construction of our dependent variables.

Our analysis delivers the following key findings: First, we provide evidence that sustainable finance literacy plays a key role in shaping investment choices. Providing some basic information about ESG criteria and portfolio selection strategies can have a substantial effect on individuals' knowledge of sustainable products and, consequently, on their probability of engaging in such investments. As a starting point, we analyze the effect of our brochure treatment using three different model classes (simple, medium, complex), which incorporate different sets of control variables. We find that the total effect of the treatment is an increase in the probability of choosing a sustainable fund of around 9%. We examine this result further using a causal mediation analysis and find that 4 to 5% of this increase can be directly attributed to an increase in sustainable finance literacy. Similarly, we find that the brochure treatment increases the share of participants who claim to use ESG criteria in their investment decisions, for which around 12-14% can be directly attributed to an increase in sustainable finance literacy.

Second, we investigate the relationship between sustainability preferences and sustainable financial literacy and how both influence sustainable investment behavior. We show that sustainable financial literacy must be coupled with at least a moderate level of sustainability-oriented preferences to positively influence ESG investments. In the absence of moderate sustainability preferences, any additional increase in sustainable finance literacy is at minimum irrelevant, and we find some weak evidence that it might even reduce sustainable investments.

Finally, we show that for the participants who choose sustainable over conventional funds, an increase in sustainable finance knowledge increases the probability of investing in the more

sustainable fund out of two ESG funds. In particular, we find that participants who possess the required knowledge to distinguish "dark green" (SFDR Article 9) funds from "light green" (SFDR Article 8) funds have an around 12% increased probability to choose the dark green over the light green fund. This increase is again moderated by the level of ESG preferences. In other words, without at least a moderate level of sustainability preferences, sustainable investment behavior is not influenced by knowledge.

We take several measures to ensure the robustness of our findings. During the experiment, we control for the possibility of an experimenter demand effect (EDE). EDE refers to a phenomenon in experiments in which the subjects form beliefs about the experimental objectives and adapt their actions in the direction most congruent to such objectives (Zizzo, 2009). Therefore, we divide the treatment group into two different random subgroups: "High EDE" and "Low EDE". Each subgroup gets to read different statements about our expectations with regard to their investment behavior, i.e., "we expect that participants in the experiment who read these instructions will be less (more) likely to invest in sustainable funds than they normally would" (de Quidt et al., 2018). In contrast, the control group does not get any particular statement. We run several tests and provide evidence that our results are not driven by an EDE. Furthermore, we perform a battery of robustness checks and show that our baseline results are robust to alternative model specifications.

Our paper complements the nascent literature on sustainable finance literacy. So far, only one recent study by Filippini et al. (2023) has investigated the relationship between sustainable finance literacy and financial decisions. Using survey data from Switzerland, their analysis shows that sustainable finance literacy is relatively rare, but it nevertheless has an important influence on whether people own sustainable finance products. We build on this study in three different ways: First, we conduct an experiment in which participants not only indicate whether they own sustainable assets, but also have to make active investment decisions from a given selection of conventional and sustainable funds. Second, we are the first to provide causal evidence for the effect of sustainable finance literacy on investment behavior by exogenously increasing the level of sustainable finance literacy of one group of participants (treatment) relative to another group (control). Third,

we extend the set of questions proposed by Filippini et al. (2023) to measure sustainable finance literacy by formulating nine questions focusing on general (ESG criteria, sustainable investment strategies) and local (EU regulation) issues.

Our study also contributes to the growing stream of literature on the determinants of sustainable investing. Previous studies show that investors value sustainability and respond to corresponding information when making investment decisions (Hartzmark and Sussman, 2019; Ceccarelli et al., 2019). Several studies focus on institutional investors (e.g., pension funds) and discuss how such investors should align their investment practices with their clients' preferences (Bauer et al., 2021). However, the findings of such studies are not directly applicable to retail investors, who form a distinct subset of non-professional investors with distinct characteristics, motivations, and constraints.

Among prior studies that take the viewpoint of retail investors, Anderson and Robinson (2021) analyze Swedish households and find that households with stronger pro-environmental values do not necessarily hold greener portfolios. Briere and Ramelli (2021) observe that the offering of responsible investment options increases the propensity of left-wing and pro-social individual investors to invest in equity products due to a better alignment with their own personal values. Finally, Heeb et al. (2022) investigate the investment behavior of experienced private investors. They find that investors are willing to pay for sustainable investments, but that this willingness does not increase with the additional impact generated by such investments. Except for the aforementioned study by Filippini et al. (2023), these studies do not include an indicator of the knowledge of retail investors about sustainable finance products as an explanatory variable. Yet, as our results show, knowledge about sustainable financial products has a causal impact on financial decisions.

Another contribution of our paper is to provide and complement a comprehensive set of survey questions gathered from the existing literature on the determinants of ESG investments. Appendix B provides an overview of these questions and shows which thematic modules we complement. While several studies have examined different determinants of socially responsible investments (SRI) individually, our work attempts to systematically analyze all of these dimensions in the context of one single experiment. This allows us to truly narrow down the specific effect that

sustainable finance literacy plays in this context. More precisely, our study contains questions on risk, trust and time preferences developed by Falk et al. (2023), on financial literacy by Lusardi and Mitchell (2014), on financial experience by Gutsche and Zwergel (2020) and Anderson and Robinson (2021), on sustainable finance literacy by Filippini et al. (2023), on perceived impact by Heeb et al. (2022), on financial expectations with respect to ESG financial products by Riedl and Smeets (2017) and Bauer et al. (2021), and on environmental literacy by Anderson and Robinson (2021); Geiger and Holzhauer (2020); Zwickle and Jones (2018). All these factors provide complementary information and together contribute to a comprehensive understanding of sustainable investment decisions.

A final contribution is our proposed design of choice environment, which conveys a high degree of external validity to our experiment. There are some experiments studying sustainable investments in the laboratory (e.g., Barreda-Tarrazona et al. (2011), Bassen et al. (2018), Gutsche and Ziegler (2019), Heeb et al. (2022)), but these studies usually employ imaginary funds using stylized financial and sustainable features, which are designed for the purpose of the study. In contrast, our participants decide between funds that actually exist: We use screenshots of a real web interface of a large direct bank, and each fund conveys the information exactly as it is presented in the field. We also link bonus payments to the actual performance of these funds, including a time window of approximately half a year between the investment decision and the disbursement. While other experiments in prior literature have some of these features, to the best of our knowledge, our study is the only one that incorporates all of them. Thus, it simulates the actual decision with one of the highest degrees of credibility yet achieved in a laboratory or online experiment.

A key implication of our findings is that fostering sustainable choices and a "green" transformation goes beyond merely understanding investors' ESG preferences. In recent years, regulatory authorities have actively sought to channel capital flows towards green assets, for example by increasing disclosure and transparency of investment funds' ESG strategies. Such initiatives have been shown to have an impact on institutional investors (see e.g., Scherer and Hasaj (2023)). However, when considering retail investors, the success of such initiatives is dependent on investors'

capacity to not only understand their preferences, but also actively translate these preferences into appropriate investment decisions, an aspect that cannot be assumed as a given. In terms of practical implications, our paper therefore highlights the need for educational initiatives and information campaigns on sustainable investments.

Understanding what kind of knowledge and preferences lead individuals to invest in certain ways is important not only to academics but also to investment professionals who invest on behalf of individuals. This is particularly true in the EU, where the revised Markets in Financial Instruments Directive (MiFID) II now mandates investment professionals to gather information about clients' sustainability preferences and integrate such preferences into the investment process. It is therefore becoming increasingly important for institutional investors to understand the sustainability preferences of their clients. At the same time, such sustainability preferences are likely to be influenced by these clients' knowledge and understanding of sustainable investment products, highlighting the importance of understanding the linkages between sustainable finance literacy, sustainability preferences and investment behavior among retail investors.

The rest of this paper is organized as follows. Section 2 presents the theoretical background of our paper. Section 3 describes the study design and provides descriptive statistics. Section 4 presents the empirical results. Section 5 discusses the limitations and implications of our paper, and Section 6 concludes.

2 Literature background and brochure development

Sustainable investing is an investment approach that considers environmental, social and governance (ESG) criteria in portfolio selection and management (GSIA, 2021). Much of the recent literature explains the demand for sustainable investing as taste-based. Several theoretical models incorporate types of agents who derive utility from investing sustainably (Pástor et al., 2021; Pedersen et al., 2021; Oehmke and Opp, 2020), and a large body of empirical literature finds evidence for this family of explanations (e.g. Riedl and Smeets (2017); Hartzmark and Sussman (2019);

Barber et al. (2021); Bauer et al. (2021); Bofinger et al. (2022); Heeb et al. (2022)). However, this literature usually focuses on establishing a link between preferences and demand, while rarely investigating how this link is mediated, or under which conditions this relationship holds. In particular, while the number of sustainable investment products has grown rapidly in recent years, the literature on whether and how such products are understood and perceived by retail investors remains limited. Compared to institutional investors, retail investors often have fewer resources and less expertise at their disposal. Therefore, it is crucial to shed light on how retail investors engage with such products, given their inherent complexity.

There is little literature that investigates the role of literacy in the context of sustainable investments, which seems surprising given the important role of financial literacy in financial decision-making as a whole (Lusardi and Mitchell, 2014). Aristei and Gallo (2021) and Bethlendi et al. (2022) investigate the influence of financial literacy on sustainable investing and find a positive relationship. Bethlendi et al. (2022) find a similar result for green, or environmental, literacy. In contrast, Anderson and Robinson (2021) and Filippini et al. (2023) do not find any influence of environmental or sustainability literacy.

However, from a theoretical point of view, it is not quite clear why financial literacy or environmental literacy, i.e., knowledge about concepts such as inflation, compound interest, the influence of carbon dioxide on the earth's climate, or the natural habitat of polar bears (see Anderson and Robinson (2021)), should influence the tendency to invest sustainably, other than via a correlation with some other aspects of sustainable investing, such as preferences or specific knowledge. This is why Filippini et al. (2023) develop the concept of sustainable finance literacy, which is tailored to this specific knowledge, and defined as the "knowledge of regulations, norms, and standards about financial products that have sustainable characteristics." The authors find that this special knowledge, while in general not widespread among individuals, nonetheless predicts the probability of sustainable investing in an observational study in Switzerland. To measure sustainable finance literacy, the authors develop a set of eight questions that cover several topics, including the definition of ESG, rules and certifications of ESG products, the difference between sustainability

characteristics and ecology, and the difference between sustainable investing and impact investing.[3]

Our paper aims to provide evidence that there is a causal relationship between sustainable finance literacy and investment behavior. To this end, and in contrast to Filippini et al. (2023), we use an experiment. Our treatment consists of a short educational brochure with key information for retail investors based on the definition developed by Filippini et al. (2023). Specifically, the brochure is organized around three central dimensions: (1) the definition and components of ESG criteria, (2) the various investment strategies incorporating these criteria, and (3) the EU regulation governing such investments. A copy of the brochure can be found in Appendix C.[4] Several examples cited in the brochure also follow a book written by the Stiftung Warentest, a foundation originally established by the German Bundestag with the aim of giving guidance to consumers by providing impartial and objective information (Stiftung Warentest, 2021).

Following Filippini et al. (2023)'s definition, which emphasizes the importance of norms and standards, the first part of our brochure explains the acronym "ESG" and addresses the specific components that fall under each of the three pillars, which together contribute to the assessment of the sustainability "profile" of a company or stock. The second part of our brochure highlights how such ESG criteria are applied in various investment strategies. Examples of these strategies include "negative screens," which deliberately avoid investing in certain stocks that do not meet pre-defined criteria. Moreover, the brochure elaborates on alternative strategies such as the "best-in-class" screening. Unlike negative screening, this approach seeks to invest in companies that are industry leaders in sustainability, irrespective of whether the industry itself is inherently "green" (Gutsche and Ziegler, 2019). Consequently, the second part of the brochure also helps explain why some investment portfolios classified as sustainable may still include stocks of companies in industries that are not necessarily inherently environmentally-friendly. This is important because a lack of knowledge about the investment strategies underlying sustainable investments often leads to misconceptions about stock selection in these portfolios.

[3] As their study focuses on Swiss investors, several of their questions are framed to fit the Swiss context.

[4] Please note that the brochure in the appendix is an English translation. The original document used in the experiment was in German.

The third part of the brochure is dedicated to the regulation of such investment products in the EU. As highlighted by Filippini et al. (2023)'s definition of sustainable finance literacy, an understanding of regulations is crucial in the context of sustainable investing. This is particularly the case in the EU where the SFDR, which took effect in 2021, imposes a set of mandatory disclosure requirements on asset managers and other financial market participants.[5] An important aspect of this regulation is the classification of investment products according to three different categories: Article 6, Article 8 and Article 9 financial products (European Parliament and Council of the European Union, 2019). Each of these three categories comes with its own disclosure requirements, resulting in more ESG-related information for retail investors.

Article 6 funds do not have sustainable investment as their objective. Nevertheless, the incorporation of sustainability risks into investment decision-making and the impact of sustainability risks on the fund's returns must be described in the fund's pre-contractual disclosures (European Parliament and Council of the European Union, 2019). When a fund manager does not consider sustainability risks in the decision-making process, the disclosure should explain why, under the principle of "comply or explain". In contrast, Article 8 products (also referred to as "light green" funds) promote investments with environmental or social characteristics, or a combination of those characteristics, provided that the companies in which the investments are made follow good governance practices (European Parliament and Council of the European Union, 2019). While sustainable investment is not the primary objective of Article 8 products, it remains an aspect of the investment process. Finally, Article 9 products (also referred to as "dark green" funds) have a sustainable investment as their objective. In this context, a sustainable investment means an investment in an economic activity that contributes to an environmental objective, as measured, for example, by key resource efficiency indicators and greenhouse gas emissions, or an investment in an economic activity that contributes to a social objective, such as tackling inequality (European Parliament and Council of the European Union, 2019). Such products must also comply with

[5]This regulation also applies to all US financial firms that market their financial products in the EU. Thus, US companies that sell to EU-based clients or are domiciled in the EU must also adhere to SFDR requirements for each fund.

the "do no significant harm" principle by demonstrating that they do not in any way significantly harm any other important sustainability objectives. Furthermore, the investee companies also have to follow good governance practices with respect to management structures, employee relations, remuneration and tax compliance.

Taken together, the SFDR regulation results overall in an increase in ESG information available to retail investors, especially regarding the characteristics and strategies applied by these financial products.

In addition to our brochure, we create nine survey questions that aim to test and measure sustainable finance literacy. We divide these questions into two distinct categories, which we refer to as "global" and "local". Within the "global" category, we include five questions related to ESG considerations, as well as investment strategies that hold relevance across the globe. For instance, the incorporation of ESG criteria and the application of positive or negative screens for sustainable investments are practices embraced by investment firms worldwide, and are therefore not limited to only the EU. However, since regulations and norms about financial products differ between regulatory contexts, we argue, in line with Filippini et al. (2023) that sustainable finance literacy cannot be measured by relying only on questions that measure aspects that are identical across jurisdictions. Thus, we add questions centered around the regulatory context of the EU's SFDR. Specifically, we include in the "local" category four questions on issues related to the SFDR's Articles 6, 8 and 9, which are specific to the EU context.

We hypothesize that increasing sustainable finance literacy has two effects: First, we expect that increasing sustainable finance literacy increases the probability of investing sustainably (H1), as such knowledge allows to translate sustainable preferences into action. Second, based on the aforementioned literature on ESG preferences (Riedl and Smeets, 2017; Hartzmark and Sussman, 2019; Barber et al., 2021; Bauer et al., 2021; Bofinger et al., 2022; Heeb et al., 2022), we only expect this effect if combined with a sufficiently high level of sustainable preferences (H2). If participants do not have any sustainable preferences, the family of preference explanations for sustainable investing predicts no effect of sustainable finance literacy.

3 Study design

3.1 Brochure treatment and experimenter demand effect

We address the question of the relationship between sustainable finance literacy and investment behavior using a preregistered experimental procedure.[6] The experiment was conducted in June 2023 with a sample of 1,000 participants recruited from the Prolific platform. To ensure the relevance and contextual validity of the results, the experiment was carried out specifically in German and targeted German residents within the Prolific platform.

The treatment in our experimental setting is a brochure containing information on ESG criteria, sustainable investment strategies and the SFDR regulation. Participants are randomly assigned to either the treatment group, which gets to read this brochure, or the control group, which does not get to see the brochure. To ensure that the treatment group actually reads the brochure, the participants are required to remain on the appropriate page for at least three minutes before moving on to the next page of the experiment. The actual average time spent reading the brochure was 328 seconds, i.e., approximately 5.5 minutes. Our experimental procedure is displayed in Figure 1.

Insert Figure 1 here.

To increase the internal validity of our experiment, we control for the possibility of experimenter demand effects (EDE) and socially desirable responses in several ways. An experimenter demand effect refers to a phenomenon in experimental research in which survey participants unintentionally modify their behavior or responses based on cues and expectations they perceive from the experimenter or the experimental setting (Zizzo, 2009). To account for the possibility that participants may change their behavior to conform to what they believe we expect in the study, we divide our treatment group into three subgroups. This is represented by the black triangle in Figure 1.

[6]The experiment was preregistered with the American Economic Association (AEA). For preregistration details, see Auzepy et al. (2023), https://doi.org/10.1257/rct.11325-2.0.

The first pool is presented with a short introductory text prior to the investment decisions. The text reads as follows: "We expect that participants in the experiment who read these instructions will be less likely to invest in sustainable funds than they normally would." We refer to this subsample as the "Low EDE" treatment. The second pool receives the following sentence: "We expect that participants in the experiment who read these instructions will be more likely to invest in sustainable funds than they normally would." We call this subsample the "High EDE treatment". Finally, the last pool did not get to read any of these sentences.

By communicating these expectations, we aim to induce experimenter demand effects[7]. We test the presence of an EDE in several model specifications and robustness checks. In addition, we perform a mediation analysis, as described in Section 4.2.4, in order to isolate the effects of a change in sustainable finance literacy from other potential effects induced by the brochure, such as experimenter demand effects. This allows us to precisely disentangle the impact of the brochure on sustainable investment behavior via the sustainable finance literacy channel.

3.2 Investment decisions

Our experiment includes four rounds of investment decisions. In each round, the participants have to choose one out of three different funds or ETFs. These funds are real funds from actual asset management companies commonly known to German retail investors. Appendix C provides an overview of the different funds used in our experiment.

The information provided for each fund is taken directly from an online account of ING, Germany's largest direct bank, and therefore reflects the information that a retail investor would typically access online. The details presented for each fund follow a standard format and include the fund's provider, its name, a performance chart showing the fund's performance over the past year, the issuing company, Morningstar's risk rating, whether it distributes or reinvests gains, the currency used, the fund's size, costs and ongoing charges, its major holdings, its exposure to differ-

[7]This procedure follows de Quidt et al. (2018). These instructions are not deceiving. In other words, based on an experimenter demand argument, we *truly* expect participants whom we tell to invest more sustainably to actually invest more sustainably, and vice versa for the Low EDE group.

ent countries and industries. Additionally, the fund information includes the fund's SFDR article[8] and a textual description of the fund's investment strategy. Finally, participants have the option to download the fund's full fact sheet.

Based on the information provided, in each round the participants have to choose a single fund to invest 200 Euro. In the first three decisions, participants are given a choice between two conventional investments and one sustainable investment offered by the same asset management company per decision round (taken from the asset management firms of the three banking groups with large customer bases in Germany). The funds are not explicitly labeled as sustainable or conventional, but with sufficient knowledge, it is possible to infer this from the information provided (e.g. the fund's name, the SFRD article, and the description of the investment strategy). In the final round, participants have the choice between two sustainable investment options (SFDR Article 8 and Article 9) and one conventional investment option (SFDR Article 6). To ensure that the sustainable investments are objectively more sustainable than the conventional funds, we reviewed their Morningstar Sustainability Rating, Carbon Risk Score, and share of fossil fuel companies prior to selecting them. Furthermore, we made sure that the sustainable funds that we selected did not exhibit strikingly more favorable risk-return profiles or cost attributes compared to the conventional funds in order to maintain fairly comparable sets of funds for each round of investment decisions.

We use these investment decisions as one of our dependent variables in several model specifications, measuring the likelihood that participants choose sustainable over conventional investments. A description of this dependent variable is provided in Appendix B.

After each investment round, participants are asked to indicate which of the displayed pieces of information about the funds played a role in their investment decision. The participants can select specific aspects from a list of pre-defined criteria that we provide, or write additional criteria in a text box. Our pre-defined list of criteria is based on standard information available for all funds. For example, we ask the participants whether they considered the fund's provider, the fund's name, its

[8]At the time of the experiment, out of the largest German online investing platforms, the ING platform was one of the few that explicitly displayed the fund's SFDR article. This was another reason why we chose this particular platform for our experiment.

risk and return profile, past performance, size, top holdings, country exposure, industry exposure, and costs. We also ask whether sustainability-related information played a role in their decision. We use this information as a second dependent variable, which measures the conscious part in the decision-making process. Specifically, we measure the number of cases in which sustainability information was reported as one of the criteria for the investment decision after each investment round.

3.3 Incentives

In the initial phase, participants receive comprehensive instructions about the experiment, including information about their compensation. The compensation per participant is 4.50 pounds (about 5.20 euros). To increase data quality, compensation is only paid if participants answer two attention questions correctly. These attention questions are easy to identify, and we have provided clear instructions on how to answer them. If a participant answers both of these questions differently from the instructions, we reject the submission.[9]

In order to increase the chances of measuring actual investment behavior, we follow Heeb et al. (2022) as well as Bauer et al. (2022) and include a bonus payment, which every participant is also informed about before making the first investment decision. The bonus payment takes the form of a lottery. For 20 participants, we implement one randomly selected investment choice each. After half a year, we pay out the value of this investment to the selected participants. Since the payout is affected by both gains and losses, this makes the investment decisions more realistic and increases the stakes of the experiment.

The bonus calculation utilizes a simplified net return, representing the raw return earned by the fund minus the fund's ongoing costs for six months. For simplicity, other cost factors, such as performance fees and sales charges, are disregarded. For instance, if a selected fund achieved a 10.5% return by December 1, 2023, with ongoing expenses of 0.5%, the net return is 10%,

[9]This happened in only 5 cases. These participants do not count for our goal of 1,000 participants and are excluded from each analysis.

resulting in a bonus payment of 220 euros. Conversely, in the case of a loss of 9.3% and running costs of 0.7%, the net return would be -10%, leading to a 180 euro bonus. In our experiment, the maximum payout is capped at 300 euros. Additionally, a floor is established, guaranteeing a minimum payout of 100 euros even if the investment's value is lower on the cut-off date.

3.4 Survey questions and control variables

To complete our dataset, we collect additional data on the survey participants. First, we collect standard demographic data on age, gender, years of education, and household income. Due to the linkages between political views and sustainability preferences found in previous literature, we ask the participants for which party they would vote in a hypothetical upcoming general election. Anderson and Robinson (2021) measure pro-environmental attitudes using Green Party voting records. Briere and Ramelli (2021) report that responsible stock funds provide incentives for left-leaning individuals to increase their stock market participation given that such funds are more in line with their personal values.

Second, we collect data on other variables that are also likely to influence investment decisions. Specifically, we collect data on individual preferences, financial literacy, financial experience, environmental literacy, sustainable finance literacy, perceived impact, and expectations regarding sustainable investment products. We made the deliberate choice to rely on a large set of questions that have already been used and validated in previous literature. All questions discussed in this section are grouped into thematic modules summarized in Appendix B. In addition, this appendix also provides a detailed description of each variable derived from these questions.

Regarding individual preferences, we focus on two types of preferences: economic preferences related to risk, time, trust and altruism, and sustainability preferences. We measure economic preferences using the experimentally validated survey module introduced by Falk et al. (2023) and previously employed in related literature (see e.g., Heeb et al. (2022)). In total, we use five questions to determine how risk-averse the participants are, how much they discount time by preferring present rewards to future ones, and how willing they are to trust and share with others. Each of

these questions is on a 10-point scale. To further elicit intrinsic social preferences, the preference module uses the responder behavior in an ultimatum game.

In order to measure sustainability preferences, we use questions that are political in nature and involve implicit individual cost-benefit trade-offs. To this end, we select seven statements from the so-called Wahl-O-Mat, a publicly accessible online tool of the German Federal Agency for Civic Education ("Bundeszentrale für politische Bildung") that contains political statements from various political parties and is intended to help citizens understand how political parties align with their own preferences on various issues. We select a set of statements intended to measure environmental and social preferences in a German context. Participants can indicate how much they agree on a 5-point scale with statements about climate neutrality, the planned phase-out of coal-fired power generation, combustion engines, subsidies for organic farming, expansion of rail transportation, mandatory photovoltaic systems for new housing, and an increase in the minimum wage. Since the answers are not labeled with numbers, we code them as ranging from 0 to 4 for convenience. From these seven questions, we calculate the average and refer to this variable as the "ESG Pref Score".

To assess the financial literacy of the participants, we use the standard test developed by Lusardi and Mitchell (2014). Specifically, we employ their three core questions (often referred to as the "Big-3"), which assess the knowledge of interest rates, inflation, and portfolio diversification. Each question can be answered correctly or incorrectly. Following the literature (see e.g., Filippini et al. (2023)), we construct a financial literacy indicator by summing the correct answers given by the participants to each of the three questions. In addition, we ask them about their agreement with the statement developed by Riedl and Smeets (2017), "I often talk with other people about investments" to measure signaling effects. Furthermore, we try to capture the extent to which participants are financially active by measuring self-assessed investment experience. We also ask whether they make financial decisions for themselves or whether someone else does (Gutsche and Zwergel, 2020). Finally, to measure financial self-monitoring, we collect information on how often participants check their investment portfolio and in which financial products (e.g., stocks, savings

accounts) they are or were invested (Anderson and Robinson, 2021; Gutsche and Zwergel, 2020).

As shown by Anderson and Robinson (2021) and Filippini et al. (2023), it is also important to account for the environmental literacy of the participants, as it differs from both sustainability preferences and financial literacy. Thus, we ask five questions designed to capture households' knowledge about climate change and the environmental costs of different consumption choices. To this end, we begin with a question on the definition of sustainable development and sustainable forestry, which was developed by Zwickle and Jones (2018) and adopted by Filippini et al. (2023). We also add a question on energy use related to heating or cooling homes, proposed by Anderson and Robinson (2021). Finally, we add questions about carbon footprints (Geiger and Holzhauer, 2020) and the rise in global temperatures. Each question has several answers, out of which only one is right. We sum up the number of correct answers.

We follow Riedl and Smeets (2017) and elicit return expectations and risk perceptions regarding sustainable investment products compared to conventional investment products. We ask the participants how they assess the returns of sustainable investments compared to conventional investments on a scale that ranges from "much lower" and "somewhat lower", to "same", "somewhat higher" and "much higher". We then ask the same question about the risk of sustainable investments compared to conventional investments.

In addition to risk and return expectations, we account for the perceived impact of certain investment decisions. As shown in previous literature (Heeb et al., 2022), positive emotions derived from choosing sustainable investments are also an important driver of sustainable investing. To capture the extent to which participants perceive their investments as making a meaningful contribution to addressing societal challenges, we ask them after each of the four investment decisions to rate their investment in terms of perceived impact on a scale from 0 ("no contribution") to 5 ("very positive contribution"). In a separate question, we ask the participants which of the following dimensions are important to them, in general, when investing: returns, risk, environment, social, and governance. The participants can provide a response ranging from "not important" to "very important" for each dimension.

Finally, we take into account the perceived skepticism towards sustainable investments and ask the participants whether they think that "sustainable financial products are just greenwashing". Respondents can give an answer ranging from "strongly disagree" to "strongly agree".

4 Empirical specification and results

4.1 Does the brochure treatment increase sustainable finance literacy?

We start by analyzing whether the brochure is indeed successful in increasing sustainable finance literacy. As highlighted in Section 2, and in contrast to financial literacy, there is no established procedure to measure sustainable finance literacy so far. As a result, we adopt Filippini et al. (2023)'s definition of sustainable finance literacy and develop a set of nine questions that address general ESG considerations as well as more specific considerations that relate primarily to the EU's SFDR regulation. An overview of these questions can be found in Appendix B.

For the treatment to be effective, we expect the treatment group, which gets to read the brochure, to answer significantly more questions correctly than the control group, which does not get to see the brochure. In order to test this, we use the nine questions referred to above and add up the number of correct answers per participant in a sum index. Figure 2 shows that the median in the treatment group answers on average 6 out of 9 sustainable finance literacy questions correctly. In contrast, the median in the control group answers only 1 out of 9 questions correctly.

Insert Figure 2 here.

To determine whether the difference between the two groups is also statistically significant, we further investigate our results in an untabulated OLS regression analysis where we regress the sum index on the brochure treatment variable. The coefficient of the brochure treatment corresponds to 4 more correct answers, and is significant at the 1% level. In addition, the explanatory power of the brochure is high: The R^2 of this simple regression is 0.38. We conclude that the treatment effect

is both statistically and economically significant and substantially increases sustainable finance literacy.

Our analysis so far serves to show that the brochure treatment is effective and increases sustainable finance literacy in a significant way. This allows us to use the brochure treatment indicator as the main independent variable in the rest of our model specifications. To understand why this choice is most appropriate and why we should not resort to employing the sum index of sustainable finance literacy instead, we need to consider two distinct causes of heterogeneity in our participant group. First, participants are randomly assigned to either the treatment or the control group. As a result, the randomization determines for which participants we increase sustainable finance literacy. This creates a source of variation between the brochure treatment group and the control group which is typically referred to as "between variation". The second source of variation is the one that the participants *naturally* show, i.e., the differences that our participants display before they enter the experiment. This variation exists within each treatment group and is therefore referred to as the "within variation".

In our experiment, due to the randomization, the treatment and control groups are identical in expectation, i.e., the "within variation" is identical for both groups. What differs between the groups is the "between variation" induced by the treatment. As a result, by using the brochure treatment as the main independent variable in our analyses, we only use the "between variation" in sustainable finance literacy to explain differences in investment behavior. If we were to use the measured sustainable finance literacy instead, we would employ the total variation, which includes the within variation that we cannot control.

It should be noted that we also do not use sustainable finance literacy as a control variable in our analyses. We hypothesize that the treatment variable explains variation in sustainable investment behavior because it increases sustainable finance literacy, and sustainable finance literacy in turn leads to an increase in the probability of investing sustainably. Technically, this means that sustainable finance literacy is a mediator on the causal path from the treatment variable to the investment behavior variable. Thus, if we were to use sustainable finance literacy as a control

variable in our model specifications, the brochure treatment variable would no longer capture the "between variation" in sustainable finance literacy. Instead, it would only capture all differences between the control and treatment groups except for the differences in sustainable finance literacy. This approach would therefore not test any of our hypotheses. As a result, we do not use the sum index of sustainable finance literacy as an independent variable or control variable in the following model specifications, but instead employ the brochure treatment variable.

4.2 Effects of sustainable finance literacy and preferences on investment decisions

4.2.1 Sample and descriptive statistics

Tables 1, 2 and 3 present descriptive statistics for our sample, categorized by measurement scale (nominal plus ordinal; metric plus Likert >=10 scale points; and Likert =5 scale points, respectively). In this section, we discuss the key descriptive statistics extracted from these three tables.

Insert Table 1 here.

Insert Table 2 here.

Insert Table 3 here.

Out of the survey participants who indicated their gender, 601 individuals identify as male, 378 as female, and 16 as non-binary. The median age of the respondents is 28 years, and their education level is 16 years, which is slightly higher than a high school diploma but lower than a fully completed bachelor's degree. As the experiment replicates investment decisions made online, using screenshots from a web interface of a large direct bank, our sample aligns with a younger demographic that is more likely to favor digital investment options over traditional banking advice.

The "Frequency Portfolio Checks" variable in Table 1 indicates that the individuals in our sample exhibit a diverse range of financial monitoring behaviors. The majority of respondents engage in weekly portfolio checks (431), indicating a frequent and active interest in their financial situation. This is also in line with the "Talks often about Investments" variable in Table 3, where 339 respondents selected "rather agree", indicating an inclination towards engaging in frequent discussions on the topic. A substantial number prefer monthly checks (221), reflecting a somewhat less intensive approach. In contrast, a smaller portion of respondents opt for more infrequent checks, with 97 individuals doing so several times per year but less frequently than monthly, and only 11 respondents checking once a year. Moreover, a minimal number never engage in portfolio checks (5), and 204 respondents mentioned not having an investment portfolio.

The majority of respondents (624) make financial decisions independently ("Financial Decision Maker") or in conjunction with their partner (314). On the other hand, 60 respondents do not make financial decisions themselves but delegate this responsibility to someone else. The "Monthly Net Income" variable reports the income distribution among the respondents. Notably, the largest group of respondents falls into the income category of 2000€ to less than 3000€, comprising 212 individuals. In addition, the second largest group of respondents belongs to the adjacent income groups, with 154 individuals earning between 1000€ and less than 2000€ per month, and 153 individuals earning between 3000€ to less than 4000€. Lastly, the "Party Preference" variable provides insights into the political preferences of the respondents and the political diversity within the surveyed population. The data reveals a range of political affiliations, with the Green Party being the most popular choice (307), followed by the SPD (123), FDP (116), and The Left (98). Smaller numbers of respondents align with CDU/CSU (60), AfD (26), or other parties (100).

Table 3 presents the summary statistics for several control variables with a Likert scale of five points. The table presents responses related to "Return expectations" and "Risk expectations" of ESG financial products as compared to conventional products. In the case of return expectations, the majority of participants (529) rated it as "somewhat lower", followed by 238 respondents who felt the returns were "the same". On the other hand, for risk expectations, a substantial portion

(386) indicated that the risk was "the same", while 324 participants felt it was "somewhat higher". Regarding greenwashing behind ESG financial products, a notable number (410) chose the "neither agree nor disagree" option, while 303 respondents "rather disagreed" indicating that a majority of respondents do not necessarily associate ESG products with greenwashing.

Additionally, the table highlights respondents' perceptions of the importance of various factors, including returns, risk and ESG considerations when making investment decisions. Notably, for "Importance of Returns," a majority found it "important" (441) or even "very important" (368), indicating a strong emphasis on financial returns. In contrast, the "Importance of Risk" is somewhat weaker, with 420 participants saying risk is rather "important" and 273 participants considering it a "very important" dimension.

Interestingly, participants exhibited a more diverse range of opinions when assessing the importance of environmental, social, and governance factors. While 279 individuals indicated that environmental factors were "important", 301 considered them to be "moderately important", and 224 respondents felt they were only "slightly important". A similar pattern emerges with regard to the importance of social factors. Of the 969 respondents, 278 individuals rated social factors as "important", 302 considered them "moderately important" and 199 respondents found social factors to be only "slightly important". The importance of governance factors also drew varied responses. Interestingly, a large number of respondents (148) regarded governance factors as "very important". Relatively speaking, more respondents seemed to rate governance factors as "very important" compared to environmental and social factors. Furthermore, 299 participants rated governance factors as "important" and 298 as "moderately important".

4.2.2 Model specifications

Our empirical strategy proceeds in two steps. In the first step, we investigate whether a higher level of sustainable finance literacy, as indicated via the brochure treatment, leads to a higher probability of investing in a sustainable fund (H1), using two different dependent variables, both binary. Specifically, we estimate the following equations, using a logistic regression:

$$\text{Dependent Variable}_{i,p} = \beta_1 \text{Brochure Treatment}_p + \beta_2 \text{controls}_{i,p} + \alpha_p + \epsilon_{i,p} \quad (1)$$

where $Dependent\ Variable_{i,p}$ is either the indicator variable $Chose\ ESG_{i,p}$, which is equal to 1 if the decision i of participant p is to invest in a sustainable fund and 0 otherwise, or $Used\ Criterion_{i,p}$, an indicator variable which equals 1 if the participant p indicated the use of an ESG criterion in decision i and 0 otherwise. $Brochure\ Treatment_p$ is an indicator variable that equals 1 if the participant p received the brochure treatment, and 0 otherwise. In our regression results, the coefficient β_1 represents the variable of interest as it captures the effect of the brochure treatment on investment decisions. α_p is a random intercept for each participant p, which accounts for the fact that the decisions are clustered at the participant level, and $\epsilon_{i,p}$ is the error term. Furthermore, $controls_{i,p}$ is an optional vector of additional control variables, depending on the complexity of the model.

For each dependent variable, we run three model types with different degrees of complexity: In the *simple* model type, we do not include any control variable at all. This model type measures the net effect of the brochure itself on the dependent variables. In the *complex* model type, we include all control variables as outlined in Section 3.4. In an experiment, the main role of control variables, aside from reducing standard errors by controlling for potential randomization failures, is to account for alternative mediators, i.e., other causal channels by which the brochure treatment might influence sustainable investing, other than through sustainable finance literacy. The advantage of the complex model type is therefore to deliver the most precise effect of sustainable finance we can measure, given all of our control variables. However, the complex model type appears to often overfit the data, as indicated by singularity problems (Bates et al., 2015, 2018). A common solution for that problem is to develop a reduced model (Matuschek et al., 2017).

We account for this with the *medium* model type, where we strive for a balance between controlling for the most important potential alternative mediators, while also keeping the model as simple as possible. Thus, this model only includes control variables that significantly correlate with the treatment variable, as shown in Table 4. These variables are "perceived impact", "importance S", "data usable" and "trust". The medium model type is simple enough not to cause

overfitting, at the cost of potentially overlooking more complex mediations.

Insert Table 4 here.

In the second step, we examine the various effects of sustainable finance knowledge combined with sustainability preferences on investment behavior (H2). We argue that the effect of the brochure depends on the level of ESG preferences. We mirror the analysis for H1, but now include an interaction term between the treatment and the ESG pref score. Specifically, we estimate the following model based on a logistic regression:

$$\text{Dependent Variable}_{i,p} = \beta_1 \text{Brochure Treatment}_p * \beta_2 \text{ESG Pref Score}_p + \beta_3 \text{controls}_{i,p} + \alpha_p + \epsilon_{i,p} \quad (2)$$

All the variables and model types (simple, medium, complex) stay the same, and in addition the ESG Pref Score$_p$ is the average answer from participant p for the seven ESG preference questions. These questions are five-point Likert scales, but the labels for the points do not include any numeric values. Thus, we scale the variable as a number between 0 and 4, which conveniently gives the coefficient β_1 for the brochure treatment in the regression model a meaningful interpretation: It is the effect of the brochure for the participants with the lowest sustainability preferences.

4.2.3 Does an increase in sustainable finance literacy lead to an increase in the probability of investing sustainably (H1)?

As a first step, we hypothesize that the brochure treatment leads to a higher probability of investing in sustainable funds and to base investment decisions on ESG-related information. Figure 3 illustrates the results, showing bar plots for both dependent variables, split by treatment condition.

Insert Figure 3 here.

Panel A shows the relative frequencies of sustainable investment decisions for the control and treatment groups. As can be seen, sustainable investment decisions, i.e., the choice of a sustainable fund in a specific investment round from the available fund selection, account for about 65% of the total number of investment decisions made by the control group. In contrast, sustainable investment decisions account for approximately 74% of total investment decisions made by the treatment group, which represents an increase of 9 percentage points compared to the control group.

In Panel B we show the relative frequencies of participants in both the control and treatment groups who reported taking ESG criteria into account in their investment decisions. In particular, in the control group, ESG criteria played a role in about 25% of investment decisions. In stark contrast, the brochure treatment group had a significantly higher usage rate, with ESG criteria used in about 50% of their investment decisions. Thus, the stated use of an ESG criterion roughly doubles from the control treatment to the brochure treatment.

Comparing Panel A and Panel B also indicates that participants often pick sustainable funds even though they do not explicitly state using ESG criteria. This is particularly true for the control group. The control group is less likely to show a conscious tendency to select sustainable funds based on ESG criteria. In contrast, the brochure group appears to make more decisions in favor of sustainable investments and tends to base its decisions more consciously on corresponding ESG information. Overall, this indicates that the control group relies less on ESG information than the brochure group.

The regression models confirm these results. Table 5 reports the logit coefficients and margins (average marginal effects, i.e., the average effect of the brochure, given that the effect of the brochure for a given decision is nonlinear and also depends on the control variables) of six regressions with a random intercept. We present the results for the dependent variables "Chose ESG" in columns (1) to (3), and for "Used Criterion" in columns (4) to (6).

Insert Table 5 here.

The regression results in columns (1) to (3) are both statistically and economically significant.

In our simple model without control variables, the margins imply that the brochure treatment leads to an increase in the probability of choosing a sustainable over a conventional fund by around 9%. The coefficient for Brochure Treatment is significant at the 0.1% level. The results also hold for the medium model, with selected control variables, and the complex model, with all control variables. The brochure treatment variable loads positively on choosing an ESG fund, and is in both models significant at the 5% level, with an effect size of around 4 to 5% in both models. Hence, while the brochure treatment does not seem to be the main driver of sustainable investment behavior, it nevertheless represents an important factor to consider for investment decisions.

In columns (4) to (6) we explore the extent to which the brochure treatment leads to the use of ESG information more consciously in investment decisions. The average marginal effects vary from around 31% in the simple model to around 20% in the medium and complex model. All effects are significant at the 0.1% level. Again, these effects are substantially larger than the actual behavior effects.

To summarize the results for H1, we find that the brochure has a positive effect on both sustainable investment and on taking ESG criteria into account for financial decisions. We explore these results further using a mediation analysis in the following section.

4.2.4 Mediation Analysis: What is the effect of the brochure on investment behavior through sustainable finance literacy?

The results so far show that the brochure affects sustainable investments. However, the brochure's effect sizes drop substantially for both our dependent variables once we include control variables. This indicates that the brochure's effects are not only driven by an increase in sustainable literacy. We control for all observed variables, but the brochure may have some other unobserved effects beyond merely increasing sustainable finance literacy.

As an illustration, the brochure could trigger mental associations related to ESG, including prior knowledge, attitudes or expectations. Thus, it is possible that the brochure induces a so-called "priming" effect, i.e., it could simply increase the level of attention paid to ESG criteria

among participants in the treatment group, without a similar priming effect in the control group. Consequently, this increased attention to ESG might also lead to a higher tendency to engage in sustainable investing – which is not directly caused by an increased sustainable finance literacy. A similar argument could be made for the EDE, where the mere display of the brochure could be indicative of our research hypothesis, motivating participants in the treatment group to invest more sustainably, while the control group has no additional motivation to do so. These arguments imply that the margins of the four medium and complex models of Table 5 should best be interpreted as an upper limit for the isolated effects of sustainable finance literacy. At worst, sustainable finance literacy could have no effect at all.

To exclude this hypothesis and measure the effect of the brochure on sustainable investment behavior *only* via sustainable finance literacy, we conduct a causal mediation analysis following the approach of Baron and Kenny (1986), Imai et al. (2011) and Acharya et al. (2016), and recently used in research related to financial literacy (see e.g., Carpena and Zia (2020)) and ESG (e.g., Zhou et al. (2022)).[10] This approach is based on the idea that the total effect of an independent variable is composed of several channels, i.e. the causal chain between the independent and the dependent variable incorporates some intermediary variables, which are called mediator variables. The conceptually simplest way to decompose the total effect is to divide it into two sub-effects. These are the "indirect" effect, which quantifies the extent to which a treatment influences an outcome through a specific mediating variable of interest, in our case sustainable finance literacy, and the "direct" effect, which is the aggregate of any other possible mediator, including unobserved variables. The indirect effect is usually operationalized as the average causal mediation effect (ACME). Thus, we focus in this analysis on the ACME of sustainable finance literacy.

Table 6 shows the results, for both the nonlinear models from table 5 and for linear models which we include as a robustness check, for both model types (medium and complex) and for both dependent variables.[11] For the "Chose ESG" variable, each total effect of the brochure is in line

[10] We use the R package "mediation" (Tingley et al., 2014).

[11] We conduct the mediation analysis for the medium and complex models since we already know from the analysis of H1 that the effect from the simple model drops to roughly half after controlling for other variables, indicating alternative mediators.

with the results from the earlier analyses, with estimates ranging from 4.3% to 5.6%. The ACME of sustainable finance literacy in the complex models is around 4 to 5%, which also confirms our initial results.

Insert Table 6 here.

For the medium models, the analysis actually suggests that the effect of sustainable finance literacy is larger, at around 10%. This implies that the net effect of all alternative mediators combined would actually be negative, meaning that we underestimate the effect of sustainable finance literacy. We do not follow this interpretation since the medium models in the table might not incorporate some relevant effects while the complex models do. However, this actually provides more evidence that the effect size of the brochure via sustainable finance literacy is around 4 to 5% for the "Chose ESG" variable, and that alternative uncontrolled mediators such as increased attention or an experimenter demand effect cannot explain this finding away.

Next, we turn to the "Used Criterion" variable. The four models estimate the total effects to be around 17.7% to 21.7%, which is in line with the earlier results. The ACME estimates in the medium models are around the same size as the total effects, which implies that the brochure's effect after controlling for observables is purely driven by sustainable finance literacy. The complex models, however, suggest that the ACME of sustainable finance literacy is smaller than the total effect. For these models, the ACMEs vary around 12.1% to 14.3%, which is around two-thirds of the total effects of the respective models. To err on the conservative side, we again champion the interpretation from the complex models. It suggests that while the brochure's effect on the decision criteria is in part due to an increase in sustainable finance literacy, other mediators, such as priming, play a role as well. The channel through sustainable finance literacy still seems to be the most relevant, as it accounts for roughly two-thirds of the total effect both in the linear and nonlinear models.

In sum, the results from the mediation analysis provide additional support for our initial results discussed in Section 4.2.3 and confirm that the effect size of the brochure via sustainable finance

literacy is around 4 to 5% for actual behavior. However, we do see that the brochure has some unmeasured influences beyond sustainable finance literacy regarding the conscious usage of ESG criteria.

4.2.5 Does an increase in sustainable finance literacy, combined with high ESG preferences, lead to an increase in the probability of investing sustainably (H2)?

Does the brochure work for all the participants in the same way, and what role do ESG preferences play in this context? A person who is knowledgeable about ESG and sustainable investing but has no strong environmental and/or social preferences could make a conscious decision *not* to invest in sustainable finance products. Conversely, a person with strong environmental and/or social preferences but insufficient knowledge of sustainable investing may have difficulty effectively translating those preferences into actionable investment decisions. As a next step, we therefore explore the role of both sustainability preferences and sustainable finance literacy in shaping investment decisions. In other words, we focus on ESG preferences and interact such preferences with the brochure treatment.

Figure 4 is an interaction plot that illustrates the results. It plots the relationship between ESG preferences and the two dependent variables "Chose ESG" and "Used Criterion" for each of the two experimental groups. Our second hypothesis (H2) implies that for these relationships, the slope for the brochure treatment should be steeper than for the control group. We find this result for both dependent variables. Panel A shows that the probability of investing sustainably increases with ESG preferences. The slope is steeper for the brochure treatment group compared to the control group, and both groups start to differ significantly as the ESG preferences score increases. Panel B shows that this pattern also holds for the incorporation of an ESG criterion into the decision-making process, and the differences become significant at a slightly lower level of ESG preferences.

Insert Figure 4 here.

Table 7 corroborates these findings, primarily for the dependent variable "Chose ESG". The

table reports the logits[12] for each of the six models, which again are combinations of the two different dependent variables and the three model types. Columns (1) to (3) show the results for the actual behavior as a dependent variable. In each of the models, the interaction term is significant on the 1% level, with the predicted sign. However, for the "Used Criterion" variable, in columns (4) to (6), we find the predicted signs, but only the coefficient in the complex model is significant at the 5% level. We attribute this to the relatively large standard errors, which are approximately twice as large as for the "Chose ESG" variable. Thus, the "Used Criterion" variable appears to be noisier.

Insert Table 7 here.

Interestingly, we find in columns (1) to (3) a negative effect of the treatment variable, which is even significant at the 5% level in the medium model in column (2). Since we deliberately mapped the ESG preferences score on a scale from 0 to 4, this coefficient represents the behavior of the participants with the lowest ESG preferences. Therefore, it might even be argued that, for individuals with low ESG preferences, the brochure reduces sustainable investments. This seems reasonable because if sufficient sustainable finance literacy makes it possible to identify sustainable funds, this very literacy combined with low preferences might help such individuals to actively avoid sustainable funds. In addition, it could also be that individuals who have a negative view of ESG issues in general may have a negative reaction to the brochure treatment. This could be related not only to anti-ESG sentiment, but also to the perception of sustainable financial products as a form of greenwashing.

However, further research would be needed to underpin this finding. Admittedly, we do not find this pattern in the case of the other dependent variable, which should be the case if the decision to avoid sustainable funds were a conscious one. Furthermore, the results are based on relatively few observations. Only 125 participants in both groups combined have an ESG preference score of 2

[12]Unlike for H1, we do not report margins (AMEs) for H2 because we are interested in the interaction term. In this case, margins cannot be determined (Williams, 2012). We can, however, use the logits to infer the interaction term's statistical significance.

or less, and only 1 participant has a value of 0. Nevertheless, these results might point to a more nuanced understanding of sustainable finance literacy to be explored in later studies.

In sum, we conclude that we find strong evidence for H2 for the behavior and weaker, more mixed evidence for the conscious use of ESG criteria. Specifically, a higher level of sustainable finance literacy, combined with high ESG preferences, leads to a higher probability of choosing an ESG fund. This suggests that sustainable finance literacy helps individuals to better align their preferences with their investment decisions. However, the effectiveness of the brochure seems limited among individuals who have low ESG preferences and could potentially have unintended negative effects in some cases.

4.3 Robustness checks

We conduct an array of additional tests to check the robustness of our baseline results. First, we estimate the nonlinear models with a probit link function ("probits") instead of logits. Second, we also run a linear model ("LPM"), which we not only use as a robustness check, but also as a second method to estimate effect sizes. Third, we restrict the sample to participants who gave a score of at least 5 out of 10 to the statement "I have given my answers and made my decisions carefully and to the best of my knowledge, and therefore think that my data should be used for the study" ("Use data 5"). We also run a robustness check excluding the fastest and slowest 2.5% of the participants ("Time 95%"). Finally, we check for the presence of an EDE, as described in Section 3.1.

Table 8 shows the results of the robustness checks for H1. In the probit models, the effect of the brochure treatment remains consistent with the baseline results. The treatment has a positive and statistically significant effect on both "Chose ESG" and "Used Criterion" across all levels of model complexity (simple, medium, complex) in columns (1) to (6). The LPM model results also show a consistent positive effect of the brochure treatment on ESG investment decisions: The treatment is statistically significant and positively associated with "Chose ESG" and "Used Criterion" across all columns, and the coefficients have a similar, but slightly smaller size as the margins in Table 5. When restricting the sample to participants who gave a score of at least 5 out of 10 for their data use

statement, the positive effect of the brochure treatment on ESG decisions remains robust. Similarly, excluding the fastest and slowest 2.5% of participants from the sample does not substantially alter the results.

Insert Table 8 here.

Table 9 reports the results of the robustness checks for H2, where we interact the brochure treatment with the sustainability preferences. The results from the probit and LPM models generally confirm the direction of effects observed in Table 7, although there are differences in the magnitude and statistical significance of some coefficients. Specifically, for the probit models in columns (1) to (3), the interaction term retains its significance ($p < 0.01$) and remains consistent with the main results. For the LPM, the coefficients are generally smaller but remain statistically significant, except in column (3). The results also hold in the robustness checks "Use data 5" and "Time 95%". Thus, all four types of robustness checks (probits, LPM, Use data 5 and Time 95%) provide strong and consistent support for the results of H2 with "Chose ESG" as the dependent variable.

Turning to columns (4) to (6) with "Used Criterion" as the dependent variable, the results are more contrasted. The coefficient of the interaction term keeps its significance ($p<0.05$) in the complex model in column (6) for the probit models, and even becomes strongly significant ($p<0.001$) across all three columns in the LPM models. The results hold consistently in the "Time 95%" robustness check, but not entirely when considering the "Use data 5" check where the statistical coefficient remains in the complex model in Column (3) and disappears in the others. Overall, the results of the four robustness checks confirm the main results and even provide some evidence that the main analyses for H2 with "Used Criterion" as a dependent variable might underestimate the significance of the interaction term. We find significant results for models (4) and (5) in two out of four robustness checks. To err on the conservative side, however, we conclude that the evidence for H2 with "Used criterion" as the dependent variable is weaker than that for the "Chose ESG".

Insert Table 9 here.

In both Table 8 and Table 9, we find very little and inconclusive evidence for the presence of an EDE. Most coefficients are insignificant, and they often have the wrong sign. For example, the "High EDE" coefficients in Table 8 should be positive because a stronger EDE should increase the probability to invest sustainably. Instead, the coefficients for the "Chose ESG" variable are all negative. Furthermore, we find that the interaction term in Table 9 is significantly larger for the "Low EDE" group compared to the treatment group without any EDE manipulation. If there was an EDE, this coefficient should actually be smaller. The only result that speaks in favor of an EDE is the significant coefficient for the complex "Used Criterion" model in Table 8. Therefore, we conclude that there is very little and weak evidence for the presence of an EDE affecting our baseline results.

4.4 Additional analysis: Does sustainable finance literacy lead to differentiation between light green and dark green funds?

While little is known to date about how retail investors understand and are influenced by ESG information, there is clear empirical evidence that institutional investors respond to ESG information (e.g. Hartzmark and Sussman (2019)), particularly SFDR labels of funds (see e.g. Becker et al. (2022); Scherer and Hasaj (2023)). Therefore, we examine whether sustainable finance literacy in combination with high sustainability preferences leads participants to differentiate between light green (SFDR Article 8) and dark green (SFDR Article 9) funds. Specifically, we hypothesize that individual investors with high sustainability preferences will deliberately invest in funds that explicitly pursue environmental or social objectives that are aligned with their preferences if they are able to identify information that allows them to recognize such funds.

To analyze this question, we focus on the fourth round of investment decisions, which includes all three types of SFDR funds: a dark green fund, a light green fund, and a conventional fund. We restrict the sample to the participants who chose one of the two sustainable funds. As the dependent variable we use a dummy variable which indicates whether the light green or the dark green fund was chosen. As independent variables we use the treatment variable, and additionally,

we focus on one particular question from the sustainable finance literacy module: "Sufili local 4". This question specifically tests knowledge about financial products classified as SFDR Article 9.

If sustainable finance literacy influences the choice between article 8 and article 9 financial products, it should be the specific knowledge about the SFDR's article 9 in particular that causes this choice, but not necessarily other aspects of sustainable finance literacy. Therefore, we expect this question to have the strongest influence on the decision between the two fund classes, while the other questions should not be as influential. We again expect an interaction with ESG preferences, for the same reasons as in the main analyses. Thus, we mirror our analyses from the main results, and label the different models as "H1" and "H2". We only compute models with the full set of control variables.

Table 10 provides support for both hypotheses. This table reports the results of logistic regressions as logits, for both hypotheses as well as for both independent variables. The brochure treatment increases the probability of choosing the article 9 fund over the article 8 fund (column 1), but this increase depends on the ESG preferences (column 2). Specific knowledge about the SFDR's article 9 also increases the probability of choosing a corresponding fund over an article 8 fund (column 3), again moderated by ESG preferences (column 4). In both columns (2) and (4) the coefficients of the interaction terms taking ESG preferences into account become larger than the individual effects of the brochure and the Sufili local 4-question.

Insert Table 10 here.

Calculating the margins, as reported in Table 11, shows that the brochure treatment increases the probability of choosing the article 9 fund over the article 8 one by around 9.4%, and knowing the correct answer to the Sufili local 4-question by around 12.2%. The interaction terms have the predicted signs.

Insert Table 11 here.

We conclude that sustainable finance literacy not only increases the probability of investing sustainably at all, but also increases the probability of choosing the more sustainable option out

of several sustainable alternatives. Since the other sustainable finance literacy questions do not increase the probability of choosing a dark green fund, it is reasonable to conclude that this effect is driven by specific knowledge about the SFDR's article 9 funds.

At first glance, this result might seem to contradict the main findings of (Heeb et al., 2022), who show in their experiment that participants do not differentiate between different degrees of sustainable impact. Although article 9 funds are not necessarily impact funds and therefore may not necessarily achieve more impact compared to article 8 funds (Chesney and Lambillon, 2023), we would like to highlight a key difference between their experimental design and ours. While the treatments differ in how much of an impact the ESG fund has ("low impact" versus "high impact"), participants in Heeb et al. (2022)'s main experiment do not explicitly decide between two ESG funds directly. They either have to choose between a high-impact fund and a conventional fund, or a low-impact fund and a conventional fund.

In contrast, the participants in our experiment can decide between one conventional and two different ESG funds. A vast literature on preference construction and preference reversals emphasizes such contrasts in the choice environment as deciding factors (see Dhami (2016) and Lichtenstein and Slovic (2006) for an overview). In our experiment, participants are able to compare both ESG funds, which may allow them to construct their preferences differently as the differences between these ESG funds become more apparent. A decision with only one ESG fund would not allow for that.

In an additional analysis, Heeb et al. (2022) actually find this "comparability" effect of an additional ESG fund as well. In their experiment, the participants decide between a conventional fund without any positive environmental impact, a second fund with a positive but relatively moderate impact, and a third fund with a relatively large positive impact. Heeb et al. (2022) conclude from their analyses that "the joint evaluation demonstrates that comparability creates some sensitivity to impact" (see p. 1765), which is consistent with our results.

Interestingly, for participants with very low levels of ESG preferences, we again find some evidence that sustainable finance literacy can decrease sustainable investments. In the H2 models

in columns (2) and (4), the main effects are negative, and even significantly negative ($p<0.05$) for the Sufili local 4-question.

4.5 Additional analysis: Contrasting evidence on the determinants of ESG investing

In this section, we discuss further factors that influence ESG investment decisions by contrasting our results with the existing literature. The objective of this analysis is not to test established findings with our data,[13] but rather to analyze whether our dataset contains some of these established results in order to provide further evidence for the validity of our data. To this end, we use a correlation matrix, as shown in Table 12, which reports the correlation coefficients between the "Chose ESG" variable and each of the control variables used in this study for which prior literature exists. We discuss whether these correlations are consistent with the literature in terms of coefficient sign and statistical significance. It is important to note, however, that there is no established consensus in the literature for several of the variables discussed below.

Insert Table 12 here.

Age In our sample, age has a negative, but statistically insignificant correlation with the likelihood to invest in ESG funds. This is broadly in line with the literature, which usually finds that younger individuals invest more sustainably. Bauer et al. (2021), Bauer et al. (2022), Brodback et al. (2019), Giglio et al. (2023) and Gutsche and Zwergel (2020) observe a significant negative age effect. Bauer and Smeets (2015), Filippini et al. (2023) and Riedl and Smeets (2017) find a negative effect, but their results contain model specifications where age is not significant. In the context of a Swedish pension scheme, Anderson and Robinson (2021) derive a positive and significant correlation when the default investment option cannot be interpreted as having sustainable characteristics, and a negative and significant correlation when it can.

[13] See Hünermund and Beyers (2022) for why this would not be a feasible endeavor.

Gender While we find that gender predicts sustainable investments significantly, the evidence in the literature is rather mixed. Giglio et al. (2023) show that although women agree more with the fact that ESG investments are "the right thing to do" than men, they often do not translate these preferences into action. Bauer et al. (2021) analyze a Dutch pension fund that bases its sustainable investment policies on the decision of its members and find that women are more in favor of a sustainable investment policy. Gutsche and Zwergel (2020) and Bauer et al. (2022) observe that women invest significantly more in sustainable funds. Other studies (e.g., Anderson and Robinson (2021); Brodback et al. (2019); Filippini et al. (2023); Riedl and Smeets (2017) do not find a significant gender difference, although the coefficient sign is usually in favor of women investing more sustainably.

Education We find that the correlation between education and the probability of investing sustainably is zero. This finding is also common in the literature. Some studies do not find any results for education (e.g., Bauer et al. (2021); Gutsche and Zwergel (2020)). For those who derive significant results, the effects are mixed. Filippini et al. (2023) present six models, out of which four have a positive relationship. Bauer and Smeets (2015) and Riedl and Smeets (2017) both find that university education does not increase the absolute amount of sustainable investments, but on the contrary decreases their share in the portfolio. Finally, Bauer et al. (2022) find a positive relationship, but operationalize education as having a Ph.D., which limits generalizability.

Income and wealth While we observe a negative relationship between income and sustainable investments, the literature on income and wealth, as another measure of financial well-being, is very mixed. Anderson and Robinson (2021) exemplify this in their study, having significant correlations with income in both directions, depending on the model. Bauer and Smeets (2015) find no relationship for income, but a negative relationship for wealth. Bauer et al. (2021) and Filippini et al. (2023) also find no relationship with income, but Filippini et al. (2023) reports a positive correlation between wealth and sustainable investment. Giglio et al. (2023) show that the share of sustainable investments increases with wealth, while Riedl and Smeets (2017) show the opposite. Finally, Brodback et al. (2019) and Gutsche and Zwergel (2020) find positive associations between

income and ESG investing, while Bauer et al. (2022) find a negative relationship.

Financial literacy and environmental literacy We find positive associations for both financial literacy and environmental literacy. The literature on these relationships is contrasted. Filippini et al. (2023) find no significant correlation for both these variables with sustainable investments. Similarly, Anderson and Robinson (2021) find no clear relationship for environmental literacy, and in the case of financial literacy, the relationship is in some models even significantly negative. In contrast, Aristei and Gallo (2021) find a positive relationship between financial literacy and sustainable investments, and Bethlendi et al. (2022) report a positive association between environmental literacy and ESG investing.

Return expectations In our data the correlation between expected returns of ESG investments and the likelihood to invest in ESG funds is zero. In a similar way, Heeb et al. (2022) find that neither investors' risk expectations nor their return expectations correlate significantly with their willingness to pay for sustainable investments. Bauer et al. (2021) report that individuals favor sustainable investments independent of return expectations. Specifically, they find that the majority of respondents in their experiment chooses to expand sustainable investing at their pension fund, even those who have negative return expectations or are uncertain about what to expect in terms of returns. Furthermore, Anderson and Robinson (2021) note that a green pro-social value orientation is strongly related to the willingness to pay higher fees for environmentally sustainable funds. Overall, this combined evidence suggests that return expectations are not the primary determinant of ESG investment decisions. Finally, Giglio et al. (2023) conduct a survey of retail investors and report considerable heterogeneity among these investors in their ESG return expectations and motivations for ESG investing, with 25% of respondents saying they are primarily motivated by ethical considerations and only 7% by return expectations.

Risk perception We find an inverse and statistically significant relationship between the perceived risk of ESG investments and the probability of investing in ESG funds. This seems reasonable, as we expect survey respondents to invest less in sustainable funds if they perceive them to be riskier – even more so as returns do not appear to be their primary motive. In contrast, Gutsche and

Zwergel (2020) do not find any relationship between perceived higher risks of sustainable funds and investments in sustainable funds. Bauer and Smeets (2015) investigate the risk perceptions of retail investors with regard to SRI funds and find that these investors do not expect higher risks from such investments compared to conventional funds. Rather, they expect such investments to have both higher returns and lower risk, indicating that investors might have a poor understanding of the relation between risk and return on securities, or that they are overconfident about sustainable investments.

Political preferences We find that Green Party and Left party voters are more likely to invest sustainably than CDU/CSU voters (i.e., the reference category in Table 12), while voters from the pro-business party FDP and the far-right party AfD are less likely to do so. In general, these findings, in particular the effects observed for the Green Party voters, are in line with the literature. Based on an experiment with German households, Gutsche and Zwergel (2020) show that participants with an ecological political identification invest more sustainably in a stated choice experiment. Briere and Ramelli (2021) demonstrate that French individuals living in regions with a high share of Green Party voters invest more sustainably. For the U.S., Giglio et al. (2023) find that there is a higher ESG participation by retail investors resident in predominately Democratic areas compared to Republican ones. Even Anderson and Robinson (2021), who find no relationship between green attitudes and sustainable investment, still provide evidence for a strong association between voting in favor of the Swedish Green Party and ESG investing.

Social preferences and trust We show a positive and statistically significant relationship between social preferences (for both "social preferences" and "social preferences, costly") and the probability of investing in ESG funds. Riedl and Smeets (2017) and Gutsche et al. (2023) find that social preferences are key to investing in sustainable funds in general, but they do not explain how much wealth is allocated to these funds. Bauer et al. (2021) show that social preferences rather than financial beliefs drive the choice for more sustainability. Our results also show a positive correlation between trust and ESG investing. This is in line with Gutsche and Zwergel (2020), but not perfectly aligned with Filippini et al. (2023), who do find positive correlations, but except for

one model they are insignificant.

Time and risk preferences We find a positive, but statistically insignificant correlation between time preferences and the likelihood to invest in ESG funds. This is broadly consistent with Bauer et al. (2022) who report that individuals with a longer-term perspective are more significantly likely to invest in a sustainable funds. Turning to risk preferences, we find that such preferences negatively predict sustainable investments. This is in line with Bauer and Smeets (2015), but not fully consistent with Filippini et al. (2023) who find a weakly positive relationship between risk preferences and ownership of sustainable financial products. Likewise, Riedl and Smeets (2017) find a positive correlation between risk tolerance and the amount invested in sustainable equity funds, but no significant impact on the probability of investing in a sustainable manner.

Financial experience The correlation between financial experience and likelihood of investing in ESG products is zero in our data. This suggests that having financial experience doesn't make one more or less likely to invest in ESG funds. Anderson and Robinson (2021) find that households that exhibit strong pro-environmental behaviors and beliefs are financially disengaged and generally uninterested in financial matters. In addition, Kaustia and Torstila (2011) show that left-wing investors are less inclined to invest in stocks because of their general aversion toward financial markets. Briere and Ramelli (2021) report that the offering of sustainable investment options increases the willingness of investors, including those with a strong pro-social orientation, to participate in financial markets due to a better value alignment. Thus, if these individuals do invest, their investments are likely more driven by environmental and social considerations than by financial expertise.

Talks often about investments Riedl and Smeets (2017) use this variable as a proxy for social signaling and report that investors who talk more often about their investments are more likely to invest in a socially responsible way. In our experiment, we find the opposite result. However, as Riedl and Smeets (2017) note, this variable is likely not a pure measure of social signaling. Instead, it may also be associated with other determinants of sustainable investing, such as financial experience or financial engagement. In particular, we expect that individuals who are more finan-

cially engaged are also more likely to talk about their investments with their peers. The observed negative relationship between the variable "talks often about investments" and the probability of investing in ESG funds seems to confirm this and might once again suggest that individuals with strong sustainability preferences are more disengaged from financial decisions.

Perceived impact We find a positive and statistically significant relationship between perceived impact and the likelihood of investing in ESG funds. This is consistent with studies using similar variables. Riedl and Smeets (2017) report that people who perceive ESG funds as having a positive impact on society have a higher likelihood of holding ESG equity. Brodback et al. (2019) find such a positive relationship in a survey among retail investors on the relative importance of social responsibility. In addition, Heeb et al. (2022), find no effect of the actual impact in their main experiments but some effect using the comparability treatments, which might point to the positive influence of perceived impact on sustainable investments.

In sum, the correlations found in our dataset are broadly in line with the patterns and relationships observed in the literature. This validates our dataset and strengthens its external validity, and consequently our main results.

5 Discussion & implications

In this paper, we show that knowledge about sustainable investments combined with at least moderate sustainability preferences can significantly influence sustainable investment behavior. In particular, we show that an educational brochure designed to increase sustainable finance literacy increases the probability of investing in an ESG-labelled fund by around 9%, of which around 4 to 5% are causally mediated by an increase in sustainable finance literacy. We also show that the brochure leads participants to consciously use more ESG criteria in their investment decisions by around 20%. Around two-thirds of this effect size can be attributed to sustainable finance literacy. However, the brochure does not work for participants with low sustainability preferences, and there is some weak evidence that it might even reduce their willingness to invest sustainably. For partic-

ipants who decided to invest sustainably, the brochure also increases the probability of investing in "dark green" article 9 funds, compared to "light green" article 8 funds, by around 12%.

Our study entails some limitations, which warrant careful consideration but also may highlight the potential for further research. One of the primary limitations of our study is that it relies on a sample of German participants recruited through Prolific, which may not fully represent the diversity of characteristics and preferences of retail investors worldwide. Future research could therefore extend our findings to additional geographical and cultural backgrounds, preferably by conducting field experiments in an actual financial context. This approach would provide a more complete understanding of the generalizability of our findings across different investor demographics.

Furthermore, in keeping with Filippini et al. (2023)'s definition of sustainable finance literacy, a portion of our brochure is focused on the regulatory context of the EU, and in particular, the SFDR. Future research could explore the adaptation of educational materials to other regulatory contexts. This approach would provide further insights into the definition of sustainable finance literacy and the effectiveness of tailored educational content in promoting sustainable investment behavior.

In addition, our study focuses on the immediate effects of providing an educational brochure on participants' investment decisions. While this is a faithful implementation of our research question, for practical purposes, it would be desirable to gain further insights into the longer-term impacts of sustainable finance literacy. Tracking participants' investment decisions over time could shed light on whether such a brochure treatment is effective in the long run and has a lasting impact on investment behavior.

By using screenshots of funds offered by a bank through an online financial account, the selection environment of our experiment has high external validity, but it is also accompanied by a simplified and standardized presentation of information. This selection may not be universally applicable, as some retail investors may face a broader range of ESG information in other investment situations. As Anderson and Robinson (2021) point out, one of the biggest challenges in

making sustainable investment decisions is overcoming the informational hurdles associated with such decisions. In other words, in an environment with many different sources of information that are presented in a non-standardized way, the task of choosing a sustainable fund that matches one's sustainability preferences might be more difficult than in our environment. In addition, even the task of searching for reliable and trustworthy information can be daunting, which might deter investors from investing sustainably in the first place. Both these arguments suggest a larger role of sustainable finance literacy in the field, which we cannot capture in our experiment. Future research might delve into that aspect.

Our results, combined with this argument, also provide important implications for the way ESG-related information should be displayed and communicated to retail investors. The fund classification emerging from the SFDR lowers information hurdles substantially. That such a simplification of the choice environment is useful might best be illustrated by the results of the additional analyses, where we show that the specific knowledge about the SFDR's article 9 increases the probability of choosing such funds. It is unlikely that we would find such results if the requirements behind article 9 were not condensed into such a concise format – the caveat being, of course, that such requirements are implemented and enforced faithfully, and that this classification does not degrade into a tool for greenwashing.

Our findings also have important implications for policymakers. Policymakers in the EU are increasingly emphasizing, for example through MiFID II, the need for financial professionals to assess and take into account their clients' sustainability preferences when making investment recommendations. While this focus on quantifying sustainability preferences is justified, our research highlights a potential pitfall of exclusively concentrating on preferences without considering individuals' knowledge of sustainable investments. In particular, our findings show that it is equally important to assess retail investors' knowledge of sustainable investments. Policymakers should therefore strive to strike a balance between measuring ESG preferences and promoting sustainable finance literacy. This entails ensuring that retail investors have access to educational resources and information that allow them to make informed decisions.

6 Conclusion

We present evidence that investors' sustainable investment behavior is not only driven by their ESG preferences, but also by their knowledge of sustainable financial products. We arrive at this result using a pre-registered experiment based on a large sample of German participants recruited through the Prolific platform. Our findings have important implications for our understanding of how to model and predict investors' sustainable investment behavior. Moreover, our research bears implications for policymakers seeking to integrate sustainability considerations into the financial system and to steer capital flows towards sustainable investments.

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Appendices

A First Appendix - Tables and figures

Table 1: This table reports the demographics and sample proportions of several key survey questions. The total sample consists of 1000 survey participants. Total N contains all responses minus refused responses.

Gender	Total N = 995
Female	378
Male	601
Non-binary	16
Frequency Portfolio Checks	Total N = 999
Weekly	431
Monthly	221
Several times per year, but less frequently than monthly	97
Once a year	11
More rarely	21
Never	5
Only when I create an investment account, or change it	9
I don't have a investment account	204
Financial Decision Maker	Total N = 998
I do not decide but someone else does (e.g., partner, parents)	60
I decide together with my partner	314
Monthly Net Income	Total N = 943
Less than 500€	43
500€ to less than 1000€	115
1000€ to less than 2000€	154
2000€ to less than 3000€	212
3000€ to less than 4000€	153
4000€ to less than 5000€	119
5000€ to less than 6000€	65
6000€ to less than 7000€	48
7000€ or more	34
Party Preference	Total N = 950
CDU/CSU	60
SPD	123
Green Party	307
FDP	116
The Left	98
AfD	26
Other Party	100
Would not vote	57
I am not eligible to vote because I do not have German citizenship	63

Table 2: This table reports the summary statistics for metric variables, aggregated indices, and Likert scales with >= 10 scale points. The total sample consists of 1000 survey participants. Total N contains all responses minus refused responses.

Variable	N	Min	Max	Median	Mean	Std. Dev.
Financial Literacy	998	0	3	3.00	2.67	0.63
Environmental Literacy	996	0	5	3.00	3.30	0.89
Perceived Impact	989	0	5	2.75	2.68	1.01
ESG Pref Score	993	0	4	3.00	2.91	0.72
Questionnaire Time (in sec.)	1000	251	4857	1247	1358	587
Data Usable	996	2	10	10.00	9.49	1.09
Age	988	18	72	28.00	29.86	8.44
Years of Education	996	8	23	16.00	14.70	2.97
Risk Preference	999	0	10	5.00	4.94	2.19
Time Preference	998	0	10	7.00	6.94	1.96
Trust	999	0	10	5.00	4.83	2.43
Social Preferences	997	0	10	7.00	6.58	2.03
Social Preferences, costly	998	0	10	6.00	5.70	2.24
Minimal Acceptance in UG	997	0	100	50.00	41.33	15.10
Financial Experience	1000	1	22	6.00	9.32	6.64

Table 3: This table reports the number of answers for Likert scales with 5 scale points. The total sample consists of 1000 survey participants. Total N contains all responses minus refused responses.

Variable	Total N	much lower	somewhat lower	same	somewhat higher	much higher	I don't know
Expected Return	996	37	529	238	141	24	27
Expected Risk	997	24	191	386	324	51	21
Variable	Total N	strongly disagree	rather disagree	neither agree nor disagree	rather agree	strongly agree	
Greenwashing	999	72	303	410	177	37	
Talks often about Inv.	999	192	339	235	190	43	
Variable	Total N	not important	slightly important	moderately important	important	very important	
Importance Returns	998	10	31	148	441	368	
Importance Risk	982	1	67	221	420	273	
Importance E	982	94	224	301	279	94	
Importance S	969	95	199	302	278	95	
Importance G	997	63	189	298	299	148	

Table 4: This table shows the correlation coefficients of each variable with the treatment variable, sorted by p-value

Variable	Correlation	P-Value
Pearson correlation coefficients of "Treatment" with numeric and nominal variables		
Perceived Impact	0.23	0.000***
Importance S	0.07	0.028*
Data usable	-0.07	0.038*
Trust	0.06	0.042*
Party Preference NA	0.06	0.072
Greenwashing	-0.05	0.129
Social Preferences	0.04	0.154
Importance E	0.04	0.163
Gender Non Binary	0.04	0.187
Importance Risk	-0.04	0.194
Importance Returns	-0.04	0.226
Gender Female	0.03	0.291
Party not eligible	-0.03	0.291
Party Greens	0.03	0.301
Time Preference	0.03	0.319
Party FDP	-0.03	0.375
Ln UG min. demand	-0.03	0.379
Importance G	-0.03	0.403
Party none	0.03	0.406
Party AfD	-0.03	0.416
ESG Pref Score	0.03	0.419
Risk Preference	0.02	0.514
Ln Interview Time	0.02	0.529
Talks often about Inv.	-0.02	0.578
Party The Left	0.02	0.629
Financial Literacy	0.01	0.673
Party other	0.01	0.709
Gender NA	0.01	0.724
Ln Age	0.01	0.73
Financial Experience	-0.01	0.752
Social Preferences, costly	0.01	0.851
Years of education	-0.00	0.949
Environmental Literacy	-0.00	0.96
Party SPD	-0.00	0.987
Spearman correlation coefficients of treatment with ordinal variables		
Return expectations of ESG Funds	-0.03	0.284
Monthly Net Income	-0.02	0.44
Portfolio Check Count	-0.02	0.563
Risk expectations of ESG Funds	-0.00	0.993
Note:		*p<0.05; **p<0.01; ***p<0.001

Table 5: This table presents the results for Hypothesis 1, and reports the logits and margins of mixed models regressions with a random intercept on the decision level, using two different dependent variables as the measure for ESG Investment decision. "Chose ESG" is a Dummy that captures whether a sustainable fund was chosen or not. This measure does not differentiate between Article 8 funds ("light green") and Article 9 funds ("dark green"). "Used Criterion" is a dummy that captures whether a participant reported to have used any ESG criterion for their decision. "Simple" models do not include any control variables. "Medium" models only include control variables that significantly correlate with the Brochure Treatment variable. "Complex" models include all control variables.

	Chose ESG, simple	Chose ESG, medium	Chose ESG, complex	Used Criterion, simple	Used Criterion, medium	Used Criterion, complex
	(1)	(2)	(3)	(4)	(5)	(6)
Logits						
Brochure Treatment	0.480***	0.263*	0.248*	2.134***	1.511***	1.436***
	(0.106)	(0.104)	(0.106)	(0.217)	(0.194)	(0.189)
Intercept	0.757***	−1.143*	−2.719*	−2.116***	−8.125***	−11.995***
	(0.090)	(0.458)	(1.289)	(0.191)	(0.837)	(2.228)
Margins						
Brochure Treatment	0.093***	0.049*	0.043*	0.306***	0.214***	0.198***
	(0.021)	(0.020)	(0.019)	(0.028)	(0.026)	(0.025)
Controls	none	correlated	all	none	correlated	all
N	3993	3934	3438	4000	3936	3440
R^2 marg.	0.01	0.06	0.19	0.10	0.28	0.43
R^2 cond.	0.21	0.21	0.24	0.65	0.66	0.67
Note:						*p<0.05; **p<0.01; ***p<0.001

Table 6: This table shows the estimations for total effects and average causal mediation effects (ACME) for both dependent variables with sustainable finance literacy as the mediator, varied by which control variables and which regression formulas are used. Complex models include all control variables, medium models include Perceived Impact, Importance S, Trust, and Use Data. Linear models use mixed effects linear models on both stages. Nonlinear models use Poisson regressions for the mediator and logit regressions for the dependent variables.

Dependent variable	Model type	Total effect	ACME sufili
Chose ESG	medium nonlinear	0.056***	0.101***
Chose ESG	medium linear	0.046*	0.097***
Chose ESG	complex noinlinear	0.047**	0.049***
Chose ESG	complex linear	0.043*	0.044***
Used Criterion	medium nonlinear	0.217***	0.207***
Used Criterion	medium linear	0.188***	0.179***
Used Criterion	complex nonlinear	0.197***	0.143***
Used Criterion	complex linear	0.177***	0.121***

Table 7: This table presents the results for Hypothesis 2, and reports the logits of mixed models regressions with a random intercept on the decision level, using two different dependent variables as the measure for ESG Investment decision. "Chose ESG" is a Dummy that captures whether a sustainable fund was chosen or not. This measure does not differentiate between Article 8 funds ("light green") and Article 9 funds ("dark green"). "Used Criterion" is a dummy that captures whether a participant reported to have used any ESG criterion for their decision. "Simple" models do not include any control variables. "Medium" models only include control variables that correlate with the Brochure Treatment variable. "Complex" models include all control variables. The relevant variable is the interaction term. The ESG Pref Score is not centered.

	Chose ESG, simple	Chose ESG, medium	Chose ESG, complex	Used Criterion, simple	Used Criterion, medium	Used Criterion, complex
	(1)	(2)	(3)	(4)	(5)	(6)
Brochure Treatment	−0.644	−0.827*	−0.743	0.760	0.095	−0.209
	(0.396)	(0.387)	(0.392)	(0.860)	(0.826)	(0.797)
ESG Pref Score	0.412***	0.299**	−0.032	1.135***	0.688**	−0.030
	(0.110)	(0.110)	(0.120)	(0.244)	(0.238)	(0.244)
Brochure * ESG Pref Score	0.387**	0.385**	0.350**	0.452	0.487	0.550*
	(0.135)	(0.132)	(0.133)	(0.283)	(0.270)	(0.260)
Intercept	−0.437	−1.450**	−2.108	−5.374***	−9.139***	−10.960***
	(0.323)	(0.534)	(1.310)	(0.756)	(1.060)	(2.308)
Controls	none	correlated	all	none	correlated	all
N	3969	3910	3438	3972	3912	3440
R^2 marg.	0.07	0.10	0.19	0.20	0.33	0.43
R^2 cond.	0.22	0.22	0.25	0.66	0.67	0.67

Note: *p<0.05; **p<0.01; ***p<0.001

Table 8: This table summarises the margins for each robustness check for Hypothesis 1. We estimate the nonlinear models with a probit link function ("Probits"). We also run a linear model ("LPM"). We restrict the sample to participants who gave a score of at least 5 out of 10 to the statement "I have given my answers and made my decisions carefully and to the best of my knowledge, and therefore think that my data should be used for the study" ("Use data 5"). We also run a robustness check excluding the fastest and slowest 2.5% of the participants ("Time 95%"). Finally, we check for the presence of an experimenter demand effect (EDE). "Chose ESG" is a dummy that captures whether a sustainable fund was chosen or not. "Used Criterion" is a dummy that captures whether a participant reported to have used any ESG criterion for their decision. "Simple" models do not include any control variables. "Medium" models only include control variables that correlate with the Brochure Treatment variable. "Complex" models include all control variables.

Robustness Check, Variables	*Dependent Variable, Model:*					
	Chose ESG, simple	Chose ESG, medium	Chose ESG, complex	Used Criterion, simple	Used Criterion, medium	Used Criterion, complex
	(1)	(2)	(3)	(4)	(5)	(6)
Probits						
Brochure	0.094***	0.051*	0.046*	0.307***	0.216***	0.198***
Treatment	(0.021)	(0.020)	(0.019)	(0.027)	(0.026)	(0.024)
LPM						
Brochure	0.084***	0.045*	0.042*	0.262***	0.190***	0.181***
Treatment	(0.019)	(0.019)	(0.019)	(0.026)	(0.025)	(0.025)
Use data 5						
Brochure	0.095***	0.052*	0.046*	0.314***	0.220***	0.202***
Treatment	(0.021)	(0.020)	(0.019)	(0.028)	(0.026)	(0.025)
Time 95%						
Brochure	0.100***	0.057**	0.054**	0.309***	0.210***	0.200***
Treatment	(0.022)	(0.020)	(0.019)	(0.029)	(0.027)	(0.026)
EDE						
High EDE-	−0.017	−0.025	−0.012	0.054	0.046	0.062*
Treatment	(0.025)	(0.024)	(0.023)	(0.037)	(0.034)	(0.032)
Low EDE-	−0.036	−0.022	−0.010	−0.033	0.000	0.021
Treatment	(0.026)	(0.024)	(0.022)	(0.037)	(0.034)	(0.032)
Note:						*p<0.05; **p<0.01; ***p<0.001

Table 9: This table summarises the margins for each robustness check for Hypothesis 2. We estimate the nonlinear models with a probit link function ("Probits"). We also run a linear model ("LPM"). We restrict the sample to participants who gave a score of at least 5 out of 10 to the statement "I have given my answers and made my decisions carefully and to the best of my knowledge, and therefore think that my data should be used for the study" ("Use data 5"). We also run a robustness check excluding the fastest and slowest 2.5% of the participants ("Time 95%"). Finally, we check for the presence of an experimenter demand effect (EDE). "Chose ESG" is a dummy that captures whether a sustainable fund was chosen or not. "Used Criterion" is a dummy that captures whether a participant reported to have used any ESG criterion for their decision. "Simple" models do not include any control variables. "Medium" models only include control variables that correlate with the Brochure Treatment variable. "Complex" models include all control variables.

Robustness Check, Variables	*Dependent Variable, Model:*					
	Chose ESG, simple	Chose ESG, medium	Chose ESG, complex	Used Criterion, simple	Used Criterion, medium	Used Criterion, complex
	(1)	(2)	(3)	(4)	(5)	(6)
Probits						
Brochure	−0.381	−0.497*	−0.446	0.561	0.072	−0.146
Treatment	(0.236)	(0.230)	(0.231)	(0.493)	(0.470)	(0.456)
Brochure *	0.230**	0.232**	0.211**	0.229	0.282	0.331*
ESG Pref	(0.080)	(0.078)	(0.078)	(0.162)	(0.154)	(0.149)
Score						
LPM						
Brochure-	−0.080	−0.110	−0.090	−0.033	−0.119	−0.129
Treatment	(0.073)	(0.072)	(0.073)	(0.100)	(0.093)	(0.095)
Brochure *	0.055*	0.054*	0.045	0.100**	0.108***	0.107***
ESG Pref	(0.025)	(0.024)	(0.024)	(0.034)	(0.031)	(0.031)
Score						
Use data 5						
Brochure	−0.639	−0.496*	−0.717	0.919	0.219	−0.134
Treatment	(0.398)	(0.230)	(0.395)	(0.861)	(0.832)	(0.799)
Brochure *	0.390**	0.232**	0.345*	0.410	0.456	0.534*
ESG Pref	(0.136)	(0.078)	(0.134)	(0.283)	(0.272)	(0.260)
Score						
Time 95%						
Brochure	−0.751	−0.858*	−0.648	0.400	−0.121	−0.421
Treatment	(0.415)	(0.406)	(0.409)	(0.887)	(0.849)	(0.816)
Brochure *	0.442**	0.414**	0.338*	0.574*	0.549*	0.623*
ESG Pref	(0.142)	(0.138)	(0.139)	(0.292)	(0.278)	(0.267)
Score						
EDE						
High EDE-	−0.189	−0.321	−0.951	−0.423	−0.355	−0.420
Treatment	(0.591)	(0.573)	(0.605)	(1.067)	(0.578)	(1.038)
Low EDE-	−0.953	−0.789	−1.242*	−2.227	−1.183	−1.296
Treatment	(0.620)	(0.603)	(0.614)	(1.138)	(0.618)	(1.078)
High EDE *	0.058	0.082	0.302	0.300	0.197	0.293
ESG Pref Score	(0.204)	(0.198)	(0.206)	(0.358)	(0.194)	(0.343)
Low EDE *	0.267	0.228	0.410*	0.677	0.394	0.488
ESG Pref Score	(0.211)	(0.206)	(0.208)	(0.375)	(0.204)	(0.352)
Note:						*p<0.05; **p<0.01; ***p<0.001

Table 10: This table presents the results for the additional analyses of whether participants with higher sustainable finance literacy prefer article 9 funds ("dark green") over article 8 funds ("light green"), and reports the logits of logistic regressions. The sample is limited to decision 4, and only includes the decisions for any of the two sustainable funds. The dependent variable in each model is a dummy variable which equals 1 if participants chose the article 9 fund, and 0 if they chose the article 8 fund. The models differ in whether the main explanatory variable is the treatment or a question that specifically measures knowledge about article 9 funds ("Sufili local 4"), and whether this variable is interacted with the ESG Preferences Score. Each model includes all control variables. The ESG Pref Score is not centered.

	Chose dark green over light green, H1	Chose dark green over light green, H2	Chose dark green over light green, H1	Chose dark green over light green, H2
	(1)	(2)	(3)	(4)
Brochure Treatment	0.427*	−1.193		
	(0.197)	(0.819)		
Brochure * ESG Pref Score		0.547*		
		(0.269)		
Sufili local 4			0.567*	−1.654*
			(0.234)	(0.796)
Sufili local 4 * ESG Pref Score				0.764**
				(0.262)
ESG Pref Score	−0.023	−0.417	−0.032	−0.461*
	(0.163)	(0.253)	(0.166)	(0.223)
Sufili global 1			0.147	0.176
			(0.240)	(0.242)
Sufili global 2			0.028	0.036
			(0.241)	(0.242)
Sufili global 3			−0.227	−0.235
			(0.272)	(0.274)
Sufili global 4			−0.179	−0.202
			(0.208)	(0.210)
Sufili global 5			0.176	0.144
			(0.205)	(0.207)
Sufili local 1			0.002	−0.075
			(0.204)	(0.208)
Sufili local 2			−0.274	−0.253
			(0.231)	(0.232)
Sufili local 3			0.075	0.073
			(0.203)	(0.204)
Intercept	−1.059	0.144	−0.888	0.367
	(2.396)	(2.477)	(2.470)	(2.516)
Controls	all	all	all	all
N	714	714	709	709
Pseudo R^2	0.11	0.12	0.12	0.13

Note: *p<0.05; **p<0.01; ***p<0.001

Table 11: This table presents the results for the additional analyses of whether participants with higher sustainable finance literacy prefer article 9 funds ("dark green") over article 8 funds ("light green"), and reports the margins of logistic regressions. The sample is limited to decision 4, and only includes the decisions for any of the two sustainable funds. The dependent variable in each model is a dummy variable which equals 1 if participants chose the article 9 fund, and 0 if they chose the article 8 fund. The models differ whether the main explanatory variable is the treatment or a question that specifically measures knowledge about article 9 funds ("Sufili local 4"). Each model includes all control variables. The ESG Pref Score is not centered.

	Chose dark green over light green, H1	Chose dark green over light green, H1
Brochure Treatment	0.094*	
	(0.043)	
Sufili local 4		0.122*
		(0.050)
ESG Pref Score	−0.005	−0.007
	(0.036)	(0.036)
Sufili global 1		0.032
		(0.052)
Sufili global 2		0.006
		(0.052)
Sufili global 3		−0.049
		(0.059)
Sufili global 4		−0.039
		(0.045)
Sufili global 5		0.038
		(0.044)
Sufili local 1		0.000
		(0.044)
Sufili local 2		−0.059
		(0.049)
Sufili local 3		0.016
		(0.044)
Controls	all	all
Note:		*p<0.05; **p<0.01; ***p<0.001

Table 12: This table shows the correlation coefficients of each control variable for which there exists literature with the "Chose ESG" variable, sorted by p-value

Variable	Correlation	P-Value
Pearson correlation coefficients of "Chose ESG" with numeric and nominal control variables		
Perceived Impact	0.18	0.000***
Party Greens	0.12	0.000***
Greenwashing	-0.10	0.000***
Social Preferences	0.09	0.000***
Risk Preferences	-0.09	0.000***
Party FDP	-0.08	0.000***
Talks often about Inv.	-0.08	0.000***
Gender Female	0.07	0.000***
Party AfD	-0.06	0.000***
Financial Literacy	0.05	0.001**
Environmental Literacy	0.05	0.001**
Trust	0.05	0.002**
Social Preferences, costly	0.04	0.008**
Party The Left	0.04	0.015*
Time Preferences	0.03	0.084
Ln Age	-0.02	0.172
Party SPD	-0.01	0.374
Financial Experience	0.00	0.777
Years of education	0.00	0.786
Spearman correlation coefficients of "Chose ESG" with ordinal control variables		
Expected Risk of ESG Funds	-0.07	0.000***
Monthly Net Income	-0.04	0.034*
Expected Performance of ESG Funds	0.00	0.957
Note:		*p<0.05; **p<0.01; ***p<0.001

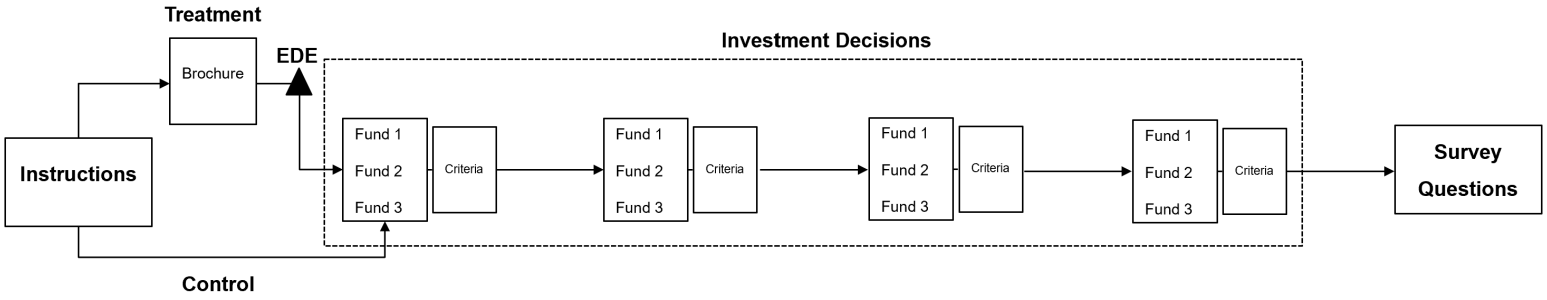


Figure 1: Experimental procedure. This figure provides an illustration of the various steps of the experimental procedure we use in our experiment. Participants are randomly assigned either to the treatment group with the brochure or the control group without the brochure. The experiment contains four rounds of investment decisions. In each round, participants have to choose one of three funds and indicate which criteria were relevant to their investment decision. We test for the presence of an experiment demand effect (EDE).

Figure 2: Participants' responses to the sustainable finance literacy questions. This figure shows the results of the treatment and control groups in relation to our 9 questions on sustainable finance literacy. The correct answers are added to form a sum index, where 9 means that all 9 questions were answered correctly and 0 means that none of the questions was answered correctly.

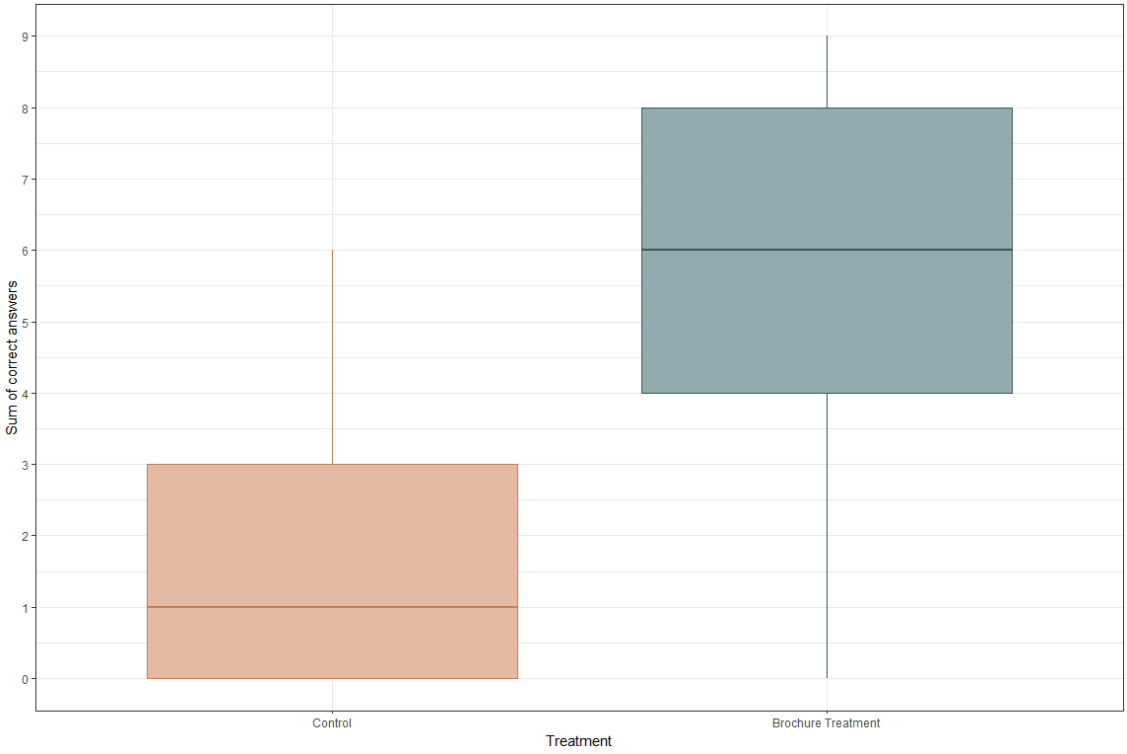


Figure 3: This figure illustrates the results of H1, showing bar plots for both dependent variables ("Chose ESG" and "Used Criterion"), split by treatment condition. Panel A shows the relative frequencies of sustainable investment decisions for the control and treatment groups. Panel B reports the relative frequencies of participants in both the control and treatment groups who reported taking ESG criteria into account in their investment decisions.

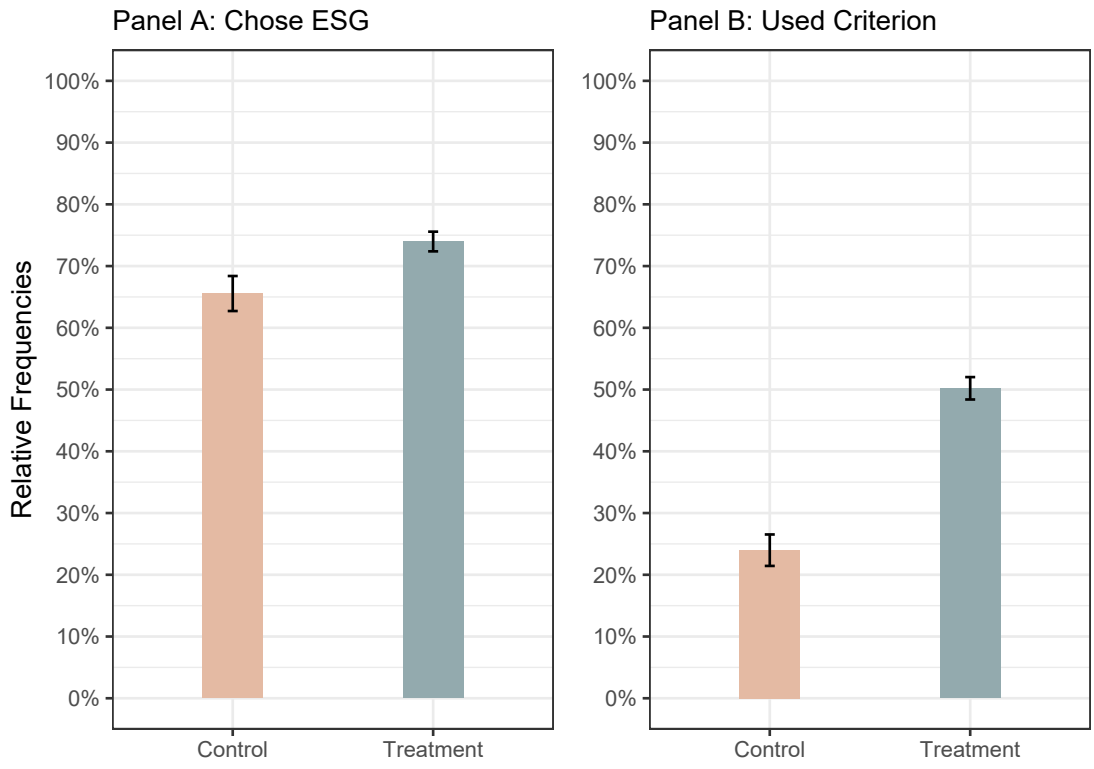
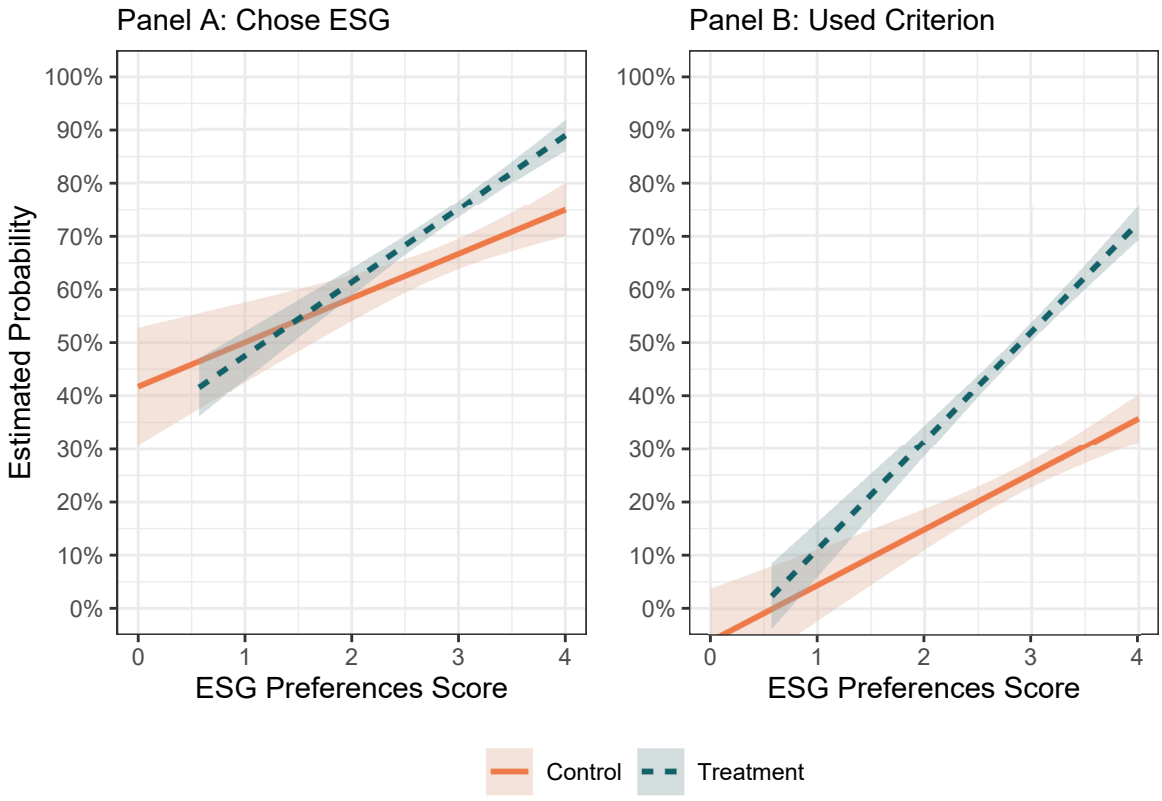


Figure 4: This figure is an interaction plot illustrating the results of H2. It plots the relationships between ESG preferences and the two dependent variables "Chose ESG" and "Used Criterion" for the control and treatment groups. Panel A shows the relationship between the probability of investing sustainably and ESG preferences. Panel B plots the relationship between the incorporation of ESG criteria into investment decisions and ESG preferences.



B Second Appendix - Description of variables & survey questions

Table 13: Overview of survey questions. This table contains a brief overview of all key questions grouped into thematic modules. The letters and numbers in parentheses correspond to their respective survey IDs. Sources are provided for relevant variables.

Variable	Survey ID	Source
Module: Demographics		
Age	(N1)	
Gender	(N2)	
Party	(N3)	Anderson and Robinson (2021), Bauer et al. (2021)
Years of education	(O1)	
Income	(O2)	
Module: Sustainability preferences		
Wahl-o-Mat questions	(Q1)	Wahl-o-Mat
Module: Environmental Literacy		
Question on Sustainable Development	(R1)	Filippini et al. (2023)
Question on heating	(R2)	Anderson and Robinson (2021)
Question on CO2 Footprint	(R3)	Geiger and Holzhauer (2020)
Question on temperature	(R4)	Own question
Question on forestry	(R5)	Zwickle and Jones (2018)
Module: Risk, time, social preferences and trust		
Risk preferences	(P1)	Falk et al. (2023)
Time preferences	(P2)	Falk et al. (2023)
Trust	(P3)	Falk et al. (2023)
Social preferences	(P4)	Falk et al. (2023)
Social preferences, costly	(P5)	Falk et al. (2023)
UG Mininimal Demand	(P6)	Falk et al. (2023)
Module: Financial experience		
Financial Decision Maker	(S1)	Gutsche and Zwergel (2020)
Checks Portfolio	(S2)	modified version from Anderson and Robinson (2021)
Talks often about investments	(S3)	Riedl and Smeets (2017)
Current investments	(T1)	Gutsche and Zwergel (2020)
Past investments	(T2)	Gutsche and Zwergel (2020)
Module: Financial expectations of ESG products		
Return expectations	(U1)	Riedl and Smeets (2017), Bauer et al. (2021)
Risk perception	(U2)	Riedl and Smeets (2017), Bauer et al. (2021)
Dimension importance	(U4)	Own question
Financial scepticism	(U5)	Own question
Module: Financial literacy		
Interest rates	(V1)	Lusardi and Mitchell (2014)
Inflation	(V2)	Lusardi and Mitchell (2014)
Diversification	(V3)	Lusardi and Mitchell (2014)
Module: Sustainable finance literacy - Global		
Question ESG	(W1)	Filippini et al. (2023)
Question Sustainable Financial Product	(W2)	Filippini et al. (2023)
Question ESG Components	(W3)	Filippini et al. (2023)
Question Exclusion-based investing	(W4)	Own question
Question Best-in-class approach	(W5)	Own question
Module: Sustainable finance literacy - Local		
Question SFDR Article 6	(X1)	Own question
Question SFDR Article 8	(X2)	Own question
Question SFDR Article 8 social	(X3)	Own question
Question Question Article 9	(X4)	Own question
Module: Perceived impact		
Positive contribution	(F2), (H2), (J2), (L2)	Heeb et al. (2022)

Description of variables In the following, we provide a description of all key variables used in our analyses, as well as the original questionnaire format. Note that the questionnaire was originally conducted in German.

Main Independent Variables

- *Brochure Treatment*. This dummy variable equals 1 if the participant was given the brochure to read and 0 otherwise.
- *ESG Pref Score*. The average over the seven Wahl-o-Mat questions (Q1). Item 3 is reversed. The questions do not have any numbers associated with the answers. For a convenient interpretation of the lowest category, we use a scale from 0 ("strongly disagree") to 4 ("strongly agree").

Main Dependent Variables - Decision Level

- *Chose ESG*. Dummy variable based on the fund decisions of questions (E2), (G2), (I2), (K2). Equals 1 if the participant chooses an article 8 or 9 fund.
- *Used Criterion*. Dummy variable based on the investment criteria of questions (F1), (H1), (J1), (L1). Equals 1 if the participant indicates that sustainability information played a role in the investment decision.

Demographics

- *Age*. The natural log of the participants' self-stated age (N1).
- *Gender.* Answers to the gender question (N2) are split into dummy variables, with "male" as the reference category.
  - *Gender Female*. This dummy variable equals 1 if the participant chooses Female from among the options Female, Male, Non-Binary and Prefer not to say, and 0 if not.
  - *Gender Non Binary*. This dummy variable equals 1 if the participant chooses Non Binary from among the options Female, Male, Non-Binary and Prefer not to say, and 0 if not.
- *Party Preference.* Answers to the party preference question (N3) are split into dummy variables, with CDU/CSU as the reference category.
  - *Party SPD*. This dummy variable equals 1 if the participant chooses SPD.
  - *Party Greens*. This dummy variable equals 1 if the participant chooses Bündnis 90 / Die Grünen
  - *Party FDP*. This dummy variable equals 1 if the participant chooses FDP
  - *Party The Left*. This dummy variable equals 1 if the participant chooses Die Linke
  - *Party AfD*. This dummy variable equals 1 if the participant chooses AfD
  - *Party Other*. This dummy variable equals 1 if the participant chooses "Other party"

  - *Party None*. This dummy variable equals 1 if the participant chooses "Would not vote"
  - *Party not eligible*. This dummy variable equals 1 if the participant chooses "I am not eligible"

- *Years of education*. Self-reported highest degree (O1), which we translate into the implied years of education the participant has completed: No degree (yet) = 8 years, elementary school = 9 years, secondary school or Realschule or completed apprenticeship = 11 years, advanced technical college entrance qualification = 12 years, Abitur or "erweiterte Oberschule" with completion of 12th grade (university entrance qualification) = 13 years, bachelor's degree = 16 years, master's degree or equivalent = 18 years, doctorate or postdoctoral qualification = 23 years.

- *Income*. Self-reported net monthly household income class (O2). The options start with "less than EUR 500" and "500 to less than EUR 1000", then move in steps of EUR 1000 until EUR 7000, and the final class is "EUR 7000 or more".

Risk Preferences, Time Preferences, Trust and Altruism

- *Risk Preference*. Answer to the question "How do you see yourself: Are you a person who is generally willing to take risks, or do you try to avoid taking risks" (P1), on a 10-point scale (0 = "Completely unwilling to take risks"; 10 = "Very willing to take risks") according to the experimentally validated survey module of Falk et al. (2023).

- *Time Preference*. Answer to the question "In comparison to others, are you a person who is generally willing to give up something today in order to benefit from that in the future or are you not willing to do so?" (P2) on a 10-point scale (0 = "Completely unwilling"; 10 = "Very willing to do so"), following Falk et al. (2023).

- *Trust*. Answer to the question "How well does the following statement describe you as a person? As long as I am not convinced otherwise, I assume that people have only the best intentions." (P3) on a 10-point scale (0 = "Does not describe me at me"; 10 = "Describes me very well"), following Falk et al. (2023).

- *Social Preferences*. Answer to the question "How do you assess your willingness to share with others without expecting anything in return when it comes to charity?" (P4) on a 10-point scale (0 = "Completely unwilling to share"; 10 = "Very willing to share"), following Falk et al. (2023).

- *Social Preferences, costly*. Answer to the question "How do you see yourself: Are you a person who is generally willing to punish unfair behavior even if this is costly?" (P5) on a 10-point scale (0 = "not willing at all"; 10 = "Very willing to punish unfair behavior"), following Falk et al. (2023).

- *UG minimal demand*. The natural log of the minimum demand as player 2 in a hypothetical Ultimatum Game with EUR 100 to share (P6), following Falk et al. (2023).

Financial Experience and Signaling

- *Financial Decision Maker*. Dummy variables based on the answers to the item "Please indicate which of the following statements applies to you personally when it comes to financial matters, e.g. investments." (S1)
  - *Decides finances with partner*. Dummy variable, equals 1 if a participant gave that answer.
  - *Does not decide about own finances*. Dummy variable, equals 1 if a participant gave that answer.
- *Checks Portfolio*. Answers to the "Checks Portfolio" question (S2) are split into dummy variables, with "weekly" as the reference category, following Anderson and Robinson (2021).
  - *Checks Portfolio 12 times/year*. This dummy variable equals 1 if the participant responds "monthly".
  - *Checks Portfolio 2-11 times/year*. This dummy variable equals 1 if the participant responds "several times per year but less frequently than monthly".
  - *Checks Portfolio 1 time/year*. This dummy variable equals 1 if the participant responds "once a year".
  - *Checks Portfolio <1 time/year*. This dummy variable equals 1 if the participant responds "more rarely".
  - *Checks Portfolio never*. This dummy variable equals 1 if the participant responds "never".
  - *Checks Portfolio only when opening/changing*. This dummy variable equals 1 if the participant responds "only when I create a account or change it".
  - *Has no Portfolio*. This dummy variable equals 1 if the participant responds "I don't have an investment account".

  For the correlation analyses, we recode this variable into an ordinal variable, where we join "Has no Portfolio" with "never" and "Checks Portfolio only when opening/changing" with "Checks Portfolio <1 time/year".
- *Talks often about inv.*. Likert scale response to the statement "I often talk about investment with others" (1 fully disagree, . . . , 5 strongly agree) (S3), slightly modifying Riedl and Smeets (2017).
- *Financial experience.*. Counts the numbers of current and past types of investments a participant has or had invested in (T1 and T2), following Gutsche and Zwergel (2020).

Literacy

- *Financial literacy*. The sum of correct answers to the "Big Three" questions (V1-V3), following Lusardi and Mitchell (2014).

- *Environmental literacy*. The sum of correct answers to the five questions from the module "Environmental Literacy" (R1-R5) in Table 13. The questions follow Filippini et al. (2023); Anderson and Robinson (2021); Geiger and Holzhauer (2020); Zwickle and Jones (2018).

- *Sustainable finance literacy*. This variable is the sum of correct answers to the five questions from the modules "Sustainable finance literacy - Global" (W1-W5) and "Sustainable finance literacy - Local" (X1-X4) in Table 13. Three of these questions follow Filippini et al. (2023).

Financial Expectations and Perceived Importance

- *ESG return expectations / ESG risk expectations*. Answers to the questions about return expectations and risk expectations of ESG funds (U1 and U2) are split into dummy variables with "much lower" as the reference category in both cases, following Riedl and Smeets (2017)

  - *ESG return expectations / ESG risk expectations somewhat lower*. This dummy variable equals 1 if the participant answers "somewhat lower".
  - *ESG return expectations / ESG risk expectations similar*. This dummy variable equals 1 if the participant answers "similar".
  - *ESG return expectations / ESG risk expectations somewhat higher*. This dummy variable equals 1 if the participant answers "somewhat higher".
  - *ESG return expectations / ESG risk expectations much higher*. This dummy variable equals 1 if the participant answers "much higher".
  - *ESG return expectations / ESG risk expectations does not know*. This dummy variable equals 1 if the participant answers "I do not know".

  For the correlation analyses, we recode these variables into ordinal variables, where we code "much lower" as 1, "somewhat lower" as 2, "similar" as 3, "somewhat higher" as 4, and "much higher" as 5.

- *Perceived Importance*. Likert scale response to the statement "How important are the following dimensions to you when investing?" (U4), on a scale from 1 (not important) to 5 (very important).

  - *Importance Returns*.
  - *Importance Risk*.
  - *Importance E*.
  - *Importance S*.
  - *Importance G*.

- *Financial Scepticism*. The average over the 3 questions from module U5, on a scale of 1 to 5, where 1 is "strongly disagree" and 5 is "strongly agree". Item 2 is reversed.

- *Perceived Impact*. The average of the 4 0-5 Likert scale questions about the perceived impact of the respective investment from modules F2, H2, J2 and L2.

Experimenter Demand Effect

- *Low EDE*. Based on statement (D2). A random subsample of the brochure group gets to read the following statement: "We expect that participants in the experiment who read these instructions will be less likely to invest in sustainable funds than they normally would.", but does not see statement (D3).
- *High EDE*. Based on statement (D3). A random subsample of the brochure group gets to read the following statement: "We expect that participants in the experiment who read these instructions will be more likely to invest in sustainable funds than they normally would.", but does not see statement (D2).

Note that for the reference group for this variable, we only show (D1).

Technical

- *Interview time*. The variable represents the natural log of the time spent responding to the survey, excluding the time spent reading the brochure.
- *Use data*. The variable represents the self-stated assessment to the statement "I have given and made my answers and decisions carefully, and to the best of my knowledge, and therefore think that my data should be used for the study" (Y1).

Note that for the two complex linear models in section 4.2.4 we had to z-standardize several variables since the downdated VtV matrix of the regression in the first stage of the analysis was not positive definite. This affects the variables Environmental Literacy, Education, Financial Literacy, Perceived impact, Use Data, Risk Preferences, Time Preferences, Social Preferences, Social Preferences, costly, and Financial Experience.

Welcome to this study on investment decisions conducted by the Justus Liebig University in Giessen. As part of our study, we will ask you to answer some questions and make some financial decisions. It should take you about 30 minutes to complete the survey.

You will be paid an allowance of 4.50 pounds (approx. 5.20 euro) for your time. In addition, you will have the opportunity to earn a bonus of approximately 200 euro. We will select 20 people out of all the participants in the study. These 20 people will be paid the bonus on December 1, 2023 (i.e. in about half a year). We will explain the specific details of the bonus payment once you have reached the point in the survey on which the bonus payment is based.

The survey contains some attention questions. These will always be recognizable as such if you read the questions carefully, and there will always be clear instructions on how to answer these attention questions. If you answer any of these questions differently from the instructions, we will unfortunately have to decline your participation. In this case, we will give you the opportunity to withdraw your submission yourself (via the Return Submission feature on Prolific) before we reject the submission ourselves after a few days. In either case, you will not receive the allowance and will not be eligible for the bonus payment. We are aware that attention questions are not very popular, but they are necessary to ensure the data quality required for scientific purposes. We thank you for your understanding

We ask that you answer all questions truthfully, accurately, and completely. By doing so, you will be making an important contribution to our research. Thank you very much for your assistance.

Technical note for Firefox users: If you are taking the survey on your smartphone or tablet using the Firefox browser, in rare cases the survey may not start because you cannot leave this homepage. In this case, please use a different browser.

Technical note for Safari users: You may need to press the "Next" button two or even four times to actually get to the next page.

A1. **By answering the following questions, you are participating in a study conducted by the Chair of Banking & Finance at Justus Liebig University in Giessen. If you have any questions, please contact Florian Gärtner, at the e-mail address florian.gaertner@wirtschaft.uni-giessen.de.**

Your participation is voluntary and you can cancel at any time. In addition, you can of course simply not answer individual questions that you do not wish to answer, or select the "No answer" selection option for mandatory questions. Completely dropping out of the study will result in you not receiving any compensation. If, on the other hand, you only fail to answer individual questions, you will still receive full compensation. However, we would like to remind you about the attention questions: of these, you must answer at least one correctly, otherwise we will ask you to withdraw the submission and will not compensate you either.

We only receive the pseudonymized data that Prolific provides us with, as well as the data that you voluntarily provide in the questionnaire. All collected data will only be used for scientific and science communication purposes (i.e. presenting the results to the interested public).

I agree to the use of my data ☐

I do not want my data to be used. I am aware that the study will then stop and I will not receive any compensation. ☐

B1.

C1. **We would like to ask you to carefully read the following brochure. This should take you about 2 minutes. Therefore, we have hidden the "Next" button in this survey for 90 seconds. At the end of this time, it will reappear in the bottom right-hand corner and you will be able to continue with the survey. In the course of the survey, we will ask you a few questions about the content of the brochure.**

If you are having trouble viewing the brochure, you can open or download it in your browser using this link (the link will open a new browser tab).

D1. **<u>Investment Decisions</u>**

In the following, you are given three different funds to choose from. You are asked to invest 200 euro in one of these funds. We repeat this situation four times with different funds. After each investment, we will ask you some questions about your investment decision.

The funds are real existing funds of different investment companies. For each fund, you will find a brief overview of the most important information. If you need more information, you can also download the prospectus for each fund.

D2. **We expect that participants in the experiment who read these instructions will be less likely to invest in sustainable funds than they normally would.**

D3. **We expect that participants in the experiment who read these instructions will be more likely to invest in sustainable funds than they normally would.**

D4. **<u>Bonus payment</u>**

Based on your investment decisions, you will participate in a bonus payment structured like a lottery: We use a random number generator to select 20 people from all the participants in the study. For each of these people, we use a random number generator to select exactly one of their four investment decisions, which we then actually implement, i.e. invest accordingly.

After half a year, these 20 people will receive a bonus equal to the value of their investment at that time. To calculate the bonus, we use a simplified net return. This is the raw return achieved by the fund minus the ongoing fund costs for half a year. Other cost factors, such as any performance fees, sales charges, etc., are ignored. For example, if a selected fund has earned 10.5% by December 1, 2023, and has ongoing expenses of 0.5%, the fund will have earned a net return of exactly 10%, and we will therefore pay out 220 euros as a bonus. If, on the other hand, there is a loss of 9.3% and running costs of 0.7%, the net return will be -10%, so we will pay out 180 euros as a bonus.

The maximum payout is 300 euros, even if your investment is worth more on December 1. To compensate, we will also limit your risk of loss by introducing a floor. We will pay out at least 100 euros even if your investment is worth less on the cut-off date. These payouts will be made at the beginning of December as a Prolific bonus.

You will receive your allowance of 4.50 pounds (about 5.20 euro) in any case.

E1. **You are given 200 Euro to invest in one of the following three funds. These funds are real, actually existing funds. Which of the three funds do you choose?**

(If you want more detailed information about the funds, you can download the corresponding fund profiles as .pdf files; the links to these files are below the three images. If you are answering this survey on a cell phone or tablet, you may want to scroll out far enough to see all three funds side by side).

E2. **Which of the three funds do you choose?**

- ☐ Fund 1: UniNachhaltig Aktien Europa A
- ☐ Fund 2: UniValueFonds: Europe A
- ☐ Fund 3: UniDividendenAss -net- A

F1. **What criteria did you use to choose this equity fund? Multiple answers are possible.**

- ☐ Fund name
- ☐ Risk and return profile (e.g. Morningstar Rating)
- ☐ Past performance

Fund size ☐

Most important positions/holdings ☐

Country exposure ☐

Industry exposure ☐

Sustainability information (e.g. text description, SFDR article, carbon footprint, sustainability indicators, ESG fund ratings such as MSCI). ☐

Costs p.a. ☐

Other criteria, namely ☐

F2. Would you say that this investment is more likely to make a positive contribution to societal concerns (e.g. addressing climate change or inclusion and diversity) or less likely to make a contribution at all?

No contribution					Very positive contribution
0	1	2	3	4	5
☐	☐	☐	☐	☐	☐

G1. You are given 200 Euro to invest in one of the following three funds. These funds are real, actually existing funds. Which of the three funds do you choose?

(If you want more detailed information about the funds, you can download the corresponding fund profiles as .pdf files; the links to these files are below the three images. If you are answering this survey on a cell phone or tablet, you may want to scroll out far enough to see all three funds side by side).

G2. Which of the three funds do you choose?

Fund 1: Deka EURO iSTOXX ex Fin Dividend+ UCITS ETF ☐

Fund 2: Deka EURO STOXX 50® UCITS ETF ☐

Fund 3: Deka EURO STOXX 50® ESG Filtered UCITS ETF ☐

H1. What criteria did you use to choose this equity fund? Multiple answers are possible.

Fund name ☐

Risk and return profile (e.g. Morningstar Rating) ☐

Past performance ☐

Fund size ☐

Most important positions/holdings ☐

Country exposure ☐

Industry exposure ☐

Sustainability information (e.g. text description, SFDR article, carbon footprint, sustainability indicators, ESG fund ratings such as MSCI). ☐

Costs p.a. ☐

Other criteria, namely ☐

H2. Would you say that this investment is more likely to make a positive contribution to societal concerns (e.g. addressing climate change or inclusion and diversity) or less likely to make a contribution at all?

No contribution					Very positive contribution
0	1	2	3	4	5
☐	☐	☐	☐	☐	☐

I1. **You are given 200 euro to invest in one of the following three funds. These funds are real, actually existing funds. Which of the three funds do you choose?**

(If you want more detailed information about the funds, you can download the corresponding fund profiles as .pdf files; the links to these files are below the three images. If you are answering this survey on a cell phone or tablet, you may want to scroll out far enough to see all three funds side by side).

I2. **Which of the three funds do you choose?**

- ☐ Fund 1: Xtrackers MSCI World UCITS ETF 1C
- ☐ Fund 2: Xtrackers MSCI World ESG UCITS ETF 1C
- ☐ Fund 3: Xtrackers MSCI World Quality UCITS ETF 1C

J1. **What criteria did you use to choose this equity fund? Multiple answers are possible.**

- ☐ Fund name
- ☐ Risk and return profile (e.g. Morningstar Rating)
- ☐ Past performance
- ☐ Fund size
- ☐ Most important positions/holdings
- ☐ Country exposure
- ☐ Industry exposure
- ☐ Sustainability information (e.g.text description, SFDR article, carbon footprint, sustainability indicators, ESG fund ratings such as MSCI).
- ☐ Costs p.a.
- ☐ Other criteria, namely

J2. **Would you say that this investment is more likely to make a positive contribution to societal concerns (e.g. addressing climate change or inclusion and diversity) or less likely to make a contribution at all?**

No contribution					Very positive contribution
0	1	2	3	4	5
☐	☐	☐	☐	☐	☐

K1. **You are given 200 euros to invest in one of the following three funds. These funds are real, actually existing funds. Which of the three funds do you choose?**

(If you want more detailed information about the funds, you can download the corresponding fund profiles as .pdf files; the links to these files are below the three images. If you are answering this survey on a cell phone or tablet, you may want to scroll out far enough to see all three funds side by side).

K2. **Which of the three funds do you choose?**

- ☐ Fund 1: JPMorgan Funds - Global Natural Resources A (acc)
- ☐ Fund 2: Swisscanto (LU) Equity Fund Sustainable Global Water AT
- ☐ Fund 3: M&G (Lux) IF 1 - Global Listed Infrastructure - EUR A Acc

L1. **What criteria did you use to choose this equity fund? Multiple answers are possible.**

- ☐ Fund provider

Fund name

Risk and return profile (e.g. Morningstar Rating)

Past performance

Fund size

Most important positions/holdings

Country exposure

Industry exposure

Sustainability information (e.g. text description, SFDR article, carbon footprint, sustainability indicators, ESG fund ratings such as MSCI).

Costs p.a.

Other criteria, namely

L2. Would you say that this investment is more likely to make a positive contribution to society's concerns (e.g. combating climate change or inclusion and diversity) or more likely not to make a contribution?

No contribution 0 | 1 | 2 | 3 | 4 | 5 Very positive contribution

M1. To what extent did the information in the brochure shown at the beginning ("General Knowledge: Sustainable Investment") help you to understand the information about the funds shown (e.g. Deka EURO STOXX 50® ESG Filtered)?

did not help at all 0 | 1 | 2 | 3 | 4 | 5 helped a lot

M2. To what extent did the information in the brochure shown to at the beginning ("General Knowledge: Sustainable Investing") help you in your investment decision regarding the funds shown (e.g. Deka EURO STOXX 50® ESG Filtered)?

did not help at all 0 | 1 | 2 | 3 | 4 | 5 helped a lot

N1. Please indicate the year you were born.

prefer not to say

2005

2004

(This question is a drop box question which includes each year from 1900 to 2005. To spare the reader several pages of only numbers, we have shortenend this list for presentation purposes)

1901

1900

N2. What gender do you feel you belong to?

Male

Female

Non-binary

Prefer not to say

N3. If a general election were to be held next Sunday, which party would you most likely vote for with your SECOND VOTE?

- CDU / CSU ☐
- SPD ☐
- AfD ☐
- FDP ☐
- Die Linke ☐
- Bündnis 90 / Die Grünen ☐
- Other party ☐
- Would not vote ☐
- I am not eligible to vote because I do not have German citizenship ☐
- Prefer not to say ☐

O1. What is your highest level of education?

(If you have a different degree, please select the degree that you believe is closest to yours. If you have more than one degree, please select the one you feel is the highest)

- Elementary school / secondary school diploma or polytechnic high school with completion of 8th or 9th grade. ☐
- Secondary school diploma, Realschule or Polytechnische Oberschule with 10th grade diploma ☐
- Advanced technical college entrance qualification (technical college graduate, etc.) ☐
- Abitur or Erweiterte Oberschule with completion of 12th grade (university entrance qualification) ☐
- Completed apprenticeship ☐
- Bachelor's degree ☐
- Master's degree, diploma, state examination or teacher's examination ☐
- Doctorate (PhD) or postdoctoral qualification ☐
- Other degree ☐
- No degree (yet) ☐
- Prefer not to say ☐

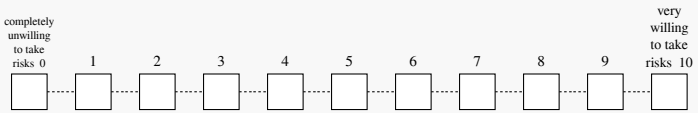
O2.

What is the total net monthly income of your household (the household includes everyone you live with in the same home, excluding roommates)? This is the amount left over after deducting taxes and social security contributions.

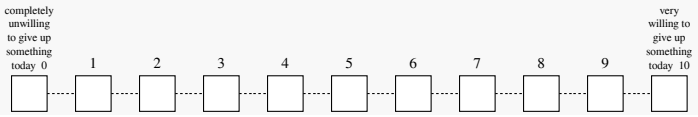
If you do not know this amount, please estimate it!

- Less than 500€ ☐
- 500€ to less than 1000€ ☐
- 1000€ to less than 2000€ ☐
- 2000€ to less than 3000€ ☐
- 3000€ to less than 4000€ ☐
- 4000€ to less than 5000€ ☐
- 5000€ to less than 6000€ ☐
- 6000€ to less than 7000€ ☐
- 7000€ or more ☐
- Prefer not to say ☐

P1. **How do you see yourself: are you a person who is generally willing to take risks, or do you try to avoid taking risks?**

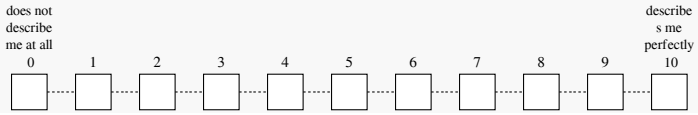


P2. **In comparison to others, are you a person who is generally willing to give up something today in order to benefit from that in the future or are you not willing to do so?**

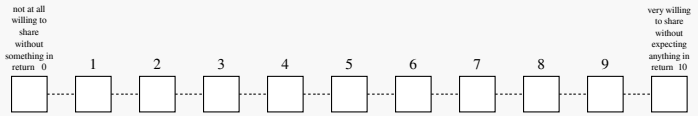


P3. **How well does the following statement describe you as a person?**

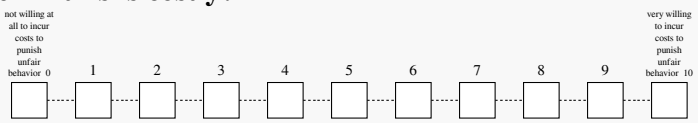
"As long as I am not convinced otherwise, I assume that people have only the best intentions."



P4. **How do you assess your willingness to share with others without expecting anything in return when it comes to charity?**



P5. **How do you see yourself: Are you a person who is generally willing to punish unfair behavior even if this is costly?**



P6.

Imagine the following situation: together with a person whom you do not know you won 100 Euro in a lottery. The rules stipulate the following: One of you has to make a proposal about how to divide the 100 Euro between you two. The other one gets to know the proposal and has to decide between two options. He or she can accept the proposal or reject it.

If he or she accepts the proposal, the money is divided according to the proposal. If he or she rejects the proposal, both receive nothing.

Suppose the other person makes a proposal. You, in turn, must decide whether to accept or reject. What is the minimum amount the other person would have to offer you to make you agree to split?

Q1. To what extent do you agree with the following statements?

	strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree
Germany should be carbon neutral by 2040 at the latest.	☐	☐	☐	☐	☐
The planned phase-out of coal-fired power generation in 2038 should be accelerated.	☐	☐	☐	☐	☐
The registration of new cars with combustion engines should also be possible in the long term.	☐	☐	☐	☐	☐
This question is an attention test. Please answer with somewhat disagree.	☐	☐	☐	☐	☐
Organic farming should be subsidized to a greater extent than conventional farming.	☐	☐	☐	☐	☐
Rail should be prioritized over road when expanding transportation infrastructure.	☐	☐	☐	☐	☐
In Germany, all new buildings should be equipped with photovoltaic systems.	☐	☐	☐	☐	☐
The statutory minimum wage should be increased to at least 13 euros by 2024 the latest.	☐	☐	☐	☐	☐

R1. Which of the following definitions best describes sustainable development?

- ☐ Ensure universal access to education, health, and social services
- ☐ Meeting today's needs while minimizing environmental impact
- ☐ Meeting today's needs without compromising future generations
- ☐ I don't know

R2. Does the world spend more energy on heating homes or cooling them?

- ☐ More energy for heating
- ☐ More energy for cooling
- ☐ About the same amount for both
- ☐ I don't know

R3. Which of the following definitions best describes the carbon footprint of a product?

- ☐ The typical coloration of the sky caused by a high concentration of CO2
- ☐ The amount of all greenhouse gas emissions over the life cycle of a product
- ☐ The amount of CO2 released by a product when it decomposes
- ☐ The chemical change caused by CO2 in the atmosphere
- ☐ I don't know

R4. Which of the following phenomena is the main cause of the increase in the Earth's temperature in recent decades?

- ☐ Reduction of the ozone layer (the so-called "ozone hole")
- ☐ Increased emission of greenhouse gases (the so-called "greenhouse effect")
- ☐ Change in ocean currents, such as "el Niño"
- ☐ Change in the tilt of the Earth's axis
- ☐ I don't know

R5. Which of the following is an example of sustainable forest management?

- ☐ Designating forests as restricted areas for the public
- ☐ Never harvest more than the forest can produce in new growth
- ☐ Producing lumber for nearby communities to build affordable housing.
- ☐ Local communities taking responsibility for forest resources
- ☐ I don't know

S1. Please indicate which of the following statements applies to you personally when it comes to financial matters, e.g. investments.

- ☐ I decide for myself and/or my household alone
- ☐ I decide together with my partner
- ☐ I do not decide but someone else does (e.g., partner, parents)

S2. How often do you review your financial portfolio?

- ☐ weekly
- ☐ monthly
- ☐ several times per year, but less frequently than monthly
- ☐ once a year
- ☐ more rarely
- ☐ never
- ☐ only when I create a deposit, or change it
- ☐ I don't have a financial deposit

S3. To what extent do you agree with this statement: "I often talk with other people about investments."?

- ☐ strongly disagree
- ☐ somewhat disagree
- ☐ neither agree nor disagree
- ☐ somewhat agree
- ☐ strongly agree

T1. Please indicate in which of the following investment forms you have <u>currently</u> invested your money.

(Please select all applicable answers.)

- ☐ Savings book
- ☐ Call money account
- ☐ Stocks
- ☐ Equity funds (including ETFs or index funds)
- ☐ Bonds
- ☐ Bond funds

Cooperative shares (Private Equity) ☐

Other fixed-interest forms of investment (e.g. mortgage bonds, treasury bonds, savings agreement, time deposit, subordinated loan) ☐

Other non-fixed-income forms of investment (e.g. warrants, certificates, open-ended real estate funds, closed-end funds, mixed funds) ☐

Other, not listed forms of investment ☐

In none of the listed forms of investment ☐

T2. <u>In addition to the previous answers,</u> please indicate which of these types of investments you have invested money in in the past <u>but no longer do.</u>

(Please select all applicable answers.)

In none of the listed forms of investment ☐

Savings book ☐

Call money account ☐

Stocks ☐

Equity funds (including ETFs or index funds) ☐

Bonds ☐

Bond funds ☐

Cooperative shares (Private Equity) ☐

Other fixed-interest forms of investment (e.g. mortgage bonds, treasury bonds, savings agreement, time deposit, subordinated loan) ☐

Other non-fixed-income forms of investment (e.g. warrants, certificates, open-ended real estate funds, closed-end funds, mixed funds) ☐

Other, not listed forms of investment ☐

U1. How do you estimate <u>the returns</u> of a sustainable investment compared to a conventional investment?

much lower ☐

somewhat lower ☐

same ☐

somewhat higher ☐

much higher ☐

I don't know ☐

U2. How do you assess <u>the risk</u> of a sustainable investment compared to a conventional investment?

much lower ☐

somewhat lower ☐

same ☐

somewhat higher ☐

much higher ☐

I don't know ☐

U3. At which bank do you have your most important bank account, i.e. the account you use most often? Please ignore this question, as it is only an attention test question. Instead, please answer "other, namely" and enter the number 8 there.

- Sparkasse ☐
- Volksbanken and Raiffeisenbanken ☐
- Deutsche Bank ☐
- Postbank ☐
- Commerzbank ☐
- other, namely ☐

other, namely

U4. How important are the following dimensions to you when investing?

	Not important 1	2	3	4	Very important 5
return	☐	☐	☐	☐	☐
risk	☐	☐	☐	☐	☐
environmental dimension	☐	☐	☐	☐	☐
social dimension (for example, fair working conditions)	☐	☐	☐	☐	☐
governance dimension (for example, no corruption)	☐	☐	☐	☐	☐

U5. To what extent do you agree with the following statements?

	strongly disagree	rather disagree	neither agree nor disagree	rather agree	strongly agree
Sustainable finance products are just greenwashing	☐	☐	☐	☐	☐
Sustainable finance products help me make a real positive contribution to sustainability	☐	☐	☐	☐	☐
At the end of the day, sustainable finance products are not very different from conventional finance products	☐	☐	☐	☐	☐

V1. Suppose you had 100 Euro in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- more than 102 Euro ☐
- exactly 102 Euro ☐
- less than 102 Euro ☐
- I don't know ☐

V2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?

- more ☐
- exactly the same ☐
- less than today ☐
- I don't know ☐

V3. Do you agree with the following statement: "Buying a single company stock usually provides a safer return than a stock mutual fund."?

- agree ☐
- disagree ☐
- I don't know ☐

W1. In the context of sustainable financial investments, the (English) acronym “ESG” is often used. What do you think the abbreviation “ESG” stands for?

- Environmental and Social Goals ☐
- Environmental and Sustainable Goals ☐
- Environmental, Social and Governance ☐
- Environmental, Sustainable and Governance ☐
- I don't know ☐

W2. Let’s say a company has a low environmental footprint but has poor social and employee practices. Would it be possible to call the shares of this company a “sustainable” financial product on the financial markets?

- Yes ☐
- No ☐
- I don't know ☐

W3. In how many of the 3 ESG components (Environment, Social, Corporate Governance) does a company have to be sustainable in order to be considered a sustainable company on the financial markets?

- only one of the components ☐
- two of the components ☐
- all three components ☐
- I don't know ☐

W4. Sustainable funds can follow different strategies when selecting stocks. One such strategy is "exclusion-based investing". What does this mean?

- Exclusion-based investing is the process of excluding detrimental companies and business practices. Depending on how sustainability is understood, there are a number of different exclusion criteria that can come into play. ☐
- Exclusion-based investing excludes companies that have both the worst ESG rating and the worst financial performance in their industry. ☐
- Exclusion-based investing excludes companies that are not on the EU sustainability list under SFDR Article 7. ☐
- I don't know ☐

W5. Sustainable funds can follow different strategies when selecting stocks. One such strategy is the "best-in-class" approach. What does this mean?

- In the best-in-class approach, sustainable funds only include companies that have both the best ESG rating and the best financial performance in their industry. ☐
- In the best-in-class approach, sustainable funds only include companies that are leaders in their industry in terms of ESG. This means that an investment in an energy company that operates coal-fired power plants or produces oil, but is also heavily involved in renewable energy, may well be an option ☐
- In the best-in-class approach, sustainable funds only include companies that are leaders in their industry in terms of ESG. This means that only investments in companies that operate in highly sustainable industries can be considered. ☐
- I don't know ☐

X1. What are financial products under Article 6?

- These are funds that explicitly consider negative impacts of investment decisions from an environmental, social, or governance perspective ☐
- These are funds that do not specifically integrate sustainability considerations into their investment process and could therefore include stocks that are currently excluded from ESG funds, such as tobacco companies or coal producers.. ☐
- These are funds that take into account six specific sustainability criteria, including CO2 emissions, water management, human rights and corruption ☐
- I don't know ☐

X2. What are financial products under Article 8 ("light green products")?

- These are funds that take into account eight precise sustainability criteria ☐
- These are funds that take environmental and/or social factors (subject to good corporate governance) into account when selecting their stocks ☐
- These are funds that primarily consider environmental criteria when selecting their stocks. Social characteristics are of secondary importance for Article 8 funds ☐
- I don't know ☐

X3. Can funds that only consider social aspects be classified as financial products under Article 8 ("light green products")?

- Yes ☐
- No ☐
- I don't know ☐

X4. Which financial products have a sustainable investment strategy contributing to a specific, identifiable environmental or social objective, without doing significant harm to any other sustainability objectives and ensuring good governance practices, for example with respect to employee relations?

- Article 6 financial products ☐
- Article 8 financial products ☐
- Article 9 financial products ☐
- I don't know ☐

Y1. To what extent do you agree with the following statement?

"I have given my answers and made my decisions carefully and to the best of my knowledge, and therefore think that my data should be used for the study".

(Note: Your chances of winning the bonus are the same regardless of how you answer this question).

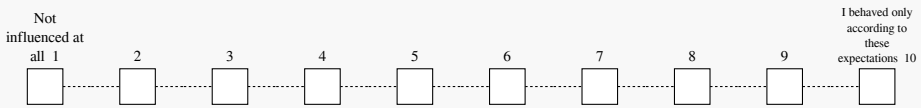
My data should not be used at all ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ My data can be used without any problems 10

Y2. This study examines the relationship between two variables. Between which two do you think (vague answers are perfectly fine)?

Y3. **Subjects in studies often believe that the researchers behind these studies want the subjects to behave in a certain way on some questions or decisions. We don't actually do that, but these expectations about our expectations can still change the subjects' behavior. This poses a problem for us because we want to study the actual research question, not whether our subjects prefer to do what they think we want them to do instead of their "real behavior." In our study, these so-called "experimenter demand effects" could appear in the four investment decisions.**

Please think about these decisions. In making these decisions, did you feel that we wished you had made certain investment decisions? If so, which ones?

Y4. **How much do you think this expectation of what we would want influenced your decision?**

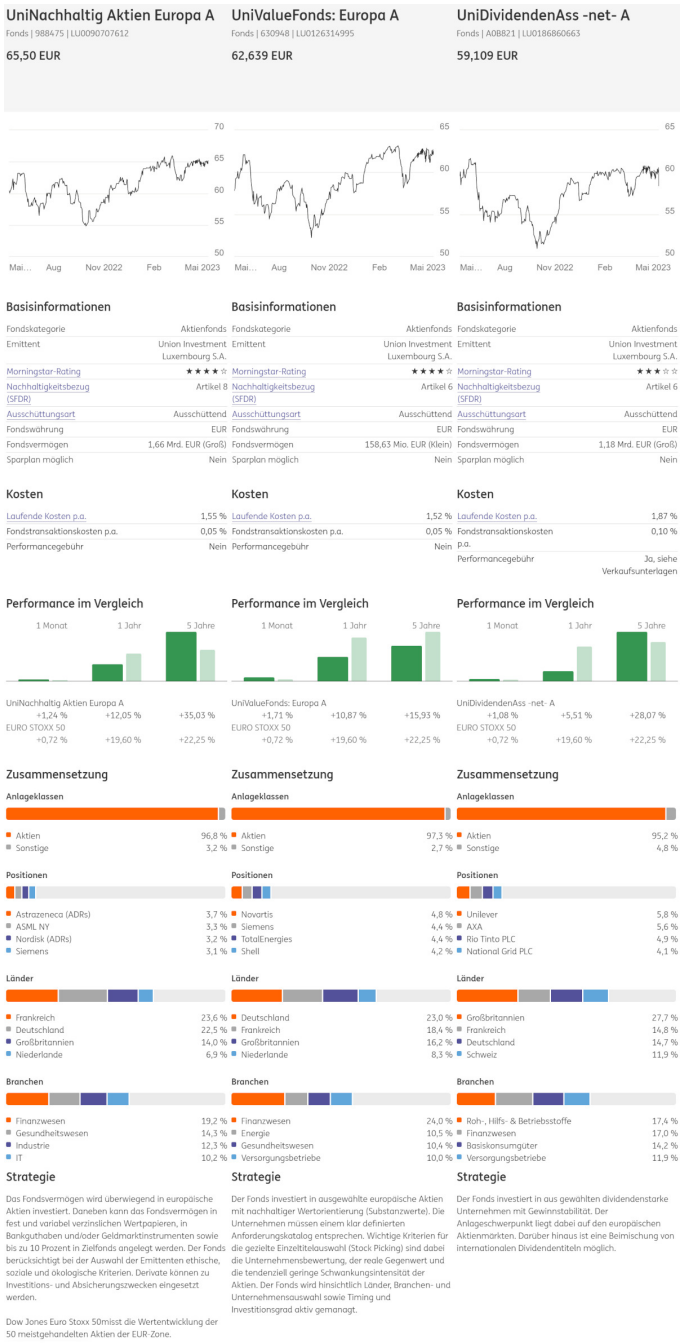


Y5. **Do you have any other comments regarding our study?**

This is the end of the study. Thank you for your participation. Your contribution is very valuable.

Contact: florian.gaertner@wirtschaft.uni-giessen.de

C Third Appendix - Used screenshots of the funds & brochure



UniNachhaltig Aktien Europa A
Fonds | 988475 | LU0090707612
65,50 EUR

Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Union Investment Luxembourg S.A.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 8
Ausschüttungsart	Ausschüttend
Fondswährung	EUR
Fondsvermögen	1,66 Mrd. EUR (Groß)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	1,55 %
Fondstransaktionskosten p.a.	0,05 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
UniNachhaltig Aktien Europa A	+1,24 %	+12,05 %	+35,03 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	96,8 %
Sonstige	3,2 %

Positionen

Astrazeneca (ADRs)	3,7 %
ASML NY	3,3 %
Nordisk (ADRs)	3,2 %
Siemens	3,1 %

Länder

Frankreich	23,6 %
Deutschland	22,5 %
Großbritannien	14,0 %
Niederlande	6,9 %

Branchen

Finanzwesen	19,2 %
Gesundheitswesen	14,3 %
Industrie	12,3 %
IT	10,2 %

Strategie

Das Fondsvermögen wird überwiegend in europäische Aktien investiert. Daneben kann das Fondsvermögen in fest und variabel verzinslichen Wertpapieren, in Bankguthaben und/oder Geldmarktinstrumenten sowie bis zu 10 Prozent in Zielfonds angelegt werden. Der Fonds berücksichtigt bei der Auswahl der Emittenten ethische, soziale und ökologische Kriterien. Derivate können zu Investitions- und Absicherungszwecken eingesetzt werden.

Dow Jones Euro Stoxx 50misst die Wertentwicklung der 50 meistgehandelten Aktien der EUR-Zone.

UniValueFonds: Europa A
Fonds | 630948 | LU0126314995
62,639 EUR

Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Union Investment Luxembourg S.A.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Ausschüttend
Fondswährung	EUR
Fondsvermögen	158,63 Mio. EUR (Klein)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	1,52 %
Fondstransaktionskosten p.a.	0,05 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
UniValueFonds: Europa A	+1,71 %	+10,87 %	+15,93 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	97,3 %
Sonstige	2,7 %

Positionen

Novartis	4,8 %
Siemens	4,4 %
TotalEnergies	4,4 %
Shell	4,2 %

Länder

Deutschland	23,0 %
Frankreich	18,4 %
Großbritannien	16,2 %
Niederlande	8,3 %

Branchen

Finanzwesen	24,0 %
Energie	10,5 %
Gesundheitswesen	10,4 %
Versorgungsbetriebe	10,0 %

Strategie

Der Fonds investiert in ausgewählte europäische Aktien mit nachhaltiger Wertorientierung (Substanzwerte). Die Unternehmen müssen einem klar definierten Anforderungskatalog entsprechen. Wichtige Kriterien für die gezielte Einzeltitelauswahl (Stock Picking) sind dabei die Unternehmensbewertung, der reale Gegenwert und die tendenziell geringe Schwankungsintensität der Aktien. Der Fonds wird hinsichtlich Länder, Branchen- und Unternehmensauswahl sowie Timing und Investitionsgrad aktiv gemanagt.

UniDividendenAss -net- A
Fonds | A0B821 | LU0186860663
59,109 EUR

Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Union Investment Luxembourg S.A.
Morningstar-Rating	★★★☆☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Ausschüttend
Fondswährung	EUR
Fondsvermögen	1,18 Mrd. EUR (Groß)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	1,87 %
Fondstransaktionskosten p.a.	0,10 %
Performancegebühr	Ja, siehe Verkaufsunterlagen

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
UniDividendenAss -net- A	+1,08 %	+5,51 %	+28,07 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	95,2 %
Sonstige	4,8 %

Positionen

Unilever	5,8 %
AXA	5,6 %
Rio Tinto PLC	4,9 %
National Grid PLC	4,1 %

Länder

Großbritannien	27,7 %
Frankreich	14,8 %
Deutschland	14,7 %
Schweiz	11,9 %

Branchen

Roh-, Hilfs- & Betriebsstoffe	17,4 %
Finanzwesen	17,0 %
Basiskonsumgüter	14,2 %
Versorgungsbetriebe	11,9 %

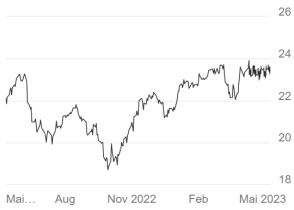
Strategie

Der Fonds investiert in aus gewählten dividendenstarke Unternehmen mit Gewinnstabilität. Der Anlageschwerpunkt liegt dabei auf den europäischen Aktienmärkten. Darüber hinaus ist eine Beimischung von internationalen Dividendentiteln möglich.

Deka EURO iSTOXX ex Fin Dividend+ UCITS ETF

ETF | ETFL48 | DE000ETFL482

23,555 EUR



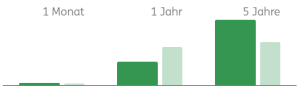
Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Deka Investment GmbH
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Ausschüttend
Nachbildung	Vollständig
Fondswährung	EUR
Fondsvermögen	286,62 Mio. EUR (Mittel)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	0,30 %
Performancegebühr	Nein

Performance im Vergleich



	1 Monat	1 Jahr	5 Jahre
Deka EURO iSTOXX ex Fin Dividend+ UCITS ETF	+1,19 %	+11,99 %	+33,60 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	98,4 %
Sonstige	1,6 %

Positionen

OCI	6,1 %
ENGIE	4,0 %
Enel	3,1 %
Telefonica	3,0 %

Länder

Deutschland	21,6 %
Frankreich	20,7 %
Niederlande	16,6 %
Spanien	11,2 %

Branchen

Versorger	23,1 %
Chemie	14,8 %
Autoindustrie	11,9 %

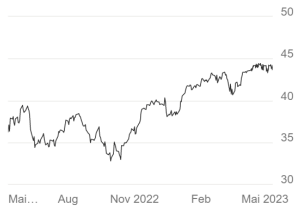
Strategie

Der Deka EURO iSTOXX ex Fin Dividend+ UCITS ETF ist ein UCITS IV konformer Publikumsfonds, der die Performance des EURO iSTOXX ex Financials High Dividend 50 Preis Index (Preisindex) nachbildet. Der Index umfasst die 50 Unternehmen des EURO STOXX® ex Financials mit der höchsten Dividendenrendite aus der Eurozone. Die Bestandteile des Index werden anhand der Dividende entsprechend gewichtet.

Deka EURO STOXX 50® UCITS ETF

ETF | ETFL02 | DE000ETFL029

44,155 EUR



Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Deka Investment GmbH
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Ausschüttend
Nachbildung	Vollständig
Fondswährung	EUR
Fondsvermögen	829,52 Mio. EUR (Groß)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	0,15 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
Deka EURO STOXX 50® UCITS ETF	+1,51 %	+24,60 %	+37,13 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	99,6 %

Positionen

ASML	7,4 %
LVMH	7,2 %
TotalEnergies	4,6 %
SAP	4,0 %

Länder

Frankreich	40,1 %
Deutschland	26,4 %
Niederlande	16,2 %
Spanien	6,3 %

Branchen

Konsumgüter	15,0 %
Technologie	14,3 %
Industrie	13,2 %
Banken	10,1 %

Strategie

Der Fonds bildet die Performance des Dow Jones EURO STOXX 50 Index (Preisindex) nach. Der Index umfasst das Segment der Blue Chips innerhalb der Aktienmärkte aus den EU-Staaten der Eurozone. Er besteht aus 50 Werten, die mindestens an einer nationalen Börse, oft aber an mehreren Europäischen Handelsplätzen, gehandelt werden können.

Der Euro Stoxx 50 misst die Wertentwicklung der 50 bedeutendsten europäischen Aktien.

Deka EURO STOXX 50® ESG Filtered UCITS ETF

ETF | ETFL46 | DE000ETFL466

97,32 EUR

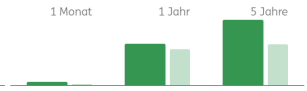
Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Deka Investment GmbH
Morningstar-Rating	★★★★★
Nachhaltigkeitsbezug (SFDR)	Artikel 8
Ausschüttungsart	Thesaurierend
Nachbildung	Vollständig
Fondswährung	EUR
Fondsvermögen	115,31 Mio. EUR (Klein)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	0,15 %
Performancegebühr	Nein

Performance im Vergleich



	1 Monat	1 Jahr	5 Jahre
Deka EURO STOXX 50® ESG Filtered UCITS ETF	+1,64 %	+22,41 %	+35,41 %
EURO STOXX 50	+0,72 %	+19,60 %	+22,25 %

Zusammensetzung

Anlageklassen

Aktien	99,5 %

Positionen

ASML	9,5 %
LVMH	9,3 %
SAP	5,2 %
Sanofi	4,7 %

Länder

Frankreich	38,2 %
Deutschland	23,6 %
Niederlande	18,5 %
Spanien	6,2 %

Branchen

Konsumgüter	19,3 %
Technologie	18,4 %
Banken	13,0 %
Industrie	9,5 %

Strategie

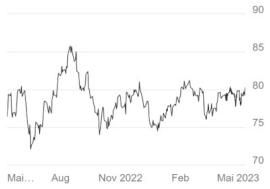
Der Deka EURO STOXX 50® ESG Filtered UCITS ETF ist ein passiv gemanagter börsengehandelter Indexfonds (Exchange Traded Fund, ETF). Ziel des Fondsmanagements ist die exakte Abbildung der Wertentwicklung des zu Grunde liegenden Index. Der Fonds bildet den EURO STOXX 50® ESG Filtered nach. Der EURO STOXX 50® ESG Filtered umfasst Aktien der 50 größten, nachhaltigen Unternehmen mit Sitz in der Eurozone. Für die Auswahl der Indexkonstituenten werden Unternehmen auf Grundlage von umweltbezogenen, sozialen oder die Unternehmensführung betreffende Kriterien (ESG-Kriterien) bewertet.

Der EURO STOXX 50® ESG umfasst Aktien der 50 größten, nachhaltigen Unternehmen mit Sitz in der Eurozone. Für die Auswahl der Indexkonstituenten werden Unternehmen auf Grundlage von umweltbezogenen, sozialen oder die Unternehmensführurng betreffende Kriterien (ESG-Kriterien) bewertet.

Xtrackers MSCI World UCITS ETF 1C

ETF | A1XB5U | IE00BJ0KDQ92

80,154 EUR



Basisinformationen

Fondskategorie	Aktienfonds
Emittent	DWS Investment S.A.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Thesaurierend
Nachbildung	Optimiert
Fondswährung	USD
Fondsvermögen	9,72 Mrd. EUR (Groß)

Kosten

Laufende Kosten p.a.	0,22 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
Xtrackers MSCI World UCITS ETF 1C	+1,11 %	+7,25 %	+45,64 %
MSCI World	+0,37 %	+2,28 %	+44,12 %

Zusammensetzung

Anlageklassen

Aktien	99,5 %

Positionen

Apple	4,9 %
Microsoft	4,0 %
Amazon	1,8 %

Länder

USA	64,8 %
Japan	6,1 %
Großbritannien	4,7 %
Kanada	3,5 %

Branchen

Informationstechnologie	19,8 %
Finanzwesen	15,0 %
Gesundheitswesen	13,5 %
Industrie	10,8 %

Strategie

Das Anlageziel des Fonds besteht darin, die Wertentwicklung des Basiswerts, des MSCI Total Return Net World Index abzubilden. Hierzu investiert der Fonds in erster Linie in übertragbare Wertpapiere und setzt zudem derivative Techniken ein.

Der MSCI World TR Net gibt die Wertentwicklung von 23 entwickelten Aktienmärkten wieder (Total Return = Kurse + Dividenden).

Xtrackers MSCI World ESG UCITS ETF 1C

ETF | A2AQST | IE00BZ02LR44

28,815 EUR

Basisinformationen

Fondskategorie	Aktienfonds
Emittent	DWS Investment S.A.
Morningstar-Rating	★★★★★
Nachhaltigkeitsbezug (SFDR)	Artikel 8 (Hellgrün)
Ausschüttungsart	Thesaurierend
Nachbildung	Vollständig
Fondswährung	USD
Fondsvermögen	3,32 Mrd. EUR (Groß)

Kosten

Laufende Kosten p.a.	0,20 %
Fondstransaktionskosten p.a.	0,10 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
Xtrackers MSCI World ESG UCITS ETF 1C	+1,39 %	+7,10 %	+50,43 %
MSCI World	+0,37 %	+2,28 %	+44,12 %

Zusammensetzung

Anlageklassen

Aktien	99,9 %

Positionen

Microsoft	8,7 %
NVIDIA	2,7 %
Alphabet A	2,6 %
Alphabet C	2,4 %

Länder

USA	66,5 %
Japan	6,1 %
Großbritannien	5,2 %
Frankreich	3,0 %

Branchen

Informationstechnologie	22,1 %
Finanzwesen	17,1 %
Gesundheitswesen	16,1 %
Industrie	10,9 %

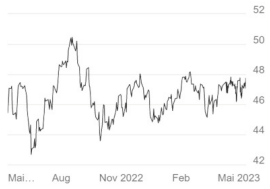
Strategie

Zur Erreichung des Anlageziels versucht der Fonds, den Index vor Gebühren und Aufwendungen nachzubilden, indem er alle (oder in Ausnahmefällen eine wesentliche Anzahl der) Aktien im Index im gleichen Verhältnis wie der Index erwirbt, wie von Gesellschaften der DWS bestimmt. Der Fonds kann Techniken und Instrumente für das Risikomanagement, zur Kostenreduzierung und zur Ergebnisverbesserung einsetzen. Diese Techniken und Instrumente können den Einsatz von Finanzkontrakten (Derivategeschäften) umfassen.

Xtrackers MSCI World Quality UCITS ETF 1C

ETF | A1103D | IE00BL25JL35

47,69 EUR



Basisinformationen

Fondskategorie	Aktienfonds
Emittent	DWS Investment S.A.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6 (Grau)
Ausschüttungsart	Thesaurierend
Nachbildung	Optimiert
Fondswährung	USD
Fondsvermögen	1,01 Mrd. EUR (Groß)

Kosten

Laufende Kosten p.a.	0,26 %
Fondstransaktionskosten p.a.	0,10 %
Performancegebühr	Nein

Performance im Vergleich

	1 Monat	1 Jahr	5 Jahre
Xtrackers MSCI World Quality UCITS ETF 1C	+1,00 %	+7,18 %	+48,32 %
MSCI World	+0,37 %	+2,28 %	+44,12 %

Zusammensetzung

Anlageklassen

Aktien	99,9 %

Positionen

Home Depot	4,3 %
Microsoft	4,0 %
Apple	3,6 %
Meta	3,1 %

Länder

USA	67,6 %
Schweiz	6,5 %
Großbritannien	4,6 %
Dänemark	2,9 %

Branchen

Informationstechnologie	18,5 %
Finanzwesen	15,9 %
Gesundheitswesen	14,0 %
Industrie	10,7 %

Strategie

Die Bestandteile des DB Equity Quality Factor Index (der Index) werden aus den Aktien von Unternehmen mit hoher und mittlerer Marktkapitalisierung aus rund 31 Industrieländern ausgewählt. Die Aktien werden mithilfe einer qualitätsbasierten Strategie ausgewählt, die die Qualität der Erträge von Unternehmen analysiert. Diese Strategie basiert auf der Annahme, dass zu bestimmten Zeiten Unternehmen mit qualitativ hochwertigen Erträgen eine bessere und Unternehmen mit qualitativ schlechteren Erträgen eine schlechtere Wertentwicklung aufweisen als der Aktienmarkt insgesamt. Die Strategie verwendet eine regelbasierte Formel zur Analyse der Aktien, die Bestandteil des MSCI World Index sind, und berechnet für jede Aktie einen ⊠Qualitätsscore⊠, der sich aus der Gesamtkapitalrendite und aufgelaufenen Beträgen ergibt. Die Indexbestandteile werden aus den im MSCI World Index vertretenen Aktien ausgewählt, mit dem Ziel, diejenigen Aktien überzugewichten, die einen höheren ⊠Qualitätsscore⊠ aufweisen, und diejenigen mit einem niedrigeren ⊠Qualitätsscore⊠ unterzugewichten. Die Gesamtkapitalrendite setzt das Nettoergebnis nach Steuern vor Dividenden und Zinsaufwendungen ins Verhältnis zum Gesamtkapital und den kurzfristigen Verbindlichkeiten des Vorjahres sowie den langfristigen Verbindlichkeiten des laufenden Jahres. Aufgelaufene Beträge messen die Wertentwicklung während eines Zeitraums, wobei Aufwendungen und damit verbundene Umsätze gegenübergestellt werden. Die zugrunde liegenden Bestandteile notieren in verschiedenen Währungen. Der Index wird auf Basis der Netto-Gesamtrendite (Total Return Net) berechnet, alle Dividenden und Ausschüttungen der Unternehmen werden nach Steuern wieder in den Aktien angelegt. Der Index wird vierteljährlich neu gewichtet.

JPMorgan Funds - Global Natural Resources A (acc) - EUR

Fonds | A0DPLL | LU0208853274

20,005 EUR

Basisinformationen

Fondskategorie	Aktienfonds
Emittent	JPMorgan Asset Management (Europe) S.à r.l.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 6
Ausschüttungsart	Thesaurierend
Fondswährung	EUR
Fondsvermögen	1,06 Mrd. EUR (Groß)

Kosten

Laufende Kosten p.a.	1,73 %
Performancegebühr	Nein
Ausgabeaufschlag	2,50 %

Performance im Vergleich

JPMorgan Funds - Global Natural Resources A (acc) - EUR

-3,53 % -3,35 % +40,85 %

Zusammensetzung

Anlageklassen

Aktien	100,1 %

Positionen

Chevron	7,0 %
Rio Tinto PLC	6,3 %
Shell	5,7 %
Freeport McMoRan	5,4 %

Länder

USA	43,1 %
Großbritannien	15,4 %
Australien	12,8 %
Kanada	12,2 %

Branchen

Materials	50,0 %
Energy	49,1 %

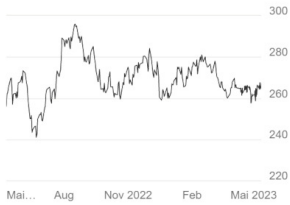
Strategie

Anlageziel des Fonds ist langfristiges Kapitalwachstum. Hierzu investiert der Fonds vorwiegend in Aktien von Unternehmen, die mit der Suche nach und Förderung von Rohstoffen, der Raffinierung, Verarbeitung und Vermarktung der Rohstoffe und deren Sekundärprodukten weltweit befasst sind.

Swisscanto (LU) Equity Fund Sustainable Global Water AT

Fonds | A0MSPX | LU0302976872

267,669 EUR



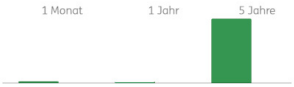
Basisinformationen

Fondskategorie	Aktienfonds
Emittent	Swisscanto Asset Management International S.A., Luxemburg
Morningstar-Rating	★★★☆☆
Nachhaltigkeitsbezug (SFDR)	Artikel 9 (Dunkelgrün)
Ausschüttungsart	Thesaurierend
Fondswährung	EUR
Fondsvermögen	390,98 Mio. EUR (Mittel)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	1,85 %
Performancegebühr	Nein
Ausgabeaufschlag	2,50 %

Performance im Vergleich



Swisscanto (LU) Equity Fund Sustainable Global Water AT

+1,35 % +0,63 % +51,81 %

Zusammensetzung

Anlageklassen

Aktien	97,2 %
Sonstige	2,8 %

Positionen

Stantec	4,3 %
Thermo Fisher Sc Rg	4,0 %
Valmont Ind	3,8 %
Evoqua Wtr Tech Rg	3,6 %

Länder

USA	63,2 %
Kanada	6,5 %
Japan	5,0 %
Großbritannien	4,5 %

Branchen

Industrie	51,4 %
Versorger	16,9 %
IT	12,0 %
Gesundheitswesen	11,3 %

Strategie

Anlageziel ist langfristiges Kapitalwachstum, verbunden mit angemessenem Ertrag. Der Fonds investiert weltweit vorwiegend in Aktien und andere Beteiligungspapiere von Unternehmen, die Technologien, Produkte oder Dienstleistungen mit Bezug zur Wertschöpfungskette des Wassers anbieten. Anvisiert werden insbesondere Unternehmen aus dem Bereich der Wasserversorgung, Wassertechnologien, Wasseraufbereitung, Wasserdienstleistungen, Wasserreinigung und Wasserrecycling.

M&G (Lux) IF 1 - Global Listed Infrastructure - EUR A Acc

Fonds | A2DXT8 | LU1665237704

15,286 EUR

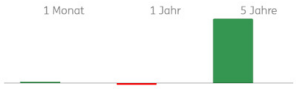
Basisinformationen

Fondskategorie	Aktienfonds
Emittent	M&G Luxembourg S.A.
Morningstar-Rating	★★★★☆
Nachhaltigkeitsbezug (SFDR)	Artikel 8 (Hellgrün)
Ausschüttungsart	Thesaurierend
Fondswährung	EUR
Fondsvermögen	2,66 Mrd. EUR (Groß)
Sparplan möglich	Nein

Kosten

Laufende Kosten p.a.	2,14 %
Performancegebühr	Nein
Ausgabeaufschlag	2,00 %

Performance im Vergleich



M&G (Lux) IF 1 - Global Listed Infrastructure - EUR A Acc

+0,95 % -1,58 % +56,95 %

Zusammensetzung

Anlageklassen

Aktien	98,9 %

Positionen

Enel Societa per Azioni	4,0 %
Segro	3,7 %
Crown Castle Intl.	3,5 %
E.ON	3,5 %

Länder

USA	39,5 %
Kanada	14,7 %
Großbritannien	12,5 %
Italien	9,5 %

Branchen

Versorger	34,0 %
Kommunikation	17,4 %
Transportwesen	14,0 %
Soziale Infrastruktur	

Strategie

Mindestens 80 % des Fonds sind in Aktien von Infrastrukturgesellschaften, Investmentgesellschaften und Immobilieninvestmentgesellschaften beliebiger Größe mit Sitz in beliebigen Ländern, einschließlich Schwellenmärkten*, investiert. Der Fonds hält in der Regel Aktien von weniger als 50 Unternehmen. Die Mindestallokation von 80 % kann Stammaktien, Vorzugsaktien und Wandelanleihen umfassen. Zu den Infrastrukturgesellschaften gehören Unternehmen in den folgenden Sektoren: Versorgung, Energie, Transport, Gesundheit, Ausbildung, Sicherheit, Kommunikation und Transaktionen. Unternehmen, die mehr als 30 % ihres Umsatzes aus Strom von Kohle- und Kernkraftwerken erzielen, sind vom Anlageuniversum ausgeschlossen, ebenso Branchen wie Tabak, Alkohol, Unterhaltung für Erwachsene, Glücksspiele und Waffen. Die Prinzipien des United Nations Global Compact zu Menschenrechten, Arbeits- und Umweltrechten sowie der Korruptionsbekämpfung werden bei der Analyse der Unternehmen ebenfalls berücksichtigt.

OBJECTIVE OF THIS BROCHURE

Dear Participants,

Sustainability is on everyone's lips these days. But what does it have to do with our financial investments? In this brochure, you will learn what sustainability means when it comes to investing. In particular, you will learn about the criteria and investment strategies that are at play in the composition of sustainable funds and ETFs. Most importantly, it will help you make more informed investment decisions. Enjoy the reading!

Best regards,

Christina E. Bannier Alix Auzepy Florian Gärtner

WHO WE ARE

Justus-Liebig-Universität Gießen
Chair of Banking & Finance (BWL VI)
Prof. Dr. Christina E. Bannier
Licher Straße 62
D-35394 Gießen

Contact person: Florian Gärtner, M.A.
Florian.gaertner@wirtschaft.uni-giessen.de

General Knowledge: Sustainable Investments

ESG – WHAT IS IT?

Anyone interested in sustainable investing will repeatedly come across the so-called ESG criteria. The acronym stands for "**Environmental, Social and Governance**".

These three generic terms have become widely accepted by professional investors, such as pension funds or asset managers, as **important criteria for classifying sustainable investments**. ESG refers to three key areas of responsibility that can be assessed in order to determine the sustainability performance of a company.

FOR A COMPANY TO BE CONSIDERED A SUSTAINABLE COMPANY ON THE FINANCIAL MARKETS, IT MUST PERFORM WELL IN ONE OF THESE AREAS - OR PREFERABLY ALL THREE.

However, there is **no universally accepted definition of sustainability**: A "green finish" does not always mean that a financial product is truly sustainable. Rather, one must carefully examine the product and its composition, for example, the individual companies in a fund. In general, a company can be considered sustainable on the financial markets if it performs well in one of the ESG areas - or preferably in all three.

Sustainability features may vary significantly from one financial product to another. Investors should therefore be aware of the **specific investment criteria and strategy applied before investing in a fund and ETF.**

THREE CENTRAL CRITERIA

Environmental

This area includes companies that are, for example, characterized by their adoption of environmentally friendly production processes, efficient utilization of raw materials, waste reduction efforts, and a focus on minimizing greenhouse gas emissions. Additionally, companies that make significant investments in renewable energy sources and technologies geared towards combating climate change tend to achieve high scores in this crucial category.

Social

This area includes companies that set high standards for the rights and well-being of their employees. This includes maintaining strict policies against child labor and avoiding any form of discrimination based on gender, ethnicity or other minority characteristics. Companies that score high in this area provide fair compensation to their employees. They also actively engage with their suppliers to ensure compliance with the necessary standards and promote a responsible and inclusive working environment throughout their supply chain.

Governance

Companies with good corporate governance reject corruption and ensure independence and transparency in their decision-making. They place a high priority on compliance with legal requirements and create a supportive environment for whistleblowers. The sustainability strategy is integrated into their management and undergoes regular review by the company's supervisory bodies.

SUSTAINABLE FUNDS AND ETFS

How do sustainable funds or ETFs actually select their stocks? What benchmarks and criteria do they use, and what methods do they employ?

A common strategy of sustainable funds is to **exclude harmful companies and business practices**. Depending on how sustainability is understood, different exclusion criteria may come into play. Here are some examples:

- **Fossil energy:** This includes various business activities related to coal and oil. Special processes such as fracking or the use of oil sands may also be excluded.
- **Nuclear power:** This often includes not only the operation of nuclear power plants, but also the production of nuclear components and uranium mining.
- **Armaments and weapons:** This category includes, for example, manufacturers of controversial weapons and suppliers of critical components.
- **Disregard for human and labor rights:** Companies may be excluded if trade union rights are not respected, if children are used as labor, or if forced labor is used.
- **Business ethics:** This refers to unethical or criminal business practices such as corruption, tax evasion and money laundering. Companies with serious violations in these areas may be excluded.

A COMMON STRATEGY OF FUND COMPANIES IS THE EXCLUSION OF HARMFUL COMPANIES AND BUSINESS PRACTICES.

Certain **thresholds** are often used when applying exclusion criteria. This means, for example, that a company can generate up to 5% of its revenue from fossil fuels without violating the specific exclusion criteria applied by the fund.

In addition to the use of exclusion criteria (as "negative" criteria), "**positive" criteria** are also used in the composition of sustainable funds. The positive criteria are based on three additional strategies, among others: ESG integration, best in class and theme selection.

THREE ADDITIONAL STRATEGIES

ESG integration

ESG integration is an investment strategy that entails including companies in a fund's composition based on specific minimum thresholds related to financially significant ESG factors. This approach involves overweighting stocks of companies with robust ESG practices and underweighting those with poor ESG performance. To evaluate these thresholds, ESG ratings or similar scores are commonly used.

Best-in-class

The best-in-class strategy focuses on including companies in a portfolio that are industry leaders in specific sustainability areas. This means selecting companies that excel in environmental, social, and governance practices, even if they operate in traditionally unsustainable sectors, as long as they are at the forefront of positive change in their industry. For example, investing in an energy company that operates coal-fired power plants might be an option if it is also has a strong commitment to renewable energy.

Theme selection

Thematic investing is an investment strategy where funds select companies based on specific themes or problem areas they focus on, such as renewable energies, water, health, and other relevant sectors. By targeting companies aligned with these themes, the funds aim to capitalize on emerging trends and innovations within these areas.

REGULATION IN THE E.U.

The multitude of terms and strategies surrounding sustainable investing can be confusing for investors. However, the European Union has taken a step towards providing clarity and transparency with the introduction of the **Sustainable Finance Disclosure Regulation (SFDR)** in 2021.

This regulation mandates asset managers, banks, and fund companies to categorize financial products like funds and ETFs into one of the **three following categories**:

- **Article 6 funds:** These funds take into consideration ESG factors and sustainability risks in their investment decisions. However, they do not explicitly promote or market their specific environmental or social features.
- **Article 8 funds:** In contrast to Article 6 funds, Article 8 funds not only consider and integrate ESG factors and sustainability risks into their investment strategies but also actively advertise their environmental or social features.
- **Article 9 funds:** Article 9 funds are specifically designed to pursue sustainable investment objectives with measurable impacts.

The SFDR facilitates investor decision-making by requiring funds to **document** their sustainability objectives and policies in fund brochures and on their websites.

THREE CENTRAL ARTICLES

Article 6 funds: Traditional financial products

Classification under Article 6 signifies that ESG considerations are not the primary focus of the investment strategy. As part of the disclosure requirements, Article 6 funds must describe how sustainability risks could potentially influence their investment policy and impact their financial position. If sustainability risks are not considered relevant, they must provide a clear explanation for this decision.

Article 8 funds: Light green products

Classification under Article 8 indicates that the funds not only consider, but also actively promote, sustainability features in its investment policy, alongside financial objectives. These products are required to disclose how they incorporate environmental and/or social features, while also ensuring good corporate governance practices.

Article 9 funds: Dark green products

Classification under Article 9 indicates that the funds have a clearly defined sustainable investment objective. They must explicitly state an environmental, social or similar objective. These funds also seek to reduce negative impacts on other environmental or social considerations. In addition, they are must transparently disclose how they ensure the achievement of their sustainable investment objective.

KEY TAKEAWAYS

- Sustainable funds are funds that use ESG criteria in their stock selection. ESG stands for the dimensions: **Environmental, Social & Governance**. These criteria are critical to evaluating a company's sustainability performance.
- Although these criteria are commonly used, there is **no binding or universally accepted definition of sustainability**, which means that sustainability characteristics can vary greatly from one financial product to another. Differences may arise due to how the individual dimensions are measured and weighted.
- In the context of sustainable funds, the selection criteria and sustainability characteristics for the inclusion of companies in the fund are determined by the **fund's strategy**. It is common for the fund strategy to have an **emphasis on certain ESG criteria** to the **detriment of other sustainability aspects**.
- It is therefore **not necessary** for a company to have an equally good performance in all three dimensions - environment, social and governance - in order to be considered sustainable by the financial markets. A single dimension may be sufficient.
- In practice, there are **various approaches** to how sustainable funds make their selection decisions based on ESG criteria. These include exclusion procedures, ESG integration, best-in-class approach and theme selection.
- The EU Sustainable Finance Disclosure Regulation (SFDR) requires asset managers and fund companies to classify their financial products into sustainability categories known as **Article 6 (traditional financial products), Article 8 (light green financial products)** and **Article 9 (dark green financial products).** The aim is to create transparency about the actual extent to which ESG criteria are taken into account in the investment strategy and the pursuit of sustainability goals.

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