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Sustainable finance literacy and the determinants of sustainable investing [☆]

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ABSTRACT

In this paper, we survey a large sample of Swiss households to measure sustainable finance literacy, which we define as the knowledge and skill of identifying and assessing financial products according to their reported sustainability-related characteristics. To this end, we use multiple-choice questions. Furthermore, we measure Swiss private investors' level of awareness about sustainable financial products using open-ended questions. We find that Swiss households, which are generally highly financially literate by international standards, exhibit low levels of sustainable financial literacy compared to the current working definitions of sustainable finance. Moreover, despite its low level, knowledge about sustainable finance is a significant factor in the reported ownership of sustainable products. The empirical results also show a relatively low level of awareness. Generally, these empirical findings suggest a need to create transparent regulatory standards and strengthen information campaigns about sustainable financial products.

1. Introduction

Sustainable financial products account for more than half of the inflow into European investment products (Morningstar, 2021), reflecting a global trend.¹ However, despite numerous initiatives, no clear definition has yet emerged in the financial markets that identifies an investment product as sustainable in a clear and systematic way. As a result, investors, especially retail investors, face a complex and confusing set of information when evaluating a financial product's sustainability level. This lack of transparency requires financial knowledge of sustainable investments that exceed basic financial literacy to make informed

investment decisions. We use a household survey in Switzerland to measure retail investors' knowledge about sustainable financial products and show their influence on self-reported sustainable investments. This concept can be understood as a type of literacy that we propose to call "sustainable finance literacy," and define it as *the knowledge and skill of identifying and assessing financial products according to their reported sustainability-related characteristics*

Our results suggest that the general level of sustainable finance literacy is low compared to the current working definitions of sustainable finance constructed by authorities and institutions. Nevertheless, it is a significant determinant for reported investments in sustainable prod-

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¹ According to European Commission, sustainable finance refers to taking into account environmental, social, and governance (ESG) considerations when making investment decisions, see: <https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance>. In the financial sector, the ESG criteria lead to more long-term investments in sustainable economic activities and projects.

ucts, complementing sustainability preferences. Note that our empirical analysis provides only suggestive evidence and no causal effect because we cannot exclude the presence of an endogeneity problem. This finding is especially relevant in the current low-transparent market for sustainable investments. This lack of information transparency regarding sustainability certainly does not favor investors. Hence, with the observed level of sustainable finance illiteracy, private investors may become easy prey for greenwashing.

Compared to classical financial literacy, we interpret sustainable finance literacy as an extension of this basic concept. Financial literacy describes the skills and knowledge necessary for financial decision-making.² Additional knowledge is necessary to make informed investment decisions in sustainable financial products.

We measure sustainable finance literacy by surveying a large sample of households in Switzerland and using close-ended questions. Switzerland has a high level of financial literacy by international standards (Ackermann and Eberle, 2016) and the Swiss government is firmly committed to making the Swiss financial center a pioneer of sustainable finance and a premier global hub in this field.³ Moreover, in our sample, all respondents had invested in a voluntary pension plan, where they were required to make an active financial decision - which corresponds to 62% of the Swiss working population. Therefore, these households serve as an ideal sample to measure sustainable finance literacy as they are characterized by considerable financial awareness.

We believe that to make well-informed investment decisions on financial products that have sustainable characteristics, private investors must possess a good level of financial literacy and sustainable finance literacy. Additionally, they require a general awareness of the existence of these products.

Hence, we also measure Sustainable Finance Awareness (SFA), which describes a top-of-the-mind general knowledge about the existence of sustainable finance products. Investors with a high SFA know that sustainable finance products exist but may not necessarily have specific knowledge about the main characteristics of these products. These investors can broadly describe sustainable investments in their own words and talk about it, but they still face barriers due to their low SFL. While we measure SFL with classic closed-ended questions, SFA is measured with a novel approach based on open-ended text answers. The main advantage of open-ended questions concerning close-ended questions is that the former do not prime the people participating in the survey. Therefore, these types of questions are more oriented to capture the general awareness of a topic than the knowledge of a specific definition or regulation. In the subsequent analysis, however, we mainly focus on the level of literacy and use SFA as a control variable.

To link sustainable finance literacy to a proxy for holding sustainable investments, survey respondents were asked to self-report their ownership of sustainable finance with “Yes,” “No,” or “I do not know.” We are aware that this outcome variable has limitations. For example,

² To measure financial literacy in our study, we closely follow Lusardi and Mitchell (2008). We remark that the definition of financial literacy by Lusardi and Mitchell (2014) goes beyond the financial knowledge considered by previous definitions (Noctor et al., 1992; Bernheim, 1998; Hilgert et al., 2003; Van Rooij et al., 2011). They define financial literacy as the ability to perform economic analysis and to do informed financial decision-making (see also Angrisani et al. (2016)). For instance, individuals with relatively higher cognitive abilities and financial literacy are more likely to optimize their investment decisions and make optimal decisions related to credit card use and applications for home loans (Agarwal and Mazumder, 2013). Titman et al. (2022) find that investors with low financial sophistication are more prone to invest in “suspicious” firms that artificially use stock splits to inflate their share prices. Moreover, investors with higher financial literacy are less likely to follow bad investment advice from financial advisors (Agnew et al., 2018).

³ See the Federal Council’s press release on June 26, 2020, <https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-79606.html>.

the sustainability of an investment is subjectively evaluated. Further, this variable doesn’t tell us the amount of money invested, risk profile, or exact sustainability profile of the investments. Nevertheless, we think this measure of ownership of sustainable finance products, although limited, can be used in an empirical analysis.

More generally, our paper contributes to different streams of literature. First, we introduce a new concept, sustainable finance literacy (SFL), and provide an analysis of its measurement. In the context of the new MiFID-II regulations in the European Union, SFL becomes even more critical because financial advisors are required to ask clients about their sustainability preferences concerning investments.

Our second contribution is to the determinants of the demand for sustainable investments. The literature on the demand for sustainable finance products is well documented, observing real-life investments (Døskeland and Pedersen, 2016; Gutsche et al., 2021; Riedl and Smeets, 2017; Bauer et al., 2021; Anderson and Robinson, 2022; Aiken et al., 2020) and hypothetical choice experiments (Barreda-Tarrazona et al., 2011; Gutsche et al., 2020; Heeb et al., 2023; Rossi et al., 2019). Most of these studies argue that environmental preferences are the main driver for sustainable investments.⁴ In our paper, we propose to consider also the knowledge of sustainable finance, measured with the level of SFL, as an additional determinant for sustainable investments.

From the above studies, the most related to our work is Anderson and Robinson (2022). They find financial literacy is a significant barrier for investors with high environmental values. These investors would like to align their environmental values with their investments, but they often do not have the necessary financial literacy to engage in financial markets. Anderson and Robinson (2022) conclude that green investors do invest more in ESG products, but only those with high financial literacy. Similarly, Bethlendi et al. (2022) analyze investors’ sustainability preferences and their financial literacy and conclude that for investors with green preferences, there is still potential to increase their investments.

Our analysis provides a complementary perspective: instead of measuring investor characteristics for finance and sustainability separately and analyzing their overlap, we directly measure the intersection of the two areas with SFL and how it correlates with decision-making. We show that even in a high financial literacy setting, more than these conditions are needed. Investors still need an additional layer of literacy - SFL, to make informed investment decisions.

Many investors have environmental preferences and, consequently, environmental knowledge, as shown by Anderson and Robinson (2022). Like Anderson and Robinson (2022), we also found that environmental knowledge (in our case, “sustainability literacy”) is no statistically significant factor for owning sustainable finance products. While green preferences are correlated with knowledge about green investing, many potentially interested green investors have low levels of SFL. This is because placing importance on sustainability does not always imply knowing how to do so. For instance, while many households want to save energy, only a minority have the necessary knowledge to choose an optimal heating source for their home. Instead of addressing green preferences, which is difficult for policymakers, they have the possibility to educate the large number of investors that already have green preferences but do not invest because of their low SFL.

Lastly, we contribute to the economics literature by using open-ended survey questions to assess the level of sustainable finance awareness (Egami et al., 2018; Stantcheva, 2020; Wekhof and Houde, 2023;

⁴ The literature suggests investors influence the behavior of firms they invest in with their sustainability preferences. For example, socially responsible institutional shareholders positively influence corporate social responsibility scores of companies they invested in (Hwang et al., 2022) and reduce local pollution (Kim et al., 2019). Moreover, there is evidence that investors include the firms’ climate change exposure into the risk premium they demand (e.g., Sautner et al., 2023). Further, close-call corporate social responsibility proposals can improve a firm’s financial performance (Flammer, 2015).

Ferrario and Stantcheva, 2022). To analyze the answers to these questions, we rely on recent advances in natural language processing (NLP).⁵ We build on this literature and use an open-ended question to assess knowledge in a finance setting. Hence, we add to the literature on survey methods in financial economics, especially those concerned with behavioral biases (Liu et al., 2022). The text-analysis method used in this paper allows us to use a large sample of respondents and transform the text answers into a quantifiable metric for statistical analysis.

The remainder of this paper is structured as follows. In the next section, we will provide an overview of the data. Section 3 describes the different literacy concepts underlying our study. In this section, we also present the open-ended question to assess sustainable finance literacy and our NLP-based method to analyze the text responses. In Section 4, we present our empirical strategy and the estimation results, followed by a concluding section.

2. Data

This section presents the survey and data used in the empirical analysis. Organized between October and November 2021, this survey provides data from 3,059 participants in the German-speaking part of Switzerland. The participants were recruited from a large panel of households by a professional marketing company. This panel has been incentivized to participate in the survey with a payment. Moreover, the company provided many background variables on the respondents, including socioeconomics, insurance, leisure time activities, and media consumption.

Further, the survey company screened participants such that only investors with previous investment experience participated. Participants could participate in the survey if they had invested in the Swiss voluntary pension plan. As of 2019, about 62% of adult Swiss residents participate in this voluntary pension plan, similar to the US private pension plan, which allows investing in financial markets for a later pension plan.⁶

In October, the survey company invited approximately 360 households to participate in a pretest. After this phase, we adjusted some questions and simplified the questionnaire. Afterward, the company invited 22,391 household members of the panel to participate in our study; the invited participants were randomly sampled from the overall panel population and stratified by age and gender (stratified random sampling). In total, 6,115 respondents started the survey, which implies a response rate of 27.3%. Out of the 6,115 potential survey respondents, 1,156 did not pass the screening because they did not have a pension plan (or did not have one in the past). 283 respondents could not participate because the quota based on age and gender had already been fulfilled for these particular respondents. 4,676 respondents started to answer the survey, and 1,617 of these respondents quit the survey after a couple of questions, which resulted in 3,059 complete responses. Moreover, for 955 participants who completed the survey, we did not receive information about their income and wealth from the survey company. Therefore, because these two variables are important, we performed the empirical analysis of this paper using a sample of 2,104 respondents. We checked the similarity of the total sample of 3,059 respondents with the sample of 2,104 concerning the variables used in the analysis, and we did not find any important difference.⁷ The question-

⁵ Examples with open-ended questions include recent surveys with store managers (Manthei et al., 2022) or start-up entrepreneurs (Ganguli et al., 2021). However, these studies rely on manual classifications by human coders. In a more general setting, NLP is increasingly used to analyze large volumes of existing text data, e.g., (Bellstam et al., 2021; Guzman and Li, 2022; Campbell and Shang, 2022).

⁶ See Switzerland's so-called "3rd pension pillar" <https://www.bfs.admin.ch/bfs/de/home.html>.

⁷ The sample with 3059 respondents and the sample with 2104 respondents (which we use in the empirical analysis) are similar for most of the socioeco-

naire has been structured in three parts. In the first part, we included questions to measure the various literacy concepts. In the second part, we organized a simple choice experiment that we intend to analyze for a future research project, and in the third part, we measured several psychographic variables.

Table 1 presents the summary statistics for all respondents for socioeconomic variables, environmental behavior, and psychographics.⁸ The mean age of the respondents is 49, and about 50% hold a university degree. The sample consists of slightly more men than women, with 54.7% male. Half of the sample is married, and 16% are pensioners. The mean household consists of 2.4 persons. The monthly household income is at 9,193 CHF, and the mean household wealth is CHF 341,250, which, at the time, corresponds to approximately USD 314,000. In addition, we asked respondents if they donated to a social or environmental organization within the last 12 months (which applies to 77% of the sample).

Most importantly, we asked if the respondents hold any sustainable financial investments, of which 26.7% answered "yes."⁹ Further, 19.8% answered "I do not know," 4.4% answered "I prefer not to answer this question", and 49% answered "No."¹⁰ In the following analysis, we excluded 4.4% of the sample that preferred not to answer the question of owning sustainable financial products.

Our measure of sustainable finance product ownership relies on the respondents' self-reporting information and not on banking and financial records. Therefore, this self-reporting variable has some limitations. For example, this variable describes respondents' subjective evaluation of whether they own sustainable finance products. Of course, we should keep in mind that there is no objective and precise definition of sustainable finance products (depending on the metric used, a product may be classified as sustainable or not Berg et al. (2022)). Therefore, also, an objective classification of sustainable finance products may be imprecise. Further, this variable doesn't tell us the amount of money invested and the risk profile of the investment. Despite its limitations, we believe this measure of ownership of sustainable finance products can be used in empirical analysis. Of course, these aspects should be kept in mind in the interpretation of the empirical results.

We also included psychographic variables on risk preferences, time preferences, altruism, and trust, where we follow Falk et al. (2022). In addition, we asked about the importance of mitigating climate change, following Heeb et al. (2023) (we call this variable "climate awareness" throughout the paper). In the Appendix, in Section C, we provide histograms for each psychographic variable; as it is visible from these histograms, the variables are not uniformly distributed. More detailed information on the exact questions for each variable can be found in Appendix J, Tables J.1, and J.2.

3. Literacy and awareness measures

We know from the literature that to make informed and sound financial decisions, it is vital to have a good level of financial literacy (Lusardi and Mitchell, 2008). In this paper, we argue that to make informed investment decisions on financial products with sustainable characteristics, private investors need, on top of a good level of finan-

conomic variables apart from a small difference in the share of women. In the Appendix, we provide summary statistics of the sample with 3059 respondents in Table D.2.

⁸ Unfortunately, at the Swiss level, there does not exist socioeconomic statistics on the population that is engaged in financial markets. Therefore, we cannot provide a table that compares the descriptive statistics of the sample considered in this paper in the final estimation. Consequently, we cannot affirm that our sample is representative of the subpopulation of Swiss private investors.

⁹ The question was "Do you own sustainable financial products?" with the options yes, no, I do not know, and I prefer not to answer this question.

¹⁰ In our sample, respondents who answered "I do not know" in comparison to respondents who stated either "Yes" or "No" are generally less literate, lower educated, and have a lower income.

Table 1
Summary statistics.

| Variable | Mean Value | Median | St.Dev. |
|---|------------|--------|---------|
| <i>Demographics</i> | | | |
| % Female | 41.73 | | |
| Age | 49.94 | 50.5 | 14.68 |
| % University Degree | 54.85 | | |
| % Pensioner | 16.78 | | |
| % Married | 50.14 | | |
| Household size | 2.40 | 2 | 1.24 |
| Income [CHF] | 9,226 | 7,500 | 3,407 |
| Wealth [CHF] | 341,516 | 75,000 | 691,398 |
| <i>Pro environmental behavior</i> | | | |
| % Social or Environmental donation (within 12M) | 78.75 | | |
| % Report sustainable financial products [Yes] | 28.8 | | |
| % Report sustainable financial products [No] | 51.1 | | |
| % Report sustainable financial products [I do not know] | 20.0 | | |
| <i>Psychographics (/10)</i> | | | |
| Risk preferences | 4.81 | 5 | 2.34 |
| Time preferences | 6.39 | 7 | 2.07 |
| Altruism | 6.35 | 7 | 2.27 |
| Trust | 4.92 | 5 | 2.59 |
| Climate awareness | 8.20 | 9 | 2.36 |

Note: This table presents the summary statistics for the complete survey sample with 2,104 observations. Additional information on the variables can be found in Appendix J.

cial literacy, to first be aware of these products and, additionally, a good level of what we call “Sustainable Finance Literacy (SFL).” This new literacy concept, as anticipated in the introduction, is defined as the knowledge and skill of identifying and assessing financial products according to their reported sustainability-related characteristics.

More specifically, to make informed decisions in green finance, private investors must first be *aware* of the existence of sustainable finance products with their different sustainability dimensions. Secondly, investors must be able to *identify* sustainable products among the available investment options. Finally, investors need to *assess* the sustainability of financial products to rank products and rank them according to their sustainability.

In this paper, we propose to measure the level of knowledge of the existence of sustainable finance products with a measure that we call “Sustainable Finance Awareness (SFA).” Furthermore, we propose to measure the ability to identify and assess sustainable financial products with the new literacy concept presented in this paper, i.e., SFL.

The SFA measure aims to determine if the investor is familiar with sustainable finance products and can realize a potential alignment with their preferences. For example, suppose an investor strongly values social issues such as inequality but assumes that sustainable finance products only prioritize environmental concerns. In that case, they may not consider sustainable financial products when deciding on financial investments. Of course, a high level of awareness may also imply an engagement or active interest in sustainable financial products.

We measure the *awareness* dimension by asking an open-ended question where respondents are invited to explain in their own words what they think is the difference between a traditional and a sustainable finance product. While it is, in principle, possible to measure awareness with closed-ended questions, we believe the open-ended format can better capture awareness as there is no influence from presented multiple-choice options. If a respondent mentions more dimensions, it indicates a higher level of SFA.

As mentioned above, the ability to identify and assess sustainable financial products is at the core of SFL. The *identify* dimension evaluates one’s understanding of the rules determining if an investment is sustainable. In practice, when an investor expresses interest in sustainable investment products, they may encounter a variety of options, but only some will have sustainable features. Therefore, it becomes crucial for the investor to identify which products possess sustainable characteristics. The skills measured for the *identify* dimension include knowing

the meaning of the acronym ESG, the understanding that not all products need to meet sustainability criteria in every ESG dimension to be deemed sustainable, and that there are no universal regulations in place.

The *assess* step outlines the requirements for creating a ranking concerning the sustainability of the sustainable products discovered in the identify stage. For example, if investors have identified two products with social features, they must determine which product excels in this sustainability aspect. To measure the dimensions of *identify* and *assess*, i.e., the level of SFL, we use multiple-choice questions. These dimensions are essential in building practical skills that enable retail investors to make informed decisions regarding sustainable finance products. Since investors already have access to available products during decision-making, multiple-choice questions are suitable as respondents can select the correct answer from several options.

In addition to sustainable finance literacy and sustainable finance awareness, we also measure classic financial literacy and general knowledge about sustainability (sustainability literacy). As discussed in more detail in the following sub-section, sustainability literacy differs from sustainable finance literacy. Sustainability literacy measures the knowledge related to the three classical dimensions of sustainable development, i.e., environmental, economic, and social dimensions. In contrast, SFL measures the knowledge of financial products that should promote sustainable development. We expect a positive correlation between these two literacy concepts. However, this correlation should not be high because these two literacy concepts cover different aspects of the broader concept of sustainable development.

Next, we present the measurement of SFL and SFA. A detailed description of measuring financial literacy and sustainability literacy is in the Appendix in Section A.

3.1. Sustainable finance literacy (SFL)

For the design of an indicator for SFL, we consulted several industry experts in the field of sustainable finance, as well as experts from NGOs and academia. Moreover, we considered numerous publications from NGOs related to green finance. The SFL indicator is measured using eight multiple choice questions that cover the identify and assess dimensions of sustainable investing (a summary of the answers can be seen in Table 2 and the complete list of questions is in Appendix I).

Table 2
Sustainable finance literacy, individual questions.

| | % correct | % incorrect | % I do not know |
|----------------------|-----------|-------------|-----------------|
| IDENTIFY: | | | |
| - ESG definition | 26.4 | 32.1 | 41.5 |
| - ESG rules | 41.0 | 31.9 | 27.1 |
| - ESG elements | 4.5 | 58.2 | 37.3 |
| - Awareness of label | 12.7 | 87.3 | N/A |
| ASSESS: | | | |
| | % correct | | |
| - ESG example | 32.3 | 46.2 | 21.5 |
| - ESG impact | 52.2 | 31.8 | 16.0 |
| - ESG Awareness | 47.9 | 12.7 | 39.3 |
| - Impact definition | 20.1 | 7.8 | 72.0 |

Note: This table contains the eight individual questions for the SFL score. For each question, the percentage of correct responses is displayed, along with the share of incorrect responses and the share of “I do not know” answers. The score for SFL consists of the sum of correct answers to the individual questions.

The score for SFL is the sum of correct answers to the eight individual questions.¹¹

We developed an initial set of questions and then discussed them with experts from the finance sector. After that, we adapted the questions based on their feedback, discussed them internally with several individuals from academia, and modified the questions. After that, we conducted a pre-test with 360 Swiss retail investors. After this pre-test, we marginally modified the questions to clarify some of the concepts we asked. In the pre-test with 360 respondents and the final survey with 3059 respondents, respondents could comment at the end of the study. In total, we received 197 responses for both the pretest and final survey, of which 13 indicated that the questions were challenging and six indicated that the questions were hard to comprehend. However, we received no major comments on the questions’ ambiguity level.

For the identifying step, the first question asked about the definition of a major concept, namely the ESG acronym that is ubiquitous in sustainable investing. Respondents had to identify the correct meaning of ESG out of several options. As shown in Table 2, 26.4% of the respondents knew the correct meaning of ESG. The following two questions covered possible certifications of sustainable finance products. First, we asked if a product must meet a uniform set of criteria set by the state regulatory authorities to be advertised as a “sustainable finance product” in Switzerland. For this question, 41% knew the correct answer, which was “no.” In the second question, we asked the respondents if they were aware of a label that certifies a sustainable finance product, which was the case for 12.7% of the respondents. Certifications and labels serve a significant role in sustainable finance by providing a standardized framework for evaluating the sustainability of financial products. Therefore, it is essential to be aware of such certifications to comprehend the sustainable finance ecosystem fully.

Next, we asked if respondents were aware that a sustainable finance product is not required to meet sustainability in each of the three areas but only in one of them. We asked how many of the three ESG components a company must be sustainable in for it to be considered as a “sustainable company” by the financial market. The correct answer to this question was that only one of the three elements must be satisfied. Strikingly, only 4.5% of the respondents gave that answer, which may indicate that the definition of sustainability in financial markets is not always aligned with the general public understanding (in contrast, 46% wrongly assumed that all three elements must be satisfied).

For the assessment step, the first question consisted of an example of a company with a low environmental footprint but poor social practices. We asked if it was possible to call the shares of this com-

pany on the financial markets a “sustainable finance product,” to which 32% answered correctly with “yes.” The last three questions covered the impact of sustainable finance products on the real economy. Many retail investors are unaware that a sustainable finance product is mainly traded on secondary financial markets, which means that an investment in such a product has no direct and immediate impact on the real world. Therefore, the first question asked if an investment in a sustainable fund that includes companies with a low CO2 footprint directly reduces global CO2 emissions (52.2% correct). In the following question, we asked if financial institutions that offer sustainable products always proactively influence the behavior of the companies in which they are invested. 48% of the respondents correctly answered that this is not always the case. Our last question asked if there was a difference between “sustainable investing” and “impact investing.” Only 20% of the respondents knew there was a difference between the meaning of these two terms.

The results of the individual questions on sustainable finance products show that the level of knowledge about these products is generally low. Of course, we should be aware that the results may be influenced by the difficulty of the questions, especially on the level of detail asked. For instance, in more general dimensions of the knowledge related to financial products, a considerable share of the investors showed knowledge.

3.2. Sustainable finance awareness (SFA)

Sustainable finance awareness aims to determine if investors are aware of the existence of sustainable finance products and their difference from more traditional finance products. It is measured through an open-ended question. For instance, an investor who values social issues may assume that sustainable finance products only prioritize environmental concerns, leading them to overlook such products. We asked respondents to explain in their own words the difference between traditional and sustainable finance products to measure their awareness. While closed-ended questions can measure awareness, we prefer open-ended questions as they can better capture awareness without influencing responses. If a respondent mentions more dimensions of sustainable finance products (such as having environmental characteristics or excluding dangerous practices), it indicates a higher level of SFA.

The literature of psychology and cognitive sciences differentiates between two major types of questions to assess knowledge: multiple-choice questions (MC), where respondents identify the correct answer among several options, and constructed response questions (CR), which consist of open-ended questions requiring a written text answer. Answering MC questions is based on a cognitive process called “recognition,” where the correct answer must be recognized among possible choices on display. In contrast, CR questions require writing an original response using information from memory, a mental process referred to as “free recall.” The cognitive processes needed to answer recognition-type questions differ from the more individual task in answering recall-questions (Lane, 2004; Anderson and Bower, 1972; Lindner et al., 2015).

To assess SFA in an open-ended format, we asked respondents to answer an open-ended question with a written text answer. Specifically, we asked the following question: *Describe which characteristics should distinguish sustainable financial products from conventional investments. Please write a short text of about three sentences.* The responses were generally well-written and based on complete sentences. An example from one survey participant is the following: *“Sustainable financial products invest in companies or technologies that minimize environmental damage and unsocial conditions without being inefficient.”*

Fig. 1 shows a word cloud with the most commonly used words in all answers (words in a larger font were used more frequently). The most frequent words are “sustainable” and “companies,” which is expected because the question was to explain sustainable financial prod-

¹¹ As for the initial development of the measurement of financial literacy, we do not exclude that other questions could emerge in the future, perhaps building on our work to capture this concept more precisely.



Note: This word cloud contains the 50 most frequent keywords that respondents used to describe the difference between a traditional financial product and a sustainable product. Words with a larger font were used more often by respondents. All words were initially in German and translated into English using Google Translator.

Fig. 1. Word cloud knowledge.

ucts. However, more informative keywords about the characteristics of sustainable finance products consist of many less frequent keywords, such as “eco-friendly” or “working conditions.”

It should be considered that open-ended questions often elicit broad responses that are at the top of the respondents’ minds. Therefore, the open-ended responses reflect a respondent’s awareness of sustainable finance and not a specific knowledge. Furthermore, the literature on how to create and interpret a quantitative indicator of knowledge based on these open-ended answers is still evolving. Still, many approaches are based on the number of topics mentioned in an answer (e.g., Kraft (2023)). Hence, we propose to measure the level of awareness by the occurrence of specific topics related to sustainable finance characteristics. A topic, for instance, the environment, is defined by the occurrence of one of several keywords, such as eco-friendly or renewable energies. For example, if a respondent mentions the keywords “eco-friendly” and “working conditions,” then we consider that the respondent touched two topics, i.e., environment and social.

More specifically, since we need to map topics to the answers, we must first identify as many keywords as possible for each topic. We identify the relevant keywords using Natural Language Processing and artificial intelligence, following the approach by Wekhof and Houde (2023). We describe this procedure in detail in the Appendix in Section B.

Table 3 reports the share of each topic extracted from the open-ended text answer. More than half of the respondents associate sustainable financial products with words that belong to the environment topic, 26% with words that reflect the social topic, and only 5.8% with words included in the governance topic. The exclusion of weapons and other dangerous products, such as tobacco, was mentioned by 6.9%. Of all respondents, 10.2% associated sustainable investments with general ethical practices. Some respondents highlighted financial aspects of sustainability, i.e., they related sustainable finance products to low risk “financial sustainability” (8.5% of respondents), “long-term” investment horizons (7.8% of respondents), and “less return” (2.7% of respondents). A fraction of about 8.7% answered that sustainable products are only a marketing strategy and, in reality, constitute greenwashing. At the same time, 9.8% stated that sustainable products should have a

Table 3
Summary statistics open ended question knowledge.

| Topic | Topic share [%] |
|----------------------------|-----------------|
| Environment | 57.70 |
| Social | 26.22 |
| Governance | 5.85 |
| ESG | 2.16 |
| Ethical | 10.20 |
| Innovation | 5.95 |
| Exclude dangerous products | 6.86 |
| Impact | 7.13 |
| Long-term | 7.81 |
| Financially sustainable | 8.47 |
| Less return | 2.68 |
| Green-washing | 8.73 |
| Certified | 9.84 |
| Do not know | 10.95 |
| Do not know (revealed) | 4.18 |
| No answer | 3.37 |

Note: This table presents the topic shares obtained from the open-ended text answers, where respondents were asked to explain the difference between sustainable and traditional financial products. Individual answers can contain multiple topics.

form of certification or control about their sustainability characteristics. Only 2.1% explicitly mentioned the “ESG” criteria or the United Nation’s Sustainable Development Goals.

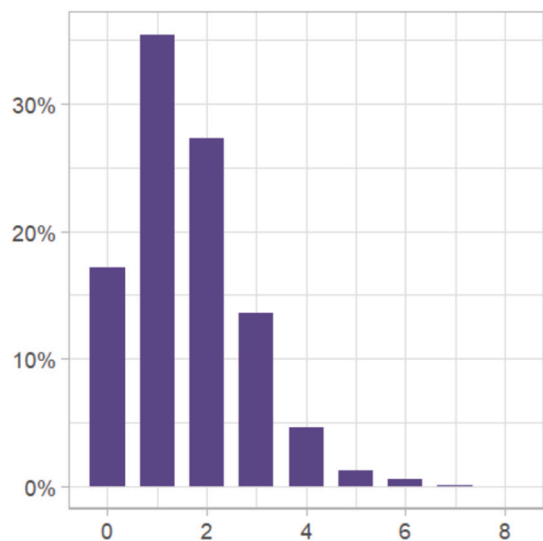
As many as 11% of the respondents wrote that they do not know the difference between sustainable and non-sustainable products. In contrast, 4.1% gave a meaningless answer that revealed to the reader that they also do not know the difference between sustainable and traditional products. Therefore, we labeled this group as “revealed do not know.” Finally, 3.3% of the respondents did not give any answer. Except for respondents who had no answer or were in one of the “do not know” categories, respondents often mentioned multiple topics in their responses.

As mentioned previously, the level of SFA is measured with the number of topics mentioned by each respondent in the text-response.¹² Fig. 2 shows a plot with the distribution of the number of topics per respondent mentioned in the answer to the open-ended question on the difference between sustainable and traditional financial products.

The descriptive statistics related to SFA indicate a median value of 1 and a mean value of 1.59, which is relatively low for a measure that ranges between 0 and 8. Therefore, identifying the level of awareness in a precise way is not easy. To identify the level of awareness, we also consider using a dichotomous variable that takes the value of 1 if the SFA measure is higher than the value of the third quartile of the distribution represented in Fig. 2 and 0 otherwise. In this way, we declare aware respondents who mentioned at least two topics in their open-ended answers. Using this approach, we can identify 42 percent of the respondents who have written at least two topics.¹³

¹² While the initial definition of the topics was performed manually, the number of topics per respondent is robust to combining topics. This is because unique keywords define the topics, and respondents usually only mention one or two keywords per topic. Hence, combining topics only affects the total number of topics per respondent in a few cases.

¹³ We also considered an alternative approach to create a continuous indicator to quantify the knowledge expressed in the open-ended responses, similar to a recent paper from Kraft (2023). This indicator considers the number of topics and adds the linguistic complexity of the answer. Our econometric results, reported later in the paper, do not change when using this more complex alternative measure. We believe that the approach based on the dummy variables is straightforward and more accessible in this specific case.



| | mean | median | 90th percentile | max | sd |
|------------------|------|--------|-----------------|-----|------|
| Number of topics | 1.59 | 1 | 3.00 | 8 | 1.19 |

Fig. 2. SFA: number of topics per respondent.

3.3. Comparing literacy measures

In this subsection, we present some descriptive statistics of the level of financial literacy, sustainability literacy, and sustainable finance literacy of the respondents of our sample. Fig. 3 shows the distributions and summary statistics of the three literacy scores. Most respondents obtained a total score of 3 points for financial literacy, which is unsurprising, given that all respondents participate in financial markets. The sustainability literacy score shows more variance with a mean score of 2 and a standard deviation of 1.2 and seems to follow a Poisson distribution. SFL follows a similar distribution with a mean value of 2.4 points and a standard deviation of 1.7. Hence, our sample of respondents is characterized by a high financial literacy standard but less knowledge of sustainability and only limited knowledge about sustainable finance. In this context, it is essential to note that the three different literacy scores are distinct from each other and are not strongly correlated. The correlation between financial literacy and SFL is at 0.23, between sustainability literacy and SFL at 0.25, and between sustainability literacy and financial literacy at 0.24. This indicates that the three indicators measure different dimensions of knowledge.¹⁴

4. Empirical specification and results

In this section, we first present the model specification used to analyze the determinants of literacy and the awareness level. Next, we show the model specification related to our primary goal of the paper, i.e., the analysis of the role of SFL on sustainable investments. Afterward, we illustrate and discuss the results obtained from the econometric analysis.

4.1. Model specifications

To specify an econometric model for the respondents' determinants of literacy level (financial literacy, sustainable literacy, and SFL), we should consider that these literacy concepts have been measured using the number of correct answers to the respective questions, a typical

¹⁴ To note that the correlation of these three literacy measures with SFA is also low.

count variable. For this reason, we opt to estimate the following econometric specification using a Poisson regression¹⁵:

$$\text{Model 1 : } Literacy_i = \alpha_i + \beta X_i + \varepsilon_i,$$

where the dependent variable consists of the respective literacy score (financial literacy, sustainable literacy, or SFL) of the i th respondent and the independent variables are the socioeconomic and psychographic characteristics.

As discussed in Section 2, our survey data included information on whether a respondent owns a sustainable financial product. Therefore, our dependent variable for the second model specification used in this paper is dichotomous. This variable is equal to one if the respondent owns a sustainable financial product and 0 otherwise.¹⁶ Therefore, for the estimation of this model, we decided to use a probit model:

$$\text{Model 2 : } SFP_i = \alpha_i + \beta Literacy_i + \delta X_i + \varepsilon_i,$$

where the dependent variable is an indicator that takes the value of 1 if the respondent i reports owning a sustainable financial product (SFP) and 0 otherwise. $Literacy_i$ includes a set of variables representing the level of financial literacy, sustainable literacy, as well as SFL, and X_i denotes the set of respondent-specific socioeconomic controls and the level of SFA, and ε_i denotes the residual term.¹⁷ From an econometric point of view, we should keep in mind that the literacy variables, as discussed in Lusardi and Mitchell (2014), may be endogenous.

In addition, we also estimate Model 1 with Sustainable Finance Awareness (SFA) as the dependent variable measured with a dichotomous variable that takes the value of 1 if the SFA measure is higher than 2 (value of the third quartile of the SFA score) and 0 otherwise. Therefore, we use a probit model to estimate this model specification.

4.2. Determinants of literacy

We now present and discuss the results on the determinants of the different literacy scores and the awareness dummy, obtained by estimating Model 1, using a Poisson count data model for the literacy scores and a probit model for the sustainable finance awareness dummy. Table 4 shows the average marginal effects for four different regressions, one for each literacy score (financial literacy, sustainability literacy, SFL) and one for SFA.

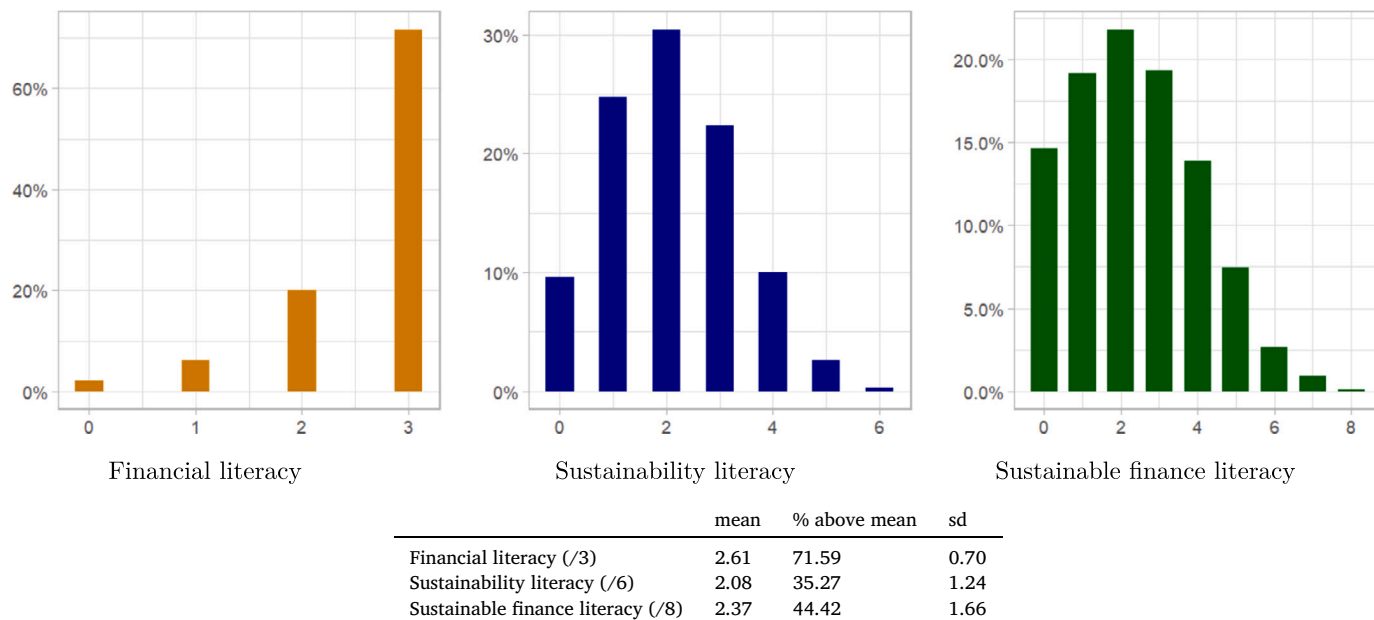
Generally, the models that explain sustainability literacy, SFL, or SFA show a higher number of significant coefficients than the model that explains financial literacy. Further, we find several statistically significant variables with a similar effect across models. For instance, most literacy scores positively correlate with university education (i.e., a respondent with a university education has a 0.4 points higher SFL). The literacy scores in the first three columns also all show a positive association with monthly income. For SFL, this means that a 100 percent higher income than the average is associated with a 0.36-point higher SFL score. Sustainability literacy and SFA share a higher time preference, meaning that respondents with a higher literacy score are more willing to forgo an immediate profit for future compensation (i.e., respondents with a one-point higher time preference than the average sample have a 0.04-point higher SFL-score).

In addition, the score on SFL shows a strong negative correlation with age and trust in other people and a positive correlation with both

¹⁵ We also estimated all model specifications using OLS. The results are similar to the results obtained using Poisson regression.

¹⁶ The value 0 reflects people whose answers to the question on the ownership of sustainable financial products was "No" or "I do not know." As a robustness check, as illustrated in section 4.3, we decided to estimate some models that consider the presence of people who answered "I do not know".

¹⁷ We also estimate this model using a linear probability model and the results are reported in the Appendix (Section E, Table E.3).



Note: This figure presents the distributions and summary statistics of the three literacy scores: financial literacy, sustainability literacy, and sustainable finance literacy.

Fig. 3. Distribution of literacy scores.

Table 4
Determinants of literacy and awareness scores - marginal effects Poisson regression.

| | (1) Financial lit. Poisson | (2) Sustainability lit. Poisson | (3) SFL Poisson | (4) SFA Probit |
|----------------------|----------------------------------|---------------------------------------|-----------------------|----------------------|
| Age | 0.001 (0.003) | -0.001 (0.003) | -0.022*** (0.003) | 0.001 (0.001) |
| Female | -0.161** (0.078) | -0.432*** (0.069) | -0.409*** (0.075) | 0.056** (0.023) |
| University educ | 0.123 (0.077) | 0.277*** (0.068) | 0.416*** (0.073) | 0.074*** (0.023) |
| Pensioner | -0.017 (0.129) | -0.062 (0.115) | 0.152 (0.136) | 0.010 (0.038) |
| Married | -0.018 (0.088) | -0.003 (0.078) | 0.014 (0.084) | -0.021 (0.026) |
| HH-size | 0.019 (0.034) | 0.016 (0.030) | -0.009 (0.033) | 0.006 (0.010) |
| Log income | 0.220** (0.103) | 0.216** (0.093) | 0.364*** (0.100) | 0.084*** (0.030) |
| Log wealth | 0.031 (0.037) | 0.040 (0.033) | 0.089** (0.035) | 0.004 (0.011) |
| Risk preference | 0.005 (0.017) | 0.023 (0.015) | 0.138*** (0.016) | 0.008* (0.005) |
| Donation | 0.050 (0.094) | 0.124 (0.083) | 0.236*** (0.086) | 0.093*** (0.028) |
| Time preference | 0.028 (0.021) | 0.042** (0.019) | 0.043** (0.020) | 0.012** (0.006) |
| Altruism | -0.009 (0.019) | 0.001 (0.017) | 0.019 (0.018) | 0.012** (0.006) |
| Trust | 0.000 (0.014) | -0.001 (0.013) | -0.036*** (0.014) | 0.008** (0.004) |
| Climate awareness | 0.011 (0.017) | 0.009 (0.015) | -0.002 (0.016) | 0.020*** (0.005) |
| Num.Obs. | 2104 | 2104 | 2104 | 2104 |
| Pseudo R2 Nagelkerke | 0.017 | 0.07 | 0.18 | 0.10 |
| Overdispersion p-val | 1 | 1 | 0.54 | |

*p<0.1; **p<0.05; ***p<0.01.

Note: Each column presents a separate regression model where the outcome is the respective literacy score. We estimated a Poisson regression model for the three literacy scores and a Probit model for SFA; the coefficients are the average marginal effects. The Over-dispersion test is performed according to Cameron and Trivedi (1990), where the null hypothesis is under equidispersion.

wealth and a preference for taking risks. Importantly, all three multiple-choice-based literacy scores show a strong negative correlation with female respondents, a well-known problem in the literature of financial literacy (Lusardi and Mitchell, 2014; Blasch et al., 2021).

Anderson and Robinson (2018) and Bucher-Koenen et al. (2021) suggest that one reason that explains a part of the gender gap in financial literacy consists of women’s lack of confidence in financial matters. This is reflected in women disproportionately choosing the option “I do not know” if it is available. Similarly, in our sample, women choose the “I do not know” option more often. However, as noted by Bucher-Koenen et al. (2021), this only explains a part of the gender gap: with a different evaluation of the answers that penalizes guessing, we find that the gender gap increases (with correct: 1, do not know: 0, wrong: (-1)).

The results for the determinants of Sustainable Finance Awareness are similar to those for literacy measures, with a positive correlation between education and time preference. Like the multiple-choice score on SFL, the open-ended SFA score also positively correlates with risk-loving behavior but less strongly. Unlike the other scores, the awareness measure does not correlate with wealth and age. In contrast to SFL, the coefficient for female respondents changed the sign, with women performing better on the awareness measure than men. This result suggests that women tend to be more aware than men but, as previously discussed, less informed about the precise characteristics of sustainable finance products.¹⁸

Overall, the above results confirm the conclusions obtained in other studies about the determinants of financial literacy and environmental literacy (Anderson and Robinson, 2022; Lusardi and Mitchell, 2014; Blasch et al., 2021).

4.3. Determinants of sustainable investments

Next, we estimate three versions of Model 2 using a probit-regression, with an indicator as a dependent variable that takes the value of 1 if the respondent reports holding a sustainable financial product and 0 otherwise. We treat the “No” and “Do not know” options as one category because this allows us to estimate a binary model.

With the estimation of Model 2, we are particularly interested in analyzing the effect of the level of SFL on the adoption on the adoption of sustainable finance products. Table 5 presents the results and reports the average marginal effects.¹⁹

The three models (columns one to three) differ in the included measures for literacy and awareness. The first column does not include the SFL and SFA as explanatory variables. The second column shows the results of the model specification that includes the SFL measure, whereas the third column presents our main model, which also includes the SFA measure.

In all model specifications, the coefficient of the most important variable of our analysis, the SFL indicator, is positive and significant. In column (3), SFL has a coefficient of 0.028, which implies that one additional point on the literacy score is associated with a 2.8 percent higher probability of owning a sustainable finance product. Of course, we should be cautious with interpreting this coefficient because we cannot exclude an endogeneity problem of the SFL variable. Therefore, this result provides only suggestive evidence that the level of SFL has an effect on the ownership of sustainable finance products. Further, the coefficients of the two other literacy measures, i.e., financial and sustainability literacy, are not statistically significant, even in the model

Table 5
Determinants of sustainable investments - marginal effects probit regression.

| | (1) | (2) | (3) |
|-------------------------|---------------------|---------------------|---------------------|
| Sust Fin Literacy | | 0.029*** (0.006) | 0.028*** (0.006) |
| SFA | | | 0.050*** (0.019) |
| Sustainability literacy | 0.001 (0.008) | -0.003 (0.008) | -0.004 (0.008) |
| Financial literacy | 0.022 (0.017) | 0.014 (0.017) | 0.012 (0.017) |
| Age | -0.001 (0.001) | 0.000 (0.001) | -0.001 (0.001) |
| Female | 0.018 (0.021) | 0.026 (0.021) | 0.021 (0.021) |
| University educ | 0.067*** (0.020) | 0.057*** (0.020) | 0.054*** (0.020) |
| Pensioner | 0.031 (0.034) | 0.026 (0.034) | 0.026 (0.034) |
| Married | 0.002 (0.023) | 0.002 (0.023) | 0.003 (0.023) |
| HH-size | -0.002 (0.009) | -0.002 (0.009) | -0.002 (0.009) |
| Log income | 0.010 (0.027) | 0.001 (0.027) | -0.002 (0.027) |
| Log wealth | 0.059*** (0.009) | 0.057*** (0.009) | 0.057*** (0.009) |
| Donation | 0.066*** (0.024) | 0.061** (0.024) | 0.058** (0.024) |
| Risk preference | 0.029*** (0.004) | 0.026*** (0.004) | 0.025*** (0.004) |
| Time preference | 0.008 (0.006) | 0.007 (0.006) | 0.007 (0.006) |
| Altruism | 0.010** (0.005) | 0.010** (0.005) | 0.009* (0.005) |
| Trust | 0.003 (0.004) | 0.004 (0.004) | 0.004 (0.004) |
| Importance climate | 0.023*** (0.005) | 0.023*** (0.005) | 0.021*** (0.005) |
| Num.Obs. | 2104 | 2104 | 2104 |
| Pseudo R2 Nagelkerke | 0.169 | 0.183 | 0.187 |

*p<0.1; **p<0.05; ***p<0.01.

Note: Each column shows the average marginal effects of a probit regression, where the dependent variable is a dummy that takes the value of 1 if the survey respondent answered “Yes” to holding sustainable investment products and 0 if the respondent answered “No,” or “I do not know.”

(column 1) that doesn’t include the SFL and SFA variables. The coefficient of SFA is positive and significant. This result indicates that people who are aware of the presence of sustainable financial products have a 5% higher probability of owning this type of product than unaware people. Overall, the magnitude of the coefficients in Model 2 is of similar magnitude compared to results from the related literature (Anderson and Robinson, 2022, e.g.).

Unlike the other significant explanatory variables for sustainable investing, SFL shows, however, not the largest effect. The most important influencing factor is wealth, followed by previous donations and university education. Interestingly, monthly income does not correlate with owning sustainable investment products. Income may not be statistically significant because we control for wealth. Wealthier investors tend to have a more diversified portfolio (Goetzmann and Kumar, 2008). Consequently, wealthier investors may be more likely to hold more sustainable finance products.

For psychographics, risk-loving and prioritizing mitigating climate change positively influence sustainable investment decisions. The effect size of these psychographic variables is comparable to the SFL score. We remark that the variable “donation” can be interpreted as variables representing the level of pro-environmental and pro-social views of the private investors in our sample.

As previously mentioned, treating “No” and “I do not know” as a single category could be problematic for two reasons: first, investors

¹⁸ We also estimated Model 1 as a dependent variable for SFA with the continuous measure that varies from zero to eight, as illustrated in Fig. 2. The results are similar to the probit model reported in column (4) of Table 4.

¹⁹ The estimation of Model 2 could also be performed using a linear probability model. We believe that, as discussed in Greene (2019), the probit model is a better choice. However, the results are confirmed also using a linear probability model, which we show in the Appendix in Section E, Table E.3.

who answered “I do not know” may own sustainable finance products. Second, these investors may have a different literacy level than those who answer “No.” As a first robustness check, we estimated the main model specification, excluding the respondents who answered: “I do not know.” The results in the Appendix in Section G confirm the findings reported in Table 5. Moreover, we also estimated a multinomial logistic regression on the three different types of ESG ownership (Yes, No, do not know, with “do not know” as the reference group) in Section F, Table F.4. Also, this analysis confirms the results of Table 5 and shows that respondents who answered “I do not know” have the lowest level of SFL of all groups.²⁰

As a complementary analysis, we also implemented an instrumental variable approach to attempt to consider that the variable SFL may be endogenous. As an instrument, we use the number of newspaper articles on ESG in the different newspapers each respondent reads. The results reported in the Appendix in Table H.1 confirm the results reported in Table 5. However, we do not claim any causal effect as the instrument may be weak.

5. Conclusion

With the increasing importance of sustainable investments in the financial market, retail investors will inevitably be confronted with sustainable investment options when deciding how to allocate their assets. However, no formal and generally accepted standard defines these financial products as sustainable. For this reason, individual retail investors’ knowledge of sustainability and its inclusion in financial products becomes essential in making informed investment decisions and achieving efficient market outcomes. When this knowledge is absent or insufficient, retail investors become prone to possibly misleading marketing and manipulation by financial providers.

In this paper, we propose to measure the knowledge necessary to make informed investment decisions regarding sustainable finance products with a new literacy concept, i.e., Sustainable Finance Literacy (SFL).

Our empirical analysis shows that although retail investors’ classical financial literacy turns out to be high, their level of sustainable finance literacy is low with respect to the current working definitions of sustainable finance as constructed by authorities and institutions. Moreover, our results provide suggestive evidence that the level of sustainable finance literacy is a relevant determinant for owning sustainable finance products and complements sustainability preferences. In contrast, financial and sustainability literacy does not have a statistically significant effect on holding sustainable assets.

The knowledge gap between the regulator’s intentions about sustainable finance and retail investors’ comprehension could probably be closed by several measures. On the regulator’s side, efforts to increase transparency about the regulations and provide legally binding standards could lower retail investors’ costs to understand sustainable finance – as it has been implemented successfully for energy efficiency or organic food labels. On the retail investor’s side, easily accessible information about sustainable finance could increase SFL, analogous to the efforts to increase classical financial literacy.

CRedit authorship contribution statement

Massimo Filippini: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **Markus Leippold:**

Conceptualization, Writing – original draft, Writing – review & editing, Funding acquisition. **Tobias Wekhof:** Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing.

Data availability

Data will be made available on request.

Appendix A. Financial literacy and sustainability literacy

A.0.1. Financial literacy

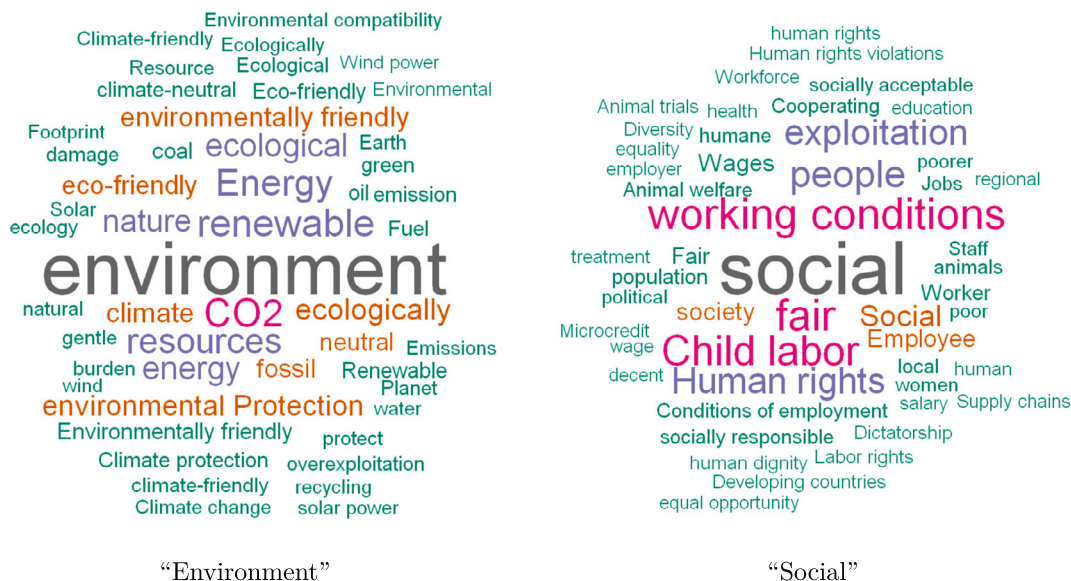
To assess general knowledge about investments, we build on the literature of financial literacy by Lusardi and Mitchell (2008) and use their three core questions to determine financial literacy, which are standard in the literature. The first question assesses the knowledge of interest rates, the second the effect of inflation, and the third question addresses the importance of portfolio diversification. Each question can be answered correctly or incorrectly. Following the literature by Lusardi and Mitchell (2008), we construct a financial literacy indicator by summing the scores based on the answers given by the participants to each of the three questions. Therefore, this indicator varies from 0 to 3 (the list of questions can be found in Appendix I). This procedure to create a literacy indicator is also used to compute the other two literacy indicators.

A.0.2. Sustainability literacy

The literature on measuring knowledge about sustainability is scarce. One of the few attempts to measure sustainability literacy is Zwickle et al. (2014), who designed a set of multiple-choice questions to assess the level of knowledge about sustainability. Notably, Zwickle et al. (2014) follow the sustainability definition of the United Nations, which includes, in addition to environmental aspects, the social and economic sphere. In the finance literature, Anderson and Robinson (2022) measure environmental literacy with a set of multiple-choice questions. However, the questionnaire used by these authors does not include questions about the social and economic dimensions of sustainable development. We start from the questionnaire by Zwickle et al. (2014), and we shorten and modify it for Swiss respondents to six questions that cover the three dimensions of sustainable development. After pretesting with 360 respondents, we refined the six questions to make them easier for respondents to understand. Each question has several answers, out of which only one is right. We take the sum of correct answers for each respondent; hence, respondents can obtain a score between 0 and 6. Appendix I provides a detailed list of all questions.

For sustainability literacy, we investigate respondents’ knowledge about the following sustainability aspects: the definition of sustainability, environmental sustainability, social sustainability, and economic sustainability. We start with the United Nations’ goals for sustainable development, which comprise economic growth, social participation, and environmental protection. Our first question targeted the UN’s definition of sustainability; we inquired if respondents knew that sustainability exceeds environmental protection and includes economic and social aspects. Our second question asked about different definitions of sustainable development, where we aimed to find out how much a respondent’s knowledge was aligned with the UN’s definition. The UN defines sustainable development as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*. We proposed two alternatives that either emphasized environmental protection or did not include the future orientation of sustainable development. The following two questions covered the ecological aspect of sustainability, where we asked for the primary source of river pollution and the main reason for the decline of fish stocks in the Atlantic Ocean. The social part was covered by a question on the share of individuals in Switzerland living below the poverty threshold. To finish, we asked to estimate Switzerland’s average annual GDP rate for the economic part of sustainability.

²⁰ As already anticipated in footnote 10, the private investors that answered “I do not know” have a lower literacy level. In Table G.6 in the appendix, we report the results of a regression where the dependent variable is “I do not know,” and the explanatory variables include SFL and SFA. The results confirm that this group is characterized by a lower SFL and SFA level than other respondents.



“Environment”

“Social”

Note: The word clouds contain the 50 most frequent keywords used to classify the topics “Environment” and “Social” from the open-ended answers. Words with a larger font were used more often by respondents. All words were initially in German and translated into English using Google Translator.

Fig. 4. Word clouds for the topics “Environment” and “Social”.

Appendix B. Extracting open-ended question topics

To analyze the open-ended text answers and extract topics, we follow the method developed by Wekhof and Houde (2023).²¹ Their method consists of creating an extensive dictionary, where keywords from the text-answers define topics. The final selection of keywords that define a topic and the initial choice of topics must be performed manually. To facilitate this manual step, Wekhof and Houde (2023) propose a method to cluster keywords into preliminary groups. Hence, we proceed as follows. First, we tag all words in the answers as nouns, verbs, adjectives, or adverbs using the “spacy” library for Python (Hon-nibal et al., 2020) (this procedure is known as “part of speech tagging”). Next, we compile a list of unique words and only retain words with a length of at least four characters. In the third step, we match the unique words to a pre-trained word-embedding matrix whenever possible.²² A word embedding matrix assigns a vector to each word that measures the semantic distance to all other words in the embedding matrix. For example, the distance between the words “pen” and “paper” is smaller than between “pen” and “sky.” In the fourth step, we cluster the words into groups using k-means clustering and the cosine similarity from the embedding matrix as a distance measure. Here, it is useful to perform the clustering separately for each part of speech. The underlying reason is that with all words, the distances from the word embedding are generally smaller between words of the same part of speech. As a result, the clustering algorithm will mostly cluster based on the part of speech and less based on semantics. The number of clusters should be such that each group has 20 to 40 words. In the final step, we manually went through each cluster of words and selected words into different topics.

²¹ In the literature, it is possible to find various algorithms that can be used to automatically extract topics from text, such as the Latent Dirichlet Allocation (LDA) (Blei et al., 2003) or the Structural Topic Model (Roberts et al., 2014). In a preliminary analysis, we tried these algorithms and found they tend to deliver topics that are difficult to interpret. Moreover, these methods cannot clearly identify multiple topics per answer, while our proposed model specifically aims to allocate multiple topics per response.

²² We use the pretrained German fasttext word-embeddings (Grave et al., 2018).

Table B.1

Summary Statistics: Open-Text Answers.

| Metric | Score |
|-------------------------------|-------|
| # answers | 3,059 |
| mean # words | 13.8 |
| median # words | 11 |
| 90 percentile # words | 28 |
| sd # words | 11.5 |
| total # unique words | 5,630 |
| total # words used for topics | 2,211 |

Note: This table contains the summary statistics from the open-ended text answers where respondents were asked to explain the difference between sustainable and traditional financial products. Of 5,630 unique words with at least four characters, 2,211 words were used as keywords to identify 15 topics.

Table B.1 shows the summary statistics for the open-ended answers and the classification. The mean number of words was 13.8, with a standard deviation of 11.5 and the 90th percentile at 28 words. The text corpus with all answers consisted of 5,630 unique words, out of which 2,211 words could be clustered into one of the 15 topics.²³ In addition, 633 words could not be linked to the word embedding, either because they were very uncommon or because of spelling mistakes. These words usually occurred only once or twice per word and had to be classified manually whenever possible. Following the keyword classification, 405 respondents out of 3,059 could not be classified with any topic. These answers were classified manually. Many of those answers consisted of “no answer,” where the text field contained only one character (such as a dash or a full stop). A second category could not be classified because the answer was not meaningful, in the sense that these respondents gave an answer but revealed that they did not know the difference between traditional and sustainable finance products. An example of such

²³ All words had at least four characters, except for the following abbreviations that were added manually “ESG,” “ETF,” “SDG” (sustainable development goals), “CO2,” “CH” (for Switzerland), and “VR” (for German: Board of Directors).

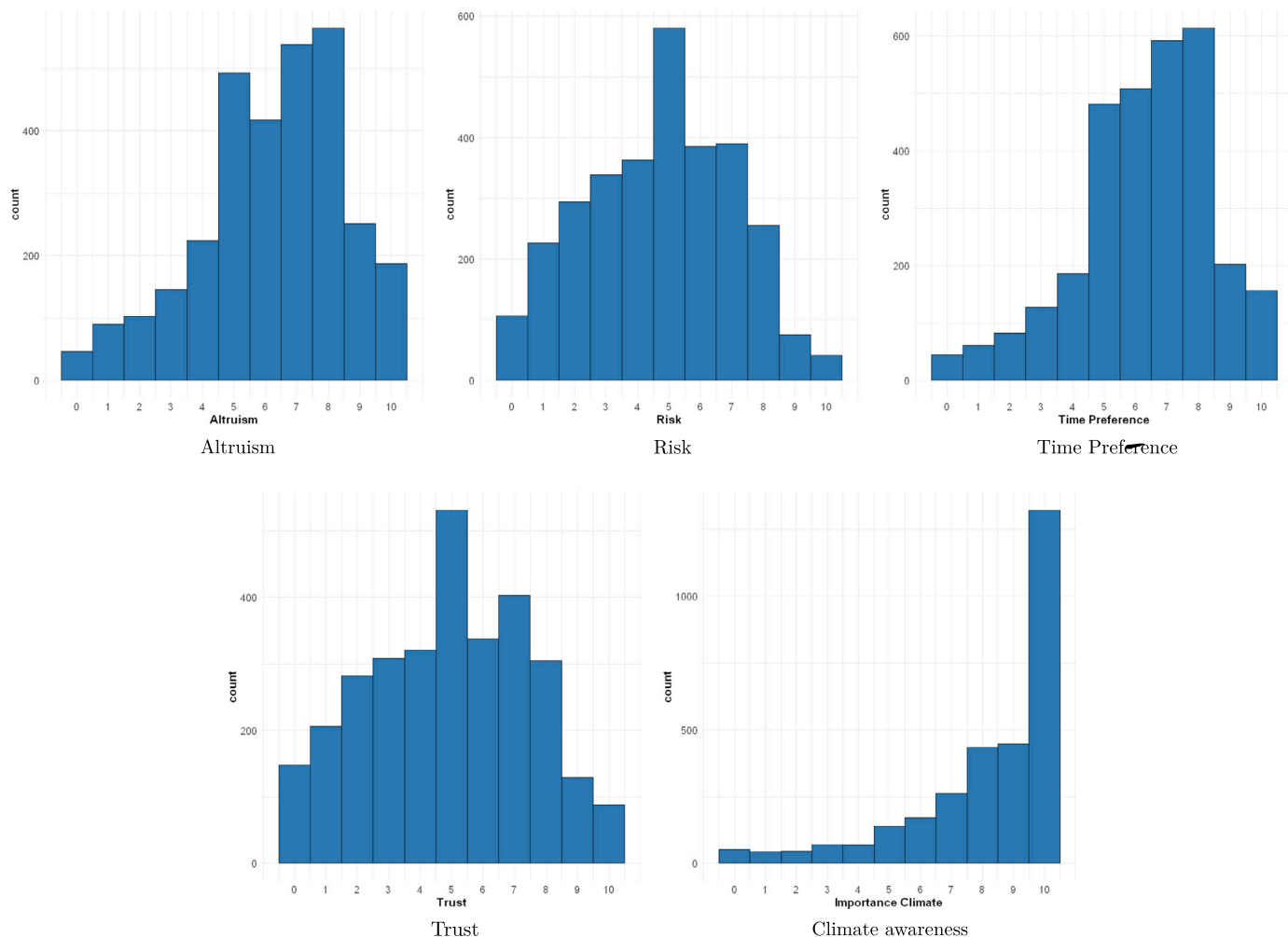


Fig. 5. Histograms of Psychographics.

an answer would be: “a sustainable finance product invests in sustainable firms.” We classified these answers as “revealed do not know,” as opposed to respondents who honestly answered that they do not know the difference (and could be successfully identified with the keyword approach).

To illustrate our approach, we take, as an example, the following sentence: “Sustainable financial products invest in companies or technologies that minimize environmental damage and unsocial conditions without being inefficient.” This sentence contains the keyword “environmental,” which classifies the answer into the topic “Environmental.” In addition, the answer contains the words “unsocial,” which adds the “Social” topic, and “technologies,” which adds the topic “Innovation.” The answer is therefore classified into three different topics: “Environment,” “Social,” and “Innovation.” Fig. 4 illustrates the most important keywords for the topics “Environment” and “Social” with two word clouds.

Appendix C. Additional plots

Additional plots are shown in Fig. 5.

Appendix D. Summary statistics for full sample

Table D.2
Summary statistics - full sample.

| Variable | Mean Value | Median | St.Dev. |
|--|------------|--------|---------|
| <i>Demographics</i> | | | |
| % Female | 45.31 | | |
| Age | 49.34 | 50 | 15.05 |
| % University Degree | 52.91 | | |
| % Pensioner | 16.09 | | |
| % Married | 49.61 | | |
| Household size | 2.43 | 2 | 1.23 |
| Income [CHF] | 9,193 | 7,500 | 3,422 |
| Wealth [CHF] | 341,250 | 75,000 | 692,590 |
| <i>Pro environmental behavior</i> | | | |
| % Social or Environmental donation (within 12M) | 77.54 | | |
| % Own sustainable financial products [Yes] | 26.7 | | |
| % Own sustainable financial products [No] | 49.0 | | |
| % Own sustainable financial products [I do not know] | 19.8 | | |
| <i>Psychographics (/10)</i> | | | |
| Risk preferences | 4.70 | 5 | 2.35 |
| Time preferences | 6.30 | 7 | 2.14 |
| Altruism | 6.21 | 7 | 2.3 |
| Trust | 4.89 | 5 | 2.56 |
| Climate awareness | 8.14 | 9 | 2.42 |

Note: This table presents the summary statistics for the full survey sample with 3,059 observations.

Appendix E. Determinants of sustainable investments - LPM

Table E.3
Determinants of sustainable investments - Linear Probability Model.

| | (1) | (2) | (3) |
|-------------------------|---------------------|---------------------|---------------------|
| SFA | | 0.031*** (0.006) | 0.029*** (0.006) |
| SFA | | | 0.050** (0.020) |
| Sustainability literacy | 0.002 (0.008) | -0.003 (0.008) | -0.004 (0.008) |
| Financial literacy | 0.016 (0.015) | 0.008 (0.015) | 0.005 (0.015) |
| Age | -0.001 (0.001) | 0.000 (0.001) | 0.000 (0.001) |
| Female | 0.018 (0.021) | 0.027 (0.021) | 0.023 (0.021) |
| University educ | 0.070*** (0.020) | 0.060*** (0.020) | 0.057*** (0.020) |
| Pensioner | 0.030 (0.034) | 0.025 (0.034) | 0.025 (0.034) |
| Married | 0.002 (0.023) | 0.002 (0.023) | 0.002 (0.023) |
| HH-size | -0.002 (0.009) | -0.002 (0.009) | -0.002 (0.009) |
| Log income | 0.006 (0.027) | -0.002 (0.027) | -0.004 (0.027) |
| Log wealth | 0.065*** (0.010) | 0.063*** (0.010) | 0.063*** (0.010) |
| Donation | 0.060** (0.025) | 0.053** (0.025) | 0.050** (0.025) |
| Risk preference | 0.029*** (0.004) | 0.025*** (0.004) | 0.025*** (0.004) |
| Time preference | 0.007 (0.005) | 0.006 (0.005) | 0.005 (0.005) |
| Altruism | 0.009* (0.005) | 0.008* (0.005) | 0.008 (0.005) |
| Trust | 0.003 (0.004) | 0.004 (0.004) | 0.003 (0.004) |
| Climate awareness | 0.020*** (0.004) | 0.020*** (0.004) | 0.019*** (0.004) |
| Num.Obs. | 2104 | 2104 | 2104 |
| R2 | 0.115 | 0.126 | 0.129 |

*p<0.1; **p<0.05; ***p<0.01.

Note: This table presents the coefficients of a linear probability model (Model 2) with ESG ownership as the dependent variable.

Appendix F. Multinomial logit

Because our measure of ESG ownership relies on the self-disclosure of the participants, the ownership measure takes three different values: “Yes,” “No,” and “I do not know,” as in Model 2a. We analyzed the three possible answers with a multinomial logistic regression, with the “I do not know” as a reference, with the following model:

$$SFP_{i,yes/no} = \alpha_i + \beta Literacy_i + \delta X_i + \epsilon_i,$$

where L_i includes a set of variables representing the level of financial literacy, sustainable literacy, as well as SFL, and X_i denotes the set of respondent-specific socioeconomic controls, and ϵ_i denotes the residual term.

Table F.4 presents the regression coefficients, where column 1 shows coefficients that describe a difference from “Yes” to “I do not know,” and column 2 reports the difference between “No” and “I do not know.”

As expected, both SFA and SFL are positive and statistically significant for respondents stating “Yes” and “No” compared to the reference, which stated “I do not know”. This means that respondents who did

Table F.4
Multinomial logit on ESG-ownership (reference: do not know).

| | Yes Own ESG | No Own ESG |
|-------------------------|---------------------|----------------------|
| SFL | 0.259*** (0.045) | 0.149*** (0.041) |
| SFA | 0.515*** (0.140) | 0.322*** (0.124) |
| Sustainability literacy | 0.005 (0.059) | 0.037 (0.052) |
| Financial literacy | 0.105 (0.114) | 0.045 (0.089) |
| Age | -0.004 (0.007) | 0.000 (0.006) |
| Female | -0.037 (0.151) | -0.202 (0.130) |
| University educ | 0.352** (0.146) | 0.070 (0.127) |
| Pensioner | 0.179 (0.236) | 0.026 (0.212) |
| Married | 0.096 (0.165) | 0.121 (0.144) |
| HH-size | 0.019 (0.067) | 0.043 (0.058) |
| Log income | 0.033 (0.192) | 0.065 (0.164) |
| Log wealth | 0.184*** (0.069) | -0.185*** (0.064) |
| Donation | 0.229 (0.187) | -0.168 (0.150) |
| Risk preference | 0.105*** (0.033) | -0.054* (0.028) |
| Time preference | 0.054 (0.040) | 0.017 (0.033) |
| Altruism | 0.062* (0.036) | 0.013 (0.030) |
| Trust | 0.021 (0.027) | 0.001 (0.024) |
| Climate awareness | 0.118*** (0.034) | -0.016 (0.026) |
| Num.Obs. | 2104 | |
| R2 | 0.339 | |

*p<0.1; **p<0.05; ***p<0.01.

Note: This table presents the coefficients of a multinomial logistic regression on ESG ownership. The dependent variable is the self-declared ESG ownership, with “I do not know” as the reference and “Yes” or “No” as the remaining two options.

not know if they had invested in ESG and hence did not make an informed investment decision have a lower awareness and literacy level than respondents who know if they invested in ESG or not.

The coefficients for both variables are lower for respondents stating “No” than for “Yes,” which indicates that respondents who had chosen sustainable investments have higher literacy and awareness than respondents who chose against such an investment. Further, respondents who answered “Yes” are more likely to have a university education and are more likely to think mitigating climate change is an important issue than both “No” and the reference group. While “Yes” reports higher wealth and is more risk-loving than the reference, “No” reports lower wealth and is more risk-averse than the reference group.

Appendix G. Determinants of sustainable investments robustness checks

Given Tables G.5 and G.6.

Table G.5

Determinants of sustainable investments (excluding I do not know answers).

| | (1) | (2) | (3) |
|-------------------------|---------------------|---------------------|---------------------|
| | Probit | Probit | Probit |
| SFL | | 0.024*** (0.007) | 0.023*** (0.007) |
| SFA | | | 0.043* (0.022) |
| Sustainability literacy | -0.002 (0.009) | -0.005 (0.009) | -0.006 (0.009) |
| Financial literacy | 0.016 (0.020) | 0.010 (0.020) | 0.008 (0.020) |
| Age | -0.001 (0.001) | 0.000 (0.001) | 0.000 (0.001) |
| Female | 0.033 (0.025) | 0.039 (0.025) | 0.035 (0.025) |
| University educ | 0.065*** (0.024) | 0.057** (0.024) | 0.054** (0.024) |
| Pensioner | 0.033 (0.039) | 0.028 (0.039) | 0.027 (0.039) |
| Married | -0.005 (0.027) | -0.004 (0.027) | -0.002 (0.027) |
| HH-size | -0.005 (0.010) | -0.004 (0.010) | -0.005 (0.010) |
| Log income | -0.001 (0.032) | -0.009 (0.032) | -0.011 (0.032) |
| Log wealth | 0.075*** (0.011) | 0.074*** (0.011) | 0.074*** (0.011) |
| Donation | 0.088*** (0.030) | 0.084*** (0.030) | 0.081*** (0.030) |
| Risk preference | 0.035*** (0.005) | 0.032*** (0.005) | 0.031*** (0.005) |
| Time preference | 0.009 (0.006) | 0.008 (0.006) | 0.008 (0.006) |
| Altruism | 0.007 (0.006) | 0.007 (0.006) | 0.007 (0.006) |
| Trust | 0.004 (0.004) | 0.005 (0.004) | 0.004 (0.004) |
| Climate awareness | 0.026*** (0.006) | 0.026*** (0.006) | 0.025*** (0.006) |
| Num.Obs. | 1682 | 1682 | 1682 |
| Pseudo.R2..Nagelkerke. | 0.19 | 0.20 | 0.20 |

*p<0.1; **p<0.05; ***p<0.01.

Note: This table presents the average marginal effects of a probit regression on ESG ownership. The dependent variable is the self-declared ESG ownership, where the “I do not know” answers were excluded from the regression.

Table G.6

Determinants of sustainable investments (“I do not know” = 1).

| | (1) | (2) |
|-------------------------|----------------------|----------------------|
| Sust Fin Literacy | -0.029*** (0.006) | -0.029*** (0.008) |
| SFA | -0.058*** (0.018) | -0.060** (0.024) |
| Sustainability literacy | -0.004 (0.008) | -0.008 (0.010) |
| Financial literacy | -0.008 (0.014) | -0.010 (0.018) |
| Age | 0.000 (0.001) | 0.000 (0.001) |
| Female | 0.022 (0.019) | 0.042 (0.026) |
| University educ | -0.026 (0.019) | -0.014 (0.025) |
| Pensioner | -0.011 (0.030) | -0.012 (0.042) |
| Married | -0.017 (0.021) | -0.019 (0.028) |
| HH-size | -0.006 (0.009) | -0.010 (0.012) |
| Log income | -0.008 (0.024) | -0.014 (0.033) |
| Log wealth | 0.006 (0.009) | 0.038*** (0.013) |
| Donation | 0.014 (0.022) | 0.031 (0.028) |
| Risk preference | 0.001 (0.004) | 0.011* (0.006) |
| Time preference | -0.004 (0.005) | -0.005 (0.007) |
| Altruism | -0.004 (0.004) | -0.001 (0.006) |
| Trust | -0.001 (0.003) | -0.001 (0.005) |
| Importance climate | -0.003 (0.004) | 0.003 (0.005) |
| Num.Obs. | 2104 | 1498 |
| Pseudo R2 Nagelkerke | 0.059 | 0.048 |

*p<0.1; **p<0.05; ***p<0.01.

Note: This table presents the average marginal effects of a probit regression on self-reported ESG ownership. The dependent variable is the self-declared ESG ownership, where “I do not know” is coded as 1. In column (1), “Yes” and “No” are coded as zero, in column (2) only “No” is coded as zero and the “Yes” answers are excluded from the analysis.

Appendix H. IV with 2SRI

Lusardi and Mitchell (2014) suggest that the potential presence of reverse causality and measurement error in estimating financial literacy may bias the estimates downwards. For this reason, we addressed this potential bias of our main variable of interest (SFL) by using the instrumental variable approach for nonlinear econometric models, suggested by Terza et al. (2008) and Terza (2017), i.e., the two-stage residual inclusion estimation approach (2SRI).²⁴

As an instrument, we propose to use the exposure to newspaper articles about “ESG” in the 12 months preceding the survey. For each major newspaper in Switzerland, the survey company provided information on how often a respondent reads the respective newspaper. Using this information, we defined respondents as regular readers of a newspaper

²⁴ As discussed in Greene (2019), section 17.6, for non-linear models, such as a probit, conventional 2SLS is not appropriate. Therefore, we did not estimate this model.

if they read the paper with a frequency of once per week or more often. Next, for each newspaper, we searched for the number of articles that contained the acronym “ESG” as a proxy for exposure to sustainable finance. We then normalized the number of articles by dividing the number of ESG articles by the highest number of all newspapers. Then we created the sum of normalized articles per regular reader. As the last step, we divided the number of ESG articles by the number of newspapers per respondent. The number of readers per newspaper and the number of articles on “ESG” can be found in Table H.2 (Appendix).

Given that most Swiss newspapers publish less than one article per week on ESG, we assume that the survey respondents did not choose to be regular readers of a newspaper because of its ESG coverage. We also control in the first stage for the respondents’ attitude towards mitigating climate change and socioeconomics, which could influence the newspaper choice.

Table H.1

2SRI first and second stage, marginal effects Poisson regression.

| | 2SRI Stage 2 | 2SRI Stage 1 |
|--------------------------|---------------------|----------------------|
| SFL | 0.135** (0.059) | |
| SFA | 0.009 (0.029) | 0.356*** (0.072) |
| Sustainability literacy | -0.021* (0.012) | 0.141*** (0.029) |
| Financial literacy | -0.017 (0.022) | 0.325*** (0.066) |
| Age | 0.002 (0.002) | -0.023*** (0.003) |
| Female | 0.056** (0.028) | -0.332*** (0.079) |
| University educ | 0.021 (0.027) | 0.305*** (0.077) |
| Pensioner | 0.007 (0.034) | 0.145 (0.130) |
| Married | 0.002 (0.023) | 0.027 (0.085) |
| HH-size | 0.000 (0.009) | -0.022 (0.032) |
| Log income | -0.028 (0.030) | 0.235** (0.101) |
| Log wealth | 0.049*** (0.010) | 0.063* (0.036) |
| Donation | 0.040 (0.028) | 0.170* (0.092) |
| Risk preference | 0.011 (0.009) | 0.129*** (0.017) |
| Time preference | 0.004 (0.006) | 0.023 (0.020) |
| Altruism | 0.008 (0.005) | 0.020 (0.018) |
| Trust | 0.008* (0.004) | -0.038*** (0.014) |
| Importance climate | 0.023*** (0.005) | -0.017 (0.016) |
| Newspapers: ESG exposure | | 0.064* (0.037) |
| Num.Obs. | 2104 | 2104 |
| Pseudo R2 Nagelkerke | 0.189 | 0.217 |

*p<0.1; **p<0.05; ***p<0.01.

Note: This table shows the results of the first and second stages of the 2SRI estimation (following Terza et al. (2008)), with the average marginal effects from a Poisson regression and with exposure to newspaper articles on ESG as an instrument for SFL.

Our choice of instrument is hereby similar to Klapper et al. (2013), who use the number of available newspapers as an instrument for financial literacy. Newspaper availability hereby serves as a proxy for exposure to information and economic knowledge. Related to the exposure to information, Fort et al. (2016) use information provision by certain banks to their clients as an instrument. According to Jappelli and Padula (2013), acquiring financial literacy is costly. Hence, easier access to information lowers the cost and burden of developing financial literacy. The coverage of sustainable finance by the major Swiss-German newspapers constitutes similarly easy access to information on ESG for regular readers and reduces their cost of acquiring SFL.

A weakness of this instrument could be that the political nature of sustainable investments may overlap with newspaper choice. Newspapers could cater to their audience with more articles on sustainable finance. We think that this effect is, however, mitigated by three points in our analysis: First, the newspaper with the most articles on ESG

Table H.2

Instrument: number of press-articles containing “ESG”.

| Newspaper | % regular readers | number articles containing “ESG” | |
|----------------------------|-------------------|----------------------------------|-----------------------|
| | | 09/30/2020-09/30/2021 | 09/30/2019-09/30/2021 |
| Neue Zürcher Zeitung (NZZ) | 17 | 61 | 93 |
| Tagesanzeiger | 20 | 29 | 37 |
| Berner Zeitung | 7 | 22 | 28 |
| Blick | 14 | 7 | 12 |
| Aargauer Zeitung | 6 | 4 | 11 |
| Luzerner Zeitung | 2 | 4 | 10 |
| St. Galler Tagblatt | 2 | 4 | 10 |
| 20 Minuten | 40 | 1 | 1 |

Note: This table shows the number of newspaper articles containing the acronym “ESG” for one year and two years prior to the survey. The articles were researched using the database “swissdox”. The percentage of regular readers was obtained from the survey company, which defines a regular reader as reading the newspaper once per week or more frequently. Note that the newspaper “20 Minuten” is a special case because it is freely available and distributed in public transportation and other public places.

(the “NZZ”) is known as a center-right, economically liberal newspaper. In contrast, the more left-wing and green newspapers (such as “Tagesanzeiger”) have fewer articles on ESG. Many respondents also read more than one newspaper regularly. Second, we control all models for respondent’s views on addressing climate change with the variable “climate awareness.” Third, we also control the first and second stages of the IV for sustainable finance awareness, which allows us to separate a vague awareness that might occur from seeing the topic in a newspaper from a more concrete form of knowledge measured by SFL.

As with most instrumental variables, we are aware that the chosen instrument might be weak. Hence, we do not claim to identify a causal effect but rather reinforce the findings of the suggestive evidence from the previous models.

The magnitude of the coefficient of SFL is higher in the 2SRI specification than in the probit model.²⁵ Consistent with Lusardi and Mitchell (2014), the coefficients with the IV are larger than in the baseline model and support the suggestive evidence that the level of SFL influences the respondents’ choice for sustainable investments. With the 2SRI approach, SFL has a coefficient of 0.135, which implies that respondents with a one-point higher SFL score than the sample average have a 13.5% higher probability of owning a sustainable finance product. Note that we did not estimate a model based on an instrumental variable approach that considers both variables, SFL and SFA, as endogenous because we only have one instrument.

Appendix I. Literacy questionnaires

Financial literacy

We measure financial literacy by applying the widely used three questions by Lusardi and Mitchell (2008). The percentage of respondents that chose each option is in parentheses, and the correct option is underlined.

1. Assume you have CHF 100 in a savings account, and you get 2% interest per year on that savings account. No further deposits or withdrawals will be made to this account. What would be the account balance after five years?

- a) More than CHF 102 [87.0%]
b) Exactly CHF 102 [4.2%]

²⁵ The first stage regressions of the 2SRI models are presented in Appendix H, Table H.1. The coefficient of the ESG-exposure instrument is significantly different from zero. The results of the IV are robust to the choice of a 2-year time frame for exposure to ESG in newspaper articles.

- c) Less than CHF 102 [6.2%]
 d) I don't know. [2.6%]

2. Now assume that you receive 1% interest per year instead and that inflation is 2% in the same period. How much could you afford after a year of the money in the account?

- a) More than today [4.3%]
 b) Same as today [3.3%]
 c) Less than today [86.2%]
 d) I don't know. [6.2%]

3. Is the following statement right or wrong: "Buying shares of a single company usually offers a safer return than buying shares of multiple companies."

- a) Correct [2.2%]
 b) False [88.1%]
 c) I don't know. [9.7%]

Sustainability literacy

The percentage of respondents that chose each option is in parentheses, and the correct option is underlined.

1. Which of the following topics are included in the United Nations (UN) Sustainable Development Goals Development? (Multiple options possible)

- a) Economic growth [35.2%]
 b) Social participation [68.7%]
 c) Environmental protection [87.1%]

18% of the respondents chose all three options, which was the correct answer.

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

- a) Ensure universal access to education, health, and social services. [17.8%]
 b) Meeting today's needs by minimizing the impact on the environment. [44.7%]
 c) Meeting today's needs without limiting future generations. [34.5%]
 d) I don't know. [3.0%]

3. What is the most common cause of pollution of streams and rivers worldwide?

- a) Waste disposal by cities. [6.9%]
 b) Industrial waste and landfills. [50.0%]
 c) Draining surface water flowing from roads, paved areas, and fields. [21.8%]
 d) Waste in the immediate vicinity of streams and rivers. [12.7%]
 e) I don't know. [8.7%]

4. Which of the following options is the main reason for the decline in fish stocks in the Atlantic Ocean?

- a) Fisheries strive to maximize their catch. [57.6%]
 b) Global climate change. [11.7%]
 c) Lower fertility of fish. [1.6%]
 d) Marine pollution. [25.8%]
 e) I don't know. [3.2%]

5. In 2019, in Switzerland, the poverty threshold was below a monthly income of CHF 2279 for an individual and CHF 3976 for a household with two adults and two children under the age of 14. What percentage of the Swiss population was below the poverty threshold in 2019?

- a) 1-5% [16.9%]
 b) 6-10% [42.0%]
 c) 11-15% [20.3%]
 d) more than 15% [9.4%]
 e) I don't know [11.3%]

6. What was Switzerland's average annual GDP growth rate between 2015 and 2019?

- a) less than 1% [3.9%]
 b) 1-1.9% [33.7%]
 c) 2-3% [27.3%]
 d) more than 3% [4.9%]
 e) I don't know. [30.2%]

Sustainable Finance Literacy

The percentage of respondents that chose each option is in parentheses, and the correct option is underlined.

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

- a) Environmental and Social Goals [3.5%]
 b) Environmental and Sustainable Goals [12.7%]
 c) Environmental, Social and Governance [26.4%]
 d) Environmental, Sustainable, and Governance [15.8%]
 e) I don't know. [41.5%]

2. Does a product advertised in Switzerland as a "sustainable financial product" have to meet uniform criteria set by the state regulatory authorities?

- a) Yes [31.9%]
 b) No [41.0%]
 c) I don't know. [27.1%]

3. Are you aware of a label (or certificate, or proof) that certifies a sustainable financial product (from governmental or non-governmental organizations)?

- a) Yes [12.7%]
 b) No [87.3%]

4. 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 in the financial markets?

- a) Yes [32.3%]
 b) No [46.2%]
 c) I don't know. [21.5%]

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

- a) only one of the elements [4.5%]
 b) 2 elements [12.2%]
 c) all three elements [46.1%]
 d) I don't know. [37.3%]

6. An investment in a sustainable fund that includes companies with a low CO2 footprint directly reduces global CO2 emissions.

- a) Yes [31.8%]
 b) No [52.2%]
 c) I don't know. [16.0%]

7. Do financial institutions that offer sustainable products always proactively influence the sustainability behavior of the invested companies (e.g., by participating in the annual shareholders' meeting)?

- a) Yes [12.7%]
 b) No [47.9%]
 c) I don't know. [39.3%]

8. Is there a difference for you between "sustainable investing" and "impact investing?"

- a) Yes [20.1%]
 b) No [7.8%]
 c) I don't know. [72.0%]

Table J.1

Definition of variables obtained from the survey company.

| Variable | Description |
|-------------------|---|
| Female | A dummy variable that takes the value of 1 if the respondent identifies as female and 0 otherwise. |
| Age | Age in years. |
| University Degree | A dummy variable that takes the value of 1 if the respondent holds a university degree and 0 otherwise. |
| Pensioner | A dummy variable that takes the value of 1 if the respondent's current employment status is "pensioner" and 0 otherwise. |
| Married | A dummy variable that takes the value of 1 if the respondent is married and 0 otherwise. |
| Household size | The number of people currently living in the respondent's household. |
| Income | Respondents were classified into six intervals for their monthly income: "less than 3,000 CHF," "3,000 - 4'500 CHF," "4'501 - 6,000 CHF," "6,001 - 9,000 CHF," "9,001 - 12,000 CHF" and "more than 12,000 CHF." We converted the intervals into a continuous variable by taking the average value for the interval when possible. The new continuous income variable thus takes the values: 3,000 CHF, 3,750 CHF, 5,250 CHF, 7,500 CHF, 10,500 CHF, and 14,000 CHF. |
| Wealth | Respondents were classified into 7 intervals for their wealth: "less than 50,000 CHF," "50,000 - 100,000 CHF," "100,000 - 250,000 CHF," "250,000 - 500,000 CHF," "500,000 - 1,000,000 CHF," "1,000,000 - 5,000,000 CHF" and "more than 5,000,000 CHF." We converted the intervals into a continuous variable by taking the average value for the interval when possible. The new continuous income variable thus takes the values: 50,000 CHF, 75,000 CHF, 175,000 CHF, 375,000 CHF, 750,000 CHF, 3,000,000 CHF, and 5,000,000 CHF. |

Note: This table describes the variables the survey company collected on their panel members. The survey company provided these background variables on the sample of respondents to the authors of this paper.

Table J.2

Definition of variables from the survey.

| Variable | Description |
|-----------------------------------|---|
| Risk Preferences | "How willing or unwilling are you to take risks when making decisions in your life?" (0 = "Completely unwilling to taking risks," 10 = "Very willing to take risks"), following Falk et al. (2022). |
| Time Preferences | "How willing are you to give up something that is beneficial for you today to benefit more from that in the future?," on a 10-point scale (1 = "Completely unwilling" to 10 = "Very willing to do so"), following Falk et al. (2022). |
| Altruism | "How would you assess your willingness to share something with others without expecting anything direct and immediate in return?" (1 = "Completely unwilling" to 10 = "Very willing to do so"), following Falk et al. (2022). |
| Trust | "As long as I am not convinced otherwise, I always assume that other people only have the best in mind." (0 = "No approval at all," 10 = "Very strong approval"), following Falk et al. (2022). |
| Climate Awareness | "Climate change is a serious problem that needs to be solved." (0 = "No approval at all", 10 = "Very strong approval"), following Heeb et al. (2023). |
| Donate social | "Have you made at least one donation to a social institution in the last 12 months (e.g., Salvation Army, Swiss Solidarity, SOS Children's Villages, etc.)?" |
| Donate environment | "Have you made at least one donation to an environmental organization in the last 12 months (e.g., Greenpeace, WWF, myclimate, etc.)?" |
| Own sustainable financial product | A dummy variable that takes the value of 1 if the respondent answered "yes" to the following question: "Do you own sustainable financial products?" (the other options were "No," "I don't know" and "I prefer not to answer.") |

Note: This table describes the variables collected directly in the survey. All variables were collected after the respondents answered the open and closed questions on the different literacy measures.

Appendix J. Variable definition

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