Sustainable Financial Literacy and Preferences for Sustainable Investments among Young Adults

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Abstract: We use a choice experiment on equity fund investments to estimate the preferences of young adults for sustainable investments relative to conventional investment funds. Our results suggest that the traditional trade-off between investment fund risk and return is still valid in the selection of sustainable investment funds. The environment focus is more important for the choice of sustainable investment then social or governance aspects. Latent behavioural characteristics (conscientiousness, importance of the impact of direct investments on sustainability, risk aversion, financial literacy) are also important to explain the choice for sustainable funds.

Zusammenfassung: In diesem Beitrag verwenden wir ein Auswahlexperiment bzgl. der Auswahl von Aktienfonds, um die Präferenzen junger Erwachsener für nachhaltige Anlagen im Vergleich zu konventionellen Investmentfonds zu schätzen. Unsere Ergebnisse deuten darauf hin, dass der traditionelle Trade-Off zwischen dem Risiko und der Rendite von Aktienfonds auch bei der Auswahl nachhaltiger Investmentfonds Bestand hat. Der Fokus auf die Umwelt ist bei der Wahl nachhaltiger Anlagen wichtiger als soziale oder Governance-Aspekte. Latente Verhaltensmerkmale (Gewissenhaftigkeit, Bedeutung der Auswirkungen von Direktinvestitionen auf die Nachhaltigkeit, Risikoaversion, Finanzwissen) sind ebenfalls wichtig, um die Entscheidung für nachhaltige Fonds zu erklären.

→ JEL classification: G53, G11, G41, C52, C91, A13
→ Keywords: portfolio choice, sustainable investments, Socially responsible investments, Ethical investing, Corporate social responsibility, equity funds, financial literacy

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Introduction

Sustainable investment, which represents the financial investment processes additionally considering environmental, social, and corporate governance (ESG) issues, is fast-growing. The growth is driven by the desire of private investors assessing ESG aspects of firm conduct. The United Nations support sustainable investments and offer a guideline with six principles for responsible investments (UNPRI, 2021). The financial institutions face the pressure by their customers, investors and regulators to offer sustainable financial products. But then, there is widespread uncertainty about how private investors understand and evaluate sustainable investments. Many private and institutional investors who like the idea of financing sustainable investments, have only a vague idea about the concept of sustainability and how it relates to investment performance. In a survey among German adults, respondents indicated that they do not understand ESG financial products (64 %), do not understand the implementation of sustainability in the investment process and its relation to return and risk (50 %), and have not been referred to ESG financial investments by financial advisors (47 %) (Röstel, 2019). According to a survey of the DIA, only 14 % of respondents among institutional and private investors correctly understand the meaning of the term "sustainable financial investments", for about 19 % ESG criteria played a role in a past investment decision, 32 % are planning to consider ESG in future investment decisions and 77 % do not know any advisor for sustainable investments (Morgenstern, 2020). To the best of our knowledge, there is no validated scale for the measurement of the sustainable financial literacy and its relation to the actual investment process

The paper aims to measure and analyze sustainable financial preferences among young adults. In particular, we analyze whether the selection of ESG funds by young adults is driven by the fund attributes (e. g., expected return, risk, geographic focus), the socio-economic characteristics and/or behavioral latent characteristics. We focus on young adults, who are in the phase of forming their lives, because it offers a good opportunity to analyze the sustainable investment preferences of future generation. From a portfolio management perspective, the crucial step for the inclusion of sustainability into portfolio formation is investors' preferences for return, risk and sustainability (Gasser et al., 2017; Varmaz et al., 2021). We empirically analyze a concept how to measure the preferences for financial sustainability for the purpose of the portfolio management. We conduct a choice-based approach as an indirect preference elicitation approach which is shown to be more externally valid compared to direct methods (Louviere & Islam, 2008). In the choice-based experiment, the young adults can choose between conventional investment funds and sustainable investment funds (ESG funds). We examine how young adults prioritize investments between the elements of ESG funds when evaluating the investment performance with conventional funds to discern differences in preference heterogeneity. The heterogeneity of young adults may be relevant for the characterization of preferences for attributes of ESG funds. Lagerkvist et al. (2020a) point out that systematic preference heterogeneity can refer to observable variation in the characteristics of individuals (such as socio-economic, demographic or personal characteristics). Additionally, we model potentially unobserved characteristics of individuals by latent class choice models.

The analysis of sustainable preferences is important because they can lead to current or future real investments that contribute to the achievement of a sustainability goal, for example, reducing CO_2 emissions (Folqué et al., 2021; Wilkens & Klein, 2021). The global sustainability agenda, including the transition toward a low-carbon economy, has become an important factor for investors who demand comprehensive measurement of both, financial and ESG risks and opportunities in investment portfolios (Hübel & Scholz, 2020; Kumar et al., 2016). Consequently, the ESG invest-

ments are part of a transformation towards a sustainable economy. The financial investments will have a transformative effect if they lead to (current or future) realization of sustainable real investments. In theory, the effects of sustainable financial investments may be direct, e. g., by the means of green bonds, or indirect, e. g., by buying shares of sustainable firms or sustainable investment funds. This paper deals with indirect effects. The indirect effects are related either to the decrease in the cost of capital of refinancing for firms that actually conduct the sustainable real investments without green washing or to the increase of the cash flows generated by companys' sustainable products and services (Louche et al., 2019). According to the financial economics literature, the decrease in expected return is accompanied by an increase of the price for the sustainable investment.

The sustainable finance literature shows that the sustainable financial investors have more obstacles to overcome relative to conventional investors because the ESG funds differ across key dimensions as investment objective and investment style (Joliet & Titova, 2018). These differences make comparability among ESG funds as well as between ESG funds and conventional funds difficult. Benabou and Tirole (2010) argue that the ESG activity of a firm can have three objectives: 1. firms can "do well by doing good" (e. g., reducing workplace injury); 2. firms can maximize shareholder value when they exercise ESG behavior on behalf of stakeholders (e. g., customers paying more for high-priced fair trade products); 3. firms can destroy value when they engage in projects for the benefit of the managers. For example, Edmans (2011) shows that sustainable firms enjoy satisfied employees, good governance and loyal customers (Edmans, 2011). These firms generate higher than expected cash flows due to their greater efficiency. Hoepner et al. (2020) argue that companies with a high value of ESG characteristics relative to companies with low ESG values may attract investors seeking protection from legal, reputational, or operational challenges. These challenges may decrease the future cash flows for low ESG firms. Friede et al. (2015) conduct a meta-analysis of 60 meta studies including over 2000 single studies. They document that a small fraction of the studies finds a significantly negative relation between sustainability of a firm and its financial performance. However, as the sustainability includes a wide range of aspects it is difficult to conclude for investors how the sustainability of a firm will affect its expected return and risk. While the majority of theoretical literature suggests that the sustainability lowers expected returns, the empirical results are inconclusive. It follows that the evaluation process of ESG funds is more challenging for investors.

The results of our choice-based experiments suggest that consistent with the traditional financial economics literature, the trade-off between return and risk is also important in the selection of ESG funds for sustainable investors. Specifically, the likelihood of choosing an ESG fund increases with higher return and lower risk. Additionally, the ESG fund with a global geographic focus are likelier to be selected by the participants. Somewhat surprisingly, the financial literacy is not significantly related to the selection of an ESG fund. As the ESG funds available in our choice experiment have lower return relative to the conventional funds, we initially expected to see a decrease of likelihood to select an ESG fund for higher levels of the financial literacy. An explanation might be that even if participants have high financial literacy, they are willing to sacrifice return on investment for sustainability. Among the observable individual characteristics that might explain preference heterogeneity, the individual's concerns on sustainability and the individual's importance of direct impact of investments on ESG increase the likelihood of ESG fund selection. Additionally, participants preferring investments with low risk and environmental impact also prefer ESG funds.

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The paper contributes to the literature by providing evidence from choice-based experiments how young adults choose among conventional and ESG funds. Specifically, we show the fund attributes that are important for the choice of young adults and the personal characteristics that increase the likelihood of selecting an ESG fund. The paper also relates to the measurement of sustainable financial literacy as we show that the participants are willing to forego returns in exchange for sustainability. The closest studies to ours is conducted by Apostolakis et al. (2016) and Lagerkvist et al. (2020). They study the preferences for sustainability of private investors and model the probability of the choice for ESG investments and funds characteristics, e. g., expected return, risk, sustainability focus. We complement their studies in regard to several dimensions. First, we include the financial literacy of participants in the choice model for ESG investments. Individuals cannot make informed choices when they do not understand the basics of financial investments and the relation between return and risk. Second, we include items about the awareness about sustainability and sustainable finance of participants because the literature proposes that this knowledge may affect the choice between conventional and sustainable products. Third, we include the beliefs of the participants about the return on ESG funds. While a wide range of theory papers in financial economics propose that the equilibrium relation between return and ESG needs to become negative, the empirical results suggest that the relation may be positive or at least non-negative (Friede et al., 2015). The control of beliefs of the participants is important because the ESG funds presented to the participants have lower expected return. Otherwise, we cannot discriminate in the choice experiment whether the ESG fund is selected due to the higher return or due to the ESG focus. Fourth, we also control for personal characteristics of the participants, e. g., logical thinking and personal traits.

The paper is organized as follows: in section 2, we give an overview of the relevant literature. Section 3 describes the data and the estimation method. We present the results and discussion in section 4, section 5 summarizes.

Literature Review

In this section, we present the variables that are perceived as important for sustainable investment decisions in the literature and discuss how the investment decision strategy of a person can be measured. Specifically, the concepts of sustainable financial literacy and sustainable investment strategies are discussed and an overview of various strands of literature is provided. Additionally, attitude and ESG beliefs as well as personal traits that have been proven to influence investment choice, namely conscientiousness, impulsivity, faith in intuition, and need for cognition are discussed. To empirically test the validity of theoretical concepts, it is important to quantify the variables under study in a way that is consistent with and appropriate for the theory.

The Concept of Sustainable Financial Literacy

The concept of sustainable financial literacy (SFL) is build up on the concept of financial literacy (FL). As in many areas of the social sciences, there is not yet a comprehensive, uniform, and universally accepted definition of financial literacy and sustainable financial literacy (Hung et al., 2009). Research agrees that it is a multidimensional concept, that is part of basic education and can be subject to factors as socio-demographic factors, individual behavior, education and training. PISA, an OECD program to measure and evaluate global education systems using the skills and competences of 15-year-olds, uses a two-part definition of financial literacy. The first part defines

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financial literacy as the knowledge and understanding of financial concepts and their risks and the ability (as well as motivation and confidence) to apply this knowledge to make effective financial decisions. The second part relates to the purpose of the skills and competencies, which is to increase prosperity for oneself and society and to participate in economic life (OECD, 2017a, 2017b). Previous literature (e. g., Chen & Volpe, 1998; Lusardi & Mitchell, 2007, 2008, 2014) uses financial literacy and financial knowledge as interchangeable concepts and build their concept on the definition of OECD.

Expanding the definition of financial literacy to incorporate the sustainability we use sustainable investment strategies, which describe financial investment processes additionally considering ESG issues. In particular, sustainable investments increase in the last years. According to the GSI-Alliance there is a 15% increase from 2018 to the beginning of 2020. They identify that the most common ESG investment strategy applies negative screening (Global Sustainable Investment Alliance (GSIA), 2021). Climate change and negative environmental effects are increasing and shifting the focus more towards sustainable investments. Investors start to focus their efforts on areas where they can achieve positive environmental and social outcomes. Investors are able to influence corporate behavior and redirect capital to sustainable companies and projects. Even the financial market is not protected from the negative effects of climate change. By incorporating ESG considerations into their investment decisions, investors seek to both mitigate sustainability risks and enhance long-term returns (Bollen, 2007; Eurosif & Sakuma-Keck, 2021).

Sustainable Investment Strategies

The financial market is affected by climate change and sustainability transformation. The demand for investments with a social and/or environmental benefit increases (Eurosif & Sakuma-Keck, 2021; GIIN, 2019) and investment professionals are adopting sustainable investment practices (Busch et al., 2015; Friede et al., 2015). It is beyond dispute, that the benefit of a sustainable investment needs a quantification. But there is widespread uncertainty about how investors understand and evaluate sustainable investment portfolios. Previous literature often claims that the results of studies on the correlation between ESG and corporate financial performance are unclear or inconclusive and argue about the total effect (Borgers et al., 2013; Hoepner & McMillan, 2009; Orlitzky, 2011, 2013; Revelli & Viviani, 2015; van Beurden & Gössling, 2008; Wood, 2010). The study of Friede et al. (2015) provides an overview and the results of over 2000 empirical studies about the relation between ESG and corporate financial performance. Most studies focus on one aspect, either environmental, social or governance, a few on two parts, rarely all three (Friede et al., 2015). On average, Friede et al. (2015) report a non-negative correlation between ESG-criteria and the corporate financial performance in about 90% of studies. On the other hand, Nilsson (2007) shows that there is no significant difference between the performance of a conventional investment and a sustainable investment. Auer and Schuhmacher (2016) report that, depending on framework of the analysis as ESG definition and sector, sustainable investments have not paid off for investors in Europe. Moreover, empirical research demonstrates that financial attributes are most often preferred over ESG attributes (Brimble et al., 2013). Regardless of the sustainable preferences, the financial performance criteria are most important for investors (Vyvyan et al., 2007). In addition, their results provide evidence of a behavior gap in environmental attitudes and investment choices.

The negative and positive screening is a common concept for sustainable investment strategies. Renneboog et al. (2008) describe that negative screening means removing specific funds or companies according to the ESG-criteria. The positive screening refers to a specific fund or com-

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pany with superior ESG-criteria relative to industry peers. In line with Apostolakis et al. (2018), Matos (2020) and Lagerkvist et al. (2020b) our study integrates the following three different strategies: negative and positive screening as well as norm-based screening (Amel-Zadeh & Serafeim, 2017; CFA Institute, 2015). Besides the screening strategy, the engagement is also important: Investors can determine companies' direction towards or against ESG-criteria at general meetings (Lagerkvist et al., 2020b; Matos, 2020).

In line with Fishbein (2008), Gopinath (1995), and Lagerkvist et al. (2020b), we apply a reasoned action approach to describe the sustainable investment decisions of young adults. The preferences stated in the choice experiment along with the influence of skills, abilities and environmental constraints can explain sustainable financial decisions. Accordingly, the sustainable financial literacy and sustainable financial decisions are influenced by observable and latent variables. For example, past decision making and demographic aspects can describe future decisions. Latent variables refer to personal traits, attitudes, preferences, and risk aversion. The preference heterogeneity by observable and latent variables results in the choice behavior that is affected by knowledge of sustainable financial literacy and situational conditions (Fishbein, 2008; Gopinath, 1995; Lagerkvist et al., 2020b).

Personal Traits

The traditional economics theory is based on the rational decision making. However, personal traits can influence an investment choice as well. We consider conscientiousness, impulsivity, faith in intuition, and need for cognition in our study.

Conscientiousness

Conscientiousness refers to individual differences in the tendency to be hardworking, orderly, responsible to others, self-controlled, and rule abiding (Roberts et al., 2014). Research has shown that conscientiousness has an influence on pro-environmental behaviors like recycling (Simmons & Widmar, 2010) and energy saving (Milfont & Sibley, 2012). Yu and Yu (2017) demonstrate that conscientiousness is positively linked to pro-environmental attitude. Furthermore, research suggests that conscientiousness and investment behavior are related (Durand et al., 2013; Husnain et al., 2019; Letkiewicz & Fox, 2014; Tauni et al., 2017). Individuals high on conscientiousness have well-defined investment goals. Such individuals are structured, go for a systematic analysis, and also depict strong intentions to invest in long term investment portfolios (Mayfield et al., 2008).

Impulsivity: Urgency & Intention

The psychological construct impulsivity is one of the basic variables of research and diagnostics of behavioral control. Behavioral control, in turn, is very closely linked to the regulation of the individual's physical reality (Eysenck, n.d.). This includes the interaction of the individual with his environment; e. g., Zafar et al. (2021) show the link between impulsivity and sustainable purchase decisions. Further research demonstrates a link between risk preferences in the investment domain and impulsivity (Zaleskiewicz, 2001). Despite the diverse findings in the field, there is still no clear and unified definition of the construct (Kovaleva et al., 2012). It is assumed that the construct impulsivity is multidimensional to encompass various aspects of impulsive behavior. In this context, the *urgency* dimension captures impulsive behavior per se. The *intention* dimension captures the construct impulsivity in the opposite direction.

Faith in Intuition & Need for Cognition

In psychology, two modes of thinking and information processing are distinguished. The first mode has been called intuitive, emotional, heuristic, or experiential, and the second mode rational, analytical, objective, or logical. The Rational-Experiential Inventory (Epstein, 1996) was designed to measure individual differences in intuitive-experiential and analytical-rational thinking. The first subscale, *faith in intuition*, is a measure of confidence in one's intuitive abilities. The second subscale, *need for cognition*, reflects the engagement in intellectual activities. Research by Zaleskiewicz (2001) shows significant correlations between the dimensions and financial risk-taking behaviors. Especially, need for cognition has been associated with a tendency to assess the quality of information and to attend different viewpoints which may reduce cognitive biases, and increase an interest in scientific research (Feist, 2012; Petty et al., 2005; Tsfati & Cappella, 2010; Winter & Krämer, 2012). Vainio (2019) demonstrates that need for cognition is positively associated with pro-environmental behavior like eating less meat.

Attitude and ESG Beliefs

Ajzen (1991, 2011) demonstrates in his theory of planned behavior that behavior is a manifestation of values and attitudes of an individual. Individuals that express concern both for the welfare of others and for the environment show a more positive attitude towards social and environmental means (Hurst et al., 2013; Liobikiene & Juknys, 2016; Steg et al., 2014). Wachholz et al. (2014) report that most college students express environmental concerns. Drawing from the theory of planned behavior, studies support the precedence of a positive attitude towards environmental and social concerns and on sustainable behavioral intentions (Budovska et al., 2019; Chao, 2012; Greaves et al., 2013; Mancha & Yoder, 2015; Nigbur et al., 2010; Yu & Yu, 2017).

Data and Estimation Method

Data and Descriptive Statistics

Our data is collected from an anonymous online survey in October 2021 based on a sample of 104 students from the University of Applied Sciences Bremen. The survey includes 40 items in the experiment on investment decision, financial literacy, personal traits, risk aversion, demographics, attitudes to sustainability and mindset towards personal finances. The translated survey is in the online appendix. We approached the students via the mailing lists from the university and invited them to participate in the online survey. The students came from different study programs and are our proxy for the young adults. Out of about 6000 invited students, 198 accessed the survey (respond rate 3.3%) and 104 completed the online survey in full. The descriptive statistics of our data sample are in Table 1.

Our sample include 49.05% of female, 49.05% male and 1.9% students without gender orientation ('diverse'). The average age of student is 22.71, with female students being slightly younger. On average, the students are in their 3-rd term. We ask the students to self-assess their knowledge level about sustainable investment (variable Knowledge ESG) on a scale between 1 (never heard of) and 6 (very good). The average level is about 3.57. Female students self-report significantly higher levels of ESG knowledge relative to male students. We have two variables measuring the risk aversion in Table 1. The first variable (risk aversion 1) is the answer from a

Table 1

Descriptive statistics

	All	Female	Male	Diverse	t-Stat
Gender	100 %	49.05 %	49.05 %	1.90 %	–
Age	22.71	21.88	23.49	24.00	–
Term	3.19	3.00	3.22	7.00	–
Knowledge ESG (1 = never heard of, ..., 4 = average, ... 6= very good)	3.57	4.12	3.06	2.50	10.73
Risk aversion 1 (1 = prefers risk-free, 2 = prefers risky investments)	1.26	1.21	1.32	1.00	-1.99
Risk aversion 2 (1 = invest into high-risk projects, ..., 4 = take no risky projects)	2.72	3.06	2.38	3.50	10.00
Financial literacy	2.01	1.90	2.33	1.00	6.24
Important characteristics of investments (1= not important, 2 = somewhat important, 3 = very important)					
Return	2.34	2.23	2.49	1.00	-4.48
Risk	2.43	2.55	2.32	2.00	4.08
Environmental impact	2.05	2.04	2.02	3.00	0.30
Social impact	1.94	2.00	1.84	3.00	2.45

Note: The table gives an overview of self-reported characteristics of the participants in the online survey. The column All (Female, Male, Diverse) shows the values for all (female, male, diverse) students. The column t-Stat reports the t-statistics from the t-test of equal averages for the groups of female and male students. The variable **gender** shows the proportion of female, male and diverse students, respectively, in %. Age is the average age of the students. **Term** is the current study term of the students. In Germany, the academic year is divided into two terms and the regular study programs last 6 – 7 terms (equivalent to 3 – 3.5 study years). **Knowledge ESG** indicates how the students assess the individual level of knowledge about sustainable investments. The students are asked this question: "Equity funds focused on sustainability invest money in companies based on environmental, social and governance factors. Environmental factors include renewable energy, carbon dioxide emissions, natural resources, pollution and waste. Social factors include human rights, fair working conditions, health and safety, and the right to privacy. Governance factors include corporate governance, diversity, wage payment, business ethics, tax transparency, corruption, and instability. How would you rate your knowledge of sustainable investing?" **Risk aversion 1** and **risk aversion 2** are related to the willingness of the students to bear risk in exchange for higher return. For the variable risk aversion 1, the students are offered the choice between: 1. A sure win of 750 euros and 2. 40 % chance to win 2000 euros and a 60 % chance to win nothing. We assign the value 1 to the first option and value 2 to the second option. For the variable risk aversion, the students took position to "[w]hich of the statements comes closest to the financial risk you are willing to take when saving or investing? 1. I take a high financial risk and expect a high return, 2. I take above average financial risks and expect above average returns, 3. I take average financial risks and expect an average return, 4. I am not willing to take financial risk." **Financial literacy** is the average number of correctly answered 'Big Three' questions on financial literacy. Financial literacy includes questions on rate of return, inflation and diversification. **Important characteristics of investments** asks the students: "Imagine that you save a fixed amount every month, e.g., 50 euros. With this in mind, answer the following question. Which of the following characteristics of a project are important to you when you think about your monthly savings, i.e., which characteristics make an investment more attractive for you?" The students can state for each characteristic (return, risk, environmental impact, social impact) how important these are.

question with two options. The students are asked to decide whether they prefer a risk-free profit of 750 Euro (option 1) or a lottery with a probability of 40 % to earn 2000 Euro, otherwise nothing (option 2). The second variable (risk aversion 2) indicates students' answer how much risk they accept when they invest. The options vary from high risk/high return to no risk at all, where higher values indicate higher risk aversion. For both variables, the female students in our sample are significantly more risk averse.

We measure the level of financial literacy by the 'Big Three' questions (Lusardi & Mitchell, 2014). These questions are widely and globally used to enhance the comparison across the studies on financial literacy (Arnold et al., 2018; Lusardi & Mitchell, 2014). The Big-Three are often considered as a standardized measure of financial literacy (Knoll & Houts, 2012). They include the questions of

interest rates, inflation and risk diversification. The variable FL in Table 1 indicates the average number of correct answers to the 'Big Three' questions. On average, the students correctly solve two questions. The average number of correct answers is significantly lower for female students. The lower score on financial literacy for female students is in line with previous literature (Bucher-Koenen et al., 2017; Riebe, 2021).

The last part of Table 1 relates to the importance of selected investment characteristics for the students. The importance scale range is from 1 for not important to 3 for very important. Both, the return and risk are important and more important relative to environmental or social impact of the investments. For return and risk, we observe a gender difference. For female students, risk is more important and for male students, the return on investment is more important. The investment impact (environmental or social) is somewhat important for students. The social impact is significantly more important for female students.

Choice Experiment

For the experiment of the stated preference choices for sustainable financial investments, we follow the guidelines provided by Apostolakis et al. (2016) and Lagerkvist et al. (2020). At the beginning of the stated preference experiment, we show students an information section, which describes the characteristics of equity funds. We translate and adapt the description of characteristics of equity funds of Lagerkvist et al. (2020) to the German market. In particular, we convert the currency to Euro and the market focus to Germany.

We adapt the choice tasks from Lagerkvist et al. (2020) and change the choice task descriptions to meet the requirement of the German market. The students decide in 5 choice tasks. Each task includes three equity funds. An illustration of a task is presented in Table 2. For each equity fund, we provide the description of its attributes. The fund attributes include risk classification, expected return, management style and costs, geographical focus, sustainability focus and sustainability selection strategies. The attributes of equity funds vary in each task. We also provide detailed description of each attribute by clicking on a link in the survey. However, only 19 % of the students acquire the additional information. Each task includes a conventional equity fund without a sustainability focus. The conventional equity fund is a choice alternative, which may be familiar to student. We include the conventional fund because previous literature suggests that private investors invest in both ethical and conventional funds (Jansson & Biel, 2011; Michelson et al., 2004). We apply the cheap-talk script at the begin of the choice task exercises to mitigate hypothetical bias (e.g., inflated "willingness to pay") in stated preference elicitation and in particular for choice experiment (Penn & Hu, 2019).

In our choice experiment, the ESG investment funds must not have higher expected returns relative to the conventional investment funds. The reason is that otherwise we could not discriminate whether the students chose the fund due to the higher expected return as proposed by the traditional financial economics theory or due to their sustainability focus. We allow equal or lower returns for ESG funds (relative to conventional funds). The other attributes of the funds vary randomly between the tasks. Additionally, we control for the beliefs of the students about the expected return on ESG funds. If students think that ESG funds offer higher expected return relative to the conventional equity funds, the presented ESG funds with lower expected return could partially explain, why these students would not choose ESG funds.

Table 2

Illustration of a choice set within the stated preference section

	Investment fund 1	Investment fund 2	Investment fund 3
Management style	Passive management	Passive management	Active management
Management fee p.a.	0.40%	0.40%	1.10%
Risk classification	Risk category 5 ±10–15% variation per year	Risk category 5 ±10–15% variation per year	Risk category 7 more than 25% variation per year
Geographic focus	German equities	German equities	Global equities
Sustainability selection strategy	–	Negative screening: The investment fund excludes countries, sectors or companies that are not considered sustainable.	Positive screening: The investment fund actively selects companies that proactively work with sustainability.
Sustainability focus	None	Environment, e.g., climate, air pollution, renewable energy	Social, e.g., human rights, working conditions, job security
Expected annual return	13%	7%	13%

Note: The table gives an example of one choice task presented to the participants of our online survey. Participants could have accessed a detailed description of equity fund attributes. In each task, the participants can select an investment fund to invest 100 euro monthly for the time period of the next 10 years. We use the cheap-talk script to mitigate the hypothetical bias when choosing the investment fund. Specifically, at the start of the choice task, we presented the following introduction to the students: "Equity funds account for about 40% of total German fund assets. By saving in equity funds, you can diversify your savings into German or foreign investments. Saving in funds inevitably involves risk and when choosing equity funds you should weigh up what risk you are prepared to accept. Higher risk means greater risk of losing money, but also greater opportunity for higher returns. A lower risk, on the other hand, means lower chances of higher returns, but also a lower risk of loss. In both cases, total loss is excluded. The investment strategy and the selection of stocks for the fund are managed by professional investors and may be more or less computerized.
You will now be introduced to various features of equity funds.
Imagine that you decide to invest in a stock fund in which you save 100 euros per month. You may already be saving monthly in certain equity funds, but we ask you to choose the fund you would like to save in based on the specified conditions. Saving 100 euros per month over a period of 10 years may be challenging! Therefore, do your best to ensure that your choice of equity fund truly reflects what is important to you in your fund savings."

Measures of Heterogeneity in Choice Tasks

As measures of heterogeneity, we include financial literacy, logical thinking, sustainability concerns, personal traits, risk aversion, importance of ESG, attitude to savings, attitude to ESG investments and individual beliefs about return and risk of ESG funds.

Financial literacy is measured by the 'Big Three' questions that are also used in Table 1 (Riebe, 2021). The financial literacy refers to the understanding of financial investment and savings. The inclusion of the financial literacy aims to analyze whether the students understand the financial consequences of their choices. The traditional financial economics theory suggests a negative relation between financial literacy and selection of ESG funds. We include an auxiliary question on population exponential growth because the interest rate question from Big-Three has recently received broad media attention. Students may know the answer to the question from the media but not understand the reason. The population growth question is a multiple-choice question, where the students are asked: "The population of the colorful giant parrot grows by 10% every year. Starting from the population 100, the population of colorful giant parrot after 3 years will be closest to the following number".

Logical thinking describes the ability of students to analyze a problem and come up with a sensible solution. We extracted four questions from the German translation of the IQ test by Wechsler (1958). Since financial investment is associated with financial mathematics, the ability of logical thinking is potentially related to understanding of the mechanism of financial investments and long-term consequences of lower returns. As the expected return on ESG is lower in our experiment, according to the traditional financial economics theory we expect that logical thinking is negatively associated with the decision to select ESG funds.

Sustainability concerns addresses the individual relevance for sustainability problems (Apostolakis et al., 2016). These concerns may influence the willingness to forego return in exchange for sustainability. The literature argues that social concerns increase the probability of conscientious behavior for private investors (Jansson & Biel, 2011). We have included two questions measuring individuals' environmental and social concerns. We expect increased concerns about environmental and social issues to positively influence the choice of an ESG fund.

We follow the literature and include the psychological constructs conscientiousness (Körner et al., 2008), impulsivity (Kovaleva et al., 2012; Zaleskiewicz, 2001), faith in intuition and need for cognition (Keller et al., 2000) as personal traits. Each construct is measured with several items on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

In financial economics literature, risk aversion indicates the trade-off between return and risk, i. e., how much risk is an investor willing to accept to gain an expected return. According to the financial theory, the higher the risk aversion is the lower is the accepted risk for a given level of expected return. Kapteyn and Teppa (2011) show that the ad-hoc measures about risk tolerance seem to explain very well the actual investment behavior of investors, i. e., the risk of the actual portfolios of the participants. In line with Apostolakis et al. (2016) and Kapteyn and Teppa (2011), our measure for risk aversion uses three items with a 5-point scale (1 = strongly disagree, 5 = strongly agree) reflecting the extent to which the individual is willing to be exposed to larger risks for larger financial gains. The financial economics literature proposes that the higher the risk aversion is the higher the expected return needs to be to motivate investors to invest into risky assets.

For the attitude to savings, the characteristic of investments and the importance of ESG, we follow Apostolakis et al. (2016). We measure attitude to saving in regard to private savings and the return on private savings. Characteristic of investments is measured by four general statements about the important aspects of personal investment in terms of return, risk, environmental and social impact. Importance of ESG (translated based on Apostolakis et al., 2016) is measured using 14 statements (1 = very unimportant; 7 = very important) related to the ESG criteria when choosing direct investment opportunities.

For individual beliefs about return of ESG funds, we ask the students to set the return on ESG investments in relation to conventional investment (1 = much less, 5 = much more). We expect that students, who estimate that ESG funds offer higher expected returns, chose less often ESG funds.

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Estimation Method

Our estimation strategy to identify and quantify the effects of different dimensions of choice set complexity on choices follows DeShazo and Fermo (2002), Lagerkvist et al. (2020), and McFadden (1974). Accordingly, the utility function of student i from choosing equity fund j in the choice task k is

$$U_{ijk} = \beta^T \boldsymbol{x}_{ijk} + \varepsilon_{ijk}$$

where β is the parameter vector to be estimated, $\boldsymbol{x}$ is the vector of equity fund characteristics and ε is the *iid* extreme value type 1 distributed residuals with variance $\pi^2/6\lambda^2$, where the scale parameter λ equals $\lambda_i = \exp(\gamma' \boldsymbol{w}_i)$. $\boldsymbol{w}$ is a vector of descriptors of the student i and λ is the parameter vector to be estimated.

Assuming a linear utility model, the choice probabilities can be expressed as

$$P_{ijk} = \frac{\exp(\lambda(\beta^T \boldsymbol{x}_{ijk}))}{\sum_j^J \exp(\lambda(\beta^T \boldsymbol{x}_{ijk}))}$$

We estimate the parameters β and γ in a heteroscedastic conditional logit model (HCLM) via maximum likelihood estimator (McFadden, 1974). For the implementation, we follow the descriptions in Hill et al. (2018).

Results and Discussion

Table 3 presents our HCLM estimates for five specifications. The dependent variable is the choice of an investment fund. The fund characteristics return (net of management fee), risk and geographic investment focus are included in all specifications. The specifications vary in regard to the inclusion of students' characteristics (e.g., traits, attitudes, beliefs). The specification 5 includes all variables. The last three rows of Table 3 provide some information about model goodness of the fit. Adj. R2 is the adjusted R^2. The Log-Likelihood and the LR test statistics allow a comparison across the specifications. The addition of variance heterogeneity by personal characteristics in specifications 2–5 to the fund characteristics in specification 1 increases significantly the log-likelihood. We apply the LR test to compare the specifications 2–5 to the base specification 1. The LR test statistic is $LR = -2\ln\left(\frac{L(m_1)}{L(m_+)}\right)$, where L is the likelihood, m_1 refers to base specification and m_+ to the alternative. The test statistic LR is χ^2-distributed with the number of degrees of freedom equaling the number of additional variables in the alternative specification. Table 3 reports the LR test statistic (and not the p-value).

The results in Table 3 suggests that funds with lower risk and higher returns (net of management fees) are preferred by students. We find support that global investment focus is more preferred among the students suggesting that a home bias does not explain our results (Coval & Moskowitz, 1999; Lewis, 1999; Tesar & Werner, 1995). Moreover, the results suggest that funds with an environmental focus are likelier to be selected.

Table 3

Regression results

	1		2		3		4		5	
	coef	z	coef	z	coef	z	coef	z	coef	z
Fund characteristics										
Return	**0.51**	15.37	**0.56**	8.17	**0.51**	8.51	**0.50**	8.33	**0.54**	6.49
Risk	**-0.19**	9.90	**-0.22**	-4.59	**-0.20**	-4.42	**-0.19**	-4.08	**-0.24**	-4.21
Geog. focus global	**3.38**	-4.49	**3.46**	5.70	**3.36**	5.83	**3.68**	5.20	**3.89**	5.39
Financial literacy and Logical thinking										
Logical thinking			0.18	0.73					0.43	1.27
FL			-0.25	-0.91					-0.26	-0.74
Parrot growth			**-0.70**	-1.83					-0.43	-0.89
Important characteristics for investments										
High interest rate					0.06	0.14			0.51	0.90
Low risk					**1.33**	3.29			**1.57**	2.94
Environmental impact					**2.22**	3.51			**2.18**	2.97
Belief about ESG return										
Returns on ESG investment			-0.59	-1.41					-0.26	-0.47
Investment and ESG concerns										
Concerns banks			-0.35	-0.81					-0.68	-1.26
Concerns ESG			**1.59**	3.95					**0.94**	1.66
Importance of return on savings			0.11	0.27					0.83	1.41
Importance of savings			-0.26	-0.55					-0.69	-1.10
Attitude										
Attitude to ESG							0.40	1.01	-0.06	-0.13
Importance of ESG and impact of direct investments										
Important aspects of ESG							**0.88**	2.89	**0.48**	1.68
Risk aversion										
RA							**-1.19**	-2.28	-1.26	-1.51
Personal traits										
Conscientiousness							**-0.69**	-1.75	**-1.14**	-2.30
Urgency							0.33	1.17	-0.05	-0.15
Intent							0.05	0.22	-0.03	-0.11
Intuition							-0.43	-1.28	-0.41	-1.13
Need f. Cognition							-0.19	-0.59	0.26	0.56
Gender										
Female									0.14	0.35
Adj.R^2	0.31		0.34		0.38		0.33		0.34	
Log-Likelihood	-119		-106		-104		-93		-80	
LR test statistic			26.77		29.86		52.86		78.65	

Note: The table presents the estimated coefficients from the heteroscedastic conditional logit model for five specifications and their z-values as well as the measures of goodness of the fit (Adjusted R2, Log-Likelihood, LR test statistic from LR test comparing specifications 2 – 5 to basis specification 1). Bold values are significant at least at the 5 % level. The variables are grouped in categories: Fund characteristics, financial literacy and logical thinking, important characteristics for investments, belief about ESG return, Investment and ESG concerns, attitude, importance of ESG and impact of direct investments, risk aversion, personal traits, gender. The corresponding questions and variables can be taken from the questionnaire in the appendix.

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The financial literacy (FL) and the understanding of exponential growth (parrot population growth) are negatively associated with students' choice of ESG funds but FL is not significant. Moreover, the likelihood increases that students with higher values on the logical thinking test select an ESG fund. The students for whom low risk and environmental impact are important characteristics of an investment are significantly more likely to choose ESG funds. The risk aversion of students is negative but it is not a significant explanation of ESG fund selection.

There is some concern that the prior beliefs of some students about the return on ESG funds can drive the results. In the experiment, we only present ESG funds with lower or equal return relative to conventional funds. These students could be in favor for ESG funds but select the conventional funds because the return is higher. Our results suggest that the students believing that ESG funds offer higher return, were less likely to select ESG funds, however the coefficient is not significant.

Regarding investment and ESG concerns, only concerns on ESG dimensions (Concerns ESG) contribute positively and significantly to the selection of ESG funds. Positive attitude to ESG is insignificantly associated with ESG fund selection. Students who care about ESG and the impact of their direct investments clearly prefer ESG funds. Among personal traits, only conscientiousness seems to be significantly associated with choice of ESG funds. Need for cognition is reversely coded, i.e., higher values indicate lower need for cognition.

Our results suggest that ESG fund offerings can be created to fit personal characteristics of potential investors. First, individuals in our sample are valuing the trade-off between return and risk as proposed by the financial economics literature. The selection of an ESG fund increases with expected return and decreases with risk. Second, individuals are more likely to select an ESG fund when low risk and environmental orientation of the investments are important for them. Third, the direct impacts of the individual investment on sustainability are positively associated with the selection of an ESG fund.

The interpretation of our results is subject to several limitations. First, we do not observe the actual orders of private investors but the stated preferences of students as our proxy for young adults. For example, the risk as an inherent feature of financial investments is a limitation in our hypothetical setting. Our experimental design allows the inclusion of a wider and deeper set of attributes and levels of potential relevance to private ESG fund investors. Still, how the hypothetical choices influence the potentially inflated estimators of marginal utilities in Table 3 remains controversial in the literature. Previous literature on hypothetical biases suggests several approaches (e.g., cheap-talk script conducted in our study) to reduce the bias (e.g., Fifer et al., 2014). Second, in the implementation of the cheap-talk script we ask the students to choose ESG funds for a given amount of money (50 Euro) that is invested monthly. Clearly, the pre-set savings amount must not correspond to the preferences of the students.

Summary

We analyze stated preferences among students for sustainable fund investments. We have two observations to report. First, the trade-off between return and risk as postulated by the financial economics literature remains important. Global ESG funds with higher return and lower risk are preferred by students. Second, our results suggest that there are some latent factors (e.g., attitude, concerns, personal traits, financial literacy, risk aversion) that explain the stated preferences. We

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examine how observable and context-relevant characteristics of individual investors explain variance heterogeneity in their choice behavior. For example, students for whom investments with low risk and ESG impact is important, are more likely to select ESG funds. Similarly, students for whom ESG aspects of their direct investments are important, preferer ESG funds. Among personal traits, conscientiousness contributes significantly to the explanation of ESG fund selection. Our results suggest that sociodemographic characteristics do not explain the stated preferences but that latent student's characteristics are predictors of ESG fund selection. Apparently, students' selections are more likely to be driven by behavioral rather than by demographic characteristics.

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Appendix

Translation of the German Questionnaire

Q1. Are you ...

☐ female ☐ male ☐ diverse

Q2. How old are you?

Answer: (17 to 99)

Q3. In which study program are you enrolled?

Sustainable Financial Literacy

Imagine that you save a fixed amount every month, e.g., in the amount of 50 euros. With this in mind, please answer the following question.

Q4. Which of the following characteristics of a project are important to you when you think about your monthly savings, i.e., which characteristics make an investment more attractive? (adapted from Siemroth & Hornuf, 2021)

Sufficiently high interest rate
Low risk
Positive environmental impact (e.g., company reduces "CO_2"; recycles a lot)
Positive social impact (e.g., product helps students to find housing)

(1 = unimportant, 2 = rather important, 3 = very important)

Below we ask you some questions about sustainable investments. Equity funds that focus on sustainability invest in companies based on environmental, social and governance criteria.

Environmental factors include renewable energy, carbon dioxide emissions, natural resources, pollution, and waste. Social factors include human rights, fair working conditions, health and safety, and the right to privacy. Governance factors include corporate governance, diversity, wage payment, business ethics, tax transparency, corruption, and instability.

Q5. How would you rate your knowledge of sustainable investments? (Brunen & Laubach, 2021)

☐ I have never heard of it ☐ Very low ☐ Low ☐ Average ☐ Good ☐ Very good

Q6 – Q10. Select an equity fund for your monthly savings (Lagerkvist et al., 2020)

Please read the following text carefully:

Equity funds account for about 40 % of total German fund assets. By saving in equity funds, you can diversify your savings into German or foreign investments. Saving in funds inevitably involves risk and when choosing equity funds you should weigh up what risk you are prepared to accept. Higher risk means greater risk of losing money, but also greater opportunity for higher returns. A lower risk, on the other hand, means lower chances of higher returns, but also a lower risk of loss. In both cases, total loss is excluded. The investment strategy and the selection of stocks for the fund are managed by professional investors and may be more or less computerized.

You will now be introduced to various features of equity funds.

Imagine that you decide to invest in a stock fund in which you save 100 euros per month, with the money to be used only after 10 years. You may already be saving monthly in certain equity funds, but we ask you to choose the fund you would like to save in based on the specified conditions. Saving 100 euros per month over a 10-year period may, for a variety of reasons, be a challenge! So do your best to ensure that your choice of equity fund truly reflects what is important to you in your fund savings.

We now present you with three funds with different characteristics to choose from. Choose which of the three you prefer in each case, when only these three are available for selection.

[*in total 5 choice sets per respondent*]

Q11. How high do you estimate the return of sustainable investments in comparison to investments without sustainability reference? (modified from Brunen & Laubach, 2021)

☐ much lower ☐ a little less ☐ the same ☐ a little higher ☐ much higher ☐ I don't know.

Investment and Sustainability Concerns (Apostolakis et al., 2016)

Imagine that you save a fixed amount every month, e. g. in the amount of 50 euros. With this in mind, answer the following question.

Q12. Do you worry about what happens to your money when you "take it to the bank", i. e. save it?

☐ Yes, very often. ☐ Yes, on a regular basis. ☐ Yes, sometimes. ☐ No, almost never. ☐ No, never. ☐ I don't know.

Q13. Are you concerned about climate change, human rights or pollution?

☐ Yes, very often. ☐ Yes, on a regular basis. ☐ Yes, sometimes. ☐ No, almost never. ☐ No, never. ☐ I don't know.

Attitude to Savings *(Q14. and Q15 from Apostolakis et al., 2016; Lagerkvist et al., 2020)*

Q14. How important is the return on your personal savings to you?

☐ Not at all important ☐ Somewhat important ☐ Relatively important ☐ Very important ☐ Extremely important

Q15. How important are your personal savings for you?

☐ Not at all important ☐ Somewhat important ☐ Relatively important ☐ Very important ☐ Extremely important

Q16. How do you personally rate yourself: Are you someone who is basically willing to do without something today in order to benefit from it in the future, or are you not willing to do so?

Please answer using the following scale: 0 = I would definitely not do without something today – to – 10 = I am very willing to do without something today.

Importance of SRI and Impact of Direct Investments *(Apostolakis et al., 2016; Lagerkvist et al., 2020)*

Imagine that you save a fixed amount every month, e. g. in the amount of 50 euros. With this in mind, answer the following question.

Q17. How important do you consider investments in ...?

☐ Not at all important ☐ Somewhat important ☐ Relatively important ☐ Very important ☐ Extremely important

Companies that engage in the local community through donations to worthy causes and employee volunteerism.
Companies that promote good employee relations.
Technologies that aim to improve transportation and infrastructure.
Companies that are not involved in human rights violations.
Companies that promote human rights standards.
Companies that work to protect the environment and are committed to recycling and waste reduction.
Companies that are not involved in oil exploration or mining.
Companies that work with efficient water management.
Companies that do not violate international norms and standards.
Companies that do not deal with weapons, alcohol, tobacco and pornography.
Companies that have nothing to do with nuclear power.
Companies that are committed to sustainability.
Technical innovations that contribute to a reduction in CO_2 emissions in the form of alternative energy sources and efficient use of natural resources.
Medical innovations and research for new treatments and medicines.

Attitude Scale

Q18. What do you think about investing in equity funds with a focus on sustainability?

1 = bad 2 3 4 5 = good
1 = careless 2 3 4 5 = useful
1 = uncertain 2 3 4 5 = certain
1 = not preferred 2 3 4 5 = preferred
1 = negative 2 3 4 5 = beneficial

Risk Aversion (Apostolakis et al., 2016; Brunen & Laubach, 2021; Lagerkvist et al., 2020)

Q19. Please rate the following statements:
1 = strongly disagree 5 = strongly agree

I am increasingly convinced that I should take greater financial risks in order to improve my financial situation.
If I believe an investment will be profitable, I am willing to borrow money to make that investment.
I am willing to risk losing money if there is also a chance to make money.

Q20. Which of the statements comes closest to the financial risk you are willing to take when saving or investing?

I take a high financial risk and expect a high return.
I take above average financial risks and expect above average returns. I take average financial risks and expect an average return.
I am not willing to take financial risk.

Q21. You have the choice between the following two options. Please choose one!

A safe return of 750 euros.
A 40 % chance to win 2000 euros and a 60 % chance to win nothing.

Financial Literacy (Big Three) (Lusardi & Mitchell, 2014; Riebe, 2021)

Q22. Suppose you have 100 euros in a savings account and the interest rate is 2 % per year. How much do you think you would have in the account after 5 years if you left the money in the savings account?

More than 110 euros
Exactly 110 euros
Less than 110 euros
I don't know.

Q23. Imagine that the interest rate on your savings account was 1 % per year and inflation was 2 % per year. After 1 year, could you afford to live on the money in this account ...

... more than you can buy today.
... buy exactly the same as today.
... buy less than today.
I don't know.

Q24. Imagine the following situation. You have 1000 Euros that you want to save with a high return and as little price fluctuation as possible for at least 3 years. Is the following statement true or false? Please estimate.

"Buying stock in a single company usually provides a safer return than stock mutual funds."
True, False, I don't know.

Q25. Imagine that you save a fixed amount each month for long-term goals. Which of the following forms of savings would you use?

Please indicate below how your savings would be divided:
To do so, check the form of saving and indicate in the free text field below how it is divided in percentage points. E.G.: Savings account 50, capital security 30, direct share investment 20.

Savings account in %
Securities savings with investment funds (e. g. equity funds, ETFs) in %
Direct investment in investment funds in %
Private fund insurance in %
Endowment insurance in %
Direct investment in equities in %

Understanding of Exponential Growth

Q26. The population of the giant parrot grows by 10 % every year. Starting from the population 100, the population of giant parrot after 3 years will be the closest to the following number: 130, 131, 132, 133.

Personal Traits (Keller et al., 2000; Körner et al., 2008; Kovaleva et al., 2012)

Q27. On this page you will find a number of statements that people can use to describe themselves. Read each statement and decide whether it fits you or not.
1 = strongly disagree 5 = strongly agree

I keep my things neat and clean.
I can manage my time quite well so that I finish my affairs on time.
I try to do all the tasks assigned to me very diligently.
When I make a commitment, I can definitely be counted on.
Sometimes I do things spontaneously that I would have been better off not doing.
To feel better, sometimes I do things that I later regret.
I usually think carefully before I do something.

I usually make decisions after careful and logical consideration.
For most decisions, it makes sense to rely on my intuition.
I am a very intuitive person.
The first idea is often the best.
When making purchasing decisions, I often go with my gut.
I find little satisfaction in thinking for hours on end.
Thinking abstractly does not appeal to me.
I would rather do something that requires little thinking than something that will certainly challenge my ability to think.
It is enough that something works, I don't care how or why.
I usually prefer to accept things as they are rather than question them.

Logical Thinking (Wechsler, 1958)

Q28. 1. all footballers are fit and healthy.
2. all famous athletes are soccer players.
Which of the following is the logical conclusion if the above statements are true?

All soccer players are famous athletes.
All famous people are fit and healthy. All famous athletes are fit and healthy.
All fit and healthy people are soccer players.

Q29. How many triangles are there in the 6th figure?

Q30. Which of the boxes below must the question mark be replaced with?

Q31. The grid is missing one box. Find out which of the boxes A to F completes the grid.

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