Essays on Non-Pecuniary Sustainability Preferences in Financial Decision-Making

Dissertation zur Erlangung des akademischen Grades
- Doctor rerum politicarum -

Der Fakultät Sozial- und Wirtschaftswissenschaften
der Otto-Friedrich-Universität Bamberg

vorgelegt von

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Bamberg, 2023

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Diese Arbeit hat der Fakultät Sozial- und Wirtschaftswissenschaften der Otto-Friedrich-Universität Bamberg als Dissertation vorgelegen.

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Tag der Disputation: 23. Oktober 2023

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URN: urn:nbn:de:bvb:473-irb-914210
DOI: https://doi.org/10.20378/irb-91421

Acknowledgements

The list of people who have contributed to the success of this thesis is long and not exhaustive.

First, I'm grateful for the excellent support and guidance, which I received from my supervisor Prof. Dr. Matthias Muck. Being the person who teached me how to conduct research and write scientific articles, he's the person who contributed most to the success of this work.

Further, I'd like to say thank you to Prof. Dr. Karl-Heinz Gerholz and Prof. Dr. Brigitte Eierle. Their supervision did not only deliver support for this thesis but also contributed significantly to the success of my various research projects.

A special thanks goes to my research colleagues in Bamberg: Pascal Albert, Michael Herold, Tobias Herzing, Tobias Kaufmann, Thomas Schmidl, Milad Zargartalebi and Gerlinde Weinhäupl. It's been a pleasure to work with you. Responsible for the success of this thesis are further Prof. Dr. Marina Grusevaja and Prof. Dr. Thorsten Petry for arousing and supporting my interest in research.

I'm utterly grateful for the support of my family and friends. This concerns in particular my mother Jutta, my father Peter, my partner Franziska, my godmother Claudia and my godfather Sigmund who always believed in me. It includes further my long time friends Benjamin, Jens, Max, Steffen and Tobias as well as my study colleagues from Wiesbaden, Bamberg and Nice, to name only a few.

Writing a PhD thesis is a marathon. Thanks to Stephan Popp for teaching me already early in life the importance of endurance.

Mehlmeisel, March 2023

P. Kleffel

Contents

Synopsis

1 Introduction

For centuries, economists are trying to explain the movement of financial markets. Apparently, fluctuations of stock prices are driven by changes in demand and supply for specific assets. The decision to buy or sell an asset is in turn reasoned in individual preferences and expectations. On the aggregate, these single choices form the "invisible hand" of the market (Smith (1904)). In this regard, the examination of individual preferences represents an important area of research to understand the behavior of markets. Two distinct views exist to explain individual decision-making in finance. Adherence of the traditional school, consider investors to be fully rational and exclusively consumption maximizing. Fama (1970)'s idea of market efficiency is grounded in this assumption. The concept of rationality is instead questioned by scholars of behavioral finance, who see it as a necessity to incorporate emotions and psychological bias in the decision process. A prominent example is Kahneman and Tversky (1979)'s Prospect Theory. Recently, sustainability issues emerged as a new decision criteria for investors and impact factor for market movements. This development seems to contradict the doctrine of Nobel Prize laureate Milton Friedman that "the social responsibility of business is to increase its profits" (Friedman (2007)). Investors seem to care also about the non-financial consequences of their investment decisions and thus the externalities of firms invested. These non-pecuniary sustainability preferences are subject of the present thesis.

While non-pecuniary sustainability preferences have been determined in various studies (e.g., Hong and Kacperczyk (2009), Riedl and Smeets (2017) or Gutsche and Ziegler (2019)), sustainability has always been regarded as an uni-dimensional construct. Investors' preferences may depend on the way how sustainability is defined and presented, though. Also, little attention has been given in how far investors are rational in their sustainability preferences.

These topics are addressed in the underlying articles of this thesis.

The cumulative dissertation consists of six articles. Article 1 investigates how "greenwashed" and "actual" sustainable assets are perceived by German investors. Article 2 extends the prior research to an international dimension and controls for cultural and country-specific differences. The effect of psychological distance on sustainability preferences is examined in Article 3. Article 4 tests for the implications of providing investors with distinct material and immaterial sustainability information. Thereby, it embeds current accounting literature to the finance context. Article 5 investigates in how far lifestyle characteristics can be used to infer about investors' sustainability preferences. Article 6 extends the examination of sustainability preferences to religious motives. While differing in their precise examination focus, the presented articles share two major results. First, all studies suggest that people have a strong non-pecuniary preference for financial products that are in line with their personal moral convictions. Second, the articles highlight the multidimensionality and actual complexity of non-pecuniary preferences, making the consideration of behavioral aspects a necessity for future research about sustainable finance.

The remainder of this synopsis is structured as follows. Section 2 delivers the theoretical background to understand non-pecuniary sustainability preferences. Sections 3 to 6 give a short summary of the six included essays. An introduction into the chosen methodology of stated choice experiments is presented in Section 7. Section 8 summarizes the scientific contribution of this thesis.

2 Background

2.1 Preferences in Economics

Understanding the process of decision-making has been subject to investigation in various disciplines. While psychologists focus on the associated cognitive processes, economists are

particularly interested in how different alternatives are evaluated and subsequent choices are made to explain actual behavior. "Rational choice theory" has been used as a standard framework to understand individuals' choices in economics. Dating back to Adam Smith (1904) and his essay "An Inquiry into the Nature and Causes of the Wealth of Nations", the theory is based on the assumption that people are rational in their preferences and choices. Rationality is given when the axioms of completeness and transitivity are fulfilled (von Neumann and Morgenstern (2007)). These assumptions imply that economic agents are able to rank all available alternatives in terms of their personal preferences (completeness) in a consistent manner (transitivity).

In economics, the concept of utility has been developed to measure preferences. In general, utility refers to the level of satisfaction received from choosing an alternative. According to neoclassical economics, individuals are exclusively concerned about maximizing their personal utility derived from consumption. Thereby, more consumption is always preferred to less but with a diminishing marginal rate. Experiments as the St. Petersburg paradox have shown that people do not only have a preference for more wealth and consumption but also an aversion to uncertainty. This idea is theorized by the "expected utility hypothesis". Instead of choosing the option maximizing expected wealth and consumption, people are concerned about maximizing their expected utility. To account for the detected risk aversion, utility functions are assumed to decrease in marginal utility. In consequence, individuals want to be compensated by an additional risk premium when making decision under uncertainty.

Over a lifetime, every person is faced with millions of choices. In economic terms, everybody's goal should be to maximize expected utility over all periods of life. The optimization process requires to constantly decide between spending wealth today for consumption and investing wealth today to consume in the future. While investing implies a financial return and thus the opportunity to consume more in the future, it bears also uncertainty with regard to the potential future states and related payoffs.

After defining optimal consumption plans, there remains the question in which kind of asset

classes economic agents should invest their money to maximize their expected utility over lifetime. In general, there are two options: Wealth can either be put on a risk-free savings account or invested in the risky market portfolio. These assumptions are in line with the "Modern portfolio theory" postulated by Markowitz (1952). The optimal portfolio choice of risk-less and risky assets should thus be exclusively defined by an individual's level of risk tolerance.

Empirical evidence indicates that market participants do not always stick to these theoretical assumptions, though. This has led to the emergence of behavioral finance. Carrying out hypothetical choice problem experiments, Kahneman and Tversky (1979) observed several violations of the rationality tenets of classical expected utility theory in participants' behavior. Their "Prospect theory" aims to describe people's choices and behavior in a more realistic way. It is based on the observation that individuals are risk averse about gains but risk seeking when facing losses. Hence, the avoidance of losses is of higher importance as the achievement of equivalent gains. This relation is known as "loss aversion". Whether a choice alternative is perceived as a win or loss may differ across individuals and is defined by a subjective reference point.

If single individuals are not rational in their choices, markets as an aggregate of individual decision may still be efficient. This is possible due to the arbitrage argument which implies that irrational choices would immediately be detected and exploited by rational market participants to restore equilibrium. Empirical research has still identified various anomalies which contradict the theory of efficient markets. Examples are manifold, including the existence of market sentiment and pricing differences of closed-end funds (Lee et al. (1991)), weather effects on trading behavior (e.g., Saunders (1993) or Hirshleifer and Shumway (2003)) or the "disposition effect" to hold on to assets that lost in value while selling those achieving financial gains too early (Shefrin and Statman (1985)).

Another line of literature questions the assumption of purely consumption-driven investors. While individuals might still be rational in their choices, also financial decisions may underlie

non-pecuniary preferences. One such example are geographic preferences, commonly referred as "home" or "foreign bias" (French and Poterba (1991), Coval and Moskowitz (2002)). In contrast to the theoretical assumption that investors should hold the diversified market portfolio, domestic and local assets are overweighted in practice. Cultural effects and distance are identified by Beugelsdijk and Frijns (2010) and Anderson et al. (2011) as potential explanations for this puzzle. In fact, investors seem to have a preference for the familiar.

2.2 Sustainability Preferences

The objective of this thesis is to provide a better understanding of non-pecuniary sustainability preferences in financial decision-making. Non-pecuniary preferences imply the existence of an additional utility component, which is detached from consumption plans. The debate whether sustainability issues should be part of the investment process can be traced back to the 1960s when American institutions like the Rockefeller Foundation or certain universities started to evaluate and monitor the social externalities of their grantmaking investment portfolios (Moskowitz (1972)). In the course of the movements against the apartheid in Southern Africa, both public and private institutions chose to divest from the African country (Lansing and Kuruvilla (1988)). Naming a specific date for the appearance of the first ethical funds is difficult, though, since the use of specific screening criteria for financial decisions had probably already been applied for a longer time by religious interest groups. Due to its compliance to ethical standards, the foundation of the first Islamic bank in 1963 in Egypt (Kuran (2004)) may yet be regarded as the foundation of the first sustainable financial institutions.

Today, the consideration of sustainability issues has become standard for many investors worldwide. According to GSIA (2021), more than two thirds of managed assets in Europe, the U.S., Canada, and Australasia might be considered as sustainable. For the correct interpretation of these observable high market shares, it is important to know that sustainable

investing represents currently an umbrella term to summarize various strategies of including sustainability issues in the investment process. Already Moskowitz (1972) stressed the difficulties of finding an adequate measuring standard for assessing the sustainability of a company. Until today, there is a large divergence in how sustainability is defined and assessed by the market (Chatterji et al. (2016), Berg et al. (2022)). While initiatives as the European Union's Taxonomy are currently trying to provide uniform regulations, these are still under development and differ in their definition and conceptualization of sustainability.

Further, not everybody is necessarily motivated by non-pecuniary aspects to invest sustainably. If the market fails to assess the informational value of sustainability issues correctly, a superior understanding of such information might be used to achieve abnormal returns. The empirical evidence for this hypothesis of "errors-in-expectations" (Derwall et al. (2011)) is ambiguous and seems to depend on factors as the examined market, time-horizon or used measure for sustainability.[2] Another potential pecuniary motive for the use of sustainability information are risk-hedging considerations. In this case, the empirical evidence is more consistent (See, e.g., Kim et al. (2014), Nofsinger and Varma (2014), Lins et al. (2017) or Broadstock et al. (2020)). Apparently, higher levels of sustainability seem to create a higher trust between a company and its stakeholders. This trust pays off to shareholders in form of lower downside risk during times of financial turmoils.

On the other hand, various studies find support for the assumption that sustainable investing is at least partly not reasoned in financial considerations but non-pecuniary preferences. Already Akerlof (1980) showed, that people may deviate from optimal consumption plans due to social issues. Following his argumentation, social customs, which lead to financially disadvantageous outcomes, may be preserved, if maximizing one's financial utility goes along with the violation of social customs and thus a loss in reputation. Examining historical market data, the papers of Hong and Kacperczyk (2009), Borgers et al. (2015), El Ghoul and Karoui (2017) and Barber et al. (2021) indicate that investors are willing to accept a lower return

[2]See Friede et al. (2015) for a literature review.

for being sustainable. Remarkably, these studies differ widely in how sustainable assets are defined. While the focus of Hong and Kacperczyk (2009) and Borgers et al. (2015) lies on sin stocks, the papers of El Ghoul and Karoui (2017) and Barber et al. (2021) rely on third-party sustainability ratings and holdings in venture capital funds. Linking actual portfolio holdings with experimental data, Riedl and Smeets (2017) determine intrinsic social preferences to explain the willingness to forego financial returns for "doing good". These social preferences are seen by Brodback et al. (2019) as an attempt of real environmentalism. Gutsche and Ziegler (2019) suggest instead that this intrinsic motivation is rather reasoned in the egoistic attempt to be emotionally rewarded for doing good, called "warm-glow" (Andreoni (1989), Andreoni (1990)).

Recently, a debate has been initiated, in how far investors are rational when pursuing non-pecuniary objectives. The studies of Hartzmark and Sussman (2019) and Heeb et al. (2022) have questioned the consistency of sustainability preferences. The results of Heeb et al. (2022) suggest that investors care primarily about their personal emotional reward and less about the actual impact of sustainable investments. Hartzmark and Sussman (2019) find instead indications, that investors fail in optimizing pecuniary and non-pecuniary preferences simultaneously. Analyzing a natural field experiment, Døskeland and Pedersen (2016) observe further that investors react stronger to wealth than moral frames to invest sustainably.

3 Consistency in Non-Pecuniary Sustainability Preferences

The first three articles of this thesis focus on the consistency of non-pecuniary preferences for sustainable investments. Article 1 "Aggregate confusion or inner conflict? An experimental analysis of investors' reaction to greenwashing" is based on stated preferences from a choice experiment conducted among 266 German retail investors and addresses the current phenomenon of "greenwashing". In general, greenwashing is given when an asset is advertised as more sustainable as it actually is for market reasons. According to Dumitrescu

et al. (2022), 23.8% of sustainable funds in the U.S. might actually be greenwashed. In this regard, the paper investigates how greenwashed and "actual" certified sustainable funds are perceived by retail investors. Results suggest that market participants show a non-pecuniary preference for both greenwashed and certified sustainable funds. This anomaly in behavior may be reasoned in motives of environmentalism and the resulting need to resolve cognitive dissonance.

Article 2 "A Matter of Culture and Development? Experimental Evidence on Cross-Country Differences in Sustainability" extends these findings to a cross-country context. Country and cultural influences are known to show significant impact on human behavior. Little attention has yet been given to potential cross-country differences in sustainability preferences and the tendency to fall for greenwashed assets. Comparing the investment behavior of 649 student investors from Belgium, France, Germany, Italy, Morocco and Turkey in a stated choice experiment, the study finds significant differences in the willingness to forego financial returns for certified sustainable funds. These disparities seem primarily related to differences in economic development and less to Hofstede (2001)'s cultural dimensions. In contrast, there are only minor differences regarding the general preferences for uncertified and thus potentially greenwashed funds.

Article 3 "Opening the Black Box of Sustainable Investing: Examining the Impact of Psychological Distance" addresses the influence of psychological distance on sustainability preferences. Describing how close or distant things are subjectively perceived, psychological distance may have an effect on investors' reaction to sustainability controversies. The study is based on two stated choice experiments conducted among 142 German and 136 French students. Results indicate a lower reaction to sustainability controversies, when these are perceived as more distant. The effect applies not only for spatial but also social and hypothetical distance. Hence, investment decisions depend significantly on how sustainability information is presented to investors.

4 Interdependence of Pecuniary and Non-Pecuniary Preferences

In the literature, it is mostly assumed that non-pecuniary and pecuniary preferences are orthogonal to each other. Article 4 "The Confusion of Taste and Consumption: Evidence from a Stated Choice Experiment" investigates whether investors are indeed able to distinguish between information related to non-pecuniary taste and pecuniary risk/return trade-offs. It relies on stated preferences of 267 experienced German bank clients and 79 German student investors. Within the research, we distinguish between financially material and immaterial sustainability information. A sustainability issue is considered as financially material if it is related to a firms' financial performance. According to Khan et al. (2016), financially material sustainability issues may be used to outperform the market, while there is no such effect for immaterial ones. Since the publication of these results, investors have especially focused on materiality when using sustainability information. The goal of the study is therefore to analyze in how far investors are able to make investment decisions in line with their pecuniary and non-pecuniary preferences when both material and immaterial sustainability information is given.

Results suggest that there are two groups of investors, who tend to confuse non-pecuniary taste with financial fundamentals. The first one is intrinsically motivated to "do good" and becomes prone to affect when confronted with salient sustainability information. In consequence, they assign sustainability issues a higher financial value as objectively given. As investors of the second group do not derive utility from "doing good", affect cannot be used to explain their behavior. Instead, they seem to get triggered by the term "financially material" and thus wealth concerns to rely on sustainability information.

5 Lifestyle Characteristics Related to Non-Pecuniary Sustainability Preferences

Article 5 "Lifestyle Characteristics Related to Non-Pecuniary Sustainability Preferences" uses a sample of 121 German business students to explore in how far non-pecuniary sustainability preferences are reflected in latent personality traits and more observable lifestyle characteristics. Existing literature suggests both a link between personality traits and investment behavior as well as personality traits and lifestyle characteristics. Being the first study examining the influence of personality traits on the tendency to invest sustainably, results suggest a positive effect of "Agreeableness" and a negative one of "Extraversion" and "Conscientiousness" on sustainability preferences. For the examination of lifestyle characteristics, the research focuses on music and drinking preferences. While music preferences show a high explanatory power to explain personality, the evidence for a direct effect of music on sustainability preferences is limited. For drinking preferences, results indicate both a positive link between the abstinence to alcohol, intrinsic personality characteristics and a higher importance of sustainability features when investing.

6 Religious Non-Pecuniary Sustainability Preferences

Article 6 "Religiosity and the Preferences for Islamic Banking - Evidence from a Stated Choice Experiment in Morocco" goes back to the origins of sustainable investing and shows that non-pecuniary taste can not only be observed for the investment context. In spite of the growing population share and general awareness of Islam, also the markets for Islamic finance and banking are worldwide growing. Similar as for sustainable investments, religious Muslims seem to derive non-pecuniary utility from using banking services which are in line with Islamic law and their religious convictions. Using the introduction of Islamic banking in Morocco as a natural experiment, the research analyses how Islamic banks are currently

perceived in Muslim African countries and asks whether these banks have the potential to become serious competitors for the conventional banking sector. The study is based on survey data of 203 Moroccan business students, who represent the future main customers of banks. Results indicate a strong effect of religious preferences on banking decisions. On the aggregate, individuals are not willing to pay a monetary premium for using Islamic banks, though. A possible explanation is a missing understanding and trust in Islamic institutions. In consequence, religious Muslims are currently still kept from using both Islamic banks and any other form of banking services in practice.

7 Applied Methodology

All included papers rely on discrete stated choice experiments to elicit non-pecuniary preferences. Fundamental for this methodology are Lancaster (1966)'s "Consumer theory" as well as the "Random utility theory" developed by Thurstone (1927) and McFadden (1974). The latter theory suggests that individual i will generally choose the alternative j in choice situation m, which provides the highest level of utility U. In some cases, i might deviate from optimal choices for latent reasons. To account for such anomalies in behavior, it is assumed that utility can be divided into an observable component V and an unobservable random component ϵ.

$$U_{ijm} = V_{ijm} + \epsilon_{ijm}$$

Lancaster (1966)'s proposition to regard the value of a good as the linear combination of its underlying characteristics can then be used to determine V, which is defined by K observable attributes x and a corresponding sensitivity parameter β_k to express the importance of each x_k.

$$V_{ijm} = \sum_{k=1}^{K} \beta_{ik} x_{ijmk}$$

The objective of stated choice experiments is to define the unknown vector β, which describes the importance of attributes on decision-making. For this purpose, individuals' choices among different alternatives have to be observed. An alternative j will be chosen if it dominates all other alternatives in total utility. However, total utility cannot be observed due to the random component. Assuming that ϵ is identically and independently (i.i.d.) as well as extreme-value I distributed, the observed choices can be expressed by a multinomial logit model.

$$\text{Prob(Alt j is chosen)} = \frac{exp(V_{ijm})}{\sum_{j=1}^{J} exp(V_{ijm})}$$

The value function and thus the probability of an alternative is coded to one if the alternative was chosen and zero otherwise. The quested vector β can then be estimated with the method of maximum-likelihood.[3] The determined parameters express the influence of each attribute on the choice for a specific alternative. To control for the reasons why an attribute has an influence on the decision process or not, the attributes of the choice experiment can be interacted with additional explanatory variables as, for example, individual-specific characteristics.

While these simple logit models are easily solvable with modern statistic programs, they come with some restriction in their practical use. First, the assumption of i.i.d. distributed error terms is not always given in real-life situations. An obvious application where this assumption is violated is panel data, which occurs when more than one choice task is completed by each

[3]For a detailed derivation of the model, see, e.g., Train (2009) or Hensher et al. (2015).

participant. Also differences in taste cannot be considered by these models. Another issue represents the independence axiom (IIA) which is required to solve the logit model.

To overcome these issues, all studies included in this thesis rely on more flexible "mixed logit models". In these models, it is assumed that (some) parameters are continuously distributed within the population.

$$\beta_{ik} = \beta_k + \sigma_k \mu_{ik}$$

In this case, μ_{ik} represents a determined distribution and σ_k can be interpreted as the standard deviation of the distribution, which has to be estimated from data. Most choice models include at least one monetary attribute which is typically handled as a fixed parameter. Also interaction terms to control for the influence of external factors as individual-specific characteristics are often excluded from randomization.

The increased flexibility and accuracy of mixed logit models comes at the cost of not being solvable by deterministic numerical integration approaches. These models can only be approximated with Monte Carlo simulation methods, instead (e.g., Train (2009)). For all random parameter specifications in this thesis, 500 Halton draws were used for simulation.

While being more sophisticated in execution and evaluation than traditional conjoint or survey analyses, the indirect elicitation method of choice models generally leads to a higher external validity of determined preferences. Also choice models can be prone to hypothetical biases, though. These might be related to issues as social desirability, salience or a lack of real-life consequences of choices (Haghani et al. (2021a), Haghani et al. (2021b)). In regard of the complexity of examining the human mind, the chosen experimental approach represents to the best of knowledge the most effective way for determining and understanding non-pecuniary preferences, which are subject to the included studies.

8 Scientific Contribution

The presented thesis extends the existing literature by highlighting the complexity of adding sustainability dimensions in the investment process. Prior studies have treated non-pecuniary taste for sustainable assets rather as a binary variable. Investors were assumed to either derive utility from sustainability issues or not. The articles of this thesis suggest instead to regard sustainability preferences as a complex multidimensional concept. Investors seem further to be inconsistent in their non-pecuniary utility preferences due to several behavioral biases - an issue so far widely ignored in the literature.

Apart from content issues, the thesis also contributes to the methodology used in finance research. In particular, the presented articles confirm the suitability of stated choice experiments as an adequate research methodology to elicit the preferences and motives of financial decision makers. Future finance studies may hence profit from an increased acceptance of choice model experiments in the literature.

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Article 1:

Aggregate Confusion or Inner Conflict? An Experimental Analysis of Investors' Reaction to Greenwashing

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Published in:

Finance Research Letters (FRL)

Volume 53, May 2023, 103421

doi: https://doi.org/10.1016/j .frl.2022.103421

Abstract

This research conducts a stated choice experiment to analyze how potential greenwashing is perceived by retail investors. Results suggest that on the aggregate, investors might fall for greenwashed assets. Considering the intrinsic motivation for sustainable investing, we find that warm-glow investors are willing to pay a premium for eliminating greenwashing risk while this is not the case for environmentalists. A possible explanation for this phenomenon is that environmentalists are primarily concerned about the resolution of cognitive dissonance between their actions and their intention to protect the environment. The validity of green labels is of secondary importance to resolve cognitive dissonance.

Keywords: Greenwashing, Sustainable investing, Cognitive dissonance, Stated choice experiment, Sustainability reporting, Investor behavior

JEL Classification: Q56, G11, G41, M48

Declaration of interest: None

1 Introduction

Existing research indicates that the popularity for sustainable assets might be detached from financial considerations. Several studies suggest that investors have a non-pecuniary taste for sustainability.[4] However, sustainability still lacks a uniform classification and regulatory framework. Currently, there is an ongoing debate among academics and practitioners that at least some investment funds may be advertised as more sustainable as they actually are for marketing considerations. This phenomenon is called "greenwashing".

Finding an objective definition and universal criteria for sustainability is a major challenge for the development of sustainability ratings and policy makers (Chatterji et al. (2016), Berg et al. (2022)). Without such a clear definition of sustainability, greenwashing is difficult to detect. Lyon and Montgomery (2015) view greenwashing as a "broad umbrella term" due to inconsistencies with respect to its definition and application in the literature. Broadly speaking, greenwashing may be understood as firms' attempt to "appear greener than they really are" (Arouri et al. (2021)). According to Dumitrescu et al. (2022) there is greenwashing if a fund advertises the consideration of ESG factors although its sustainability rating is at best average and votes in less than 70% of annual votes in support of shareholder-initiated sustainability proposals. An application of this definition yields that 23.8% of examined ESG funds are greenwashed.

In this paper, we ask how greenwashing is perceived by retail investors. We explore to which extent the valuation of assets might be affected by greenwashing. Existing literature primarily attributes the existence of greenwashing to a lack of transparency and resulting confusion. In this paper, we address the importance of the intrinsic motivation to "do good". In line with literature, we distinguish between warm-glow and environmentalism as potential taste motives: Warm-glow describes the selfish pleasure received from doing a good deed. Since this feeling does not necessarily depend on the actual outcome of one's actions, it is regarded as

[4]See, for example, Hong and Kacperczyk (2009), Riedl and Smeets (2017), Hartzmark and Sussman (2019), Gutsche and Ziegler (2019), and Ghoul and Karoui (2021).

an impure form of altruism (Andreoni (1989), Andreoni (1990)). In this case, sustainability characteristics may be regarded as "nice-to-have" but not compulsory by investors. Environmentalism, as measured by value-belief-norm theory, relates to a purer form of altruism. In contrast to warm-glow, it implies that individuals with pro-environmental values will feel a moral obligation to do good if they believe in the effectiveness of their actions (Stern et al. (1999)). Hence, environmentalism is based on a higher intrinsic motivation than warm-glow giving.

We tackle the research question with a survey-based choice experiment that was conducted among 266 German retail investors. Participants were asked to choose between conventional and green labelled funds. We informed participants that a green label is not necessarily related to the actual environmental performance and can be assigned for marketing reasons only. To guarantee sustainability, some green labelled funds have a hypothetical governmental sustainability certificate. Participants were instructed that only green funds with certificates are actually sustainable. Moreover, participants were informed that all fund characteristics are reflected in the pecuniary risk/return trade-offs of investments.

The paper provides the following contributions: First, results suggest that investors are willing to lower expected returns by 1.13% for green labelled funds without certificates. Hence, greenwashing has an impact. On the aggregate, investors are at least aware of greenwashing as they are willing to sacrifice another 3.14% in expected returns for the certificate, which could be viewed as an "insurance against greenwashing". Second, we explore the impact of investor characteristics on investment decisions. We find a positive relation between warm-glow and the probability to reduce expected returns for both greenwashed and certified green funds. In contrast, environmentalists are not willing to pay an insurance premium to avoid greenwashing. A possible explanation for this unanticipated observation is that these are primarily concerned about resolving cognitive dissonance between their actions and the perceived obligation to protect the environment. To do so, a green (marketing) label may be sufficient. It does not have to be externally validated.

The paper is related to two strands of literature. First, it contributes to the current debate on greenwashing in finance. To the best of our knowledge, this is the first study examining greenwashing from the eye of individual investors, which takes into account intrinsic motivation in an experiment. Ghoul and Karoui (2021) analyse historical market data and find little evidence for the impact of greenwashing. Examining U.S. mutual funds, Dumitrescu et al. (2022) observe that retail investors may be exploited by greenwashing, while this is not the case for professional ones. Urbański and ul Haque (2020) detect a positive relation between environmentalism and the impact of greenwashing for consumption markets. Also Gutsche and Ziegler (2019) apply a stated choice experiment. Their research investigates if and why investors value sustainable assets without addressing greenwashing.

The second strand of literature addresses the motivation for sustainable investing. Environmentalism and warm-glow are tested as taste motives by Brodback et al. (2019) and Gutsche and Ziegler (2019), respectively. To the best of our knowledge, this is the first study controlling for these related constructs simultaneously. Heeb et al. (2022) suggest that taste-driven investors may be rather insensitive to the magnitude of the non-pecuniary impact of their investments. Our study shows that even investments without any impact are valued by taste investors. Enhanced trust was introduced by Lins et al. (2017) as an important determinant to explain why investors decide for sustainable assets. Arouri et al. (2021) argue that the provision of wrong sustainability information may yet have negative effects on trust and the attractiveness of sustainable assets.

The remainder of the paper is organized as follows. Section 2 discusses data and methodology. Section 3 contains the results. Section 4 concludes.

2 Data and Methodology

The empirical analysis is based on data from a choice experiment among 266 German retail investors. The data was collected in summer 2021 within a larger anonymous online survey

conducted in collaboration with three local banks.[5] The demographics of participants are presented in Table 1. The representation of gender and education is similar to the German population of investors. The group of investors over the age of 60 is underweight, though (cf. Deutsches Aktieninstitut (2020)). Most investors in the sample have more than five years of investment experience. About 50% of all participants consider sustainability criteria in real-life investment decisions.

We also collected anonymized data on investor-specific characteristics. Table 2 provides the summary statistics. "Warm-glow", "Transcendental values" and "Perceived environmental threat" are measured on 7-point Likert scales, while "Risk aversion" and "Patience" follow from 11-point-scales. "Perceived effectiveness", "High literacy" and "High income" are dummy variables which take the value if a participant believes in the effectiveness of sustainable investing to protect the environment, answered at least three of four basic financial literacy questions correctly or rather receives a monthly above-average net household income of 3'600 euros or more. Finally, 'Environmentalism" is measured by the product of "Transcendental values", "Perceived environmental threat" and "Perceived effectiveness" as suggested by value-belief-norm theory (Stern et al. (1999)). The measurement of warm-glow and environmentalism follows standard approaches from the literature and was particularly inspired by Gutsche and Ziegler (2019) and Brodback et al. (2019). As the correlation of all used covariates scores below 0.5, concerns of multicollinearity can be ruled out.

In the experiment, participants were asked to add an investment to their sufficiently diversified portfolio. Each participants faced four choice sets. A choice set consisted of two conventional funds, two green labelled funds, and an investment in the risk-free bank account (status quo option). Investors were instructed that a green label may not reflect a fund's actual environmental performance per se. Instead it can be assigned exclusively for marketing reasons due to a lack of regulations. However, the green label can be backed up by a

[5]In this survey, participants participated in two experiments in fact. The results of the other experiment are reported in Kleffel and Muck (2022).

governmental certificate that ensures the conformity with the environmental targets of the European Union (EU). Thus, the certification of a green label eliminates the risk of green-washing. Moreover, all investments were characterized by i) expected return, ii) risk and iii) geographic investment focus. Before and during the experiment, participants were informed that all value-relevant information is already incorporated in expected returns and risk. This implies that sustainability information and risk/return trade-offs are disentangled from each other and prevents a rationally justifiable pecuniary-motivated use of sustainability in the experimental set-up.

The empirical analysis aims to determine the unknown vector β_i which defines the utility U_{ijm} over all respondents i for fund j in choice set m by maximum likelihood estimations. The size of the vector depends on observable fund attributes and individual-specific characteristics x_{ijm} as well as an unobservable error term ϵ_{ijm} which is assumed to be identically and independently (i.i.d.) extreme-value I distributed.

$$U_{ijm} = \beta_i' x_{ijm} + \epsilon_{ijm}$$

The panel structure of our data contradicts the assumption of i.i.d. error terms. Therefore, we rely on a more flexible mixed logit model, where parameters are assumed to be random and in addition to the mean also the standard deviation of the distributed parameters has to be estimated from the data. This methodology follows standard procedures in choice modelling as proposed by Hensher et al. (2015) or Train (2009). The empirical analysis was executed with *Biogeme* (Bierlaire (2020)), a flexible open source Python package designed particularly for the analysis of choice models. In total, 48 different choice sets were created and blocked into 12 groups. Participants were randomly assigned to a block. The applied D-efficient experimental design (e.g., Street et al. (2005)) is based on prior values from pre-test results and was generated with the software *ChoiceMetrics Ngene*. Expected returns were

treated as a continuous variable. All other attributes are dummy variables.

3 Results

Table 3 reports the results of the mixed logit analysis. A positive (negative) estimated mean indicates that investors derive positive (negative) utility from a specific attribute. From the estimated utility parameters, the Willingness-to-Pay (WTP) of each attribute can be determined to simplify the interpretation of results. Per convention in the literature, a corresponding negative (positive) WTP implies that investors demand a return discount (premium) for choosing a fund comprising the respective attribute. For random parameters, the estimated standard deviation is also given.

As expected, investors prefer higher returns and dislike risk. High and low risk are treated asymmetrically. While investors are willing to give up about 1.36% for low risk investments they require a compensation of about 5.05% when risk is high. The variable "Domestic focus" is not significant, that is, investors do not prefer investments that target domestic firms (home bias). The variable "Mutual funds" reflects differences in the preference for fund investments compared to the status-quo alternative of keeping money on the savings account. Its positive size implies a general preference for mutual fund investments.

The variables of main interest are "Green fund" and "Certificate". While the former captures the impact of a green (marketing) label, the latter measures the impact of a certificate which confirms that a green labelled fund is indeed sustainable. In the model without interaction terms (Model 1) the WTP is significant for both variables. On the aggregate, investors are willing to give up about 1.13% for a green label. Obviously, investors rely on the green label although there is the risk of greenwashing. However, they further sacrifice an additional 3.14% of expected returns to obtain a certificate which guarantees the sustainability of the fund. This "insurance premium" against greenwashing risk is significantly higher than the one accepted up for the green label alone. This indicates that in general investors understand

the value and implications of the certificate.

The impact of investor characteristics is explored in Model 2, which includes interaction terms. It turns out that the attached importance to both greenwashed and certified green funds depends on the intrinsic motivation of investors. Interestingly, we observe differences between "Warm-glow" and "Environmentalism". For warm-glow, the interaction term with the certificate yields a significant and negative WTP. The interaction term for green labels is insignificant, though. For environmentalists, the results are the other way round. Furthermore, risk averse investors are willing to forego expected returns in exchange for green (marketing) labels.

Warm-glow and environmentalism are related concepts. In the data set the correlation is 0.39 between these variables and there seems to be some overlap.[6] For this reason, we repeated the estimations excluding the "Warm-glow" and "Environmentalism" interaction terms in Models 3 and 4, respectively. In Model 3, only the interaction term of "Environmentalism" and "Green fund" is statistically significant while the interaction term with "Certificate" is insignificant. This is in line with the results of Model 2. In Model 4, the interaction terms of "Warm-glow" with "Green fund" and "Certificate" reveal both a significant negative WTP. This suggests that the impact of "Environmentalism" overshadows the interaction of "Warm-glow" with "Green fund" in Model 2.

The results imply that warm-glow investors and environmentalists treat green labels and certificates differently. Warm-glow investors are willing to sacrifice expected return in exchange for a certificate confirming the sustainability of the investment. To some extent this is also true for green (marketing) labels. These investors derive utility from the feeling of "doing good" alone. The impact of their actions is of secondary importance. Therefore, they reduce return expectations for sustainable and at least to some extent also for potentially greenwashed assets.

[6]We are grateful to an anonymous referee for pointing this out.

The behaviour of environmentalists is more difficult to explain. They substitute expected returns for a green (marketing) label while not reducing return expectations for a certificate assuring that an investment is sustainable. In contrast to warm-glow investors, environmentalists feel morally obliged to protect the environment and should derive utility only from the actual outcome of their actions. It could be argued that environmentalists perceive the risk of greenwashing for green labelled assets without a certificate as low and irrelevant. However, this conjecture is difficult to rationalize within the experimental set-up. Another explanation is that the elimination of greenwashing risk does not matter. This could indicate that the resolution of cognitive dissonance represents the primary motivation for these investors. Cognitive dissonance describes an inner conflict arising from an inconsistency between two contradicting items of information (Festinger (1957)). Since investors are concerned about ending this state of disharmony, they are motivated to change the conflicting items to reduce dissonance. In our context, there might be a cognitive dissonance between the felt obligation to protect the environment and the intention to maximize financial returns. A green label might resolve this cognitive dissonance independent of its validity. In this case, a certificate would not yield any further utility.

All interaction terms between "Green fund" and "Risk aversion" are significant and suggest a positive relation between risk aversion and the propensity to value greenwashed funds. A likely explanation is reputation risk, that is, the risk to not meet the perceived expectations of the social environment. Alternative explanations are financial hedging motives or the avoidance of sustainability risk with respect to the firms' externalities. However, these explanations are not in line with the experimental set up.

4 Conclusion

In this research, we look at the potential of greenwashed assets to deceive investors. Results suggest that investors with an intrinsic motivation to do good are willing to sacrifice expected

return for assets that may be greenwashed. Paradoxically, only investors driven by warm-glow accept a lower return for assets with a certificate that reduces greenwashing risk while this is not the case for environmentalists. Potential explanations are that environmentalists either ignore the risk of greenwashing or that green labels resolve cognitive dissonance and thus an inner conflict. The former explanation is difficult to justify within the experimental set-up. In summary, the motivation for the observed behavior seems to be manifold and is of interest for future research.

Acknowledgements

We thank Pascal Albert, Brigitte Eierle, AbdelKader El Alaoui, Karl-Heinz Gerholz, Michael Herold, Tobias Herzing, and Jamil Jaballah for helpful comments and suggestions. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Tables

Table 1 – Demographics of participants

Measure	**Value**	**# of obs.**	**%**
Gender	Female	89	33.46
	Male	176	66.17
	Non-Binary	1	0.38
Age	16-24	21	7.89
	25-34	49	18.42
	35-44	45	16.92
	45-54	66	24.81
	55-65	67	25.19
	More than 65	18	6.77
Income	Less than 1'700€	19	7.14
	1'700-2'599€	28	10.53
	2'600-3'599€	63	23.68
	3'600-4'999€	66	24.81
	5'000-7'000€	36	13.53
	More than 7'000€	26	9.77
	No answer	28	10.53
Education	Secondary school	73	27.44
	High school	48	18.05
	University	105	39.47
	Advanced vocational education	37	13.91
	Other	1	0.38
	No answer	2	0.75
Investment experience	Less than 1 year	17	6.39
	1-5 years	64	24.06
	More than 5 years	169	63.53
	Professional/Institutional investor	5	1.87
	No answer	11	4.14
Use of sustainability	Yes	132	49.62
	No	134	50.38
Total: 266			

Note: The table shows the demographics of survey participants. # of obs. refers to the absolute and % to the relative number of participants in a category.

Table 2 – Summary statistics of individual-specific characteristics

Variable	Mean	Standard deviation	Min	Max	Reference
Warm-glow	5.30	1.54	1.0	7.0	Gutsche and Ziegler (2019),
Environmentalism	22.46	17.99	0.0	49.0	Stern et al. (1999)
Transcendental values	5.56	0.93	1.5	7.0	Bouman et al. (2018)
Per. environm. threat	5.67	1.47	1.0	7.0	Own elaboration
Per. effectiveness	0.67	0.47	0.0	1.0	Own elaboration
Risk aversion	5.05	1.94	1.0	11.0	Dohmen et al. (2011)
Patience	6.64	2.41	1.0	11.0	Vischer et al. (2013)
High literacy	0.81	0.39	0.0	1.0	Lusardi and Mitchell (2011)
High income	0.59	0.49	0.0	1.0	Statistisches Bundesamt (2022)

Note: The table shows summary statistics of the individual-specific characteristics used as explanatory variables. "Warm-glow", "Social norms", "Environmentalism", "Transcendental values" and "Per. envirom. threat" are measured on Likert scales ranging from 1 to 7. "Per. effectiveness" is a dummy variable, which equals one if participants believe in the effectiveness of sustainable investing to do something good. "Per. envirom. threat" and "Per. effectiveness" are used as abbreviations for "Perceived environmental threat" and " Perceived effectiveness", respectively. "Risk aversion" and "Patience" measure the attitude towards risk and time on Likert scales ranging from 1 to 11. "High literacy" and "High income" are dummy variables and equal to one if respondents answered at least out of four financial literacy questions correctly and stated to earn an above average monthly net income of 3'500€ or more. Summary statistics are based on the answers of 266 German retail investors.

Table 3 – Mixed logit estimation results of the choice experiment

Explanatory variables	Model 1			Model 2			Model 3			Model 4		
	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.293***	-	-	0.314***	-	-	0.31***	-	-	0.308***	-	-
	(0.0227)			(0.0237)			(0.0235)			(0.0234)		
Mutual funds	2.08***	1.96***	-	2.10***	2.1***	-	2.07***	2.06***	-	2.09***	2.04***	-
	(0.611)	(0.494)		(0.627)	(0.485)		(0.616)	(0.475)		(0.623)	(0.485)	
Risk high	-1.48***	1.52***	5.05%	-1.51***	1.40***	4.81%	-1.49***	1.39***	4.81%	-1.50***	1.43***	4.87%
	(0.173)	(0.214)		(0.171)	(0.212)		(0.169)	(0.210)		(0.171)	(0.213)	
Risk low	0.399***	0.656***	-1.36%	0.385***	0.755***	-1.23%	0.383***	0.765***	-1.24%	0.379***	0.737***	-1.23%
	(0.106)	(0.168)		(0.109)	(0.159)		(0.108)	(0.159)		(0.108)	(0.157)	
Domestic focus	-0.119	0.572***	n.s.	-0.145*	0.569***	0.46%	-0.138	0.554***	n.s.	-0.144*	0.559***	0.47%
	(0.086)	(0.137)		(0.0868)	(0.137)		(0.0858)	(0.135)		(0.0864)	(0.136)	
Green fund	0.330***	0.153	-1.13%	-0.474	-	n.s.	-0.364	-	n.s.	-0.250	-	n.s.
	(0.0947)	(0.150)		(0.501)			(0.446)			(0.494)		
x Warm-glow	-	-	-	0.0364	-	n.s.	-	-	-	0.144**	-	0.47%
				(0.0654)						(0.0596)		
x Environmentalism	-	-	-	0.025***	-	-0.08%	0.026***	-	-0.08%	-	-	-
				(0.00591)			(0.00538)					
x Risk aversion	-	-	-	0.114**	-	-0.36%	0.124**	-	-0.40%	0.0903*	-	-0.40%
				(0.0521)			(0.0508)			(0.0512)		
x Patience	-	-	-	0.5	-	n.s.	-0.0437	-	n.s.	-0.0698*	-	0.23%
				(0.0947)			(0.0398)			(0.0397)		
x Literacy	-	-	-	-0.178	-	n.s.	-0.179	-	n.s.	-0.162	-	n.s.
				(0.243)			(0.243)			(0.241)		
x Income high	-	-	-	0.101	-	n.s.	0.0995	-	n.s.	0.0331	-	n.s.
				(0.195)			(0.194)			(0.192)		
Certificate	0.919***	0.421**	-3.14%	-0.837	-	n.s.	0.232	-	n.s.	-0.882*	-	2.86%
(only for green funds)	(0.10)	(0.188)		(0.531)			(0.196)			(0.526)		

(continued)

Table 3 – *Continued*

x Warm-glow	-	-	-	0.293***	-	-0.93%	-	-	-	0.283***	-	-0.92%
				(0.0723)						(0.066)		
x Environmentalism	-	-	-	-0.00322	-	n.s.	0.00673	-	n.s.	-	-	-
				(0.00599)			(0.00541)					
x Risk aversion	-	-	-	-0.0341	-	n.s.	0.0102	-	n.s.	-0.0306	-	n.s.
				(0.0533)			(0.0515)			(0.0528)		
x Patience	-	-	-	0.0144	-	n.s.	0.0235	-	n.s.	0.0166	-	n.s.
				(0.0405)			(0.04)			(0.0399)		
x High literacy	-	-	-	0.356	-	n.s.	0.377	-	n.s.	0.352	-	n.s.
				(0.252)			(0.25)			(0.251)		
x High income	-	-	-	-0.00399	-	n.s.	0.0445	-	n.s.	-0.0106	-	n.s.
				(0.199)			(0.196)			(0.197)		
N (# of observations)	266 (1053)			266 (1053)			266 (1053)			266 (1053)		
Log-likelihood	-1,260.584			-1,214.966			-1,230.177			-1,227.196		

The table shows the results of a mixed logit model for the choice experiment. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Article 2:

A Matter of Culture and Development? Experimental Evidence on Cross-Country Differences in Sustainability Preferences

Author:

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Abstract

This research focuses on potential cross-country differences in investors' non-pecuniary "taste" for sustainability. Relying on data from a stated-choice experiment conducted in Belgium, France, Germany, Italy, Morocco and Turkey, I control for country-related differences in the reaction to greenwashed and certified sustainable funds. Results indicate only minor influences of country effects on the general preference for sustainability. While cultural dimensions show some explanatory power, individual-specific characteristics as warm-glow and risk aversion are better suited to explain the general motivation to invest sustainably. Country factors are important when it comes to foregoing financial wealth for additional certificates. This observation might be explained by disparities in economic development and resulting differences in pecuniary and non-pecuniary marginal utility.

Keywords: Sustainable investing, Cultural finance, Emerging markets, Greenwashing, Investor behavior

JEL Classification: Q56, G11, G41, M48

Declaration of interest: None

1 Introduction

The consideration of sustainability information is becoming more and more mainstream on financial markets (GSIA (2021)). Literature has shown that this phenomenon is not necessarily driven by pecuniary considerations, only. Instead, investors seem to derive non-pecuniary utility from being sustainable. So far, little attention has been given to potential cross-country differences in this taste for "doing good". Such disparities might be reasoned in cultural aspects. In the finance literature, cultural dimensions have in particular been used to explain geographic investment preferences, known as "home" or "foreign bias". Alternatively, those effects might be due to disparities in economic development and resulting differences in the marginal utility received from pecuniary and non-pecuniary returns.

This research focuses on country-related differences in the taste for sustainability. Relying on a stated-choice experiment among 649 student investors from Belgium, France, Germany, Italy, Morocco and Turkey, I ask whether there are systematic deviations in sustainability preferences in Europe and its neighbouring emerging markets. Country and individual-specific characteristics are used to control for potential explanations. To ensure robustness, results are compared with a sample of actual retail investors. In real-life investing, market participants are faced with a wide divergence in the sustainability assessment of companies (e.g., Chatterji et al. (2016) or Berg et al. (2022)). This lack in uniform classification frameworks has initiated the debate about "greenwashing". Broadly speaking, "greenwashing" is given when a conventional asset is advertised as sustainable for marketing reasons. Greenwashed assets might be accepted by market participants due to the current lack in uniform regulations and resulting confusion. Kleffel and Muck (2023) suggest to consider psychological biases and the resolution of cognitive dissonance as an alternative explanation. As the proneness to such biases might underlie country-specific influences, I analyze whether investors differ across countries in how "greenwashed" and actual "certified" sustainable investments are perceived.

The findings of this study are threefold. First, investors show a strong preference for sustainability, independent of the country of origin. For "greenwashed" funds without certificates, a return discount of around 1% of expected returns is accepted. This preference is best explained by individual-specific characteristics as warm-glow and higher levels of risk aversion.

Second, cross-country differences matter when it comes to certified funds. Results suggest a positive relation between the willingness to forego expected returns for a certificate and the economic development of a country. In the case of certificates, the economic development shows a higher explanatory power than the examined individual-specific characteristics. In other words, not everyone might be able to afford being sustainably in terms of utility maximization.

Third, the study indicates that also cultural dimension have a certain influence on sustainability preferences. These relate primarily to the general preference for sustainability and less for certificates. Greenwashed funds are valued to a lower extend in masculine and thus more competitive countries. In these cultures, caring for the overall welfare is of lower importance. Also uncertainty avoidance seems to be related to a lower appreciation of uncertified funds, what might be traced back to the uncertainty induced by the current lack in regulatory unity.

The paper contributes to two lines of literature. First, it improves the understanding of sustainable investing by providing an international perspective. Current research has focused mainly on one country (e.g., Borgers and Pownall (2014) and Riedl and Smeets (2017) for the Netherlands, Gutsche et al. (2021) for Japan, Døskeland and Pedersen (2016) for Norway or Gutsche and Ziegler (2019) and Kleffel and Muck (2023) for Germany). The findings of this paper are therefore important to assess whether the results of former studies can be generalized to the whole market.

Second, if affects the rather new literature about cultural finance. So far, this literature centered mainly on understanding geographic investment preferences (e.g., Beugelsdijk and Frijns (2010), Anderson et al. (2011), Aggarwal et al. (2012) or Karolyi (2016)). By stressing

the impact of cultural background on the decision to invest sustainable or not, this research might be used as a starting point to establish cross-country differences in sustainable investing as a new field of research in cultural finance. Results are further relevant for policy makers. To the best of my knowledge, this is the first study analysing the sustainability preferences of investors from emerging markets. The study may hence be used as an indicator for the actual demand of sustainable investments in countries where the access to such assets is yet limited. Eliminating the current ambiguity in sustainability assessments remains instead a global challenge.

The paper is organized as follows. Section 2 provides the theoretical background and derives the research question. Section 3 describes the data and methodology. Section 4 reports the empirical results. Section 5 controls for robustness and Section 6 concludes.

2 Background and Research Question

2.1 Non-Pecuniary Taste for Sustainability

The consideration of sustainability information has become more than just a temporary trend among investors in all major markets (GSIA (2021)). One explanation for this phenomenon is based on rational calculus and pecuniary motives. In a market failing to price the value of sustainability issues correctly, sustainable investing may be used to improve financial performance by enhancing information about future dividends.[7] Other studies suggest a lower downside risk of sustainable assets, which could be exploited as a hedging tool in times of financial turmoil.[8] The financial profitability of sustainable investing might further differ across geographic regions. Auer and Schuhmacher (2016) suggest that investors in Europe have to pay a premium for being sustainable, while this is not the case when allocating money

[7]See, e.g., Borgers et al. (2013), Belghitar et al. (2014), Khan et al. (2016).

[8]See, e.g., Kim et al. (2014), Nofsinger and Varma (2014), Lins et al. (2017), Nofsinger et al. (2019), Broadstock et al. (2020).

in the Asia-Pacific region or the U.S. Liang and Renneboog (2017) find higher ratings but also a higher importance of sustainability ratings in civil law countries as compared to common law ones. The influence of country factors as culture or economic development on firms' sustainability ratings is also stressed by Cai et al. (2016). With regard to the fundamental value of sustainability characteristics, Van Duuren et al. (2016) observe a higher appreciation among European than American asset managers.

Alternatively, investors may not be driven by financial aspects but a non-pecuniary "taste" for sustainability. In this case, they are willing to forego financial returns in exchange for "doing good". Several studies found empirical evidence for the existence of a non-pecuniary taste component in investors' utility when examining historical market data.[9] Combining actual stock holdings with answers from an experiment, Riedl and Smeets (2017) trace this taste for sustainability back to intrinsic social preferences. Gutsche and Ziegler (2019) and Kleffel and Muck (2023) successfully applied the concept of "warm-glow" to substantiate this intrinsic motivation. "Warm-glow" describes the utility derived from "the good feeling from doing good" (Andreoni (1989), Andreoni (1990)). Hence, the actual impact and externalities of sustainable investing would be of subordinate interest. Brodback et al. (2019) suggest in contrast to regard sustainable investing as a form of "Environmentalism" where the impact of actions is of priority.

These competing explanations of social preferences have initiated a debate about how rational investors are with respect to maximizing their non-pecuniary utility. Hartzmark and Sussman (2019) find evidence that market participants tend to confuse sustainability information with firm fundamentals. Heeb et al. (2022) deliver further evidence that taste-driven investors are not consequential in their sustainability preferences. In line with the concept of "Warm-glow", investors may rather seek emotional reward than actual impact when deciding for a sustainable asset.

[9]See, e.g., Hong and Kacperczyk (2009), Borgers et al. (2015), El Ghoul and Karoui (2017), Barber et al. (2021) or Bofinger et al. (2022).

A major challenge for sustainable investing represents currently the lack in a uniform classification framework. Chatterji et al. (2016) and Berg et al. (2022) find significant divergence in the sustainability assessment of existing rating agencies. This "aggregate confusion" (Berg et al. (2022)) may have induced investment companies to advertise conventional assets as sustainable ones for marketing considerations. This practice is known as "greenwashing" (Arouri et al. (2021)). Dumitrescu et al. (2022) suggest that 24% of U.S. mutual funds which claim to be sustainable should actually be regarded as greenwashed. Besides these regulatory issues, Kleffel and Muck (2023) see behavioral biases and the resolution of cognitive dissonance as an alternative driver for the large share of greenwashed assets.

2.2 Country-related Differences in Investment Behavior

Countries differ in terms of economic development and culture. As defined by Hofstede (2001), culture can be described as "the collective programming of the mind that distinguishes the members of one group or category of people from others". Culture influences the individual behavior of a society's members. To compare the culture and resulting differences in the functioning of countries and their members, Hofstede (2001) developed the theory of cultural dimensions, which is today accepted as a standard framework in research. In its current form, it distinguishes between the six cultural dimensions.

- Power distance:

  Do members of the society accept and expect a low or high degree of power distribution?

- Individualism versus collectivism:

  Do members of the society care only about themselves and their close family (individualism) or also about the wider environment (collectivism)?

- Masculinity versus femininity:

  Do members of the society prefer competition and personal reward (masculinity) or collaboration and overall well-fare (femininity)?

- Uncertainty avoidance:

  Do members of the society feel uncomfortable with the state of an uncertain future?

- Long-term orientation vs. short-term orientation:

  Do members of the society prefer to maintain existing norms (long-term oriented) or to try new approaches (short-term oriented) when facing challenges?

- Indulgence vs. restraint:

  Are members of the society allowed to enjoy life and pleasure (indulgence) or not (restraint) by social norms?

Only recently, the term "cultural finance" emerged as a new line of literature to account for the effect of cultural issues on financial decisions (cf. Zingales (2015) or Nadler and Breuer (2019)). Research in cultural finance has primarily focused on explaining the tendency to overweight certain stocks due to their geographic origin, known as "home" and "foreign bias" (e.g., French and Poterba (1991) or Coval and Moskowitz (2002)). As for the preference for sustainable assets, also these geographic preferences might be explained by both pecuniary as well as non-pecuniary "taste" motives. Seen from the pecuniary-side, investors might prefer local assets due to lower information asymmetries and transaction costs. In contrast, a non-pecuniary "taste" may be reasoned in a preference for familiarity as induced by similarities in language and culture or geographic proximity.

Analyzing the stock ownership of Finish firms, Grinblatt and Keloharju (2001) were the first to confirm the positive effect of linguistic and cultural similarities as well as geographic proximity on the propensity to trade a stock. Subsequent studies used Hofstede's framework to explain this anomaly with cultural characteristics. Literature suggests in particular a positive relation between "Individualism" (Beugelsdijk and Frijns (2010), Aggarwal et al. (2012)), "Masculinity" as well as "Long-term orientation" (Anderson et al. (2011), Aggarwal et al. (2012)) and the tendency to allocate capital abroad. The opposite holds for investors from more uncertainty avoiding countries who show a higher preference for domestic assets

(Beugelsdijk and Frijns (2010), Anderson et al. (2011)). The mentioned studies stress further the importance of cultural distance, i.e., the difference between cultural dimensions of countries, as a criteria to invest in a foreign market or not.

Hofstede's cultural dimensions may also be used to explain differences in the preference for sustainability. In masculine societies, people are rather driven by egoistic than altruistic motives and feel a lower moral obligation to care for the common good. As masculinity promotes competition and material achievements, investors from masculine countries should be less willing to forego financial returns in exchange for "doing good".

Due to the current lack of uniform regulations and the resulting risk of greenwashing, I would further expect a correlation between "Uncertainty avoidance" and sustainability preferences. The effect might work in opposite directions, though. On the one hand, the existing ambiguity may induce investors from uncertainty avoiding countries to stay away from sustainable assets at all. On the other hand, it may encourage these individuals to pay a higher premium for certified funds to hedge against greenwashing risk. On real world markets, sustainable assets have further proven to bear a lower financial risk (Lins et al. (2017)). This pecuniary risk-hedging feature may also appeal in particular to investors from more uncertainty avoiding countries. A plausible relation between the other cultural dimensions and the preference for sustainable assets turns instead difficult to argue.

2.3 Research Question

Previous research has mainly focused on single countries when examining non-pecuniary taste.[10] Little attention has instead been given to differences in the taste for sustainability across countries. This gap is filled by this research. This paper raises the question whether investors differ systemically across countries in their non-pecuniary taste for sustainability. Thereby, it controls separately for the preference for certified and greenwashed investments.

[10]See Gutsche et al. (2021) for a summary of existing studies.

Such differences could be reasoned in three potential explanations. First, social preferences may be influenced by cultural dimensions. In line with the argumentation of the prior subsection, I expect a negative relation between "Masculinity" and the overall preference for sustainability. For "Uncertainty avoidance", various effects are conceivable. In regard of non-pecuniary taste, the current lack in reliable standards may restrain uncertainty avoiding investors to engage in sustainable investing at all. On the other hand, investors from more uncertainty avoiding countries may be willing to pay a higher price for sustainability certificates to eliminate greenwashing risk. As sustainable investments have shown to reduce financial risk, investors from uncertainty avoiding countries may also prefer sustainable assets for pecuniary risk-hedging considerations. Second, not all investors might be able to afford being sustainable. This aspect becomes relevant when sustainable investing comes at the cost of lower financial returns. This argumentation also follows from Cai et al. (2016) who find a positive relation between firms' sustainability ratings and a country's income-per-capita. Therefore, the ability to afford investing sustainably might be positively related to the average financial wealth and hence overall economic development of a country. Finally, investors might not invest sustainably due to a limited access to sustainable assets. Although this aspect might be important for real-life investing and the analysis of market data, it is not of relevance for the present study, where the access to sustainable investment has been guaranteed by the experimental set-up.

3 Data and Methodology

3.1 Data

The study is based on survey data of 649 business students from Belgium, France, Germany, Italy, Morocco and Turkey, which was collected between July 2021 and December 2022. Apart from the European Union's (EU) three largest economies (Germany, France and Italy)

as well as the country of its de facto political capital (Belgium), the sample also includes data of two neighbouring emerging markets (Turkey and Morocco). The included countries show a sufficient heterogeneity in terms of culture and economic development to control for potential cross-country differences in sustainability preferences.

Students were invited to the anonymous online questionnaire during English-taught classes. Therefore, a translation of the English questionnaire in the local languages was not necessary.[11] The participation in the survey was voluntary. While the use of student samples bears the risk of not being representative, the comparative analysis of these homogeneous groups represents a suitable tool to analyze country-specific differences in investment behavior.

Table 1 shows the demographics of participants. With shares of 26.5% and 20.3%, Moroccan and German students account for almost half of the sample. Participants from the other four countries make up between 10% and 15% of the analyzed data. As I control with dummy variables for the influence of each country, these disparities in sample weights do not constitute a concern for the reliability of results. The ratio of male and female participants is balanced. Conducting a chi-squared test, suggests no country-related differences in terms of the gender distribution. Due to the use of student data, most participants are between 16 and 24 years old. There are significant differences across countries with respect to age, though. In particular German students seem to be older than their international fellows. This observation can be explained with the general higher age of German students in the international comparison (cf. OECD (2014)). The differences across countries are also significant regarding investment experience. The total share of participants experienced in stock or bond investments ranges from 18.6% in Italy to 61.4% in Germany. Also if participants were not yet experienced in investing, most of them are interested to do so in the future.

[11] German student were provided with a German version of the questionnaire due to administrative reasons.

3.2 Choice Experiment

Choice experiments are used to analyze people's preferences for products and product attributes. The methodology is build on the assumption that individuals will generally select the alternative from a bundle of choice options which provides them with the highest level of utility. The observed choices can subsequently be used to determine preferences and forecast decisions. This indirect way of preference elicitation improves the external validity of obtained results compared to classical survey or conjoint analysis. Depending on the context of application, also choice experiments can be subject to hypothetical biases, though.[12]

In the experiment, each participant i was asked four times to choose an additional mutual fund to a sufficiently diversified portfolio. In each such choice situation m, participants had the choice between two conventional and two green labeled funds. To moderate the potential hypothetical biases of the experiment, participants were further given the opportunity to leave their money on a risk-free bank account as a status-quo option. Students got informed that the green labels of green funds can exclusively be assigned for marketing reasons due to a lack of regulatory uniformity. They were further instructed that only green funds featured with additional governmental certificates can be regarded as truly sustainable. The governmental certificates ensure that the funds are in compliance with the environmental targets of the respective country and can be seen as an insurance against greenwashing. The funds were further characterized by different levels of expected returns and risk. While expected returns ranged from 0% to 10% and were treated as continuous variables, risk was divided into the categories "High", "Middle" and "Low" and treated as a dummy variable. The geographic investment focus was added as an additional decision criteria to reduce the salience of the sustainability attributes. The experimental set-up implies a detachment of pecuniary risk/return trade-offs and non-pecuniary sustainability characteristics. Before and during the experiment, participants were informed about this experimental particularity,

[12]See Haghani et al. (2021) for a literature review.

which prevents a rational use of sustainability characteristics for pecuniary reasons. An exemplary choice situation as used in the survey of the French sample is provided in Figure 1.

Overall, the experiment consisted of 48 different choice situations, which were blocked into 12 groups and randomly assigned to participants. The composition of the choice sets was defined with the software *ChoiceMetrics Ngene* and is based on a D-efficient experimental design.[13] A the effects of monetary incentives to reduce hypothetical biases are controversially discussed in the literature (Haghani et al. (2021), participants' answers were not linked to any monetary reward. This ensures also the comparability of results with the studies of Gutsche and Ziegler (2019) and Kleffel and Muck (2023),

To answer the research question, the influence of the sustainability characteristics on participants' investment decisions has to be determined. This effect is formally represented by the unknown vector β, which defines the utility U_{ijm} that respondent i derives from fund j in choice set m. As the observed choices may not always reflect optimal decisions and underlie unknown external influences, it is assumed that the utility U_{ijm} can be divided into an observable value function V_{ijm} and an unobservable error term ϵ_{ijm}.

$$U_{ijm} = V_{ijm} + \epsilon_{ijm}$$

The value function V_{ijm} defines the influence β of an attribute x on observable choices. By assigning the value of one to V_{ijm} if an alternative j was chosen (and zero otherwise) and assuming the error terms to be identically and independently (*i.i.d.*) extreme-value I distributed, each choice can be expressed by a multinomial logit model. Maximum-likelihood estimations can then be used to estimate β. As the panel structure of the data sample contradicts the assumption of *i.i.d.* distributed error terms, I rely on a more flexible mixed

[13] See, e.g., Street et al. (2005).

logit model. These models allow to include random parameters, where not only the mean but also standard deviation of an attribute has to be estimated. To define the missing parameters, Monte Carlo methods have to be used for simulation, though.[14] All calculations were executed with the Python package BIOGEME (Bierlaire (2020)).

The goal of this study is to detect potential differences in sustainability preferences across countries. In its basic form, the choice experiment provides answers to the question whether investors have a preference for sustainability or not. In general, choice experiments have the shortcoming that additional explanatory variables cannot be included as main effects as in traditional regression models. Instead, the influence of additional explanatory variables can only be controlled for by introducing interaction terms between the attributes of interest and respective external characteristics. Therefore, the parameters for "Green fund" and "Certificate" have to be interacted with further individual- and country specific variables.

3.3 Individual- and Country-Specific Characteristics

Table 2 provides the summary statistics of individual- and country-specific characteristics included as explanatory variables in interaction terms. "Warm-glow" is defined as the good feeling received from "doing good" (Andreoni (1989), Andreoni (1990)). This construct has been successfully applied by Gutsche and Ziegler (2019) and Kleffel and Muck (2023) for both certified and uncertified green assets. I follow their methodology by asking participants to rate how happy it makes them to do something good for the environment on a 7-point Likert scale. An 11-point-scale is instead used to measure participants' degree of "Risk aversion". The robustness of this approach has been proven by Dohmen et al. (2011). The construct was also used by Kleffel and Muck (2023) to explain investors' tendency to fall for greenwashed assets.

Running an analysis of variance in unreported results, I detect significant country-related

[14]See, e.g., Hensher and Greene (2003) or Train (2009).

differences in the mean values of "Warm-glow" and "Risk aversion". Assuming an explanatory power of these two constructs on the choice for sustainable assets, these differences may be seen as an indicator for cross-country differences in sustainability preferences.

In line with section 2.3, "Masculinity" and "Uncertainty avoidance" are used as cultural dimensions to explain country-related differences in sustainable investing. The values of these two dimensions were retrieved from Hofstede Insights (2022). The observable higher values in "Masculinity" of Italians and Germans may imply a lower taste for sustainability of investors from these two nations. The cultures of Belgium, France and Turkey show in contrast a higher aversion to uncertainty. Investors from these countries may consequently put a higher importance on certified green funds or alternatively restrain from sustainable investing at all. The other cultural dimensions were not included as explanatory variables due to a lack in theoretical reasoning and concerns of multicollinearity. Finally, we measure the economic development and thus available financial means to forego financial returns for "doing good" with the countries' gross domestic product (GDP) per capita. The respective values are retrieved from the World Bank (2022) using current international dollars converted by purchasing power parity (PPP). We observe large differences in the economic development of the included countries, especially when comparing the EU-countries Belgium, France, Germany and Italy with the emerging markets of Morocco and Turkey. The lower economic development and resulting average wealth of the latter two may therefore result in a lower willingness to forego returns for sustainability characteristics.

To exclude concerns of multicollinearity, the correlation of the used variables was examined. With a correlation of -0.55, the concepts of "Masculinity" and "Uncertainty avoidance" are most closely related to each other. Although "Risk aversion" and "Uncertainty avoidance" seem theoretically related, the variables measure different constructs and show only a low correlation of 0.14. Therefore, multicollinearity does not represent an issue in this analysis.

4 Results

Tables 3 and 4 report the results of the choice model analysis. Thereby, "Mean" resembles the estimated values of the utility defining vector β. For random parameters, also the "Standard deviation" is given. To facilitate the interpretation of results, I provide the corresponding Willingness-to-Pay (WTP) for each variable. Following the literature, the WTP is defined as the negative ratio of an attribute's estimated mean and the estimated value for "Expected return". Hence, a positive (negative) WTP can be interpreted as the monetary return premium (discount) investors demand for accepting a fund which includes the respective attribute.

Model 1 of Table 3 delivers the basic results without interaction terms. Observing a preference for higher returns and an aversion to risk confirms economic intuition. Remarkably, the negative estimate for "Domestic focus" contradicts the idea of the "home bias". Instead, market participants seem to have understood the concept of diversification and prefer to invest internationally. The positive sign of "Mutual funds" suggests a general preference to invest in funds instead of keeping the money on bank accounts. This result may not be of external validity, as this alternative was only included to reduce potential hypothetical biases. Investors seem to have further a preference for sustainability. Regarding the two sustainability-related variables "Green fund" and "Certificate", my results are in line with the findings of Kleffel and Muck (2023) who conducted a similar experiment with experienced German retail investors. As expressed by the variable "Green fund", investors are willing to forego 1.32% of expected returns for green marketing labels (and thus greenwashed funds). For a "Certificate", which can be regarded as an insurance that a green fund is indeed sustainable, the market is willing to pay an additional 2.38% of expected returns. Hence, on the aggregate investors seem to understand and appreciate the additional value of the certificate.

The inclusion of interaction terms in the following models delivers insights why investors have a preference for green labels and certificates. Interaction terms to control for country-related differences are added in Model 2. Germany is used as the reference category. As

for all following models, no major changes can be observed for the non-interacted variables "Expected return", "Risk high", "Risk low" and "Domestic focus". Regarding the interaction terms, also the preference for unlabeled funds (and thus tendency to fall for greenwashing) seems to be independent from an investor's country of origin. However, there is a significant lower willingness of Moroccans to pay for the "Certificate".

Model 3 controls for the influence of individual-specific characteristics. "Warm-glow" and "Risk aversion" are positively related to the preference for green funds. These findings are in accordance with the studies of Gutsche and Ziegler (2019) and Kleffel and Muck (2023). For "Warm-glow", this relation is intuitive: A higher intrinsic motivation to "do good" favors the general preference for sustainability. The effect of "Risk aversion" is more difficult to explain. Due to the experimental set-up of the study, pecuniary risk/return trade-offs and non-pecuniary sustainability characteristics are detached from each other. As green labels are further detached from firms' actual sustainability performance, motives of hedging against both financial and sustainability risk can be excluded as potential explanations. Instead, the significant influence of "Risk aversion" on the WTP for "Green funds" might be interpreted as an attempt to avoid the reputational risk of not meeting the expectations of one's social surrounding. Regarding the preference for certified green funds, these two individual-specific characteristics cannot be used as explanatory variables, though. This is surprising and contradicts the prior findings of Gutsche and Ziegler (2019) and Kleffel and Muck (2023).

Bringing together the country dummies and variables for "Warm-glow" and "Risk aversion" in Model 4 confirms the prior findings. Apparently, individual-specific characteristics are suitable to explain whether an investor has a preference for sustainability or not. The willingness to pay a premium for a certificate seems to depend instead on the country of origin. Besides Moroccans, also Turkish investors show a lower WTP for certified green funds. To compare the overall explanatory power of models, the log-likelihood of each specification can be used. The inclusion of the additional interaction terms in Model 2 to 4 had a significant effect on the total explanatory power. Therefore, we can conclude that sustainability pref-

erences may depend not only on individual-specific characteristics but also the country of investors' origin.

To gain further insights to the reasons for the observed country-related differences in the valuation of certificates, the effects of cultural dimensions and economic development are addressed in Table 4. Model 5 controls for the influence of "Masculinity" and "Uncertainty avoidance". In turns out, that these two cultural dimensions do not contribute to explain the general preference for green funds detected in previous models. Surprisingly, the inclusion of the two interaction terms has implications on the main effect of "Green fund", which is still positive in size but not longer significant. The cultural dimensions show instead an explanatory power for the valuation of "Certificates". Within expectations, higher country levels of "Uncertainty avoidance" are positively related to the preference for certified funds. The positive effect of "Masculinity" on the WTP for "Certificates" is in contrast difficult to explain.

Adding "GDP" as an additional country-specific variable in Model 6 delivers the explanation. Apparently, the found influence of the cultural dimensions on the "Certificate" can be better traced back to countries' economic development. This finding is in line with my argumentation from Section 2.3. Even though individuals have a preference for sustainability, not everyone can afford to be (indeed) sustainable.

This effect remains significant when adding individual-specific characteristics in Model 7. Again, "Warm-glow" and "Risk aversion" can explain the general preference for green-labeled funds. The willingness to forego additional returns to invest in actual sustainable funds depends instead on the economic development and thus the available wealth to exchange pecuniary utility in return for non-pecuniary taste.

Country dummies are included in Model 8 to investigate for still undetected country-specific particularities. No such effects can be observed in terms of the preference for "Green fund". The inclusion of the country dummies suggests that also cultural dimensions may have a cer-

tain influence on general sustainability preferences, though. Investors from more masculine and uncertainty avoiding countries show a lower WTP for uncertified green funds. These findings are plausible and confirm my initial assumptions. As illustrated by the still significant effect of the individual-specific characteristics of "Warm-glow" and "Risk aversion", there might yet be a wide discrepancies in the sustainability preferences within a cultural group.

The premium for certified green funds seems to depend in turn on the economic development. I see three potential interrelated and complementary explanations for this observation. First, intrinsically motivated investors from less developed countries might maximize their overall utility by giving some financial wealth in return for "doing good". The additional marginal utility received from certified funds can instead not compensate the utility loss induced from the payment of the respective return premium. The second explanation adds to Kleffel and Muck (2023) who relate the preference for greenwashed funds to the resolution of cognitive dissonance (Festinger (1957). In general, intrinsically motivated investors may feel an obligation to "do good" and invest sustainably. This obligation creates an inner state of disharmony, called cognitive dissonance, which can be resolved by taking actions and buying a sustainable fund. In the context of this study, intrinsically motivated investors from lower developed countries might be limited in their financial means to decide for an actual sustainable fund to resolve cognitive dissonance. In this case, a simple green label may be sufficient to restore inner harmony and resolve cognitive dissonance. Third, differences in economic development are driven by various factors. Possibly, the preferences for certified funds may depend on other latent variables which were not considered directly in this research. One such example might be differences in trust in governmental institutions and thus the reliability of governmental certificates for sustainability. If investors do not see a added-value in sustainability certificates, it is obvious that they are also not willing to pay a premium for certified funds.

Looking at the overall model quality, we observe a significant increase in explanatory power

from Model 5 to Model 7. The simultaneous inclusion of the cultural dimensions and country dummies in Model 8 did instead not improve the model quality significantly. In summary, the general preference for sustainability seems to dependent mainly on individuals' levels of "Warm-glow" and "Risk aversion". In addition, also the cultural dimensions "Masculinity" and "Uncertainty avoidance" may be used as explanatory factors. The premium investors are willing to pay for certificates to insure the sustainability of a fund seems instead to depend primarily on the economic development and thus country-related effects.

5 Robustness

The use of student data bears the risk of a sample bias and resulting limitations in the generalizability of results. To overcome this concern, I compared the sustainability preferences of priorly examined German students with a sample of 264 German retail investors. The latter shows representativeness in terms of gender and education to the German population of investors (cf. Deutsches Aktieninstitut (2020)). As reported in Table 5, there are no significant differences in the valuation of both certified and uncertified green funds between German retail investors and students. In consequence, there are no indication why the sustainability preference of students should differ from the whole population in other countries, what confirms the overall validity of this study.

6 Conclusion

This research extends existing literature by controlling for potential cross-country differences in the non-pecuniary taste for sustainability. My results imply that country characteristics matter indeed for understanding sustainability preferences. However, these relate primarily to the preference for certified sustainable assets and can be traced back to differences in economic development and thus wealth. In lower income countries, investors might not be

able to forego additional wealth for sustainability insuring certificates in terms of total utility maximization. Individual-specific factors seem instead better suited to explain the general preference for sustainability, including greenwashed assets. In this regard, the paper confirms the results of prior studies concerning the importance of intrinsic motivation (e.g., Riedl and Smeets (2017) or Gutsche and Ziegler (2019)) and risk aversion (Kleffel and Muck (2023)) to understand why investors decide for sustainable investments. In addition, also the country-specific cultural dimensions masculinity and uncertainty avoidance seem to be related to the general preference for sustainability. The country-specific differences detected in this research are of high importance as they indicate that the results of single country studies may not be generalizable. Instead, country-specific factors and cultural aspects should be included when studying sustainability preferences. Remarkably, we observed a high demand for sustainable investing in developing countries, where the access to such products is yet limited. Understanding and developing these markets may not only be a promising field for future research but also represent a large potential for investment corporates.

Acknowledgements

I thank Pascal Albert, Mudeer Ahmed, Ralf Barkemeyer, Saskia Crucke, Frederik Dahlmann, Brigitte Eierle, AbdelKader El Alaoui, Karl-Heinz Gerholz, Marina Grusevaja, Birgit Hagen, Tobias Herzing, Oğuzhan İrengün, Tobias Kaufmann, Matthias Muck, Gabriele Murry and Micha Schmiedl for helpful comments, suggestions and support in collecting the data. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Figures

Advertised as:	**Normal Fund**	**Normal Fund**	**Green Fund**	**Green Fund**	**Savings Account**
Expected Return	5%	3%	7%	8%	0%
Risk	Middle	Low	Low	Middle	No Risk
Geographic Focus	France	International	France	International	
EU Sustainability Label			No	Yes	
Your Choice:	○	○	○	○	○

Figure 1 – Exemplary choice set used for the French sample

Tables

Table 1 – Demographics of participants

		Belgium		France		Germany		Italy		Morocco		Turkey	
Measure	Value	#	%	#	%	#	%	#	%	#	%	#	%
Gender	Female	47	67.1	42	44.2	60	45.5	48	49.5	87	50.6	38	45.8
	Male	23	32.9	52	54.7	72	54.6	49	50.5	83	48.26	44	53.01
	Non-Binary	0	0.0	1	1.1	0	0.0	0	0.0	2	1.16	1	1.2
Age***	16-24	65	92.9	86	90.5	81	61.4	91	93.8	158	91.9	76	91.6
	25-34	4	5.7	9	9.5	50	37.9	5	5.15	13	7.5	4	4.8
	35-44	1	1.4	0	0.0	0	0.0	1	1.0	1	0.58	2	2.4
	45-54	0	0.0	0	0.0	1	0.8	0	0.0	0	0.0	1	1.2
Investment	None and not interested	12	17.1	6	6.3	4	3.0	9	9.3	26	15.1	13	15.7
experience***	None but interested	30	42.9	51	53.7	47	35.6	69	71.1	103	59.9	28	33.73
	<1 year	10	14.3	19	20.0	21	15.9	10	10.3	15	8.7	17	20.5
	1-5 years	17	24.3	15	15.8	45	34.1	8	8.25	12	7.0	22	26.5
	>5 years	1	1.43	1	1.1	15	11.4	0	0.0	1	0.6	2	2.4
	Professional	0	0.0	0	0.0	0	0.0	0	0.0	6	3.5	1	1.2
	No answer	0	0.0	3	3.2	0	0.0	1	1.0	6	3.49	0	0.0
Total: 649		70	10.8	95	14.6	132	20.3	97	15.0	172	26.5	83	12.8

The table shows the demographics of survey participants. # refers to the absolute and % to the relative number of participants in a category. * (**, ***) indicate whether the values of a measure differ across countries at the 10% (5%, 1%) significance level, respectively, using a chi-squared test.

Table 2 – Summary statistics of explanatory variables

			Belgium		France		Germany		Italy		Morocco		Turkey		
Variable	Min	Max	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Reference
Individual-specific characteristics															
Warm-glow	1	7	5.31	1.16	5.58	1.18	5.72	1.35	6.03	0.99	6.19	1.09	6.16	0.94	Gutsche and Ziegler (2019)
Risk aversion	1	11	6.47	2.19	5.19	2.34	6.13	2.44	5.96	1.93	5.23	2.63	5.41	2.15	Dohmen et al. (2011)
Country-specific characteristics															
Masculinity	43	70	54	-	43	-	66	-	70	-	53	-	45	-	Hofstede Insights (2022)
Uncertainty avoidance	45	94	94	-	86	-	65	-	75	-	68	-	85	-	Hofstede Insights (2022)
GDP per capita (in thousand int. $)	8.14	58.93	58.93	-	50.73	-	57.93	-	45.94	-	8.14	-	30.47	-	World Bank (2022)

The table shows summary statistics of the individual- and country-specific characteristics used as explanatory variables. Summary statistics are based on the answers of 649 students. "Warm-glow" and "Risk-aversion" are measured on Likert scales ranging from 1 to 7 and 1 to 11, respectively. The cultural dimensions "Masculinity" and "Uncertainty avoidance" can range from 1 to 100. All variables are treated as continuous.

Table 3 – Mixed logit estimation results of the choice experiment

Explanatory variables	Model 1			Model 2			Model 3			Model 4		
	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.233***	-	-	0.234***	-	-	0.234***	-	-	0.237***	-	-
	(0.0135)			(0.0136)			(0.0137)			(0.0138)		
Mutual funds	2.03***	2.02***	-	1.77***	1.84***	-	1.89***	1.99***	-	1.84***	1.89***	-
	(0.371)	(0.29)		(0.312)	(0.326)		(0.326)	(0.267)		(0.317)	(0.261)	
Risk high	-0.878***	0.6***	3.77%	-1.02***	0.946***	4.36%	-1.01***	0.955***	4.32%	-1.04***	0.958***	4.39%
	(0.0783)	(0.158)		(0.0911)	(0.139)		(0.091)	(0.139)		(0.0915)	(0.139)	
Risk low	0.373***	0.24*	-1.60%	0.357***	0.3**	-1.53%	0.36***	0.261***	-1.54%	0.358***	0.288***	-1.51%
	(0.0595)	(0.123)		(0.0597)	(0.103)		(0.0591)	(0.1)		(0.0598)	(0.102)	
Domestic focus	-0.174**	0.0792	0.75%	-0.097*	0.159*	0.41%	-0.099**	0.198**	0.42%	-0.175***	0.132	0.74%
	(0.0452)	(0.0919)		(0.0499)	(0.0818)		(0.0497)	(0.0815)		(0.0468)	(0.136)	
Green fund	0.307***	0.041	-1.32%	0.277**	-	-1.18%	-1.49***	-	6.37%	-1.47***	-	6.20%
	(0.0559)	(0.12)		(0.129)			(0.326)			(0.346)		
x Belgium	-	-	-	0.0328	-	n.s.	-	-	-	0.0974	-	n.s.
				(0.231)						(0.233)		
x France	-	-	-	0.0434	-	n.s.	-	-	-	0.141	-	n.s.
				(0.192)						(0.195)		
x Italy	-	-	-	-0.189	-	n.s.	-	-	-	-0.259	-	n.s.
				(0.196)						(0.197)		
x Morocco	-	-	-	-0.00733	-	n.s.	-	-	-	-0.0604	-	n.s.
				(0.162)						(0.166)		
x Turkey	-	-	-	-0.00833	-	n.s.	-	-	-	-0.0473	-	n.s.
				(0.203)						(0.206)		
x Warm-glow	-	-	-	-	-	-	0.227***	-	-0.97%	0.238***	-	-1.00%
							(0.0486)			(0.05)		
x Risk aversion	-	-	-	-	-	-	0.0741***	-	-0.32%	0.0716***	-	-0.30%
							(0.0238)			(0.024)		

(continued)

Table 3 – *Continued*

Certificate	0.554***	0.287**	-2.38%	0.896***	-	-3.83%	0.58*	-	-2.48%	0.694*	-	-2.93%
(only green funds)	(0.0587)	(0.133)		(0.125)			(0.345)			(0.369)		
x Belgium	-	-	-	-0.12	-	n.s.	-	-	-	-0.0913	-	n.s.
				(0.243)						(0.245)		
x France	-	-	-	-0.233	-	n.s.	-	-	-	-0.228	-	n.s.
				(0.19)						(0.192)		
x Italy	-	-	-	0.0317	-	n.s.	-	-	-	0.0144	-	n.s.
				(0.196)						(0.197)		
x Morocco	-	-	-	-0.846***	-	3.62%	-	-	-	-0.879***	-	3.57%
				(0.168)						(0.172)		
x Turkey	-	-	-	-0.32	-	n.s.	-	-	-	-0.375*	-	1.58%
				(0.205)						(0.207)		
x Warm-glow	-	-	-	-	-	-	-0.00415	-	n.s.	0.0492	-	n.s.
							(0.0516)			(0.0539)		
x Risk aversion	-	-	-	-	-	-	0.0069	-	n.s.	-0.0134	-	n.s.
							(0.0242)			(0.0248)		
N (# of obs.)		649 (2472)			649 (2472)			649 (2472)			649 (2472)	
Log-likelihood		-3,340.059			-3,305.218			-3,306.462			-3,272.61	

The table shows the results of a mixed logit model for the choice experiment. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. Interaction terms are introduced in Model 2 to 4 to control for the effects of country and individual-specific characteristics on sustainability preferences. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 4 – Mixed logit estimation results with interaction terms to control for the influence of cultural dimensions

	Model 5			Model 6			Model 7			Model 8		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.234***	-	-	0.235***	-	-	0.237***	-	-	0.237***	-	-
	(0.0136)			(0.0136)			(0.0138)			(0.0138)		
Mutual funds	1.84***	1.85***	-	1.80***	1.82***	-	1.84***	1.89***	-	1.84***	1.89***	-
	(0.318)	(0.261)		(0.312)	(0.258)		(0.317)	(0.261)		(0.317)	(0.261)	
Risk high	-1.02***	0.935***	4.36%	-1.03***	0.929***	4.38%	-1.04***	0.953***	4.39%	-1.04***	0.958***	4.39%
	(0.0904)	(0.138)		(0.0905)	(0.139)		(0.0913)	(0.139)		(0.0915)	(0.139)	
Risk low	0.353***	0.269***	-1.51%	0.354***	0.294***	-1.51%	0.357***	0.289***	-1.51%	0.358***	0.288***	-1.51%
	(0.0592)	(0.103)		(0.0596)	(0.104)		(0.0597)	(0.102)		(0.0598)	(0.102)	
Domestic focus	-0.174**	0.137	0.74%	-0.176***	0.128	0.75%	-0.176	0.132	0.74%	-0.175***	0.132	0.74%
	(0.0465)	(0.0832)		(0.0466)	(0.0829)		(0.0468)	(0.0821)		(0.0468)	(0.0821)	
Green fund	0.817	-	n.s.	1.17	-	n.s.	-0.0274	-	n.s.	-0.0274	-	n.s.
	(0.813)			(1.05)			(1.09)			(0.031)		
x Masculinity	-0.00669	-	n.s.	-0.0101	-	n.s.	-0.0153	-	n.s.	-0.019***	-	0.08%
	(0.00705)			(0.00931)			(0.00943)			(0.0055)		
x Uncertainty avoidance	-0.00209	-	n.s.	-0.00536	-	n.s.	-0.00718	-	n.s.	-0.009***	-	0.04%
	(0.00692)			(0.00927)			(0.00934)			(0.00403)		
x GDP	-	-	-	-0.189	-	n.s.	0.00499	-	n.s.	0.00621*	-	-0.03%
				(0.196)			(0.00394)			(0.00362)		
x Warm-glow	-	-	-	-	-	-	0.232***	-	-0.98%	0.237***	-	-1.00%
							(0.0496)			(0.05)		
x Risk aversion	-	-	-	-	-	-	0.0731***	-	-0.31%	0.0715***	-	-0.30%
							(0.0239)			(0.024)		
x Belgium	-	-	-	-	-	-	-	-	-	0.115	-	n.s.
										(0.146)		
x France	-	-	-	-	-	-	-	-	-	-0.0671	-	n.s.
										(0.122)		

(continued)

Table 4 – *Continued*

x Italy	-	-	-	-	-	-	-	-	-	-0.0229	-	n.s.
										(0.162)		
x Morocco	-	-	-	-	-	-	-	-	-	0.0303	-	n.s.
										(0.0743)		
x Turkey	-	-	-	-	-	-	-	-	-	-0.1	-	n.s.
										(0.131)		
Certificate	-3.18***		13.59%	-1.13	-	n.s.	-1.43	-	n.s.	-0.0443	-	n.s.
(only green funds)	(0.855)			(1.07)			(1.12)			(0.0321)		
x Masculinity	0.0323***	-	-0.14%	0.0124	-	n.s.	0.0121	-	n.s.	0.0007	-	n.s.
	(0.00726)			(0.00945)			(0.00953)			(0.00581)		
x Uncertainty	0.0261***	-	-0.11%	0.00677	-	n.s.	0.00706	-	n.s.	-0.00221	-	n.s.
avoidance	(0.00731)			(0.00947)			(0.00951)			(0.00411)		
x GDP	-	-	-	0.0133***	-	-0.06%	0.0143***	-	-0.06%	0.0144***	-	-0.06%
				(0.00393)			(0.00402)			(0.00376)		
x Warm-glow	-	-	-	-	-	-	0.0577	-	n.s.	0.0495	-	n.s.
							(0.0535)			(0.0539)		
x Risk aversion	-	-	-	-	-	-	-0.0154	-	n.s.	-0.0134	-	n.s.
							(0.0247)			(0.0248)		
x Belgium	-	-	-	-	-	-	-	-	-	-0.0345	-	n.s.
										(0.156)		
x France	-	-	-	-	-	-	-	-	-	-0.0626	-	n.s.
										(0.126)		
x Italy	-	-	-	-	-	-	-	-	-	0.205	-	n.s.
										(0.164)		
x Morocco	-	-	-	-	-	-	-	-	-	-0.147*	-	0.62%
										(0.233)		
x Turkey	-	-	-	-	-	-	-	-	-	0.0791	-	n.s.
										(0.136)		
N (# of obs.)	649 (2472)			649 (2472)			649 (2472)			649 (2472)		
Log-likelihood	-3,312.941			-3,302.113			-3,273.415			-3,272.61		

The table shows the results of a mixed logit model for the choice experiment with interaction terms to control for the influence of cultural dimensions. Country and individual-specific control variables are added in Model 6 to 8. For fixed parameters only the "Mean" is estimated. For random parameters

also the “Standard deviation” is reported. “Mean WTP” shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 5 – Mixed logit estimation results of German students and German retail investors

Explanatory variables	Mean	Standard deviation	Mean WTP
Expected return	0.328***	-	-
	(0.0193)		
Mutual funds	0.98*	1.59***	-
	(0.577)	(0.554)	
Risk high	-1.6***	-1.44***	4.88%
	(0.129)	(0.181)	
Risk low	0.53***	0.752***	-1.62%
	(0.0884)	(0.129)	
Green fund	0.354***	-	-1.08%
	(0.0939)		
x Students	-0.0977	-	n.s.
	(0.164)		
Certificate (only green funds)	0.914***		-2.79%
	(0.0954)		
x Students	0.136	-	n.s.
	(0.167)		
N (# of observations)		396 (1573)	
Log-likelihood		-1,849.196	

The table shows the results of comparing the sustainability preferences of 132 German students and 264 German retail investors with interaction terms. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. "Openness" refers to the personality trait "Openness to experience". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Article 3: Opening the Black Box of Sustainable Investing: Examining the Impact of Psychological Distance

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Abstract

This study examines the effects of psychological distance on investors' reaction to sustainability controversies. Based on two stated choice experiments among 142 German and 136 French participants, we find evidence that investors react less to controversies which are perceived as more distant in social, spatial or hypothetical terms. These findings stress the importance of incorporating behavioral aspects to understand why market participants decide for or against sustainable investments.

Keywords: ESG controversies, Sustainable investing, Psychological distance, Stated choice experiment, Investor behavior, Construal level theory

JEL Classification: Q56, G11, G41, G40

Declaration of interest: None

1 Introduction

Various studies have provided evidence that the current popularity of sustainable investments is at least partially driven by non-pecuniary preferences for sustainability (e.g., Hong and Kacperczyk (2009), Riedl and Smeets (2017) or Gutsche and Ziegler (2019)). Yet, the extant literature has largely treated sustainable investment decision-making as a black box, ignoring the cognitive processes and resulting behavioral biases that drive sustainability preferences. Only recently, Heeb et al. (2022) and Kleffel and Muck (2023) have suggested that investors might not necessarily be consistent in their sustainability preferences.

In this research, we examine the effects of psychological distance on investors' reactions to sustainability controversies. In general, psychological distance describes the extent to which individuals can relate to a given event, perceiving it as near and concrete (low-level construal) or distant and abstract (high-level construal) from their personal subjective point of view. The concept has been refined under the umbrella of Construal Level Theory (CLT). According to CLT, individuals differ in the psychological distance they have to issues and events, what influences how they evaluate and respond to them (Trope and Liberman (2010), Wiesenfeld et al. (2017)). Intuitively, the larger the psychological distance to an objective, the more abstract individuals will think about it. Psychological distance then forms the basis of various behavioural biases that cause deviations from purely rational decision-making. CLT originally emerged in the psychology and economics literature, focusing on decision-making of the individual (Wiesenfeld et al. (2017)). It has since been applied to a wider variety of domains (See, e.g., Brügger et al. (2016), Brügger (2020) or Adler and Sarstedt (2021)). In the finance literature, Beugelsdijk and Frijns (2010) and Anderson et al. (2011) have used geographic and cultural distance to explain investors' preference for local assets.

In turn, a sustainability controversy represents a negative sustainability performance signal, which is sent to investors. Since this information is linked to an event that has already materialized and is based on independent media reports, sustainability controversies are argued to

be more objective and unambiguous than other ESG performance metrics which largely rely on companies' self-reported sustainability performance (Aouadi and Marsat (2018), Svanberg et al. (2022)). Following CLT, we hypothesize that investors will react less to sustainability controversies, which are perceived as psychologically distant.

Psychological distance can be expressed in a number of conceptually distinct but interrelated ways. Commonly, social, spatial, temporal and hypothetical distance are distinguished. Social distance describes how distant or close an individual feels associated to other members of society. The perception of sustainability controversies might hence be affected by social distance and the empathy for one's peers. Spatial distance refers to geographic proximity, with investors being potentially inclined to be less concerned about sustainability controversies which happen far away rather than next door. Temporal distance captures instead the time that has elapsed since an event, implying a stronger reaction to recent than bygone controversies.

Finally, hypotheticality refers to the perceived probability of the occurrence of an event. This does not only include the factual likelihood of occurrence, but also the way in which an issue is described. In this regard, the amount of information provided or the language used to describe an event should affect people's behavior. Along these lines, consumption and investment decisions are more likely to be triggered by signals that are perceived as less abstract (Todorov et al. (2007), Soderberg et al. (2015)). Stronger reactions can be expected in response to more concrete descriptions of a controversy (e.g. "human rights violation") than to more abstract and general descriptions (e.g. "sustainability controversy").

The perception of psychological distance is subjective and might further depend on individual-specific characteristics. We argue that persons with a lower ability or willingness to care for others will perceive a lower (e.g. social or hypothetical) psychological distance. We conceptualize such behaviour by relying on the theory of the dark triad (Paulhus and Williams (2002)). Spatial distance and also social distance to other cultures might in turn be negatively related to cosmopolitanism and the idea of global citizenship (Riefler et al. (2012)).

The study is based on two choice experiments that explore the relation between spatial, social as well as hypothetical psychological distance and the reaction to sustainability controversies.[15] Choice experiments represent an innovative method of eliciting preferences and were introduced only recently to finance research by Gutsche and Ziegler (2019). The experiments are based on a sample of 142 German and 136 French business students. Our results confirm a negative effect of psychological distance on investors' reaction to sustainability controversies. This effect holds similarly for French and German participants and is most pronounced for the social dimension of psychological distance.

Our study contributes to the sustainable and behavioral finance literature by opening the black box of sustainable investment decision-making. Existing research has largely conceptualized taste for sustainability akin to a dichotomous variable (e.g., Riedl and Smeets (2017), Gutsche and Ziegler (2019) or Rossi et al. (2019)). This study adds to these analyses by demonstrating that taste for sustainability is, in fact, conditioned by a number of interrelated types of psychological distance. Understanding the influence of psychological distance on sustainable investment decisions is crucial for policy makers who are trying to realign investment streams to sustainable business activities.

The paper is organized as follows. Section 2 describes our research design. Section 3 presents and discusses the empirical findings. Section 4 concludes.

2 Data and Methodology

The empirical analysis is based on two choice experiments conducted among 142 German and 136 French business students in February 2023. Table 1 shows the demographics of participants.

Discrete choice experiments are based on the idea that preferences can be derived from

[15]Note that temporal distance is not examined in this study as it seems obvious that people will react stronger to recent than bygone controversies.

observing people's choices between different alternatives (Louviere and Hensher (1983)). This indirect way of preferences elicitation in choice experiments increases the complexity but also ability to predict real-world preferences compared to classical survey techniques (see Haghani et al. (2021b)). In both experiments, participants were asked to choose between corporate bonds with identical default risk, which differed in their annual return. In addition, further non-pecuniary information about the associated companies was provided.

The first experiment focused on spatial distance. Each participant i was asked to choose $M = 4$ times between $J = 3$ domestic bonds. A total of 48 different choice sets was created and randomly assigned to participants. The composition of the choice sets was determined by a D-efficient experimental design (e.g., Street et al. (2005)). Apart from return rates, participants were given separate information about the presence of domestic and international sustainability controversies. An exemplary choice situation is shown in Figure 1. If there is an effect of spatial distance on the perception of sustainability controversies, investors should react differently to domestic and international sustainability controversies.

In the second experiment, we control for the effects of spatial and social distance. This time, each participant i had $M = 5$ times the choice to invest in a domestic ($j = 1$), Canadian ($j = 2$) or Chinese ($j = 3$) company. For this experiment, 60 different choice sets were created. For each bond, generic information about the presence of sustainability controversies was provided. From the perspective of our French and German respondents, Canada and China represent a similar spatial distance. However, the culture and thus social distance between Canada and the two European countries should be lower as compared to China. Following the literature on local bias (e.g., Anderson et al. (2011)), we would expect a stronger aversion to Chinese as compared to Canadian funds. At the same time, the assumed higher social distance should reduce the reaction to sustainability controversies encountered by Chinese companies in comparison to Canadian ones. Figure 2 shows an exemplary choice set.

To test for hypothetical distance, we used in both experiments the more concrete wording

"Human and Labour Rights Controversies" in a control group instead of the broader, more abstract term "Sustainability Controversies".[16] We would expect the reduced hypotheticality of the more concrete wording to trigger a stronger reaction to controversies within this group.

As perceptions of psychological distance can also be expected to be shaped by personal characteristics, we interact the parameters of the choice experiment with two individual-specific explanatory variables.[17] Summary statistics are given in Table 2. To measure the general social distance to other people, we rely on the "Dark Triad Dirty Dozen" as proposed by Jonason and Webster (2010). This construct summarizes narcissistic, Machiavellian and psychopathic personality traits, which are all considered to be socially maladaptive. Persons with dark triad characteristics can be expected to keep a higher social distance between themselves and their surroundings and hence show a general weaker reaction to controversies.

Measuring "Cosmopolitanism" by using the C-COSMO scale as proposed by Riefler et al. (2012), enables us to control further for the perceived spatial but also social distance across cultures. As cosmopolitans see the world as one single community, the place or culture where a controversy takes place should be irrelevant for their reaction to controversies.

Prior literature has shown that the consideration of sustainability issues may be used to hedge against financial risk (e.g., Lins et al. (2017) or Broadstock et al. (2020)). To control for a potential intentions of financial risk-hedging, individuals' self-stated risk aversion is included as a control variable. In addition, a gender dummy was added for potential gender-related differences.

Our empirical analysis is based on mixed logit models with partly random parameters (e.g., Train (2009) or Hensher et al. (2015)). In choice modelling, it is assumed that the utility U_{ijm} which respondent i derives from bond j in choice set m is defined by an unknown vector β_i, the bond's characteristics and individual-specific characteristics x_{ijm} as well as an

[16]Note that we decided for this component of sustainability as we perceived it as more tangible than any other subcategory of the social, ecological or govermental sustainability pillar.

[17]Note that individual-specific characteristics cannot be included as main effects in choice models.

unobservable error term ϵ_{ijm}.

$$U_{ijm} = \beta_i' x_{ijm} + \epsilon_{ijm}$$

To approximate β_i, Monte Carlo simulation methods have to be applied. All estimations were executed with the Python package *Biogeme* (Bierlaire (2020)). Given the controversial discussions about monetary incentives in choice experiments[18] and the convention of the existing finance literature using stated-choice experiments (e.g., Gutsche and Ziegler (2019), Lagerkvist et al. (2020) or Kleffel and Muck (2023)), no incentives were provided in the experiments.

3 Results

3.1 Experiment 1

Table 3 shows the results of the first choice experiment in which we address differences in the reaction to domestic and international controversies. A positive (negative) estimated mean indicates that investors derive positive (negative) utility from a specific attribute. The Willingness-to-Pay (WTP) relates the utility derived from each attribute to "Annual returns". In case of a positive (negative) WTP, investors will demand a return premium (discount) to decide for a bond including the respective attribute. In case of random parameters, the estimated standard deviation is also provided.

Model 1 suggests a strong preference for higher returns. This finding is in line with classical finance theory. At the same time, results reveal a significant aversion to both domestic and international sustainability controversies. We observe a significant higher aversion to

[18] See Haghani et al. (2021a).

domestic than international controversies. For domestic controversies, a 0.23% higher return is demanded. Apparently, the increased spatial distance of international controversies reduces investors' reaction to controversies. For French respondents, this difference does not show: Domestic and international controversies are assessed equally.

As seen by the estimates for "Human rights" there are some indications, that the use of the more concrete wording of controversies (Human and labour rights controversies) in the control group triggers a stronger reaction to controversies than the more generic one (Sustainability controversies). While this effect of hypothetical distance holds similarly for domestic and international controversies, it is only relevant at the 10% level.

In Model 2, we control for individual-specific characteristics. Adding these variables, the former differences for French respondents and Human rights disappear. Instead, the aversion to both domestic and international controversies seems equally driven by dark triad characteristics and thus higher social distance. As the inclusion of the additional interaction terms distorts the size of the respective main effects, comparing the aversion of domestic and international controversies is not applicable in this model specification.

3.2 Experiment 2

Table 4 shows the results of the second experiment, in which participants were asked to choose between domestic, Canadian and Chinese bonds. Again, investors like higher return rates. We observe that domestic bonds are preferred over Canadian and Chinese ones. Canadian bonds are further preferred over Chinese ones. This pattern tallies with the results of Beugelsdijk and Frijns (2010) who provide a cultural explanation for foreign bias in investment preferences.

In line with the first experiment, we see that investors have an aversion to controversies, irrespective of whether the scenario focuses on domestic, Canadian or Chinese companies. However, the effect is stronger for domestic ones, where investors demand a 1.3% higher

return for investing in such companies. Interestingly, the effect is significantly lower for Chinese than for Canadian companies. This finding is also aligned with CLT and corroborates the above finding in relation to geographical patterns: if respondents prefer domestic and Canadian bonds over Chinese ones on the grounds of social distance, then this greater social distance may also lead them to be more forgiving (or less concerned) in response to controversies involving a Chinese company.

As indicated by the negative parameter for "Human rights", we observe again weak evidence across all bonds that the use of more concrete wording triggers a stronger reaction to controversies than a general label. For French respondents, a lower difference between controversies of domestic and both Canadian and Chinese companies is revealed than for German respondents.

Individual-specific characteristics are added in Model 2. This does not change the general preferences for higher returns and domestic as well as Canadian bonds. In line with the results from the previous experiment, dark triad shows a significant effect on the reaction to controversies. Apparently, dark triad characteristics increase the social psychological distance. For controversies of both Canadian and Chinese companies, we observe a stronger reaction of French compared to German participants.

Finally, cosmopolitanism shows an explanatory power to explain how investors react to Chinese controversies. At higher levels of cosmopolitanism, no distinction is made between Chinese controversies and Canadian or domestic ones, indicating reduced psychological distance. For these individuals, the place and culture where a controversy takes place does not matter.

4 Conclusion

In this study, we have started to open the black box of sustainable investment decisions by examining the effects of psychological distance on investors' reaction to sustainability

controversies. Our results show that sustainable investment decisions depend to a large extend on social, spatial and also hypothetical distance. These insights are of high relevance for both policy makers and corporates. Understanding the influence of psychological distance represents a powerful tool to nudge investors to invest more sustainably. We invite future studies to build on these findings and to establish a more formal framework to integrate cognitive and behavioral aspects to the research about sustainable finance.

Acknowledgements

We thank Lutz Preuss and Frank Schiemann for their support in the data collection process. We further thank the Franco-Bavarian University cooperation center for providing funding for a physical research exchange.

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Figures

	French Bond 1	**French Bond 2**	**French Bond 3**
Annual Return	2.3%	3.6%	2.5%
Domestic Sustainability Controversies	None	Yes	None
International Sustainability Controversies	None	None	Yes
Your Choice:	○	○	○

Figure 1 – Exemplary choice set of the first choice experiment used for the French sample

Country of Origin	**France**	**Canada**	**China**
Annual Return	2.7%	3.6%	2.3%
Sustainability Controversies	Yes	Yes	None
Your Choice:	○	○	○

Figure 2 – Exemplary choice set of the second choice experiment used for the French sample

Tables

Table 1 – Demographics of participants

		German		French	
Measure	**Value**	**# of obs.**	**%**	**# of obs.**	**%**
Gender	Female	64	45.07	66	46.53
	Male	77	54.23	69	50.74
	Non-Binary	1	0.70	1	0.74
Age	16-24	93	65.49	107	78.68
	25-34	49	34.51	28	20.59
	35-44	0	0	1	0.74
Term for controversies	Sustainability	69	48.59	68	50.0
	Human and labour rights	73	51.41	68	50.0
Investment experience	Yes	74	52.11	47	34.56
	No	68	47.89	89	65.44
Total: 278		142	51.08	136	48.92

Note: The table shows the demographics of survey participants. # of obs. refers to the absolute number of participants in a category. % is the share of participants in a category set in relation to each sample.

Table 2 – Summary statistics of individual-specific characteristics

	Total		German		French			
Variable	Mean	SD	Mean	SD	Mean	SD	Min	Max
Dark triad	2.69	0.55	2.73	0.56	2.65	0.54	1.0	5.0
Cosmopolitanism	4.07	0.49	3.96	0.50	4.18	0.45	1.0	5.0
Risk aversion	5.73	2.22	6.18	2.32	5.26	2.00	1.0	11.0
Male	0.53	0.50	0.54	0.50	0.51	0.50	0.0	1.0

Note: The table shows summary statistics of the individual-specific characteristics used as explanatory variables. "Dark triad" and "Cosmopolitanism" are measured on Likert scales ranging from 1 to 7. "Risk aversion" measures the attitude towards risk on a Likert scale ranging from 1 to 11. "Male" is a dummy variables and equal to one if respondents are male and zero otherwise. Summary statistics are based on the answers of 278 participants. * (**, ***) means that the mean values between German and French participants differ at the 10% (5%, 1%) significance level, respectively.

Table 3 – Mixed logit estimation results of the first choice experiment

Explanatory variables	Model 1			Model 2		
	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Annual return	1.83***	-	-	1.85***	-	-
	(0.114)			(0.114)		
Domestic controversies	-2.13***	3.06***	1.16%	-5.05**	2.45***	2.73%
	(0.397)	(0.529)		(2.26)	(0.288)	
x Human rights	-0.77*	0.916	0.42%	-0.491		n.s.
	(0.425)	(0.585)		(0.395)		
x French students	-0.298	0.209	n.s.	-0.277	-	n.s.
	(0.41)	(0.578)		(0.407)		
x Dark triad	-	-	-	0.803**	-	-0.43%
				(0.376)		
x Cosmopolitanism	-	-	-	0.233	-	n.s.
				(0.414)		
x Risk aversion	-	-	-	0.0419	-	n.s.
				(0.0951)		
x Male	-	-	-	0.554	-	n.s.
				(0.409)		
International	-1.70***	2.20***	0.93%	3.67*	2.14***	1.16%
controversies	(0.339)	(0.518)		(2.07)	(0.288)	
x Human rights	-0.684*	0.299	0.37%	-0.567	-	n.s.
	(0.395)	(0.586)		(0.362)		
x French students	-0.925**	0.471	0.51%	0.592	-	n.s.
	(0.398)	(0.573)		(0.374)		
x Dark triad	-	-	-	1.06***		-0.57%
				(0.348)		
x Cosmopolitanism	-	-	-	-0.307		n.s.
				(0.378)		

(continued)

Table 3 – *Continued*

x Risk aversion	-	-	-	-0.0664	-	n.s.
				(0.0873)		
x Male	-	-	-	0.195	-	n.s.
				(0.375)		
δ Controversies						
Domestic - International	-0.43**	-	0.23%	not applicable		
N (# of observations)	276 (1067)			276 (1067)		
Log-likelihood	-1,014.3502			-779.7741		

The table shows the results of a mixed logit model for first the choice experiment. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 4 – Mixed logit estimation results of the second choice experiment

Explanatory variables	Model 1			Model 2		
	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Annual return	2.4***	-	-	1.98***	-	-
	(0.119)			(0.0975)		
Canadian bond	-0.362**	0.279	0.15%	-0.314**	0.822***	0.16%
	(0.147)	(0.208)		(0.15)	(0.254)	
Chinese bond	-0.969***	0.297	0.40%	-1.16***	0.981***	0.59%
	(0.157)	(0.204)		(0.178)	(0.194)	
Controversies domestic	-3.11***	4.23***	1.30%	-4.22***	-	2.13%
	(0.566)	(0.649)		(2.61)		
x Human rights	-1.24**	2.1***	0.52%	-0.311	-	n.s.
	(0.577)	(0.693)		(0.239)		
x French students	-0.74	0.166	n.s.	0.305	-	n.s.
	(0.526)	(0.618)		(0.247)		
x Dark triad	-	-	-	0.711***	-	-0.36%
				(0.229)		
x Cosmopolitanism	-	-	-	0.0458	-	n.s.
				(0.259)		
x Risk aversion	-	-	-	0.0311	-	n.s.
				(0.0579)		
x Male	-	-	-	0.148	-	n.s.
				(0.247)		
Controversies Canadian	-2.69***	3.92***	1.12%	-4.34***	-	1.94%
	(0.525)	(0.657)		(2.45)		
x Human rights	-0.931*	1.63**	0.39%	-0.233	-	n.s.
	(0.538)	(0.712)		(0.246)		
x French students	-1.26**	0.363	0.52%	-0.745***	-	0.38%
	(0.498)	(0.636)		(0.257)		

(continued)

Table 4 – *Continued*

x Dark triad	-	-	-	0.71***	-	-0.36%
				(0.241)		
x Cosmopolitanism	-	-	-	0.0775	-	n.s.
				(0.26)		
x Risk aversion	-	-	-	0.0577	-	n.s.
				(0.0591)		
x Male	-	-	-	0.0458	-	n.s.
				(0.255)		
Controversies Chinese	-1.92***	4.04***	0.80%	0.228	-	n.s.
	(0.568)	(0.494)		(1.65)		
x Human rights	-1.08*	1.33*	0.45%	-0.553*	-	0.28%
	(0.62)	(0.732)		(0.285)		
x French students	-1.19**	0.173	0.50%	-0.558*	-	0.28%
	(0.589)	(0.666)		(0.292)		
x Dark triad	-	-	-	0.522*	-	-0.26%
				(0.267)		
x Cosmopolitanism	-	-	-	-0.741**	-	0.37%
				(0.306)		
x Risk aversion	-	-	-	0.0192	-	n.s.
				(0.0681)		
x Male	-	-	-	0.101	-	n.s.
				(0.295)		
δ Controversies						
Domestic - Canadian	-0.42	-	n.s.		not applicable	
Domestic - Chinese	-1.19***	-	0.50%		not applicable	
Canadian - Chinese	-0.77**	-	0.32%		not applicable	
N (# of observations)		278 (1350)			278 (1350)	
Log-likelihood		-946.1516			-1,052.7	

The table shows the results of a mixed logit model for the second choice experiment. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Article 4:

The Confusion of Taste and Consumption: Evidence from a Stated Choice Experiment

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Abstract

In this research, we conduct a stated choice experiment with German retail investors to elicit their preferences with respect to financial materiality of sustainability information. We find that there are market participants who are not able to distinguish between information related to sustainability and financial performance. In particular, investors seem to overreact to bad financially material sustainability information. Others seem to be prone to affect as they are intrinsically motivated to "do good" and erroneously project sustainability information onto future dividends, regardless of materiality. Our results highlight the importance of establishing appropriate classification systems for sustainability reporting.

Keywords: Sustainable investing, Stated choice experiments, Materiality, Salience, Behavioral finance, Sustainability reporting, Investor behavior

JEL Classification: G11, G41, Q56, M48

1 Introduction

Sustainable investments comprise estimated market shares of more than one third of assets under management in North America, Europe and Australasia (GSIA (2021)). One approach to explain this phenomenon enlarges the traditional view of purely consumption-driven investors by assigning sustainability a value on its own. In this case, the utility function should be characterized by an independent non-pecuniary taste component that motivates investors to lower return expectations for doing good. Both experimental (e.g., Riedl and Smeets (2017), Gutsche and Ziegler (2019)) and empirical studies (e.g., Hong and Kacperczyk (2009), Bofinger et al. (2022)) find evidence for this taste hypothesis.

Disclosure requirements reflect the growing popularity of sustainable investments. In this context, financially material and financially immaterial information have to be distinguished. In the U.S., the Securities and Exchange Commission (SEC) considers disclosure requirements for sustainability information, which is related to financial performance and, thus, financially material for shareholders. In contrast, the European Union (EU) advocates the wider stakeholder-oriented principle of "double materiality", which requires companies to disclose information on their general impact on the environment as well. To classify financially material and financially immaterial information, the Sustainability Accounting Standards Board (SASB) has developed an industry-specific materiality framework, which gives guidance on how sustainability information affects enterprise values.[19] Khan et al. (2016) show empirically that the distinction between financially material and immaterial information may be economically important since expected financial performance and financially material sustainability information are related to each other.

The dichotomous classification of sustainability information into financially material and immaterial may be difficult to handle for non-professional taste-driven investors. Therefore,

[19]The assessment of whether an information is financially material may change over time. Therefore, the World Economic Forum (WEF) advances the concept of dynamic materiality which states that financial immaterial information can become material over time. An obvious example are carbon emissions (cf. Bolton and Kacperczyk (2021)).

this paper examines the consistency of investors' intention to use sustainability information with regard to financial materiality and taste. Can investors distinguish information related to sustainability (taste component) and financial performance (pecuniary component) appropriately or are investors biased and project sustainability characteristics to financial fundamentals? Analysing the effect of sustainability ratings on fund flows, Hartzmark and Sussman (2019) find empirical evidence that sustainability information may distort investors' performance expectations. In this paper, we conduct a stated-choice experiment among 346 German non-professional retail investors to address this question in a more direct way. In the experiment, investors may chose among different investment opportunities, which are characterized by (pecuniary) risk/return trade-offs and (non-pecuniary) financially material and immaterial sustainability ratings. Participants were aware that risk/return trade-offs and sustainability information are independent and disentangled from each other. Therefore, all sustainability information should be irrelevant for the investment decision of purely pecuniary-driven investors. For taste driven investors, sustainability information should matter. However, they should have no reason for treating financially material and immaterial ratings differently. In the experiment, we test how investors react to these different kinds of sustainability ratings.

The main findings are the following: First, the experiment suggests that investors have a non-pecuniary taste for sustainability. Good and bad sustainability ratings are treated differently. Independent of financial materiality, investors try to avoid bad ratings while they favour good ratings and green (marketing) labels. This behavior resembles the reaction towards risk. Investors demand a four times higher compensation for assets with high risk compared to what they are willing to forego for firms with low risk.

Second, there is evidence that the perception of bad sustainability information depends on financial materiality. Investors demand a return premium that is significantly higher for investments with a bad financially material sustainability rating compared to those with a bad financially immaterial rating. For the whole sample, the extra return required is

0.85%. Thus, the experiment suggests that the perception of (bad) sustainability information depends on financial materiality.

Third, to explore why the perception of bad sustainability information depends on financial materiality, we divide investors into three groups. These are investors who i) did not use sustainability information at all, ii) used sustainability information exclusively for non-pecuniary reasons and, iii) used sustainability information also for pecuniary reasons within the experiment. We find that the distinction between bad material and immaterial ratings is only significant for the latter group of pecuniary-driven investors who demand an extra return of 1.85% for investments with bad financially material compared to bad financially immaterial sustainability ratings. This suggests that this sustainability information is regarded as financially informative by these investors. However, in light of the experimental setup, this behavior cannot be explained with rationality. It seems that the distinct and salient provision of financially material and financially immaterial ratings induced these investors to confuse taste information with firm fundamentals and assign a higher weight to the ratings as consciously intended.

Fourth, we also consider the impact of real-life investing behavior and individual-specific characteristics on results. We asked investors whether they use sustainability information in their real-life investing decisions and formed again three groups of investors i) not using sustainability ratings at all, ii) using sustainability ratings exclusively for non-pecuniary reasons and iii) using sustainability ratings also for pecuniary reasons. It turns out that only investors who do not use sustainability information in real-live distinguish between bad material and immaterial sustainability ratings. This observation suggests that these investors confuse pecuniary and taste information as ratings on sustainability and financial materiality become available. It seems that these investors got erroneously activated by wealth concerns to use the provided ratings in the experiment. The other two subgroups seem to also project sustainability information on firms' financial performance but do not differentiate this information according to financial materiality. Moreover, they are characterized by a higher

intrinsic motivation. There behavior is more likely to be explained by emotional affect that is the believe that "doing good leads to something good" as it is proposed by Hartzmark and Sussman (2019).

Our paper contributes to the literature on sustainable investing. While other studies address the question of non-pecuniary taste (e.g., Riedl and Smeets (2017), Gutsche and Ziegler (2019), Barber et al. (2021) or Heeb et al. (2022)), we ask whether taste-driven investors can consistently distinguish between information related to taste and financial performance. Most closely related to our research, Hartzmark and Sussman (2019) find evidence for emotional affect to explain sustainable investing. Our experimental dichotomy of financially material and immaterial taste information extends the literature by showing that not only affect but also pecuniary wealth concerns motivate investors to deviate from optimal investment decisions. In line with Døskeland and Pedersen (2016) we find proof for the effectiveness of addressing wealth concerns to induce a more sustainable investment behavior. These insights are important for policy makers and regulators who are currently trying to establish uniform classification frameworks for sustainable investments. As shown by Khan et al. (2016), there may be also rational motives to discriminate between financially material and immaterial sustainability information. However, the examination of performance differences and the implied hypothesis of errors-in-expectations (e.g., Derwall et al. (2011), Borgers et al. (2013)) is not subject to this study.

The remainder of the paper is organized as follows. Section 2 discusses relevant literature and develops the research question. Section 3 describes the methodological approach and data. Section 4 reports the empirical results. Section 5 concludes and suggests future fields of research.

2 Theoretical Framework and Literature Review

This section gives an overview over the literature on sustainability information and investing. Section 2.1 discusses the literature on investors' perception towards sustainability. Sections 2.2 reviews the concept of financial materiality in the context of sustainability reporting. Section 2.3 addresses the research question of this paper.

2.1 Sustainability Information and Investment Decisions

The literature suggests that investors may use sustainability information for pecuniary and non-pecuniary reasons. From a traditional view, markets are efficient and investment decisions reflect optimal consumption plans. Investors consider sustainability issues only if they enhance market efficiency and enlarge information. In a market failing to price the informational value of sustainability correctly, sustainable investing may be used as a successful investment strategy to achieve positive alphas (Derwall et al. (2011)). The empirical evidence for a mispricing of sustainable assets is ambiguous, depending on the geographical focus (e.g., Auer and Schuhmacher (2016)), time-horizon (e.g., Borgers et al. (2013)) as well as ways of measuring both sustainability (Halbritter and Dorfleitner (2015)) and financial performance (Belghitar et al. (2014)). Other analyses indicate a reduced crash and downside risk protection of sustainable investments, reasoned in potentially higher levels of transparency and enhanced trust in times of financial turmoil[20]. Nofsinger et al. (2019) find support for an asymmetric sustainability preference. In contrast to strengths, weaknesses are valued by institutional investors as they may represent additional downside risk.

Apart from future consumption plans, investors may derive non-financial utility from "doing good". Depending on the size of this taste component, investors may be willing to forego utility derived from consumption in exchange for non-financial taste. In this case, the differentiation between financially material and immaterial issues should not be meaningful for

[20]See, e.g., Kim et al. (2014), Nofsinger and Varma (2014), Lins et al. (2017), Broadstock et al. (2020).

investors. If this group is large enough in size, taste may also influence equilibrium prices and firms' cost of capital (e.g., Heinkel et al. (2001), Friedman and Heinle (2016)). The findings of studies examining historical market data are mainly consistent with this hypothesis of "shunned-stocks" (Derwall et al. (2011)) and support the existence of a taste component (e.g., Hong and Kacperczyk (2009), Borgers et al. (2015), El Ghoul and Karoui (2017) or Barber et al. (2021)). Analyzing green and conventional municipal securities in the U.S., Larcker and Watts (2020) observe no differences in the pricing of green and conventional securities, though.

Experimental research designs have tested different motives to explain non-financial taste. In its strongest form, investors may see investing as a form of environmentalism. According to value-belief-norm (VBN) theory (Stern et al. (1999)), pro-environmental actions are the result of a feeling to be morally obligated to act, induced by personal norms. To activate these norms, individuals must not only i) show high transcendental values but also ii) fear that things they value are in threat and iii) believe that their actions are an effective tool to counteract. Brodback et al. (2019) find evidence that VBN can be applied to explain sustainable investing. Also warm-glow (Andreoni (1989), Andreoni (1990)), the good feeling from doing good, assumes an intrinsic motivation for pro-environmental behavior. Unlike VBN, this feeling is neither an obligation nor does it depend on the actual impact of personal actions and can be regarded as an impure form of altruism. Gutsche and Ziegler (2019) find warm-glow to be the main determinant for explaining sustainable investing. In line with the idea of warm-glow, Heeb et al. (2022) suggest that sustainable investors are not consequential in their taste and seek rather for positive emotions than actual impact. Social norms and perceived social pressure may be a third non-pecuniary motive for sustainable investing. In contrast to the two preceding approaches, social norms represent an extrinsic motivator. Hong and Kacperczyk (2009) explain their observed abnormal returns of sin stocks with social norms. Also Brodback et al. (2019) support the impact of norms on investing behavior. Riedl and Smeets (2017) find a significant influence of social signaling that is related to social

norms. The results of Gutsche and Ziegler (2019) do instead not indicate a direct relation between the consideration of sustainability information and social pressure.

2.2 Financial Materiality

Sustainability information may or may not be related to a firm's financial performance. According to the Securities and Exchange Commission (SEC), "a matter is 'material' if there is a substantial likelihood that a reasonable shareholder would consider it important". The Sustainability Accounting Standards Board's (SASB) aims to establish industry-specific standards for the materiality of sustainability issues. Matching this recently published classification with existing sustainability ratings from *MSCI KLD*, Khan et al. (2016) find performance-related differences between material and immaterial sustainability issues. While assets with good material ratings outperformed those with poor ones, there is no comparable effect for immaterial ones. As found by Amel-Zadeh and Serafeim (2018) and Eccles and Klimenko (2019), materiality represents the main driver why professional investors use sustainability information today. ESG integration, the systematic use of financially material information, is globally seen the most popular sustainability investing strategy (GSIA (2021)). Also the methodology of third-party sustainability rating providers as, for example, MSCI, Refinitiv or Sustainalytics is putting increased focus on delivering financially material information.

Under the term "dynamic materiality", it is currently discussed whether a clear demarcation between financial materiality and immaterial sustainability is actual possible. Following Freiberg et al. (2019), changing societal expectations may induce so far financially immaterial issues to become material in the future. Bolton and Kacperczyk (2021) show that carbon emissions got systematical priced and thus materialized only recently. Several standard setters, including the Sustainability Accounting Standards Board (SASB), meanwhile adopted this way of thinking about sustainability reporting.

To cope with the challenges of the climate change, also regulators and policymakers are increasingly trying to set incentives for sustainable investments. The idea that sustainability represents an inherent value in itself is currently pursued by the efforts of the EU. For reaching the objectives of its 2030 Climate Target Plan and aligning investment activities to climate goals, it advocates the concept of "double materiality". Broadly speaking, this means that companies should not only report sustainability information if it is i) financially material for shareholders but also if it is ii) financially immaterial but material for the broader public of stakeholders, including the environment. The concept of "double-materiality" thereby extends the stockholder-oriented focus of financial materiality to the stakeholder-oriented view of impact materiality. This non-pecuniary information should be relevant for taste driven investors, though.

No uniform classification system has been established until today. Frameworks like the Global Reporting Initiative (GRI), the UN Principles for Responsible Investing (PRI) or the EU's Taxonomy are still under development and differ widely in their methodology. Also third-party rating providers show large divergence in their sustainability assessment (Chatterji et al. (2016), Berg et al. (2022)). This does not only complicate the academic analysis of sustainable investing with historical market data but also gives stage to the possibility of green-washing conventional investments with random sustainability labels to attract more customers (e.g., Ghoul and Karoui (2021)).

2.3 Research Question

In this paper we raise the question how financially material and immaterial information affect investment decisions of non-professional retail investors. The differentiation according to financial materiality reflects that sustainability information and financial performance may be interrelated. We ask whether investors can disentangle this relationship in the context of their investment decisions and explore how they deal with this complexity. Is there (at least

unintentionally) a taste for financial materiality?

It is expected that financial materiality does not matter for rational investors along the taste dimension of their decisions. However, very detailed information can also overstrain investors. Borgers and Pownall (2014) suggest that the simultaneous consideration of both pecuniary and non-pecuniary goals may represent an overwhelming task for at least some market participants. From psychological literature it is known that individuals base their decision on simplifying but not necessarily rational heuristics (mental shortcuts) in such situations of cognitive overload (e.g., Tversky and Kahneman (1974)). The way how salient or prominent sustainability information is presented to investors may have an impact on how investors use it. Bordalo et al. (2013) find that consumers focus their attention to salient attributes when making choice decisions between different goods. Examining investors' reaction to the introduction of the Morningstar globe rating, Hartzmark and Sussman (2019) highlight the importance of salience and affect, that is, the tendency to base decisions rather on emotions than rationality, to explain sustainable investing. Funds rated best (worst), experienced significant inflows (outflows) in the months succeeding the publication of the ratings. This observation can primarily be traced back to the discrete five-glow-rating system and less to the more detailed continuous sustainability scores. In this paper and in contrast to the existing literature, we differentiate between financially material and immaterial sustainability information and confront investors with these salient attributes.

3 Data and Methodology

To address the research question, we conduct a stated choice experiment. Choice experiments are implemented to estimate preferences for existing but also hypothetical products and product attributes. In the experiment, participants choose among different alternatives. Assuming that participants will select the alternative which provides them the highest utility, preferences can be estimated from observed choices. In comparison to more traditional

methods of preference elicitation as, for example, standard surveys or conjoint analyses, the indirect nature of choice experiments enhances the external validity of estimation results. Depending on the particular application and context, the meta-analysis of Haghani et al. (2021) suggests that also stated choice experiments can be subject to hypothetical biases as a result of social desirability, salience, or a lack of real-life consequences of choices. However, such potential hypothetical biases concern primarily absolute and less marginal estimates. Since our focus is on the relative importance of financially material and financially immaterial sustainability information, these biases are of minor importance in the context of this paper. Moreover, there were no incentives for participants within the experiment. In this regard, we follow Gutsche and Ziegler (2019) who were the first to introduce stated choice experiments to financial research. This ensures comparability of our results to theirs.

The goal of our study is to estimate the preferences for sustainability information. In particular, we are interested in the utility that investors derive from financially material and immaterial sustainability. Therefore, we observe investors' choices between various investment alternatives. Each alternative is characterized by a traditional risk/return trade-off, financially material and immaterial sustainability information, and other information as detailed below. Empirically, sustainability and financial performance may interact. To disentangle these effects, participants were explicitly informed, that all value-relevant information (including financially material sustainability information) is already incorporated in expected returns and risk. This information is communicated before and during the experiment.[21] All empirical analyses of the choice experiment are done with BIOGEME (Bierlaire (2020)), a flexible open source Python package designed particularly for the analysis of choice models. We consider all random parameters to be continuously normal distributed and rely on 500 Halton draws with a base of 5 for simulations.

This section gives details on the data and the methodology. Section 3.1 addresses the data and survey design. Section 3.2 discusses the methodology of the stated choice experiment.

[21] See also Appendix A.5.

Section 3.3 details the characterization of participants and their attitude towards sustainability.

3.1 Data

The study relies on a sample of exclusively experienced retail investors, which was collected in an anonymous online survey in collaboration with three local German cooperative and savings banks in summer 2021. Participants were invited through their online banking and newsletter subscriptions to the questionnaire. As a reward for finishing the survey, participants had the chance to win a 10 Euro voucher for regional shopping. Table 1 shows the demographics of survey participants. To assure the external validity, only participants with investment experience are included in the analysed sample. The sample is representative in terms of gender and education for German investors. Market participants over the age of 60 are underrepresented, though.[22] To control for possible differences related to generation, we additionally surveyed business students with investment experience from a German university as a comparison group. After the exclusion of inconsistent and incomplete responses, our final sample consists of 267 experienced German bank clients and 79 student investors. To explore the representativeness of this sample, participants were also confronted with a second choice experiment that is similar to Gutsche and Ziegler (2019) who surveyed a representative sample of German investors. Qualitatively, we replicate their results. This supports the external validity of our data.

The consistency and comprehensibility of the questionnaire were ensured by a pre-test of 63 participants and discussions with experts. As a result, we employed the terms "value-relevant" and "not value-relevant" instead of financially material and immaterial in the survey. More precisely, sustainability information was classified as (not) value-relevant if it had (not) a significant positive or negative impact on firms' business success and firm value. In the

[22] See Deutsches Aktieninstitut (2020).

final survey, more than 95 percent of participants stated to have understood the difference. In the remainder of this paper and for the sake of clarity, we will refer to materiality instead of value-relevance, though. To make the concept of sustainability more tangible for study participants, our experiment focused exclusively on the environmental dimension. This is the most prevailing sustainability aspect in light of current accounting and policy efforts[23] and the most referred sustainability category among investors according to Hartzmark and Sussman (2019). All relevant survey questions can be found in Appendix A.

3.2 Stated Choice Experiments

Within the experiment, each participant i faced $M = 5$ different choice sets. In each choice set m participants were asked to choose between two conventional and two green labeled mutual funds.[24] Additionally, participants were given the opportunity to invest in a savings account ("status quo option"). An exemplary choice set is provided Figure 1.

In choice modeling, it is assumed that the utility U_{ijm} can be divided into an observable value function V_{ijm} and an unobservable identically and independently (i.i.d.) distributed error term ϵ_{ijm}.

$$U_{ijm} = V_{ijm} + \epsilon_{ijm}$$

[23]These accounting and policy efforts include, e.g., the EU Taxonomy, EU Emissions Trading Scheme, Carbon Disclosure Project, and the GHG protocol.

[24]Mutual funds were offered instead of single stocks to address potential diversification concerns.

For each alternative j a separate value function is given.

$$V_{i1m} = \alpha_{\text{fund}} + \beta' x_{i1m} \tag{1}$$

$$V_{i2m} = \alpha_{\text{fund}} + \beta' x_{i2m} \tag{2}$$

$$V_{i3m} = \alpha_{\text{fund}} + \alpha_{\text{green}} + \beta' x_{i3m} \tag{3}$$

$$V_{i4m} = \alpha_{\text{fund}} + \alpha_{\text{green}} + \beta' x_{i4m} \tag{4}$$

$$V_{i5m} = 0 \tag{5}$$

The alternatives $j \in \{1, 2\}$ are conventional funds while $j \in \{3, 4\}$ are green funds. The alternative $j = 5$ is the status quo option (savings account), which was added to increase realism and hence the external validity of the experiment. The value function of this option constitutes the overall reference level and is set to zero. The preference for green funds in comparison to conventional ones is measured by α_{green}. Mutual fund alternatives are further characterized by i) expected return, ii) risk and iii) geographic investment focus. The latter was also added to increase realism by reducing the salience of the sustainability characteristics. Participants were further provided with distinct material and immaterial sustainability ratings. Both ratings are divided into the levels "good", "middle" and "bad". Sustainability and risk/return information are disentangled from each other in this experiment by definition. All attributes and their corresponding levels are captured by x_{njm}. The variables are are summarized in Table 2. In total, we created 60 different choice sets which were blocked into 12 groups and randomly assigned to participants. The applied D-efficient experimental designs[25] are based on prior values from pre-test results and were generated with the software *ChoiceMetrics Ngene*.

The objective of the empirical analysis is to determine the impact of sustainability attributes on investment decisions. For this purpose, the corresponding vector β is estimated from observed choices. Under the assumption of i.i.d. and extreme-value I distributed unobservable

[25] See, e.g., Street et al. (2005).

error terms, each observed choice can be expressed by a multinomial logit model. The value function and thus the probability of an alternative is coded one if the alternative was chosen and zero otherwise. The quested vector β can then be estimated with the method of maximum-likelihood.[26]

To facilitate the interpretation of results, we also calculate the corresponding return premium or discount that investors demand for accepting a fund which includes a respective attribute. In the literature, this elasticity is known as the Willingness-to-Pay (WTP) and is determined by the negative ratio of the estimated mean of an attribute of interest and the estimated parameter for expected returns. The WTP is positive (negative) if investors demand a return premium (discount) for choosing a fund which includes the specific attribute.

The expected serial correlation resulting from the panel structure of data violates the assumption of i.i.d. distributed error terms. To overcome this restriction, we assume α_{fund} and α_{green} to be normally distributed within the population. Similarly, all attributes x_{ijm} are assumed to be normally distributed to account for potential heterogeneity in taste. In consequence, the standard deviation of the distributed parameters has to be estimated from data in addition to the mean. In line with literature, "Expected returns" is defined as a fixed parameter, as is represents the monetary attribute used to derive WTP estimates. The gained flexibility of such mixed logit models comes at a numerical cost. Closed form solutions for the probability equations are not available and the parameters can only be estimated by simulating probabilities with Monte Carlo methods.[27]

3.3 Individual Characteristics

To characterize participants attitude towards sustainability, we collect data on a number of individual characteristics. Summary statistics are provided in Table 3. In line with Gutsche

[26]See, e.g., Train (2009).

[27]See, e.g., Train (2009) or Hensher and Greene (2003).

and Ziegler (2019), the variable "warm glow" was estimated by asking participants how far it makes them happy to do something good for the environment. The variable "social norms" is based on two questions about the role and expectations of one's surrounding concerning sustainability. These questions were answered on 7-point Likert scales. As proposed by VBN theory (Stern et al. (1999)), "Environmentalism" is assessed by the product of transcendental values, perceived environmental threat, and the perceived effectiveness of sustainable investing to protect the environment. Items for biospheric and altruistic values are taken from the E-PVQ developed by Bouman et al. (2018) to measure "Transcendental values". "Perceived environmental threat" is controlled by two questions about environmental and climate protection on 7-point Likert scales. Finally, we created the dummy variable "Perceived effectiveness". It is zero if participants regard a lack of environmental effectiveness as an obstacle for sustainable investing and one otherwise. With Cronbach alphas higher than 0.7, all used constructs show acceptable levels in terms of internal consistency.

The ability to distinguish between taste and consumption information may depend on cognitive capabilities and financial expertise. Dohmen et al. (2010) find a positive effect of patience and risk-taking on individuals' cognitive capabilities. Therefore, risk and time preferences are assessed on 11-point-scales, using the respective finance-related survey questions for "Risk-aversion" and "Patience" validated by Dohmen et al. (2011) and Vischer et al. (2013). Financial literacy is estimated using the "Big Five" questions from Lusardi and Mitchell (2011) excluding the question on mortgages due to lack of relevance in the given context. The variable "High literacy" is a dummy variable and equal to one, if respondents answered at least three out of four question correctly and zero otherwise. Eventually, the taste-driven appreciation of sustainability may require a certain amount of wealth. The dummy variable "High income" is one if the respondent stated to have a monthly net household income above the German average of 3'600 Euros.[28]

[28]See Statistisches Bundesamt (2022).

4 Results

This section contains the experimental results. Section 4.1 addresses the impact of sustainability information on investors' behavior. Section 4.2 explores the motivation for doing so. In particular, we consider pecuniary and non pecuniary motives. Section 4.3 looks at the link to the actual real-life investment behavior.

4.1 Impact of Sustainability Information on Investors' Behavior

Table 4 shows the results of the mixed logit model discussed in Section 3.2. The table includes the corresponding WTP estimates. Recall that a positive (negative) WTP indicates that investors request a return premium (discount) for choosing a fund with such an attribute. Except for expected returns, all parameters are assumed to be normally distributed, as indicated by the estimated standard deviations. To begin with risk/return trade-offs, it turns out that investors derive positive utility from expected returns and show an aversion towards risk. This is in line with expectations. Note that high and low risk are treated asymmetrically, though. While investors require an extra return of about 4% for high risk investments they are willing to sacrifice only 1% return when risk is low.

The variables "Material good/bad" and "Immaterial good/bad" measure the impact of financially material and immaterial sustainability information on expected returns. These are the variables of main concern. Investors distinguish between good and bad ratings. Similar to risk, the importance of avoiding bad ratings is about four times as high as the corresponding preference for good ones. Psychological literature suggests that humans focus more on avoiding bad things rather than on doing good ones (e.g., Baumeister et al. (2001); Rozin and Royzman (2001)). This negativity bias may induce investors to put a greater weight on negative characteristics compared to positive ones. In this case, also pure taste-motives may be responsible for this observation. Another potential explanation is that investors perceive investments with bad sustainability ratings as more risky. Nofsinger et al. (2019) find an

empirical relationship between bad sustainability ratings and economic risk. However, in the experimental setup, risk-return trade/offs and sustainability information are disentangled from each other. Therefore, the implicit assumption underlying this interpretation is that investors confuse these two pieces of information with each other.

To explore whether financial materiality matters, we look at the differences of the WTP between good (bad) financially material and immaterial sustainability ratings. While this difference is not significant for good ratings, it is significant for bad ratings. In total, investors require 0.85% more return for funds that have a bad financially material rating compared to those funds that have a bad financially immaterial rating. This result is difficult to rationalize with taste. Why should it matter whether bad sustainability information is financially material or immaterial? A possible explanation might be that the perceived riskiness of funds with a bad financially material is higher. This implies that financial materiality interacts with the risk/return trade-off. However and as discussed above, this is not coherent with the experimental set-up. This question will be discussed in greater detail in the subsequent sections 4.2 and 4.3.

We also check for further potential factors that might have an impact on the WTP. First, the positive estimate for "Mutual funds" suggests a general preference for mutual funds compared to the savings account option. As the savings account option was added to the experimental design as a status-quo alternative to increase realism, the respective estimates should be regarded as study-specific. Second, the geographic investment horizon does not represent a significant decision criteria. As indicated by the variable "Domestic", investors are indifferent between domestic and international investments. Third, the variable "Green Label" measures the impact of a green marketing label. Investors are aware that these labels are not substantiated by any quality standards. The determined willingness to forego around one percent of returns for these labels indicates that they might pay for greenwashing.[29] Fourth, the impact of the sustainability variables on the WTP of students and bank customers is mostly not

[29]See also Kleffel and Muck (2023) for further discussion.

statistically significant. The only exception are good financially immaterial sustainability ratings for which they are willing to sacrifice less return than the other investors. Due to these only minor deviations in behavior, we will not distinguish between student investors and bank clients in the subsequent analyses.

4.2 The Influence of Pecuniary and Non-Pecuniary Motives

An important feature of the experiment is that sustainability ratings are available and clearly communicated, which is not necessarily the case in practice.[30] This provides an opportunity to study the impact of the provision of sustainability information. After the experiment, we asked participants whether and – if applicable – why they used the sustainability ratings. We divide investors into three groups. The first group is comprised of investors who did not use sustainability information at all ("no conscious use"). Investors who used sustainability information – among others – for pecuniary reasons ("pecuniary reasons") are in the second group. The third group consists of investors who used sustainability for non-pecuniary reasons only ("Non-pecuniary reasons"). Recall that in the experimental set-up, sustainability information and risk/return trade-offs are disentangled from each other. Therefore, it is difficult to rationalize a pecuniary motivation for the consideration of sustainability information within the experiment.

Table 5 gives an overview over the three groups of investors. In total, about 68% stated to have used the sustainability ratings. A majority of about two-thirds of these investors considered sustainability information at least partially for pecuniary reasons, while about one-third took it into account for non-pecuniary motives only. Regardless of the motivation to use the ratings, both groups of sustainable investors receive a higher satisfaction from warm-glow giving than individuals who did not use sustainability information in the experiment. Also social norms seem to have triggered participants to use the given ratings. In

[30] In fact, 67% of all participants claim that they do not rely (more) on sustainability information in practice because they feel that reliable information is not available.

general, we register a 20% increase of investors using sustainability information compared to real-life investing. Hence, participants were activated to rely on sustainability criteria in the experiment. In particular, we register an increase in investors using sustainability for pecuniary reasons.

We repeat the estimation of the logit model for the three groups of investors, respectively. Results are reported in Table 6. The strongest impact of financially material and immaterial sustainability information on the WTP is found for investors who use this kind of information also for pecuniary reasons, followed by investors who use it for non-pecuniary reasons only. The lowest impact is observed for investors who did not consciously use sustainability information. The effect is still statistically significant for good and bad financially material as well as for bad financially immaterial information, though. Thus, these investors used the ratings at least subconsciously. All groups have in common that they treat good and bad sustainability differently. Hence, there is a negativity bias. The only group that discriminates bad financially material and immaterial information are investors who use sustainability information also for pecuniary reasons. This suggests that investors using sustainability information out of pecuniary considerations overestimate the importance of financially material sustainability information and its impact on financial performance, which is explicitly ruled out in the experiment.

4.3 The Impact of Actual Investment Behavior

To further explore why investors discriminate between financially material and financially immaterial sustainability information within the experiment, we reconsider the group of pecuniary-driven sustainability investors and compare their behavior in the experiment to their real-life trading behavior. We divide the group of pecuniary-driven investors into three subgroups. The first subgroup comprises conventional investors who do not use sustainability information in practice but used the ratings within the experiment also for pecuniary

reasons ("Conventional to pecuniary"). The second subgroup contains investors who also use sustainability information for pecuniary reasons in practice ("Pecuniary to pecuniary"). Investors in the third group use sustainability information for non-pecuniary reasons only in practice but used it also for pecuniary reasons within the experiment ("Non-pecuniary to pecuniary"). Table 7 shows the composition and individual-specific characteristics of investors who pursued pecuniary-intentions in the experiment. In particular, it demonstrates that investors who use sustainability information in real-life receive a significantly higher pleasure from warm-glow giving than those who do not.

We repeat the estimation of the logit model for the three groups of investors, respectively. Table 6 has the results. All subgroups distinguish between good and bad sustainability information. More importantly, the discrimination between bad financially material and immaterial information can be traced back to the group of investors who do not use sustainability information in practice ("conventional to pecuniary"). Apparently, these investors got activated by wealth concerns to use sustainability information. Triggered by the term "financially", they erroneously projected sustainability characteristics on firm fundamentals. The lower intrinsic motivation of this group reduces the suitability of affect to explain this behavior, though. Instead, they might be overconfident and overestimate their personal skills to exploit sustainability information and/or are simply inexperienced in using sustainability information in the context of investments.

For the other two subgroups of investors, the differences between the WTP for financially material and immaterial sustainability information is not statistically significant. Moreover, these investors have a significantly higher intrinsic motivation to do something good. These observations suggest that Hartzmark and Sussman (2019)'s explanation of emotional affect is applicable. Broadly speaking, affect occurs when decisions are made on emotions instead of rational considerations[31]. These investors associate positive emotions with sustainability and may believe or hope that "doing good" implies to also "do well" in a financial way. In

[31]See, e.g., Alhakami and Slovic (1994), Finucane et al. (2000), Slovic et al. (2007).

particular, this believe is independent of financial materiality.

5 Conclusion

In this study, we examine investors' reaction to financially material and immaterial sustainability information that is detached from financial fundamentals. We ask if investors can distinguish between information related to taste and firm financials. Results indicate that investors are primarily concerned to avoid investments with bad sustainability ratings, independent of financial materiality. Although participants are aware that financial performance and sustainability characteristics are disentangled from each other, almost half of investors pursues pecuniary motives when using the sustainability ratings in the experiment. For intrinsically-motivated investors, this behavior may be explained with affect. The distinction between financially material and immaterial ratings is instead only significant for investors who are inexperienced in the use of sustainability information in real-life investing. These individuals have a lower intrinsic motivation to "do good" and got erroneously activated by wealth concerns to rely on sustainability information.

These findings highlight the importance of behavioral issues to understand sustainable investing and are of importance for policy makers. Classification frameworks should be easily understandable and focus rather on the identification of firms with lagging sustainability records than on good ones. Our study delivers evidence that the concept of "double materiality" is best suited to meet the needs of taste-driven shareholders. The provision of distinct financially material and immaterial sustainability information may be instead difficult to understand for retail investors. Regulatory efforts might counteract this deficit by enhancing the communication and financial literacy with respect to sustainable investing. On the other hand, the found behavioral biases may also be used to nudge investors to invest more sustainably.

For future research, the verification of our results with historical market data may represent

a promising albeit challenging field of research. The results of this paper are further based on a sample of private investors from Germany. As private investors constitute only a minority in regard of trading volumes (Börse Frankfurt (2019)), it should be verified, that the results of this research can also be transferred to the whole market and professional investors. Extending this analysis to a larger international sample and controlling for professional investors may by an interesting field for future research.

Acknowledgements

We thank Brigitte Eierle, Karl-Heinz Gerholz, Andrej Gill and Frank Schiemann for helpful comments and suggestions. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Figures

Advertised as:	**Normal Fund**	**Normal Fund**	**Green Fund**	**Green Fund**	**Savings Account**
Expected Return	10%	2%	5%	2%	0%
Risk	High	Low	High	Middle	No Risk
Geographic Focus	International	Germany	Germany	International	
Value-relevant Sustainability Rating	Bad	Good	Bad	Middle	
Not Value-relevant Sustainability Rating	Middle	Good	Good	Bad	
Your Choice:	○	○	○	○	○

Figure 1 – Exemplary Choice Set

Tables

Table 1 – Demographics of participants

		Bank clients		Student investors	
Measure	**Value**	**# of obs.**	**%**	**# of obs.**	**%**
Gender	Female	90	33.71	23	29.11
	Male	176	65.92	56	70.89
	Non-Binary	1	0.37	-	-
Age	16-24	21	7.87	48	60.76
	25-34	49	18.35	31	39.24
	35-44	45	16.85	-	-
	45-54	67	25.09	-	-
	55-65	67	25.09	-	-
	More than 65	18	6.74	-	-
Income	Less than 1'700€	19	7.12	42	53.16
	1'700-2'599€	28	10.49	15	18.99
	2'600-3'599€	63	23.60	10	12.66
	3'600-4'999€	66	24.72	5	6.33
	5'000-7'000€	37	13.86	4	5.06
	More than 7'000€	26	9.74	-	-
	No answer	28	10.49	3	3.80
Education	Secondary school	73	27.34	-	-
	High school	48	17.98	28	35.44
	University	105	39.33	51	64.56
	Advanced vocational education	37	13.86	-	-
	Other	1	0.37	-	-
	No answer	3	1.12	-	-
Investment experience	Less than 1 year	17	6.37	19	24.05
	1-5 years	64	23.97	45	56.96
	More than 5 years	169	63.30	15	18.99
	Professional/Institutional investor	5	1.87	-	-
	No answer	12	4.49	-	-
Total: 346		267	77.17	79	22.83

Note: The table shows the demographics of survey participants. # of obs. refers to the absolute number of participants in a category. % is the amount of participants in a category set in relation to each sample.

Table 2 – Attributes and attribute levels of the stated choice experiment.

Expected annual return	1%, 2%, 3%, 5%, 6%, 7%, 8%, 10%
Risk	Low, **Middle**, High
Green label	Yes, **No**
Material sustainability rating	Low, **Middle**, High
Immaterial sustainability rating	Low, **Middle**, High
Geographic focus	**International**, Domestic

Note: The table shows the attributes and corresponding attribute levels used in the choice experiment. For categorical variables, the reference category is printed in bold type.

Table 3 – Summary statistics of individual-specific characteristics.

Variable	Mean	Standard deviation	Min	Max
Warm glow	5.37	1.51	1.0	7.0
Social norms	4.10	1.36	1.0	7.0
Environmentalism	22.75	17.70	0.0	49.0
Transcendental values	5.57	0.91	1.5	7.0
Perceived environmental threat	5.66	1.43	1.0	7.0
Perceived effectiveness	0.68	0.47	0.0	1.0
Risk aversion	5.07	1.99	1.0	11.0
Patience	6.55	2.43	1.0	11.0
High literacy	0.83	0.38	0.0	1.0
High income	0.49	0.50	0.0	1.0

Note: The table shows summary statistics of the individual-specific characteristics used as explanatory variables. "Warm glow", "Social norms", "Environmentalism", "Transcendental values" and "Perceived environmental threat" are measured on Likert scales ranging from 1 to 7. "Perceived effectiveness" is a binary variable coded to one if participants believe in the effectiveness of sustainable investing to do something good and zero otherwise. "Risk aversion" and "Patience" assess individuals attitude towards risk and time on Likert scales ranging from 1 to 11. "High literacy" and "High income" are binary variables coded to one if respondents answered at least three out of four financial literacy questions correctly or stated to earn an above average monthly net income of 3'500€ or more. Summary statistics are based on the answers of 346 German retail investors.

Table 4 – Basic mixed logit estimation results of the choice experiment.

Explanatory variables	Mean	Standard deviation	Mean WTP
Expected Return	0.324***	-	-
	(0.0176)		
Mutual Funds	3.01***	3.09***	-
	(0.524)	(0.435)	
Risk high	-1.31***	1.01***	4.04%
	(0.124)	(0.181)	
Risk low	0.327**	0.788***	-1.01%
	(0.0933)	(0.132)	
Domestic focus	-0.0933	0.151	n.s.
	(0.061)	(0.0926)	
Green Label	0.384***	0.0124	-1.18%
	(0.0731)	(0.152)	
Material good	0.346***	0.0525	-1.07%
	(0.0837)	(0.121)	
Material bad	-1.30***	0.122	4.00%
	(0.104)	(0.165)	
Immaterial good	0.296***	0.388***	-0.91%
	(0.085)	(0.125)	
Immaterial bad	-1.02***	0.248	3.15%
	(0.101)	(0.152)	
δ Mat.-Immat. good	0.05	-	n.s.
δ Mat.-Immat. bad	-0.28**	-	0.85%
Students			
x Green Label	-0.116	0.226	n.s.
	(0.146)	(0.213)	
x Material good	0.116	0.155	n.s.
	(0.174)	(0.22)	
x Material bad	-0.153	0.234	n.s.
	(0.228)	(0.308)	
x Immaterial good	-0.404**	0.117	1.25%
	(0.171)	(0.238)	
x Immaterial bad	-0.277	0.263	n.s.
	(0.217)	(0.275)	
N (# of observations)		346 (1719)	
Log-likelihood		-1,959.688	

The table shows the results of a mixed logit model for the choice experiment. For fixed parameters only the "Mean" is estimated, whereas for random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. Differences in student behavior are controlled by respective interaction terms. 500 Halton draws were used for simulation of the random

parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively. All estimation results are calculated using Panda's Biogeme.

Table 5 – Self-Declared use of the material and immaterial sustainability ratings within the experiment

	No conscious use	Conscious for	
		Pecuniary reasons	Non-pecuniary reasons
Warm glow	-	0.306***	0.335***
		(0.108)	(0.124)
Social norms	-	0.227*	0.256*
		(0.117)	(0.134)
Environmentalism	-	0.005	-0.007
		(0.008)	(0.009)
Risk aversion	-	-0.016	0.025
		(0.070)	(0.082)
Patience	-	-0.052	-0.012
		(0.056)	(0.064)
High literacy	-	-0.035	-0.443
		(0.381)	(0.408)
High income	-	-0.233	-0.443
		(0.292)	(0.333)
Students	-	-0.409	-0.717
		(0.340)	(0.416)
Constant	-	-1.63**	-2.13**
		(0.799)	(0.917)
Share in sample	31.50%	44.22%	24.28%
δ to real-life use	-19.95%	+18.79%	+1.16%

The table shows the results of logit regressions to characterize participants stating to not use and use the sustainability ratings consciously for pecuniary and non-pecuniary reasons within the experiment. Each group is regressed with potential explanatory variables using the Stata command mlogit. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively. Investors not using the sustainability ratings represent the reference category.

Table 6 – Mixed logit estimation results of the choice experiment, grouping investors according to their stated use of sustainability information within the experiment.

	No conscious use			Conscious use for pecuniary reasons			Conscious use for nonpecuniary reasons		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected Return	0.34***			0.34***			0.34***		-
	(0.0181)			(0.0181)			(0.0181)		
Mutual Funds	3.0***	3.0***		3.0***	3.0***		23.0***	3.0***	
	(0.523)	(0.43)		(0.523)	(0.43)		(0.523)	(0.43)	
Risk high	-1.42***	1.23***	4.18%	-1.42***	1.23***	4.18%	-1.42***	1.23***	4.18%
	(0.131)	(0.173)		(0.131)	(0.173)		(0.131)	(0.173)	
Risk low	0.293***	0.71	-0.86%	0.293***	0.71	-0.86%	0.293***	0.71	-0.86%
	(0.0922)	(0.132)		(0.0922)	(0.132)		(0.0922)	(0.132)	
Domestic focus	-0.115*	0.186*	0.34%	-0.115*	0.186*	0.34%	-0.115*	0.186*	0.34%
	(0.0622)	(0.0969)		(0.0622)	(0.0969)		(0.0622)	(0.0969)	
Green Label	-0.128	0.0631	n.s.	0.714***	0.074	-2.10%	0.382***	0.446	-1.12%
	(0.114)	(0.212)		(0.0996)	(0.187)		(0.136)	(0.176)	
Material good	0.266**	0.0655	-0.78%	0.533***	0.229	-1.57%	0.324**	0.31	-0.95%
	(0.129)	(0.129)		(0.117)	(0.168)		(0.152)	(0.195)	
Material bad	-0.718***	0.106	2.11%	-2.15***	0.142	6.32%	-1.14***	0.212	3.35%
	(0.143)	(0.203)		(0.167)	(0.25)		(0.183)	(0.248)	
Immaterial good	-0.0322	0.427**	n.s.	0.465***	0.221	-1.37%	0.241	0.263	n.s.
	(0.131)	(0.175)		(0.116)	(0.17)		(0.148)	(0.193)	
Immaterial bad	-0.459***	0.141	1.35%	-1.52***	0.431*	4.47%	-1.43***	-0.201	4.21%
	(0.137)	(0.115)		(0.151)	(0.255)		(0.181)	(0.23)	
δ *Mat.-Immat. good*	0.2982		n.s.	0.998		n.s.	0.083		n.s.

(continued)

Table 6 – *Continued*

δ Mat.-Immat. bad	-0.259	n.s.	-0.63***	1.85%	0.29	n.s.
N(# observations)	346 (1719)					
Log-likelihood	-1,886.883					

The table shows the results for estimating the sustainability parameters separately according to the stated conscious use of the material and immaterial sustainability ratings within the experiment. For fixed parameters only the "Mean" is estimated, whereas for random parameters also the "Standard" deviation' is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 7 – Individual-specific characteristics of investors following pecuniary-intentions in the experiment

	Conventional to Pecuniary	Pecuniary to Pecuniary	Non-pecuniary to Pecuniary
Warm glow	-	0.579***	0.694***
		(0.191)	(0.215)
Social norms	-	0.183	0.201
		(0.191)	(0.196)
Environmentalism	-	0.004	0.014
		(0.012)	(0.013)
Risk aversion	-	-0.144	-0.040
		(0.124)	(0.126)
Patience	-	0.137	0.012
		(0.089)	(0.090)
High literacy	-	-1.383**	-0.847
		(0.664)	(0.692)
High income	-	0.373	-0.212
		(0.499)	(0.492)
Students	-	0.252	-1.028*
		(0.552)	(0.609)
Constant	-	-3.389**	-4.233**
		(1.428)	(1.545)
Share of pecuniary-motivated investors	36.60%	32.03%	31.37%

The table shows the constitution and characteristics of participants stating to have used the sustainability ratings for pecuniary considerations within the experiment according to the participants' use of sustainability information in real-life investing. Each group is regressed with potential explanatory variables using the Stata command mlogit. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively. Investors not using the sustainability ratings represent the reference category.

Table 8 – Mixed logit estimation results of the choice experiment of investors who used the sustainability ratings for pecuniary reasons, grouped according to the stated use of sustainability information in real-life.

	Conventional to Pecuniary			Pecuniary to Pecuniary			Taste to Pecuniary		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected Return	0.33***			0.33***			0.33***		-
	(0.0286)			(0.0286)			(0.0286)		
Mutual Funds	2.02***	2.29***		2.02***	2.29***		2.02***	2.29***	
	(0.639)	(0.584)		(0.639)	(0.584)		(0.639)	(0.584)	
Risk high	-1.28***	0.398	3.88%	-1.28***	0.398	3.88%	-1.28***	0.398	3.88%
	(0.175)	(0.245)		(0.175)	(0.245)		(0.175)	(0.245)	
Risk low	0.52***	0.633***	-1.58%	0.52***	0.633***	-1.58%	0.52***	0.633***	-1.58%
	(0.145)	(0.196)		(0.145)	(0.196)		(0.145)	(0.196)	
Domestic focus	-0.133	0.161	n.s.	-0.133	0.161	n.s.	-0.133	0.161	n.s.
	(0.101)	(0.17)		(0.101)	(0.17)		(0.101)	(0.17)	
Green Label	0.499***	0.00477	-1.51%	0.837***	0.34	-2.54%	1.03***	0.514*	-3.12%
	(0.156)	(0.232)		(0.197)	(0.224)		(0.202)	(0.286)	
Material good	0.367*	0.704	-1.11%	0.564**	0.195	-1.71%	0.64***	0.302	-1.94%
	(0.196)	(0.345)		(0.222)	(0.252)		(0.236)	(0.296)	
Material bad	-1.87***	0.19	5.67%	-2.49***	0.217	7.54%	-1.94***	0.378	5.88%
	(0.262)	(0.415)		(0.346)	(0.425)		(0.305)	(0.417)	
Immaterial good	0.463**	0.476	-1.40%	0.503**	0.209	-1.52%	0.473**	0.424	-1.43%
	(0.197)	(0.29)		(0.224)	(0.295)		(0.224)	(0.297)	
Immaterial bad	-1.05***	0.711**	3.18%	-1.94***	0.948**	5.88 %	-2.58***	0.755	7.82%
	(0.255)	(0.36)		(0.388)	(0.399)		(0.39)	(0.507)	
δ Mat.-Immat. good	-0.096		n.s.	0.061		n.s.	0.167		n.s.
δ Mat.-Immat. bad	-0.82**		2.49%	-0.55		n.s.	0.64		n.s.

(continued)

Table 8 – *Continued*

N(# observations)	153 (762)
Log-likelihood	-760.3802

The table shows the results for estimating the sustainability parameters for investors who stated to have used the sustainability ratings for pecuniary reasons within the experiment, according to the participants' use of sustainability information in real-life investing. For fixed parameters only the "Mean" is estimated, whereas for random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

A Appendix

A.1 Use of Sustainability in Real-life Investing

Do you use sustainability information/criteria for your investment decision?

- Yes
- No
- I don't have any experience with investing.

Please tell us the reasons, why you use sustainability information and/or criteria for your investment decision.
Multiple selection possible.

- I want to make a positive contribution to environment.
- I want to reduce my financial risk.
- I want to avoid investment with a bad influence on the environment.
- I have to fulfill regulatory requirements.
- I feel ethically obliged to do so.
- I want to better diversify my investment portfolio.
- I want to support companies, which are pioneers in sustainability issues.
- I want to obtain a higher financial return.

A.2 Use of Sustainability Ratings within the Experiment

Did you use the not value-relevant sustainability rating as a decision criteria?

- Yes
- No
- Don't known

Why did you use the not value-relevant sustainability rating as a decision criteria?
Multiple selection possible.

- I feel ethically obliged to do so.
- My social surroundings expect me to include the environment in my investment decision.
- I want to avoid investments with a negative impact on the environment.
- I like to do something good for the environment.
- I want to avoid companies, which use their resources for not value relevant business activities.
- I want to improve my financial performance by doing so.
- I want to support companies, which are pioneers in sustainability issues.
- I think that also not value-relevant sustainability issues have an impact on firm-value.
- Don't know.
- Other:

Did you use the value-relevant sustainability rating as a decision criteria?

- Yes
- No
- Don't known

Why did you use the value-relevant sustainability rating as a decision criteria?
Multiple selection possible.

- I like to do something good for the environment.
- My social surroundings expect me to include the environment in my investment decision.
- I want to avoid investments with a negative impact on the environment.
- I think that the influence of value-relevant sustainbility issues on financial returns is undervalued.
- I feel ethically obliged to do so.
- I think that the influence of value-relevant sustainbility issues on financial returns is overvalued.
- I want to support companies which are pioneers in sustainability issues.
- I want to improve my financial performance by doing so.
- Don't know.
- Other.

A.3 Description of the Choice Experiment

Assume that you would like to add stock mutual funds to your sufficiently diversified investment portfolio.

On the following page, you're offered different corresponding investment products.

"Green Funds" are explicitly advertised as environmentally sustainable by the issuing investment companies. This classification lacks a uniform regulatory framework.

The offered mutual funds differ regarding the following characteristics:

1. Expected Return

   Shows the market's expectations regarding the fund's annual performance in percentage terms after fees under consideration of all value-relevant information.

2. Risk

   Shows the risk of price fluctuations of the funds.

   - Low
   - Middle
   - High

3. Investment Focus

   Shows the geographic investment focus of the funds.

   Germany: The fund only invests in companies based in Germany.

   International: The fund invests in companies worldwide, particularly in non-European countries.

4. Value-relevant Sustainability Rating

   Measures today's average sustainability rating of the invested companies regarding value-relevant sustainability issues.

- Good: Invests only in companies, which belong to best 25 percent regarding value-relevant sustainability issues.
- Middle: Invests only in companies, which belong neither to the best nor the worst 25 percent regarding value-relevant sustainability issues.
- Bad: Invests only in companies, which belong to worst 25 percent regarding value-relevant sustainability issues.

5. Not Value-relevant Sustainability Rating

   Measures today's average sustainability rating of the invested companies regarding not value-relevant sustainability issues.

   - Good: Invests only in companies, which belong to best 25 percent regarding not value-relevant sustainability issues.
   - Middle: Invests only in companies, which belong neither to the best nor the worst 25 percent regarding not value-relevant sustainability issues.
   - Bad: Invests only in companies, which belong to worst 25 percent regarding not value-relevant sustainability issues.

Please note that there is no automatic link between the value-relevant and not value-relevant sustainability rating.

Alternatively, you can further keep your savings on your savings account. This results in no risk but also in no return.

A.4 Describing Difference between Material and Immaterial Sustainability Issues

A company's business model can have both i) positive and ii) negative effects on the environment, climate and people.

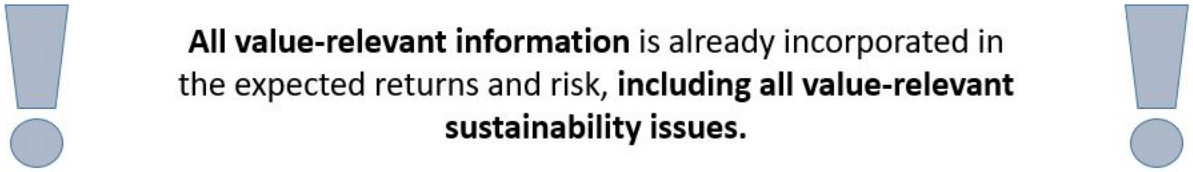
These effects are represented by different sustainability issues.

From today's perspective, some sustainability issues have also an impact on the business success and firm value of a company. Therefore, we distinguish between:

- Value-relevant Sustainability Issues: Business activities have from today's perspective a significant (positive/negative) impact on
  - Environment/Climate/People and
  - Business Success/Firm Value
- Not Value-relevant Sustainability Issues Business activities have from today's perspective a significant (positive/negative) impact on
  - Environment/Climate/People but not
  - Business Success/Firm Value

Not value-relevant sustainability issues may become value-relevant in the future due to social and regulatory changes.

A.5 Figure informing Participants about Value-relevance of Attributes



A.6 Survey Questions for Individual-specific Explanatory Variables

Variable: "Transcendental values"

It is important to him/her

- that every person is treated justly.
- to prevent environmental pollution.
- that every person has equal opportunities.
- that there is no war or conflict.
- to protect the environment.
- to respect nature.
- take care of those who are worse off.
- to be helpful to others.

Variable: "Perceived effectiveness (PCE)"

1. If participant uses sustainability information:

   Are there reasons which keep you from relying even more on sustainability information and/or criteria for your investments?
   Multiple selection possible.

   - No
   - It is difficult to obtain reliable sustainability information.
   - I'm not sure, if I can thus effectively protect the environment.
   - Focusing more on sustainability may have a negative influence on my financial performance.

- It lacks uniform standards to measure sustainability.
- It is difficult to measure and compare sustainability.
- This would restrict my diversification possibilities.
- Other

2. If participant does not use sustainability information:

   Please tell us the reasons, why you do not use sustainability information or criteria for your investments.

   Multiple selection possible.

   - These are not relevant for my financial performance.
   - This would restrict my diversification possibilities.
   - It is difficult to obtain reliable sustainability information.
   - These have a negative influence ony my financial performance.
   - It lacks uniform standards to measure sustainability.
   - I did not know about these so far.
   - Sustainable investment show higher fees.
   - I don't think, that his helps to protect the environment effectively.
   - My investment decision has no impact on the environment.
   - I'm not interested.
   - It is difficult to measure and compare sustainability.
   - Other:

Variable: “Perceived environmental threat”

To what extent do you agree with the following statement? You can choose between 0 disagree completely and 6 agree completely.

- Society is doing to little to protect climate and environment.
- Aside of the COVID-19 pandemic, climate protection is the biggest challenge for humanity.

Variable: “High literacy”

1. Suppose you had 100 Euro in a savings account and the interest rate was 2% per year. After 3 years, how much do you think you would have in the account if you left the money to grow?
    - More than 106 Euro
    - Exactly 106 Euro
    - Less than 106 Euro
    - Do not know
2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?
    - More than today
    - Exactly the same
    - Less than today
    - Do not know

3. If the interest rate falls, what should happen to bond prices?

    - They rise
    - They fall
    - They stay the same
    - None of the above
    - Do not know

4. Buying a company stock usually provides a safer return than a stock mutual fund.

    - True
    - False
    - Do not know

Variable: "Warm glow"

To what extent do you agree with the following statement? You can choose between 0 disagree completely and 6 agree completely.

It makes me happy to do something good for the environment.

Variable: "Social norms"

To what extent do you agree with the following statements? You can choose between 0 disagree completely and 6 agree completely

- Sustainability plays an important role in my social surroundings.
- My social surroundings expect me to buy environmentally sustainable products.

Variable: “Risk aversion”

Are you rather risk-averse or risk-loving, when it comes to investing?

Please select a value between 0 “very risk-averse”, 5 “Neither risk-averse nor risk-loving” and 10 “very risk-loving”.

Variable: “Patience”

Are you in general a rather patient or impatient person?

Please select a value between 0 “very patient”, 5 “neither patient nor impatient” and 10 “very impatient”.

Article 5:

Personality, Lifestyle Characteristics and the Preference for Sustainable Investments

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Abstract

This paper investigates on the effects of personality traits as well as music and drinking preferences on sustainable investment behavior. Conducting a stated choice experiment among German business students, we find a positive relation between "Agreeableness" and the importance of sustainability characteristics. "Extraversion" and "Conscientiousness" are in contrast negatively correlated to sustainable investing. We further confirm a link between personality traits and music preferences. The effect is only partially reflected in investment behavior, though. Regarding drinking preferences, wine lovers and non-drinkers of alcohol tend to invest more sustainably. For the latter, this behavior can be explained by less extroverted personality traits.

Keywords: Sustainable investing, Stated choice experiment, Behavioral finance, Personality traits, Music

JEL Classification: Q56, G11, G41, G40

Declaration of interest: None

1 Introduction

The promotion of sustainable investing is a core element of the European Union's green deal to reach its 2030 climate target plan. Since the enforcement of the updated MiFID II framework in 2022, European financial service providers are therefore obliged to consider the sustainability preferences of their clients when giving investment advice. Understanding sustainability preferences and suggesting appropriate investment products represents a challenging task for investment advisers and portfolio managers. While research has shown that intrinsic non-pecuniary motives are an important driver for sustainable investing, little is known in how far more obvious lifestyle characteristics can be used to draw conclusions about a person's sustainable investment behavior.

In this paper, we investigate on the eligibility of personality traits and music as well as drinking preferences to asses investors' preferences for sustainable assets. Literature suggests a link between personality and music/drinking preferences as well as personality and investment behavior. Personality traits are latent constructs, which are difficult to elicit in advisory practice. Hence, we ask whether the preference for music or alcoholic drinks sufficiently reflects investors' personality to draw conclusions about sustainability preferences. Such a relation would have an impact on the advisory practice of financial services providers. Ideally, a customer's reaction to a specific style of music or an alcoholic drink may be enough to understand the person's sustainability preferences without relying on time-consuming questionnaires.

The main findings are the following: First, our study suggests a relation between personality traits and the preference for sustainable investments. While investors with higher levels of "Agreeableness" tend to put a greater importance on sustainability characteristics, the opposite holds for those scoring high on "Extraversion" and "Conscientiousness".

Second, we confirm the link between personality and musical taste. While extroverts prefer "Dance/Electronica", "Hip-Hop/Rap" or "German Schlager", an enthusiasm for "Classical"

music may implicate a higher "Openness to experience" and a lower "Agreeableness". A preference for "Intense" music seems instead linked to "Neuroticism". These effects are only partially reflected in investment behavior, though. Still, we find indications for a negative relation between the taste for "Hip-Hop/Rap" and the preference for sustainability. This may be traced back to the higher extraversion of "Hip-Hop/Rap" lovers.

Third, results indicate a link between personality traits and the preference for alcoholic drinks. This time, drinking preferences significantly affect the importance of sustainability attributes. Non-drinkers of alcohol are not only less extraverted but put also a significantly higher importance on sustainability features when making investment decisions.

Our paper contributes to the behavioral finance literature examining the effects of personality traits on investment decisions (e.g., Durand et al. (2013), Oehler et al. (2018) or Durand et al. (2019)). While Busic-Sontic et al. (2017) analyze the effect of personality traits on different situations of sustainable behavior, this is to the best of our knowledge the first study focusing on individual investment decisions. Our research question is further related to the literature analyzing the interdependence of music preferences and personality traits (e.g., Nave et al. (2018) or Greenberg et al. (2022)). We extend these lines of literature by controlling for the effect of music and drinking preferences as a vehicle to infer sustainability preferences.

The remainder of the paper is organized as follows. Section 2 discusses the theoretical background. Section 3 describes the methodological approach and data. Section 4 reports the empirical results and Section 5 concludes.

2 Theory

2.1 Personality Traits and Sustainable Investing

Human behavior is shaped by personality. To assess people's personality, the Big Five model (McCrae and Costa (1987), Goldberg (1993)) has established as a standard framework in

research. It suggests that people's personality can be divided into the five dimensions: i) *Openness to experience*, ii) *Conscientiousness*, iii) *Extraversion*, iv) *Agreeableness* and v) *Neuroticism*. Examining the investment decisions of private investors, Oehler et al. (2018) find a relation between "Neuroticism" and risk aversion as well as "Extraversion" and overconfidence. Evidence for an effect of personality traits on myopic loss aversion is delivered by Durand et al. (2019).

The effect of personality traits on the importance of sustainability characteristics has not been analyzed, yet. Instead, altruistic taste motives as "warm-glow" (Gutsche and Ziegler (2019)) or "environmentalism" (Brodback et al. (2019)) have been used to explain sustainable investing. Being closely related to altruism, we would expect "Agreeableness" to represent the most suitable personality trait to explain sustainable investing.

Quintelier (2014) find a negative relation between "Extraversion" and ethical consumption. In general, extroverts are social persons who enjoy the interaction with other people. Their self-centered desire for attention may yet be in contrast to the idea of unselfish "doing good" for others and reduce the propensity to invest sustainably.

Neurotic people are characterized by emotional instability and a low stress tolerance. Uziel et al. (2020) suggest a relation between "Neuroticism" and egoistic values. Similar to extroverts, neurotic individuals might therefore rather restrain from sustainable investments.

"Conscientiousness" describes how careful people are and can control their impulses. This may be seen as the tendency to think and act rationally. Conscientious people might put more scrutiny on the actual effect of sustainable investments. The current lack of reliable sustainability information (e.g., Chatterji et al. (2016) or Berg et al. (2022)) may thus discourage investors with high values of "Conscientiousness" from investing sustainably.

Ultimately, "Openness to experience" captures individuals' appreciation of changes and the discovery of new horizons. For this personality trait, we do not see a theoretical link to sustainable investing. As found by DeYoung et al. (2010), this is further the only personality

traits which cannot be associated to a specific brain region.

2.2 Lifestyle Characteristics and Personality Traits

Personality traits are latent constructs which are difficult to observe directly. Instead, standardized questionnaires have to be used for approximation. These are not only time-consuming but require the disclosure of sensitive personal data. Being easier to observe and elicit, we ask whether common lifestyle characteristics sufficiently reflect investors' personality to predict sustainability preferences.

Our research idea is based on Greenberg et al. (2022) who find a relation between personality traits and music preference. Their study relies on the *MUSIC* framework developed by Rentfrow et al. (2011, 2012), which categorizes music into the five factors

i) Mellow: Relaxed, slow and romantic, e.g., "Pop" or "Classic"

ii) Unpretentious: Uncomplicated, unaggressive and soft sounding, e.g., "Country" or "Pop"

iii) Sophisticated: Complex, intelligent and cultured, e.g., "Blues" or "Jazz"

iv) Intense: Loud, aggressive and tense, e.g., "Punk" or "Heavy Metal"

v) Contemporary: Current, rhythmic, and danceable, e.g., "Rap/Hip-Hop" or "Dance/Electronica"

Greenberg et al. (2022) suggest that "Agreeableness" is related to the taste for "Mellow" and "Unpretentious" music. Listeners of "Pop" or "Classic" may in turn tend to invest more sustainably. "Extraversion" seems instead linked to the preference for "Contemporary" music. In this case, a taste for "Rap/Hip-Hop" or "Dance/Electronica" may decrease the propensity to invest sustainably. The same applies for those listening to "Heavy metal" or "Punk" as these "Intense" styles of music are positively correlated to "Neuroticism".

While "Conscientiousness" may be negatively related to sustainable investing, there is no indication that this personality trait is reflected in the preference for a specific style of music. People who are open to experiences seem further attracted to "Sophisticated" music. There are no indications to expect a relation between "Openness to experience" (and in consequence "Sophisticated" music) and sustainable investment behavior, though.

Another potential lifestyle characteristic connected to personality traits is drinking behavior. Baer (2002) find evidence for a positive relation between "Neuroticism" and the drinking rates of alcohol. Ruiz et al. (2003) and Walton and Roberts (2004) suggest in turn a negative relation between "Openness to experience" as well as "Agreeableness" and the drinking of alcohol. This makes us hypothesize that sustainable investors can be characterized by an abstinence to alcohol. It remains ambiguous, though, whether also the preference for a specific alcoholic drink may infer something about personality and thus sustainability preferences.

3 Data and Methodology

3.1 Data

The research relies on a sample of 121 German business students, collected in July 2022. The sample size is sufficient to guarantee a 10% error margin within a 95% confidence level. The demographics of participants are given in Table 1. Showing an even distribution in terms of male and female participants, the sample is representative in terms of gender for German business students. 92% of participants stated to either have investment experience or to be interested in investing. As Kleffel and Muck (2022) detect only minor differences in the sustainability preferences between students and actual investors, we see no indications why the external validity of study results should be restricted.

To assess the personality traits of participants, we use the BFI-10 scale of Rammstedt et al. (2017). The corresponding summary statistics are provided in the upper part of Table 2.

The taste of music was measured by asking participants to rate their preference for the most popular music styles in Germany (cf. IfD Allensbach (2022)) on 5-point Likert scales. We excluded styles which turned out to be mainly unknown in pre-tests. Thereby, we further discovered a large divergence in how the genre "Rock" is interpreted. As suggested by the *MUSIC* framework, we split this category into the groups "Alternative/Independent", "Punk" and "Heavy metal" and summarized these three styles as "Intense" music. "German Schlager" represents a particularity of the German music market. It characterizes a style of easy listening upbeat music and may fit best into the category "Contemporary" of the *MUSIC* framework. Summary statistics of the musical taste are shown in the middle part of Table 2.

The lower part of Table 2 delivers the summary statistics of drinking preferences. Again, we focus on the most popular alcoholic drinks in Germany (cf. Statista (2022)). Compared to the age-specific average, we observe a higher (lower) share of beer (cocktail) drinkers. This particularity may be explained by the beer drinking culture of the sample area.

To examine the influence of music and drinking preferences on personality traits, OLS regressions are conducted with the Stata command *reg*, including a gender-related control variable.

3.2 Choice Experiment

We use a stated choice experiment to determine investors' preference for sustainability. In the experiment, participants were asked to choose five times between four mutual funds, each characterized by different levels of expected returns and risk (low, middle, high). While risk is treated as a dummy variable with "Middle" being the reference category, "Expected returns" is of continous nature. Apart from risk/return trade-offs, funds were either declared as conventional or sustainable. Participants were informed that all value-relevant information is already included in risk/return trade-offs. An observed preference for sustainability should

hence not be related to pecuniary considerations. To increase realism, participants were also given the opportunity to not invest and keep the money on their savings account. Figure 1 shows an exemplary choice set.

Observing individuals' choices between differently characterized funds allows to draw conclusions on the importance of expected returns, risk and sustainability labels in the decision process. This indirect way of preferences elicitation in choice experiments generally enhances the external validity of study results compared to more classical survey techniques.

The effects of providing monetary incentives in choice experiments are controversially discussed.[32] Without providing a comparable non-monetary incentive for investing sustainably, such an incentive system would even rather distort the study results. Therefore, we followed the existing finance literature using stated choice experiments (e.g., Gutsche and Ziegler (2019), Lagerkvist et al. (2020) or Kleffel and Muck (2023)) and renounced on any incentives.

In the econometric analysis, we determine the unknown vector β_i and thus importance of fund characteristics which defines the utility U_{ijm} over all respondents i for fund j in choice set m by maximum likelihood estimations. U_{ijm} is determined by observable fund attributes as well as individual-specific characteristics x_{ijm} and an unobservable error term ϵ_{ijm}.

$$U_{ijm} = \beta_i' x_{ijm} + \epsilon_{ijm}$$

To account for taste heterogeneity and the panel structure of our data, we use a mixed logit model with random parameters (e.g., Hensher and Greene (2003) or Train (2009)). In contrast to classical regression models, further explanatory variables cannot be estimated as main effects. Instead, we have to introduce interaction terms between the "Sustainability" attribute of the choice experiment and the individual-specific variables for personality traits as well as musical and drinking preferences. Within this analysis, we treat personality traits

[32] See Haghani et al. (2021) for a literature review.

and music preferences as continuous variables. In unreported results, we transformed these variables into binary ones. This did not lead to major changes in estimation results. Indicating whether an alcoholic drink is preferred or not, the respective variables for drinking preferences are instead treated as binary.

The empirical analysis was executed with *Biogeme* (Bierlaire (2020)), a flexible open source Python package designed particularly for the analysis of choice models. In total, 60 different choice sets were created and blocked into 12 groups. The applied D-efficient experimental design (e.g., Street et al. (2005)) was generated with the software *ChoiceMetrics Ngene*.

4 Results

4.1 Personality Traits and Sustainable Investing

Table 3 shows the results of the choice model, when interacting the sustainability parameter with the Big Five personality traits. A positive (negative) estimated mean indicates that investors derive positive (negative) utility from a specific explanatory variable. For random parameters, also the estimated standard deviation is given. To simplify the interpretation of results, the Willingness-to-Pay (WTP) of each attribute is provided. Thereby, a positive (negative) WTP indicates that investors demand a return premium (discount) for choosing a fund comprising the respective attribute.

Within expectations, investors have a preference for financial returns and an aversion to risk. Remarkably, the utility loss suffered from a fund comprising "Risk high" is around five times as high as the utility gain experienced from "Risk low". This may be regarded as an indication for the existence of loss aversion. As seen by the positive estimate for "Sustainability", participants also like to invest sustainably. The size of this relation is moderated by personality traits, though.

The positive estimate for "Agreeableness" confirms our assumption regarding the link of the

construct to altruism and the tendency to invest sustainably. Remember that personality traits were measured on 5-point Likert scales. In this regard, for each additional scale level in "Agreeableness", investors are willing to forego additional 0.78% of expected returns. Individuals with higher levels of "Extraversion" and "Conscientiousness" are in contrast less willing to forego financial returns for sustainability. Again, results are within expectations. As extroverts are confident and focus on their own interest, engaging for others and investing sustainable is of secondary importance. Conscientious investors may instead be kept by the present lack in reliability of sustainability information.

Interestingly, the estimated parameters for "Agreeableness" and "Conscientiousness" roughly equal each other in absolute size while differing in sign. A very agreeable investor would hence be kept from investing more sustainable if being at the same time also very conscientious and worried about the actual sustainability of the chosen fund. "Openness to experience" and "Neuroticism" seem to have only minor effects on sustainability preferences. Also the inclusion of the gender dummy does not indicate any gender-specific differences regarding the importance of sustainability.

4.2 Music Preference and Sustainable Investing

The results of regressing personality traits with participants' music preferences are given in Table 4. It shows that especially extroverted persons can be identified by their music taste. Both the preference for "German Schlager", "Hip-Hop/Rap" and "Dance" seems related to more extroverted characters. Musical preferences can also be used to identify neurotic individuals who seem to have a favour for "Intense" music as "Alternative", "Punk" or "Heavy Metal". Lovers of "Classical" music are instead not only more open to experiences but also less agreeable. Controlling for the effect of gender, results suggest that men tend to be less conscientious and neurotic than women. Overall, we observe especially for "Openness", "Extraversion" and "Neuroticism" a high explanatory power of music styles, as indicated by

the R^2 of the different regressions.

Combining these results with the findings of Section 4.1, we would expect a negative relation between the preference for "German Schlager", "Hip-Hop/Rap", "Dance" and "Classical" on the valuation of sustainability. Against expectations, we find only week evidence for a relation between music and sustainable investing, when analysing the results of the corresponding choice model. As shown in Table 5 most interaction parameters are insignificant. Exclusively lovers of "Oldies" and "Hip-Hop/Rap" seem to put a lower weight on sustainability characteristics as listeners of other styles of music. These results are only significant at the 10% level, though. The latter confirms our theory at least partially: Music preferences can be used to infer sustainable investment preferences. Listeners of "Hip-Hop/Rap" are not only more extroverted but in consequence also less willing to forego financial returns for sustainability.

4.3 Drinking Preference and Sustainable Investing

The results of the OLS regression to verify the relation between personality and drinking preferences are delivered in Table 6. As participants were asked to define their favorite drink, the listed variables are of binary nature and "Beer" is used as the reference category for dummy coding.

Overall, the explanatory power of alcoholic drinks on personality traits is rather poor. This is also confirmed by the low values of R^2. The strongest effect can be observed for "Non-drinkers" of alcohol on "Extraversion". Apparently, people who do not drink alcohol tend to be less outgoing. Indications are further given that the drinking of cocktails and hard liquor is related to more open personalities. In line with previous results, the effect ot the "Male" dummy is significant. Men tend not only to be less neurotic but also less conscientious than the reference group.

The results of the corresponding choice model analysis are given in Table 7. No major changes

can be observed for the risk and return parameters. The significant positive estimate for the interaction between "Sustainability" and "None-drinkers" confirms our initial assumption. Apparently, sustainability characteristics are of higher importance for investors who do not drink alcohol. Among drinkers of alcohol, we find evidence that also wine drinkers tend to invest more sustainably as beer, liquor or cocktail lovers. While the effect remains significant when the gender dummy is added, it cannot be related to personality traits. A possible explanation might be that there is another latent construct behind wine drinking apart from personality traits to explain this observation. Klatsky et al. (1990) find wine drinkers likely to be "women, temperate, young or middle-aged, non-smokers, better educated and free of symptoms or risk of illness". While our results for gender testing are insignificant, effects of age and education can be excluded by the homogeneous study sample. In unreported results, we rerun the estimations including an interaction for "patience" (Vischer et al. (2013)) to control for temperate. The effect remains insignificant, though. Possible explanations might therefore be related to smoking behavior and the state of health. Possibly, wine drinkers put a higher focus on their health than consumers of other alcoholic beverages.

5 Conclusion

This research focuses on the implications of personality traits on the preference for sustainable investments. Results confirm this relation and suggest that personality traits are also reflected in the musical taste and drinking behavior of investors, albeit in a weakened form. Understanding the customer is crucial for every business. The updated MiFID II framework makes it for financial advisors now even an obligation to understand their customers sustainability preferences. The presented link between sustainability preferences, personality traits and lifestyle characteristics might thus particularly be interesting for the advisory scene. For future research, the results of this study should be regarded as a starting point for having a closer look on the influence of lifestyle characteristics on behavioral investment aspects.

Acknowledgements

We thank Pascal Albert and Tobias Herzing for helpful comments and suggestions.

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Figures

	Normal Fund	**Normal Fund**	**Sustainable Fund**	**Sustainable Fund**	**Savings Account**
Expected Return	5%	7%	8%	5%	
Risk	Middle	High	Low	Middle	
Your Choice:					

Figure 1 – Exemplary Choice Set

Tables

Table 1 – Demographics of participants

Measure	**Value**	**# of obs.**	**%**
Gender	Female	61	50.41
	Male	60	49.59
Age	16-24	95	78.51
	25-34	25	20.66
	35-44	1	0.83
Investment experience	No experience & not interested	10	8.26
	No experience but interested	53	43.80
	Experienced	58	47.93
Total: 121			

Note: The table shows the demographics of survey participants. # of obs. refers to the absolute and % to the relative number of participants in a category.

Table 2 – Summary statistics of personality traits

Variable	Mean	Standard deviation	Min	Max
Personality traits				
Openness to experience	3.26	1.07	1.5	5.0
Conscientiousness	3.52	0.73	1.0	5.0
Extraversion	3.38	0.98	1.0	5.0
Agreeableness	3.05	0.91	1.0	5.0
Neuroticism	3.01	0.90	1.0	5.0
Music preference				
Pop	3.93	1.06	1.0	5.0
Oldies	3.47	1.35	1.0	5.0
German Schlager	2.17	1.31	1.0	5.0
Classical	2.60	1.31	1.0	5.0
Hip-Hop/Rap	3.78	1.23	1.0	5.0
Intense	2.01	0.92	1.0	4.67
Dance/Electronica	3.27	1.33	1.0	5.0
Preferred alcoholic drink				
Wine	0.16	0.37	0.0	1.0
Beer	0.39	0.49	0.0	1.0
Liquor	0.05	0.22	0.0	1.0
Cocktails	0.27	0.45	0.0	1.0
Non-drinkers	0.13	0.34	0.0	1.0

Note: The table shows the summary statistics of the personality traits, the preferences for the most popular music genres in Germany and the preferred alcoholic drink of 121 study participants. For eliciting personality traits, the BFI-10 Big Five Inventory of Rammstedt et al. (2017) is used.

Table 3 – Mixed logit estimation results of the choice experiment, including interaction terms for personality traits

	w/o Gender			with Gender		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.439***	-	-	0.441***	-	-
	(0.0236)			(0.0237)		
Mutual funds	1.56**	2.83***	-	1.58**	2.82***	-
	(0.751)	(0.553)		(0.763)	(0.567)	
Risk high	-3.02***	1.12***	6.88%	-3.03***	1.14***	6.87%
	(0.288)	(0.341)		(0.287)	(0.335)	
Risk low	0.619***	0.547***	-1.41%	0.637***	0.504**	-1.14%
	(0.13)	(0.21)		(0.129)	(0.213)	
Sustainable fund	2.67***		-6.08%	3.78***	-	-8.57%
	(1.02)			(1.15)		
x Openness	-0.177	-	n.s.	-0.154	-	n.s.
	(0.116)			(0.116)		
x Conscientiousness	-0.319**	-	0.73%	-0.377**	-	0.77%
	(0.165)			(0.172)		
x Extraversion	-0.44***	-	1.00%	-0.514***	-	0.85%
	(0.131)			(0.132)		
x Agreeableness	0.344**	-	-0.78%	0.338**	-	-0.77%
	(0.135)			(0.138)		
x Neuroticism	0.0733	-	n.s.	-0.283*	-	0.64%
	(0.482)			(0.151)		
x Male	-	-	-	0.28	-	n.s.
				(0.264)		
N (# of observations)		121 (597)			121 (597)	
Log-likelihood		-554.1745			-552.2992	

The table shows the results of interacting the choice experiment with personality traits. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. "Openness" refers to the personality trait "Openness to experience". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 4 – Results of regressing personality traits with music preferences

Variables	Openness	Conscientious-ness	Extraversion	Agreeableness	Neuroticism
Pop	-0.068	0.027	-0.127	-0.019	0.133*
	(0.093)	(0.070)	(0.084)	(0.084)	(0.078)
Oldies	0.121	0.043	0.007	0.113*	-0.046
	(0.073)	(0.055)	(0.067)	(0.067)	(0.061)
German Schlager	-0.145*	-0.023	0.227***	0.026	-0.058
	(.075)	(0.056)	(0.068)	(0.068)	(0.062)
Classical	0.299***	0.019	0.011	-0.167**	-0.078
	(0.071)	(0.053)	(0.065)	(0.065)	(0.060)
Hip-Hop/Rap	0.093	-0.016	0.174**	0.014	-0.078
	(0.081)	(.061)	(0.074)	(0.074)	(0.068)
Intense	0.050	-0.023	-0.071	-0.015	0.236***
	(0.106)	(0.079)	(0.096)	(0.096)	(0.088)
Dance/Electronica	0.091	-0.020	0.158**	-0.023	-0.011
	(0.071)	(0.053)	(0.065)	(0.065)	(0.059)
Male	0.024	-0.307**	0.085	-0.373**	-0.497***
	(0.204)	(0.152)	(0.185)	(0.185)	(0.170)
Constant	1.79***	3.597***	2.257***	3.346***	3.073***
	(0.598)	(0.447)	(0.542)	(0.542)	(0.499)
Adjusted R-squared	0.1585	0.0055	0.1731	0.0399	0.1628

The table shows the results of regressing the personality traits of 121 participants with their preferences for music genres using the stata command reg for OLS regressions. "Openness" refers to the personality trait "Openness to experience". The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 5 – Mixed logit estimation results of the choice experiment, including interaction terms for musical preferences

	w/o Gender			with Gender		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.426***	-	-	0.426***	-	-
	(0.0227)			(0.0228)		
Mutual funds	1.77**	2.87***	-	1.77**	2.87***	-
	(0.792)	(0.591)		(0.791)	(0.590)	
Risk high	-2.97***	1.12***	6.97%	-2.97***	1.13***	6.97%
	(0.287)	(0.347)		(0.288)	(0.348)	
Risk low	0.576***	0.489**	-1.35%	0.576***	0.487**	-1.35%
	(0.126)	(0.211)		(0.126)	(0.211)	
Sustainable fund	1.52**		-3.57%	1.58**	-	-3.71%
	(0.742)			(0.779)		
x Pop	0.177	-	n.s.	0.166	-	n.s.
	(0.113)			(0.122)		
x Oldies	-0.161*	-	0.38%	-0.163*	-	0.38%
	(0.0977)			(0.0981)		
x German Schlager	-0.107	-	n.s.	-0.102	-	n.s.
	(0.0946)			(0.0967)		
x Classical	0.025	-	n.s.	0.0223	-	n.s.
	(0.0924)			(0.138)		
x Hip-Hop/Rap	-0.197*	-	0.46%	-0.192*	-	0.46%
	(0.101)			(0.104)		
x Intense	-0.183	-	n.s.	-0.18	-	n.s.
	(0.137)			(0.138)		
x Dance/Electronica	0.0458	-	n.s.	0.0443	-	n.s.
	(0.0909)			(0.0911)		
x Male	-	-	-	-0.0602	-	n.s.
				(0.263)		
N (# of observations)		121 (597)			121 (597)	
Log-likelihood		-563.668			-563.6419	

The table shows the results of the choice experiment interacted with individuals taste of music. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 6 – Results of regressing personality traits with drinking preferences

Variables	Openness	Conscientious-ness	Extraversion	Agreeableness	Neuroticism
Wine	0.286	0.080	-0.201	-0.038	0.173
	(0.353)	(0.239)	(0.321)	(0.084)	(0.282)
Cocktails	0.534*	-0.197	-0.177	-0.212	0.332
	(0.308)	(0.208)	(0.280)	(0.263)	(0.246)
Liquor	0.891*	-0.183	0.053	-0.289	-0.198
	(0.474)	(0.320)	(0.431)	(0.405)	(0.379)
None-drinkers	0.044	-0.199	-0.576**	0.027	0.256
	(0.320)	(0.216)	(0.291)	(0.273)	(0.256)
Male	0.389	-0.410**	0.233	-0.387*	-0.437**
	(0.262)	(0.177)	(0.238)	(0.223)	(0.209)
Constant	2.83***	3.805***	3.413***	3.316***	3.083***
	(0.276)	(0.187)	(0.252)	(0.236)	(0.221)
Adjusted R-squared	0.0094	0.0435	0.0218	-0.0040	0.0964

The table shows the results of regressing the personality traits of 121 study participants with their preferred alcohol drink using the stata command reg for OLS regressions. Beer is used as the reference category for dummy coding the preference for alcoholic drinks. "Openness" refers to the personality trait "Openness to experience". The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 7 – Mixed logit estimation results of the choice experiment, including interaction terms for drinking preferences

	w/o Gender			with Gender		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Expected return	0.428***	-	-	0.429***	-	-
	(0.0229)			(0.023)		
Mutual funds	1.63**	2.78***	-	1.63**	2.78***	-
	(0.753)	(0.559)		(0.753)	(0.559)	
Risk high	-2.98***	1.15***	6.96%	-2.98***	1.15***	6.95%
	(0.289)	(0.341)		(0.289)	(0.341)	
Risk low	0.593***	0.50**	-1.39%	0.593***	0.50**	-1.38%
	(0.127)	(0.210)		(0.127)	(0.209)	
Sustainable fund	0.508***	-	-1.19%	0.547***	-	-1.28%
	(0.125)			(0.172)		
x Wine	0.759***	-	-1.77%	0.733**	-	-1.71%
	(0.284)			(0.296)		
x Beer	-0.273	-	n.s.	-0.222	-	n.s.
	(0.195)			(0.247)		
x Liquor	-0.457	-	n.s.	-0.44	-	n.s.
	(0.436)			(0.439)		
x Cocktails	-0.228	-	n.s.	-0.25	-	n.s.
	(0.217)			(0.227)		
x Non-drinkers	0.707**	-	-1.65%	0.727**	-	-1.69%
	(0.29)			(0.296)		
x Male	-	-	-	-0.102	-	n.s.
				(0.309)		
N (# of observations)		121 (597)			121 (597)	
Log-likelihood		-562.4238			-562.3698	

The table shows the results of the choice experiment interacted with individuals preference for alcoholic drinks. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of expected returns. 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Article 6:

Religiosity and the Preferences for Islamic Banking - Evidence from a Stated Choice Experiment in Morocco

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Abstract

This research uses two stated choice experiments to elicit the banking preferences of young Moroccan financial decision makers. Our results indicate that intrinsic religious motives are required to prefer Islamic banks. Islamic window banks are similarly perceived as conventional institutions, though. Extrinsic religious people try instead to avoid all kind of banking services, including Islamic ones. On the aggregate, we do not find a preference for Islamic banks. This may be reasoned in a lack in understanding and trust in Islamic institutions due to their innovative character. These findings have implications for the strategy of both conventional and Islamic banks operating in Muslim countries.

Keywords: Islamic Banking, Islamic Finance, Stated Choice Experiment, Household Finance, Sustainable investing

JEL Classification: G20, G21, G41, G51, Z12

Declaration of interest: None

1 Introduction

Islam represents worldwide the fastest growing religion. By 2060, two thirds of the global population may adhere to Islam (Pew Research Center (2017)). This growth in population share goes in hand with a rising importance and awareness to behave in line with Islamic values, referred as "Islamic revival" (e.g., Haddad and Esposito (1997) or Lapidus (1997)). A resulting issue is the emergence of a Sharia-compliant financial industry (Iqbal and Mirakhor (2011)). While the concept of Islamic finance encompasses all forms of financial transactions, most practical advances can be observed in the field of Islamic banking. In Muslim countries as Iran, Sudan or Saudi Arabia, Islamic banks already dominate the domestic banking sectors (Islamic Financial Services Board (2022)).

These developments give reason to ask in how far the emergence of Islamic banking represents a challenge for conventional banks. This question is tackled in this paper. Due to the prohibition of interest in the Sharia, a strong preference of religious Muslims for Islamic banks could be expected. Yet, the market shares of Islamic banks are still low - not only in Morocco but also in most other Muslim countries in Africa (Islamic Financial Services Board (2022)). Taking the introduction of Islamic banking in Morocco as a natural experiment, we investigate on the actual preferences and practical reasons for choosing or restraining from Islamic banks. Due to the role of Morocco as a hub for both finance and culture in Africa, results might also have implications on the development of the Islamic banking industry in other African countries. Our research design focuses on two stated choice experiments among young financial decision makers to elicit the preferences for Islamic banks in Morocco, five years after these services were introduced to the country. Combining these results with individual-specific characteristics and perceptions enables to better understand why or why not people decide for Sharia-compliant banking services.

The findings of this study can be summarized as follows. First, we show that religiosity has an effect on banking preferences. Distinguishing between intrinsic and extrinsic religiosity,

we demonstrate that Islamic banks are only preferred by intrinsic religious individuals who regard religion as a private issue and an end in itself. In contrast, both Islamic and conventional banks are avoided by extrinsic religious individuals. For these persons, religion represents a public issue and is used as an instrument to reach other objectives such as social or personal needs. Their more conservative world-view makes them avoid all kind of banking services.

Second, our results indicate that conventional banks cannot attract potential religiously motivated customers by offering Islamic banking products within their entities. The differences between such "window banks" and full-fledged Islamic banks are recognized by religious individuals. Additional fees are only accepted for the services of full-fledged and not Islamic window banks, which are similarly perceived as conventional banks.

Third, we find that on the aggregate, full-fledged Islamic banks are only considered when offering favorable financial conditions. A possible explanation for the general aversion to banking services offered by full-fledged Islamic banks seems a lack in understanding and trust in these institutions and their offered services. Instead, there seems to be a general preference for domestic over international banks detached from the question of religiosity.

The paper affects two lines of literature. First, it confirms that utility does not only comprise a monetary component. In this regard, we show that the findings about non-pecuniary taste (e.g., Riedl and Smeets (2017) or Gutsche and Ziegler (2019)) are not limited to sustainable investing. Instead, the idea of exchanging pecuniary utility in exchange for "doing good" can also be observed in a religious context. Second, we extend the existing literature about Islamic finance in various ways. Previous papers focused mainly on stability, efficiency and performance differences between conventional and Islamic banks (e.g., Čihák and Hesse (2010), Beck et al. (2013) or Abedifar et al. (2013)). Other analyses examined the practical differences between conventional and Islamic banks with respect to Sharia-compliance (Chong and Liu (2009) and Khan (2010)). We are the first study focusing on the actual preferences for Sharia-compliant banking services and the practical reasons for using or re-

straining from Islamic banks. Distinguishing between full-fledged and Islamic window banks, delivers insights to how the emergence of Islamic banks might change the current banking industry in Muslim countries - a topic of equal importance for both academia and practitioners. Further, this is the first study applying a choice experiment in the context of Islamic finance.

The remainder of the paper is organized as follows. Section 2 focuses on the theoretical background. Section 3 describes the data and methodology. Section 4 reports the results of the choice experiments. Section 5 analyses the current use and perception of Islamic banks in Morocco. Section 6 concludes.

2 Theory

In this section we provide background information on Islamic banking and the motivation to choose an Islamic bank. Section 2.1 gives an overview over the most important characteristics of Islamic Banking. Section 2.2 highlights the possible motives for choosing or restraining from Islamic banks. Section 2.3 provides some background information on Islamic banking in Morocco and explains why Morocco is a relevant market to study the preferences for Islamic banking with a stated choice experiment.

2.1 Islamic Banking

Globally and with around 1% of total banking assets, Islamic banking is still a niche market. Figure 1 shows the size and market share of Islamic banking assets in countries where Islamic banking accounts at least for 15% of the domestic banking sector or 1% of global Islamic assets. It demonstrates that Islamic banking is mostly observed in the Arab states of the Persian Gulf, Iran, and Malaysia. In theses countries, more than 75% of Islamic banking assets are currently located (Islamic Financial Services Board (2022)). In countries like Iran

or Sudan, no conventional banks exist due to regal regulations. Also in Brunei, Saudi Arabia, and Kuwait, more than half of banking assets are considered as Islamic. Despite its large Muslim population, Islamic banks constitute only a minor share in Africa. However, with annual growth rates of up to 35%, Africa registers the highest increase in Islamic banking assets. Also in the Gulf states and South-East Asia, the Islamic banking sectors were growing with double-digit rates (Islamic Financial Services Board (2022)).

The Islamic law of the Sharia is at least partly in conflict with the modern financial system. Therefore, Islamic scholars ("ulamā") have elaborated different concepts to align economic activities with the Sharia. A prominent example is Islamic banking in which interest is not present. While the prohibition of interest has been loosened in Judaism and Christianity today (Visser and Macintosh (1998)), it remains fundamental in Islamic law. Strictly speaking, any unjustified income is considered as interest ("ribā"). However, it is not only the prohibition of interest that distinguishes Islamic banking from the conventional system. Muslims must also avoid financial activities i) where the outcome of a commercial transaction is unknown ("gharār"), ii) which include any form of gambling ("maysir") and iii) which encompass products, that are generally forbidden in Islam ("harām").[33] El-Hawary et al. (2004) identify four basic principles to provide practical guideline for Sharia-compliant banking. First, risk and return should be distributed symmetrically among contractual partners. Second, financial transactions have to be related to material economic transactions, involving real assets. This directive of materiality bans Islamic banks from engaging in any form of derivative instruments like, for example, options or futures. Third, none of the contractual partners should be exploited. Finally, harām business activities cannot be financed.

[33]See, for example, Khan (2010).

2.2 Motivation to Use Islamic Banks

According to traditional financial theory, individuals are rational and maximize expected utility from consumption. The classical risk/return trade-off assumes that risk averse investors prefer higher expected returns and dislike risk that is measured, for example, by volatility. From the viewpoint of these pecuniary considerations, Islamic banks may look attractive. The policy of risk-sharing and the prohibition of derivative instruments as well as speculation in general may lead to more stable banks. For example, Abedifar et al. (2013) find that small Islamic banks have a lower credit and insolvency risk while charging similar prices as conventional competitors. Similarly, Čihák and Hesse (2010) find evidence for a higher stability of small Islamic banks in comparison to their conventional competitors. The opposite seems to be true for large banks, though. Additional evidence for differences in financial conditions is presented by Beck et al. (2013). While being less cost-effective, Islamic banks show higher intermediation and capital-asset ratios as well as a higher asset quality compared to conventional ones. Bitar et al. (2017) suggest that the potential benefits of Islamic banking in terms of financial soundness are negatively related to the level of democracy of a bank's country of operations. Furthermore, Islamic banks seem to perform better in times of financial turmoil (e.g., Hasan and Dridi (2011) or Mirzaei et al. (2022)).

Recent literature on sustainable investing suggests that individuals might have an additional non-financial "taste for doing good" (e.g., Riedl and Smeets (2017), Gutsche and Ziegler (2019) or Heeb et al. (2022)). In addition to classical pecuniary utility, they seem to derive utility from the sustainability of investments. Similarly, individuals may be motivated by religious motives to deviate from optimal consumption plans. Individuals may be driven by religious motives and the desire for Sharia-conform financial transactions. Allport and Ross (1967) distinguish between intrinsic and extrinsic religiosity. Intrinsic religiosity is the desire to live in harmony with the religion. Religion is seen as a private issue and represents an end in itself. In contrast, extrinsic religious individuals use religion as an instrumental goal

for other objectives. These may include the intention of keeping social relations or satisfying personal needs. In this case, religion focuses primarily on social aspects. Extrinsic individuals may hence tend be more skeptical towards other denominations and religious lifestyles that do not confirm their formal religiosity. In practice, intrinsic and extrinsic religiosity might be complementary.

In the context of religiousness, time preferences and patience may also be relevant. As in Christianity or Judaism, an important aspect of Islam is the life after death. While people respecting Islamic law during their lives will enter paradise ("jannah"), those who violate the Sharia and object the uniqueness of God ("allah") will come to hell ("jahannam"). This may expose individuals to a trade-off between enjoying sinful pleasures during their lifetime and feeling well in the hereafter. The resolution of this trade-off may, therefore, be driven by the time preference of individuals.

There are also be reasons why Islamic banks might be unattractive to bank customers. In particular, a lack in trust could explain why religious Muslims restrain from Islamic banks. This may be traced backed to similarities of the activities of Islamic and conventional banks in practice. In contrast to theory, the majority of real-life Islamic banking transactions is not based on equity-like financial contracts, where profits and losses are shared symmetrically. Instead, the most common form of Islamic contracts is "murabāha". When in need for financing, the bank buys the good its customer originally intended to acquire and resells it afterwards at an agreed mark-up rate to the customer. Since the bank becomes the legal owner of an asset before transferring the ownership to the final customer, a required minimum degree of risk-sharing and materialization is affirmed. This is similar to conventional tangible asset-backed transactions. Besides murabāha, also Islamic leasing contracts, called "ijāra" are becoming increasingly popular. Like murabāha contracts, the bank buys the asset but then leases it to its client. As the legal owner of the asset, the bank remains liable for any depreciations.

Aggarwal and Yousef (2000) as well as Khan (2010) view concerns of adverse selection and

moral hazard as an explanation for the practical dominance of debt-like Islamic banking transactions. Still, these contracts are considered to be Sharia-compliant by most scholars. Importantly, Sharia-compliance should not be regarded as a static or purely binary concept. Different schools of thought have led to different interpretations of Islamic law and the process of assessing Sharia-compliance represents a case-specific legal process. Hence, the Sharia-compliance of each transaction has to be assured by a bank's Sharia Board, which can be regarded as a religious supervisory board. The practical similarities between conventional and Islamic banks and resulting uncertainties regarding the actual Sharia-compliance have to be considered as a factor why some Muslims avoid not only conventional but also Islamic banks.

Individuals may also restrain from Islamic banks due to a lack in knowledge and convenience considerations. In most countries, Islamic banks are underrepresented in the banking system. Therefore, not everyone might find an Islamic bank nearby and decide instead for a more accessible conventional alternative. In some Muslim countries, Islamic banking services may not be available at all. At the other extreme, individuals might be obliged to use Islamic banks as conventional services are prohibited as, for example, in Iran.

Importantly, there may also be differences in how Islamic borrowing and saving contracts are perceived. On the one hand, this might be due to differences in how the Sharia-compliance of classical borrowing and savings contracts is assessed. While the payment of "ribā" is outright prohibited, trading and responsible investing under the guidelines listed in Section 2.1 are generally appreciated in Islam (Khan (2010)). This implies that religious individuals should be less reliant on Islamic banks for deposits than for loans. In addition, borrowing contracts (murabāha) have been prevailing in practice (e.g., Khan (2010), Beck et al. (2013)). The resulting higher familiarity with Islamic borrowing as compared to savings contracts might hence also lead to a higher preference for these types of banking services.

2.3 Islamic Banking in Morocco

Morocco is a constitutional monarchy in Northern Africa. 99% of its population is Muslim (CIA (2023)). While being a midsize country in terms of size and population, the country influences the culture beyond its borders and is even considered as a hub of globalised traditional Islam (Sparkes (2022)). Apart from being the fifth largest economy of the African continent, its largest city Casablanca is currently considered as the leading financial center of African (Z/Yen (2022)). While the country is still influenced by the structures of the French colonial time, its banking sector is dominated by domestic institutions nowadays (African Business (2022)). According to the World Bank (2023), only 44.4% of the population possess a financial account, though. One reason for this rather low bankability might be a general mistrust of Moroccans towards banking institutions due to religions considerations.

In 2012, the Islamic Finance Advisory and Assurance Services (IFAAS) conducted a survey to estimate the demand for Islamic banking in Morocco. 94% (79%) of participants stated to be (very) interested in Islamic banking services. 35% of participants thereby stated to open an account with an Islamic bank a soon as Islam banking is available in Morocco (Islamic Financial Services Board (2022)). To meet this demand, a regulatory framework for Islamic banking was introduced in 2015. Two years later, the first Islamic banks were launched. As in Turkey, the term "participative banking" is also used in Morocco to refer to Islamic banks (Z/Yen (2022)). Today, the sector consists of five full-fledged and three Islamic window banks. The latter are subsidiaries of conventional banks that offer Sharia-compliant financial products and services. Due to the tight interdependence with a conventional bank, the Sharia-compliance of Islamic window banks is often criticized. All Islamic financial contracts offered by both full-fledged and window banks require further the approval of the highest board of Islamic scholars of Morocco (Conseil Supérieur des Oulémas). This certification process can take up to two years and prevents Islamic banks from quickly launching new products.

The Moroccan Islamic banking sector is one of the fastest growing ones worldwide (Islamic Financial Services Board (2022)). Due to its well-established conventional banking sector, the financial data provider Refinitiv sees Morocco as the African hub for Islamic banking (Zawya (2018)). While showing higher asset growth rates than conventional competitors, the industry is with a market share of only 1.4% of total banking assets still an infant in absolute terms (Bank Al-Maghrib (2022)). Considering the high stated interest in Islamic banking before its introduction raises the question why market shares are still on such low levels.

Two peculiarities of the Moroccan banking systems may partly explain the restrained popularity of Islam banks. First, there is a monetary price to be paid when choosing an Islamic bank in the country. For murabāha, which represents with 87.2% of assets the most popular Islamic banking contract (Bank Al-Maghrib (2022)), an additional fee is charged. This is justified by the additional service of acting in compliance with the Sharia provided by the bank. Second, switching to an Islamic bank may be difficult. This is particularly true when there is already an existing loan contract with a conventional banks. For instance, changing the bank after taking out a loan requires that the borrower's employer assures to inform the creditor bank in case the customer decides to quit his current job. This stickiness might explain why Islamic banks are only slowly gaining market shares.

From a research perspective, the introduction of an Islamic banking sector can be regarded as an innovation to the existing banking industry. This natural experiment allows to analyze how Muslims react to the sudden availability of Sharia-compliant banking alternatives and why they do or do not decide for Islamic banks. Due to the leading role of Morocco as both a financial but also cultural hub in Africa, the reaction to this event might be also transmitted to other African countries due to potential spill-over effects. Predicting the popularity of Islamic banks on the African continent is also of interest for the currently leading conventional banks to assess whether Islamic banks represent a serious challenge for their success.

3 Data and Methodology

In this study, we are interested in the preferences for Islamic banking. We conducted two stated choice experiments, including one with regard to loan products and the other with regard to savings accounts. Stated choice experiments allow to determine which attributes are important for the decision of potential bank clients. In particular, we look at the extra utility that is derived from the matter of fact that a bank is Islamic, hybrid or conventional. Furthermore, we explore the importance of personal characteristics like, for example, religiosity. This section is structured as follows. Section 3.1 describes the data set. Section 3.2 discusses the methodology of the stated choice experiments. Section 3.3 describes the polled individual characteristics.

3.1 Data

The anonymous study was conducted among 203 students from a Moroccan business school. From the viewpoint of Islamic banks, student data is of high interest. Compared to long-standing bank customers, students are usually less bounded to existing bank contracts. The stickiness to existing constructs is of minor importance. The general lack in experience with banking services in the country[34], further restricts the use of a representative sample to elicit the preferences of potential customers. Students are instead the future customers of banks and represent a group that could more likely be attracted to an Islamic bank than other groups within the Moroccan society.

In the study, we proceeded as follows: Individuals were asked to answer questions about their current use of conventional and Islamic banks, their perceived restrictions for relying (more) on Islamic banks and their assessment of Islamic banks compared to conventional ones with respect to various categories. Further, participants took part in two survey-based stated choice experiments about borrowing and savings decisions. The data was collected in

[34]See Section 2.3.

November and December 2022 within business classes of a Moroccan university. Participants were invited to answer the questionnaire in English, French or Arabic. The participation in the online survey was voluntary and not linked to any material rewards.

Table 1 summarizes the characteristics of study participants. All participants are between the age of 16 and 34. With 55.7% of the sample, female participants are slightly over-represented. 95.5% of participants stated to have a bank account, of which 19% are customers of an Islamic institutions.

3.2 Stated Choice Experiments

Stated choice experiments are a recent approach to elicit preferences for different product attributes in an indirect manner. The methodology assumes that individuals make choices according to their preferences and thus maximize utility. Therefore, from the observation of choices, preferences with respect to product attributes can be inferred. The methodology represents a robust tool to elicit preferences for alternatives which are currently unfamiliar or even hypothetical to the customer. Due to the innovative character of Islamic banks in Morocco, the current use of Islamic banks might not sufficiently reflect the actual demand for such banking services. The popularity of choice experiments stems in particular from their more accurate prediction ability of consumer preferences and behavior as compared to traditional surveys[35]. Preferences usually depend further on individual characteristics like in our case risk aversion or religious convictions.

In each choice experiment, 48 different choice sets were created and randomly assigned to participants. In each choice set, participants were asked to choose an alternative from either a i) conventional, ii) full-fledged Islamic or iii) Islamic-window bank[36]. As a fourth option, participants had also the opportunity to decide against all bank offers. This opt-out option

[35]See, e.g., Haghani et al. (2021) for a literature review of the prediction quality of choice experiments.

[36]For the sake of simplicity, we will refer to full-fledged Islamic banks as just Islamic banks in the following.

enables to model the potential aversion of strict Muslims against all kinds of banks. In each choice sets, the rates for lending/borrowing differed according to the type of bank. To control for potential local preferences, banks could have their headquarters either in Morocco (domestic) or Europe (international). Each participant was randomly assigned 4 out of the 48 choice sets to measure the preferences with respect to the attributes "Annual Interest/Return", "Islamic Bank", "Window Bank", "No Bank" and "International'. The experimental designs are D-efficient (e.g., Street et al. (2005)) and were developed with the software *ChoiceMetrics Ngene*. An example of a used choice set for the savings experiment is presented in Figure 2.

For the empirical analysis of choice models, it is assumed that the utility U_{ijm} respondent i derives from choosing alternative j in choice situation m can be divided into an observable part V_{ijm} and an unobservable, extreme-value type I distributed error term ϵ_{ijm}. V_{ijm} is defined by the observable characteristics of an alternative x_{ijm} and an unknown vector β_i which describes the importance of single product characteristics.

$$U_{ijm} = \beta_i' x_{ijm} + \epsilon_{ijm}$$

Transforming the observed choices into a multinomial logit model, the unknown vector β_i can be determined by maximum-likelihood estimations. Nowadays, so called mix logit models are used as a standard procedure in choice modeling (e.g., Hensher and Greene (2003) or Train (2009)). By including random parameters, such models allow a wider flexibility with regard to the restrictive assumptions of the standard model as identically and independently distributed error terms or the independence axiom. The gained flexibility comes at a numerical cost since mixed logit models can only be estimated with Monte Carlo simulations.[37] To solve the models, we use the Python package BIOGEME (Bierlaire (2020)). Following the

[37]See, e.g., Train (2009) or Hensher and Greene (2003).

existing finance literature using stated choice experiments (e.g., Gutsche and Ziegler (2019), Lagerkvist et al. (2020) or Kleffel and Muck (2023)), no monetary incentive structure was provided.[38]

3.3 Individual Characteristics

As discussed in Section 2, individuals may (or may not) choose Islamic banks for both religious and pecuniary reasons. Summary statistics of the individual characteristics used as explanatory variables are provided in Table 2. These characteristics were polled before the experiments started by asking participants to fill out a questionnaire related to the constructs.

Religion is obviously a key variable in our study. As discussed before, religiosity is not a one dimensional construct. In line with the literature, we distinguish between intrinsic and extrinsic religiosity (Allport and Ross (1967)). We measure these constructs with 15 questions similar to the Muslim religiosity scale proposed by Khan (2014). The questions about intrinsic religiosity centered on individuals' actual religious behavior (e.g. "I like to spend some time (or at least a few moments") each day in the remembrance of God or in contemplation.). For extrinsic religiosity, the items focused on individuals' perceived importance of Islam in a social context (e.g. "If covering the head or wearing a beard is an obstacle in the way of progress, it should be abandoned"). We further added a question about almsgiving (zakat) to each construct of the original scores after expert consultation. The agreement to all these questions was answered on 5-point Likert scales. The items used in the questionnaire are listed in the Appendix. With a Cronbach's alpha of 0.70 and 0.59, the internal consistency of these two constructs is acceptable.

Further, patience may be related to religious motives and the trade-off between pleasure today and in the hereafter. Similarly, time preferences may be related to financial decisions

[38]See Haghani et al. (2021) for a discussion of the effects of providing monetary incentives in stated choice experiments.

and the willingness to postpone consumption. To operationalize these potential motives for Islamic banks, we rely on individuals' self-assessed level of patience on a 11-point-scale, as suggested by Dohmen et al. (2011). Also an individual's risk attitude might influence bank preferences for both religious but also financial motives. From the religious perspectives, a lacking trust in Sharia-compliance might be related to higher levels of risk aversion. From a financial side, more risk averse individuals may instead be attracted by the potential higher stability of Islamic banks. To measure risk attitudes, we followed Vischer et al. (2013) and asked participants to state their personal risk preference on a 11-point-scale. Note, that our measure of risk aversion refers to individuals' overall risk attitude and is not limited to the financial context.

Finally, we add two control variables. First, estimated preferences might be connected to a general understanding of finance. To control for potential effects of financial literacy, we also consider individuals' self-stated financial knowledge on a 5-point Likert scale. Second, a dummy variable was added to detect potential gender-related differences in preference relations.

Observing only a low correlation between the used constructs, concerns of multicollinearity can be eliminated. Remarkably, also the correlation between intrinsic and extrinsic religiosity amounts to only 0.06. This underlies that intrinsic and extrinsic religiosity are indeed to distinct motivators for religious behavior.

4 Empirical Results of the Stated Choice Experiment

In the following, we summarize the results of the choice experiment. As reported in Section 2.2, there is reason to assume a stronger reaction for borrowing as compared to savings transactions. Comparing the results of the two experiments ensures further the robustness of our findings. Note that the number of participants in each choice experiment may vary from the amount of total participants due to the voluntary character of the survey.

4.1 Loan Contracts

The experimental results for loan contracts are summarized in Tables 3 and 4. Table 3 shows the aggregated impact of bank attributes. The attributes are "Annual return", "Islamic Bank", "Window Bank", "No bank" (opt-out option) and whether the bank is a foreign institution. While "Annual interest" is of continuous nature, all other attributes are dummy variables and measure the extra utility that individuals derive in comparison to the reference categories. These are conventional and domestic banks, respectively.

The variable of main interest is the "Mean", which describes the utility gain or loss experienced from choosing an alternative with the respective attribute. Intuitively speaking, the variable "Willingness-to-Pay" (WTP) transforms the mean into the "additional interest" accepted for choosing an alternative with the respective attribute. Following the literature, we calculate the WTP by the negative ratio of the estimated mean of an attribute and the estimated mean of "Annual interest". Hence, a positive (negative) WTP indicates that individuals are willing to pay higher (lower) interest for choosing an alternative including the respective attribute. The "Standard deviation" is estimated for random parameters. All quantities refer to conventional banks as the benchmark.

The attribute "Annual Interest" is negatively related to utility. Therefore and not surprisingly, individuals have an aversion to higher rates of interest. This is in line with the classical risk/return trade-off. More interestingly, individuals seem to have also an aversion to Islamic banks. The attribute "Islamic Bank" is negatively related to utility as well. In terms of the WTP, this means that individuals would borrow from an Islamic bank only if the bank offers at least a 0.9% lower interest rate as compared to a conventional competitor. A similar effect is not observed for a window banks, though. A possible explanation is that window banks are rather perceived as conventional than Islamic by bank customers. Moreover, individuals generally appreciate the financing services of bank institutions. When in need for capital, individuals would accept in theory a 12% higher interest for receiving a loan from any fi-

nancial institutions to avoid being deprived of banking services at all ("No bank" option). In a nutshell, results suggest that survey participants prefer conventional and window banks over Islamic banks and other financing sources. These results are independent of individual characteristics, though. Moreover, domestic banks are preferred to "International" ones. For loan contracts offered by domestic banks, an additional fee of up to 0.4% is accepted.

To measure the impact of individual characteristics and their moderating effects, Table 4 also includes interaction terms between the attributes from the choice experiment and individual characteristics. Four versions of the model are estimated to explore robustness. The number of interaction terms increases from Model 1 to Model 4. Intuitively, interaction terms control for the influence of individual-specific characteristics on the utility derived from attributes.

The table demonstrates that individual characteristics may have a significant impact on the preferences for Islamic banking services. Concerning religiosity, we find that individuals with intrinsic religiosity obtain a higher utility from Islamic banks. The effect is highly significant over all model specifications. Interestingly, intrinsic religiosity does not have a significant effect on the preference for window banks. This might suggest that the difference between Islamic and window banks is understood and considered in religious banking preferences. We further observe a significant influence of the level of "Patience" on the choice for Islamic banks. This effect is in line with the argument that patience and intrinsic religiosity could be connected since religious people face the trade-off between experiencing pleasure in this world and feeling bad in the hereafter.[39] Risk aversion has instead a significant negative impact on the perceived utility of Islamic banks and window banks. From a financial perspective, loan contracts from Islamic banks (murabāha) should be less risky due to the enhanced risk sharing policy of contractual parties. Eventually, risk averse individuals may be intimidated by the potential uncertainty regarding the Sharia-compliance of Islamic banking practices. The preference for Islamic banks seems to depend further on individuals' financial literacy. Potentially, an enhanced knowledge of financial matters is required to understand the

[39]See Section 2.

functioning and religious added-value of Islamic banking services.

Extrinsic religiosity is significant for the "No bank" option only. It seems that these individuals are trying to avoid loan contracts from banking institutions at all. This behavior might be viewed as an attempt to concur with a general skepticism of society to the banking system, as these people seem to regard all kinds of banks loan, including those from Islamic institutions, as non Sharia-compliant. Finally, note that individuals' preference of domestic over international banks remains significant in all model specifications.

4.2 Deposit Account

In this section, we report the results of the choice experiment about saving transactions. The set-up of this experiment is identical to the first one about borrowing decisions. The only difference is that participants could choose among offers for hypothetical savings accounts (and not loan contracts). The choice sets differed with respect to bank attributes and offered return rates. From the choice experiment, we computed the impact of attributes on utility and the WTP. This time, the WTP is defined by the negative ratio of an attribute's estimated mean and the estimated mean for "Annual return". In consequence, a positive (negative) WTP indicates that investors demand a higher (lower) return rate for accepting a savings offer.

Table 5 shows the impact of bank attributes on utility. Similar to the first choice experiment, we find that Islamic banks and the opt-out option ("No bank") yield negative utility, that is, individuals choose these alternatives only if they offer higher rates on deposit. In contrast to borrowing decisions, the impact of the attribute "Islamic bank" is significant at the 10 percent level only. The effects are thus weaker than for borrowing contracts. Again, window banks do not have a significant impact on utility and domestic banks are preferred to international ones. This also suggests that window banks are rather perceived as conventional than Islamic institutions.

Table 6 has the results when interaction terms are considered. Again, the findings are similar to the first choice experiment: Intrinsic religiosity has a positive impact on the utility derived from the attribute "Islamic bank" and extrinsic religiosity is positively related to preferences for the "No bank" option. The preference for window banks is not affected by religiosity at all. Patience, which may occur with religiosity, has a positive impact on the utility derived from the attribute "Islamic bank". Risk aversion is again negatively related to the preferences for both Islamic banks and window banks. As discussed in Section 2, it can be argued that Islamic banks should be more stable than conventional banks. However, our empirical results suggest that the potential stability is not appreciated by surveyed participants. In fact, risk averse investors require a return premium for investing in Islamic banks and window banks. Therefore, risk aversion might again be rather related to Sharia-compliance and not financial risk. As the effect of intrinsic religiosity reduces its significance when risk aversion is added as a variable, these two variables might be interrelated. This may be explained as follows: When religious individuals have doubt in the Sharia-compliance of Islamic banking contracts, they are only willing to pay a lower monetary price for such services. Finally and in contrast to the first experiment, financial literacy is not related to the preference for Islamic banks.

5 Current Use and Perception of Islamic banks

Results in the previous section suggest that, on the aggregate, individuals have an aversion to Islamic banks. A preference for Islamic banks is given only in the presence of intrinsic religious motives. Risk concerns seem to keep also individuals with religious motives from choosing Islamic institutions, though. To shed further light on this observation, we look at the answers to more direct questions about the actual use as well as perception on Islamic banks.

Figure 3 shows the use of banking services of study participants. Current and savings accounts are used by almost all of examined respondents. Also funding and leasing contracts

are popular among participants. The strong experience in the use of banking services ensures the reliability of the sample. Islamic banks represent only a minority of used bank, though. This is in line with the low market share of Islamic banks in Morocco and their negative impact on utility discussed in Section 4. Within our sample, 38 participants stated to be currently a customer of an Islamic banks. This represents 18.7% of the sample. In relative terms, the highest market share of Islamic banking services can be attributed to funding and leasing contracts.

Table 7 shows how Islamic banks are perceived in comparison to conventional ones. In contradiction to the elicited preferences from the choice experiment, Islamic banks are in general positively evaluated by market participants. Current customers of Islamic banking services assess Islamic banks as significantly better than conventional ones in all categories. With respect to "Quality of customer relation" and "Number and proximity of branches", the perceived difference is only significant at the 10% level, though. Islamic banks are particularly appreciated in terms of "Trustfulness" and "Sharia-compliance". Customers of conventional banks do instead not put a significant higher level of trust in Islamic banks. These individuals see Islamic banks in most categories as equivalent to conventional competitors. Only in terms of "Sharia-compliance" and "Ethical behavior", Islamic banks are regarded as significantly better. In contrast, this group of bank clients perceives Islamic banks to be inferior with respect to the "Number and proximity of branches". This is a valid point of criticism, as Islamic banks represent less than 3% of total bank branches in the country (Bank Al-Maghrib (2022)). Eventually, neither Islamic nor conventional bank customers criticized the "Offered conditions (Fees & Returns)" of Islamic banks.

So why do Islamic banks have to offer more favorable loan and deposit conditions to be considered by survey participants? We also asked participants about perceived restrictions for using Islamic banks. Table 8 reports the results. Note that Islamic banks and window banks are not distinguished. The complexity of Islamic banking products represents the major reason for restraining from Islamic banks. The access to bank branches, perceived

difference between conventional and Islamic banks as well as general knowledge of Islamic banking are also identified as major restrictions. As only 14.3% stated to have no interest in Islamic banking, our results confirm the findings of the Islamic Financial Services Board (2022) that there is indeed a high demand for Sharia-compliant finance products in Morocco. In fact, three out of the top five restrictions (complexity of products, access to bank offices, and knowledge of Islamic banking) may become less relevant when customers get better used to the still relatively new Islamic banking sector within the Moroccan banking system. For current customers of Islamic banks, the stickiness to existing contracts with other banks represents a further major restriction for not relying more on Islamic institutions. Eventually, the general aversion against Islamic banks may decline when Islamic banking is better understood and Islamic banks become more established.

6 Conclusion

The objective of this research is to understand people's preference for Islamic banks. These insights are important to make predictions about the future development of the industry. Five years after their introduction, there is no general preference for Islamic banking services in Morocco. While religious motives are needed to prefer Islamic banks, a lack in trust and experience with Sharia-compliant products keeps individuals from choosing Islamic institutions. Differences in the preference for full-fledged and Islamic window banks are significant, though. This represents a challenge for conventional banks as they cannot attract religious customers by establishing Islamic windows within their institutions. Importantly, there is also a group of people avoiding bank services at all. This behavior is reasoned in extrinsic religious motives. For these individuals, the Sharia-compliance of Islamic banks is not sufficient to behave in line with Islamic law, what makes them restrain from all kind of banking services. To gain market shares, Islamic banks have to focus on better communicating their operative functioning and additional value of business activities to reduce the

existing uncertainty with regard to their Sharia-compliance. Given the potential demand for Sharia-compliant banking services, Islamic banks may indeed become a serious competitor for conventional banks in Morocco and the whole African continent. The validation of our results with data from other countries with rising Islamic banking industries represents a promising field for future research.

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Figures

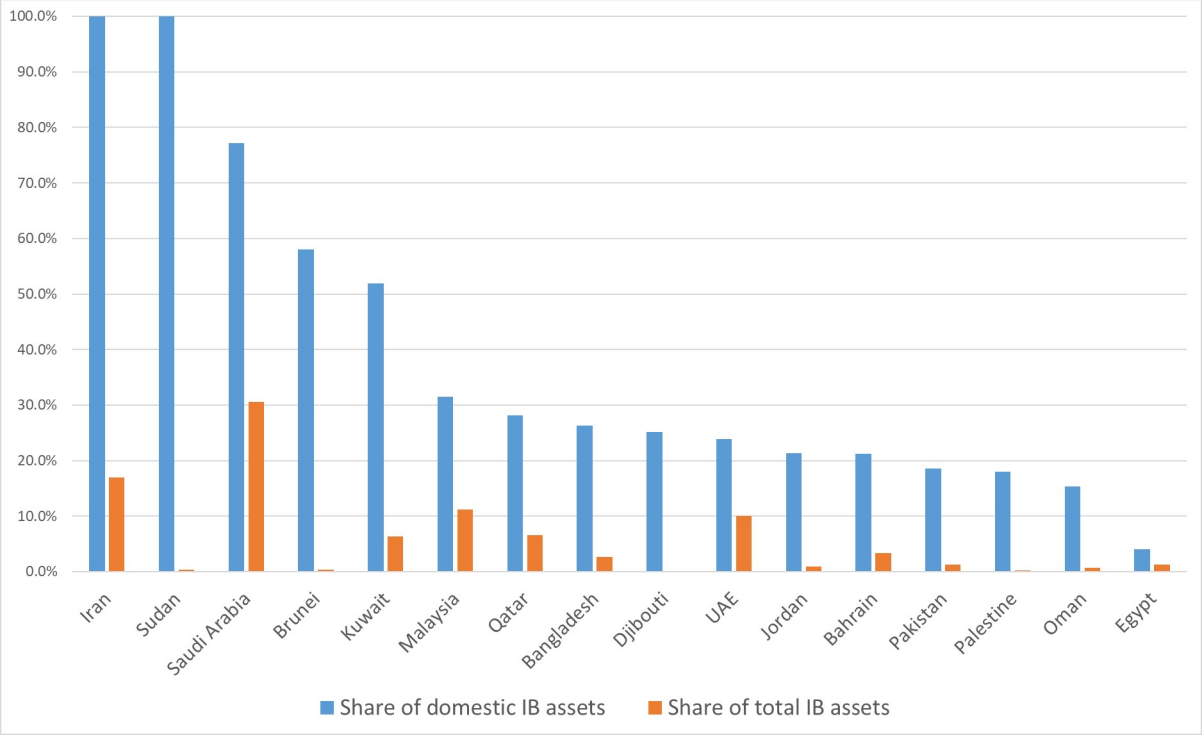

Figure 1 – Share of Islamic banking (IB) assets by country

Bank Type:	**Conventional**	**Islamic Window within conventional bank**	**Full Islamic**	**None of these**
Annual return	2.1%	1.9%	1.4%	
Country of Origin	Europe (France)	Europe (France)	Morocco	
Your Choice:	○	○	○	○

Figure 2 – Exemplary choice set used in the choice experiment about saving accounts

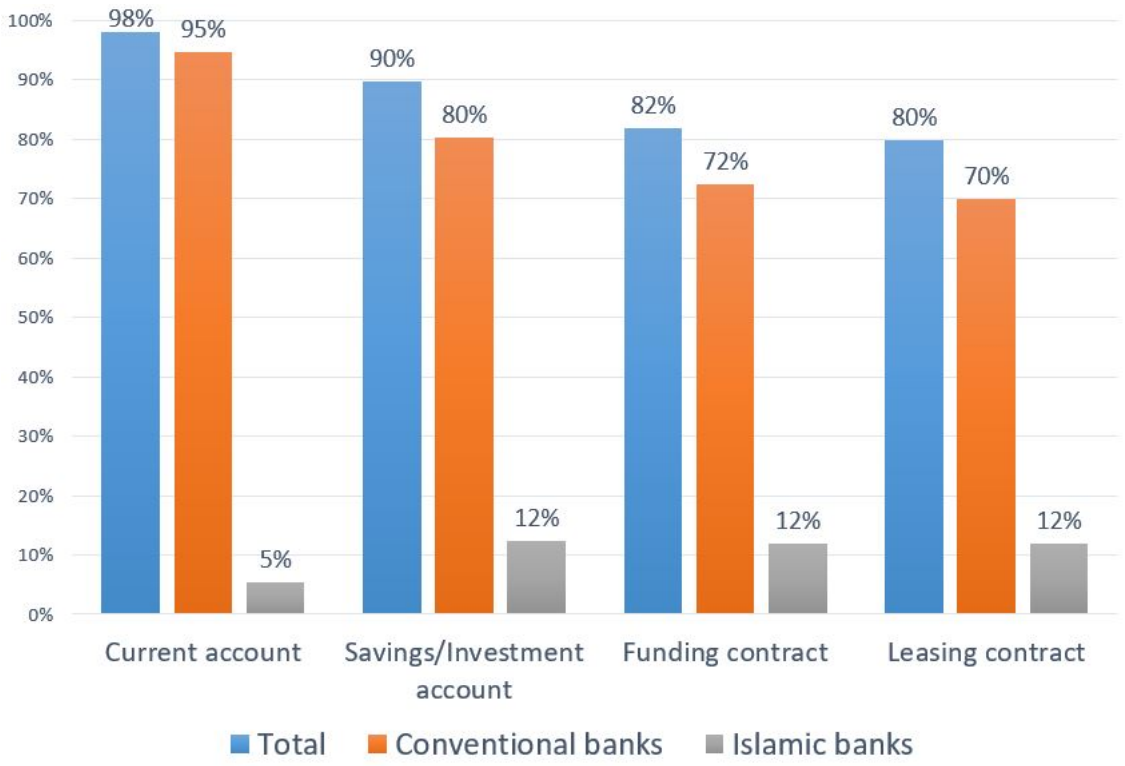

Figure 3 – Use of banking services

Tables

Table 1 – Demographics of participants

Measure	**Value**	**# of obs.**	**%**
Gender	Female	113	55.67
	Male	90	44.33
Age	16-24	189	93.10
	25-34	14	6.90
Bank customer	Conventional	162	79.80
	Islamic	38	18.72
	None	3	1.48
Total: 203			

Note: The table shows the demographics of survey participants. # of obs. refers to the absolute and % to the relative number of participants in a category.

Table 2 – Summary statistics of individual-specific characteristics

Variable	Mean	Standard deviation	Min	Max
Intrinsic religiosity	3.53	0.68	1.0	5.0
Extrinsic religiosity	3.44	0.64	1.0	5.0
Risk aversion	5.31	2.97	1.0	11.0
Patience	6.38	2.92	1.0	11.0
Financial knowledge	3.24	0.80	1.0	5.0

Note: The table shows summary statistics of the individual-specific characteristics used as explanatory variables. "Intrinsic religiosity" and "Extrinsic religiosity" are based on several items measured on 5-point Likert scales. "Risk aversion" and "Patience" assess individuals attitude towards risk and time on Likert scales ranging from 1 to 11. "Financial knowledge" describes participants self-rated knowledge of finance on a Likert scale ranging from 1 to 5. Summary statistics are based on the answers of 203 Moroccan students.

Table 3 – Mixed logit estimation results of the choice experiment about loan contracts

Explanatory variables	Mean	Standard deviation	Mean WTP
Annual interest	-0.814***	-	-
	(0.102)		
Islamic bank	-0.722***	1.79	-0.89%
	(0.202)	(0.286)	
Window bank	-0.0694	0.752**	n.s.
	(0.122)	(0.325)	
No bank	-10***	7.89***	-12.28%
	(1.57)	(1.75)	
International	-0.303**	0.346*	-0.37%
	(0.124)	(0.203)	
N (# of obs.)		188 (743)	
Log-likelihood		-804.8204	

The table shows the results of a mixed logit model to analyze the choice experiment about bank preferences with regard to loan contracts, For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of "Annual interest". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively, using t-tests.

Table 4 – Mixed logit estimation results of the choice experiment about loan contracts with interaction terms to control for the influence of individual-specific characteristics

	Model 1			Model 2			Model 3			Model 4		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Annual interest	-0.771***	-	-	-0.791***	-	-	-0.793***	-	-	-0.789***	-	-
	(0.0968)			(0.0987)			(0.0995)			(0.0999)		
Islamic bank	-2.89***	-	-3.75%	-1.97**	-	-2.56%	-3.44***	-	-4.34%	-3.75***	-	-4.75%
	(0.816)			(0.853)			(0.992)			(1.01)		
x Ext. religiosity	0.273	-	n.s.	0.262	-	n.s.	0.207	-	n.s.	0.224	-	n.s.
	(0.173)			(0.176)			(0.18)			(0.179)		
x Int. religiosity	0.448***	-	0.58%	0.445***	-	0.58%	0.406***	-	0.51%	0.428***	-	0.54%
	(0.00692)			(0.133)			(0.137)			(0.138)		
x Risk aversion	-	-	-	-0.164***	-	-0.21%	-0.173***	-	-0.22%	-0.162***	-	-0.21%
				(0.0389)			(0.0412)			(0.0419)		
x Patience	-	-	-	-	-	-	0.121***	-	0.15%	0.123***	-	0.16%
							(0.0409)			(0.0411)		
x Fin. knowledge	-	-	-	-	-	-	0.325**	-	0.41%	0.302**	-	0.38%
							(0.147)			(0.149)		
x Male	-	-	-	-	-	-	-	-	-	0.355	-	n.s.
										(0.24)		
Window bank	0.0935	-	n.s.	0.761	-	n.s.	0.976	-	n.s.	1.37	-	n.s.
	(0.737)			(0.773)			(0.9)			(0.926)		
x Ext. religiosity	-0.0292	-	n.s.	-0.0248	-	n.s.	-0.0142	-	n.s.	-0.0346	-	n.s.
	(0.164)			(0.167)			(0.168)			(0.169)		
x Int. religiosity	-0.0248	-	n.s.	-0.0278	-	n.s.	-0.024	-	n.s.	-0.0434	-	n.s.
	(0.119)			(0.121)			(0.122)			(0.123)		
x Risk aversion	-	-	-	-0.126***	-	-0.16%	-0.13***	-	-0.17%	-0.143***	-	-0.18%
				(0.037)			(0.0387)			(0.0397)		
x Patience	-	-	-	-	-	-	-0.00454	-	n.s.	-0.0151	-	n.s.
							(0.0388)			(0.0392)		

(continued)

Table 4 – *Continued*

x Fin. knowledge	-	-	-	-	-	-	-0.0699	-	n.s.	-0.0464	-	n.s.
							(0.145)			(0.147)		
x Male	-	-	-	-	-	-	-	-	-	-0.438*	-	-0.56%
										(0.233)		
No bank	-7.14***	-	-9.26%	-7.48***	-	-9.70%	-7.63	-	-9.62%	-7.46	-	-9.46%
	(1.02)			(1.07)			(1.19)			(1.21)		
x Ext. religiosity	0.764***	-	0.99%	0.795***	-	1.03%	0.796***	-	1.00%	0.781***	-	0.99%
	(0.189)			(0.192)			(0.194)			(0.194)		
x Int. religiosity	0.0225	-	n.s.	0.0406	-	n.s.	0.0311	-	n.s.	0.0253	-	n.s.
	(0.133)			(0.135)			(0.137)			(0.138)		
x Risk aversion	-	-	-	0.0118	-	n.s.	0.0133	-	n.s.	0.0115	-	n.s.
				(0.04)			(0.042)			(0.0428)		
x Patience	-	-	-	-	-	-	-0.0008	-	n.s.	-0.0042	-	n.s.
							(0.0422)			(0.0425)		
x Fin. knowledge	-	-	-	-	-	-	0.0493	-	n.s.	0.0522	-	n.s.
							(0.162)			(0.162)		
x Male	-	-	-	-	-	-	-	-	-	-0.121	-	n.s.
										(0.256)		
International	-0.443***	1.36***	-0.57%	-0.451***	1.4***	-0.58%	-0.447***	1.41	-0.56%	-0.446***	1.4	-0.56%
	(0.148)	(0.177)		(0.151)	(0.178)		(0.152)	(0.18)		(0.152)	(0.18)	
N (# of obs.)		188 (743)			188 (743)			188 (743)			188 (743)	
Log-likelihood		-948.6961			-933.0863			-923.7324			-918.7053	

The table shows the results of mixed logit models to analyze the choice experiment about bank preferences with regard to loan contracts, including interaction terms to control for the influence of individual-specific characteristics. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of "Annual interest". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 5 – Mixed logit estimation results of the choice experiment about savings accounts

Explanatory variables	Mean	Standard deviation	Mean WTP
Annual return	0.664***	-	-
	(0.108)		
Islamic bank	-0.396*	2.28***	0.60%
	(0.223)	(0.333)	
Window bank	0.109	1.38***	n.s.
	(0.153)	(0.279)	
No bank	-3.56***	3.79***	5.36%
	(0.845)	(0.81)	
International	-0.564***	0.0248	0.85%
	(0.112)	(0.19)	
N (# of obs.)		186 (733)	
Log-likelihood		-817.4574	

The table shows the results of a mixed logit model to analyse the choice experiment about bank preferences with regard to savings accounts. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of "Annual return". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 6 – Mixed logit estimation results of the choice experiment about savings accounts with interaction terms to control for the influence of individual-specific characteristics

	Model 1			Model 2			Model 3			Model 4		
Explanatory variables	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP	Mean	Standard deviation	Mean WTP
Annual return	0.663***	-	-	0.666***	-	-	0.665***	-	-	0.663***	-	-
	(0.11)			(0.111)			(0.112)			(0.112)		
Islamic bank	-1.67**	-	2.52%	-0.863	-	n.s.	-1.95**		2.93%	-2.08**		3.14%
	(0.804)			(0.841)			(0.982)			(1.01)		
x Ext. religiosity	0.102	-	n.s.	0.112	-	n.s.	0.0462	-	n.s.	0.0557	-	n.s.
	(0.167)			(0.169)			(0.174)			(0.174)		
x Int. religiosity	0.305**	-	-0.46%	0.273**	-	-0.41%	0.238*	-	-0.36%	0.244*	-	-0.37%
	(0.133)			(0.134)			(0.139)			(0.139)		
x Risk aversion	-	-	-	-0.132***	-	0.20%	-0.132***	-	0.20%	-0.129***	-	0.19%
				(0.0399)			(0.0418)			(0.0425)		
x Patience	-	-	-	-	-	-	0.113***	-	-0.17%	0.115***	-	-0.17%
							(0.0419)			(0.0422)		
x Fin. knowledge	-	-	-	-	-	-	0.223	-	n.s.	0.214	-	n.s.
							(0.152)			(0.153)		
x Male	-	-	-	-	-	-	-	-	-	0.15	-	n.s.
										(0.245)		
Window bank	-0.0388	-	n.s.	0.536	-	n.s.	0.463	-	n.s.	0.416	-	n.s.
	(0.749)			(0.783)			(0.894)			(0.915)		
x Ext. religiosity	-0.113	-	n.s.	-0.116	-	n.s.	-0.127	-	n.s.	-0.126	-	n.s.
	(0.16)			(0.161)			(0.163)			(0.163)		
x Int. religiosity	0.121	-	n.s.	0.111	-	n.s.	0.0982	-	n.s.	0.102	-	n.s.
	(0.122)			(0.123)			(0.124)			(0.125)		
x Risk aversion	-	-	-	-0.095***	-	0.14%	-0.0917**	-	0.14%	-0.0897**	-	0.14%
				(0.036)			(0.0381)			(0.0388)		
x Patience	-	-	-	-	-	-	-0.003	-	n.s.	-0.002	-	n.s.
							(0.0377)			(0.0378)		

(continued)

Table 6 – *Continued*

x Fin. knowledge	-	-	-	-	-	-	0.0481	-	-n.s.	0.0473	-	n.s.
							(0.143)			(0.144)		
x Male	-	-	-	-	-	-	-	-	-	0.0474	-	n.s.
										(0.218)		
No bank	-1.66*	-	2.50%	-1.43	-	n.s.	-1.86	-	n.s.	-1.69	-	n.s.
	(1.00)			(1.05)			(1.19)			(1.21)		
x Ext. religiosity	0.616***	-	-0.93%	0.615***	-	-0.92%	0.606***	-	-0.91%	0.598***	-	-0.90%
	(0.203)			(0.204)			(0.206)			(0.209)		
x Int. religiosity	-0.21	-	n.s.	-0.208	-	n.s.	-0.226	-	n.s.	-0.228	-	n.s.
	(0.149)			(0.15)			(0.154)			(0.155)		
x Risk aversion	-	-	-	-0.0425	-	n.s.	0.00499	-	n.s.	-0.0477	-	n.s.
				(0.0457)			(0.00394)			(0.0487)		
x Patience	-	-	-	-	-	-	0.0056	-	n.s.	0.00056	-	n.s.
							(0.0474)			(0.0476)		
x Fin. knowledge	-	-	-	-	-	-	0.149	-	n.s.	0.172	-	n.s.
							(0.186)			(0.187)		
x Male	-	-	-	-	-	-	-	-	-	-0.338	-	n.s.
										(0.291)		
International	-0.761***	1.51	1.15%	-0.778***	1.51	1.17%	-0.775***	1.57***	1.16%	-0.773***	1.57***	1.17%
	(0.159)	(0.191)		(0.159)	(0.192)		(0.163)	(0.196)		(0.163)	(0.197)	
N (# of obs.)		186 (733)			186 (733)			186 (733)			186 (733)	
Log-likelihood		-900.9025			-893.712			-888.1623			-886.6988	

The table shows the results of a mixed logit model to analyze the choice experiment about bank preferences with regard to savings accounts, including interaction terms to control for the influence of individual-specific characteristics. For fixed parameters only the "Mean" is estimated. For random parameters also the "Standard deviation" is reported. "Mean WTP" shows the average willingness to pay in terms of "Annual return". 500 Halton draws were used for simulation of the random parameters. The corresponding t-statistics of the parameter estimates are in parentheses. * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Table 7 – Participants' assessment of Islamic banks compared to conventional ones

	Customers of Islamic banks		Customers of conventional banks	
Variable	Mean	Standard deviation	Mean	Standard deviation
Trustfulness	4.15***	1.09	3.40	0.95
Sharia-compliance	4.10***	1.11	3.93***	1.14
Quality of services	3.59**	1.18	3.11	0.82
Offered conditions (Fees & Returns)	3.78***	1.26	3.07	0.98
Quality of customer relation	3.40*	1.22	2.99	0.91
Efficiency of managing money	3.50**	1.20	3.10	0.93
Financial stability	3.44**	1.09	3.11	0.86
Ethical behaviour	3.81***	1.05	3.62***	1.04
Social reputation	3.5**	1.35	3.14	1.18
Complexity of offered services	3.29**	1.15	2.88	0.89
Number and proximity of branches	3.00*	1.17	2.57***	1.05

Note: The table shows how participants assess Islamic banks in comparison to conventional banks on 5-Point Likert scales (1 = Much worse, 2 = Somewhat worse, 3 = The same, 4 = Somewhat better, 5 = Much better). * (**, ***) means that customers assess Islamic banks differently as conventional banks at the 10% (5%, 1%) significance level, respectively, using t-tests. Results are based on the answers of 203 participants.

Table 8 – Perceived restrictions for using Islamic banks

	Total		Conventional customers		Islamic customers	
Restriction	**# of obs.**	%	**# of obs.**	%	**# of obs.**	%
Complexity of products	54	26.60	44	27.16	10	26.32
Access to bank offices	40	19.70	34	20.99	5	13.16
Perceived difference	36	17.73	27	16.67	9	23.68
Knowledge of Islamic banking	33	16.26	29	17.90	4	10.53
No Interest	29	14.29	26	16.05	2*	5.26
Stability concerns	18	8.87	13	8.02	5	13.16
Monetary aspects	17	8.37	12	7.41	5	13.16
Trust in Islamic banks	14	6.90	12	7.41	2	5.26
Stickiness to existing contracts	16	7.88	8	4.94	8***	21.05
Efficiency concerns	12	5.91	7	4.32	5**	13.16
Service concerns	12	5.91	7	4.32	5**	13.16
Fear of extremism	3	1.48	2	1.23	1	2.63
Total	203	100.0	162	79.80	38	18.7

Note: The table shows the perceived restrictions of survey participants to use Islamic banks. # of obs. refers to the absolute number of participants in a category. % is the amount of participants in a category set in relation to each sample. * (**, ***) means that the customers of Islamic banks differ from those of conventional banks at the 10% (5%, 1%) significance level, using chi-squared tests. Results are based on the answers of 203 participants.

A Appendix

A.1 Intrinsic religiosity

Please rate to what extent you agree with the following statements on a scale from 0 to 4, with 0 = “strongly disagree”, 2 = “do not know” and 4 =“strongly agree”.

- I often worry about the afterlife.
- I make every effort that my acts shall accomplish Allah’s (God’s) will and pleasure.
- In my worship of God (Allah), there is no difference between my acts of devotion in private or public.
- I like to spend some time (or at least a few moments) each day in the remembrance of God or in contemplation.
- I try to take some time and perform my prayers everyday on time.
- I’m willing to forego happiness today to gain happiness in the hereafter.
- I try to pay my Zakat (Alm) all time and on time.

A.2 Extrinsic religiosity

Please rate to what extent you agree with the following statements on a scale from 0 to 4, with 0 = “strongly disagree”, 2 = “do not know” and 4 =“strongly agree”.

- I tell petty lies in everyday’s life.
- I often raise my hands for prayer while experiencing obstacles in my matter.
- Religion is by far the most important thing in my life.

- If covering the head or wearing a beard is an obstacle in the way of progress, it should be abandoned.
- At times, I do not follow religion so that the people may not consider me conservative or even extremist.
- I am reluctant to those who are always spreading the word of Islam.
- In my daily decisions it happens that my decisions are not in line with God's will.
- I do not need to pay Zakat (Alm) because I am already paying the tax to the state.