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Framing Effects in Sustainable Investment Decisions: Exploring Personal Characteristics and Environmental Impacts

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Abstract

Sustainable investments are significantly influenced by how information is framed. Research on framing, particularly by Tversky and Kahneman (1981), has shown that subtle changes in how choices are presented can shift individual preferences, challenging the assumption of purely rational decision-making. This study examines the influence of framing effects on sustainable investment decisions, focusing specifically on how various framing strategies impact investor behavior. This was achieved through a quantitative methodology that employs statistical analyses, including paired t-tests and repeated measures ANOVAs, on survey data. The findings reveal that emotionally engaging frames, such as those focusing on endangered species conservation or supporting local communities, showed a slightly stronger influence on investment decisions compared to more abstract frames, like carbon emission reduction or gender equality, though these effects were not statistically significant. Similarly, loss-framed messages, such as those emphasizing job loss prevention, appeared marginally more effective than gain-framed messages, with some differences observed in gender-specific responses. Additionally, personal characteristics, particularly personal norms, consistently moderated investment decisions, with stronger personal norms correlating with more pronounced responses to sustainability-oriented frames. Sustainable investor identity and social norms exhibited context-dependent effects, while justice beliefs, risk tolerance, and trust in investment providers showed limited or inconsistent moderation. This research contributes to the academic understanding of sustainable investing while offering insights that can inform the strategies of financial professionals, sustainable investment managers, and policymakers about the effectiveness of different framing strategies.

Key words: Framing effects, sustainable investments, socially responsible investing, behavioral finance, investor decision-making, social norms, personal norms, risk tolerance, justice beliefs, consumer identity, trust, sustainable finance, gain-loss framing, attribute framing, investment behavior, financial decision-making, behavioral economics

Abstract

Nachhaltige Investitionen werden maßgeblich davon beeinflusst, wie Informationen aufbereitet werden. Forschungen zum Framing, insbesondere von Tversky und Kahneman (1981), haben gezeigt, dass subtile Veränderungen in der Art und Weise, wie Wahlmöglichkeiten präsentiert werden, individuelle Präferenzen verändern können, was die Annahme einer rein rationalen Entscheidungsfindung in Frage stellt. Diese Studie untersucht den Einfluss von Framing-Effekten auf nachhaltige Investitionsentscheidungen und konzentriert sich insbesondere darauf, wie verschiedene Framing-Strategien das Anlegerverhalten beeinflussen. Dies wurde durch eine quantitative Methodik erreicht, die statistische Analysen, einschließlich gepaarter t-Tests und ANOVAs mit wiederholten Messungen, für Umfragedaten verwendet. Die Ergebnisse zeigen, dass emotional ansprechende Frames, wie solche, die sich auf die Erhaltung gefährdeter Arten oder die Unterstützung lokaler Gemeinschaften konzentrieren, einen etwas stärkeren Einfluss auf Investitionsentscheidungen haben als abstraktere Frames, wie die Reduzierung von Kohlendioxidemissionen oder die Gleichstellung der Geschlechter, obwohl diese Effekte statistisch nicht signifikant waren. Ebenso schienen Botschaften, die auf Verluste abzielen, wie zum Beispiel solche, die den Verlust von Arbeitsplätzen verhindern, geringfügig wirksamer zu sein als Botschaften, die auf Gewinne abzielen, wobei einige Unterschiede bei geschlechtsspezifischen Reaktionen zu beobachten waren. Darüber hinaus moderierten persönliche Merkmale, insbesondere persönliche Normen, durchweg die Investitionsentscheidungen, wobei stärkere persönliche Normen mit ausgeprägteren Reaktionen auf nachhaltigkeitsorientierte Frames korrelierten. Die Identität des nachhaltigen Anlegers und die sozialen Normen zeigten kontextabhängige Effekte, während Gerechtigkeitsüberzeugungen, Risikotoleranz und Vertrauen in Investmentanbieter eine begrenzte oder inkonsistente Moderation zeigten. Diese Studie trägt zum akademischen Verständnis nachhaltiger Investitionen bei und bietet gleichzeitig Erkenntnisse, die Finanzfachleuten, Managern nachhaltiger Anlagen und politischen Entscheidungsträgern Informationen über die Wirksamkeit verschiedener Framing-Strategien liefern können.

Schlagwörter: Framing-Effekte, nachhaltige Investitionen, sozial verantwortliches Investieren, Behavioral Finance, Entscheidungsfindung von Anlegern, soziale Normen, persönliche Normen, Risikotoleranz, Gerechtigkeitsvorstellungen, Verbraucheridentität, Vertrauen, nachhaltige Finanzen, Gewinn-Verlust-Framing, Attribut-Framing, Investitionsverhalten, finanzielle Entscheidungsfindung, Verhaltensökonomie

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1 Introduction

Decision-making is shaped by both cognitive and emotional processes, profoundly influenced by how information is presented. Tversky and Kahneman's seminal research on framing (1981) revealed that small changes in presentation can significantly shift individual preferences, challenging assumptions of purely rational decision-making (Tversky & Kahneman, 1981, pp. 453, 457). Framing, as defined by Entman (1993, p. 52), involves the selection and emphasis of specific elements of reality to shape interpretations, evaluations and decisions. In financial contexts, three dominant framing types play a critical role in shaping decision-making, namely positive-negative, attribute and temporal framing. Positive-negative framing, highlights gains or losses relative to a reference point, with individuals often being risk-averse for gains and risk-seeking for losses (Tversky & Kahneman, 1981, p. 456). Attribute framing emphasizes specific characteristics, such as the environmental or social benefits of an investment, to influence perceptions without altering its intrinsic value (Dolgopolova et al., 2022, p. 254). Temporal framing, rooted in construal level theory, explores how the temporal distance of an event affects perceptions, with immediate rewards perceived as more compelling than distant ones (Trope & Liberman, 2003, p. 418).

Building on these concepts, research shows framing extends beyond individual choices to societal behaviors, influencing areas like health, conservation and financial investments (Candraningrat et al., 2018, p. 66; Levin et al., 1998, p. 150; S. Li et al., 2024, p. 13). For example, gain-loss framing affects risk preferences, while goal framing emphasizes positive or negative outcomes to guide behavior (Igou & Bless, 2007, p. 125; Kahneman & Tversky, 1979, p. 263)

Sustainable investment products, which incorporate environmental, social, and governance (ESG) criteria into decision-making, offer a balance between profitability and societal impact. These investments address global challenges like climate change and align with the United Nations' 17 Sustainable Development Goals (SDGs) (Rehman et al., 2024, pp. 5340–5343). For example, reducing carbon emissions corresponds to SDG 13, safeguarding biodiversity aligns with SDGs 14 and 15, and promoting gender equality and decent work are captured under SDGs 5 and 8, respectively (Independent Group of Scientists appointed by the Secretary-General, 2023, p. 3). Studies reveal growing preferences for sustainable funds, driven by ethical considerations, financial literacy and social norms (Bauer et al., 2021, pp. 3976, 4012; Gutsche et al., 2020, p. 2). Negative framing of environmental risks often drives stronger behavioral responses than positive framing, motivating sustainable choices (Ropret Homar & Knežević Cvelbar, 2021, pp. 4–6).

In socially responsible investing (SRI), framing effects significantly influence decision-making. Highlighting social or environmental benefits or risks can increase preferences for SRI options

(Glac, 2009, pp. 50–53). For instance, loss-oriented frames often lead to safer, more socially responsible investment choices (Levin et al., 1998, pp. 181–182). These findings emphasize the critical role of framing in promoting sustainable investments and guiding individuals towards socially and environmentally responsible financial decisions.

Previous research highlights the effectiveness of framing (Berto, 2022, pp. 147–150; Bordalo et al., 2013, pp. 833–835; Candraningrat et al., 2018, p. 66, 2018, p. 66; Dolgopolova et al., 2022, p. 254; Feldman & Wong, 2018, p. 537; Garland & Newport, 1991, p. 65; Igou & Bless, 2007, p. 125; Kahneman & Tversky, 1979, p. 263; Kirchler et al., 2005, p. 98; Levin et al., 1998, p. 150; S. Li et al., 2024, p. 13; Z. Li et al., 2024, p. 9; Monteiro & Bressan, 2021, p. 285; Rovelli & Allegretta, 2023, pp. 43–44; Trope & Liberman, 2003, p. 418; Tversky & Kahneman, 1981, p. 456) and the influence of emotions (Crivelli et al., 2024, pp. 734–735; Druckman & McDermott, 2008, pp. 317–318; Khudabadi & Shankaran, 2023, p. 2545; Lan, 2024, pp. 146–147; Takemura, 2014, pp. 135–137) and personal characteristics (Crivelli et al., 2024, pp. 742–744; Feldman & Wong, 2018, p. 537; Garland & Newport, 1991, p. 65; Gutsche et al., 2020, p. 2; Tversky & Kahneman, 1981, p. 453) on decision-making processes. However, the interplay between personal characteristics and framing, especially in the context of socially responsible and sustainable investment products, remains underexplored. Among the limited research available, Gutsche et al. (2020) and Glac (2009) provide foundational insights but leave significant gaps that this thesis aims to address.

Gutsche et al. (2020, pp. 2, 14–21, 32–34) conducted a framed field experiment analyzing preferences for sustainable versus conventional investment products but did not explore which specific attributes of sustainable investments drive these decisions. While their focus on personal characteristics as determinants was significant, they examined different traits than those investigated in this study, which are derived from Andorfer and Liebe's (2013) influential findings on sustainable consumer behavior. Furthermore, Gutsche et al.'s (2020, pp. 2, 14–21, 32–34) survey group consisted solely of financial decision-makers in Germany with prior investment knowledge, whereas this thesis tries to offer a broader reflection of general population behavior by including a diverse sample, where prior investment knowledge wasn't required to participate in this survey.

Similarly, Glac (2009, pp. 41, 44–45, 47, 50–52) investigated the impact of framing techniques in socially responsible investment contexts, focusing on financial and expressive framings. Her findings indicated that expressive framing significantly influenced the likelihood of choosing socially responsible investments (SRI). However, her study primarily involved undergraduate students and concentrated on consumerism-related expressive framing, neglecting other critical dimensions of sustainability. Moreover, Glac (2009) did not analyze which specific attribute framings were most effective or the determinants driving these effects (Glac, 2009, pp. 41, 44–45, 47, 50–52). This thesis addresses these shortcomings by examining how various attribute framings, such as those emphasizing global issues like carbon emissions, social

themes such as gender equality, or local concerns like community support, interact with personal characteristics to shape investor preferences.

By addressing these research gaps, this thesis contributes to the growing field of sustainable investment research. It aims to provide a comprehensive understanding of the effectiveness of different framing strategies and how they interact with personal traits to influence decision-making. This exploration offers nuanced insights into the diverse factors shaping investor preferences, which is increasingly important as sustainable investment options continue to grow in prominence.

Therefore, this thesis tries to answer the following research questions:

“What is the influence of various characteristics of sustainable frames on the amount invested in environmentally sustainable and socially responsible investment options?”

“Which personal characteristics contribute to the differential impact of sustainable frames on investment behavior?”

This research seeks to contribute to the field of sustainable finance by analyzing how different sustainability characteristics — such as a focus on endangered species conservation or support for local communities — resonate with diverse investor profiles. The study aims to explore these dynamics without attempting to influence investor behavior, providing insights that can inform academic understanding, practitioner strategies, and policymaking in the realm of ESG investments.

The data for this study were collected through an online survey employing a within-subjects design, where participants allocated hypothetical investments across different framing conditions. To reduce potential carryover effects, the order of questions was randomized. Paired t-tests were conducted to analyze the data, allowing for a detailed examination of the nuanced impact of framing on investment behavior. The study also examined the interaction between frames and personal traits, such as sustainable investor identity, risk tolerance, trust and norms using repeated measures ANOVAs. This methodological rigor supports the study’s objective of uncovering the nuanced relationship between framing strategies and sustainable investment behavior. In the preparation of this thesis, the tools SciSpace and ChatGPT were utilized. SciSpace was employed to find relevant academic literature, while ChatGPT was used exclusively to refine linguistic expression and correct grammatical errors. This was achieved by uploading sentences written by myself with the prompt to check them for grammatical correctness and to give me advice and suggestions for stylistic improvements. Neither tool was used to create content, ensuring the originality and integrity of the research, including its survey design and analysis.

2 Theoretical Background

Understanding how mental, emotional, and environmental factors influence human behavior is key to grasp the purpose of this thesis and the core process behind investment decision-making. This chapter establishes a solid framework for understanding the different variables that influence investment decisions, particularly in the context of sustainable investing. The chapter is divided into three main sections: the decision-making process [2.1], framing [2.2], and sustainable investment products [2.3]. Each part digs into key ideas and theories that are critical for understanding the processes at play in the decision-making landscape.

2.1 Decision Making Process

Understanding how individuals make decisions is fundamental to explore the role of framing in investment choices. Decision-making involves both cognitive and emotional mechanisms, with individuals evaluating and prioritizing various attributes of their options. This process, known as multi-attribute decision-making, requires gathering and weighing relevant information, influenced by cognitive resources and information availability (Takemura, 2014, pp. 127–129).

People employ different strategies depending on the complexity of the decision. Compensatory strategies weigh all attributes, while non-compensatory methods prioritize certain criteria or exclude options outright. Under high cognitive load, individuals may resort to heuristics simplifying decisions but introducing biases (Takemura, 2014, pp. 129–132). Task complexity often shapes the approach taken, as the nature of the decision significantly influences the strategy employed, highlighting the flexibility and adaptability of human decision-making (Takemura, 2014, pp. 133–135).

Emotions also play a significant role, particularly in uncertain or risky scenarios (Takemura, 2014, pp. 135–137). Positive emotions may encourage risk-taking, while negative emotions can lead to cautious behavior. Research highlights how emotional states influence risk perception and framing effects, shaping decision outcomes (Crivelli et al., 2024, pp. 734–735; Lan, 2024, pp. 146–147; Takemura, 2014, pp. 135–137). Personality characteristics further influence decision styles. For example, individuals with higher emotional stability may rely more on emotional processing, while those high in openness or agreeableness favor cognitive strategies. Emotions also affect resistance to framing and responses to sunk costs, emphasizing their integral role in decision-making (Crivelli et al., 2024, pp. 742–744; Khudabadi & Shankaran, 2023, p. 2545). The significant influence of emotions on the tendency to take risks and on the impact a frame has on risky choices has also been proven by Druckman and McDermott (2008, p. 297).

Aside from the emotional impact on the decision-making process, Rovelli and Allegretta's (2023, pp. 43–44) research highlights the critical role of context in decision-making, while

Druckman and McDermott (2008, pp. 317–318) demonstrate how emotions influence risk perception and decision strategies. For instance, anger often promotes risk-taking, whereas distress encourages caution. Emotions also shape framing effects by influencing how mental accounts are formed and closed, sometimes leading to decisions that deviate from rational analysis. Emotional impacts on framing vary by context, such as the stakes involved in financial versus life-or-death decisions (Druckman & McDermott, 2008, pp. 316–318).

This interplay between emotions and framing underscores the non-rational aspects of decision-making, aligning with key insights from behavioral finance that challenge traditional models of rational choice. Additionally, post-decision processes, such as the need for justification, cognitive dissonance and regret, play a crucial role in shaping long-term well-being and future decision patterns (Takemura, 2014, pp. 137–139).

2.2 Framing

The foundation of this thesis was led by Tversky and Kahneman (1981, p. 453) who discovered, that seemingly inconsequential changes in the way a problem of choice was presented or formulated led to significant shifts in people's preferences. In their study, the authors point out, that such frames, which are adopted by the decision maker, are controlled on the one hand by the formulation of the decision problem and on the other hand by the norms, habits and personal characteristics of the decision maker. Entman (1993, p. 52) further defined this effect in his paper, by stating that:

> *"Framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described." (Entman, 1993, p. 52)*

2.2.1 What are Frames?

Frames direct attention to specific features of a communication's subject matter, making those details more noticeable, meaningful or memorable to the audience. This focus increases the likelihood that recipients will notice, process and store the highlighted information (Entman, 1993, p. 53). Kahneman and Tversky's (1984, p. 343) classic experiment illustrates this. Participants were asked to choose between programs to combat a disease outbreak, that was presented to them in the following way:

> *"Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows: If Program A is adopted, 200 people will be saved. If program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved. Which of the two programs would you favor?" (Kahneman & Tversky, 1984, p. 343)*

In a second experiment, the same treatment alternatives were presented, but they were expressed in terms of potential deaths rather than lives saved. When framed as lives saved, 72% choose the sure outcome (Program A), but when framed as deaths, only 22% chose its equivalent (Program C). Similarly, the riskier options (Programs B and D) saw opposing preferences depending on the framing. This demonstrates how frames highlight specific aspects of reality while downplaying others, shaping how people perceive and respond to situations. The study emphasizes that framing impacts many, even if not universally, by guiding attention through what is included or excluded (Entman, 1993, pp. 53–54; Kahneman & Tversky, 1984, pp. 343–344).

Igou and Bless (2007, p. 125) examine how cognitive processing influences framing effects during decision-making. Their findings show that framing impacts are stronger when individuals engage in deep, constructive processing, particularly with loss framing favoring riskier choices. Factors like decision time, processing ability and accountability affected the framing effects, with longer deliberation amplifying the impact unless contextual cues reduced the need for deep thought (Igou & Bless, 2007, p. 125). Similar, Berto (2022, pp. 147–150) highlighted framing effects as changes in attitudes toward logically equivalent statements based on their presentation. He introduced *Framed Believers* to describe individuals whose beliefs shift due to framing. Using examples from economics and medicine, Berto argued that these effects stem from the structure of belief systems rather than a lack of information or cognitive ability (Berto, 2022, pp. 147–150).

2.2.2 Types of Frames

There are three main types of frames in financial contexts. The first, positive versus negative framing, was identified by Tversky and Kahneman (1981). It involves presenting information as gains or losses relative to a reference point, which affects perceptions of risk. People are generally risk-averse when outcomes are framed as gains but become risk-seeking when framed as losses, as the psychological impact of losses tends to outweigh that of equivalent gains (Tversky & Kahneman, 1981, p. 456). This higher sensitivity towards potential losses makes loss framing potentially more persuasive (Tversky & Kahneman, 1981, p. 453).

The second type, attribute framing, emphasizes specific characteristics of an option, such as health or environmental benefits, without altering its overall value. For example, highlighting the sustainability benefits of an investment demonstrates this framing type (Dolgopolova et al., 2022, p. 254). Levin et al. (1998, pp. 181–182) explored framing effects in two ways: risky choice framing, where risk preferences shift depending on positive or negative framing and global framing, which evaluates how emphasizing losses versus gains influences behavior. They found that positive frames often enhance risk aversion and negatively framed messages are more persuasive in encouraging specific actions (Levin et al., 1998, pp. 181–182). Both, Levin et al. (1998, pp. 181–182) and Kahneman and Tversky (1981, p. 454) demonstrated that

emphasizing potential losses increases the likelihood choosing safer options, even at the expense of higher potential gains.

The third type, temporal framing, focuses on how temporal distance influences decision-making. Based on Construal Level Theory, Trope and Liberman (2003, p. 418) explained that distant events are perceived abstractly, focusing on broader, essential aspects, while immediate events are seen concretely, making short-term rewards more appealing despite long-term benefits often being greater. Temporal distance thus impacts how people prioritize decisions (Trope & Liberman, 2003, p. 418).

2.2.3 Framing in Investment Decisions

In behavioral finance, the framing effect is a powerful tool for influencing decisions. Financial advisors and policymakers can leverage framing to encourage better decision-making. Kahneman and Tversky (1979, p. 263) demonstrated that emphasizing the potential losses of inaction can be a strong motivator. Similarly, Candraningrat et al. (2018, p. 66) showed that how dividend information is framed affects investor perceptions of future stock prices and risks. Highlighting the downside of inaction, such as through negative feedback or sunk cost framing, can strongly motivate individuals to take action (Feldman & Wong, 2018, p. 537; Garland & Newport, 1991, p. 65). Framing decisions as avoiding losses can motivate risk-averse individuals to act, as they prioritize preventing losses over potential gains. For instance, framing a decision to enroll in a retirement plan as avoiding missed future gains can drive action. Conversely, gain framing, which highlights potential returns, can encourage growth-oriented investors to explore opportunities they might otherwise overlook (Bordalo et al., 2013, pp. 833–835). Studies demonstrate the effectiveness of framing. Li et al. (2024, p. 9) found that highlighting the social benefits of heritage projects increased public support, while framing messages around losses led to higher vaccine uptake (S. Li et al., 2024, p. 13). Monteiro and Bressan (2021, p. 285) revealed that framing historical performance data influences perceived risk. For variable-income funds, emphasizing monthly yields heightens risk perception, while fund value framing enhances perceived returns. For fixed-income funds, framing fund value emphasizes both returns and risk (Monteiro & Bressan, 2021, p. 285). Kirchler et al. (2005, p. 98) showed that positively and negatively framed dividend information affects trading patterns and market behavior, shaping optimism or pessimism in investors.

The framing effect has broad applications in policy, marketing and finance. Governments use it to promote desirable behaviors, while businesses frame products to highlight benefits and downplay drawbacks. Financial professionals utilize framing to nudge clients toward informed decisions, such as promoting investment products. However, the effectiveness of a frame depends on personal characteristics and context. Overall, framing loss prevention tends to resonate most with risk-averse individuals, driving them to act even in uncertain situations (Feldman & Wong, 2018, p. 537; Garland & Newport, 1991, p. 65; Igou & Bless, 2007, p. 125; Tversky & Kahneman, 1981, p. 453).

2.3 Sustainable Investment Products

Before diving into this master's thesis in its entirety, it is essential to define sustainable investment products. These integrate environmental, social and governance (ESG) factors into the investment process, aiming to balance profitability with positive societal and environmental impacts, unlike traditional investments focused solely on financial returns. Such investments address global issues like social inequality and climate change, aligning directly with the UN's 17 Sustainable Development Goals (SDGs). Since the 2008 financial crisis, sustainable investments have grown significantly due to increasing ESG awareness. Their emphasis on ethics, transparency and long-term value makes them appealing to investors seeking to align portfolios with broader social and environmental objectives (Rehman et al., 2024, pp. 5340–5343).

2.3.1 Working Definition of Sustainable Investment Products

In its essence, sustainability is about managing resources to suit present demands while making sure that those of future generations may be satisfied as well (Elsawy & Youssef, 2023, p. 23; Rees, 2010, pp. 13–14). This idea goes beyond simple economic expansion; it requires finding a balance between social justice, environmental preservation, and economic growth (Elsawy & Youssef, 2023, p. 23; Rosen & Kishawy, 2012, pp. 155–156). Economic sustainability involves resource preservation, economic stability, and minimizing negative environmental and societal impacts. It prioritizes long-term planning and supports a steady-state economy that limits resource use to the planet's capacity (Elsawy & Youssef, 2023, pp. 23, 28).

This study followed a sustainability framework based on the UN's 17 SDGs. These goals provided the basis for the survey's framing, focusing on reducing carbon footprints, protecting endangered species, promoting gender equality, supporting local communities and employment. For example, carbon emission reductions align with SDG 13, protecting species with SDGs 14 and 15, gender equality with SDG 5 and employment-related issues with SDG 8 (Independent Group of Scientists appointed by the Secretary-General, 2023, p. 3).

2.3.2 State of the Art on Sustainability

Sustainability integrates economic, social and environmental goals which are aligned with the UN's SDGs. Research shows a growing preference for sustainable investments over traditional ones, driven by environmental values, social norms and financial considerations (Barber et al., 2021; Bauer et al., 2021; Gutsche et al., 2020; Hartzmark & Sussman, 2017; M. Jansson & Biel, 2011; Rehman et al., 2024; Wins & Zwergel, 2016). Studies, such as those by Rehman et al. (2024, pp. 5357–5358), highlight regional performance differences in sustainable portfolios, with some outperforming traditional benchmarks.

Gutsche et al. (2020, p. 2) demonstrated that financial decision-makers in German households actively preferred sustainable equity funds over conventional ones, even after controlling for financial differences. This indicates that motives such as financial literacy, environmental values, and social norms significantly influence sustainable investment decisions. Framing sustainable options with social or environmental benefits further increases their appeal, even when returns may be lower (Gutsche et al., 2020, p. 2). Similarly, Bauer et al. (2021, p. 3976) found that two-thirds of surveyed participants were willing to invest pension funds in companies prioritizing the SDGs, despite potential financial drawbacks, highlighting strong social preferences (Bauer et al., 2021, p. 4012). Barber et al. (2021, pp. 182–183) and Hartzmark and Sussman (2017, pp. 2824–2825) also observed that many investors are willing to sacrifice financial gains for positive social and environmental impact, with sustainability often viewed as a desirable corporate trait. Wins and Zwergel (2016, pp. 94–96) noted a growing preference among German retail investors for sustainable investments, even at the cost of slightly lower financial returns. Additionally, Jansson and Biel (2011, pp. 140–142) identified financial considerations, environmental concerns, and the desire for a positive future as key motivators for adopting sustainable options.

These findings collectively suggest that sustainability, alongside financial performance, plays an increasingly critical role in investment decisions, forming the foundation for this thesis to explore the factors driving such preferences.

2.3.3 Framing in Socially Responsible Investing

Framing plays a pivotal role in influencing investor behavior, particularly as sustainability gains traction in investment decisions. Glac (2009, pp. 50–53) explored the impact of framing in socially responsible investing (SRI) through a framed field experiment. The study revealed that the presentation of investment opportunities significantly affects investor preferences, with financial framing showing more consistent effects than expressive framing. Glac highlighted how framing influences trade-offs between financial returns and social or environmental benefits, emphasizing financial attitudes as key determinants. While the study's reliance on undergraduate participants limits generalizability, it underscores the value of controlled experiments in understanding the causal effects of framing on SRI decisions (Glac, 2009, pp. 50–53). Additionally, Ropret Homar and Knežević Cvelbar (2021, pp. 4–6) reviewed 61 studies and found that framing environmental consequences as losses was more likely to drive behavioral change, whereas gain framing often shifted stated preferences. These findings highlight the importance of framing in shaping both environmental and investment decisions. However, these studies do not provide insights which sustainable characteristics resonate most with investors and what effect personality traits might have in explaining these preferences.

3 Methodology

This chapter outlines the methodology employed in this study to investigate the influence of framing effects on sustainable and socially responsible investment decisions. It provides a detailed explanation of the research methods employed, the data collection techniques and the analytical procedures used to address the research questions. The methodology chapter is divided into four key sections: the developed hypothesis [3.1], data and sample selection [3.2], research design [3.3] and the design of the survey used [3.4]. Each part is intended to explain the reasoning behind the chosen methodology, the application of statistical tools, and the theoretical foundations that guide the study, resulting in a strong framework for examining the decision-making process in sustainable investment.

3.1 Hypothesis

Building on past research (Barber et al., 2021; Bauer et al., 2021; Gutsche et al., 2020; Hartzmark & Sussman, 2017; M. Jansson & Biel, 2011; Rehman et al., 2024; Wins & Zwergel, 2016) this study assumes that investors prefer sustainable investments over conventional ones. Therefore, this study examines how framing specific environmental and social impacts influences investment decisions. It compares the explanatory power of various determinants, including pressing global issues, less prominent environmental concerns, culturally aligned social impacts, broader social issues, positive social outcomes and avoidance of negative social consequences. To analyze the different determinants and their impact the following Hypothesis will be tested:

The first hypothesis tests whether framing investments as addressing urgent global issues like climate change (Goal 13 of the UN SDGs) is more impactful than focusing on concerns like protecting endangered species (Goals 14 and 15) (Independent Group of Scientists appointed by the Secretary-General, 2023, p. 3) due to greater media attention (Bordalo et al., 2013, pp. 833–835). A study by the Federal Environment Agency found 93.6% of respondents believe in climate change and 72.5% expect its negative effects (Kestler, 2023). In Austria and Germany, climate change is a top concern, while protecting endangered species is less prioritized (Der Standard, 2023; Ipsos, 2024). Therefore, this hypothesis explores the following:

> ***H1:*** *Investors will allocate a significantly higher proportion of their hypothetical investment towards sustainable options framed with a focus on decreasing carbon emissions compared to those framed with a focus on safeguarding endangered species.*

Since hypothesis 1 focuses on the environmental aspect of framings the second hypothesis explores the social dimension of different framing messages. Based on social identity theory individuals tend to categorize themselves and others in different social categories, including membership in organizations, religions, gender, age groups (Ashforth & Mael, 1989, p. 20) and

nationality (Hogg et al., 1995, p. 259). People can be classified in various categories, and this enables individuals to self-define in the social environment (Ashforth & Mael, 1989, p. 20). The part of a person's self-definition that is based on their perceived membership in a relevant social group is called social identity (Bauer & Smeets, 2015b, p. 3). According to the research of Bauer and Smeets (2015b, p. 19) social identification plays a crucial role in the allocation to socially responsible investments. In hypothesis 2 the support for two categories from social identity theory are tested against each other: local community and gender. Based on Bénabou and Tirole's (2006, pp. 704, 711) theory of motivated cognition and the social identity theory, this hypothesis suggests that investors are more influenced by framing that aligns with their social identity and that highlights social impacts relevant to their cultural background or personal experiences. For the framing of gender equality Hardacre and Subašić (2018, pp. 10–11) found that while women showed a significant reaction to framing messages, men were more or less unaffected. While gender equality is important, it may feel more abstract to individuals without direct experience with it (Glas, 2022, pp. 969–971; Gurieva et al., 2022, pp. 77–79; Mazzuca & Santarelli, 2023, pp. 1271–1273). Local communities often form the social fabric of one's daily life, offering a sense of belonging, identification, and direct effect. When an investment opportunity presents itself as helpful to a certain community, it is more likely to appeal to an individual's personal experiences and emotional attachments to that place (Manzo & Perkins, 2006, pp. 347–348; Trope & Liberman, 2010, pp. 440–444). As potentially every individual can identify with their local community only about 50% are directly affected by gender inequality. Therefore, hypothesis 2 theorizes that the support of local communities will resonate more with the investors than the support of gender equality.

> ***H2:*** *Investors will allocate a significantly higher proportion of their hypothetical investment towards sustainable options framed with a focus on supporting local communities compared to those framed with a focus on gender equality.*

Hypothesis 3, based on Prospect Theory by Kahneman and Tversky (1979, pp. 268–269), suggests that investors are more influenced by loss aversion, where losses have a greater psychological impact than gains. People are more likely to take risks to avoid losses than to achieve gains (Kahneman & Tversky, 1979, p. 269). This implies that investors will respond more strongly to sustainable investment options framed in terms of avoiding negative outcomes (e.g., "Invest to prevent job losses") rather than highlighting positive outcomes (e.g., "Invest in creating jobs"). The loss frame triggers a stronger emotional response by focusing on the potential loss.

> ***H3:*** *Investors will allocate a significantly higher proportion of their hypothetical investment towards sustainable options framed with a focus on avoiding negative*

social outcomes generated by the investment compared to those framed with a focus on positive social consequences.

Building upon these hypotheses about framing effects, it is crucial to consider the underlying mechanisms that explain why certain frames have stronger effects on investor behavior than others. As possible reasons for these differences, this study examines how individual investor characteristics, such as risk tolerance, consumer identity, social and personal norms, trust, and justice beliefs, interact with frames to influence decision-making.

This analysis draws on Andorfer and Liebe's (2013) work on ethical consumption, particularly their study of Fair Trade coffee consumption, which explored how personal characteristics like consumer identity, personal norms, social norms, justice beliefs, and trust influence behavior (Andorfer & Liebe, 2013, p. 1251). This study extends their findings by examining how these traits shape responses to different investment frames. Andorfer and Liebe (2013) found that personal beliefs, especially those linked to social identity, strongly drive decision-making, while external factors like trust and justice concerns have less influence when personal norms are well-established (Andorfer & Liebe, 2013, pp. 1261–1262).

The first characteristic to consider is risk tolerance. It is debated whether risk-tolerant individuals invest less in sustainable equities, as they may perceive climate or ethical risks as less serious than risk-averse individuals. However, prior studies show mixed results. Bauer and Smeets (2015a, pp. 132–133) found that risk-tolerant clients invested less in sustainable banks, while Bassen et al. (2019, p. 72) noted that risk-tolerant investors focus more on climate performance than financial returns. Riedl and Smeets (2013, pp. 32–35) found a positive link between risk tolerance and the amount invested in sustainable equity funds. Based on these findings, the hypothesis to be tested is:

H4: *Investors with high risk tolerance will invest significantly more in the framed companies, compared to risk averse investors.*

Andorfer and Liebe (2013, p. 1253) suggest that individuals gain utility from adhering to social expectations tied to their identity, such as being an environmentally responsible investor. Consumer identity influences investment choices, with a stronger alignment to sustainable investing leading to higher commitment. Robba et al. (2024, pp. 1, 11) and Lavuri et al. (2023, p. 8) also highlight the significant role of personal values and attitudes in responsible investments. This study posits that investors who strongly identify with sustainable investing are more likely to respond positively to frames emphasizing social or environmental impact, increasing their willingness to invest. Conversely, those with a weaker sustainable identity may be less influenced by such frames.

H5: *Investors with high sustainable investor identity will invest significantly more in the framed companies, compared to investors with a low sustainable investor identity.*

Andorfer and Liebe (2013, pp. 1253–1254) highlight the role of social and personal norms in guiding behavior. Social norms drive individuals to make socially and environmentally responsible investments due to anticipated social benefits, while personal norms arise from internalized moral obligations and one's own values to align with ethical standards (Andorfer & Liebe, 2013, pp. 1253–1254; Schwartz, 1977, pp. 226–270). Rašić et al. (2024, pp. 185–186) found that personal values, such as altruism and environmental concern, often outweigh financial returns in investment decisions. Social norms, including pressure from family and friends, also influence sustainable behaviors (Jang & Kim, 2023a, pp. 6420–6421). This study posits that frames emphasizing social and personal norms will strongly influence sustainable investment behaviors. Investors aligned with these norms will respond positively to frames highlighting social approval or moral responsibility, increasing their willingness to invest in socially responsible portfolios. Conversely, those with weaker norms will experience less influence from such frames.

H6: *Investors with high social norms will invest significantly more in the framed companies, compared to investors with low social norms.*

H7: *Investors with high personal norms will invest significantly more in the framed companies, compared to investors with low personal norms.*

Trust plays a crucial role in sustainable investing. Investors who believe their decisions can make a difference are more likely to invest larger amounts (Nilsson, 2008, p. 321). However, a lack of trust in sustainable investment providers can be a significant barrier (Gutsche & Zwergel, 2020, pp. 144–146). Investors' decisions depend on their faith in companies' ability to deliver on promises of ethical practices and environmental responsibility. Like consumers unsure of the impact of their purchases, sustainable investors rely on trust to ensure their investments lead to positive social and environmental outcomes (Andorfer & Liebe, 2013, pp. 1254–1255).

H8: *Investors with high trust in providers of environmentally sustainable and socially responsible investments will invest significantly more in the framed companies, compared to investors with a low level of trust.*

Andorfer and Liebe (2013, p. 1254) introduce justice beliefs, suggesting that individuals who perceive a situation as unjust will seek to restore fairness, often through their choices. In sustainable investing, those who view global trade systems as unfair may invest in companies supporting ethical labor and environmental practices to align with their sense of justice. Sharma (2023, pp. 1, 5) and Parmono and Nguyen (2019, p. 728) support this, noting that

justice beliefs influence sustainable investment and consumption decisions. This study assumes that investors who perceive global systems as unjust will be more responsive to frames emphasizing ethical practices, while those with weaker justice beliefs may be less influenced.

> ***H9:*** *Investors with high justice beliefs will invest significantly more in the framed companies, compared to individuals with a low level of justice beliefs.*

3.2 Data

This study used an online survey to reach a broad sample of potential investors. A minimum sample size of 34 participants was calculated using G*Power for a paired t-test, with an alpha level of 0.05, power of 0.80, and a medium effect size. However, based on descriptive statistics from Gutsche et al. (2020, p. 43), the required sample size increases to 100 participants to detect differences with higher power (0.95). A within-subjects design, where all participants experience all conditions, enhances statistical power by reducing variability from individual differences. The survey link was distributed through various channels, including university groups, colleagues, and personal contacts.

Compared to the general Austrian population in 2024, the 111 respondents in this sample are younger. In the sample 45.95% are in the age group 25–34 and 33.34% in the group 18-24, whereas only 12.38% and 7.5% are in the same groups in the overall population (Statistik Austria, 2024b). Only one participant is younger than 18 years of age and 16.21% of the questioned people are older than 45 years, compared to 48.23% in the Austrian population (Statistik Austria, 2024b). The sample is also slightly more male, with 51,35% compared to 49,3% in the overall population (Statistik Austria, 2024a). Only one person indicated non-binary as their gender and 47.75% are female. The respondents are more educated with 55.85% of higher education compared to 20.4% (Statistik Austria, 2022). Higher education includes postsecondary degrees like bachelor's and above (Britannica, T. Editors of Encyclopaedia, 2024). Since education levels in Austria have remained stable between 2019 and 2022, the latest available data from 2022 were used for comparison. For only eight individuals the highest educational level is below an A-level degree. The sample's median household income (2,500–3,000 EUR) is below the national median of 3,765 EUR (Statistik Austria, 2024c), reflecting the sample's composition of students and junior professionals, with fewer older individuals. More details about the demographics of the sample can be found in the appendix in chapter 7.5.

3.3 Research Design

This study employs a within-subject design and paired t-tests to investigate how framing effects influence sustainable and socially responsible investment decisions. The within-subject approach enhances statistical power by controlling for individual differences, reducing

variability, and requiring smaller sample sizes (Simkus, 2023; Suong et al., 2024, pp. 9–10). This was possible since the same participants are used in all conditions, each participant serves as their own control, eliminating the effects of individual variations between conditions. However, to address potential carryover effects from sequential exposure to conditions, the order of investment-related questions was randomized, and participants were instructed to treat each scenario independently (Simkus, 2023; Suong et al., 2024, pp. 11–13).

With the paired sample t-test, two paired samples are tested to see whether their averages differ significantly. A paired sample is one in which the same individual is subject to two distinct treatments or measures (Darwis et al., 2022, p. 278). It is ideal for comparing means in related samples, ensures precise measurement of framing effects by accounting for the dependency between observations (Gleichmann, 2020; Hossain & Siddiqua, 2024, p. 477; Mishra et al., 2019, p. 409). In this study, participants were asked to allocate investment amounts between different framing conditions for the same set of companies. The paired t-test is appropriate because it accounts for the fact that the data points (investment amounts) are not independent, they are linked by the participants. There is a significant difference between the amount invested in the two framings if the significance value is smaller than 0.05. This indicates that one framing had a significantly stronger effect than the other one. Conversely, differently framed scenarios do not significantly vary from one another if the significance value is larger than 0.05. Assumptions of the test, including normality and continuous data (Mishra et al., 2019, p. 409), are met, ensuring the validity of results.

In a next step a repeated measures ANOVA was conducted to assess the difference in mean scores under different conditions (Brown & Grays, 2020, p. 346; Laerd Statistics, n.d.; Muhammad, 2023a, p. 1; Park et al., 2016, p. 97; Reiczigel, 1999, pp. 1059–1060; Sullivan, 2008, p. 1238). The repeated measures ANOVA accounts for the dependencies among observations from the same participants under both the experimental and control conditions. This approach helps isolate the effect of the treatment framing (independent variable) on the amount invested (dependent variable) while accounting for variations across subgroups based on personal characteristics (moderator variable).

This robust design integrates behavioral theories and investor traits to provide a comprehensive analysis of investment behavior.

3.4 Survey Design

The questionnaire was administered online using SociSurvey, a versatile tool that provided the necessary features for the creation of this online survey and the collection of the necessary data. The questionnaire was divided into three distinct parts: demographics, sustainable framing and personal characteristics. After creating the survey, a pretest was conducted to assess its quality and reliability, which is included in the appendix. Utilizing SociSurvey's functionality to support multilingual survey creation, the questionnaire was designed in both

English and German to ensure accessibility for a diverse audience. However, only the English version is included in the appendix.

The demographics section used standardized questions adapted to the Austrian education system, covering gender, age, education level, and household income. While these factors may not be central to the study, they provide additional insights to contextualize the sample.

The sustainable framing section of this survey follows the demographics part to ensure a quick and easy start for participants, helping maintain momentum. Participants are asked to allocate 500 EUR among four companies focused on sustainability and ethical practices, simulating a long-term retirement investment strategy, which encourages conservative decision-making (Glac, 2009, p. 46). There are two primary benefits to this design. First, it shows how much more money people invest in the firm with the particular frame, which helps assess how effective the framing is. Second, it simplifies the decision-making process for participants by letting them transfer small amounts of money between the businesses rather than forcing them to put all of their money into one. Since the underlying assumption of this study is that people prefer to invest in sustainable investment products over conventional ones (Barber et al., 2021; Bauer et al., 2021; Gutsche et al., 2020; Hartzmark & Sussman, 2017; M. Jansson & Biel, 2011; Rehman et al., 2024; Wins & Zwergel, 2016), it was important to make all four companies at least to some extent sustainable, environmentally friendly or socially responsible. Limiting sustainability to only a subset of companies might have introduced biases and distortions in the framing effects, particularly when analyzing and comparing their impact across companies with varying levels of sustainability. The decision to create four companies that don't exist was important to hinder the influence of prior knowledge about the performance of these companies, it also led to the opportunity to let them choose between four different branches to also take the personal preferences, with regards to certain business areas, of the participants into account. In the first question of this part of the survey four companies will be introduced with a short company description highlighting its core business activities. With this general description, participants will distribute the money between different investment alternatives, to see how they decide before introducing different frames to them.

- **EcoTech Solutions** develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.
- **GreenHarvest Farms** practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.
- **EthicalTrade Co.** is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.

- **CommunityBuilders Inc.** focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.

The answer of the investors to this question builds the basis to which the different frames will be compared to. So, the effectiveness of a frame is defined as a higher amount invested to the company framed compared to the amount invested to that company in the baseline question without framing. Following this first question, there will be six framing questions, where only one company will be framed in each question with a message focused on specific social or environmental impacts generated by the company. As already explained in the hypothesis for this study, these frames focus on decreasing carbon emissions, safeguarding endangered species, supporting local communities, gender equality, avoiding negative social outcomes as well as a focus on positive social consequences. To combat these topics additional framing messages will be displayed prominently and in bold font alongside the company description for each investment option and are formulated in the following way:

- **Decrease Carbon Emissions:** With a commitment to reducing carbon emissions and promoting environmental stewardship, EcoTech Solutions is at the forefront of creating a greener future.
- **Safeguarding Endangered Species:** GreenHarvest Farms is dedicated to preserving local ecosystems and biodiversity, actively participating in efforts to safeguard endangered species through habitat restoration and conservation initiatives.
- **Supporting Local Communities:** EthicalTrade Co. actively supports local communities by empowering artisans, prioritizing partnerships with local farmers and producers and promoting fair labor practices, fostering economic development, community resilience and strengthening social bonds.
- **Gender Equality:** EcoTech Solutions is committed to promoting gender equality in the renewable energy sector, fostering an inclusive work environment and providing equal opportunities for all employees regardless of gender.
- **Avoiding Negative Social Outcomes:** GreenHarvest Farms actively contributes to the local economy by supporting job creating initiatives, providing employment opportunities and fostering economic growth in rural communities.
- **Positive Social Consequences:** CommunityBuilders Inc. addresses the challenges posed by technological advancements by implementing strategies that prevent job loss and ensure workforce resiliency, thereby safeguarding livelihoods and promoting economic stability in communities.

The description for the other three companies stays the same. Although bolding may introduce confirmation bias, leading participants to align with perceived expectations (Pouget et al., 2017, pp. 2095–2096), the pretest showed it was necessary, as participants otherwise

questioned the differences between scenarios. As discussed in Chapter 3.3, carry-over or order effects can occur when responses to one question influence another. To minimize this effect the question including a framing were randomized for all participants, so everyone got a random order of questions, only the question including the description of the companies without any framing, which creates the baseline for each participant, remains as the first question of this part. Another way to counterbalance this effect was by including the following passage in the introduction and description of this part in the questionnaire, as well as a reminder before each framed question:

> *"[…] Your decision-making process should solely rely on the information presented in each specific question, and **no** prior knowledge from previous questions should influence your personal choices.*
>
> *Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question! "*

After the survey has been conducted, the relationship between the differences in investment amounts (dependent variable) and the framing conditions (independent variables) was analyzed using a paired t-test framework. Differences were calculated by subtracting control values from the framed values for each hypothesis: Decrease carbon footprint vs. Safeguard endangered species (H1), Supporting local communities vs. Supporting gender equality (H2), and Invest in creating jobs vs. Invest in preventing job loss (H3). Paired t-tests were then conducted to compare these differences, testing whether one frame led to significantly higher investment preferences than the other. The analyses, performed in R-Studio, provided t-values and p-values to assess the statistical significance of the framing effects.

The personal characteristics section was deliberately placed at the end of the survey, following the framed investment questions, to address the influence of the question-behavior effect (QBE). The QBE suggests that asking individuals about their values, attitudes, or preferences can shape subsequent behavior, often leading to greater alignment with the values expressed (Spangenberg et al., 2016, p. 455; Sprott et al., 2006, pp. 130–131). Studies, including Morwitz et al. (1993), have demonstrated that pre-questioning can significantly impact consumer behavior, such as increasing purchase likelihood (Morwitz et al., 1993, p. 59). Spangenberg et al. (2016) further substantiated this effect by analyzing 40 years of research, concluding that questioning individuals about ethical or socially desirable topics can encourage behavior consistent with those values (Spangenberg et al., 2016, pp. 454–455).

By placing personal characteristic questions—such as those on sustainable investor identity, justice beliefs, or social norms—at the end of the survey, the study reduces the risk of participants consciously or unconsciously modifying their responses to align with these characteristics. This sequencing ensures that responses to the framed investment questions remain unbiased, leading to more authentic data. The decision aligns with findings from prior research, highlighting the importance of survey design in obtaining reliable behavioral insights.

By changing the order and exposing participants with the framed investment questions first, more authentic responses should be obtained.

The questions used in this part of the survey were adapted from various tested questionnaires (Andorfer & Liebe, 2013, p. 1256; Edward Jones, 2021; Gates, 2011, p. 117; J. Jansson & Dorrepaal, 2015, p. 387; Testa et al., 2020, pp. 80, 84) and tailored to this study. To keep the survey concise and minimize dropouts, only three to four questions were selected for each personal characteristic, ensuring the survey could be completed in under 15 minutes. All questions used a uniform 5-point Likert scale, ranging from strongly disagree to strongly agree, with three increments (somewhat disagree, neutral, somewhat agree). This consistent format made the survey easier to understand and complete, while providing a neutral option to avoid pressuring participants into unsupported responses. The precise questions included in this survey were chosen based on their statistical power in previous research, their adaptability to the individual instance of this study, and their perceived relevance and interest it seemed to have for this topic.

The work by Andorfer and Liebe (2013) significantly influenced the selection of personal characteristics for the analysis of this thesis. The first characteristic they looked at was consumer identity, which is described as a collection of meanings attached to the self that act as a benchmark or point of reference that directs behavior in circumstances. According to their research on consumer behavior in moral marketplaces, purchasing fair trade goods therefore supports not only small-scale producer cooperatives and workers in developing nations, but also serves as a means of expressing one's identity as a moral person (Andorfer & Liebe, 2013, p. 1253). Their findings identified this characteristic as the most prominent factor shaping consumer behavior (Andorfer & Liebe, 2013, p. 1260). This insight prompted the decision to place the questions about consumer behavior at the forefront of the personal characteristics section in the questionnaire. The questions for this part were taken from the works of Testa et al. (2020) since they were formulated in a more general and easier way than the ones used by Andorfer and Liebe (2013). Participants were asked to rate their agreement with the following four statements using a 5-point Likert scale:

- *"I buy products which have a low negative impact on the environment.*
- *I buy products made in safe and healthy workplaces (e.g. fair trade).*
- *I do my best to buy local products.*
- *I follow trends." (Testa et al., 2020, p. 80)*

For all four statements a higher agreement indicates a higher consumer identity of the investor.

Another factor that showed a significant impact on consumer behavior according to Andorfer and Liebe (2013, p. 1260) was trust. Since they only used one question in their work to test for this characteristic, three further questions were taken from the study by Testa et al. (2020).

- *"I pay much attention to whether a product is certified by third parties.*

- *I generally have faith in third-party certification.*
- *I generally trust third parties."* (Testa et al., 2020, p. 84)
- *"I doubt that the money invested in sustainable investment products actually reaches the people and projects the companies promise it would."* (Andorfer & Liebe, 2013, p. 1256)

In contrast to the first three questions, which were again positively phrased, which means that a higher agreement indicates a higher level of trust, the last question is negatively phrased. Because a stronger disagreement actually indicates a higher level of trust, this has to be decoded when analyzing the data later on. By doing so, the questions from both Andorfer and Liebe (2013) and Testa et al. (2020) could be used in the way they tested them and it also helps to counterbalance the effect of participants who might rush through the survey, consistently selecting the same extreme responses (such as "strongly agree"). In this case, one negatively worded question ensures that such behavior will not simply inflate their trust scores.

Following that, questions about social and personal norms were presented to the participants. The questions for this part were taken from the work by Jansson and Dorrepaal (2015) who analyzed how the behavior to act against climate change can be explained. According to their work personal norms strongly influences this behavior (J. Jansson & Dorrepaal, 2015, p. 381). In contrast to their findings, Andorfer and Liebe (2013, pp. 1258–1260) found a stronger effect for social norms. From all the questions they present in their study the following six were chosen, because according to their data, these questions were the strongest indicator for the characteristics in question (J. Jansson & Dorrepaal, 2015, p. 387):

Social Norms:

- *"People around me think that I should do as much as possible to protect the environment.*
- *I see many people around me who actively act in a climate friendly way.*
- *I think that many people who mean a lot to me expect me to reduce my climate impact."* (J. Jansson & Dorrepaal, 2015, p. 387)

Personal Norms:

- *"I have a moral responsibility to take climate change into consideration.*
- *Not only governments and industry are responsible for climate change, I am as well.*
- *I feel a moral obligation to invest in sustainable investment products." (J. Jansson & Dorrepaal, 2015, p. 387)*

For the questions about justice beliefs Andorfer and Liebe (2013, p. 1256) provide mostly questions specifically about their example about coffee consumptions besides one question which is included also in this survey. Additionally, the research by Gates (2011) offered three more questions for this characteristic, since his work focuses on the effects of climate justice.

- *"In my opinion, there are justified differences in wealth between developing countries and industrialized countries."* (Andorfer & Liebe, 2013, p. 1256)
- *"There will always be rich and poor people in society, it is a fact of life.*
- *If you work hard you will be financially secure.*
- *Most poor people could get out of poverty if they would take initiative and work harder."* (Gates, 2011, p. 117)

In contrast to the other statements before, all four are formulated in a negative way. By doing so it is possible to take the questions as they were tested in the two studies, and it is not necessary to rephrase them. In the following analysis those questions have to be decoded to get right results.

The last characteristic that was evaluated is the risk tolerance of the participants. Those questions were put last in the survey because their structure differs from all the other characteristics. The questions for this endeavor were taken from the Edward Jones Risk Tolerance Questionnaire (provided by the USA Financial Advice company Edward Jones) (Edward Jones, 2021) which comes with some benefits and costs. The benefits are, that this set of questions is commonly used in financial advisory and therefore often reviewed and tested, to give a high indication of the investors risk tolerance. On the downside however it takes too long to add the whole questionnaire to this survey, which resulted in a practical reduction to the four questions which are presented in the appendix in chapter 7.2.

After the survey was conducted, the participant's responses to the Likert-scale questions assessing personal characteristics were assigned numerical scores based on their selected answers. These scores were then aggregated for each personal characteristic to compute a total score. Participants whose total scores exceeded the median for a given characteristic were categorized as having a *high* level of that characteristic, while those scoring below the median were categorized as *low*. A repeated measures ANOVA then evaluates whether *high* and *low* subgroups exhibit significantly different decision-making behaviors when comparing pre- and post-treatment (framing) conditions (Muhammad, 2023b, p. 1; Park et al., 2016, p. 97; Sullivan, 2008, p. 1238). By focusing on how decisions differ before and after the framing condition within each subgroup, the repeated measures ANOVA allows for a robust assessment of whether the framing effect varies significantly depending on the strength of personal traits. Furthermore, this approach minimizes error variance by accounting for individual differences, making sure that the observed effects are due to the interaction between the framing condition and the subgroup classification, rather than random fluctuations or unrelated factors (Sullivan, 2008, pp. 1238–1239). A significant interaction effect with a higher mean difference for the *high* subgroup individuals would suggest that the strength of certain personal characteristics moderates the effectiveness of specific framing strategies.

4 Analysis of Survey Data

This chapter presents the results of the data analysis examining the effects of framing on sustainable and socially responsible investment decisions, along with the influence of personal characteristics. The analyses were conducted using R-Studio.

The chapter is structured into three main sections and aims to provide insights into how framing and personal traits influence sustainable investment behavior. Section [4.1] provides an overview of general investment preferences, showing how participants allocated funds to different companies. The second section [4.2] presents the findings of the framing effects, highlighting how different presentations of investment options influenced participant decisions. Section [4.3] examines the role of personal characteristics—such as consumer identity, trust, and risk tolerance—in shaping investment choices, including analysis on subgroup differences.

4.1 General Preferences

An initial analysis of the investment distribution shows distinct preferences among participants. Despite all four companies being framed as contributing positively to sustainability, EcoTech Solutions, a technology company, received the highest investment by a significant margin (mean = 203.38 EUR). It was followed by GreenHarvest Farms (mean = 131.94 EUR), an agricultural company, and CommunityBuilders Inc. (mean = 105.54 EUR), which focuses on urban revitalization and community development. EthicalTrade Co., with its emphasis on ethical sourcing and fair trade, received the least investment (mean = 59.14 EUR), suggesting that participants perceived it as having lower potential for future returns compared to the other companies. These findings indicate that, despite a consistent emphasis on sustainability, investors demonstrated a preference for technology and agriculture over ethical sourcing, potentially driven by varying perceptions of the sectors' impact and financial viability.

4.2 Results of the Framing Effects

The paired t-tests provide robust evidence of statistically significant differences across all examined dimensions, with sustainable framing attributes consistently outperforming control values. Every treatment demonstrates significantly higher amounts invested compared to the control condition, with the mean differences and corresponding t-values detailed in table 1. For framing initiatives aimed at safeguarding endangered species, the mean difference was 45.24 ($t = 5.728$, $p < 0.0001$), and for investing to prevent job loss, the mean difference was 36.55 ($t = 5.237$, $p < 0.0001$), indicating particularly strong impact in these areas.

Table 1: Paired t-test Analysis of Sustainability Framing Effects on Investment Preferences

Statistical Analysis of the Impact of Sustainability Framing on Investment Preferences

Treatment vs. Control	Mean Treatment Group (Standard Deviation)	Mean Control Group (Standard Deviation)	Mean Difference	t-value	p-value	Conf. Inverval (Lower)	Conf. Interval (Higher)
Decrease Carbon Footprint	235.06 (108.86)	203.38 (99.53)	31 685	5 174	< 0.0001	19 549	43 821
Safeguard Endangered Species	177.18 (107.06)	131.94 (89.57)	45 243	5 728	< 0.0001	29 589	60 897
Supporting Local Communities	93.31 (83.58)	59.14 (55.56)	34 162	5 181	< 0.0001	21 095	47 229
Supporting Gender Equality	226.62 (110.58)	203.38 (99.53)	23 243	2 636	< 0.0001	5 772	40 715
Invest in Creating Jobs	159.98 (88.79)	131.94 (89.57)	28 045	4 724	< 0.0001	16 281	39 810
Invest in Preventing Job Loss	142.09 (95.54)	105.54 (82.74)	36 550	5 237	< 0.0001	22 718	50 381

Notes: The results from paired t-tests presented in this table compare the mean investment preferences between sustainability frames and their respective control values. Each row corresponds to a specific sustainability frame and its paired comparison to a control value, with the aim of assessing whether framing an investment option with a specific sustainability focus influences investor decisions.
Each paired t-test was conducted with 110 degrees of freedom, corresponding to the number of participants in the study.
Mean Difference: Average difference between treatment and control groups. Due to the design of the study, there are 111 participants in the treatment and in the control group.
t-value: Size of the difference relative to variation. Due to equal sample sizes higher values suggest stronger effects.
p-value: The p-value gives the probability of observing the test results under the null hypothesis. The lower the p-value, the lower the probability of obtaining a result like the one that was observed if the null hypothesis was true. Thus, a low p-value indicates decreased support for the null hypothesis.
Confidence Interval (CI): Range within which the true mean difference likely lies (usually 95%).

The analysis compared the investment amounts allocated to sustainable options framed with specific focuses to alternative framing messages. By computing the differences in investment amounts between each sustainable framing condition and corresponding control values, paired t-tests were conducted to assess whether these specific framings (e.g., reducing carbon emissions, supporting local communities or avoiding negative outcomes) led to significantly higher hypothetical investment proportions. The results are summarized in table 2.

Table 2: Paired t-test Comparison of Sustainability Framing Effects Within Hypotheses

Statistical Analysis of the Difference Between Sustainability Framing Effects on Investment Preferences

Hypothese	Treatment vs. Treatment	Mean Difference	t-value	p-value
H1	Decrease Carbon Footprint vs. Safeguarding Endangered Species	-13 558	-1 332	0.907
H2	Supporting Local Communities vs. Supporting Gender Equality	10 919	1 331	0.093
H3	Invest in Preventing Job Loss vs. Invest in Creating Jobs	8 504	1 099	0.137

Notes: The results from paired t-tests presented in this table compare the mean differences between two sustainability frames within each hypothesis. The tests are designed to assess whether one sustainability frame (first mentioned in the table) has a greater influence on investment preferences than the other (mentioned second in the table) within each pair.
Each paired t-test was conducted with 110 degrees of freedom, corresponding to the number of participants in the study.
Mean Difference: Average difference between treatment and control groups. Due to the design of the study, there are 111 participants in the treatment and in the control group.
t-value: Size of the difference relative to variation. Due to equal sample sizes higher values suggest stronger effects.
p-value: The p-value gives the probability of observing the test results under the null hypothesis. The lower the p-value, the lower the probability of obtaining a result like the one that was observed if the null hypothesis was true. Thus, a low p-value indicates decreased support for the null hypothesis.
Confidence Interval (CI): Range within which the true mean difference likely lies (usually 95%).

The paired t-test comparing the differences in investment allocations between sustainable options framed as decreasing carbon emissions and safeguarding endangered species (H1) yielded a t-value of -1.332 and a p-value of 0.907. The mean difference between the two conditions was -13.56. Given the high p-value, there is no evidence to support the alternative

hypothesis that framing with a focus on decreasing carbon emissions leads to significantly higher investment allocations compared to safeguarding endangered species. This suggests that both framings are perceived similarly, or that the safeguarding framing might even be slightly more compelling, though not statistically significant.

A paired t-test comparing the investment allocations of sustainable alternatives framed as supporting local communities and supporting gender equality (H2) produced a p-value of 0.093 and a t-value of 1.331. The mean difference was 10.92. Although the p-value is slightly above the conventional significance threshold ($p < 0.05$), the results indicate a weak trend within the sample, suggesting a preference for sustainable investments framed as supporting local communities over those framed as supporting gender equality. However, due to the lack of statistical significance, this trend cannot be confidently generalized to the broader population.

The test comparing the differences in investment allocations between sustainable options framed as preventing job loss (avoiding negative outcomes) and creating jobs (achieving positive outcomes) (H3) yielded a t-value of 1.099 and a p-value of 0.137. The mean difference was 8.50. While there is a modest trend favoring the preventing job loss framing, the result is not statistically significant. This indicates that both framings are likely to have a similar impact on investment allocations, with no substantial preference for one over the other.

Overall, the results provide limited evidence to support the proposed hypothesis. None of the paired comparisons demonstrated statistically significant differences in investment allocations across the tested framing conditions. In response to this, further analysis was done by segmenting the sample based on gender subgroups to determine if differences in preferences might emerge within these distinct categories. The results are presented in table A8 in the appendix.

For hypothesis 1 there was still no significant difference when analyzing based on the gender subgroups. The results reveal that for hypothesis 2, males show a marginally significant preference for supporting local communities over supporting gender equality ($p = 0.061$), while females do not display a significant preference ($p = 0.338$). This suggests a slight male tendency to prioritize community-focused investments. With respect to hypothesis 3, males show no significant preference between investing in creating jobs and preventing job loss ($p = 0.659$), whereas females demonstrate a slightly significant preference for preventing job loss ($p = 0.052$). This highlights potential gender differences in economic value prioritization.

4.3 Results of the Personal Characteristics

After seeing the effects different frames had on the investment decision, the origin of these effects was of overarching interest for this study. Each of the six framing conditions was analyzed with respect to seven personal characteristics: consumer identity, trust, social norms, personal norms, social and personal norms, justice beliefs, and risk tolerance.

This chapter presents the results of the repeated measures ANOVAs, which examine the influence of these personal characteristics on investment decisions under different sustainable framings. The analyses aim to evaluate whether these personal characteristics moderate the effect of sustainable framing, as hypothesized. To account for the increased risk of *Type I errors* (when a statistical test incorrectly rejects a true null hypothesis, leading to the false conclusion that an effect or relationship exists when it does not) due to multiple comparisons, Bonferroni corrections were applied, ensuring robust statistical interpretation (Hemmerich, 2016). The findings, presented in tables 3 and 4, highlight nuanced patterns of interaction between personal characteristics and treatment framing, offering insights into how individual differences shape investment behavior.

The first characteristic analyzed is risk tolerance, in accordance with the hypothesis (H4) that posits that investors with high risk tolerance will invest significantly more in the framed companies compared to risk-averse investors. Across all scenarios, the main effect of framing was consistently significant ($p < 0.01$ or lower), indicating that framed investments significantly increase investment levels regardless of risk tolerance. However, the interaction effects between treatment and risk tolerance were not significant in any scenario, suggesting limited evidence for differential responses based on risk tolerance. These results indicate that the effect of treatment framing on investment decisions does not differ meaningfully between high and low risk tolerance subgroups across the tested contexts. While a slight trend in supporting local communities ($p = 0.172$) hints at a potential differential effect especially for risk-averse individuals, the evidence is insufficient for drawing definitive conclusions.

Given the need for six tests to evaluate this hypothesis, Bonferroni corrections were applied to control for Type I errors, multiplying each p-value by six. After adjustment, all p-values remained non-significant, reinforcing the conclusion that risk tolerance does not moderate the effect of treatment framing on investment behavior across the tested scenarios.

The hypothesis that investors with higher sustainable investor identity invest significantly more in framed companies compared to those with low sustainable investor identity (H5) was only partially supported by the results of the repeated measures ANOVAs. Across the analyzed scenarios, the main effect of framing was consistently significant ($p < 0.01$ or lower), confirming that framing investment opportunities in a socially or environmentally sustainable context significantly influences investor behavior. However, the interaction effect between treatment and sustainable investor identity revealed a more nuanced pattern. For the framings supporting gender equality ($p = 0.045$) and invest in creating jobs ($p = 0.011$), significant interaction effects were observed, but the detailed examination of the means for invest in creating jobs framing reveals a striking insight. While both high and low sustainable investor identity subgroups show increased investments under framing, the effect was more pronounced in the low-identity subgroup. Specifically, the mean investment in low-identity subgroup increased from 103.45 in the control condition to 146.69 in the treatment condition

(mean difference = 43.24), compared to a smaller increase in the high-identity subgroup, from 159.91 to 172.04 (mean difference = 12.13).

Table 3: Moderator Analysis of Personal Characteristics on the Impact of Sustainability Framing: Repeated Measures ANOVA Results – Part 1

Statistical Analysis of Treatment Effects on Environmental and Social Outcomes in Relation to Personal Characteristics - Part 1

					repeated measures ANOVA (high-low, treatment-control)		
	Treatment	Subgroup	Mean Treatment Group (Standard Deviation)	Mean Control Group (Standard Deviation)	F-Statistic	p-value	adjusted p-value
Risk Tolerance	Decrease Carbon Footprint	High	255.00 (106.15)	229.42 (114.39)	0.435	0.511	3 066
		Low	226.26 (109.56)	191.88 (90.66)			
	Safeguard Endangered Species	High	175.44 (101.74)	132.21 (84.07)	0.028	0.867	5 202
		Low	177.95 (109.97)	131.82 (92.43)			
	Supporting Local Communities	High	75.00 (76.66)	54.41 (55.89)	1 886	0.172	1 032
		Low	101.39 (85.68)	61.23 (55.65)			
	Supporting Gender Equality	High	246.76 (118.24)	229.41 (114.39)	0.196	0.659	3 954
		Low	217.73 (106.62)	191.88 (90.66)			
	Invest in Creating Jobs	High	165.44 (82.62)	132.21 (84.07)	0.336	0.564	3 384
		Low	157.57 (91.79)	131.82 (92.43)			
	Invest in Preventing Job Loss	High	118.08 (92.08)	83.97 (67.20)	0.053	0.818	4 908
		Low	152.68 (95.69)	115.06 (87.45)			
Consumer Identity	Decrease Carbon Footprint	High	228.94 (118.67)	185.81 (92.58)	3 580	0.061	0.366
		Low	241.40 (98.56)	221.27 (103.94)			
	Safeguard Endangered Species	High	198.39 (110.61)	159.91 (88.06)	0.744	0.390	2.340
		Low	155.58 (99.73)	103.45 (82.51)			
	Supporting Local Communities	High	108.39 (90.87)	64.28 (48.09)	2 345	0.129	0.774
		Low	77.95 (73.09)	53.91 (62.26)			
	Supporting Gender Equality	High	226.52 (121.76)	185.81 (92.58)	4 112	0.045	0.270
		Low	226.73 (99.05)	221.27 (103.94)			
	Invest in Creating Jobs	High	173.04 (91.39)	159.91 (88.06)	6 769	0.011	0.066
		Low	146.69 (84.82)	103.45 (82.51)			
	Invest in Preventing Job Loss	High	123.93 (91.57)	90.00 (83.82)	0.142	0.707	4 242
		Low	160.58 (96.76)	121.36 (79.26)			
Social Norms	Decrease Carbon Footprint	High	243.51 (102.63)	205.17 (91.81)	1 247	0.267	1 602
		Low	226.15 (115.37)	201.48 (107.91)			
	Safeguard Endangered Species	High	175.00 (105.61)	134.82 (81.12)	0.432	0.512	3 072
		Low	179.48 (109.53)	128.89 (98.39)			
	Supporting Local Communities	High	98.07 (90.26)	59.21 (50.34)	0.533	0.467	2 802
		Low	88.28 (76.41)	59.07 (61.06)			
	Supporting Gender Equality	High	232.89 (110.11)	205.17 (91.82)	0.270	0.604	3 624
		Low	220.00 (111.73)	201.48 (107.92)			
	Invest in Creating Jobs	High	149.65 (85.67)	134.82 (81.12)	5 447	0.021	0.126
		Low	170.89 (91.49)	128.89 (98.39)			
	Invest in Preventing Job Loss	High	134.38 (92.34)	100.79 (80.71)	0.188	0.666	3 996
		Low	150.22 (99.03)	110.56 (85.31)			
Personal Norms	Decrease Carbon Footprint	High	239.41 (96.86)	194.45 (83.36)	6 725	0.011	0.066
		Low	229.15 (124.21)	215.53 (117.93)			
	Safeguard Endangered Species	High	194.95 (98.64)	144.53 (81.19)	0.583	0.447	2 682
		Low	152.98 (114.22)	114.78 (98.16)			
	Supporting Local Communities	High	111.82 (91.87)	60.55 (53.85)	9 924	0.002	0.012
		Low	68.08 (63.38)	57.24 (58.35)			
	Supporting Gender Equality	High	228.36 (107.14)	194.46 (83.37)	2 010	0.159	0.954
		Low	224.25 (116.25)	215.54 (117.93)			
	Invest in Creating Jobs	High	164.58 (80.82)	144.53 (81.19)	2 506	0.116	0.696
		Low	153.72 (99.18)	114.78 (98.16)			
	Invest in Preventing Job Loss	High	149.79 (85.09)	100.47 (79.75)	4 719	0.032	0.192
		Low	131.59 (108.24)	112.45 (87.03)			

Notes : The results from repeated measures ANOVAs presented in this table assess the impact of framing on investment preferences, considering personal characteristics across different subgroups. Each analysis compares the treatment group (focused on specific sustainability frames) with the control group. The focus is to examine if the sustainability frame influences the investment choices based on individual characteristics.
Each analysis was conducted with 110 degrees of freedom, corresponding to the number of participants in the study (111 participants in both the treatment and control groups).
The F-value indicates the magnitude of the treatment effect relative to within-subject variation, and the p-value indicates the likelihood that the observed differences could be due to random chance.
Mean and Standard Deviation: In addition to the significance tests, the mean and standard deviation for both the treatment and control groups are provided for each subgroup to give a detailed understanding of the distribution of values.
The adjusted p-values, calculated by multiplying the original p-values by six to account for the Bonferroni correction, are presented in the table. This adjustment ensures that the multiple comparisons do not inflate the type I error rate while evaluating the effect of personal characteristics across all framing conditions.

Table 4: Moderator Analysis of Personal Characteristics on the Impact of Sustainability Framing: Repeated Measures ANOVA Results – Part 2

Statistical Analysis of Treatment Effects on Environmental and Social Outcomes in Relation to Personal Characteristics - Part 2

					repeated measures ANOVA (high-low, treatment-control)		
	Treatment	Subgroup	Mean Treatment Group (Standard Deviation)	Mean Control Group (Standard Deviation)	F-Statistic	p-value	adjusted p-value
Social and Personal Norms	Decrease Carbon Footprint	High	239.48 (95.98)	197.50 (86.21)	2 176	0.143	0.858
		Low	231.69 (118.38)	207.85 (109.06)			
	Safeguard Endangered Species	High	195.11 (107.47)	144.48 (85.32)	0.352	0.554	3 324
		Low	163.52 (105.55)	122.38 (92.21)			
	Supporting Local Communities	High	103.03 (97.24)	54.79 (52.63)	3 548	0.062	0.372
		Low	85.91 (71.39)	62.46 (57.89)			
	Supporting Gender Equality	High	228.54 (106.98)	197.50 (86.21)	0.594	0.443	2 658
		Low	225.16 (114.08)	207.86 (109.06)			
	Invest in Creating Jobs	High	163.23 (90.35)	144.48 (85.32)	1 883	0.173	1 038
		Low	157.51 (88.23)	122.38 (92.20)			
	Invest in Preventing Job Loss	High	152.61 (94.89)	103.23 (86.55)	2 610	0.109	0.654
		Low	134.08 (96.01)	107.31 (80.36)			
Trust	Decrease Carbon Footprint	High	242.19 (106.45)	203.05 (107.12)	0.869	0.353	2 118
		Low	230.88 (110.79)	203.57 (95.61)			
	Safeguard Endangered Species	High	196.58 (115.37)	153.66 (109.13)	0.050	0.824	4 944
		Low	165.81 (101.01)	119.21 (73.77)			
	Supporting Local Communities	High	92.07 (80.34)	50.00 (50.00)	0.842	0.361	2 166
		Low	94.03 (85.98)	64.50 (58.25)			
	Supporting Gender Equality	High	214.51 (112.07)	203.05 (107.11)	1 046	0.309	1 854
		Low	233.71 (109.89)	203.57 (95.61)			
	Invest in Creating Jobs	High	174.02 (103.79)	153.65 (109.13)	0.980	0.324	1 944
		Low	151.75 (78.34)	119.21 (73.77)			
	Invest in Preventing Job Loss	High	145.00 (75.43)	93.29 (62.76)	2 808	0.097	0.582
		Low	140.38 (106.05)	112.71 (92.13)			
Justice Beliefs	Decrease Carbon Footprint	High	237.60 (103.45)	191.25 (84.52)	4 512	0.036	0.216
		Low	233.13 (113.59)	212.62 (109.36)			
	Safeguard Endangered Species	High	181.04 (102.57)	136.35 (80.66)	0.004	0.951	5 706
		Low	174.24 (111.08)	128.57 (96.31)			
	Supporting Local Communities	High	103.96 (73.92)	72.29 (61.85)	0.108	0.743	4 458
		Low	85.19 (89.98)	49.13 (48.38)			
	Supporting Gender Equality	High	223.43 (102.01)	191.25 (84.52)	0.783	0.378	2 268
		Low	229.05 (117.45)	212.62 (109.36)			
	Invest in Creating Jobs	High	165.62 (85.30)	136.35 (80.66)	0.032	0.858	5 148
		Low	155.68 (91.80)	128.57 (96.31)			
	Invest in Preventing Job Loss	High	148.02 (74.11)	100.10 (58.39)	2 040	0.156	0.936
		Low	137.57 (109.47)	109.68 (97.57)			

Notes : The results from repeated measures ANOVAs presented in this table assess the impact of framing on investment preferences, considering personal characteristics across different subgroups. Each analysis compares the treatment group (focused on specific sustainability frames) with the control group. The focus is to examine if the sustainability frame influences the investment choices based on individual characteristics.
Each analysis was conducted with 110 degrees of freedom, corresponding to the number of participants in the study (111 participants in both the treatment and control groups).
The F-value indicates the magnitude of the treatment effect relative to within-subject variation, and the p-value indicates the likelihood that the observed differences could be due to random chance.
Mean and Standard Deviation: In addition to the significance tests, the mean and standard deviation for both the treatment and control groups are provided for each subgroup to give a detailed understanding of the distribution of values.
The adjusted p-values, calculated by multiplying the original p-values by six to account for the Bonferroni correction, are presented in the table. This adjustment ensures that the multiple comparisons do not inflate the type I error rate while evaluating the effect of personal characteristics across all framing conditions.

In other scenarios, the interaction effects were weaker or non-significant. For decrease carbon footprint ($p = 0.061$, marginal significance) and supporting local communities ($p = 0.129$), trends suggest a potential differential effect by identity subgroup, but the evidence is insufficient for definitive conclusions. For safeguarding endangered species and invest in preventing job loss, the interaction effects were decidedly non-significant ($p = 0.39$ and $p = 0.707$), indicating no meaningful difference in treatment framing effects based on sustainable investor identity. After applying the Bonferroni correction, only the interaction for invest in creating jobs retained marginal significance (adjusted $p = 0.066$), suggesting that the observed effects should be interpreted cautiously.

Also for the hypothesis H6 and H7, which assert that investors with strong social norms (H6) and high personal norms (H7) will invest much more in framed firms than investors with low social and personal norms, showed consistently significant main effects of the framing across

all scenarios, suggesting that investment behavior is highly influenced by framing investment possibilities in a setting that has social or environmental significance. A more complex picture was painted by the interaction effects between treatment and the high-low subgroups for both personal and societal norms. For social norms, the interaction effect between treatment and subgroup was generally not significant across most scenarios. Only in the case of invest in creating jobs, the interaction effect was significant ($p = 0.021$), however, a detailed analysis revealed that this effect was more noticeable in the low-identity category, even though both high and low social norms subgroups exhibit higher investments under framing. Specifically, the mean investment in low norms subgroup increased from 128.89 in the control condition to 179.89 in the framing condition (mean difference = 42.00), compared to a smaller increase in the high social norm's subgroup, from 134.82 to 149.65 (mean difference = 14.83).

For personal norms, interaction effects between treatment and subgroup were more prominent. Significant interaction effects were observed in scenarios such as decrease carbon footprint ($p = 0.011$), supporting local communities ($p = 0.002$) and invest to prevent job loss framing ($p = 0.032$). For the decrease carbon footprint framing, the high personal norms group exhibited a larger mean difference (44.96) between investment under treatment and the control values (239.41 to 194.45) compared to the low personal norms group (229.15 to 215.53, mean difference = 13.62). Similarly, in the supporting local communities framing, the high personal norms group showed a greater mean difference (51.27), with an increase of the invested amount from 60.55 to 111.82, than the low personal norms group (68.08 to 57.24) with only a mean difference of 10.84. In the invest to prevent job loss framing, the high personal norms group again displayed a larger mean difference (149.79 to 100.47, mean difference = 49.32) relative to the low personal norms group (131.59 to 112.45, mean difference = 19.14). For other framings, the interaction effects were non-significant, with no meaningful differences in investment changes between high and low personal norms groups.

Given the need to conduct multiple tests to comprehensively evaluate the hypothesis, a Bonferroni correction was applied to the p-values. After this adjustment, the only interactions who retained significant effects for H7 was supporting local communities (adjusted $p = 0.012$), however also the framing about decrease carbon footprint was marginally significant (adjusted $p = 0.066$). These results reinforce the need for cautious interpretation, highlighting that while personal norms exhibit stronger moderating effects across various contexts, social norms appear to influence investment behavior selectively.

After analyzing social and personal norms separately, both were combined into a single factor, social and personal norms, and the analysis was repeated. However, these combined results did not provide any new insights and did not outperform the stronger of the two effects when considered independently. Specifically, personal norms emerged as the dominant factor. The statistical tests reveal no significant interactions between the treatment and the social and

personal norms subgroup, as evidenced by p-values greater than 0.1 in most cases. This suggests that the influence of treatment on the outcomes is largely independent of the participants' social and personal norms, with no substantial moderation observed.

The results of the analysis aimed at testing hypothesis H8, which posited that higher trust in providers of environmentally sustainable and socially responsible investments would lead to greater investment in the framed companies, didn't reveal any significant evidence supporting this hypothesis. In all six frames the interaction between trust level and treatment effect was not statistically significant, suggesting that trust did not play a substantial role in moderating the impact of the treatment on investment behavior.

The last personal characteristic tested was justice beliefs, which hypothesis (H9) states that investors with high justice beliefs will invest significantly more in framed companies compared to individuals with low levels of justice beliefs. The interaction effects between framing and justice beliefs subgroups were generally not significant, indicating limited evidence that justice beliefs moderate the relationship between framing and investment behavior. Only the decrease carbon footprint framing showed a significant interaction effect ($p = 0.036$), suggesting that investors with high justice beliefs may have responded more strongly to framing in this context. For the high justice beliefs subgroup, the mean investment increased from 191.25 in the control group to 237.60 in the treatment group (mean difference = 46.35), while for the low justice beliefs subgroup, the mean investment increased from 212.62 in the control group to 233.13 in the treatment group (mean difference = 20.51). However, this trend was not observed in other scenarios, such as safeguarding endangered species ($p = 0.951$), supporting local communities ($p = 0.743$), supporting gender equality ($p = 378$), invest in creating jobs ($p = 0.858$) or invest to prevent job loss ($p = 0.156$). After the adjustment of the Bonferroni correction also the effect for decrease carbon footprint (adjusted $p = 0.216$) was no longer significant, confirming that justice beliefs do not consistently moderate the effect of framing. These findings suggest that justice beliefs are not consistently associated with differential responses to framed investment opportunities across various contexts.

Overall, these results highlight that while sustainable framing significantly impacts investment decisions, the moderating effects of personal characteristics vary. Personal norms consistently influenced responses, particularly in scenarios like decreasing carbon footprints, supporting local communities and preventing job loss. Social norms and sustainable investor identity showed selective or mixed effects, with notable interactions in specific contexts like job creation. In contrast, characteristics like risk tolerance, justice beliefs and trust exhibited minimal or inconsistent moderation across scenarios. These findings emphasize the nuanced role of individual differences in shaping investment behavior.

5 Discussion and Concluding Remarks

The findings of this study provide significant insights into how sustainable investment framing influences decision-making and how personal characteristics moderate these effects. The findings demonstrate that framing can effectively elevate investment levels in socially and environmentally oriented opportunities, though the underlying mechanisms differ across individual characteristics.

Contrary to initial expectations, framing around endangered species conservation (linked to SDGs 14 and 15), though not significant, elected a slightly stronger response than reducing carbon emissions (aligned with SDG 13) (Independent Group of Scientists appointed by the Secretary-General, 2023, p. 3). This aligns with salience theory by Bordalo et al. (2013, pp. 803–804), which emphasizes the power of vivid, emotionally charged information to capture attention. Endangered species narratives often highlight identifiable victims and urgent consequences, making them more emotionally engaging than the global, abstract nature of carbon reduction efforts. Although public opinion data from Der Standard (2023) and Ipos (2024) indicate that climate change is perceived as a more pressing issue, the findings of this study suggest that such statistics may not fully translate into individual investment preferences, as evidenced by the slightly stronger response to framing around endangered species conservation. Interestingly, gender analysis revealed that males and females exhibited no significant difference in their preferences between these two environmental objectives, suggesting that both genders perceive these goals as equally important or interchangeable, reflecting shared prioritization of environmental sustainability.

Framing around supporting local communities showed an advantage over gender equality framing in the data. However, as the effect was not statistically significant, it may not reliably extend to the broader population. This suggests that the observed preference in this sample for supporting local communities may stem from its alignment with individuals' everyday realities and cultural values, as well as the influence of personal connections and direct experience (Manzo & Perkins, 2006, pp. 347–348), which together make it a more relatable and motivational cause. This finding supports the idea that individuals are more likely to respond to framing that resonates with their social identity, particularly when it involves causes tied to their personal experiences (Bauer & Smeets, 2015b, p. 19). In contrast, gender equality may be seen as more abstract or systemic, especially by male investors who showed a slight preference for local community support (Glas, 2022, pp. 969–971; Gurieva et al., 2022, pp. 77–79). This reflects the notion that gender equality may not evoke the same immediate emotional attachment for those without direct experiences, as suggested by Hardacre and Subašić (2018, pp. 10–11). According to motivated cognition theory (Benabou & Tirole, 2006, pp. 704, 711; Rheu, 2020, p. 8), individuals prioritize causes that resonate with their social identity and immediate environment. Female investors, on the other hand, exhibited a more

balanced evaluation of these framing messages, indicating a broader sense of inclusivity and responsiveness to both local community and gender equality concerns. This suggests that, as hypothesized, the support for local communities tends to resonate more with investors than gender equality, likely due to its stronger personal relevance and direct impact.

Framing investments to prevent job loss showed a more compelling impact in this survey than framing them to create jobs, but as this effect was not significant, it cannot be assumed to generalize to the broader population. For this survey, the observed effect aligns with Prospect Theory (Kahneman & Tversky, 1979, pp. 268–269), which highlights the psychological asymmetry between loss aversion and gain orientation. Individuals appear slightly more motivated to avoid losses than to pursue equivalent gains, explaining the seemingly stronger impact of loss-avoidance framing. Gender differences further illuminate this pattern. Female investors, typically more risk-averse and empathetic (Croson & Gneezy, 2009, pp. 20–21; Eagly & Crowley, 1986, pp. 283–284), displayed a marginal preference for preventing job loss over creating jobs, emphasizing stability and risk mitigation. Male investors, however, showed no significant preference, indicating a more neutral or risk-tolerant stance. While these findings are consistent with Prospect Theory (Kahneman & Tversky, 1979, pp. 268–269), it is essential to recognize that the theory has faced various challenges. As Haerem et al. (2011, pp. 491–492) have shown, risk-seeking behavior is present in both gain and loss domains, contrary to Prospect Theory's predictions of risk-aversion. Furthermore, the empirical study by Chung et al. (2019, p. 34) suggest that gain-loss asymmetries, a cornerstone of Prospect Theory, are not consistently observed in riskless choices, indicating that neoclassical utility functions may better explain such scenarios. These results of this study highlight the importance of aligning framing strategies with demographic-specific motivations in sustainability-related decision-making, while contrasting findings from other research underscore the nuanced and context-dependent nature of decision-making under risk.

The first personal characteristic analyzed was risk tolerance, hypothesized to influence responses based on willingness to accept uncertainty, showed limited moderating effects across all scenarios. While some trends in the sample suggested that risk-tolerant investors preferred growth-oriented framing like job creating, and risk-averse investors leaned towards loss-avoidance frames like preventing job loss, these effects were not statistically significant. For this sample, however, these findings align with research suggesting risk-tolerant individuals are drawn to opportunities with long-term growth potential despite uncertainty (Erdemlioglu & Joliet, 2019, pp. 17–18; Madhuchhanda Lahiri, 2024, p. 155). Although, high model uncertainty can alter the perceived risk of investments over time, potentially making investments riskier in the long run (Diris, 2011, p. 1), which complicates the assumption that risk-tolerant investors are always better positioned for long-term growth. In contrast, risk-averse investors preferred frames emphasizing stability and loss avoidance. Although the differences were not statistically significant, the trends observed align with theoretical

expectations, even though its role may be secondary when strong emotional or moral considerations are at play.

Among the personal characteristics examined, personal norms emerged as the strongest and most consistent moderator of framing effects. High personal norms investors demonstrated significantly higher investments across half of the scenarios, particularly in the decrease carbon footprint, supporting local communities and preventing job loss framings. These results indicate that high personal norms investors were more influenced by framing in these contexts compared to their low personal norms counterparts. For example, in decrease carbon footprint framing, high personal norms investors showed a significantly stronger response to framing, suggesting that personal moral obligations are a critical driver in promoting sustainable investment behavior. Similarly, the strong interaction for supporting local communities suggest that framing investments in ways that align with personal values of community support is particularly effective for high personal norms investors. These findings align with theories of moral motivation, which emphasize the role of internalized moral obligations in driving socially responsible behavior (Andorfer & Liebe, 2013, pp. 1253–1254, 1260; d'Adda et al., 2020, p. 303; Helferich et al., 2023, p. 1; Rašić et al., 2024, p. 185; Singh et al., 2021, pp. 555–556). Interestingly, the influence of social norms, although weaker overall, may still rival personal norms in certain contexts. Studies by Fielding et al. (2008, pp. 323–324) and Teng et al. (2015, pp. 308–311) indicate that social norms – shaped by external pressure from family, friends and coworkers – can significantly guide environmental actions and consumer behaviors. In fact, social norms have been shown to have a stronger impact than personal norms in some cases, such as decisions to engage in pro-environmental actions (Jang & Kim, 2023b, p. 6419). This suggests that while personal norms are critical for driving internalized moral behavior, social norms, especially in community-oriented contexts, can also play a prominent role in shaping sustainability-related decisions. This dynamic highlights the need to understand the interaction between social and personal norms in influencing investment decisions. By contrast, social norms showed weaker effects in this study. Significant differences between high and low social norms subgroups were only observed for the job creation framing, where low social norms investors invested significantly more than the investors with a high level of this characteristic. This suggests that investors with low social norms may be more influenced by framing emphasizing job creating than investors with high social norms, which indicates that the influence of social norms is more context-dependent and less robust overall. When a combined measure of social and personal norms was calculated and used in the analyses, the results did not reveal additional significant information. Cases showing significance were primarily driven by personal norms, which consistently had a stronger and more pronounced impact than social norms. Importantly, the combined measure of social and personal norms never outperformed the stronger individual effect of personal norms. These findings suggest that social and personal norms, although

related, operate differently in influencing investment decisions. Personal norms, tied to internalized moral obligations, provide a strong motivational foundation for socially and environmentally responsible actions. Conversely, social norms rely on external pressures or perceived social expectations, making them less intrinsic motivators in individual decision-making. The findings underscore the importance of focusing on individual moral principles rather than blending internalized values with external pressures, which may dilute the overall impact.

Sustainable investor identity also played an important role, particularly in scenarios such as supporting gender equality, creating jobs and decrease carbon footprints. Interestingly, low-identity investors responded more strongly to the job creating framing, with a larger increase in investments compared to high-identity investors. This suggests that low-identity investors may be more influenced by framing emphasizing job creating, potentially because this aligns with broader social or economic concerns rather than sustainability-focused values. In contrast, high-identity investors, who are already strongly aligned with sustainability goals, exhibited consistently high investment levels across most scenarios, suggesting that their established priorities leave less room for framing effects to influence their decisions. These findings align with prior research emphasizing the role of self-perception in sustainable consumption and investment (Andorfer & Liebe, 2013, pp. 1253, 1260–1261; Lavuri et al., 2023, p. 8; Robba et al., 2024, pp. 1, 11) and underscore the importance of tailoring framing messages to address varying levels of sustainability orientation. Investors who identify as sustainable are likely to incorporate environmental and ethical considerations into their decision-making. Frames emphasizing these impacts reinforce their identity and act as a motivational force, consistent with the theory of motivated cognition, which highlights the prioritization of decisions aligned with values and self-concept (Benabou & Tirole, 2006, p. 711; Rheu, 2020, p. 8).

Trust in providers of sustainable investments showed no significant moderating effects in any of the presented contexts, which might suggest that while trust is necessary for establishing baseline confidence in investment providers, its role may be more context-dependent, exerting a stronger influence only in scenarios where perceived credibility is directly tied to the investment's impact.

The results indicate that justice beliefs had a notable impact on framing, particularly in the context of decreasing carbon footprints. Investors with strong justice beliefs responded more strongly to framing that emphasized broader environmental issues, like climate change. However, this effect was not consistent across other scenarios, such as safeguarding endangered species or supporting local communities. The lack of significant effects in these contexts suggests that the influence of justice beliefs is contingent on the alignment of the framing with perceptions of fairness.

Overall, these findings highlight the nuanced interplay between personal characteristics and framing effects. Personal norms emerged as the most robust and consistent driver, while social norms and sustainable investor identity exhibited context-specific or mixed effects. Risk tolerance, trust and justice beliefs played a smaller part, highlighting the importance of intrinsic moral motivations and alignment with framing content in influencing sustainable investment behavior. These results emphasize the relevance of considering individual differences when analyzing the effectiveness of sustainability messaging.

5.1 Broader Implications

The findings of this study provide insights into the psychological and behavioral mechanisms behind sustainable investment decisions, offering practical implications for shaping policy, marketing, and investment strategies. By leveraging framing techniques, financial institutions, policymakers, and organizations can better align messaging with investor motivations, thereby enhancing engagement with socially responsible investment products.

The study highlighted the importance of framing techniques, demonstrating that certain messaging styles resonate more effectively with specific types of investors. For instance, investors motivated by environmental concerns are likely to respond more positively to emotionally vivid narratives that emphasize the tangible impact of investments, such as species conservation, rather than abstract global issues like carbon emissions. In contrast, risk-averse individuals are more likely to engage with loss-framed messaging, particularly those emphasizing harm prevention, such as the risk of job losses. On the other hand, risk-tolerant investors are more responsive to gain-framed messages that highlight long-term financial opportunities. These insights suggest that investment communications should be tailored to investor preferences, utilizing a segmentation approach rather than a one-size-fits-all model.

Personal norms and sustainable investor identity emerged as the strongest drivers of framing effects. High personal norms amplified responses to moral framings, such as decreasing carbon footprints, supporting local communities and invest in creating jobs, reflecting the influence of internalized moral obligations. Similarly, high sustainable investor identity correlated with higher investment levels across scenarios, such as supporting gender equality and invest in creating jobs. These results emphasize the importance of tailoring sustainability messaging to align with individual values and moral motivations for greater impact.

For investment practitioners, these findings emphasize the importance of crafting compelling narratives that reflect shared values like environmental preservation and social harm avoidance. Segmenting target audiences based on personal characteristics can help investment providers design messages that maximize psychological resonance and financial commitment. Campaigns emphasizing tangible social impacts and moral alignment can encourage broader participation in sustainable investing. Similarly, businesses can use these

insights to refine sustainability strategies, aligning their objectives with investor priorities to attract interest and loyalty.

A key takeaway is that tailoring strategies to align with the psychological and ethical proprieties of investors, financial institutions, policymakers, advisors and sustainability advocate can foster greater engagement and promote the growth of environmentally and socially responsible investment practices. Policymakers could design initiatives that prioritize accessible and relatable framings of sustainable investment options to encourage participation across diverse groups. Financial advisors might consider integrating personal values and identity factors into their clients' consultations to help investors aligning their portfolios with their ethical beliefs. Moreover, investment firms could also develop marketing strategies that will adjust their framing based on investor profiles by using segmentation techniques to ensure messages that resonate with the different target audiences.

5.2 Limitations

While the findings of this study provide insights into sustainable investment behavior, several limitations must be acknowledged. These constraints are important for the correct interpretation of the data and for guiding future research. One notable limitation is that only a few results reached statistical significance, which restricts the ability to generalize the findings to a broader population. Increasing the sample size could enhance the statistical power, making it easier to detect subtle effects that may exist. Additionally, applying more complex statistical models could help uncover nuanced relationships and interactions, providing a deeper understanding of the factors influencing sustainable investment behavior. Addressing these limitations in future research could strengthen the reliability and applicability of the results.

One limitation is the generalizability of the results, as the sample was derived from a specific geographic group. Cultural, economic, and educational differences across regions could influence how framing effects shape investment decisions. Future studies should include more diverse, cross-cultural samples to test the robustness of these findings.

The reliance on a survey-based methodology introduces the possibility of self-report or confirmation bias. The self-report bias explains the problem that people may not give fully correct answers because they seek to make a good impression (American Psychological Association, 2018). The confirmation bias on the other hand states that people tend to ignore information that are inconsistent with their beliefs, which can include their expectations in a given situation and their predictions about a particular outcome (Bettina J. Casad & J.E. Luebering, 2024). This can result in a behavior where the participants of the study tend to choose answers they think that are expected from them. Although the survey was designed to minimize these biases, they cannot be entirely ruled out. While biases might have influenced participants' tendency to choose companies with positive environmental impacts, the

variability in investments across framing conditions still highlights the strength of the framing effects. Future research could reduce these biases by using experimental designs or real-world investment scenarios.

Additionally, the simplified framing used in this study may not fully reflect the complexity of real-world investment decisions, which often involve multiple competing factors such as environmental impact, ethical considerations, and financial returns. Future studies could incorporate more multidimensional framing scenarios to better capture the complexity of decision-making. Also, while this study focused on framing conditions like endangered species and gender equality, other sustainable investment messages, such as eco-friendly transportation or water conservation, were not explored. Expanding research to include these additional frames and exploring the interaction of personal characteristics, such as risk tolerance and justice beliefs, could offer a more comprehensive understanding of investment behavior.

The use of hypothetical investment scenarios also limits the study, as real-world decision-making involves factors like financial constraints, market volatility, and risk perception. Participants might behave differently when real money is at stake. Future studies could incorporate experimental designs or field studies with actual investments to better capture real decision-making. Furthermore, the use of Likert scales may have restricted participants' ability to express nuanced preferences. Advanced techniques like conjoint analysis or open-ended responses could provide deeper insights.

Another limitation of this study is its focus on analyzing the impact of personal characteristics in isolation, without considering more complex models that could capture the interplay between these characteristics. While the study provides insights by comparing subgroups based on individual traits such as sustainable investor identity, trust, and personal norms, it does not explore potential interactions between these characteristics. Future research could benefit from examining how combinations of traits might collectively influence sustainable investment decisions, as well as how these characteristics may interact within more sophisticated behavioral models. This would offer a deeper understanding of the dynamic and multifaceted factors that drive investor behavior.

Finally, the cross-sectional nature of the study only captures a snapshot of preferences at a specific time. Sustainable investment behavior is dynamic, influenced by personal circumstances, cultural norms, and global events. Longitudinal studies could offer insights into how framing preferences and investment decisions evolve over time.

Addressing these limitations in future research will enhance our understanding of sustainable investment behavior and improve the application of framing techniques in sustainable finance.

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7 Appendix

7.1 Sample Size Calculation

As described in chapter 3.2 the first attempt to calculate the sample size, using G*Power Calculator, was made using standardized values from social sciences, like an alpha level of 0.05, power of 0.80, and a medium effect size (Cohen's d = 0.5), which results in a total sample size of 34.

The second calculation, showed an effect size of 0.3647455, which resulted from the mean of differences and the standard deviation of differences from the study by Gutsche et al.(2020, p. 43). This value, combined with a higher power of 0,95 resulted in a sample size of 100 participants. The outputs from this G*Power Calculator also showed how the actual power of the results increased from approximately 80% to over 95% (exactly 95,0721%) by these adjustments.

7.2 Questions about Personal Characteristics

The final characteristic assessed in the personal characteristics part of the survey is participants' risk tolerance, using a shortened version of the Edward Jones Risk Tolerance Questionnaire (provided by the USA Financial Advice company Edward Jones) (Edward Jones, 2021). While widely tested and reliable, the full version was too lengthy, so it was reduced to the following four key questions.

Besides the formatting of the questions also the way different answers are valued is different for these questions, because Edward Jones gives each answer a different value and this value isn't even constant throughout the whole survey, so this valuation needs to be adapted to get reliable results for this characteristic.

Table A1: Risk Tolerance Question 1

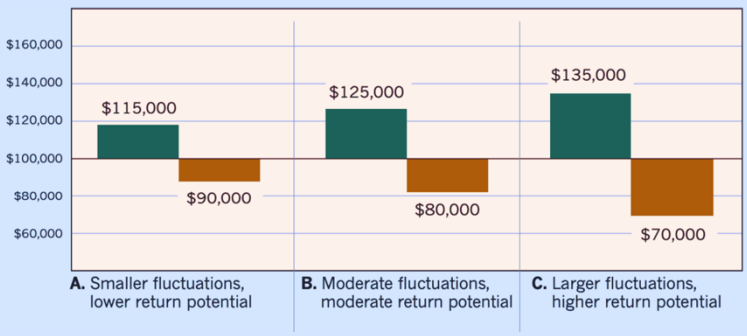
"How comfortable are you with potential fluctuations in your portfolio?" (Edward Jones, 2021)	
"The table below shows the potential high and low values in a given year for three different portfolios, each based on an initial portfolio value of €100,000. Which portfolio would you prefer? Choose one." (Edward Jones, 2021)	*Figure A1: Risk Tolerance Question Chart (Edward Jones, 2021)* 

Table A2: Risk Tolerance Question 2

"Which statement best describes how you feel about the trade-off between potential returns and declines?" (Edward Jones, 2021)
- "I'm more focused on potential declines in my portfolio's value. The return I achieve is of secondary importance. - The potential for declines is equally important to me as the potential return. - I am more focused on the return potential of my portfolio than on potential declines." (Edward Jones, 2021)

Table A3: Risk Tolerance Question 3

"There have been several periods in history in which the value of the market has dropped 25% or more in a year. If the value of your portfolio fell from €200,000 to €150,000 (25%) in one year, how would you react?" (Edward Jones, 2021)
- "I would move my money to different investments to reduce the potential for more declines, even if this meant missing a potential recovery. - I would be concerned and would consider moving into different investments if the declines continued. - I would leave my money where it is and continue according to my long-term strategy. - I would view this as an opportunity and would consider investing more if I had the money available." (Edward Jones, 2021)

Table A4: Risk Tolerance Question 4

"There is a trade-off between larger potential short-term fluctuations and a portfolio's long-term growth potential, as shown in the table below. Which portfolio would you be most comfortable with?" (Edward Jones, 2021)

Table A5: Risk Tolerance Question Table (Own illustration based on Edward Jones, 2021)

	Long-term Average Return	Possible Gain in One-year Period	Possible Decline in One-year Period
Portfolio A	4%	15%	-10%
Portfolio B	5,5%	25%	-20%
Portfolio C	7%	35%	-30%

7.3 Pretest

Dear participant,

Thank you for taking the time to participate in the pretest of my questionnaire. Your participation is of great value to me! In order to carry out the pretest smoothly and efficiently, I would ask you to follow the instructions.

Instructions

The pretest is divided into two phases. In the first phase, I would like to ask you to complete the questionnaire without any assistance and in your usual way. Please take enough time for this and follow the steps below:

1. Make a note of the start time and once completed, the end time of the survey.
2. Read all the important information carefully and complete the questionnaire in the order given.
3. Should you encounter any (technical) problems, please contact the following e-mail addresses: a[redacted]@univie.ac.at

In the second phase, I would ask you to complete the questionnaire a second time and to go into the following points in more detail:

Once you have completed the questionnaire, I would like to ask you to answer the following questions on the questionnaire in as much detail as possible:

Table A6: Pretest Questions

How long did it take you to complete the questionnaire in the usual way?
Were the statements understandable for you? If not, please explain this in more detail. Which question(s) was (were) not understandable and why?
Was the order of the statements appropriate? If not, why?
Were there any thematic problems in understanding the context of the statements on investment opportunities and personality traits? If yes, which ones?
Can you briefly describe why you chose question 5 the way you did (first question after the introduction on the second page)?
Can you briefly describe why you chose question 13 the way you did (last question on the second page)?
Do you have any other comments on this questionnaire that you have not yet been able to comment on?

The answers to this pre-test revealed several key issues that needed addressing. Participants pointed out that the survey took longer than expected to complete and expressed confusion over the question format, particularly in the framing section. Additionally, while the overall order and structure were logical, some adjustments were necessary to improve clarity and engagement. These insights led to revisions aimed at streamlining the survey and ensuring a more intuitive experience for participants.

Time Restrictions

The pre-test with nine participants showed an average completion time of 20 minutes, exceeding the target of 15 minutes. To address this, one hypothesis (formerly Hypothesis 2) was removed, which explored the effectiveness of direct versus indirect framing of carbon reduction messaging. Additionally, company descriptions were shortened, and key details were bolded for clarity. While this may slightly increase confirmation bias, the adjustments aim to improve completion rates while keeping bias to a minimum within the study's design constraints.

Understanding of the Question Format

To address confirmation bias, the sustainable framing details were initially embedded seamlessly into the text. However, this caused confusion, as participants found it hard to differentiate the investment questions or understand their structure. In response, the additional information was highlighted in bold font, and the introduction was revised for clarity. Feedback about the survey being too text-heavy also supported the planned adjustments: reducing the amount of text and simplifying the questions to improve readability and completion time.

Order and Thematic Problems

Participant feedback on the order and clarity of the statements was uniformly positive. All pre-test participants found the question sequence logical and easy to follow. Additionally, no issues were reported regarding the understanding of the context or questions, confirming that the structure and content were clear and well-designed.

Reasoning for Decisions made by the Participants

Participants' reasoning for their decisions (questions 5 and 13) emphasized climate protection, renewable energy, fair trade, and sustainability, often prioritizing these aspects based on personal values and perceived future profits. Responses confirmed that individuals create internal value-based rankings to assess investment options. Many referenced the bolded content, highlighting its influence, and noted the financial performance of sectors alongside sustainability factors, reinforcing the study's purpose and relevance.

7.4 Questionnaire

The whole questionnaire was split on three pages in the online survey tool which will be presented on the following pages. The first page includes the questions about the demographics, the second page was about the differently framed questions and the third page included the questions about the personal characteristics. The final page only contains a short sentence to thank the participants for their participation and to verify that their survey was successfully submitted, it also includes some references for the pictures used in the questionnaire.

First Page

Introduction

Dear participant,

Thank you for your willingness to take part in my study on environmentally sustainable and socially responsible investments.

This survey is being conducted as part of my Master's thesis at the University of Vienna. The aim is to understand how environmental and social factors influence investor preferences for sustainable investment products. Your participation will enhance the theoretical understanding of environmentally sustainable and socially responsible investing. Your responses will help reveal the psychological and personal factors behind investment decisions and show how additional information affects behavior.

The data can be viewed by the supervisor of the academic work for the purposes of performance assessment. The data collected may be stored for an unlimited period of time in accordance with Art. 89 Abs. 1 DSGVO.
You have the right to obtain information from me about the personal data collected and the right to rectification, erasure and restriction of processing of the data as well as a right to object to the processing and the right to data portability.
Your data is collected and processed exclusively on the basis of the statutory provisions (§ 2 f Abs. 5 FOG). You have the following personal rights in the context of this survey:

- Participation in the study is **voluntary**. You can cancel the questionnaire at any time.
- Your participation is **anonymous**, your answers cannot be traced back to you. This also means that your personal data record is **not identifiable** for us after completion of the survey.
- Your data will be used exclusively for **scientific purposes**.
- The research does not follow any commercial interest. I will treat all your data **strictly confidential**.

Completing the questionnaire should take about **15 minutes**.

I will be happy to answer your questions about the survey at any time. You can reach me by e-mail at a[redacted]@unet.univie.ac.at.

1. You are ... ?

- ◯ female
- ◯ male
- ◯ non-binary
- ◯ diverse

2. What is your age?

- ◯ under 18 years old
- ◯ 18-24 years old
- ◯ 25-34 years old
- ◯ 35-44 years old
- ◯ 45-54 years old
- ◯ 55-64 years old
- ◯ 65-74 years old
- ◯ 75 years or older

3. What is the highest degree or level of education you have completed?

If currently enrolled, highest degree received.

- ◯ No schooling completed (kein Pflichtschulabschluss)
- ◯ Compulsory schooling completed (Pflichtschulabschluss)
- ◯ Apprenticeship certificate (Lehrabschluss)
- ◯ Vocational school with 3 years, no A-level diploma (Berufsbildende mittlere Schule ohne Matura (z.B. Handelsschule, 3 jährige HBLA))
- ◯ High school graduate, with A-level diploma or the equivalent (Allgemeinbildende oder berufsbildende höhere Schule mit Matura (z.B. Gymnasium, HTL, HAK))
- ◯ Bachelor's degree (Bachelorabschluss einer Universität / Fachhochschule)
- ◯ Master's degree (Masterabschluss einer Universität / Fachhochschule)
- ◯ Doctorate degree (Doktor- oder PhD-Abschluss einer Universität / Fachhochschule)
- ◯ Other

4. Please indicate your household income:

Please indicate the total monthly net income for everyone living in your household. Include all sources of income such as salaries, pensions, unemployment benefits, housing benefits, child benefits, student support, alimony, etc., after taxes and social security contributions. If unsure, please estimate the monthly amount.

- ◯ less than 500€
- ◯ 500€ to less than 1000€
- ◯ 1000€ to less than 1500€
- ◯ 1500€ to less than 2000€
- ◯ 2000€ to less than 2500€
- ◯ 2500€ to less than 3000€
- ◯ 3000€ to less than 3500€
- ◯ 3500€ to less than 4000€
- ◯ 4000€ to less than 4500€
- ◯ 4500€ to less than 5000€
- ◯ 5000€ or more

Second Page

Although this has been discussed in previous chapters, it is worth reiterating. Question five is identical for all participants; however, questions six through thirteen are presented in a randomized order. While the content of these questions remains the same, the sequence in which they appear differs for each participant.

Instructions

INVESTMENT SCENARIO
In this survey, you will allocate a hypothetical investment of 500 EUR among four companies, which focus on sustainability, ethical practices, and community development. The scenarios simulate a retirement investment strategy, where you invest a monthly amount from your savings over a long-term horizon.

SURVEY INSTRUCTIONS
Before proceeding with the survey, please note that each question presents a hypothetical investment scenario. **In the first question, the companies are introduced, and in each of the following questions, one additional piece of information is provided, which is highlighted in bold.** Your decision-making process should solely rely on the information presented in each specific question, and **no** prior knowledge from previous questions should influence your personal choices.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

5. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!		
EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.		EUR invested
Sum	0	EUR invested

6. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!		
EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives. **With a commitment to reducing carbon emissions and promoting environmental stewardship, EcoTech Solutions is at the forefront of creating a greener future.**		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.		EUR invested
Sum	0	EUR invested

7. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation. **GreenHarvest Farms actively contributes to the local economy by supporting job creating initiatives, providing employment opportunities and fostering economic growth in rural communities.**		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. konzentriert sich auf die städtische Wiederbelebung und die Entwicklung von Gemeinden und ist spezialisiert auf erschwinglichen Wohnraum, die Wiederbelebung von Stadtvierteln und Programme zum Engagement in der Gemeinde.		EUR invested
Sum	0	EUR invested

8. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods. **EthicalTrade Co. actively supports local communities by empowering artisans, prioritizing partnerships with local farmers and producers and promoting fair labor practices, fostering economic development, community resilience and strengthening social bonds.**		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.		EUR invested
Sum	0	EUR invested

9. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs. **CommunityBuilders Inc. addresses the challenges posed by technological advancements by implementing strategies that prevent job loss and ensure workforce resiliency, thereby safeguarding livelihoods and promoting economic stability in communities.**		EUR invested
Sum	0	EUR invested

10. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives.		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation. **GreenHarvest Farms is dedicated to preserving local ecosystems and biodiversity, actively participating in efforts to safeguard endangered species through habitat restoration and conservation initiatives.**		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.		EUR invested
Sum	0	EUR invested

11. How much money of the 500€ available would you invest in the following companies.

Please invest in the companies all the money available to you. The way you allocate the money between the companies is up to you.

Please make your investment choices based on what you personally believe is the best option, and only consider the information given in this specific question!

EcoTech Solutions develops sustainable technology, designing and manufacturing renewable energy systems like solar panels and wind turbines, and offering eco-friendly energy alternatives. **EcoTech Solutions is committed to promoting gender equality in the renewable energy sector, fostering an inclusive work environment and providing equal opportunities for all employees regardless of gender.**		EUR invested
GreenHarvest Farms practices sustainable agriculture, cultivating organic crops with eco-friendly techniques and prioritizing soil health and biodiversity conservation.		EUR invested
EthicalTrade Co. is committed to ethical sourcing and fair trade, partnering with local and global artisans to create high-quality, ethically sourced clothing, accessories, and home goods.		EUR invested
CommunityBuilders Inc. focuses on urban revitalization and community development, specializing in affordable housing, neighborhood revitalization, and community engagement programs.		EUR invested
Sum	0	EUR invested

Third Page

12. Consumer Identity

To which extent do the following statements represent your consumer identity?

	strongly disagree	somehow disagree	neutral	somehow agree	strongly agree
I buy products which have a low negative impact on the environment.	◯	◯	◯	◯	◯
I buy products made in safe and healthy workplaces (e.g. fair trade).	◯	◯	◯	◯	◯
I do my best to buy local products.	◯	◯	◯	◯	◯
I follow trends.	◯	◯	◯	◯	◯

13. Trust

Third-party certifications are certifications released by independent entities on a voluntary basis that attest the commitment of the certified company for a specific cause (e.g. environmental commitment).

	strongly disagree	somehow disagree	neutral	somehow agree	strongly agree
I pay much attention to whether a product is certified by third parties.	◯	◯	◯	◯	◯
I generally have faith in third-party certification.	◯	◯	◯	◯	◯
I generally trust third parties.	◯	◯	◯	◯	◯
I doubt that the money invested in sustainable investment products actually reaches the people and projects the companies promise it would.	◯	◯	◯	◯	◯

14. Social Norms

How much do you personally disagree or agree with the following statements?

	stongly disagree	somehow disagree	neutral	somehow agree	strongly agree
People around me think that I should do as much as possible to protect the environment.	◯	◯	◯	◯	◯
I see many people around me who actively act in a climate friendly way.	◯	◯	◯	◯	◯
I think that many people who mean a lot to me expect me to reduce my climate impact.	◯	◯	◯	◯	◯

15. Personal Norms

How much do you personally disagree or agree with the following statements?

	stongly disagree	somehow disagree	neutral	somehow agree	strongly agree
I have a moral responsibility to take climate change into consideration.	◯	◯	◯	◯	◯
Not only governments and industry are responsible for climate change, I am as well.	◯	◯	◯	◯	◯
I feel a moral obligation to invest in sustainable investment products.	◯	◯	◯	◯	◯

16. Justice Beliefs

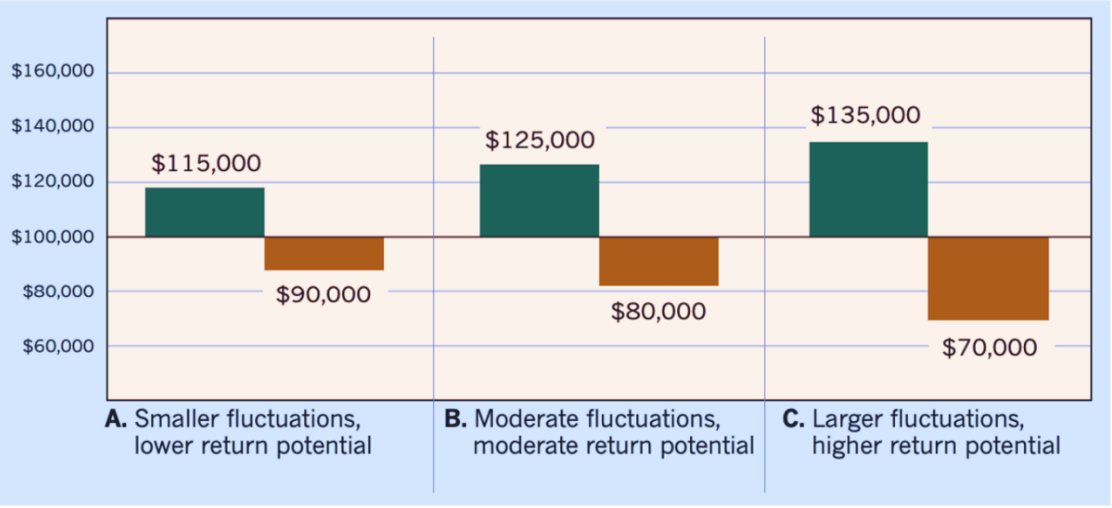
How much do you personally disagree or agree with the following statements?

	strongly disagree	somehow disagree	neutral	somehow agree	strongly agree
In my opinion, there are **justified** differences in wealth between developing countries and industrialized countries.	○	○	○	○	○
There will always be rich and poor people in society, it is a fact of life	○	○	○	○	○
If you work hard you will be financially secure.	○	○	○	○	○
Most poor people could get out of poverty if they would take initiative and work harder.	○	○	○	○	○

17. How comfortable are you with potential fluctuations in your portfolio?

The table below shows the potential high and low values in a given year for three different portfolios, each based on an initial portfolio value of €100,000. Which portfolio would you prefer? Choose one.

○ A
○ B
○ C



18. Which statement best describes how you feel about the trade-off between potential returns and declines?

○ I'm more focused on potential declines in my portfolio's value. The return I achieve is of secondary importance.
○ The potential for declines is equally important to me as the potential return.
○ I am more focused on the return potential of my portfolio than on potential declines.

19. There have been several periods in history in which the value of the market has dropped 25% or more in a year. If the value of your portfolio fell from €200,000 to €150,000 (25%) in one year, how would you react?

○ I would move my money to different investments to reduce the potential for more declines, even if this meant missing a potential recovery.
○ I would be concerned and would consider moving into different investments if the declines continued.
○ I would leave my money where it is and continue according to my long-term strategy.
○ I would view this as an opportunity and would consider investing more if I had the money available.

20. There is a trade-off between larger potential short-term fluctuations and a portfolio's long-term growth potential, as shown in the table below. Which portfolio would you be most comfortable with?

- ◯ A
- ◯ B
- ◯ C

	Long-term Average Return	Possible Gain in One-year Period	Possible Decline in One-year Period
Portfolio A	4%	15%	-10%
Portfolio B	5,5%	25%	-20%
Portfolio C	7%	35%	-30%

Final Page

Thank you very much for taking the time to participate in my study!

Your answers were transmitted, you may close the browser window or tab now.

The illustrations on the second page are from the Edward Jones Risk Tolerance Questionnaire:

Edward D. Jones & Co., L.P. (2021). Risk tolerance questionnaire. Edward D. Jones & Co., L.P. URL: https://www.edwardjones.com/sites/default/files/acquiadam/2021-02/risk-tolerance-questionnaire.pdf [09.07.2024]

7.5 Demographic Characteristics of Survey Respondents

This chapter provides an overview of the key characteristics of the respondents who participated in the survey, offering valuable context for interpreting the results of this study. The analysis focuses on demographic factors such as gender, age, education level, and household income, providing insights into the composition of the sample and its relevance to understanding sustainable investment behavior.

Table A7: Demographic Characteristic of Respondents

Characteristics (N = 111)		**n**	**%**
Gender	Male	57	47.8
	Female	53	51.4
	Non-Binary	1	0.9
Age	under 18 years old	1	0.9
	18-24 years old	37	33.3
	25-34 years old	51	46.0
	35-44 years old	4	3.6
	45-54 years old	3	2.7
	55-64 years old	11	9.91
	65-74 years old	1	0.9
	75 years or older	3	2.7
Education Level	No schooling completed (kein Pflichtschulabschluss)	0	0
	Compulsory schooling completed (Pflichtschulabschluss)	2	1.8
	Apprenticeship certificate (Lehrabschluss)	3	2.7
	Vocational school with 3 years, no A-level diploma (Berufsbildende mittlere Schule ohne Matura (z.B. Handelsschule, 3 jährige HBLA))	3	2.7
	High school graduate, with A-level diploma or the equivalent (Allgemeinbildende oder berufsbildende höhrer Schule mit Matura (z.B. Gymnasium, HTL, HAK))	41	36.9
	Bachelor's degree (Bachelorabschluss einer Universität / Fachhochschule)	42	37.8
	Master's degree (Masterabschluss einer Universität / Fachhochschule)	18	16.2
	Doctorate degree (Doktor- oder PhD-Abschluss einer Universität / Fachhochschule)	2	1.8
Household Income	less than 500 EUR	2	1.8
	500 EUR to less than 1000 EUR	15	13.5
	1000 EUR to less than 1500 EUR	15	13.5
	1500 EUR to less than 2000 EUR	3	2.7
	2000 EUR to less than 2500 EUR	13	11.7
	2500 EUR to less than 3000 EUR	11	9.91
	3000 EUR to less than 3500 EUR	8	7.21
	3500 EUR to less than 4000 EUR	7	6.31
	4000 EUR to less than 45000 EUR	9	8.11
	4500 EUR to less than 5000 EUR	7	6.31
	5000 EUR or above	21	18.9

7.6 Additional to Results of Framing Effects

The analysis highlights gender-specific patterns in investment preferences across environmental, social and economic objectives, informed by the quantitative results in the table below. In the environmental domain, male participants exhibited a mean difference of -17.81 between their preferences for reducing carbon footprints and safeguarding endangered species, with a p-value of 0.895. Similarly, female participants showed a mean difference of -8.30 with a p-value of 0.707. These findings suggest no significant preferences within or between genders, indicating that both groups view these environmental goals as equally important or contextually interchangeable.

Table A8: Statistical Analysis of Gender-Based Differences in the Impact of Sustainability Framing on Investment Preferences

Statistical Analysis of Gender Differences in the Impact of Sustainability Framing on Investment Preferences

Hypothese	Subgroup	Treatment vs. Treatment	Mean Difference	t-value	p-value
H1	male	Decrease Carbon Footprint vs. Safeguarding Endangered Species	-17 807	-1 266	0.895
H2	male	Supporting Local Communities vs. Supporting Gender Equality	16 789	1 568	0.061
H3	male	Invest in Preventing Job Loss vs. Invest in Creating Jobs	-3 614	-0.412	0.659
H1	female	Decrease Carbon Footprint vs. Safeguarding Endangered Species	-8.302	-0.549	0.707
H2	female	Supporting Local Communities vs. Supporting Gender Equality	5.377	0.421	0.338
H3	female	Invest in Preventing Job Loss vs. Invest in Creating Jobs	21.519	1.652	0.052

Notes: The results from paired t-tests presented in this table compare the mean differences between two sustainability frames within each hypothesis for male and female participants separately. The tests are designed to assess whether one sustainability frame (first mentioned in the table) has a greater influence on investment preferences than the other (mentioned second in the table) within each pair for both genders.
Each paired t-test was conducted with degrees of freedom (df) of 56 for male participants and 52 for female participants, corresponding to the number of participants in each gender group.
Mean Difference: Average difference between the treatment (sustainability framed) and control groups for each sustainability frame comparison. For each group (male or female), there are 57 participants in the treatment and 53 in the control group.
t-value: Size of the difference relative to variation. Higher t-values suggest stronger effects.
p-value: The p-value indicates the probability of observing the test results under the null hypothesis. A lower p-value suggests stronger evidence against the null hypothesis.
Confidence Interval (CI): The range within which the true mean difference likely lies, with a 95% confidence level.

In the social domain, male participants displayed a slight preference for supporting local communities (mean difference = 16.79, p-value = 0.061), suggesting a marginal inclination toward community-focused goals over supporting gender equality. In contrast, female participants showed no significant preference, with a mean difference of 5.38 and a p-value of 0.338. These results suggest that while males may prioritize tangible, localized outcomes, females exhibit a more balanced evaluation of social objectives, reflecting potentially broader inclusivity in their decision-making.

The results with regards to hypothesis 3 revealed the most pronounced gender differences. Female participants showed a marginally significant preference for preventing job losses over creating new jobs, with a mean difference of 21.51 (p-value = 0.052). In contrast, male participants demonstrated no significant preference (mean difference = -3.61, p-value = 0.659). These results suggest that females prioritize stability and risk mitigation, focusing on safeguarding existing economic structures, whereas males adopt a more neutral stance, possibly indicating a broader acceptance of risk or a less context-sensitive approach.

In addition to the findings of the paired t-tests the results from a repeated measures ANOVA highlighted significant gender differences in investment allocation decisions across various framing conditions (table A9). For the endangered species frame, no significant gender difference was found (p = 0.415), indicating that both males and females respond similarly to its emotional appeal. However, for the carbon emissions frame, a marginal difference (p = 0.067, F = 3.412) emerged, with females exhibiting a stronger increase in investment allocations, which can be seen in the interaction charts in figure A2. When comparing local community support and gender equality framings, significant gender differences were observed for both (p = 0.018 and p = 0.016, respectively), with females allocating more to these frames overall, though local community support was preferred by both genders. For the prevalent job loss and create jobs framings, males and females responded similarly to the gain-focused create jobs frame, but significant divergence appeared for the loss-focused prevent job loss frame, with females responding far more strongly. This trend reflects a pronounced sensitivity to loss-framed messages among females, consistent with their higher levels of risk aversion (83% females versus 56.1% of males). This aligns with prior research by Corson and Gneezy (2009, pp. 453, 468–469), which found that woman are generally more risk-averse than men, especially in financial decision-making contexts. The reactions of the two gender subgroups to all presented framings is visualized in figure A2, which shows interaction charts between treatment (framing) and gender.

Table A9: Results repeated measures ANOVA of interaction between treatment and gender

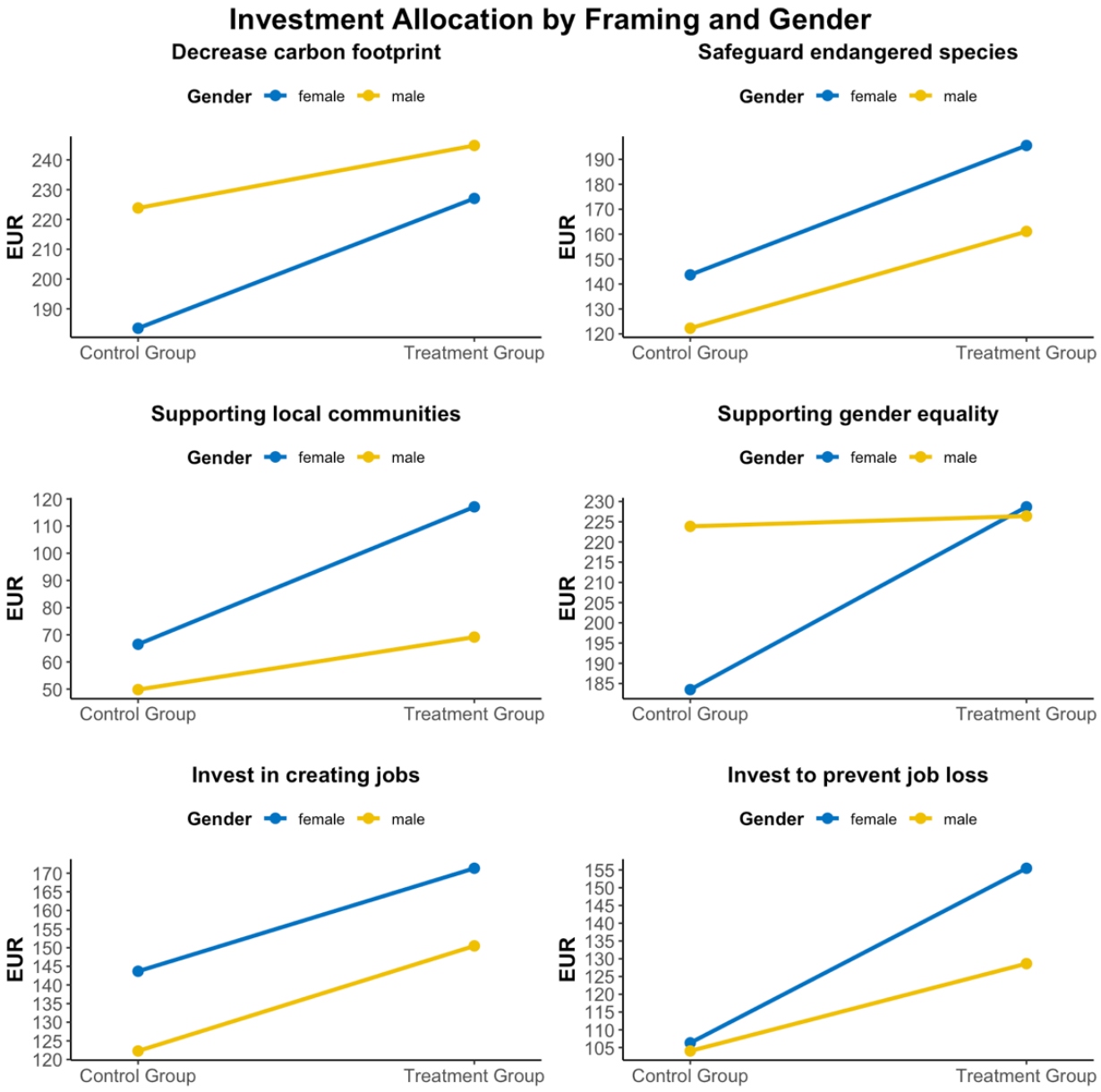
Interaction Effects of Treatment and Gender on Social and Environmental Outcomes

	Statistical Results for Interaction Effects	
Outcome	**F-statistic**	**p-value**
Decrease Carbon Footprint	3.412	0.067
Safeguard Endangered Species	0.670	0.415
Support Local Communities	5.747	0.018
Support Gender Equality	6.001	0.016
Invest in Creating Jobs	0.002	0.962
Prevent Job Loss	3.094	0.081

Note: The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment type (independent variable) and gender (moderator variable) for each dependent outcome, assessing whether the effect of treatment varied by gender.
F-statistic: Indicates the strength of interaction effects.
P-value: The p-value gives the probability of observing the test results under the null hypothesis. The lower the p-value, the lower the probability of obtaining a result like the one that was observed if the null hypothesis was true. Thus, a low p-value indicates decreased support for the null hypothesis.
The degrees of freedom for the interaction term Treatment are 1, while the degrees of freedom for the residuals are 108. For the main effect of Treatment, the degrees of freedom are 1, and the degrees of freedom for the residuals in the model are also 108.

Overall, these findings underscore the influence of gender on investment decision-making. While environmental goals elicit similar responses across genders, the observed differences in social and economic contexts highlight distinct priorities. Males appear more oriented towards localized social outcomes, while females emphasize stability and inclusivity.

Figure A2: Interaction charts between treatment and gender



Note: Each chart represents the interaction between treatment and gender for a specific framing.
The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by gender.

7.7 Additional to Results of Personal Characteristics

Repeated measures ANOVA on Decreased Carbon Footprint Framing

Table A10: Results of repeated measures ANOVAs - Interaction between Decrease Carbon Footprint framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Decrease Carbon Footprint - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
HighLow	1	32005	32005	1.636	0.204	1	1504	1504	0.076	0.784
Residuals	109	2132394	19563			109	2162895	19843		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
Treatment	1	55817	55817	27.40	< 0.0001	1	55718	55718	26.738	< 0.0001
Treatment:HighLow	1	7281	7281	3.58	0.0611	1	1810	1810	0.869	0.353
Residuals	109	221666	2034			109	227137	2084		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
HighLow	1	6146	6146	0.31	0.579	1	1587	1587	0.08	0.778
Residuals	109	2158253	19800			109	2162813	19842		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
Treatment	1	55718	55718	26.830	< 0.0001	1	55718	55718	28.163	< 0.0001
Treatment:HighLow	1	2590	2590	1.247	0.267	1	13305	13305	6.725	0.0108
Residuals	109	226357	2077			109	215642	1978		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
HighLow	1	90	90	0.005	0.946	1	3887	3887	0.196	0.659
Residuals	109	2164309	19856			109	2160513	19821		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**	**DF**	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
Treatment	1	55718	55718	27.056	< 0.0001	1	55718	55718	27.625	< 0.0001
Treatment:HighLow	1	4481	4481	2.176	0.143	1	9100	9100	4.512	0.0259
Residuals	109	224466	2059			109	219847	2017		

Error (Individual Differences)	Risk Tolerance				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
HighLow	1	51789	51789	2.672	0.105
Residuals	109	2112611	19382		

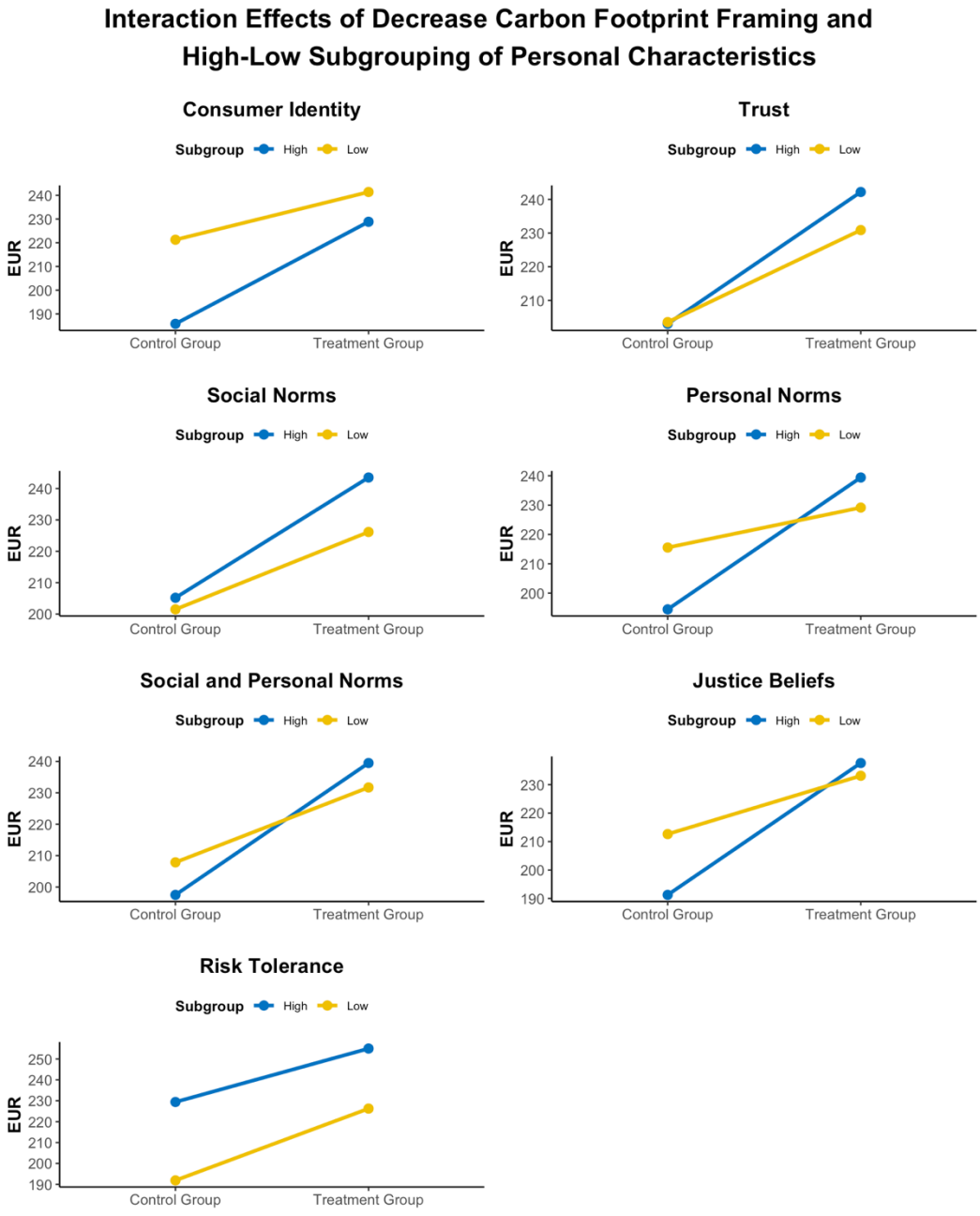
Interaction: ID - Treatment	Risk Tolerance				
	DF	**Sum Sq**	**Mean Sq**	**F value**	**Pr(>F)**
Treatment	1	55718	55718	26.633	< 0.0001
Treatment:HighLow	1	911	911	0.435	0.511
Residuals	109	228036	2092		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

These charts below show the interaction between framing and high-low subgrouping of personal characteristics. The graphs show that investors in the two subgroups make significantly different decisions especially for consumer identity, personal norms and justice

beliefs. The difference in the slope of the two lines indicates this difference, by showing that individuals in low subgroups change their allocated investment amounts by a smaller EUR amount, compared to investors in the high subgroup. Even though also the other charts show some differences between the two subgroups, those are notably smaller compared to the personal characteristics that had been significant according to the repeated measures ANOVA.

Figure A3: Interaction charts between decreased carbon footprint framing and high-low subgrouping of personal characteristics



Note: Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.

Repeated measures ANOVA on Safeguard Endangered Species Framing

Table A11: Results of repeated measures ANOVAs - Interaction between Safeguard Endangered Species framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Safeguard Endangered Species - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	136713	136713	9.166	0.00308	1	54983	54983	3.51	0.0637
Residuals	109	1625766	14915			109	1707496	15665		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	113606	113606	32.731	< 0.0001	1	113606	113606	32.52	< 0.0001
Treatment:HighLow	1	2583	2583	0.744	0.39	1	174	174	0.05	0.824
Residuals	109	378333	3471			109	380742	3493		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	29	29	0.002	0.966	1	69693	69693	4.488	0.0364
Residuals	109	1762449	16169			109	1692786	15530		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	113606	113606	32.637	< 0.0001	1	113606	113606	32.682	< 0.0001
Treatment:HighLow	1	1505	1505	0.432	0.512	1	2027	2027	0.583	0.447
Residuals	109	379412	3481			109	37889	3476		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	39249	29249	2.483	0.118	1	2898	2898	0.18	0.673
Residuals	109	2164309	19856			109	1759581	16143		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	113606	113606	32.613	< 0.0001	1	113606	113606	32.510	< 0.0001
Treatment:HighLow	1	1225	1225	0.352	0.554	1	13	13	0.004	0.951
Residuals	109	379691	3483			109	380903	3495		

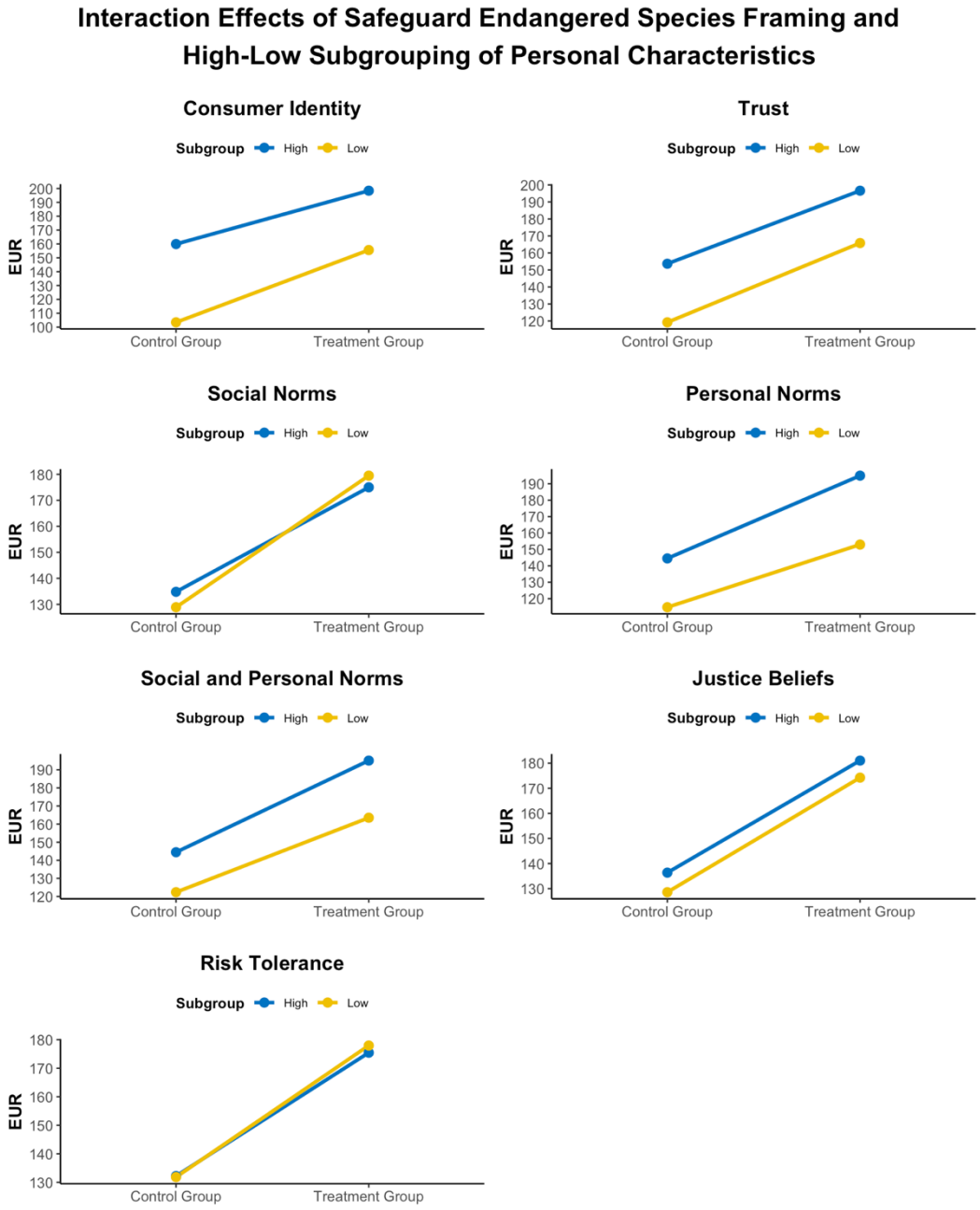
Error (Individual Differences)	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	53	53	0.003	0.954
Residuals	109	1762426	16169		

Interaction: ID - Treatment	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	113606	113606	32.517	< 0.0001
Treatment:HighLow	1	99	99	0.028	0.867
Residuals	109	380817	3494		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

These graphs below show how the participants in the different subgroups made their investment decisions for the control question and the framed question. Since all seven graphs show almost parallel lines for both subgroups, this implies that there is no major difference in the decisions made by high subgroup individuals compared to the ones in the low subgroup.

Figure A4: Interaction charts between safeguard endangered species framing and high-low subgrouping of personal characteristics



Note:Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.

Repeated measures ANOVA on Supporting Local Communities Framing

Table A12: Results of repeated measures ANOVAs - Interaction between Supporting Local Communities framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Supporting Local Communities - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	23122	23122	3.076	0.0823	1	2501	3501	0.455	0.502
Residuals	109	819412	7518			109	839033	7698		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	64771	64771	27.172	< 0.0001	1	64771	64771	26.806	< 0.0001
Treatment:HighLow	1	5589	5589	2.345	0.129	1	2034	2034	0.842	0.361
Residuals	109	259827	2384			109	263381	2416		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	1367	1367	0.177	0.675	1	30002	30002	4.025	0.0473
Residuals	109	841167	7717			109	812532	7454		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	64771	64771	26.739	< 0.0001	1	64771	64771	29.022	< 0.0001
Treatment:HighLow	1	1293	1293	0.533	0.467	1	22148	22148	9.924	0.00211
Residuals	109	264123	2423			109	243267	2232		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	1216	1216	0.158	0.692	1	23951	23951	3.189	0.0769
Residuals	109	841318	7719			109	818582	7510		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	64771	64771	27.466	< 0.0001	1	64771	64771	26.627	< 0.0001
Treatment:HighLow	1	8368	8368	3.548	0.0623	1	263	263	0.108	0.743
Residuals	109	257048	2358			109	265152	2433		

Error (Individual Differences)	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	13008	13008	1.709	0.194
Residuals	109	829256	7610		

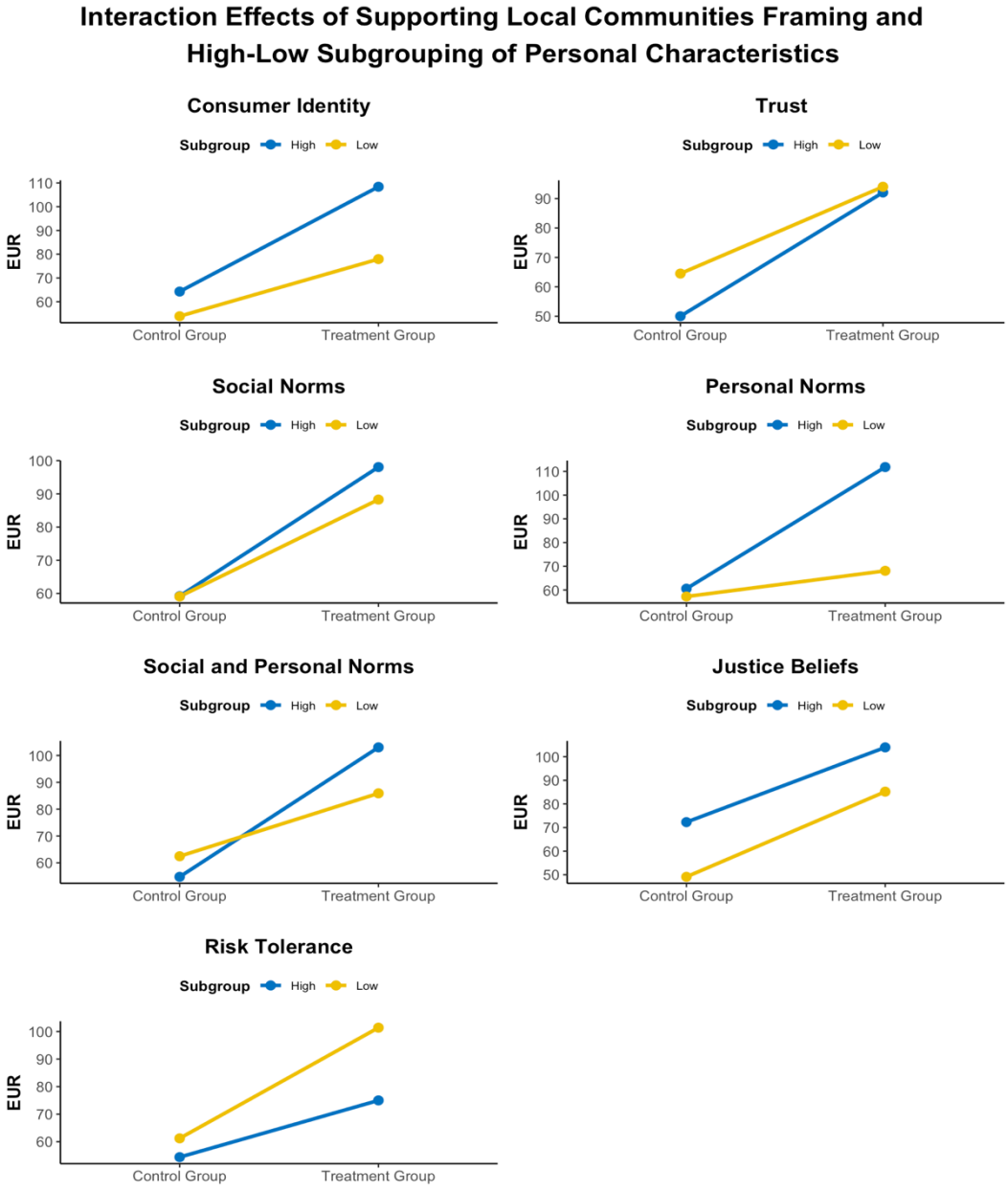
Interaction: ID - Treatment	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	64771	64771	27.060	< 0.0001
Treatment:HighLow	1	4515	4515	1.886	0.172
Residuals	109	260900	2394		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

This graph shows more irregularities compared to the other ones, which make the statistical results from the repeated measures ANOVA even more important, but it is still visible that the chart for personal norm shows the strongest difference between the choices of the two subgroups. Even though the lines for other characteristics cross each other and thereby indicate strong differences in the decisions made, their slopes are quite similar, which implies

that overall, the impact of the framing message had somehow the same effect on both subgroups.

Figure A5: Interaction charts between supporting local communities framing and high-low subgrouping of personal characteristics



Note:Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.

Repeated measures ANOVA on Supporting Gender Equality Framing

Table A13: Results of repeated measures ANOVAs - Interaction between Supporting Gender Equality framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Supporting Gender Equality - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	17661	17661	0.991	0.322	1	5030	5030	0.28	0.598
Residuals	109	1942739	17823			109	1955370	17939		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	29984	29984	7.147	0.00866	1	29984	29984	6.954	0.00959
Treatment:HighLow	1	17249	17249	4.122	0.04503	1	4511	4511	1.046	0.30867
Residuals	109	457268	4195			109	470005	4312		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	3815	3815	0.213	0.646	1	3904	3904	0.218	0.642
Residuals	109	1956585	17950			109	1956496	17950		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	29984	29984	6.905	0.00984	1	29984	29984	7.015	0.00929
Treatment:HighLow	1	1174	1174	0.270	0.60420	1	8593	8593	2.010	0.15909
Residuals	109	473342	4343			109	465923	4275		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	663	663	0.037	0.848	1	9915	9915	0.554	0.458
Residuals	109	1959737	17979			109	1950485	17894		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	29984	29984	6.925	0.00973	1	29984	29984	6.937	0.00967
Treatment:HighLow	1	2572	2572	0.594	0.44257	1	3383	3383	0.783	0.37828
Residuals	109	471945	4330			109	471133	4322		

Error (Individual Differences)	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	52254	52254	2.985	0.0869
Residuals	109	1908146	17506		

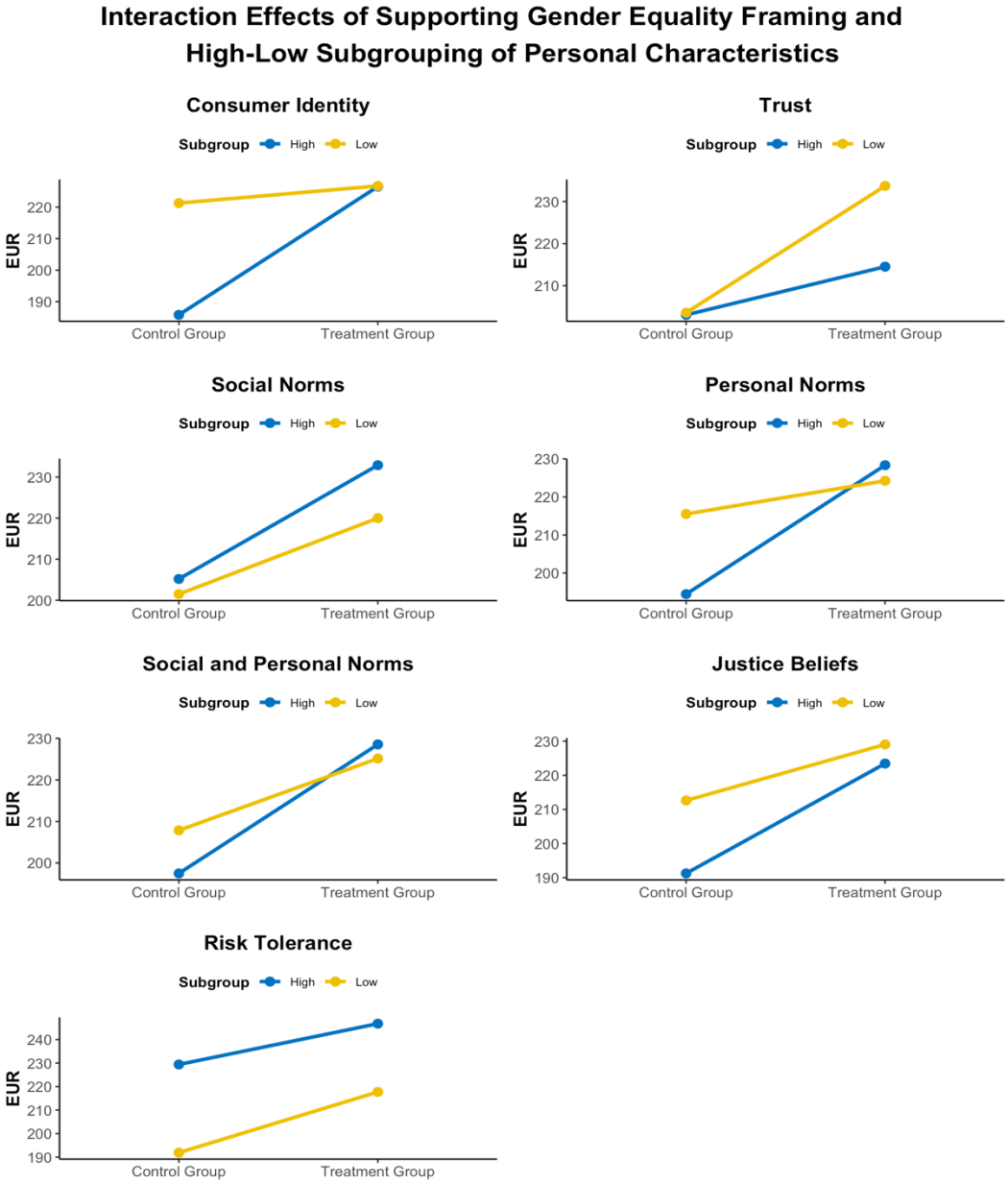
Interaction: ID - Treatment	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	29984	29984	6.900	0.00986
Treatment:HighLow	1	850	850	0.196	0.65912
Residuals	109	473666	4346		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

These graphs show similar trends in the decision-making process for almost all characteristics, mainly shown by the similarity in the slopes for the different lines, besides consumer identity and personal norms. For these two characteristics the change for the low subgroup between the allocation in the control question and the treatment question is much lower than for the

participants in the high subgroups, which indicate that the framing message had a stronger impact on their decisions in comparison to the investors with low characteristics.

Figure A6: Interaction charts between supporting gender equality framing and high-low subgrouping of personal characteristics



Note:Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.

Repeated measures ANOVA on Invest in Creating Jobs Framing

Table A14: Results of repeated measures ANOVAs - Interaction between Invest in Creating Jobs framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Invest in Creating Jobs - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	95119	95119	7.203	0.00842	1	41579	41579	3.036	0.0843
Residuals	109	1439481	13206			109	1493021	13697		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	43652	43652	23.489	< 0.0001	1	43652	43652	22.32	< 0.0001
Treatment:HighLow	1	12579	12579	6.769	0.0106	1	1917	1917	0.98	0.324
Residuals	109	202563	1858			109	213225	1956		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	3247	3247	0.231	0.632	1	22333	22333	22.282	0.207
Residuals	109	1531353	14049			109	1512267	13874		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	43652	43652	23.221	< 0.0001	1	43652	43652	22.624	< 0.0001
Treatment:HighLow	1	10239	10239	5.447	0.0214	1	4835	4835	2.506	0.116
Residuals	109	204903	1880			109	210308	1929		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	10542	10542	0.754	0.387	1	4280	4280	0.305	0.582
Residuals	109	1524058	13982			109	1530320	14040		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	43652	43652	22.498	< 0.0001	1	43652	43652	22.122	< 0.0001
Treatment:HighLow	1	3653	3653	1.883	0.173	1	64	64	0.032	0.858
Residuals	109	211489	1940			109	215079	1973		

Error (Individual Differences)	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	804	804	0.057	0.812
Residuals	109	1533796	14072		

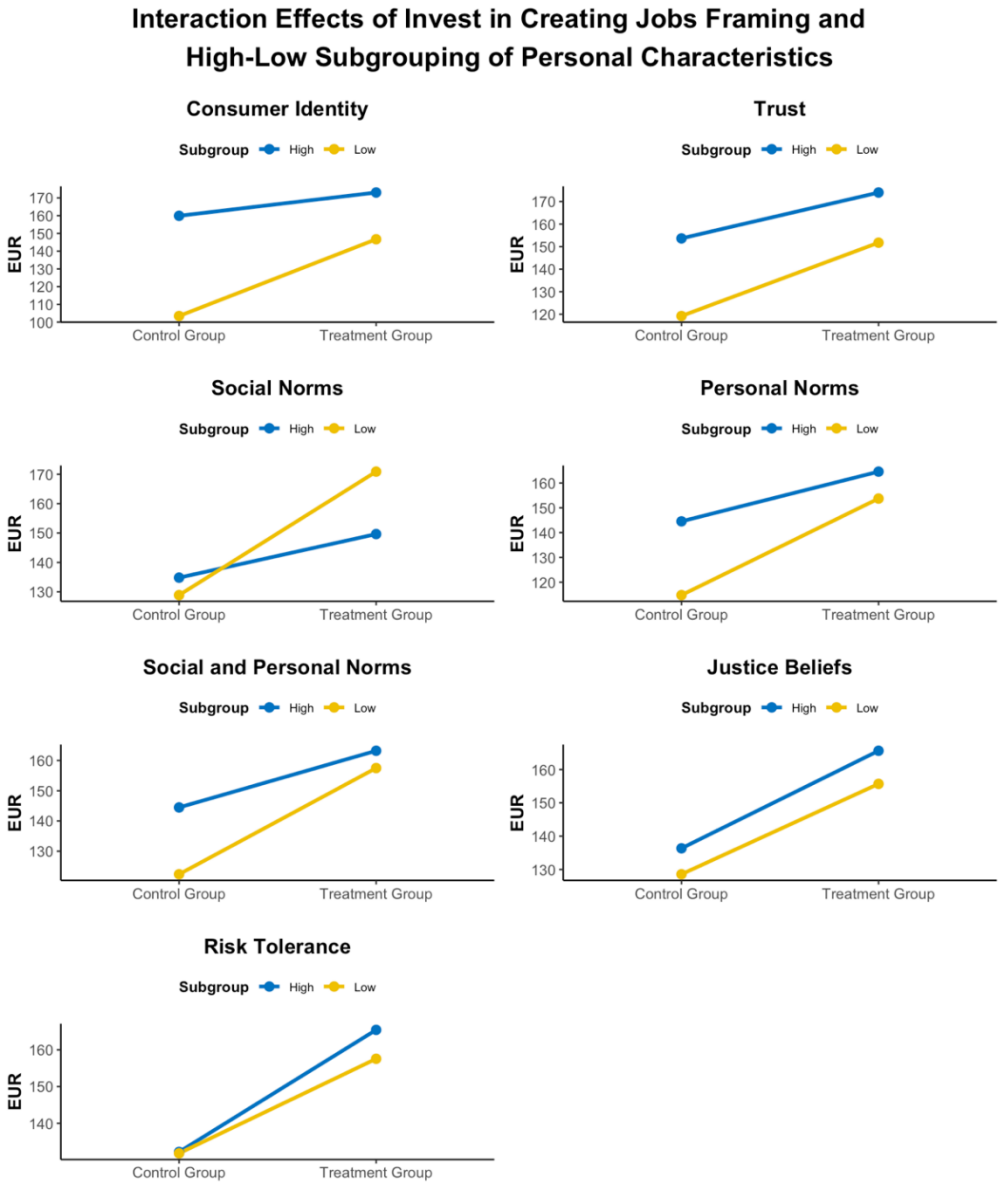
Interaction: ID - Treatment	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	43652	43652	22.184	< 0.0001
Treatment:HighLow	1	660	660	0.336	0.564
Residuals	109	214482	1968		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

The interaction charts show that for most characteristics, the effect is similar across subgroups, as indicated by the parallel lines. For social norms, however, individuals with low social norms significantly increase their investments in response to job creation framing, while those with high social norms show only a marginal increase. A similar pattern is observed for consumer

identity, where low-type investors show a larger shift between control and treatment scenarios compared to high-type investors.

Figure A7: Interaction charts between invest in creating jobs framing and high-low subgrouping of personal characteristics



Note: Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.

Repeated measures ANOVA on Invest to Prevent Job Loss Framing

Table A15: Results of repeated measures ANOVAs - Interaction between Invest in Preventing Job Loss framing and high-low subgrouping of personal characteristics

repeated measures ANOVA: Invest to Prevent Job Loss - Personal Characteristics

Error (Individual Differences)	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	64185	64185	5.013	0.0272	1	2835	2835	0.212	0.646
Residuals	109	1395538	12803			109	1456888	13366		

Interaction: ID - Treatment	Consumer Identity					Trust				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	74141	74141	27.209	< 0.0001	1	2835	2835	27.874	< 0.0001
Treatment:HighLow	1	388	388	0.142	0.707	1	7469	7469	2.808	0.0967
Residuals	109	297006	2725			109	289925	2660		

Error (Individual Differences)	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	9088	9088	0.683	0.41	1	525	525	0.039	0.843
Residuals	109	1450635	13309			109	1459198	13387		

Interaction: ID - Treatment	Social Norms					Personal Norms				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	74141	74141	27.221	< 0.0001	1	74141	74141	28.350	< 0.0001
Treatment:HighLow	1	511	511	0.188	0.666	1	12341	12341	4.719	0.032
Residuals	109	296883	2724			109	285053	2615		

Error (Individual Differences)	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	2845	2845	0.213	0.645	1	10	10	0.001	0.978
Residuals	109	1456878	13366			109	1459713	13392		

Interaction: ID - Treatment	Social and Personal Norms					Justice Beliefs				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	74141	74141	27.82	< 0.0001	1	74141	74141	27.68	< 0.0001
Treatment:HighLow	1	6956	6956	2.61	0.109	1	5464	5464	2.04	0.156
Residuals	109	290438	2665			109	291930	2678		

Error (Individual Differences)	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
HighLow	1	50895	50895	3.938	0.0497
Residuals	109	1408828	12925		

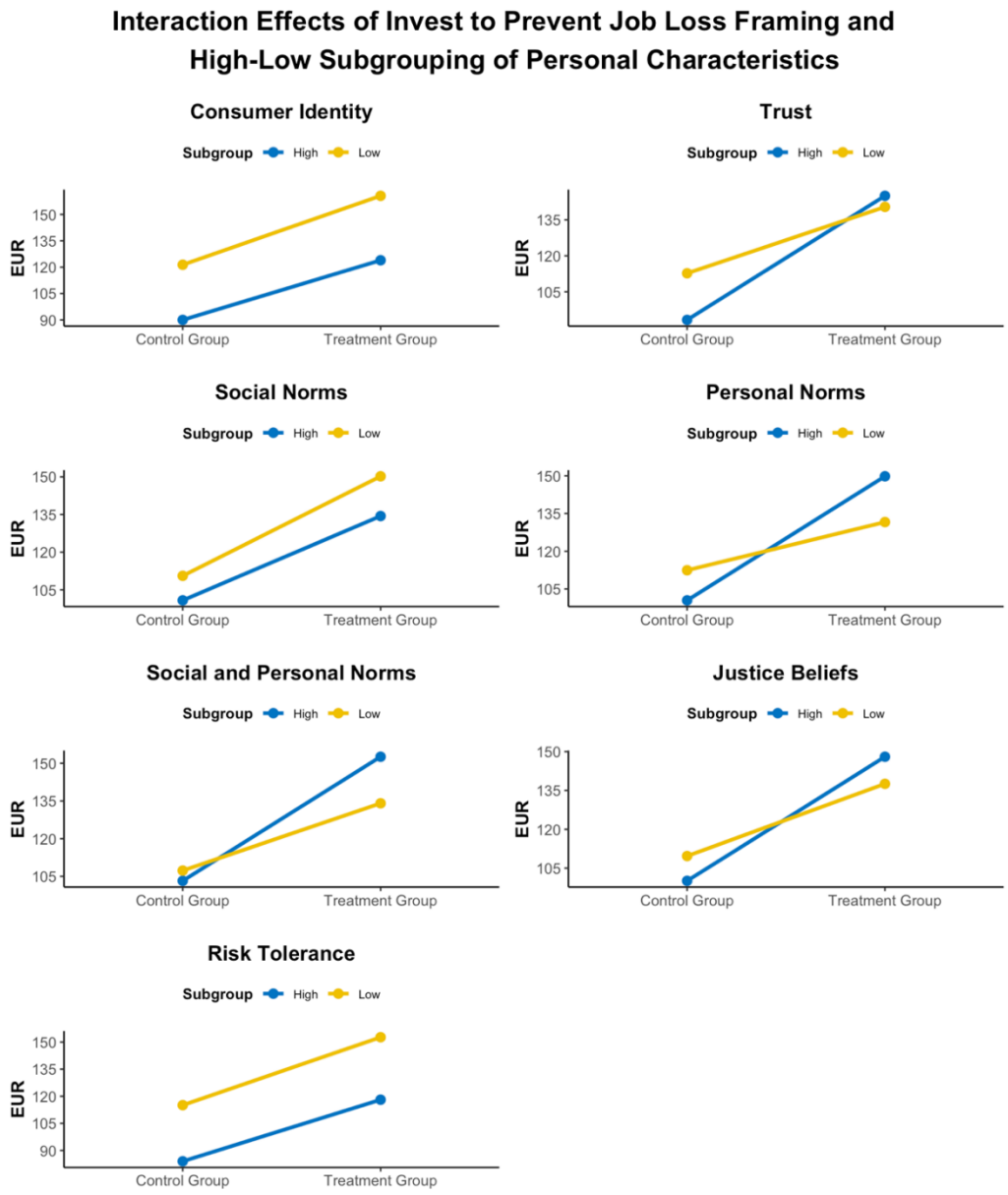
Interaction: ID - Treatment	Risk Tolerance				
	DF	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	1	74141	74141	27.187	< 0.0001
Treatment:HighLow	1	145	145	0.053	0.818
Residuals	109	297249	2727		

Notes : The F-statistics and p-values presented correspond to the results of a repeated measures ANOVA, which tested the interaction between treatment framing and high-low subgrouping of personal characteristics (independent variable) for each dependent outcome. This analysis assesses whether the impact of treatment framing varies significantly across subgroups defined by personal characteristics.
Df (Degrees of Freedom): Represents the number of independent pieces of information available for estimating the statistical parameters. For each source of variation, the degrees of freedom are calculated based on the number of groups or observations involved.
Sum Sq (Sum of Squares): This value represents the total variation or the sum of squared deviations from the mean for each source of variation. It measures the extent of variability attributable to each factor in the model.
Mean Sq (Mean Square): The mean square is the sum of squares divided by the degrees of freedom. It provides an estimate of the variance for each factor, giving an idea of the magnitude of variability explained by that factor.
F value: The F-value is the ratio of the mean square of a factor (or interaction) to the mean square of the residuals (error term). It tests the null hypothesis that the factor or interaction has no effect. A higher F-value indicates a greater effect of the factor on the dependent variable.
Pr(>F) (P-value): The p-value associated with the F-statistic tests the null hypothesis that the factor (or interaction) has no effect on the dependent variable. A smaller p-value indicates stronger evidence against the null hypothesis.
Residuals: The residuals represent the unexplained variation after accounting for the factors in the model. The degrees of freedom and sum of squares for residuals provide insight into the amount of variability left in the data after fitting the model.

These graphs show a very clear picture, when confronted with a framing message about the prevention of job loss. High and low subgroups of personal characteristics like consumer identity, social norms, risk tolerance and justice beliefs behave the same way. The behavior of the subgroups are two almost perfect parallel lines, which indicate that their reactions are the same. For the other two personal characteristics, trust and personal norms the reaction of the

two subgroups is quite different, which has also been explained in chapter 4.3. Since social and personal norms is the combination of these two characteristics it can be seen that the difference in behavior is driven by the personal norms rather than by social norms.

Figure A8: Interaction charts between invest to prevent job loss framing and high-low subgrouping of personal characteristics



Note: Each chart represents the interaction between the treatment framing and high-low subgrouping of personal characteristics. The y-axis shows the mean investment amount (in EUR) for the control and treatment groups, categorized by high and low subgroups.