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Understanding ESG Investment Decisions: The Influence of Risk Aversion, Environmental and Social Awareness, and Perceived ESG Greenwashing Risk

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1. Introduction

The environment is significantly harmed by industries through their operations, production processes, and resource consumption. The practices of industries lead to pollution, waste generation, deforestation and resource depletion. Industrial agriculture is responsible for 80% of global deforestation (FAO & UNEP, 2020). The industrial sector's fossil fuel consumption exemplifies resource depletion, accounting for approximately 55% of global fossil fuel use. Industries are also a significant contributor to water pollution, discharging a round 193 million tons of toxic pollutants into water bodies each year (Nickel, Schröder & McLinden, 2015). Additionally, it is the primary contributor to outdoor air pollution, causing an estimated 4.2 million premature deaths annually worldwide (WHO, 2022). Moreover, the industrial sector is a major source of plastic waste. Figure 1 shows the increase of annual production of plastic worldwide over the years. In 2019, 374.8 million metric tons of plastics are produced. As can be calculated from figure 2, 28.3% of all plastics are considered as plastic waste in 2019. The industrial sector is one of the main contributors to this plastic waste generation, since industries are responsible for 78% of all produced plastic (Geyer, Jambeck & Law, 2017).

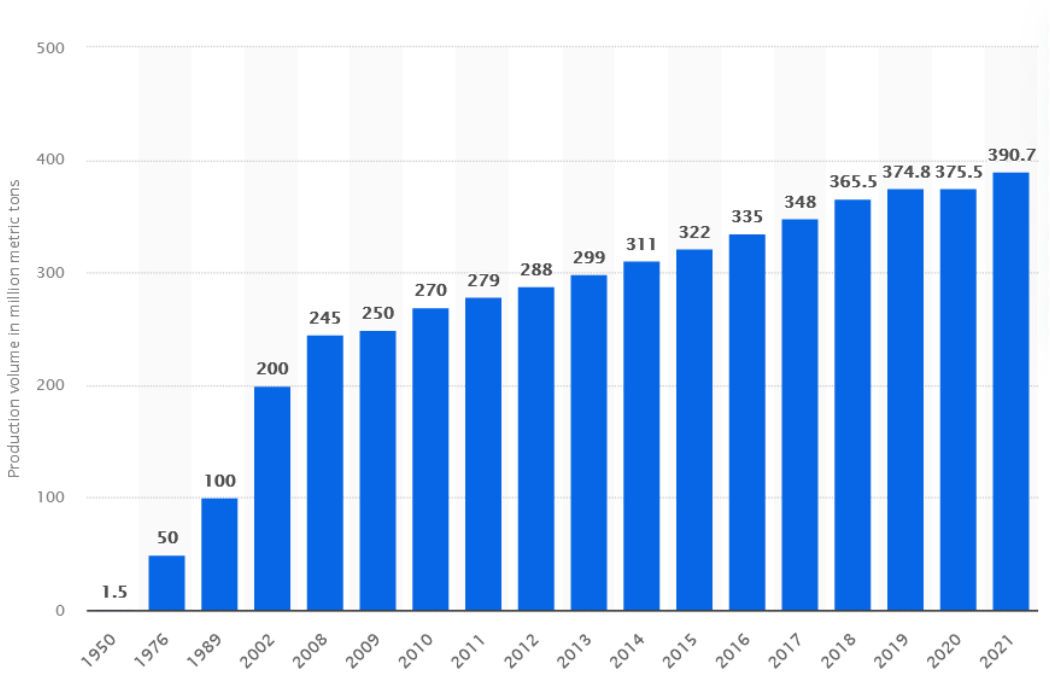

Figure 1 Annual Production of plastics worldwide from 1950 to 2021 (PlasticsEurope (PEMRG), 2022)

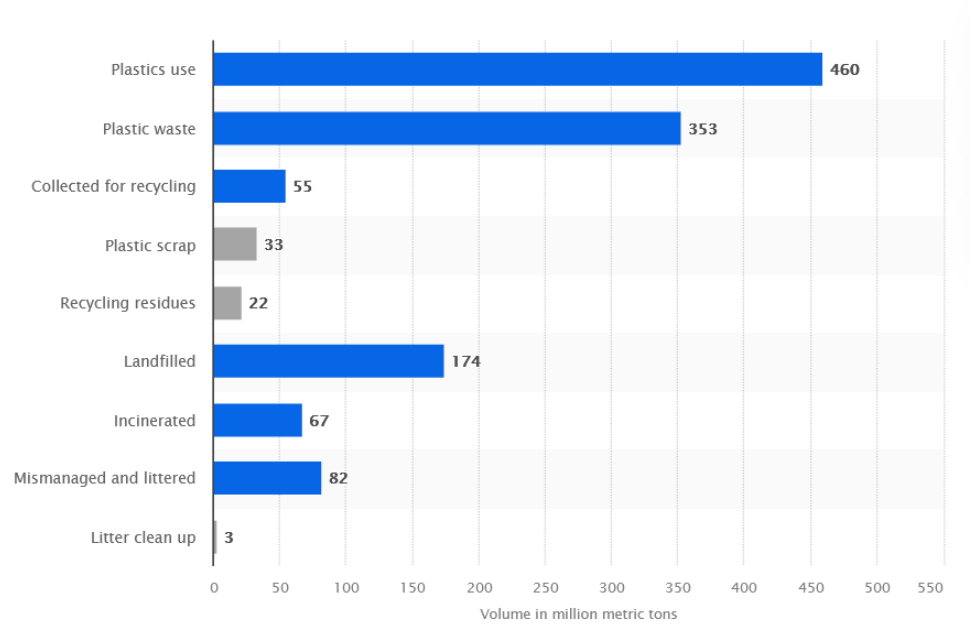

Figure 2 Lifecycle of plastic waste worldwide in 2019 (OECD, 2022)

It is undeniable that we cannot afford to ignore the issue of environmental degradation as a global society. Environmental degradation even has the greatest effects on the health of individuals and populations (Donohoe, 2003). Accordingly, environmental factors would be responsible for 22% of the global disease burden (healthy life years lost) and 23% of all deaths globally (premature deaths) (Prüss-Ustün, Wolf, Corvalan, Bos & Neira, 2016). Besides, environmental degradation also has a major effect on biodiversity. Biodiversity can be defined as the diversity of living things at the genetic, species, and ecosystem levels (Brears, 2020). For example, terrestrial bird populations are threatened with extinction due to loss of habitat, and over 40% of insect species are threatened with extinction. Plants, freshwater fish and marine life are also negatively affected by environmental degradation (Brears, 2020).

Green finance can play a crucial role in mobilizing capital to restore and conserve nature. By 2050, investment in nature of a value of $8.1 trillion is necessary to tackle climate, biodiversity, and land degradation crises (United Nations Environment Programme, 2021). To reach this amount of money, annual investment should triple by 2030 and increase four-fold by 2050. This highlights the urgent need for significant financial resources and underscores the critical role that green finance can play in achieving ambitious environmental targets (United Nations Environment Programme, 2021).

To realise the required increase in green investments, not only the public sector has to take more responsibility, but also the private sector should be more involved. Therefore, governments should ensure to make green financing easier for the private sector. For example, this could be done by reviewing trade tariffs and developing clear taxonomies that can be used to identify whether an investment is sustainable (United Nations Environment Programme, 2021). Since the risk associated with increasing green finance can be shared if companies and financial institutions are committing to increase green finance and investments, it is assured that the private sector is a crucial part of the solution (United Nations Environment Programme, 2021).

A tool that can help professional investors to invest pro-environment and sustainability, and to manage (systematic) risk, are Environmental, Social and Governance (ESG) factors. Estimated ESG scores are regularly used in investment decision making. Recently, the ESG market has been growing considerably. Approximately 89% of investors considered ESG issues in their investment decision making in 2022, while this was 84% in 2021 (Baker, 2023). The fact that the ESG market has been growing is also confirmed by the increase in estimated revenues from the ESG-rating market, which rose from $617 million in 2019 to approximately $1 billion by 2021 (Gyönyörová, Stachoň & Stašek, 2021).

ESG consideration is gaining increasing importance in the business as well as in the investment landscape. Companies are recognizing the significance of environmental, social, and governance factors. Incorporating ESG considerations can bring benefits to businesses, since the advantages of ESG disclosure outweigh the associated costs (Yu, Guo & Van Luu, 2018). From investor side, ESG consideration is also shown to affect actual investment behaviour (Giglio et al., 2023).

However, the rise in ESG awareness is accompanied by a growing risk of greenwashing, where companies make misleading or exaggerated claims about their sustainability practices. The benefit of appearing sustainable and lack of standardization create an incentive for companies to engage in greenwashing. Currently, there is a lack of standardization in how ESG data is collected and compiled across industries (Gyönyörová, Stachoň & Stašek, 2021).

In addition, ESG data of firms often is unaudited (Yu, Van Luu & Chen, 2020). As a result, this makes it convenient for companies to manipulate ESG scores, and thus publish higher ESG scores than in reality. This lack of standardization, reliability of the data and the allure of appearing sustainable, creates an incentive for companies to engage in greenwashing practices (Zhang, 2022).

Although ESG consideration is gaining increasing importance in the investment landscape, it is questionable how much ESG factors are actually considered by investors. Financial considerations remain influential regardless of other investment choices (Giglio et al., 2023). Besides, the concerns of ESG greenwashing makes ESG investment a less effective tool to mitigate or hedge the impacts of climate change. This is supported by the fact that approximately 25% of investors that express significant concerns about climate change do not have specific reasons to invest in ESG (Giglio et al., 2023).

ESG greenwashing is a barrier for investors to consider ESG scores into their investment analysis and decision making (Yu, Van Luu & Chen, 2020). There are several scientific articles that acknowledge the problem of ESG greenwashing (Gyönyörová, Stachoň & Stašek, 2021; De Silva Lokuwaduge & De Silva, 2022; Dumitrescu, Gil-Bazo & Zhou, 2022). It is important to address and overcome the issue of ESG greenwashing. By tackling greenwashing practices, investors can ensure their ESG consideration are genuine and meaningful.

The existing literature acknowledges ESG greenwashing but lacks a clear understanding of its direct impact on investor decisions. While research explores the relationship between risk/return and investor behaviour, and the importance of environmental awareness in green investment, a crucial gap remains. The potential influence of greenwashing concerns on investor decisions, and how these concerns interact with risk preferences and environmental/social awareness, has not been extensively examined empirically.

This gap highlights the need for further research on the extent to which ESG greenwashing acts as a barrier to ESG investment, the interplay between ESG factors, investor behaviour, risk preferences, and environmental/social awareness and the impact of ESG greenwashing, a critical concern in the

investment landscape. Quantifying ESG greenwashing as a barrier for investors to consider ESG greenwashing would be of value, since it shows the potential of ESG investment when ESG greenwashing would not exist. This would provide a clear understanding of the relevance of investing in regulation and compliance of ESG factors to mitigate ESG greenwashing. Since such investments might be crucial for encountering ESG greenwashing, enhancing transparency and ultimately making ESG investment more appealing. Addressing these gaps will contribute valuable insights to both academia and industry, enhancing our comprehension of the complex dynamics guiding investors in the realm of sustainable investing. Additionally, investigating the most effective ways to mitigate ESG greenwashing risks according to investors will help to define the investors needs to overcome ESG greenwashing risk.

This study investigates the extent to which three factors influence investors' decisions to invest in high ESG assets: perceived ESG greenwashing risk, environmental and social awareness (ESA), and risk aversion. Additionally, the research explores the reasons and barriers for investing in such assets, the perceived impact of greenwashing risk on investment decisions, and potential mitigation strategies identified by investors. Based on these areas of investigation, the research questions are:

- To what extent do ESG factors influence investor behaviour regarding investment in high ESG assets?
- To what extent does investor risk preference influence the likelihood of investing in high ESG assets?
- To what extent does environmental and social awareness (ESA) influence the likelihood of investing in high ESG assets?
- To what extent does the perceived risk of ESG greenwashing influence investor decision-making?
- According to investors, what are the most effective ways to mitigate ESG greenwashing risk?

2. Theoretical Background

To investigate the impact of ESG greenwashing on investment decisions, it is crucial to delve into the factors that drive such decisions. In the existing literature, numerous theories have been put forth to explain investment decision-making processes. Among these theories, Modern Portfolio Theory (MPT) has been identified as a relevant framework in the context of sustainable investing.

2.1 Modern Portfolio Theory

Modern Portfolio Theory (MPT) represents a robust framework dedicated to the management of risk and return within a portfolio context. Embraced widely by investors, it forms the cornerstone of strategic decision-making in investment practices (Surtee & Alagidede, 2023). Central to MPT is the portfolio problem, which involves the meticulous selection of assets based on their mean (representing average return) and variance (representing risk) (Elton & Gruber, 1997). The fundamental objective of MPT is to optimize the expected return for a given level of risk, or conversely, to minimize risk for a specified expected return. By integrating these principles, MPT constructs an efficient frontier, furnishing investors with a spectrum of portfolio options aligned with their risk preferences (Elton & Gruber, 1997).

The relevance of MPT extends to the examination of the relationship between Environmental, Social, and Governance (ESG) factors and investment behaviour. Given the impact of ESG-positive investments on both risk and return, MPT serves as a pertinent framework for analysing this dynamic interplay.

However, despite its utility, MPT harbours certain limitations. One such limitation arises from its assumption of asset returns conforming to a normal distribution, which potentially underestimates the likelihood of extreme market events or shocks (Taleb, 2010). Additionally, MPT's reliance on constant correlations between assets overlooks the dynamic nature of such relationships, leading to suboptimal portfolio decisions (Ilmanen, 2011). Furthermore, MPT predominantly addresses market risk, neglecting non-market risks such as political, legal, and economic uncertainties, which can significantly impact asset returns (Damodaran, 2012).

In the context of ESG investments, investors' risk aversion levels and environmental and social awareness significantly influence their decision-making processes. Individual risk preferences shape one's efficient frontier within the MPT framework, while ethical considerations pertaining to environmental and social factors impact investment choices. Moreover, investigating the influence of environmental and social awareness levels on the likelihood of investing in ESG assets adds another dimension to comprehending investor behaviour.

2.2 Influence of ESG investment on risk and return

The ESG investing industry exhibits three main conditions that contribute to reducing risk. This is the case for overall as well as systemic risk. First, the risk of future processes initiated by stakeholders against a company are increased when a company scores low on ESG ratings (Becchetti, Ciciretti & Dalò, 2018). Besides, ESG funds are less dependent on short-term risk/return performance. This is mainly because long-term investment strategies are adopted by ESG funds (Cerqueti, Ciciretti, Dal Dalò & Nicolosi, 2021). In addition, high ESG-ranked funds often include assets that adhere to ESG criteria. As a result, these high ESG-ranked funds include assets that are not commonly featured in other funds. This results in minimal overlap with low ESG-ranked funds, thereby mitigating the potential for cross-fund contagion. Consequently, ESG investments contribute in reducing overall as well as systemic financial risks.

Some research shows a positive correlation between ESG factors and expected returns (Eccles, Ioannou & Serafeim, 2014; Friede, Busch & Bassen, 2015), while others find the relationship to be negative or statistically insignificant (Dimson, Karakas & Li, 2015; Hong & Kostovetsky, 2012). Since investing in high ESG assets reduces overall and systemic risks, resulting in higher current valuation for ESG assets (Zhang, 2021). This could explain the positive correlation between ESG factors and expected returns. However, Stotz (2011) suggests that high ESG assets might be exposed to a reduction in discount rates compared to low ESG assets, which could explain the negative or insignificant correlation between ESG factors and expected returns.

Apart from the risk and return factors emphasized by MPT, investors choose ESG-positive assets for various reasons. Investing in (high) ESG assets can lower general and systemic risks, making it a logical choice. While the prospect of high returns can be enticing, the evidence on the relationship between ESG considerations and returns is mixed. Therefore, the expectation of high returns might not be a significant motivator for investing in ESG assets. Individual factors such as the desire for sustainable investments, personal risk preferences, awareness, and commitment to reducing environmental impact influence investors' decisions. It is important to note that MPT (Modern Portfolio Theory) does not consider these individual factors, meaning it does not account for differences among investors.

To study the relationship between ESG greenwashing risk and investors' (ESG) investment behaviour, I propose combining risk-return considerations with investors' risk preferences, awareness, and commitment to reducing human-caused environmental effects. Beyond considerations of risk and return, investors' level of risk aversion and their environmental and social awareness exert notable influence on their investment choices within the realm of ESG-positive assets. An individual's level of risk aversion will affect their personal efficient frontier, while an individual's environmental and social awareness can influence their investment decisions based on their subjective ethical values.

2.3 Risk aversion and ESG investment

An individual's portfolio preferences will be affected by their personal efficient frontier, which partially depends on an individual's level of risk aversion. Risk aversion refers to the tendency to avoid taking risks and to have a lower tolerance for risk. Investors who exhibit risk aversion prioritize protecting their initial investment over the potential for higher returns (Chen, 2024). Since investing in (high) ESG assets reduces both overall and systemic risk of an investment (Cerqueti et al., 2021), it can be expected that an individual with a higher level of risk aversion is more likely to invest in high ESG assets. By doing so, one reduces overall and systemic risks, which is in line with being more risk averse. Conversely, an individual who is more risk seeking tends to accept greater economic uncertainty and risks in exchange for the potential of higher returns (Hayes, 2022). It is expected that an investor who is more risk seeking is willing to invest in assets with a higher systemic risk, which is often related to assets with lower or poor ESG scores and performances.

2.4 Environmental & Social Awareness and ESG investment

In addition to impacting the balance between risk and return, ESG investing is also about investing in a socially responsible manner. People are motivated to invest in assets with high ESG ratings because these investments align with their personal values and beliefs. This alignment, as pointed out by Kräussl (2023), encourages investors to choose ESG assets over traditional ones. The awareness of environmental issues is a key driver behind ESG investments (Park & Jang, 2021). Companies with high ESG ratings tend to handle environmental, social, and governance risks more effectively than others. Therefore, individuals who have a higher environmental and social awareness are more likely to invest in high ESG assets because they resonate with their values and beliefs.

If an investor has a high level of risk aversion, and a high level of environmental and social awareness, the likelihood this investor would invest in (high) ESG assets is high. However, when an investor has a high level of risk aversion, but a low level of environmental and social awareness, these two features counteract each other. Thus, the effect of the level of risk aversion on the likelihood to invest in (high) ESG assets depends on the level of environmental and social awareness, and vice versa. Therefore, it is expected that there exists a positive interaction effect between an individual's level of risk aversion and an individual's level of environmental and social awareness.

2.5 Reasons and barriers for ESG investment

Investors are progressively incorporating ESG data into their investment strategies, acknowledging its financial significance and its capacity to improve investment outcomes (Khemir, 2019). The acknowledgment of ESG information's financial materiality motivates investors to consider it in their decision-making processes (Amel-Zadeh & Serafeim, 2018). Investors understand that ESG factors can significantly impact financial outcomes, encouraging investors to incorporate ESG data into their investment strategies.

As discussed earlier, another main reason for investors to invest in (high) ESG assets is the motivation to invest in assets with high ESG ratings because these investments align with their personal values and beliefs (Torre, Mango, Cafaro & Leo, 2020). This alignment not only attracts investors towards (high) ESG assets but also indicates a growing interest in incorporating ESG criteria into portfolio selection decisions. Additionally, ESG investments are seen as offering better risk-adjusted returns, especially during volatile market conditions like COVID-19 pandemic (Ferriani & Natoli, 2020). The stability and resilience of (high) ESG assets in turbulent market conditions appeal to risk-conscious investors. Investors utilize ESG data as a risk management tool, enabling them to effectively manage risk and identify warning signs (Duuren et al., 2020). This long-term perspective aligns with the sustainable nature of ESG investments and can result in more stable and consistent returns over time (Giakoumelou, Salvi, Bertinetti & Micheli, 2022).

However, currently there is a lack of standardization in how ESG data is collected and compiled across industries (Gyönyörová, Stachoň & Stašek, 2021). The absence of consistent data, which enables sector-wide comparability standards in ESG reporting is one of the main barriers for investors to invest in (high) ESG assets. As a result, it is demanding to effectively assess and compare ESG data across diverse companies (Amel-Zadeh & Serafeim, 2018; Eccles, Kastrapeli & Potter, 2017; Vuuren & Marco, 2022). Consequently, the lack of standardization complicates the evaluation of the actual impact of ESG factors on investment performance. This potentially impacts the financial gains achievable from (high) ESG assets. The lack of reliable ESG data originates from inconsistent measurement standards and insufficient corporate reporting, posing challenges for investors to make informed decisions regarding ESG investments (Eccles et al., 2017; Friede et al., 2015; Rastogi, Singh & Kanoujiya, 2023). Additionally, significant resources are required to consistently and effectively evaluate and manage ESG data (Paredes-Gázquez et al., 2014). This raises challenges for individual investors that are interested in ESG investment, given the complexity and effort involved in processing ESG data (Park & Oh, 2022).

Since investors are progressively incorporating ESG investment, and the preference for green assets increases, this could potentially lead to underperformance in ESG investments, discouraging individual investors from engaging in ESG investing (Kräussl, 2023). Often, the concern regarding the trade-off between profitability and ESG considerations is another barrier for individual investors to adopt ESG investment (Petelczyc, 2022). Companies generally exhibit limited commitment to positive changes related to ESG issues, which discourages investors from allocating funds to high ESG assets (Zeidan, 2022). Another barrier for investors considering high ESG assets is the legitimacy of ESG data. However,

improvements in data quality and reporting standards regarding ESG data are expected in the future (Rahman & Lau, 2023).

2.6 Perceived ESG greenwashing risk and ESG investment

The rise in ESG awareness is accompanied by a growing risk of ESG greenwashing, where companies make misleading or exaggerated claims about their sustainability practices. Due to the barriers to invest in (high) ESG assets, which are addressed in the previous section, investors may become more vulnerable to greenwashing practices, wherein companies offer misleading or incomplete information regarding their ESG practices to present themselves as more sustainable than they are (Aldieri, Amendola & Candila, 2023). The absence of ESG data could influence investment outcomes, as investors might encounter difficulties in identifying and prioritizing companies with robust ESG performance, potentially impacting the overall sustainability and long-term performance of their investment portfolios (Rau & Yu, 2023).

Conversely, high-quality ESG data would empower investors to make more informed investment decisions, as the ESG data on companies would be accurate and dependable. This could bolster investors' trust in the reliability of ESG data, leading to increased confidence in companies' sustainability practices and disclosures (Rau & Yu, 2023). Consequently, the evaluation of sustainability and responsible business practices would be more thorough (Arvidsson & Dumay, 2021), contributing to more effective risk management strategies for investors (Aldieri et al., 2023).

Based on these findings, it can be expected that investors who perceive a higher risk of ESG greenwashing have a lower likelihood to invest in (high) ESG assets compared to investors who perceive a lower risk of ESG greenwashing. This is in line with the MPT. Due to the rise in risk and uncertainty, while expected return remains constant or even decreases, it can be expected that ESG greenwashing risk decreases the likelihood that investors will invest in (high) ESG assets.

In addition, an investor's perceived ESG greenwashing risk in combination with an investor's level of risk aversion will have an impact on the likelihood to invest in (high) ESG assets. ESG greenwashing risk is an extra risk that comes with investing in (high) ESG assets. The certainty that systematic risk is reduced is lower due to the existence of ESG greenwashing risk. This means it is less attractive for risk averse people to invest in (high) ESG assets. Therefore, the effect of the level of risk aversion on the likelihood to invest in (high) ESG assets depends on the level of perceived ESG greenwashing risk, and vice versa. Thus, it is expected that there exists an interaction effect between an individual's level of risk aversion and an individual's level of perceived ESG greenwashing risk.

Besides, an investor's perceived ESG greenwashing risk in combination with an investor's level of environmental and social awareness will have an impact on the likelihood to invest in (high) ESG assets. If an investor invests in (high) ESG assets mainly because of the environmental and social aspect, this investor would be less likely to invest in (high) ESG assets as there exists uncertainty on the actual performs in environmental and social terms of the company one invests in. Therefore, the effect of the level of environmental and social awareness on the likelihood to invest in (high) ESG assets depends on the level of perceived ESG greenwashing risk, and vice versa. Thus, it is expected that there exists an interaction effect between an individual's level of environmental and social awareness and an individual's level of perceived ESG greenwashing risk.

2.7 Hypotheses

Based on the theory discussed, six hypotheses are formulated. Specifically, the relationship between the likelihood to invest in (high) ESG assets (Y), an individual's level of risk aversion (R), one's level of environmental and social awareness (E), and one's level of perceived ESG greenwashing risk (G) are examined. In the model, which was used for hypotheses testing, interaction effects between these three main independent variables are included as well. Additionally, age, gender, education level, knowledge on ESG scores and ESG investment, experience with ESG investment, familiarity with ESG scores and ESG investment, and the percentage of their total asset one is investing.

The model that is used for testing the hypotheses is as follows:

$$Y = \beta_0 + \beta_1 R + \beta_2 E + \beta_3 G + \beta_4 (RE) + \beta_5 (RG) + \beta_6 (EG) + \beta_7 A + \beta_8 GE + \beta_9 EDU + \beta_{10} K + \beta_{11} EX + \beta_{12} F + \beta_{13} AI + \epsilon$$

Where:

- β_0 is the intercept, representing the base investment likelihood.
- β_1 represents the coefficient for risk aversion (R).
- β_2 represents the coefficient for environmental and social awareness (E).
- β_3 represents the coefficient for perceived ESG greenwashing risk (G).
- β_4 represents the coefficient for the interaction effect between risk aversion and environmental/social awareness (R×E).
- β_5 represents the coefficient for the interaction effect between risk aversion and perceived ESG greenwashing risk (R×G).
- β_6 represents the coefficient for the interaction effect between environmental/social awareness and perceived ESG greenwashing risk (E×G).
- β_7 represents the coefficient for age (A).
- β_8 represents the coefficient for gender (GE).
- β_9 represents the coefficient for education level (EDU).
- β_{10} represents the coefficient for knowledge on ESG scores and ESG investment (K).
- β_{11} represents the coefficient for experience with ESG investment (EX).
- β_{12} represents the coefficient for familiarity with ESG scores and ESG investment (F).
- β_{13} represents the coefficient for the percentage of their total asset one is investing (AI).
- ϵ is the error term, accounting for unexplained variability in investment choices.

In this study, there is opted to not include a three-way interaction among the variables. The main reason for this is the need for a substantial sample size to accurately detect significant effects, given the complexity of three-way interactions. Moreover, the theoretical framework does not provide a clear prediction for such an interaction. By concentrating on two-way interactions nuanced relationships are explored. Focusing on specific interactions provided a detailed examination of pairwise influences, providing targeted insights into the factors guiding ESG investment decisions.

Age is included in the model to see if there is a relation between age and the likelihood one is investing in (high) ESG assets in the future. The same accounts for one's gender and education level. Knowledge, experience, and familiarity with ESG scores and ESG investment are included as well since this could potentially help explain one's likelihood to invest in (high) ESG assets in the future. Finally, the percentage of total assets one is investing is included as well to see the significance of investing of someone. This might be an indicator of the seriousness in which one is investing. Given the above general framework, here are the hypothesis that will guide my thesis.

1. There is a statistically significant positive correlation between an individual's level of risk aversion and their likelihood to invest in (high) ESG assets

Since MPT focuses on optimizing the trade-off between risk and return, it is interesting to investigate if an individual's level of risk aversion has an impact on their likelihood to invest in (high) ESG assets. This hypothesis implies that as an individual becomes more risk-averse, their likelihood of investing in high ESG assets will increase. This hypothesis will be tested by collecting data on individuals' risk aversion levels and their investment choices. Then the correlation between these two variables will be analysed using appropriate statistical methods.

2. There exists a statistically significant positive correlation between the level of an investor's environmental and social awareness and their likelihood to invest in (high) ESG assets

This hypothesis suggests that as an investor's degree of environmental and social awareness increases, their probability of investing in high ESG assets will also increase. To investigate this hypothesis, data is gathered on investors' levels of environmental and social awareness. The relationship between an investor's environmental and social awareness and their likelihood to invest in (high) ESG assets (β_2) is rigorously examined.

3. There exists a statistically significant negative correlation between an individual's perceived ESG greenwashing risk and their likelihood to invest in (high) ESG assets

This hypothesis suggests that as an investors' level of concern about ESG greenwashing risk increases, their likelihood of investing in high ESG assets will decrease. To investigate this hypothesis, data on investors' perceived ESG greenwashing risk is gathered.

4. There exists a statistically significant positive interaction effect between an individual's level of risk aversion and an individual's level of environmental and social awareness on their likelihood to invest in (high) ESG assets

This hypothesis suggests that the combination of the level of risk aversion and the environmental and social awareness of an individual does have a significant positive effect on the likelihood that an individual would invest in (high) ESG assets. It is expected that it is a significant positive interaction effect since a higher level of risk aversion as well as a higher level of environmental and social awareness both is expected to cause a higher likelihood to invest in (high) ESG assets.

5. There exists a statistically significant interaction effect between an individual's level of risk aversion and an individual's perceived ESG greenwashing risk on their likelihood to invest in (high) ESG assets

This hypothesis suggests an interaction effect, which implies that the combined impact of an individual's level of risk aversion and an individual's perceived risk of greenwashing of ESG assets affects the likelihood to invest in (high) ESG assets.

6. There exists a statistically significant interaction effect between an individual's level of environmental and social awareness and an individual's level of perceived ESG greenwashing risk on their likelihood to invest in (high) ESG assets.

This hypothesis suggests an interaction effect, which implies that the combined impact of an individual's environmental and social awareness and an individual's perceived risk of greenwashing of ESG assets affects the likelihood to invest in (high) ESG assets.

3. Method

3.1 Data collection and Respondents

For this research, primary as well as secondary data collection has been performed. The study involved conducting a literature review on various topics related to ESG investment, ESG greenwashing, ESG disclosure, and investment behaviour. For the literature study, search engines such as Scopes, Google Scholar, and WUR Library were used. Key search words used to search for and select relevant scientific articles are “ESG investment” and/or “ESG greenwashing” and/or “ESG disclosure” and/or “ESG” and/or “Investment behaviour” and/or “barriers for ESG investment” and/or “incentives and reasons for ESG investment” and/or “Risk aversion” and/or “Environmental and social awareness”.

A survey was conducted to collect data on the likelihood an investor will invest in high ESG assets, one’s level of risk aversion, one’s level of environmental and social awareness and one’s perceived ESG greenwashing risk. In the next section, the survey will be discussed in more detail. Overall, there is chosen to use direct survey questions to ensure clarity and precision of questions. Besides, this minimises response biases, is easier to standardize, is easier to analyse and is more comparable.

Since the respondents for the survey needed to be individual investors, it was a challenge to gather enough data. Eventually, after trying to collect data with multiple data collection techniques, Prolific was used to gather the data. Prolific is an online platform that connects researchers with participants for scientific studies. It serves as a tool for researchers to recruit and collect data from a diverse pool of participants efficiently. The possibility to filter potential respondents by using criteria that match the sampling criteria ensures that the respondents fit the research sample criteria. Based on a study conducted by Gutsche, Wetzel and Ziegler (2019), which investigated the factors influencing individual sustainable investment behaviour, some criteria for sample selection were used. Therefore, there was chosen to select respondents who are 18 years or older, responsible for their household income, make financial decisions in their household, and have ever invested.

Prolific is a reliable platform to gather data for scientific research. Prolific has been used by several thousand researchers, many of which have used Prolific as a subject pool successfully (Palan & Schitter, 2018). Prolific has been used in economics (Marreiros, Tonin, Vlassopoulos & Schraefel, 2017) and psychology (Simmonds, Woods & Spence, 2018) before. This fits well with the survey, which looks at investment decisions, risk types and the level of environmental and social awareness. Besides, Peer et al. (2017) shows that Prolific has a superior response rate compared to a university pool. In 2017, over 1,500 researchers used Prolific for at least one study (Palan & Schitter, 2018). This shows the value of using Prolific as a tool for this study to gather data.

By using a formula by Cresswell (2008), which includes a Z-score corresponding to the desired confidence level (95%-confidence level), the estimated proportion of investors likely to invest in high ESG assets (0.5) and a margin of error (0.01), the sample size was calculated. In this study, a margin of error of 0.1 is used, instead of the more common 0.05. The main reason for this is to balance precision and feasibility, considering time and budget constraints. Due to a margin of error of 0.1, a level of imprecision in the estimate is introduced but allows for analysis with a smaller sample size. The estimated proportion of investors likely to invest in high ESG assets is unknown, so a value of 0.5 for p is used for maximum variability. This led to a calculated sample size of 97 participants, ensuring the desired level of confidence and margin error.

To calculate the Minimum Detectable Effect (MDE), the same formula was rearranged. According to this formula, the study design would allow to detect differences (MDE) in proportions that are greater than or equal to 19.9%. Effects smaller than this threshold might not achieve statistical significance given the selected sample size and margin of error. The balance struck between precision and practical constraints ensures a robust analysis within the study's limitations.

In total, 98 respondents completed the survey. Most respondents are from the United Kingdom. However, during the data analysis there was opted to exclude investors that are not investing currently. Reasoning for this is provided in the result section. Therefore, the study included 76 participants. Descriptive findings will be discussed in the results section.

Pilot survey

The survey is tested for clarity and relevance of questions as well as for appropriateness of the sample selection method with help of a pilot survey. A pilot survey was conducted with 19 participants. Their feedback was incorporated into the survey. Furthermore, certain filtering questions were removed as it became evident during the pilot phase that collecting data without using a platform like Prolific was not feasible.

3.2 Survey

All participants first received an introductory text with information on the survey and the research performed. After this introduction, respondents were asked to consent to participate to the survey. Next, definitions for high ESG assets and ESG greenwashing were provided to make sure that these two concepts were clear and concise for all respondents. All respondents were asked if they understood these definitions to check for any misunderstanding. At the end of the survey, respondents were asked to answer questions on demographic data, such as age, gender, and education level. In addition, their familiarity with ESG scores and ESG investment is measured on a 5-point Likert scale, and the percentage of their assets they are investing is measured in percentages. An example of the survey is provided in Appendix A.

3.2.1 Likelihood to invest in (high) ESG assets

Next, all participants received questions on the likelihood to invest in (high) ESG assets. As explained, there is opted to choose for a direct way of asking respondents their likelihood to invest in high ESG assets. Respondents were asked on their likelihood to invest in (high) ESG assets in the coming 12 months (future ESG investment) on a scale from 0 to 10, how much of their current investments they consider as high ESG assets in percentages (present ESG investment), and how much of their past investments they consider as high ESG assets in percentages if they already invested in (high) ESG assets in the past (past ESG investment). Besides, respondents were asked how knowledgeable they are on ESG investing on a 5-point Likert scale, if they are currently investing, since when they are investing in high ESG assets, their main reasons to invest in high ESG assets, their biggest barriers to

invest in high ESG assets, incentives to encourage them to invest (even more) in ESG assets and some questions to measure respondents views on risk, return and viability of ESG-focused investments compared to traditional investments on a 5-point Likert scale.

3.2.2 Risk preference

To measure the level of risk aversion of the respondents, the DOSPERT scale is used. The DOSPERT scale is considered a suitable approach for this study since it is widely used in scientific literature to analyse the risk behaviour and preferences for an individual. For instance, the DOSPERT scale has been applied in the context of modelling investor behaviour in South Africa (Dickason, 2017), the role of perceived costs and perceived benefits in the relationship between personality and risk-related choices (Soane, Dewberry & Narendran, 2010), and establishing a link between risk tolerance, investor personality and behavioural finance in South Africa (Dickason-Koekemoer & Ferreira-Schenk, 2018). The DOSPERT scale is used to analyse the level of risk aversion of respondents. The DOSPERT scale consists of five different domains of life (Blais & Weber, 2006). These five domains are ethical, financial, health/safety, social, and recreational risk. Since this study has its focus on financial risk and does only include investment risks and no betting risks, only 3 of the 30 questions from the DOSPERT scale were part of the survey. For these three questions, a 7-point Likert scale is used, ranging from 1 (extremely unlikely) to 7 (extremely likely). Since the DOSPERT scale is widely used in different domains, including investment behaviour, it can be considered an appropriate way to measure the level of risk aversion.

By combining these 3 questions, an index for one's level of risk aversion is constructed. This is done by taking the mean score of the 3 questions answered by a respondent. To check the reliability and internal consistency of the index, Cronbach Alpha is calculated. The value of Cronbach Alpha for the index for one's level of risk aversion is 0.600. This means that the reliability and internal consistency of the index is moderate and acceptable. Ideally, the value for Cronbach Alpha for this index would be higher. Since there are only 3 questions included to construct this index, a value of 0.600 for Cronbach Alpha is acceptable.

Besides, respondents were asked to answer a control question to measure the self-assessment of their level of risk aversion related to taking financial risks. This question was asked on a scale from 1 (extremely risk-averse) to 10 (not risk-averse at all). This question has also been used by Ding, Hartog & Sun (2010) and Hyll & Irrek (2015). This is a more direct way of measuring one's level of risk aversion, and this allows for a robustness check of the data.

3.2.3 Environmental and social awareness

A direct and clear approach is used to measure the respondents' environmental and social awareness level. The questions are based on survey questions used by Stokes & Carle (2020) and formulated in such a way it is most replicable for this research.

First, questions on environmental awareness are asked. Respondents are asked on how concerned they are about companies' impact on nature and the environment in their operations and practices on a 5-point Likert scale. To check if the respondents' understanding on environmental issues our planet is facing today is in line with environmental issues the research aims for, respondents are asked to name three major environmental issues our planet is facing today. In addition, respondents are asked on their familiarity with renewable energy sources like solar and wind power on a 5-point Likert scale.

To make sure the questions to measure one's level of social awareness are in line with the questions to measure one's environmental awareness, the social awareness questions are based on the questions used for assessing one's environmental awareness. In this way, it is ensured that

environmental and social awareness do have the same weight in the overall environmental and social awareness index. First, respondents are asked on how concerned they are about social issues and its impact on the society on a 5-point Likert scale. The same control question is asked, which asks respondents to name three social issues prevalent in their community or country. In addition, respondents are asked to rate their knowledge about the challenges faced by marginalized communities on a 5-point Likert scale.

By combining the 4 quantitative questions, an index for one's level of environmental and social awareness is constructed. This is done by taking the mean score of the 4 questions answered by a respondent. For the index for one's level of environmental and social awareness, the value of Cronbach Alpha is 0.450. This means that the reliability and internal consistency is poor. Since there is no alternative to measure the level of environmental and social awareness with the data collected, the index is still used in analysing the data. One reason why the value of Cronbach Alpha is low could be because the index only consists of 4 questions. This is certainly a limitation for this study.

3.2.4 Perceived ESG greenwashing risk

To measure a respondents' perceived risk of ESG greenwashing, six statements will be provided, and respondents will be asked to indicate the level in which they agree with the statement on a 7-point Likert scale. Since this topic is quite new, there is not a lot of literature on how to measure this variable. Therefore, direct, clear, and concise statements were formulated to get the most valuable data. These statements are inspired by studies from Chen (2010) and Avcılar & Demirgünes (2016).

By combining these 6 questions, an index for one's level of perceived ESG greenwashing risk is constructed. This is done by taking the mean score of the 6 questions answered by a respondent. To check the reliability and internal consistency of the index, Cronbach Alpha is calculated. The value of Cronbach Alpha for the index for one's level of risk aversion is 0.678. This means that the reliability and internal consistency of the index is moderate and acceptable.

Besides, respondents were asked to answer a question to self-assess their perceived ESG greenwashing risk on a scale from 0 to 100. This is a more direct way of measuring one's level of perceived ESG greenwashing risk, and this allows for a robustness check of the data.

In addition, respondents were asked to indicate to what extent they agree with the statement that they believe that ESG ratings are an accurate reflection of a company's environmental and social performance on a 5-point Likert scale. Likewise, respondents were asked to indicate their trust in ESG ratings agencies to provide unbiased and reliable information about companies' ESG performance on a 5-point Likert scale. To analyse the impact of the perceived ESG greenwashing risk on one's investment decision making when considering ESG scores, respondents that indicated that their perceived ESG greenwashing risk does influence their investment decision making were asked to explain how it impacts their investment decision making when considering ESG scores. At the end of the questions related to perceived ESG greenwashing risk, investors' view on how to mitigate the risk of ESG greenwashing most efficiently is asked.

4. Results

4.1 Descriptive findings

In total, 98 respondents completed the survey, of whom most are from the United Kingdom. However, only 76 respondents do currently have investments. Since there is opted to use respondents that are currently investing, the 22 respondents that are not investing currently have been dropped from the dataset. From these 76 respondents, 25 are female and 51 are male. The average age is 48.6, while the average education level is 3.2, which is between HBO/Bachelor and a Master's degree. The sample represents the overall sample target of investors in developed countries. Women invest less compared to men, which explains that only 32.9% of all respondents is female (Charness & Gneezy, 2007). In the United States, 38.1% of all investors is female, which is in line with the research sample. Besides, in the United States, 17% of investors is between 20-30 years, 31% of investors is between 30-40 years, and 53% of investors is older than 40 years (Zippa.com, 2023). Since the average age of the research sample is 48.592, with a minimum of 28 and a maximum of 80, this aligns with the overall investors in the United States. Regarding the education level of the sample, this also corresponds with the education level of overall investors. Research shows that the education level of investors and their understanding of financial literacy is significantly correlated (Baihaqqy, Disman, Nugraha & Sari, 2020). This means that investors overall are high educated, which is also the case in the research sample. An overview of descriptive findings of demographic data is shown in table 1.

Variable	Mean	Standard Deviation	Minimum	Maximum
Age	48.592	13.622	28	80
Gender	0.329	.473	0	1
Education	3.211	.789	2	5

Table 1 Descriptive findings of demographic data

Besides the demographic data, respondents were also asked on other information. This information includes for example one's knowledge on ESG, one's experience on ESG and one's opinion on the truthfulness of ESG data, risk of ESG investment and return of ESG investment. An overview of this is shown in table 2. Table 3 shows descriptive statistics of the main explanatory variables.

Variable	Mean	Standard Deviation	Minimum	Maximum
Familiarity with ESG scores and investment (1 = not familiar at all; 5 = extremely familiar)	2.395	.910	1	5
Knowledge on ESG investment (1 = very unknowledgeable; 5 = very knowledgeable)	2.75	1.179	1	5
Current ESG (Percentage of current assets that one considers as a (high) ESG asset)	20.118	21.243	0%	82%
Likelihood to invest in (high) ESG assets in the future (0 = extremely unlikely; 10= extremely likely)	3.737	2.640	0	10
Past ESG (Percentage of past assets that one considers as (high) ESG assets)	28.140	25.440	0	100
Experience with ESG investment (1= not yet; 7= more than 5 years)	2.697	1.926	1	7
Self-assessment of perceived ESG greenwashing risk (0= no perceived ESG greenwashing risk; 100= highest level of perceived ESG greenwashing risk)	52.776	22.929	0	100
Self-assessment of risk aversion (0= extremely risk averse; 100= not risk averse at all)	42.566	24.004	1	85
Significance investment (Percentage of their assets they are investing)	25.684	23.765	2	89
Trust in ESG scores (1= no trust at all; 5= complete trust)	2.908	0.982	1	5
Accurateness ESG scores (1= not accurate at all; 5= very accurate)	2.842	0.925	1	5
Outperformance ESG (1= ESG investments will not at all outperform other types of investments in the long run; 5= ESG investments will definitely outperform other types of investments in the long run)	3	0.894	1	5
High ESG lower risk (1 = Strongly disagree that investing in high ESG assets reduces the risk; 5= strongly agree that investing in high ESG assets reduces the risk)	2.553	0.944	1	5
Viability ESG scores (1= strongly disagree that ESG investment are just as viable as traditional investments; 5= strongly agree that ESG investment are just as viable as traditional investments)	3.737	0.870	2	5
Risk ESG investment (1= ESG investments have an insignificant risk compared to traditional investments; 5= ESG investments have a severe risk compared to traditional investments)	2.711	1.081	1	6

Table 2 Descriptive statistics of outcome variables

As can be seen in table 2, on average respondents are slightly to somewhat familiar with ESG scores and ESG investment. This aligns with their knowledge on ESG scores and ESG investment. Currently, on average respondents consider 20.1% of their investments a (high) ESG asset investment, which is ranging from 0 to 82%. The average likelihood to invest in (high) ESG assets in the coming 12 months is 3.73 on a scale from 0 (extremely unlikely) to 10 (extremely likely). On average, respondents have one to two years of experience with ESG investing, with quite a high standard deviation which suggest that a lot of variety in experience with ESG investment exists across the sample. The average level of perceived ESG greenwashing risk, which is self-assessed by the respondents, is 52.78 on a scale from 0 to 100. The average level of risk aversion of respondents when assessing their own level of risk aversion related to financial risk is 42.56 on a scale from 0 to 100. Thus, on average respondents are slightly more risk averse than risk seeking. 25.68% of all assets owned are invested by the average respondent, from which it can be concluded that the overall respondent invests quite seriously. Respondents overall neither trust nor not trust ESG ratings agencies to provide unbiased and reliable information about companies' ESG performance. Likewise, the accurateness of ESG ratings of a company's environmental and social performance is neither accurate nor inaccurate. Overall, respondents neither agree nor disagree with the statement that ESG-focused investments will outperform other types of investment in the long run. Respondents disagree a bit more with the statement that investing in an asset with a higher ESG score in general decreases the risk of this investment. Besides, respondents overall somewhat agree that ESG investments are just as viable as traditional investments. Finally, respondents' overall rate the overall risk of ESG focused investments as a minor to significant risk compared to other types of investments.

Variable	Mean	Standard Deviation	Minimum	Maximum
Index risk (1= low level of risk aversion; 7= high level of risk aversion	3.689	1.317	1	6.333
Index awareness (1 = low level of environmental and social awareness; 5= high level of environmental and social awareness	3.546	.583	2	4.75
Index perceived risk (1= low level of perceived ESG greenwashing risk; 7= high level of perceived ESG greenwashing risk)	5.092	.754	2.5	6.667

Table 3 Descriptive statistics of explanatory variables

Table 3 shows that the average level of risk aversion is 3.69, which indicates that on average respondents are neither likely nor unlikely to take financial risks. The average level of environmental and social awareness is 3.55, which means that the average respondent is moderately aware of environmental and social issues. On average, the level of perceived ESG greenwashing risk is 5.09, which indicates that the average respondents have a quite high level of perceived ESG greenwashing risk.

4.2 Hypotheses testing

After data clearing, the model was defined. First, the independent variable to be used was chosen. Since past ESG investment only included 43 respondents, there was opted to choose between current ESG investment or future ESG investment. Information selection criteria was used to decide to go for the likelihood to invest in (high) ESG assets in the coming 12 months (future ESG investment) as dependent variable. Table 4 shows the information selection criteria of each model that has been considered before performing the hypothesis testing. For all three possible dependent variables, four models have been tested. First, a base model which only includes the three indexes. Second, interaction terms were included to the base model (interaction model). In the third model, all other relevant explanatory variables were included in the base model. This means that the interaction terms are not included in the third model. In the last model, all other relevant explanatory variables and all interaction terms were included.

		R^2	AIC	BIC	VIF
Past ESG (43 respondents)	Base model	.158	399.945	406.990	1.02
	Interaction model	.351	394.774	407.103	62.11
	Full model (without interactions)	.184	412.585	431.958	1.64
	Full interaction model	.374	407.185	431.842	34.51
Current ESG (76 respondents)	Base model	.279	662.380	671.702	1.03
	Interaction model	.428	650.780	667.095	61.41
	Full model (without interactions)	.369	666.205	691.843	1.46
	Full interaction model	.512	652.713	685.343	31.39
Future ESG (76 respondents)	Base model	.170	356.113	365.436	1.03
	Interaction model	.229	356.500	372.815	61.41
	Full model (without interactions)	.306	356.463	382.101	1.46
	Full interaction model	.347	357.826	390.456	31.39

Table 4 Overview Information Selection Criteria independent variable. In the full model the following variables are included: age, gender, education level, knowledge on ESG scores and ESG investment, experience with ESG investment, familiarity with ESG scores and ESG investment, and the percentage of their total asset one is investing.

Despite having a slightly lower AIC and BIC, a model without interaction effects was not chosen. This is because including interaction terms is necessary to test the three hypotheses we formulated, and even though it leads to some multicollinearity, the benefits outweigh the drawbacks. The final model incorporates all explanatory variables as it offers a significant improvement in R-squared with only a slight increase in AIC and BIC, while also substantially reducing the VIF.

The Breusch-Pagan test was used to test for potential heteroscedasticity in the model presented in section 2.7. With a p-value of .735, the null hypothesis of constant variance cannot be rejected. This indicates the assumption of constant variance holds, thus transforming the model is not needed. A representation of the regression of the model is shown in table 5. All independent variables have been standardized to interpret the coefficients correctly.

Future ESG (Y)	Coefficient	Standard Error	P-value
Level of Risk Aversion (R)	2.673	2.931	0.365
Level of Environmental and Social Awareness (E)	2.069	1.756	0.243
Level of Perceived ESG Greenwashing Risk (G)	2.883	1.728	0.100
Interaction Effect Awareness and Risk Aversion (RE)	.936	2.122	.661
Interaction Effect Risk Aversion and Perceived Risk (RG)	-2.918	2.302	.210
Interaction Effect Awareness and Perceived Risk (EG)	-3.268	2.161	0.136
Age (A)	.521	.305	.092
Gender (GE)	-.109	.308	.726
Education (EDU)	-.325	.280	.250
Knowledge on ESG Scores and ESG Investment (K)	.240	.380	.530
Experience with ESG Scores and ESG Investment (EX)	.347	.369	.350
Familiarity with ESG Scores and ESG Investment (F)	.620	.400	.126
Percentage of Total Asset One is Investing (Significance of Investments; AI)	-.190	.329	.566
Constant (ε)	3.737	.269	0.000

Table 5 Regression outcomes of the model, which is standardized to interpret the coefficients correctly due to different measurement scales used for different variables.

Hypothesis 1: Level of Risk Aversion and Likelihood to Invest in (High) ESG Assets in the Future

The potential relationship between one's level of risk aversion and one's likelihood to invest in (high) ESG assets in the future is examined. Here, both the main effect and interaction effect are taken into consideration. Hypothesis 1 suggests that there exists a positive correlation between an individual's level of risk aversion and their likelihood to engage in future investments in ESG assets. This translates to a statistically significant positive value for the combined effect (the sum of the direct (β1) and indirect effects (β4, and β5)) in the regression model (H_1: $\beta_1 + \beta_4 + \beta_5 > 0$). The null hypothesis suggests that the combined effect is not statistically different from zero (H_0: $\beta_1 + \beta_4 + \beta_5 = 0$).

To test hypothesis 1, a regression analysis was conducted with the likelihood of future investment in (high) ESG assets as the dependent variable and one's level of risk aversion as the independent variable. The results revealed a statistically significant overall effect ($\beta_1 = 2.673$, $\beta_4 = .936$, $\beta_5 = -2.918$, $p<0.1$), suggesting a relationship between one's level of risk aversion and their likelihood to invest in (high) ESG assets in the future.

Hypothesis 2: Level of Environmental and Social Awareness and Likelihood to Invest in (High) ESG Assets in the Future

The potential relationship between one's level of environmental and social awareness and one's likelihood to invest in (high) ESG assets in the future is examined. The main as well as the interaction effect between one's level of environmental and social awareness and one's level of risk aversion, and

the interaction effect between one's level of environmental and social awareness and one's level of perceived ESG greenwashing risk are taken into consideration. Hypothesis 2 hypothesizes a statistically significant positive correlation between an individual's level of environmental and social awareness and their likelihood to engage in future investments in (high) ESG assets. This translates to a statistically significant positive value for the combined effect (H_1: $\beta_2 + \beta_4 + \beta_6 > 0$) in the regression model. The null hypothesis suggest that the combined effect is not statistically different from zero (H_0: $\beta_2 + \beta_4 + \beta_6 = 0$).

To test this hypothesis, a regression analysis was conducted with the likelihood of future investment in (high) ESG assets as the dependent variable and one's level of environmental and social awareness as the independent variable. The results revealed no statistically significant combined effect ($p>0.1$), suggesting that there is no significant relationship between one's level of environmental and social awareness and their likelihood to invest in (high) ESG assets in the coming 12 months. However, as can be seen in table 5, the direct effect of one's level of environmental and social awareness on their likelihood to invest in high ESG assets in the future is positive. This is also the case for the interaction effect between one's level of environmental and social awareness and one's level of risk aversion. Nevertheless, the interaction effect between one's level of environmental and social awareness and one's level of perceived ESG greenwashing risk on their likelihood to invest in high ESG assets is negative. Since these effects are opposites, they can cancel each other out, potentially explaining why the combined effect is not statistically significant. The discussion section will delve deeper into the direct and indirect effects of one's level of environmental and social awareness on their likelihood to invest in high ESG assets in the future.

Hypothesis 3: Level of Perceived ESG Greenwashing Risk and Likelihood to Invest in (High) ESG Assets in the Future

The potential relationship between one's level of perceived ESG greenwashing risk and one's likelihood to invest in (high) ESG assets in the future is examined. The main as well as interaction effects are taken into consideration. Hypothesis 3 suggests a statistically significant negative correlation between an individual's level of perceived ESG greenwashing risk and their likelihood to invest in (high) ESG assets in the future. This translates to a statistically significant negative value for the combined effect (H_1: $\beta_3 + \beta_5 + \beta_6 < 0$) in the regression model. The null hypothesis suggests that the combined effect is not statistically different from zero (H_0: $\beta_3 + \beta_5 + \beta_6 = 0$).

To test this hypothesis, a regression analysis was conducted with the likelihood of future investment in (high) ESG assets as the dependent variable and one's level of perceived ESG greenwashing risk as the independent variable. The results revealed no statistically significant combined effect ($p>0.1$), suggesting that there is no significant relationship between one's level of perceived ESG greenwashing risk and their likelihood to invest in (high) ESG assets in the coming 12 months. However, the regression outcomes which are presented in table 5 show that the direct effect of one's level of perceived ESG greenwashing risk has a positive effect on one's likelihood to invest in high ESG assets in the future. Contrastingly, the interaction effects that include one's level of perceived ESG greenwashing risk have a negative effect on one's likelihood to invest in high ESG assets. Since the direct effect contradicts the indirect effect of one's level of perceived ESG greenwashing risk on their likelihood to invest in high ESG assets, they can cancel each other out, potentially explaining why the combined effect is not statistically significant. In the discussion section, the direct and indirect effects of one's level of perceived ESG greenwashing risk on their likelihood to invest in high ESG assets in the future will be analysed.

Hypothesis 4: Interaction Effect between an Individual's Level of Risk Aversion and an Individual's Environmental and Social Awareness to Invest in (high) ESG Assets in the Future

Hypothesis 4 (H4) deals with the interaction between risk aversion and environmental/social awareness and how it affects future investment in (high) ESG assets. H4 predicts a positive interaction effect ($\beta_4 > 0$). This means that individuals with both high risk aversion and high environmental/social awareness are more likely to invest in ESG assets, compared to the effect of each factor alone. In the regression model, a statistically significant and positive value for the interaction term (β_4) would support this hypothesis. The null hypothesis (H_0) suggests no significant relationship between the interaction and investment in ESG assets ($\beta_4 = 0$).

To test the hypothesis of a positive interaction effect, a regression analysis was conducted. The dependent variable was the likelihood of future investment in (high) ESG assets. The key independent variable was the interaction term between an individual's risk aversion level and environmental/social awareness level. The analysis revealed no statistically significant effect ($p>0.1$), suggesting no significant influence of the interaction on future ESG investment.

Hypothesis 5: Interaction Effect between an Individual's Level of Risk Aversion and an Individual's Perceived ESG Greenwashing Risk to Invest in (high) ESG Assets in the Future

Hypothesize 5 (H5) deals with the interaction between risk aversion and perceived ESG greenwashing risk and how it affects future investment in (high) ESG assets. H5 predicts a negative interaction effect ($\beta_5 < 0$). This means that individuals with both high risk aversion and high perceived ESG greenwashing risk are less likely to invest in ESG assets, compared to the effect of each factor alone. In the regression model, a statistically significant negative value for the interaction term (β_5) would support this hypothesis. The null hypothesis (H_0) suggests no significant relationship between the interaction and the likelihood to invest in ESG assets in the future ($\beta_5 = 0$).

To test the hypothesis of an interaction effect, a regression analysis was conducted. The dependent variable was the likelihood to invest in high ESG assets in the future. The key independent variable was the interaction term between one's level of risk aversion and one's perceived ESG greenwashing risk. The analysis revealed no statistically significant effect ($p>0.1$), suggesting no significant influence of the interaction on future ESG investment.

Hypothesis 6: Interaction Effect between an Individual's Environmental and Social Awareness and an Individual's Perceived ESG Greenwashing Risk to Invest in (high) ESG Assets in the Future

Hypothesis 6 (H6) examines the potential interaction effect between environmental/social awareness and perceived ESG greenwashing risk on future investment in (high) ESG assets. H6 predicts a positive interaction effect ($\beta_6 > 0$). This means individuals with high environmental/social awareness and high perceived greenwashing risk are more likely to invest in ESG assets compared to the effect of each factor alone. A statistically significant and positive value for the interaction term ($\beta 6$) in the regression model would support this hypothesis. The null hypothesis (H_0) suggests no significant relationship between the interaction and investment in ESG assets ($\beta_6 = 0$), meaning the combined effect of high awareness and high perceived risk is not significantly different from the effect of each factor alone on investment decisions.

To test this hypothesis, a regression analysis was conducted. The dependent variable was the likelihood to invest in high ESG assets in the future. The key independent variable was the interaction term between one's level of environmental and social awareness and one's level of perceived ESG greenwashing risk. The analysis revealed no statistically significant effect ($p>0.1$), suggesting no significant influence of the interaction on the likelihood to invest in high ESG assets in the future.

4.3 Additional findings

First, all independent variables in the model that were not included in the hypotheses testing will be discussed. Only age does have a statistically significant effect on one's likelihood to invest in (high) ESG assets in the coming 12 months ($p<0.1$). The effect of age (A) on one's likelihood to invest in (high) ESG assets in the future is statistically significant positive ($\beta_7= 0.521$). This suggests that, if the age increases by 1 and all other variables stay constant, the likelihood to invest in (high) ESG assets will increase by 0.521 on a scale from 0 to 10. Thus, overall people that are older are investing more in (high) ESG assets compared to younger people.

Second, the reasons for investors to invest in high ESG assets will be discussed. All respondents that have invested in high ESG assets in the past answered a question about their main reasons to invest in high ESG assets. As shown in figure 3, from the qualitative data it can be concluded that ESG reasons are the most important motive to invest in high ESG assets for investors. Answers that are included in being an ESG reason are for example "social responsibility", "ethics", "environmental concerns" and "supporting companies that are contributing to a more sustainable world". The other main reason for investors to invest in high ESG assets is the impact of high ESG performance on the long-term value of a company and the investment. Answers that are included to it being a long-term investment as main reason to invest in high ESG assets are for example "the longevity and potential of the firm", "lower volatility", "long-term value", and "it also being profitable besides it being sustainable". Some of the respondents mentioned that investing in high ESG assets is related to a lower regulatory and/or reputational risk as an explanation of the investment being of long-term value. Conversely, there was also one respondent that does not see a point in investing in high ESG assets. This respondent mentioned that no matter which green companies he invests in, it is practically guaranteed that their own stakeholders, high profile directors and CEO certainly invest their own money, which they make from their companies, into highly polluting industries. Therefore, there can be concluded that the main reasons to invest in high ESG assets are ESG reasons and the long-term value of these assets. However, there are also investors that are much more skeptical about investing in high ESG assets. While this only is one respondent, this question was only asked to people that have invested in high ESG assets in the past. Consequently, it could be that respondents that are not yet investing in high ESG assets, are also skeptical about ESG assets and do not see the point in ESG investments as well.

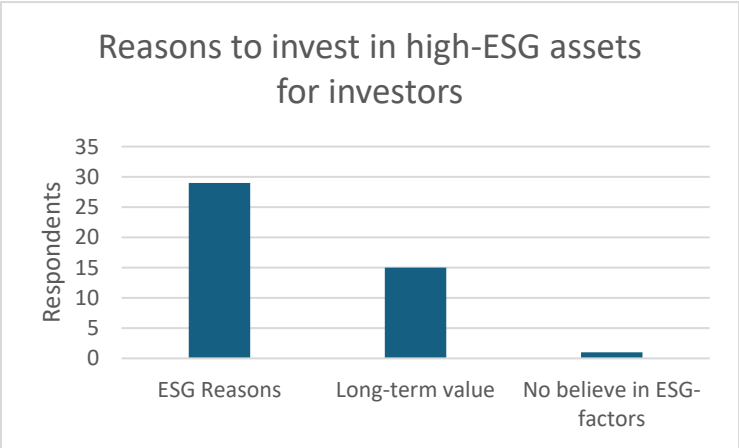

Figure 3 The main reasons to invest in high ESG assets according to the respondents.

In addition, respondents were also asked about the main barriers for them to invest in (high) ESG assets. An overview of the main barriers for investors to invest in (high) ESG assets according to the respondents is shown in figure 4. The most common barrier for investors to invest in high ESG assets is that investing in high ESG assets gives them less return, and they argue that profitability is more important. The second largest barrier for investors can be defined as the quality of ESG data. Respondents mention a lack of transparency, the availability of ESG data, and the accurateness of the ESG data as main barriers to invest in high ESG assets. The third largest barrier for investors to invest in high ESG assets is their knowledge on ESG scores and ESG investment. Then, there is a group of investors that do not believe in the good of companies. There is also a smaller group of investors that do not see any barriers to invest in high ESG assets as it is a long-term investment. Other barriers for investors are their own awareness of benefits and returns related to ESG investment, the current high valuation of ESG assets, risk, and the fact that ESG investments are not mainstream yet and are in the early stages.

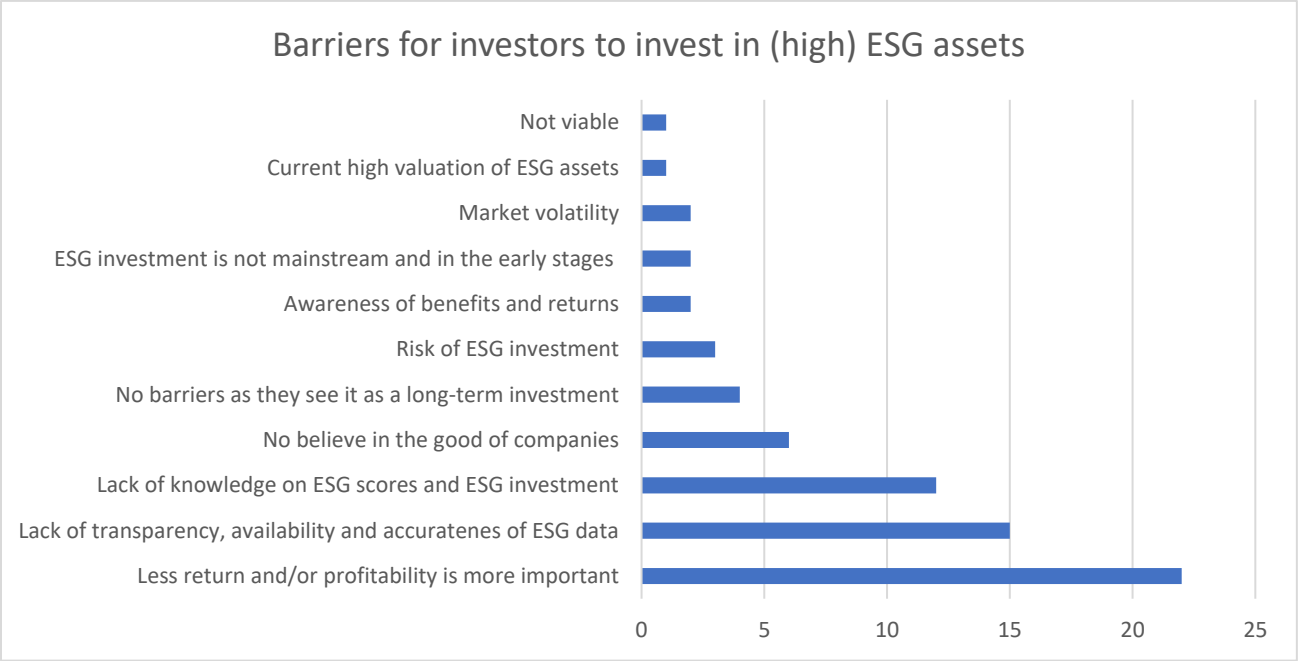

Figure 4 The main barriers for investors to invest in (high) ESG assets according to the respondents.

Besides, respondents were asked what would be needed to encourage them to invest (even more) in high ESG assets. An overview of the results can be seen in figure 5. The most common incentive needed for investors to invest (even more) in high ESG assets is related to ESG data. ESG data should have a higher quality, the availability of ESG data should be better, and there should be more transparency around ESG data and ESG topics. This also relates to the risk of ESG greenwashing. The second most mentioned incentive for investors to invest (even more) in high ESG assets is related to the return of the investment. Some of these respondents want guaranteed returns or miss a track record since ESG investment is in the early stages. The third most mentioned incentive is having more knowledge on ESG data and ESG investment. There are also some respondents that mention the availability of (fully) ESG funds at lower costs as an incentive to invest (even more) in (high) ESG assets. More government and regulatory support were also mentioned by some investor as an incentive to invest (even more) in high ESG assets. However, there were also some respondents that did not see any incentives to invest (even more) in high ESG assets. One of these respondents meant this in a positive manner, while four respondents were not interested in ESG investment at all.

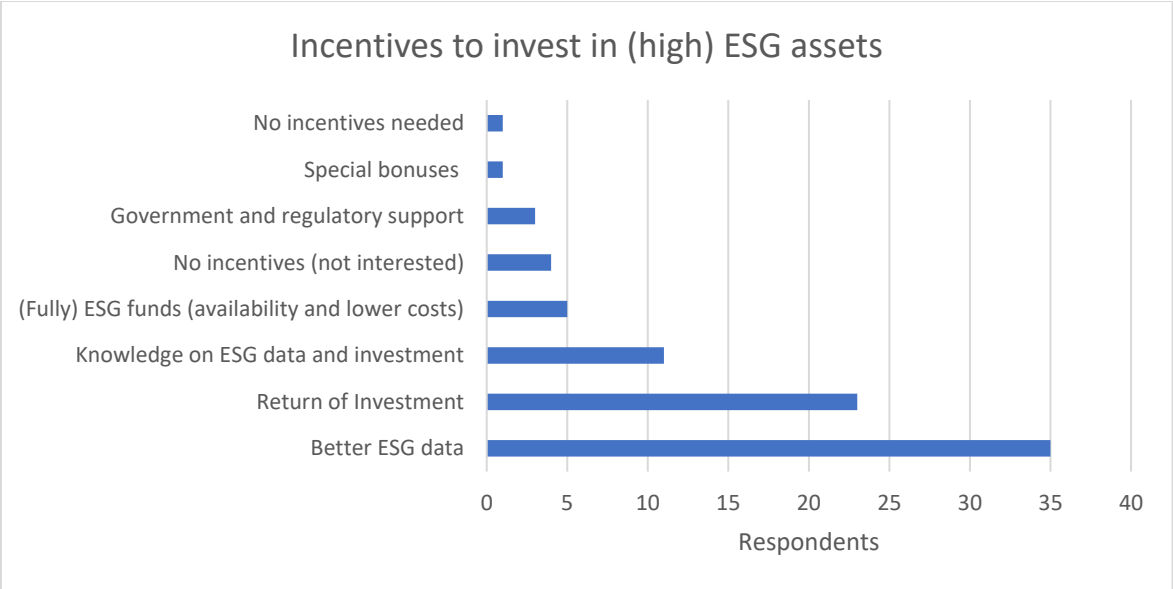

Figure 5 Incentives for investors to invest (even more) in (high) ESG assets according to the respondents.

Figure 6 shows the results for this question. The overall conclusion is that investors would be less likely to invest in a company of which they perceive ESG greenwashing risk. The main reason respondents mention is that they are skeptical about the claims companies are making. If companies make vocal compliance, they are not focused on the true value. Besides, companies often exaggerate ESG scores. Another main reason is a lack of trust in the whole company because of the perceived ESG greenwashing risk. A lot of investors see the risks related to perceived ESG greenwashing risk. If a company is greenwashing their ESG claims and ESG scores, this could lead to reputational and regulatory risk which could have a huge impact on the return of the investment. There are also some respondents that mention that they will do more research themselves to evaluate a company's ESG claims and scores to reduce the risk of ESG greenwashing.

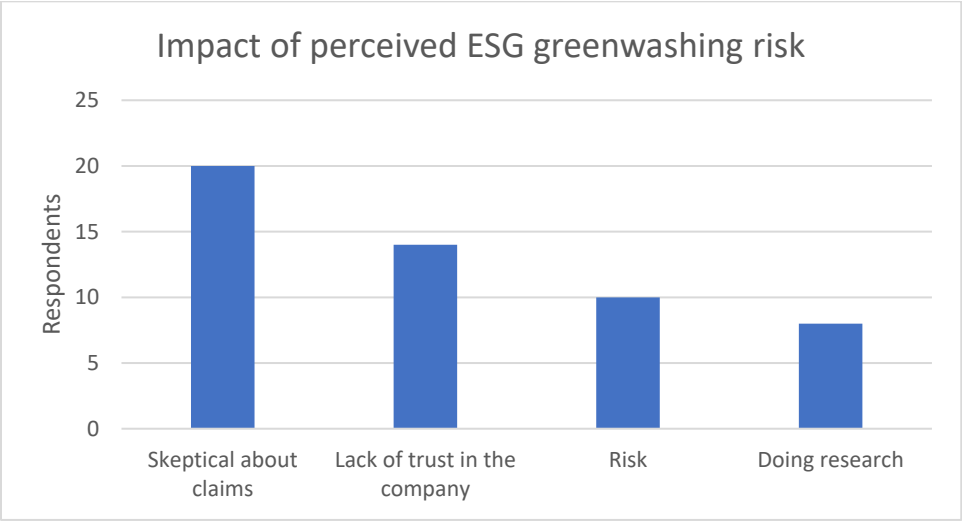

Figure 6 The impact that the perceived risk of ESG greenwashing has on investors investment decision making according to the respondents.

Finally, respondents were asked to provide their view on how to best mitigate the risk of ESG greenwashing. The most mentioned way to mitigate the risk of ESG greenwashing can be categorized in better regulation, standardization, and transparency of ESG data. External auditing, a stringent policy and monitoring, drastic and enforceable financial penalties, shareholding voting at annual

general meetings (AGMs), and exposing companies that are greenwashing in the media are all instruments mentioned by respondents to mitigate the risk of ESG greenwashing by improving the regulation, standardization, and transparency of ESG data. Other investors mention that their knowledge on ESG data should be improved, that they would spread their investments by not only investing in ESG assets, or to ignore ESG data completely.

Figure 7 The most effective ways to mitigate ESG greenwashing risk according to the respondents.

5. Discussion

5.1 Theory and Findings

The objective of this research is to understand ESG investment decisions by considering the influence of risk aversion, environmental and social awareness, and perceived ESG greenwashing risk. Besides, investors' view on ESG scores, ESG investment, and ESG greenwashing is analyzed.

Impact of ESG factors on investor's investment behaviour

The first research question analyzed the extent to which ESG factors influence investors' investment behaviour. The findings revealed significant variation among investors. Some investors already invested in high ESG assets in the past, some are currently investing in ESG assets, while others have no plans to do so in the future at all.

The main reasons for investors to invest in high ESG assets are: (1) ESG principles and (2) long-term investment potential. This is in line with the theory. ESG issues are considered as an ethical duty highlighting the necessity of integrating ESG factors into investment analysis (Nazarova & Лаврова, 2022). This motivates investors to consider ESG factors in their investment decision-making process (Amel-Zadeh & Serafeim, 2018). As mentioned by some respondents as well as by Ferriani & Natoli (2020), ESG investments are offering better risk-adjusted returns, especially during volatile market conditions. The stability and resilience of high ESG assets in turbulent market conditions appeal to risk-conscious investors and therefore ESG investments are often seen as long-term investment.

However, there are also barriers for investors to invest in high ESG assets. The main barrier mentioned by respondents is that they argue that investing in high ESG assets gives them less return. Since literature does not provide a clear answer to the impact of ESG investment on risk and return, and there are not a lot of track records on how high ESG assets are performing financially, it seems logical that concerns over return of an investment is the main barrier for investors to invest in high ESG assets. Kräussl (2023) also argues that the increase in preference for green assets could potentially lead to underperformance in ESG investments, which could discourage investors from allocating funds to high ESG assets (Zeidan, 2022). Besides, respondents mainly mentioned a lack of transparency, availability, and accurateness of ESG data as a barrier to invest in high ESG assets. This is acknowledged in the literature by Gyönyörová, Stachoň & Stašek (2021). Consequently, it is hard for individual investors to assess and compare ESG data across diverse companies (Amel-Zadeh & Serafeim, 2018; Eccles et al., 2017; Vuuren & Marco, 2022). This poses challenges for investors to make informed decisions regarding ESG investments (Eccles et al., 2017; Friede, Busch & Bassen, 2015; Rastogi et al., 2023). The challenges to invest in ESG investments, given the complexity and effort involved in processing ESG data makes it harder for individual investors to invest in high ESG assets (Park & Oh, 2022). There also exists a lack of knowledge on ESG data and ESG investment among investors. Overcoming these barriers could help increase ESG investments significantly. Therefore, more information on risk and return related to ESG investments, better ESG data availability, accurateness and transparency, and an increase in knowledge on ESG investments among investors are important pillars to focus on to increase ESG investments.

According to the data, incentives for investors to invest (even more) in (high) ESG assets are a higher quality, better availability, and better transparency of ESG data and ESG topics, a better return of investment, having better knowledge on ESG topics and ESG investment, and the availability of (fully) ESG funds at lower costs. Improvements in data quality and reporting standards regarding ESG data are expected in the future (Rahman & Lau, 2023). Since investors are progressively incorporating ESG investments, and ESG investments are rising, the overall knowledge is expected to increase over time

as well. In addition, more and more track records of high ESG assets will be available, which will make it easier to compare the returns and risk related to ESG investments compared to traditional investments.

Overall, there can be concluded that there is a lot of spread in the extent in which ESG factors impact investors' investment decision making among investors. There exist multiple reasons and barriers to invest in (high) ESG assets, but overall, the quality of ESG data, knowledge on ESG investment among investors, and clarity on returns from ESG assets should improve to increase the impact of ESG factors on investors' investment behaviour.

Risk preference and likelihood to invest in (high) ESG assets

The second research question analyses the extent to which the level of risk aversion of an investor influences the likelihood an investor will invest in (high) ESG assets. From the results, it can be concluded that one's level of risk aversion has a statistically significant positive overall effect on their likelihood to invest in high ESG assets in the future. While the overall effect is significant, further investigation into the specific effects (direct and indirect) yielded unexpected results. Neither the direct effect (β_1) nor the indirect effect ($\beta_4 + \beta_5$) was statistically significant ($p>0.1$ for both the direct as well as the indirect effect). This seems to contradict the initial finding of a significant overall effect.

A potential explanation for these counterintuitive results lies in the offsetting nature of the confirmed interaction effects (β_4 and β_5). While hypothesis 1 predicted a positive relationship between one's level of risk aversion and their likelihood to invest in (high) ESG assets in the future, the scenario becomes more nuanced when considering these interactions. β_4 captures a positive interaction effect, implying that a higher level of risk aversion is coupled with greater environmental and social awareness leads to an even stronger likelihood to invest in (high) ESG assets in the future. β_5 captures a negative interaction effect. In this case, higher risk aversion with increased perceived ESG greenwashing risk results in a weaker preference for ESG assets.

Interestingly, further tests revealed that neither β_4 and β_5 were statistically significant ($p>0.1$ for both β_4 and β_5), but with opposite signs. This suggests that these confirmed positive and negative interaction effects might be partially offsetting each other within the overall model, leading to a statistically significant overall effect ($\beta_1 + \beta_4 + \beta_5$) even though the direct and indirect effects were not individually significant.

Thus, the overall effect ($\beta_1 + \beta_4 + \beta_5$) could appear statistically significant even though the direct (β_1) and the sum of the indirect effects ($\beta_4 + \beta_5$) are not individually significant. This is because the positive and negative interaction effects might be partially offsetting each other in the overall model. Therefore, there only exists a statistically significant overall effect of one's level of risk aversion on their likelihood to invest in high ESG assets in the future.

Therefore, from the results it can be concluded that a higher level of risk aversion increases the likelihood to invest in (high) ESG assets. This can be explained by the qualitative results. Respondents mentioned the regulatory and reputational risk that can be reduced by investing in a company that performs well on ESG factors. ESG investments are also seen as a long-term investment, because scoring good on ESG topics positively influences the longevity and potential of the company. Besides, this result can be explained with help of the MPT. MPT helps to identify one's efficient frontier. Investors with a higher level of risk aversion would likely choose portfolios closer to the low-risk end of the efficient frontier. ESG investments potentially reduce overall and systemic risks (Becchetti et al., 2018; Cerqueti et al., 2021). Besides, MPT emphasizes diversification, which involves spreading investments across different asset classes to reduce overall portfolio risk. This aligns well with the behaviour of risk-averse investors who seek to minimize risk through diversification. Thus, from the

theory it was expected that an individual with a higher level of risk aversion is more likely to invest in ESG, which is confirmed by the results.

Environmental and social awareness (ESA) and likelihood to invest in (high) ESG assets

The extent in which an investors' level of environmental and social awareness influences their likelihood to invest in (high) ESG assets is investigated in this research as well. There was hypothesised that one's level of environmental and social awareness has a statistically significant positive effect on their likelihood to invest in (high) ESG assets. The study's findings do not reveal a statistically significant overall relationship between an investor's level of environmental and social awareness and their likelihood to invest in high ESG assets. This insignificance could be explained by several reasons.

First, counteracting effects could potentially cause the insignificance. Investors with high environmental and social awareness might prioritize ESG factors, making them more likely to invest in ESG assets. However, they might also be more risk-averse, potentially leading them to avoid these assets due to perceived ESG greenwashing risk. These opposing effects could cancel each other out, resulting in no significant effect.

Second, the insignificance can potentially be explained by the gap between environmental and social awareness and investment behaviour. Investors with high environmental and social awareness might understand the importance of ESG issues but lack the knowledge or confidence to navigate the ESG investment landscape. This is also supported by the qualitative results. According to the respondents, one of the main barriers for investors to invest in high ESG assets is a lack of knowledge on ESG scores and ESG investment. Thus, the gap between environmental and social awareness and actual investment behaviour, partially caused by a lack of knowledge on ESG scores and ESG investment, could be an explanation why there is no significant relationship found between one's level of environmental and social awareness and their likelihood to invest in (high) ESG assets.

Third, the qualitative data shows that another barrier for investors to invest in (high) ESG assets is the lack of transparency, availability, and the poor quality of ESG data. Due to this, even investors with a higher level of environmental and social awareness are not more likely to invest in (high) ESG assets. This also relates to the knowledge gap that exists and influences the gap between environmental and social awareness and investment behaviour. Therefore, another potential explanation of the insignificance could be the lack of transparency, availability, and the poor quality of ESG data.

Fourth, one might argue that an individual who is more aware of environmental and social problems is also more aware of the potential for ESG greenwashing. According to the data, environmental and social awareness and perceived ESG greenwashing risk correlates with 0.164. This means that there is a weak, positive correlation between one's level of environmental and social awareness and one's level of perceived ESG greenwashing risk. Although the correlation is weak, this could potentially be an additional reason that can explain the insignificance of environmental and social awareness. Besides being environmental and social aware, perceiving ESG greenwashing risk could cause a lack of trust in ESG data. Consequently, if these concerns about greenwashing are equally important to their environmental and social priorities, they might not be more likely to invest in high ESG assets despite their awareness.

Fifth, ESG investment is in the early stages, which makes it hard to analyse the potential return of ESG investments. According to the qualitative results, the main barrier for investors is that they expect less return from ESG investments compared to traditional investments. A lot of investors worry about the return of ESG investment, which often is the main reason to invest for investors, even if they have a high environmental and social awareness.

Lastly, the quality of the data could also be a reason why the results are insignificant. Unfortunately, only 78 respondents could be used in the data analysis. If the sample size would be higher, the data would be more reliable and generalizable. Besides, the reliability of the index for one's level of environmental and social awareness is poor, which is shown by its Cronbach Alpha of 0.450. The small sample size and the poor reliability of the index could have led to an insignificant effect.

Thus, there can be concluded that the study's findings do not reveal a statistically significant positive overall relationship between an investor's level of environmental and social awareness and their likelihood to invest in (high) ESG assets in the future. However, further investigation into the specifics (direct and indirect effects) was performed as well. From this analysis, for the level of environmental and social awareness neither the direct (β_2) nor the indirect effect ($\beta_4 + \beta_6$) were statistically significant ($p>0.1$) for both the direct as well as the indirect effect). It was expected that the interaction effect between environmental and social awareness and risk aversion (β_4) would be positive, and that the interaction effect between environmental and social awareness and the perceived level of ESG greenwashing risk (β_6) would be negative. This is confirmed by the results. Since β_4 and β_6 have opposite effects on one's likelihood to invest in (high) ESG assets in the future, it suggests a potential suppression effect. This could explain the non-significance of the indirect effect ($\beta_4 + \beta_6$). To conclude, the non-significance of the direct as well as the indirect effect is in line with the initial finding of a non-significant overall effect.

Perceived ESG greenwashing risk and likelihood to invest in (high) ESG assets

The study found no statistically significant overall effect (combining direct and indirect effects, including those involving risk aversion and environmental and social awareness) of perceived ESG greenwashing risk on the likelihood of investing in (high) ESG assets. This non-significance could potentially be caused by the opposite effects of the positive direct (β_3) and negative indirect effect ($\beta_5 + \beta_6$). Further investigation into the specifics (direct and indirect effects) yielded somewhat unexpected results. The direct effect of one's level of perceived ESG greenwashing risk on their likelihood to invest in (high) ESG assets is marginally significant ($p=0.1$, $\beta_3 = 2.883$). This indicates that an one-point increase in level of perceived ESG greenwashing risk will lead to a 2.833 (28.33%) increase in the likelihood to invest in (high) ESG assets in the future (on a scale from 0 to 10). However, the results revealed no statistically significant indirect effect ($\beta_5 + \beta_6$) of perceived ESG greenwashing risk on one's likelihood to invest in (high) ESG assets. Both interaction effects have a non-significant negative effect on one's likelihood to invest in (high) ESG assets. Combined, the indirect effect is also non-significant.

However, the results revealed a statistically significant positive direct effect of perceived ESG greenwashing risk (β_3) on the likelihood to invest in (high) ESG assets in the future. This is the opposite of what was expected from the literature. In addition, this also contradicts some findings from the qualitative data. One of the main barriers for investors to invest in (high) ESG assets is the lack of transparency, availability, and accurateness of ESG data, which can be linked to ESG greenwashing risk. This contrastingly result could be explained by several reasons.

First, a potential reason for this conversely result could be that investors that perceive more ESG greenwashing risk are more aware of ESG greenwashing risk. The data also reveals that the level of perceived greenwashing risk has a weak, positive correlation (0.108) with the experience one has in ESG investment. This shows that investors that have more experience with ESG investment overall perceive slightly more ESG greenwashing risk compared to investors that have less experience with ESG investment. This suggests that even though investors perceive ESG greenwashing risk, they can select ESG investments of which they think the ESG scores are valid. Since investors who invested in

ESG assets in the past are perceiving slightly more ESG greenwashing risk relative to investors with less experience in ESG assets, the statistically significant positive effect of one's level of perceived ESG greenwashing risk on their likelihood to invest in (high) ESG assets in the future could be explained.

Second, this contrastingly result could potentially be explained by the weak, positive correlation (0.164) between one's level of environmental and social awareness and one's level of perceived ESG greenwashing risk. This indicates that investors with a heightened awareness of greenwashing risk might also have slightly stronger environmental and social priorities. These priorities could motivate investors to seek out high-quality ESG assets despite the perceived ESG greenwashing risk. This is partially supported by the qualitative data, which shows that investors are less likely to invest in assets of which they perceive ESG greenwashing risk. Besides, 8 respondents mentioned that they would do additional research on companies of which they question the accuracy and validity of their ESG data. This strengthens the assumption that environmental and social priorities could motivate investors to seek out high-quality ESG assets despite their perceived ESG greenwashing risk.

Lastly, the data quality could be a reason for the conversely result. With a larger sample size, and a more reliable index for the level of perceived ESG greenwashing risk (Cronbach Alpha = 0.678) the results could differ. Additionally, measuring perceived ESG greenwashing risk is a challenge. For further research, it would be meaningful to add more details on the extend in which an investor is able to differentiate valid ESG factors from false claims and unrealistic target setting. In this way, one could distinguish investors that perceive ESG greenwashing risk by their ability to identify truly sustainable investments. This would provide additional insights on the analysis of this study.

Mitigating ESG greenwashing risk

The last research question analysed the most effective ways to reduce ESG greenwashing risk according to investors. Especially better regulation, standardization, and transparency of ESG data is mentioned as the most effective way to mitigate the risk of ESG greenwashing. Manners to increase the quality of ESG data, and thus to mitigate ESG greenwashing risk, that are mentioned by respondents are external auditing, a stringent policy and monitoring, drastic and enforceable financial penalties, shareholder voting at AGMs, and exposing companies that are greenwashing in the media. In the future, improvements in data quality and reporting standards regarding ESG data are expected (Rahman & Lau, 2023). Another way to mitigate ESG greenwashing risk according to respondents is education. A lot of investors have a lack of knowledge on ESG factors and ESG investments, which makes them vulnerable to ESG greenwashing risk. Besides, educating investors on ESG investment would help investors to make proper investment considerations regarding ESG factors and risks related to ESG investment compared to traditional investment. Other respondents indicated that they diversify their investments to spread risks, and thus mitigate the risk of ESG greenwashing as well.

5.2 Limitations, literature contribution and future literature

This research confirms most existing theory. Reasons to invest in high ESG assets and barriers to invest in high ESG assets mentioned by respondents correspond with existing literature. Since availability of literature on ESG greenwashing and the impact of ESG greenwashing on investment decision making is lacking, this research can be used as a starting point for other researchers to investigate the impact of ESG greenwashing on investment decision making. Because this research emphasizes the views of investors themselves, it provides new insights into pre-existing literature. It has become clear that based on the results of this study one's level of environmental and social awareness does not have a statistically significant effect on their likelihood to invest in (high) ESG assets. Besides, this study

confirms that people that are more risk averse are more likely to invest in (high) ESG assets to manage risks.

Most notable is the result that investors with a higher level of perceived ESG greenwashing risk are more likely to invest in high ESG assets. Considering that this result was unexpected according to the literature reviewed, its inclusion adds a compelling dimension to the existing literature. For future research, it would be interesting to analyse the grounds for the unexpected results. Based on this study, potential reasons for these unexpected results are that investors that perceive more ESG greenwashing risk are more aware of ESG greenwashing risk and more experienced in ESG investment, which suggest that they can select ESG investments of which they think the ESG scores are valid.

Since ESG investments are progressively increasing and more and more track records of (high) ESG assets will become available in the future, more and more literature on risk and return related to (high) ESG assets will become available. Reporting standards regarding ESG data and the quality of ESG data will improve in the future, which will help mitigating the risk of ESG greenwashing. Other ways to mitigate ESG greenwashing risk according to this study are educating investors on ESG investment, external auditing and diversify investments to spread risks. ESG data should become available more easily, with more transparency and accurateness.

For future research, it might be interesting to compare two groups of investors. One group that has not yet invested in ESG assets before, and one group that already has experience with ESG investments. In this way, the risk of ESG greenwashing on both groups can be analysed, which would give more insightful results. Besides, comparing the likelihood to invest in high ESG assets with and without the existence of ESG greenwashing might be interesting to analyse the impact of ESG greenwashing on investment behaviour. Additionally, having a larger sample size might help to get more reliable and representative results. Diving into the reasons why people with a higher level of perceived ESG greenwashing risk are more likely to invest in (high) ESG assets might also be an interesting topic for future research.

The limitations of this study are related to the recommendations for future research. First, having a larger sample size would have helped to get more reliable and representative results, and would increase the possibility of getting more significant results. Second, the results would have been more meaningful if the study would only include investors that already have experience in ESG investments. However, this would be less representative for reality. Third, there are a lot of ways to measure one's level of risk aversion and one's level of environmental and social awareness. Employing other ways to measure one's level of risk aversion and one's level of environmental and social awareness might have provided better results. This is also confirmed by the values of the Cronbach Alpha for both indices. Lastly, using Prolific as a tool to gather respondents could potentially limit the results of this study. Since respondents get paid to complete the survey, their motives to complete the survey might be wrong. Gathering data via networks of investors could have provided better data, but due to time and budget constraints this was not possible.

6. Conclusion

This study investigated the influence of various factors on investor behaviour towards ESG assets. There is examined how ESG factors, risk tolerance, environmental and social awareness, and perceived ESG greenwashing risk impact investment decisions.

The key findings indicate that ESG factors positively influence investment decisions, as investors increasingly favour assets with high ESG ratings. Additionally, risk tolerance plays a significant role, with investors who have a higher tolerance for risk being less likely to invest in ESG assets, potentially because ESG investment can be seen as a tool to mitigate overall and systemic risk of an investment.

Interestingly, the study found no significant correlation between environmental and social awareness and investment in ESG assets, suggesting a potential gap between awareness, knowledge, and action. Furthermore, despite expectations, a high perceived risk of greenwashing did not deter investment in ESG assets. This suggests a more complex relationship where investors weigh greenwashing risk alongside other factors such as potential returns and overall impact.

Investors have suggested several key strategies to mitigate greenwashing risk, including increased regulation and enforcement of ESG reporting standards, independent verification of ESG claims, improved transparency and disclosure by companies, and greater investor education on ESG investing and greenwashing identification.

From these findings, several key insights can be drawn. First, the high perceived risk of greenwashing does not deter investors from investing in ESG assets, indicating a nuanced relationship where multiple factors are considered. Second, the variables influencing ESG investment decisions interact in complex ways, and understanding these interactions is crucial to avoid misleading conclusions. Third, investors with heightened greenwashing awareness may possess the skills to navigate concerns and identify credible ESG opportunities. Finally, while ESG factors are increasingly important, traditional financial considerations remain a key driver in investment decisions.

This study confirms existing theories and highlights areas for further research, such as analysing the reasons behind the unexpected greenwashing risk finding, comparing investor behaviour regarding ESG investment with and without perceived ESG greenwashing risk, conducting larger-scale studies to enhance generalizability, and investigating the specific strategies employed by investors with high greenwashing risk awareness to identify credible ESG opportunities.

In conclusion, this study contributes to the understanding of ESG integration in investment decisions by highlighting the complex interplay between various factors and investor behaviour. Further research is necessary to explore how investors navigate the ESG landscape and identify high-quality ESG investment opportunities, especially in the presence of perceived ESG greenwashing risk.

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Appendices

Appendix A: Survey Example

Final Survey MSc Thesis

Start of Block: Introduction

Dear respondents,

I would like to invite you to participate in my research by completing the following survey. This research is developed by Niels Bolder, a MSc student from Wageningen University & Research. This MSc Thesis investigates the impact of perceived ESG greenwashing risk on the likelihood one will invest in high ESG assets. Besides, it investigates the probability that different risk types and people with different environmental and social awareness will invest in high ESG assets.

The objective of this study is to quantify the impact and magnitude of ESG greenwashing risk on investors' (ESG) investment behaviour and to identify investors' view on how to overcome this ESG greenwashing risk. The following questionnaire will take approximately 7 to 10 minutes to complete.

The data collected through this survey will remain confidential and used solely for academic purposes. Your support towards my research will help to conduct my MSc thesis ideally. I would like to thank you for your time and assisting me in my research.

Thanks in advance!

Q1 I consent to participate to this survey

- ○ Yes (1)

End of Block: Introduction

Start of Block: Introduction ESG investment and ESG greenwashing

Q2
The following questions are about high ESG assets and ESG greenwashing. To be sure the definitions of these two concepts are clear and concise, the definitions are given below.

High ESG assets
An ESG rating is assigned to a company and is an evaluation of its focus and direction when it comes to environmental, social and governance (ESG) issues. A high ESG asset is considered an asset with an ESG score of 70 or higher on a scale from 0 to 100.

ESG greenwashing
ESG greenwashing refers to the practice of making false or exaggerated claims about a company's environmental, social, and governance (ESG) initiatives and performance to appear more environmentally and socially responsible than they actually are.

Q3 Do you understand these definitions?

- ○ Yes (1)
- ○ No (2)

End of Block: Introduction ESG investment and ESG greenwashing

Start of Block: Likelihood to invest in high ESG assets

Q4 On a scale from 1 to 5, how knowledgeable are you on ESG investing?

	Very unknowledgeable (1)	Moderately unknowledgeable (2)	Not knowledgeable but neither unknowledgeable (3)	Moderately knowledgeable (4)	Very knowledgeable (5)
Knowledge on ESG investing (1)	○	○	○	○	○

Q5 How likely are you to invest in high ESG assets in the coming 12 months?

	0 1 2 3 4 5 6 7 8 9 10
A lower score indicates a lower likelihood to invest in high ESG assets, while a higher score indicates a higher likelihood to invest in high ESG assets in the coming 12 months. ()	

Q6 Do you currently have investments?

- ○ Yes (1)
- ○ No (2)

Skip To: Q8 If Do you currently have investments? = No

Q7 How much of your current investments do you consider as high ESG assets?

	0 10 20 30 40 50 60 70 80 90 100
In percentages (%) ()	

Q8 Since when are you investing in high ESG assets?

- ○ Not yet (1)
- ○ Less than 1 year (2)
- ○ 1 to 2 years (3)
- ○ 2 to 3 years (4)
- ○ 3 to 4 years (5)
- ○ 4 to 5 years (6)
- ○ More than 5 years (7)

Skip To: Q11 If Since when are you investing in high ESG assets? = Not yet

Q9 During this period that you have been investing in high ESG assets, how much of your investments do you consider as a high ESG investment?

	0 10 20 30 40 50 60 70 80 90 100
In percentages (%) ()	

Q10 What are your main reasons to invest in high ESG assets?

_____

Q11 In what extent do you agree with the following statements?

	Strongly disagree (21)	Somewhat disagree (22)	Neither agree nor disagree (23)	Somewhat agree (24)	Strongly agree (25)
In general, investing in an asset with a higher ESG score decreases the risk of this investment. (1)	○	○	○	○	○
ESG-focused investments will outperform other types of investment in the long run. (4)	○	○	○	○	○
ESG investments are just as viable as traditional investments. (5)	○	○	○	○	○

Page Break

Q12 How would you rate the overall risk of ESG-focused investments compared to other types of investments?

	Insignificant risk (1)	Minor risk (2)	Significant risk (4)	Major risk (5)	Severe risk (6)
A lower risk here indicates that ESG-focused investments overall have a lower risk compared to other types of investments. (1)	○	○	○	○	○

Q13 What are the biggest barriers for you to invest (more) in high-ESG assets?

_____

Q14 What would be needed to encourage you to invest (even more) in high-ESG assets?

_____

End of Block: Likelihood to invest in high ESG assets

Start of Block: Control question

Q15 What does ESG mean?

_____

End of Block: Control question

Start of Block: Perceived ESG greenwashing risk

Q16 For the following 6 statements, please indicate the level in which you agree with the statements. Here, 1 is the lowest score, and 7 the highest score you can give to a statement.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
To what extent does the possibility of companies exaggerating their environmental efforts concern you? (1)	○	○	○	○	○	○	○
How confident are you that ESG scores consistently reflect a company's genuine environmental practices? (2)	○	○	○	○	○	○	○
How often do you believe companies use misleading language to portray environmental responsibility while their actions do not align with their claims? (3)	○	○	○	○	○	○	○
How sceptical are you about the accuracy of ESG ratings and labels provided by companies? (4)	○	○	○	○	○	○	○
To what degree do you believe that some companies resort to deceptive practices to enhance their ESG scores without making significant environmental improvements? (5)	○	○	○	○	○	○	○

• Do you feel that the regulatory and monitoring measures for ESG ratings are sufficiently stringent? (6)	○	○	○	○	○	○	○

End of Block: Perceived ESG greenwashing risk

Start of Block: Perceived ESG greenwashing risk 2

Q17 From 0 to 100, how much ESG greenwashing risk do you perceive?

	0 10 20 30 40 50 60 70 80 90 100
Perceived ESG greenwashing risk ()	

Q18 To what extent do you agree with the following statement:

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I believe that ESG ratings are an accurate reflection of a company's environmental and social performance. (1)	○	○	○	○	○

Q19 How much do you trust ESG ratings agencies to provide unbiased and reliable information about companies' ESG performance?

	No trust at all (1)	moderate no trust (2)	Neither trust nor no trust (3)	moderate trust (4)	Complete trust (5)
Trust in ESG ratings agencies (1)	○	○	○	○	○

Q20 Does your perceived greenwashing risk have an impact on your investment decision making when considering ESG scores?

○ Yes (4)

○ No (5)

Skip To: End of Block If Does your perceived greenwashing risk have an impact on your investment decision making when cons... = No

Q21 Please explain how your perceived greenwashing risk impacts your investment decision making when considering ESG scores?

_____

End of Block: Perceived ESG greenwashing risk 2

Start of Block: Environmental awareness

Q22 On a scale of 1 to 5, how concerned are you about companies' impact on nature and the environment in their operations and practices?

	Not concerned at all (1)	Slightly not concerned (2)	Neither concerned nor unconcerned (3)	Moderately concerned (4)	Very concerned (5)
Climate change and its impact on the environment (1)	○	○	○	○	○

Q23 What do you think are the three main environmental issues our planet is facing today?

_____

Q24 On a scale of 1 to 5, how familiar are you with the concept of renewable energy sources like solar and wind power?

	Not at all familiar (1)	Slightly familiar (2)	Somewhat familiar (3)	Moderately familiar (4)	Extremely familiar (5)
Familiarity with renewable energy sources (1)	○	○	○	○	○

End of Block: Environmental awareness

Start of Block: Level of social awareness

Q25 On a scale from 1 to 5, how concerned are you about social issues and its impact on the society?

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Concern about social issues and its impact on the society (1)	○	○	○	○	○

Q26 What do you think are the three main social issues prevalent in your community or country?

_____

Q27 On a scale from 1 to 5, how knowledgeable are you about the challenges faced by marginalized communities?

	Not knowledgeable at all (1)	Slightly knowledgeable (2)	Moderately knowledgeable (3)	Very knowledgeable (4)	Extremely knowledgeable (5)
Challenges faced by marginalized communities (1)	○	○	○	○	○

End of Block: Level of social awareness

Start of Block: Risk types

Q28 For each of the following statements, please indicate the likelihood that you would engage in the described activity or behaviour if you were to find yourself in that situation.

	Extremely unlikely (1)	Moderately unlikely (2)	Slightly unlikely (3)	Neither likely nor unlikely (4)	Slightly likely (5)	Moderately likely (6)	Extremely likely (7)
1. Investing 10% of your annual income in a moderate growth diversified fund. (2)	○	○	○	○	○	○	○
2. Investing 5% of your annual income in a very speculative stock. (4)	○	○	○	○	○	○	○
3. Investing 10% of your annual income in a new business venture. (6)	○	○	○	○	○	○	○

Q29 On a scale of 1 to 10, where 1 represents extremely risk-averse and 10 represents not risk-averse at all, how would you rate your willingness to take financial risks?

0 10 20 30 40 50 60 70 80 90 100

Your willingness to take financial risks ()	

End of Block: Risk types

Start of Block: How to overcome ESG greenwashing

Q30 From your point of view, what do you think is the most efficient way to mitigate the risk of ESG greenwashing?

_____

End of Block: How to overcome ESG greenwashing

Start of Block: Demographic data

Q31 Gender: How do you identify yourself?

_____

Q32 What is your age? (Please answer with numbers)

_____

Q33 What is your highest graduate degree?

- None (1)
- Secondary school (2)
- HBO/Bachelor (3)
- Master (4)
- PhD (5)

Q34 Please indicate your familiarity with ESG scores and ESG investment

	Not familiar at all (1)	Slightly familiar (2)	Moderately familiar (3)	Very familiar (4)	Extremely familiar (5)
Familiarity ESG scores and ESG investment (1)	○	○	○	○	○

Q35 How much of your assets are you investing?

In percentages

0 10 20 30 40 50 60 70 80 90 100

% Of assets that you are investing ()	

End of Block: Demographic data

Start of Block: Incentive to participate

Q36 If you are interested to perform an interview with me to further discuss your results and discuss how to mitigate the risk of ESG greenwashing, please leave your email here. In that case, I will contact you when performing the interviews.

_____

Q37 If you are interested in the results of my research, please leave your email here. In that case, you will receive the results of my study at first hand.

_____

End of Block: Incentive to participate

Appendix B: The use of AI

During this MSc thesis, AI was used as a helping tool. AI was used to assist in writing my thesis, to help me doing my data analysis, and as an inspiration source to find additional literature. To strengthen my thesis, I used AI for rephrasing a sentence or paragraph. I used the AI's suggestions to arrive at the best possible way to express something. Besides, I asked AI the Stata commands I needed to use during my data analysis, and asked AI to explain the interpretation of interaction effects. In addition, I asked AI for scientific articles that discussed specific topics. However, often the AI was not able to provide valuable scientific articles. But, sometimes the input from the AI was useful to navigate through scientific articles.

Unfortunately, I cannot share all links to the conversation with ChatGPT, since I can only see the chats from the last month. However, these are two chats I had last month. One is an example in which AI helps me with analysing data, and one is a chat in which AI helps me translating from Dutch to English and to rewrite some phrases.

https://chatgpt.com/share/28c2842e-e111-4199-84d9-eaf767891ef0

https://chatgpt.com/share/eae17409-8a6d-4290-a227-e56ddb4f153b