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Behavioral Biases in the Sustainability Framework: An Empirical Study

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Chapter 1: Introduction

1.1 Research Background

Sustainable finance is becoming central in the contemporary financial scenario, both in terms of transactions' volume and in terms of companies' issuance of financial instruments.

The key drivers of this economic phenomenon are, from one side, the relevance and impact that climate change has in the current political and economic context, and, on the other side, the populations 'concerns about climate change related topics. As regards the latter point, the GlobeScan-Sustainability Survey (2022) underlines that the future and urgency of climate change has dramatically increases in recent years; a confirmation of this findings is given by the World Economic Forum (2022), in which respondents signal the climate action failure, extreme weather and biodiversity loss as the most severe risks that the environment and the society will face in the long run.

In this scenario, sustainable finance has gained and is gaining more relevance; this is important because sustainable projects, green initiatives, and climate change limitation can, for sure, contribute to the safeguard of the planet.

Given the large interest that sustainable instruments have reached in recent times, it becomes crucial to understand what factors and characteristics are essential for investors, the public, and companies; as regards investors, the relevant literature has started to investigate how individuals' preferences, demographic characteristics and behavioral biases affect both the initial decision of investing in sustainable instruments, and the relevant information that investors' need in making their choices. At the moment, only a few considerations and generalizations of results can be made, since most of the results are country specific and so impossible to extend to other situations. Therefore, huge opportunities of studies and development of new methods and theories are offered by this new financial framework.

The objective of this thesis is to investigate and to study how all the latter individuals' characteristics and biases affect the investors' perception of the sustainable finance context. To do this, it was fundamental the development of a questionnaire that captures all these themes and makes possible the analysis of the results.

Furthermore, individuals' preferences towards sustainable products are considered both by companies in their internal process and communication, and by the European Union regulatory

framework, which has established new important rules and binding regulations in order to ensure the correct functioning of the market and the transparency for investors.
So, as the result of all these innovations and developments, the sustainable finance market has been in continuous evolution and it is able to reach and satisfy investors who are more concerned about the environment and, up to now, were not fully included in the "traditional" financial market.

1.1.1 The Role of the EU Legislation in the Diffusion of Sustainable Finance

The United Nations Sustainable Development Goals (SDGs) are targets for global development that were adopted since the Paris Agreement in 2015; all countries have agreed to work towards achieving them by 2030.
Throughout the past years, there has been an increase in the amount of money going toward projects that are climate neutral. Despite the positive trend in green financing activities, the amount is still well below the goals. To accomplish the climate targets by 2030, the yearly growth rate of climate funding needs to be at least 550% (Climate Policy Initiative, 2021). As a result, the financial sector's role in directing capital toward more sustainable initiatives is becoming increasingly crucial. Financial authorities in many countries released initiatives to promote the participation of retail investors in sustainable investments. In European Union (EU) for instance, European Commission launched The Commission Delegated Regulation (EU) 2021/1257 of 21 April 2021 (European Commission, 2021) in which all firms subject to the Markets in Financial Instruments Directive (MiFID), including financial firms and advisors, are required to assess their client's sustainability preferences. However, limited access to financial advisory services and financial markets is one of the main obstacles to putting this strategy into practice. A substantial number of potential retail investors are prevented from making sustainable investments by a lack of availability and incomplete information (Gutsche, et al., 2023).
This and other policies (for example the Sustainable Finance Disclosure Regulation, SFDR) are the implementations made by the European Union to accomplish the objective of reaching the United Nations SDG's.
In coherence with the EU Green Deal, the key areas in which there has been more actions, according to Cruciani, et al. (2022), are, first of all, the establishment of an EU classification system for sustainable activities, which entered into force in 2020, in order to set which criteria determine a product to be classified as sustainable or not. Another important step was the creation of standards and labels for green financial instruments to level the playing field for

companies and to harmonize the market. Then, fostering investment in sustainable projects and the incorporation of sustainability when providing financial advice are crucial steps that the EU has established for the development of a sustainable finance culture.
The purpose of this thesis of studying individuals' preferences and individuals' potential biases are of fundamental importance if the trend and the development that the EU has undertaken is considered.

1.2 Purpose of this Thesis and Research Questions

This thesis aims at investigating individual investors' preferences and knowledge of sustainable investments. Also, the effects of behavioral biases on investors' behavior are studied. This is done by examining the impact of investment-related attitudes and demographic characteristics on sustainable investment choices and assessing investors' knowledge level regarding sustainable investments. In addition, hypothetical scenarios are created in order to assess how respondents would act and if they are biased in their behavior.
To achieve the purpose of this study, two research questions are defined.

RQ1) Which are the Relevant Factors and Preferences that Mostly Affect Overconfidence in Subjective Knowledge Concerning Sustainable Finance Literacy in Individuals?

Sustainable investments integrate social and environmental considerations alongside purely pecuniary motives in the decision-making process, so the decisional process is more complex than the traditional one. Therefore, investors need to have both financial and sustainability knowledge when evaluating sustainable investment choices.
Filippini et al. (2021) finds that investors have a lower knowledge of sustainable finance literacy with respect to financial literacy. In addition, overconfidence was found to be a relevant factor when financial literacy was examined as a driver in the initial decision of investing in sustainable instruments; in particular, overconfidence is considered a crucial variable when the investors' perception of financial knowledge was compared with the actual financial knowledge of the individuals.
Rossi et al (2019) studies the effects of financial knowledge with respect to sustainable instruments. The authors find that individuals who perceive themselves as very knowledgeable in financial matters tend to allocate much lower amounts to socially responsible investments; conversely, individuals who have more objective financial knowledge are significantly more likely to participate in social investments.

Another important contribution in this field is the one of Aristei & Gallo (2021); in this study, the authors find some patterns that affect overconfident and underconfident individuals. In particular, overconfident individuals display a higher probability of making financial investment, while underconfident individuals exhibit suboptimal investment choices, but are less likely to engage in risky financial behaviors.

Therefore, one of the purposes of this thesis is to study if these patterns can be extended also to the Italian context.

RQ2) In Which Manner the Disposition Effect is Affected by the Sustainability Framework?

The disposition effect is a widespread bias that consists in the tendency to sell appreciated stocks too early and to hold depreciated stock too long (Shefrin & Statman, 1985). This behavior is found both at individual level and at aggregate market level for traditional finance instruments.

Given the large relevance that sustainable products have gained during the recent period, some studies have tried to analyze this phenomenon under different points of view. Dooren & Galema (2018) finds that the disposition effect is larger when sustainable instruments are incorporated into the data; so, socially responsible investors are more biased in this context than conventional ones. Overall, the disposition effect is found to be 7.9 percentage points higher for socially responsible investors with respect to traditional ones, but this value drops if the number of transactions and the amount of assets held are taken into account. If all the latter variables are considered, the value of the disposition effect is still higher for sustainable investors (the minimum amount was found to be 3.7%).

Rubaltelli, et al. (2010) studies affective reactions; the authors find that individuals have different perceptions of socially and non-socially responsible funds. Not only the socially responsible fund induced significantly more positive feelings than the non-socially responsible fund, but also affective reactions behave differently in accordance to the two types of funds. In fact, socially responsible funds have higher selling prices and investors tend to hold them for longer periods than non-socially responsible funds.

This thesis has the objective to find evidence in relation to this topic and to find out if they are in line with the literature.

1.3 Thesis Organization

This thesis comprises five chapters and is organized as follows. Chapter 2 provides related works on investors' preferences and knowledge of sustainable investments; also, the description and the related literature review of behavioral biases is conducted. In Chapter 3 there is a detailed analysis of the questionnaire used to collect the data. Chapter 4 provides summary statistics of data and the empirical findings of the research questions; possible limitations are also discussed. The conclusion and possible applications of this thesis are covered in Chapter 5.

Chapter 2: Literature Review and Conceptual Framework

This chapter provides an overview of the existing literature related to the topic of this thesis. The literature review is conducted by analyzing, summarizing and comparing previous studies, concepts and theories. To do that, the review will focus on the key findings, methodologies and possible limitations of past researches in order to highlight the growing importance of the sustainability framework.

2.1 Conceptual Framework

2.1.1 The Increasing Interest in Sustainable Finance

Sustainable finance has gained an increasing interest in recent years.

It can be defined as the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects (European Commission, 2021). This type of investments regards, as the name suggests, an investment with special attention to one, or more, aspects concerning sustainability. It could be environmental considerations, which include climate change mitigation and adaption or the preservation of biodiversity, pollution prevention and the circular economy. Also, social consideration could be addressed in this type of investments; it refers to inclusiveness, labour relations, human rights issues and limiting inequalities in the society. As regards the governance of public and private institutions, the employee relations, the management structure and the executive remuneration are some of the key factors that have to take into account social and environmental considerations in the decision-making process (European Commission, 2021).

The interest into this category of investments can be explained by two different approaches. One is related to the European policy and, in particular, to the European Green Deal, a set of measures presented by the European Commission in 2019 with the objectives of eliminating the emission of greenhouse by 2050, the economic growth decoupled from resource use, and no person and no lace left behind (Fetting, 2020). Sustainable finance can be considered as the financial implementation of the European Green Deal and as a way to reach its objectives. In fact, the European Commission, in the early 2020, presented the European Green Deal investment plan, which will mobilize at least €1 trillion of sustainable investments over the next decade. This will create the framework to facilitate and stimulate the public and private

investments needed to make the transition into climate-neutral, green, competitive and inclusive economy (European Commission, 2021).

The other important driver of the large interest in sustainable finance is, according to The Global Risk Report, the increasing perception of environmental and sustainable risk as a major concern as regard both the probability and the severity of potential damages (World Economic Forum, 2022); these issues are found at individual levels in the survey proposed in the report. According to the latter, respondents signal the climate action failure, extreme weather and biodiversity loss as the most severe risks that the environment and the society will face in the long run. Another survey that confirms these points is the one conducted by GlobeScan-Sustainability Survey, in which more than 700 qualified sustainability experts responded in 2022 (GlobeScan-Sustainability Survey, 2022). Also in this report, the climate change is considered as the major concern in the future and its urgency is increased if compared to other issues (for example, the increased perceived urgency of water pollution).

Both the European policy and the individuals 'perception of risks have contributed to the increase and the propagation of sustainable finance instruments. The volume of these instruments has followed an increasing trend; in particular, the total amount of sustainable instruments was $22.8 trillion in 2016 and $35.3 trillion in 2020, a 55% increase (Global Sustainable Investment Alliance, 2021). Of these $35.3 trillion, Europe makes $12.0 trillion of the world sustainable instruments, confirming the relevance of this market at the world level. In 2020, reported sustainable investment assets under management make up a total of 35.9% of total assets under management, an increase of 2.5% with respect to 2018.

These trends are important indicators of the new trajectory that the financial sector is following; a key variable for attracting new investors and taking care of the environment will be the incorporation of ESG factors into companies 'business plans and future' disclosure policies. In doing that, the risk of greenwashing may emerge. Greenwashing is defined by Treccani as a "*communication or marketing strategy pursued by companies, institutions, bodies that present their activities as eco-sustainable, trying to hide the negative environmental impact*". Another definition of this phenomenon is "*the intersection of two firm behaviors: poor environmental performance and positive communication about environmental performance*" (Delmas & Burbano, 2011). In their paper, Delmas and Burbano identify the major drivers of greenwashing and divide them into three levels: external, organizational and individual. External drivers include non-market actors (regulators and non-governmental organization) and market actors (consumers, investors and competitors); it is important that the regulatory framework is able to limit these possibilities in order to mitigate and leveling the playing field. Organizational-

levels drivers include firm incentive structure, ethical climate and effectiveness of intra-firm communication; in a lax regulatory context, firms face little incentive to put structures and processes in place to alter organizational tendencies and so greenwashing is more pronounced. Individual-level drivers are related to optimistic bias and narrow decision framing; these cognitive tendencies are reinforced under conditions of uncertainty and limited or imperfect information, so it is crucial that the regulatory environment provides the adequate set of standards and labels for green financial instruments.

2.1.2 The Spectrum of the Sustainable Investing Universe

Sustainable finance and its instruments are only a possible solution of a broader spectrum of investing opportunities and options. In fact, it is possible to divide the investing universe into three major categories: philanthropy, sustainable and social investing, and conventional financial investing (Boffo & Patalano, 2020). This division is based not only on a risk-return approach, but also on considerations on the type of investment, their focus and the possibility of non-financial objectives.

On one side of the spectrum there is philanthropy, where social return is the main driver; the primary objective of this type of investments is to address societal challenges through the provision of grants. Some possible goals are the safeguard of human and worker rights, the improvement of education in certain specific areas, gender equality, etc.

On the other side of the spectrum there is conventional financial investing, where the major concern is to maximize shareholders and debtholders value through financial returns based on absolute or risk-adjusted measures. Here the underlying approach is, at best, the solution of the Markowitz' optimization problem (Markowitz, 1952); minimizing the exposure to risk through a high level of diversification is one of the techniques used.

In the middle of this investing universe there is sustainable and social investing, where the aim is to combine the positive aspects of the other two forms; in particular, both the social considerations and the financial aspects are incorporated in these instruments. Whitin this category, it is possible to identify two different types of investment opportunities: social impact investing and sustainable and responsible investing. The distinction, according to the OECD's report, is not very clear and remains some ambiguity in the market that could be better addressed by the financial industry, third-party providers and international organizations. The main difference among these two forms of investment is that sustainable and responsible investing incorporates the risk assessment of long-term environmental, social and governance challenges and developments into the objective of maximization of financial returns. Instead,

social impact investing focuses on social and/or environmental outcome rather than financial returns, where the latter are subordinated in term of significance with respect to the social outcome. Social impact investing aims to have a measurable environmental or social return; this quantification is essential in the distinction among these two categories of investments, since, in ESG investing, the financial returns are still the major concern and the ESG categorization can be considered as a broader level of the impact and social framework.

Whitin sustainable and social investing, there are many possible instruments among which investors can choose; the most widespread and most known are the green bonds. These financial products are bonds, whose proceeds are committed to finance environmental and climate-friendly projects, such as renewable energy, green buildings or resource conservation (Flammer, 2021). The use of the proceeds in some specific destinations and type of projects are essential in the categorization of a green bond; for these reasons, transparency in the use of proceeds and the disclosure of relevant information to stakeholders are of fundamental importance. In fact, most of market guidelines require that the reporting of the use of proceeds is disclosed at least annually after issuance (Climate Bond Initiative, 2018). However, impact reporting, which is the reporting of the ultimate effect on the environment of the financed project with green bonds, is still not mandatory and it is considered as a way to strengthening market accountability.

In an interesting paper by Fatica and Panzica, the authors found out that the majority of green bonds are pure-play bonds, which are instruments issued by non-financial corporations used to finance general corporate purposes; they account for 65% of green bond at world market and 84% of the European Union market. Refinancing is the second largest, clearly identified, specific category for bond allocation; in fact, almost 21% of funds raised in the green bond market are used to refinance existing projects, rather than financing new ones (Fatica & Panzica, 2021).

Other popular green instruments are social and sustainability bonds; social bonds are financial instruments used to finance projects regarding socio-economic advancement, food security and sustainable food systems, affordable housing and access to essential services. Compared to green bonds, social bonds are often harder to define, sometimes requiring indicators that account for highly cultural and context-specific factors. Sustainability bonds are products where the proceeds exclusively apply to finance or re-finance a combination of both green and social projects; for this reason, they offer a wider range of potential opportunities by connecting climate change initiatives and social and developing initiatives (Kim, et al., 2023).

In the financial market, also ESG mutual funds are quite widespread and very popular; nowadays, they are in the list of the biggest mutual funds providers in the world. In fact, among

the others, Vanguard, PIMCO, Fidelity and BlackRock offer ESG mutual funds in their portfolio allocation to investors. This strategy permits to investors to reach a higher level of diversification in their portfolios and to contribute to social and environmental objectives through their choices of investing in these products.

According to the EU regulation, and the Sustainable Finance Disclosure Regulation (SFDR) in particular, the ESG mutual funds and the other forms of sustainable investments are classified following some parameters that help investors to be properly informed; this approach by the EU has been implemented with the scope of reducing asymmetric information in the market and for guarantee a higher level of transparency. The regulation defines two different types of sustainable financial products: products that aim to promote social and/or environmental characteristics ("products as Art.8") and products that contribute to social and/or environmental aspects and their effects are measured and effectively pursued ("products as Art .9").

2.2 Sustainable Instruments and Investors' Preferences

2.2.1 Characteristics of Sustainable Instruments

Sustainable instruments are characterized by same unique features that make them difficult to evaluate in the traditional way. Classical finance has the maximization of returns and the maximization of diversification as the two most important pillars in making financial decisions and asset allocation. Sustainable finance introduces principles and concepts that are controversial in their effects on financial returns and, by their own nature, on environmental and societal impacts.

A first level in which there is a substantial difference with respect to traditional finance is the asset allocation. When an ESG fund is first built, some techniques of stock picking are applied in the construction of the fund. According to the OECD's report in 2020, the primary form of selection is exclusion or avoidance, which means the exclusion of corporates and governments whose behavior do not align with basic societal values (Boffo & Patalano, 2020). The causes of exclusion include the manufacturing of controversial weapons, activities that are not aligned with ethical standards (tobacco, alcohol and casinos), companies with more than a certain percentage of revenues from coal extraction or activities with negative impacts on social values. Another type of asset allocation is "norms-based" or "inclusionary screening", which pursues the inclusion or higher representation of issuers that are compliant with international norms;

this can include “best in class” investing whereby firms achieving above certain ESG score thresholds are included (Boffo & Patalano, 2020).

A third level of asset allocation, according to the authors of the OECD’s report, is a more tilt of portfolio exposures towards issuers with higher ESG and avoiding lower ESG scores.

All these principles in asset allocation have the effect of reducing the diversification of the overall portfolio; making the cross correlation among stocks and bonds at the minimum level is considered a principal objective in traditional finance in order to reduce the risk exposure to potential negative events in the market. By excluding certain sectors or by incorporating a huge amount of high ESG rated firms, the diversification principle is less effective, so the number of risks borne by the portfolio is increased and the allocation can be considered less efficient if evaluated in the traditional way (Markowitz, 1952).

A second major difference between sustainable and traditional finance is the temporal horizon; in fact, the effects of green investments are more relevant and observable in the medium and in the long run. The impact of economic activities on society, and even more on the environment, is typically felt in the long term; by contrast, the horizons that managers and investors work in conventional finance are mostly short-term (Schoenmaker, 2017). This has some advantages, in the sense that stakeholders, and investors in particular, can take the benefits of a more efficient asset allocation in their investment decisions by including sustainable instruments in order to have long-term objectives. But, at the same time, this implies some disadvantages, since the costs of actions are borne now, while the benefits are in the future (Carney, 2015). This nature of sustainable finance creates a trade-off between using markets as a disciplining device for managers and investors, and designing measures and incentives that foster their long-term behavior.

Another difference is the concept of financial materiality; the quality and the type of information that a company has to disclosure to inform the stakeholders are not the same as in the traditional finance system. This framework is quite new in time and lots of changes are starting to modify the information that stakeholders need to inform themselves about how to make informed judgment about their investments and interests. This can be clear if the core of sustainable finance is considered; by their own nature, these instruments are more complex and more difficult to understand due to their investment policy, temporal horizon and types of drivers that make them change in value. So, transparency by institutions and companies are crucial in this process (Candelon, et al., 2021).

According to Gutsche and Zwergel , transparency is the key driver in reducing the risk of greenwashing; this practice can be reduced and minimized also by the certification of third

parties, which could be a rating agency or a ESG rating. In this way, the information asymmetry between insiders and stakeholders is limited and all the system can benefit (Gutsche & Zwergel, 2020).

Another issue that emerges if sustainable instruments are considered is the quality of information that a firm has to disclose; in particular, the disclosure of non-financial information, such as environmental (water consumption, carbon consumption, etc.), social (employee, customer related, etc.) and governance (political lobbying, board diversity, etc.), is guided by a set of accounting standards (Corporate Sustainability Reporting Directive – CSRD) that defines financially material sustainability disclosure requirements. In particular, the Sustainability Accounting Standards Board (SASB) provides important information about the classification of what is sustainable material and what it is not. The objective is to improve transparency in the market by trying to create a set of common rules and principles that will make the environment more competitive and uniform. In fact, providing the right sustainability information to stakeholders, like corporate reports, ESG ratings, industry affiliation, news and private communication with firms, is crucial in the development of this culture (Daugaard, et al., 2023).

In the end, also investors' objectives play an important role; the maximization of financial returns is not the only objective that matters when sustainable products are considered and evaluated. According to Riedl and Smeets, social signaling and social preferences can explain why investors are willing to forgo financial returns in order to invest in accordance with their environmental and social values (Riedl & Smeets, 2017). In their experiment, the authors found out that Socially Responsible Investment (SRI) decisions are carried by non-financial objectives, since the financial performance of sustainable products is characterized by at least equal returns, but always higher management costs. Another important paper by Døskeland and Pedersen confirms partially these results; in their experiment in an online banking context, they focused on the way in which these investments are proposed (Døskeland & Pedersen, 2016). They made a distinction between the wealth framing, in which the financial dimension was the main driver in information providing, and the moral framing, in which the environmental and social benefits were the main sources of communication. The main result of this paper is that the wealth framing is more effective than moral framing for both information search and investment behavior, so a deeper study in the investors' preferences towards sustainable finance is essential to understand the main development of this market.

2.2.2 Investors' Preferences towards Sustainable Instruments

During the past years, a large number of papers was published in relation to investors' preferences; some patterns emerged but the results were mixed. In fact, the results of these researches were strictly related to the sample analyzed and so it is quite difficult to summarize the findings and to reach unanimous results. But, from the evidence, it is clear that some factors are found to be relevant and crucial in describing some investors 'attitudes and choices. In particular, demographic characteristics, such as age, gender, income, education, etc., and financial literacy are important since they are able to describe individual preferences toward financial instruments.

Socio-demographic characteristics are widely used in the literature to segment retail investors into clusters in order to make analysis and inference (Capon, et al., 1996). In particular, among these variables, age and gender have been shown to affect investment behavior in several studies; age is negatively correlated with financial risk, as young people hold investment portfolios with a higher level of risk than those held by households headed by older people (Pålsson, 1996). If Socially Responsible Investments (SRI) funds are included in the investible universe, then age is also negatively correlated with the probability of holding a sustainable financial instrument in the portfolio; in fact, older investors, in general, are not as concerned in SRI funds as younger investors (Nilsson, 2008). This result is confirmed in other studies, where the age effect is found to be negatively associated with SRI holdings, the common reason is that young people are more interested into environmental care and pro-social behavior (Torgler, et al., 2008) (Gutsche, et al., 2023) (Filippini, et al., 2021).

With regards to gender, several studies point out that women, in general, tend to be more risk averse and less overconfident than men (Barber & Odean, 2001) (Loibl & Hira, 2007) (Lascu, et al., 1997); women are found to be more concerned for the environment with respect to men at every age (Torgler, et al., 2008). By contrast, in other papers, this gender difference is not found so, for this variable, the sample is crucial (Rossi, et al., 2019).

Also, income is an important variable in explaining investors 'preferences towards SRI products; specifically, it is found to exist a positive relationship between income and green investments (Gutsche, et al., 2023). However, this effect must be taken with some attention since income is generally associated with age, so the overall result has to be analyzed properly before reaching a conclusion.

As regards education, the majority of the studies found a positive and high correlation with the decision of investing in green products (Torgler, et al., 2008); this means that highly educated

people tend to invest more in SRI fund, but this has to be distinguished from the concept of financial literacy, which is, by its own nature, a different aspect (Rossi, et al., 2019).

The concept of financial literacy, which was first introduced by Noctor (Noctor, et al., 1992), can be defined as the basic understanding and knowledge of finance that is essential to assist individuals to make informed financial decisions (Altman, 2012). Financial literacy has been found to have a significant impact on individuals 'financial behavior and outcomes. Several studies have demonstrated that a higher level of financial literacy is associated with a higher participation in the stock market (Arrondel, et al., 2012), plan better for retirement (Lusardi & Mitchelli, 2007) and a better management of personal cash flow (Hilgert, et al., 2003). In this period of increasing development of sustainable finance and the increasing demand for these products, the role of financial knowledge is even more crucial; investors not only have to consider financial aspects in their decision process, but they have to incorporate ESG factors into their considerations. To this purpose, the notion of sustainable finance literacy was introduced; the objective of this metrics is to measure the individuals' knowledge of sustainable finance products. Knowledge of sustainable finance integrates the understanding of ESG factors that may affect the financial performance of companies, the knowledge of sustainability criteria and certifications as well as the regulatory frameworks of sustainable investments (Filippini, et al., 2021).

In an interesting paper by Rossi et al., the authors analyze the difference between subjective and objective financial literacy and the different implication that they have in SRI holdings. In particular, through a questionnaire specifically designed to a Dutch representative household panel, they tested the perceived knowledge of respondents about financial aspects and they discovered that respondents who scored high in this metric were less willing to hold SRI mutual funds. This result may be interpreted with some attention because there was a clear penalty function for sustainable instruments and individuals with higher financial literacy did not want to give up the risk-return trade off. Another possible interpretation considers the hypothesis that this measure could be biased by certain degree of overconfidence by respondents that attributed too much weight to the penalty function. When the objective measure of financial literacy was taken into account, the negative relationship between financial literacy and sustainable instruments holding disappears so the hypothesis of overconfidence of the respondents in their self-assessments is more valid (Rossi, et al., 2019).

Another central aspect in sustainable finance is the social dimension that these products offer to individuals; Riedl and Smeets, for example, in their paper found that investors hold SRI funds mainly for two reasons. The first one is associated with intrinsic social preferences, which are

related to specific personal motives and are disconnected to any type of future benefits for the individual itself; the second one is related to social signaling, which is the tendency of individuals to give a better self-portrait to other in order to improve their social reputation and image (Riedl & Smeets, 2017). Intrinsic social preferences are strictly associated with personal values of individuals, and a deep analysis of this topic is proposed by Brodback, Guenster, & Mezger. They focus on altruism and egoism theory; in particular, altruistic values are found to be positively correlated with relative importance of social responsibility, and this effect is stronger when individuals believe that they can make a positive social or environmental impact whit their investments (Brodback, et al., 2019). So, investors will consider SRI even more when they believe in the cause (SRI effectiveness) and thus activate an obligation to act (norm); the sum of these two connected effects is a higher holding of SRI funds.

Egoistic values emerge when financial returns are one of the main drivers of the underlying motives to invest in SRI funds. Only when there is a clear link between self-interest and pro-environmental behavior, SRI funds are considered by "egoistic values investors" (Karp, 1996); the egoistic rationale is found also when financial incentives are added in the decision process, because they can mitigate intrinsic motivations.

Overall, the financial dimension is found to be the main driver also in this type of investments; investors, unless highly personal motivated and highly involved in prosocial behavior, will usually not accept lower financial returns in exchange of some kind of non-financial remuneration (Riedl & Smeets, 2017; Trond Døskeland, 2016; Nilsson, 2008). So, profit oriented influence is considered fundamental in the investment procedure by individuals; some studies found that SRI funds perform no different from "regular" investments on risk-adjusted basis (Cornell, 2021) (Larcker & Watts, 2020) (Rivoli, 2003). This is, however, an objective measure of performance, and investors are sometimes guided by perceived performance of SRI in their investment decisions. In fact, Lewis and Mackenzie show that investors in SRI profiled mutual funds hold heterogeneous beliefs; according to their study, they found that 41% of the respondents said that SRI mutual funds generated lower returns with respect to traditional funds, 14% said that SRI generated higher returns and the remaining 41% of respondents thought that the returns were similar (Lewis & Mackenzie, 2000). These findings are partially confirmed by a natural field experiment of investors in an online banking context conducted by Trond Døskeland and Lars Jacob Tynes Pedersen. They focus on the concept of framing, and, in particular, the type of information that investors receive during their investment period; there was two types of information, wealth framing and moral framing. Investors who receive information regarding wealth concerns were more interested in them and were more willing to

buy green funds than those who only receive information concerning moral aspects (the difference is almost 21%) (Døskeland & Pedersen, 2016).
The main difference between "traditional" investors and part of the "sustainable" investors is that the commitment of the latter in their believes and values is by far the most important driver of their decisions. Investors who are engaged in ethical investments were committed to pledging their wealth into the funds even when the financial performance is poor (Webley, et al., 2001).

2.2.3 The Empirical Evidence in Europe and in Italy

In recent years, the market has changed quite a lot; new instruments have been developed, incorporating new features. Financial returns are still important to investors, but new approaches and challenges were integrated into financial instruments and so new markets were created.
The most important news come from the green, social and sustainability markets, where the instruments are used to finance the growth of sustainable projects and the transition into a low-carbon, climate-resilient and fair economy. These markets have seen a huge increase in volume during the last years; only in 2022 this trend has not been followed, but it can be explained by the widespread diffusion of COVID-19 pandemic and its effects were dramatic to the global population (Michetti, et al., 2023).
It is interesting to notice that the 42% of the volume of the total volume of green instruments is priced in euros; the Europe as a whole is one of the biggest areas where green instruments are widespread and developed. This, of course, is not casual. The European Commission has presented the European Green Deal (EGD) in 2019, a set of initiatives, strategies and legislative acts that, together, are intended to enable a just, sustainable and inclusive transformation of European society and economy (Fetting, 2020). From that date, all the policies and innovations in the financial products went in that direction, with the overall objective of reaching a carbon zero emissions by 2050.
To this purpose, a new form of information disclosure was developed by updating the existing regulation at investors level; from August 2022, Markets in Financial Instruments Directive (MiFID II) Delegated Regulation has been updated to integrate sustainability factors, risk and preferences into certain organizational requirements and operating conditions for investment firms (Anon., 2023). This new version of the MiFID II aims to give investors a new level of protection through a higher quality of information regarding sustainable financial instruments and through the mandatory assessment of investors 'preferences by financial advisors. This

new version of the MiFID II was added in order to improve the transparency of this type of products and to suit better the sustainable preferences and priorities of investors.

Whitin the European context, Italy has benefit of these new developments on both the regulatory and the socio-economic framework; a survey of 1.436 individual representative of the Italian investor population was conducted by Commissione Nazionale per le Società e la Borsa (CONSOB), the Italian national competent authority concerning the correct functioning and supervisory of financial markets. The objective of this survey was to analyze the preferences of Italian retail investors and to try to study some trends concerning the evolution of preferences and choices of investments. Even though the limited amount of sustainable investments in portfolios of the Italian investors (only 11% of the total amount is invested in green products), it is interesting to point out that the interest of respondents in sustainable instruments is growing a lot; in fact, the trend is increasing since it went from 60% in 2019 to 74% in 2021, demonstrating the efficacy of the European policies through the years (Linciano, et al., 2023). To this purpose, the level of financial knowledge of Italian investors, and the sustainable financial literacy in particular, was very low in previous years; the introduction of this new directive has increased the objective knowledge of investors. In fact, according to a study provided by CONSOB, only one third of respondents has given all the correct answers concerning basic financial knowledge; this value, however, is increasing with respect to the precedent revelation of the survey (Costa, et al., 2022).

2.3 Behavioral Biases

2.3.1 Behavioral Biases and Investors 'Behavior

Every investment has its own level of uncertainty and risk; investors have to make their decisions under these circumstances so traditional finance has developed a theory to guide them. The traditional approach to this problem is found in expected utility theory; this theory has dominated the analysis of financial decisions under risk and uncertainty for decades and it has been generally accepted as a normative model of rational choices. Specifically, expected utility theory says that a rational agent chooses between risky prospects by comparing their expected utility values, that is, the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities (Davis, et al., 1998).

A critique of this way of proceeding was given by Daniel Kahneman and Amos Tversky in a famous paper published in 1979; they developed and proposed an alternative model, called

Prospect Theory, in which they underline how the classical expected utility theory was not able to capture and to describe how investors actually behave. In their work, they found out that investors' behavior depends on the setting in which they make their decisions; in the domain of gains, investors exhibit risk averse attitude and in the domain of losses, investors exhibit risk seeking behavior. These different results are found because individuals do not valuate options in terms of final wealth, but in terms of relative gains and losses relative to a reference points, where the latter is usually the status quo. Another important finding was that individuals are averse to losses because losses loom larger than gains; so, individuals stay away from uncertain situations in which they cannot give a proper probability assessment to outcomes (Kahneman & Tversky, 1979).

Investors do not always behave as fully rational agents and this new theory is able to give an explanation where the classical expected utility theory fails; in fact, Prospect Theory is postulated observing the actual behavior of individuals, and then formalizing the results. In the real world, investors are not able to process all the relevant information to make their choices, they are not able to have a complete overview of all the possible scenarios and assign them a certain probability; the humans' rationality is bounded (Simon, 1990). In particular, Simon recognizes two main forms of limit in making rational decisions: one is associated to cognitive limits, which are related to the difficulty in obtaining and processing all the information needed, and the other is associated with social limits, which are related to personal and social ties among individuals.

This concept is one of the milestones of all the behavioral finance theory. As a consequence of this type of limitations, investors use shortcuts to make decisions under uncertainty and risk (Edwards, 1996); of course, this implies errors and, by their own nature, non-optimal decisions as the classical *Homo Economicus* would have made. In particular, in an environment with lots of information to proceed and little amount of time to take decisions as it is the financial market framework, shortcuts, or heuristics, become necessary; the main driver of investors 'choices is the selection of a solution that is satisfactory rather than optimal using a subset of the information set (Ackert & Deaves, 2009).

The number of biases that affect individuals' decision is large and there are many dimensions in which these biases can be classified and studied. A common distinction in the literature is the division into emotional biases and cognitive biases (Pompian, 2012); cognitive biases stem from faulting reasoning, in the sense that it generally involves decision-making based on established concepts that may or may not be accurate. Emotional biases originate from impulse or intuition rather than conscious calculations; they typically occur spontaneously based on the personal

feelings of an individual at the time the decision is made. Since emotional biases may also be deeply rooted in personal experiences, they are more difficult to rectify than cognitive biases.

In the traditional finance framework, one of the most common cognitive biases is overconfidence, which is the tendency of people to overestimate their knowledge, abilities, and the precision of their information, or to be overly sanguine of the future and their ability to control it (Ackert & Deaves, 2009). The two main facets of overconfidence are miscalibration and the better-than-average effect. In fact, overconfidence can be considered as a particular form of miscalibration, for which the assigned probability that the answers given are correct exceeds the true accuracy of the answers (Skała, 2008). In addition to that, people have unrealistically positive views of themselves; a common manifestation of that is the evidence that people judge themselves to be better than others with regard to skills or positive personality attributes (Glaser & Weber, 2010).

Another important cognitive bias is mental accounting, which can be defined as the people' tendency to code, categorize, and evaluate economic outcomes by grouping their assets into any number of nonfungible mental accounts (Thaler, 1999). It is important to note that individuals give to these accounts different level of importance according to their values, past experiences and so the valence of each account is crucial when these are evaluated. Also the individuals' behavior change in relation to these accounts; some accounts are perceived as more relevant (for example the amount of money saved for children' education) and so individuals are more risk averse in these situations; or, in context of previous gains (for example, in gambling at the casino), some individuals can exhibit more risk seeking behavior than usual (house money effect) (Thaler & Johnson, 1990).

In an important paper published in 1974, Tversky and Kahneman analyzed judgments and systematic errors that people make in uncertainty situation (Tversky & Kahneman, 1974). They found out that when people are required to estimate a value with unknown magnitude, they start with some default, initial value, an "anchor", and then adjust up or down based on new information they receive. This phenomenon is known as anchoring and adjustment. Another finding concerns the representativeness bias; this mental shortcut affects the way in which individuals estimate probabilities. In particular, individuals tend to relate a new event that occurs with some familiar elements that have already been classified by past experience; in doing so, people create a connection in events that aren't truly related by some objective measures. The last cognitive bias studied in the paper is the availability concept, which allows people to perceive easily recalled possibilities as being more likely than those prospects that are harder to imagine or difficult to comprehend.

Another important factor in the decision-making process of investors is the implication of emotions; pride and regret are two of the main drivers in this context. But, as stated in Prospect Theory, the valence of regret is higher than the valence of pride. This because individuals are highly motivated by avoiding the feeling of regret and also the loss aversion has an important role in this process.

Regret Theory was proposed and developed by Loomes and Sugden in 1982 as an alternative to Prospect Theory; the authors highlighted how the utility of a choice option additionally depends on the feelings evoked by the outcomes of rejected options. They state that people compare the actual outcome with what the outcome would have been, had a different choice been made, and that they experience emotions as a consequence. Another important pillar of Regret Theory is that the emotional consequences of decisions are anticipated and taken into account when making decisions (Loomes & Sugden, 1982). So, individuals act by choosing the regret-minimizing alternative in order to reduce and avoid that feeling (Zeelenberg, et al., 1996).

Another important aspect that affects individuals is the loss aversion bias; it was first introduced by Tversky and Kahneman (Kahneman & Tversky, 1979). They found that people generally feel a stronger impulse to avoid losses than to acquire gains or improvements. In fact, losses loom larger than gains by an estimated factor of two (Tversky & Kahneman, 1991); these measures are calculated in relation to a neutral reference point, which is generally the status quo. Loss aversion affects also financial markets through affecting the risk attitude of market participants (Yang, 2019).

The disposition effect also occurs in financial markets and it was first introduced by Shefrin and Statman (Shefrin & Statman, 1985); they defined the disposition effect as the tendency to sell assets that have gained value ("winners") and keep assets that have lost value ("losers"). They gave two explanations for this effect; one is related to regret aversion, in the sense that the fear of triggering regret leads an investor to postpone losses, whereas on the other side, the desire for pride leads to the realization of gains. The other one concerns Prospect Theory; after a large gain, an individual has moved to the risk-averse segment of the value function and only major reversals in the market are likely to move the investor back to the reference point (her initial wealth). On the other hand, after a large loss, an investor has moved to the risk-seeking segment of the value function and so it is very unlikely to move quickly back to investor's reference point. The underline implication is that since an investor is less risk averse for losers than winners, she is more likely to hold on to them. The latter consideration is inefficient also because it doesn't take advantage of a possible tax swap, with which an investor sells a losing stock and

buys another stock with similar risk in order to realize a loss for tax purposes without changing the risk exposure in her portfolio.

The existence of this bias was confirmed and observed in financial markets also by Terrance Odean (Odean, 1998). In his work, the disposition effect has been found to be significant and to have negative effects on the performance of investors' portfolios.

2.3.2 Behavioral Biases in the Sustainability Framework

The recent development of the sustainable finance environment has pushed researchers and the academic world into the study of these new products and instruments; among these studies, the field of behavioral finance and its connection with the sustainability framework has seen some interesting findings.

In particular, new patterns have been found into financial markets, some biases and their effects have been amplified by sustainable instruments and other biases have been involved in some changes.

A major objective of these researches is to understand if these differences (or, in some cases, similarities) are due to the differences in the nature and in the architecture of sustainable finance products, or if other factors, which are not related to technical characteristics, come into the decisional process and subsequential behavior of investors.

One of the areas in which these studies have found an important difference is the relevance of past performances of sustainable investments for investors; it has been shown that past performances of green products are less significant in investors' future decision to sell or hold these products with respect to traditional ones (Renneboog, et al., 2011). In fact, SRI funds attract investors not only for financial goals; investors may be more concerned with ethical and social issues than fund performance. Therefore, SRI money flows are less sensitive to past fund returns. Non-financial objectives and attributes are crucial in explaining this difference between SRI funds and conventional ones. These findings confirm a previous study conducted by Bollen in which he found that the monthly volatility of cash flows into SRI funds is lower than traditional funds (Bollen, 2007).

Also, the overconfidence bias has been tested in the sustainability framework; its effects are most related to the overestimate of individuals' knowledge of social and environmental literacy. In fact, there is a widespread and significant difference between subject and objective knowledge when these aspects are verified. This cognitive bias is most present in male individuals (Adil, et al., 2022), investors who don't seek any kind of financial advice (Hsu, 2022) and individual with lower risk aversion (Ainia & Lutfi, 2019). It is demonstrated that

overconfidence is strictly related to financial satisfaction (Sahi, 2017), so the effects of this bias is similar both in the traditional and in the sustainability environment.

An important study concerning the disposition effect was conducted by Bono van Dooren and Rients Galema; they analyzed trading and portfolio data from a large retail bank and they found that socially responsible investors display a greater disposition effect than conventional investors (Dooren & Galema, 2018). In particular, they found that the disposition effect is 7.9 percentage points higher for socially responsible investors, but this value drops if the number of transactions and the amount of assets held are taken into account. The value of the disposition effect, however, is still higher if all these variables are considered (the minimum amount was found to be 3.7%); a possible explanation to these findings could be attributed to investors' sophistication, where a greater level of sophistication is associated with a lower disposition effect (Dhar & Zhu, 2006).

Chapter 3: Questionnaire's Literature Review

This chapter provides a detailed review of the questionnaire used in this research.
The literature review is conducted by analyzing, and comparing previous studies, concepts and theories.
The development of the related literature will follow the structure of the survey itself.

3.1 Socio-Demographic Characteristics

Socio-demographic characteristics are widely used in the literature to segment retail investors into clusters in order to make analysis and inference (Capon, et al., 1996).
To this scope, the following questions have the objective of obtaining personal and standard information of respondents. The last questions of this section are of particular interest in obtaining information about trust and pro-societal attitudes of respondents.

Q.1. ***"Indicate your gender"***

In the literature there are different findings with regard to the gender variable; in particular, Barber and Odean (2001), Loibl and Hira (2007) and Lascu et al. (1997) find that women tend to be more risk averse and less overconfident than men.
Togler et al. (2010) also finds that women are more concerned about the environment with respect to men at every age. By contrast, Rossi et al. (2019) finds no gender effect.
One conclusion for this variable is that the sample and the time in which the survey is done are of fundamental importance.

Q.2. ***"Indicate your age"***

Age is found to be negatively correlated with financial risk, as young people hold investment portfolios with a higher level of risk than those held by households headed by older people (Pålsson, 1996).
If Socially Responsible Investments (SRI) funds are included in the investable universe, then age is also negatively correlated with the probability of holding a sustainable financial instrument in the portfolio; in fact, older investors, in general, are not as concerned in SRI funds as younger investors (Nilsson, 2008). Gutsche et al. (2023), Filippini et al. (2021) and Torgler et al. (2010)

confirm these results; the common reason is that young people are more interested in environmental care and pro-social behavior.

Q.3. ***"Indicate the highest qualification you have"***

In the literature there is large evidence of this variable and its effect with regards the investments frameworks; in particular, several papers, as for example Riedl and Smeets (2017), Rossi et al. (2019), Torgler et al. (2010) and Nilsson (2008) , find a positive and significant relation between education and the probability of holding SRI funds. These results are confirmed by Costa et al. (2022) for the Italian retail investors.

By contrast, Gutsche et al (2023) finds no significant effect of this variable in their paper.

Q.4. ***"Indicate your work situation"***

From the literature it is possible to find evidence that the working situation is associated with other variables connected with the investment world.

With this regard, Rossi et al. (2019) finds a positive and significant correlation between working status and the tendency to make sustainable investments.

But the working situation is also associated with the behavioral finance frameworks, since Baker et al. (2019) finds that occupation is strongly related to the probability that individual investors are behavioral biased. In particular, Prosad et al. (2015) finds that occupation is related with overconfidence and optimism.

Q.5. ***"Indicate your family's monthly income"***

Gutsche et al. (2023) finds a significant and positive correlation between income and SRI investments; the authors find this correlation for both low and high income individuals, but the effect of the latter is larger. These results are found also by Nilsson, (2008), Vining and Ebreo (1990) and Rossi et al. (2019).

As regards the Italian context, Costa et al. (2022) reaches the same conclusion of the other papers and the related literature.

Income is considered an important variable in explaining some behavioral biases; among them, the disposition effect is found to be explained by income considerations. In particular, low-income individuals tend to exhibit a greater disposition effect (Ravi & Ning, 2006), while Lin (2011) finds that income has no significant relation with the disposition effect and overconfidence.

Q.6. ***"On a scale of 1 to 7, indicate how much confidence you have in the following categories"***

The study of the trust into some specific categories (for example the financial system, friends and family, the banking and the political system, etc.) is of fundamental importance in order to obtain information about investment decisions.

In particular, the trust in the financial environment is associated with a higher probability of holding SRI funds; Gutsche et al (2023) and Nilsson (2008) both confirm these results. Another aspect that is crucial in the financial system is the presence, or not, of the financial advisor when making financial decisions. The tendency to not have a financial advisor is strongly related to the overconfidence bias (Hsu, 2022); so, individuals with high perception of their own abilities and knowledge are less probable to have a financial advisor. Another relevant finding of the latter paper is that seeking for advice is associated with higher mental accounting bias; this means that investors with mental accounting bias are more likely to seek financial advice.

Klein and Shtudine (2016) studies the effects of trust in the investment decision-process; they find that people who have faith in others tend to take more financial risks. These individuals tend to concentrate their funds in risky instruments; on the other side, subjects who have low faith in others not only invest in less risky instruments, but they also divide their capital among several assets.

Q.7. ***"Indicate with a value from 1 to 4, where 1 indicates that it is completely true and 4 that it is completely false how much the following statements describe you"***

This scale follows the pattern of the financial self-efficacy proposed by Lown (2011); the author proposes a scale in which the respondent has to self-evaluate his ability in dealing with financial situations and problems.

Unexpected external shocks are causes of stress and emotional damages for individuals; their ability of planning for the future is compromised and it is difficult for them to follow their initial plan when uncertainty is dominating in the market. These results are found in Fox and Bartholomae (2020), and Grable and Britt (2012).

Also, financial planning for retirement is a crucial moment in an individual's lifetime; Hershey et al (2007) and Lusardi and Mitchelli (2007) find that financial knowledge is associated with better planning for retirement.

As regards the financial self-efficacy, several studies, among which Nitani et al. (2020), Montford & Goldsmith (2016) and Skimmyhorn et al. (2016), have pointed out that women have lower financial self-efficacy than men.

In a survey conducted by CONSOB (2022), it is found that Italian households exhibit high levels of financial anxiety and stress when making financial decisions. Anxiety for retirement saving and low trust in the financial services are the factors that cause most anxiety to respondents. Female and low-income families are the categories most affected, while high financial literacy is negatively associated with this phenomenon.

3.2 Risk Attitude

This section has the objective of profiling the respondent through the assessment of her risk attitude towards investment instruments and asset allocation. Also, her ability to bear losses is evaluated. These questions are required by Markets in Financial Instruments Directive II (MiFID II) when a financial advisor first assess the risk profile of their clients and their ability of bearing losses; from August 2022, the sustainability preferences must be acquired by financial advisors in order to have a complete overview of the investor's preferences (Anon., 2023).

Q.8. ***"My willingness to bear financial risks is"***

This question has the objective of discovering the subjective risk tolerance of the respondent; in fact, it is explicitly asked to respondents to make an estimate of their own capability of bearing financial risks.

By asking their personal interpretation of their capability of bearing losses, it can be compared to the actual capacity of bearing losses (question 12). The objective of this comparison is to try to understand if there is some degree of overconfidence, miscalibration or some other biases in investors' behavior. Previous studies by Chang et al. (2004) and Marinelli et al. (2017) have found these behavioral biases in their observations.

Q.9. ***"I am more oriented towards making investments"***

This is a question that has the objective of obtaining additional information about the risk-return trade off; it is possible, through this question, to reach a complete overview of respondents' risk profile in connection with the previous questions (in particular, questions 12 and 13).

Risk-return trade off is highly supported both by the literature and by the empirical evidence; for example, Ghysels et al. (2005), Campbell and Viceira (2005) confirm the existence of a risk-return trade off in the market.

Considering Italian retail investors, Costa et al. (2022) gives interesting insights about the risk-return metric. The authors find that Italian households are highly risk averse; in fact, 70% of respondents of their sample prefer investments with low returns and low volatility.

3.3 Financial Literacy

The concept of financial literacy, which was first introduced by Noctor et al. (1992), can be defined as the basic understanding and knowledge of finance that is essential to assist individuals to make informed financial decisions (Altman, 2012).

The following questions are widespread in the literature since they are able to give insights about the financial knowledge of respondents. In particular, most of the questions are taken from Lusardi and Mitchell (2014); the authors give interesting results from their research that will be discussed in the following points.

Q.10. ***"Suppose you have €100 invested in a deposit at 2% interest per annum. After 5 years, how much do you think you will have in that deposit if you have not made any other transactions in the meantime?"***

Q.11. ***"If the annual interest rate on your deposit is 1% and the annual inflation rate is 2%, then, in a year, your deposit balances will allow you to buy…"***

Q.12. ***"Please indicate whether the following statement is true or false. "Buying shares of a single company provides a safer return than an equity mutual fund""***

These questions are from Lusardi and Mitchell (2014) and are important because they are an objective measure of investors' knowledge of financial instruments.

In a framework that grows at an incredible rate and where the innovations and technologies are always changing, it is extremely important that investors know the basic principles that are the pillar of the financial system. Many papers go in this direction, since it is evident from the empirical evidence that financial literacy is becoming more relevant in making informed decisions by investors and, at policy level, is considered a primary objective by institutions. Braunstein et al. (2002), Lusardi and Mitchell (2011) and Filippiniet al. (2021) support these results.

It is found that high-literacy investors are better at timing the market and are more likely to trade according to the prescriptions of normative models; however, though statistically significant, these effects are economically small (Guiso & Viviano, 2015).

The report of the OECD (2020) finds low levels of financial literacy (respondents score an average of 12.7 out of 21) for European respondents. These results are also confirmed by the report of the European Commission (2023), which finds, on a survey of July 2023, that 18% of EU citizens display a high level of financial literacy, 64% a medium level, and the remaining 18% a low level. These scores are low if the Capital Market Union (CMU) action plan is considered; in 2020, the EU has issued this action plan that has, among the others, the objective of making the EU an even safer place for individuals to save and invest in the long-term. This objective can be reached by empowering citizens through financial literacy.

Concerning the Italian context, in the CONSOB' s survey proposed by Costa et al. (2022), it is found that only 33% of respondents have a high level of financial literacy (for basic financial knowledge). However, the authors find an increasing trend in financial literacy if compared to the previous survey.

Q.13. ***"Indicate the year in which you made your first financial investment"***

Malmendier (2021) shows that past experiences of macro-finance realizations shape individual beliefs for years and decades to come. Also, the recency bias can affect investors' behavior; in fact, prior gains or losses have significant impacts on the future decision of continuing to invest in the financial market (Tversky & Kahneman, 1974).

Trading volumes are affected by past experiences: Barber and Odean (2001) and Bradbury et al. (2019) find that emotions are important factors that have to be considered when this variable is taken into account. In fact, as observed by Pompian (2012), since emotions are an expression of some irrationality of the individual' s personality and are consequences of past experiences, these emotions are difficult to exacerbate and to remove.

3.4 Behavioral Biases

The following questions have the objective of discovering some behavioral biases that could affect investors' choices.

The questions are mostly based on empirical cases and hypothetical scenarios with some evidence in the literature; in fact, there is a large literature of behavioral biases and empirical studies of the financial framework.

Indeed, the connection between behavioral biases and personality traits has little documentation in the literature; precious insights are given by Pompian (2008) in this context.

Q.14. ***"How often do you monitor your investment portfolio?"***

This question is introduced into the questionnaire in order to control the possible presence of the myopic loss aversion bias of respondents. Mayhew and Vitalis (2014) finds that even investors with experience are found to suffer from myopic loss aversion.

Higher frequencies are associated with some behavioral biases (disposition effect, overconfidence, mental accounting, etc.) since, as stated in Prospect theory, the number of reference points that individuals are subjected to is higher and so they will be more influenced by prior losses and gains (Benartzi & Thaler, 1995).

Another implication of a high frequency feedback is the lower numbers of investments; controlling for the status quo bias with a low frequency of feedback is a successful behavioral intervention to increase investment levels (Fellner & Sutter, 2009).

Q.15. ***"Indicate on a scale from 1 to 7 where 1 indicates "not at all" and 7 "very much" how much you identify with the following behaviors"***

I. ***"I am keen to organize my financial wealth by function (e.g. investments for children or for retirement)"***

Thaler (1999) underlines how individuals tend to create different accounts in their brain with different valence and relative importance to them. Thaler and Johnson (1990) finds out the house money effect, where individuals respond differently after a prior gain or loss.

An interesting research could be to understand if investors perceive sustainable funds as a different account with respect to traditional investments or if they are perceived in the same manner (mental account bias).

II. ***"In general, I consider myself better than other people I know when it comes to making financial decisions"***

Gervais and Odean (2001) finds that investors tend to attribute to themselves their success, and, to the other, their failures; the impact on their investment choices are of great relevance. Investors with this bias tend to trade more, to have higher volatility and to have lower expected profits.

Mishra and Metilda (2015) finds that while overconfidence is associated with gender (men are more overconfident than women), there is no significant difference among women and men when testing for the self-attribution bias.

III. ***"The fear of making a worse choice stops me from changing my financial decisions even when it goes badly or I would like to"***

Reb and Connolly (2007) and Kahneman et al. (1990) find that, for investors, it is hard to change their decisions once they made it (this feeling is amplified in the case in which they did not make the initial choice, for example in heritage cases). In fact, the feeling of losing and privation is of high valence, and individuals want to avoid that. In addition, Regret theory, developed by Loomes and Sugden (1982), underlines these emotions: individuals tend to act by choosing the regret-minimizing alternative in order to reduce and avoid that feeling (Zeelenberg, et al., 1996).

IV. ***"Market news that highlights investment opportunities in a new sector influences my financial decisions"***

Tversky and Kahneman, (1974) defines the recency bias as a cognitive predisposition that make people to overreact to recent and new information; this can create excessive trading volume and, in general, it decreases decision quality (Sulistiawan & Edie Wijaya, 2015).

Karlan et al. (2016), in an empirical study, finds that reminder messages to clients of a large bank increase their commitment to increase saving; this is a confirmation of the recency bias.

V. ***"If I receive negative information about an investment I have just made, I immediately search for as much information as is available to see if I was wrong"***

Conservatism bias can be defined as the tendency to underreact to the new information, maintaining impressions derived from the previous estimate rather than acting on the updated information (Pompian, 2012).

Barberis et al. (1998) finds that investors tend to underreact to both good and bad news when they first receive them.

VI. ***"When I invest in stocks, stocks of larger companies always seem like better investments to me"***

Individuals tend to perceive probabilities and odds that resonate with their own pre-existing ideas (good companies), even when the resulting conclusions drawn are

statistically invalid (good investments). This creates ambiguity to investors in the sense that they are not able to recognize the true probability distribution (Pompian, 2012).

Q.16. ***"In the last few months a financial product you purchased has lost 10% of its value. It is an investment fund with a risk profile consistent with your characteristics. How likely are you to sell it in the next month? Indicate the probability (in %)"***

The disposition effect, first introduced by Shefrin and Statman (1985), is highly documented in the market and in experimental settings. Some documentations of this effect can be found in Odean (1998), Weber and Camerer (1998) and Kaustia (2010).

In the literature there are some patterns that some empirical studies have found to describe this behavioral bias. In particular, Dhar and Zhu (2006) finds that the disposition effect decreases with the level of investors' sophistication and Da Costa Jr et al. (2013) discovers that it also decreases with investors' experience. Dooren and Galema (2018) finds that sustainable investors are more subjected to the disposition effect.

Rubaltelli et al. (2010) studies affective reactions; the authors find that individuals have different perceptions of socially and non-socially responsible funds. Not only the socially responsible fund induced significantly more positive feelings than the non-socially responsible fund, but also affective reactions behave differently in accordance to the two types of funds. In fact, socially responsible funds have higher selling prices and investors tend to hold them for longer periods than non-socially responsible funds.

Q.17. ***"Imagine the following scenario: you have only two financial products in your portfolio (called A and B) and you find that A has lost 10% of its value. By how much B, the second security, must increase in value (in percentage) for you to be as happy as before knowing about the loss in value of A"***

Prospect theory estimates that losses loom larger than gains by a factor of two; this measure is calculated in relation to a neutral reference point, which is generally the status quo (Tversky & Kahneman, 1991).

Loss aversion also affects financial markets through affecting the risk attitude of market participants; in particular, Yang (2019) finds that risk averse individuals show a high level of loss aversion.

3.5 ESG Knowledge and Preferences

Sustainable instruments have gained lots of interest in recent times. The following questions have the objective of understanding if investors have the appropriate knowledge of ESG instruments (sustainable finance literacy, as proposed by Filippini et al. (2021)).

Also, the survey conducted by CONSOB (2023) is a source of inspiration for the following questions; it gives specific insights of Italian households and their preferences concerning sustainable instruments.

Q18. ***"On a scale from 1 to 7, where 1 indicates very little and 7 very much, indicate your level of knowledge of the following concepts: Sustainable investments, Green bonds, ESG factors, Greenwashing"***

In the literature there is evidence that some demographic characteristics are generally associated with a higher interest with respect to ESG instruments. In particular, Nilsson (2008) and Torgler et al. (2010) find that young individuals show a higher interest in ESG instruments than older individuals; the same it is true for high income individuals (as found in Gutschea et al. (2023)) and individuals who have a high level of education (as confirmed by Riedl and Smeets (2017) in their empirical experiment). Also, as found by Rossi et al. (2019), individuals from urban areas are more concerned about sustainable instruments than individuals who live in rural areas.

A demographic characteristic that creates some ambiguity in the literature of sustainable preferences is the gender variable; it is not clear at all if there is a clear gender difference (as found by Raut & Kuma (2023) and Torgler et al. (2010)) or there is not (as found by Rossi et al. (2019)).

Q.19. ***"Which of the following statements regarding sustainable investing is correct?"***

Q.20. ***"Which of the following statements regarding "green bonds" is correct?"***

Q.21. ***"Which of the following statements regarding the "greenwashing" strategy is correct?"***

All these questions concern the financial knowledge of investors with specific regard of sustainable instruments; Filippini et al. (2021) finds little knowledge about sustainable finance with respect to traditional finance, which is larger. These results are confirmed also by the CONSOB's survey conducted by Costa et al. (2022), which finds a positive trend in sustainable knowledge through the years for the Italian population. However, the authors find that Italian households have little knowledge of sustainable finance (only 29% of correct answers, on

average). The notion of greenwashing risk is the answer with the lowest correct answers (only 19% of total respondents).
Mehta et al. (2020) and Thanki et al. (2022) find that individuals' knowledge of environmental and social issues is positively associated with their willingness to invest in sustainable investments.

Q.22. ***"Compared to other investment options, sustainable investments generally have"***
Some studies by Cornel (2021), Larcker and Watts (2020), and Rivoli (2003) find that SRI funds perform no different from traditional funds on a risk-adjusted basis.
This is, however, an objective measure of performance, and investors are sometimes guided by perceived performance of SRI' s funds in their investment decisions. In fact, Lewis and Mackenzie (2000) shows that investors in SRI profiled mutual funds hold heterogeneous beliefs; according to their study, the authors found that 41% of the respondents said that SRI mutual funds generated lower returns with respect to traditional funds, 14% said that SRI generated higher returns and the remaining 41% of respondents thought that the returns were similar. These results are partially confirmed by Døskeland and Pedersen (2016).

Q.23. ***"Compared to other investment options, I may be interested in sustainable investment"***
Measuring the reasons for investing in ESG in this way gives an insight into the investor's willingness and thoughts on sustainable instruments; in particular, it is difficult to measure these metrics because it is difficult to have a clear distinction of financial and non-financial motives. Døskeland and Pedersen (2016), and Riedl and Smeets (2017) find that financial and wealth framing are more relevant than moral framing when the initial decision of making a sustainable investment or not is taken into consideration (this is true also for the decision to hold or sell an asset during the investment period).
Eccles et al. (2017), and Gutsche and Zwergel (2020) find that, among the others, the difficulty of having high quality data about material social-environmental information is one of the main barriers of investing in sustainable funds.

Q.24. ***"Are you planning to hold stocks related to sustainable investing in the next two years?"***
The new development of the MiFID II (2023) requires that financial advisors must give information about ESG instruments to potential and actual investors. By giving investors

information concerning sustainable instruments, the financial knowledge of investors can increase and so the potential holding of these instruments in investors' portfolios.
In the Italian framework, the report of the CONSOB (2022) points out that only 11% of the respondents own sustainable instruments in their portfolios. But this measure can change; in fact, 57% of the respondents want to have or want to increase sustainable instruments in their portfolios in the near future.

Q.25. ***"Consider three financial products A, B, and C described in the table below"***
The three instruments are a representation of the different products that are present in the sustainable market.
Product A is an instrument that is compliant with the definition of Art. 8 of the Sustainable Finance Disclosure Regulation (SFDR); product B is an instrument that is compliant with the definition of Art. 9 of SFDR and product C is an instrument that is compliant with the definition of Art. 6 of SFDR.

The first three questions are constructed as a Likert Scale in order to build the investor's preferences of sustainable instruments; but, according to economic and financial theory, sustainable instruments have some unique features that are incorporated in their architecture by construction.
According to Boffo and Patalano (2020), sustainable funds are created according to principles that are incoherent with an efficient asset allocation: the exclusion of certain sectors and industries, the higher inclusion of compliant companies with ESG principles and the higher representation of companies with higher ESG scores are some of the typical principles of the construction of a sustainable fund. All these methods are deviations from an efficient asset allocation because the diversification principle, as intended in Markowitz (1952), is violated.
Another characteristic of sustainable instruments is the fact that their temporal horizon is longer with respect to traditional instruments; in fact, it is found by Carney (2015) and Schoenmaker (2017) that their effects on the environment and on society are achieved in the medium-long run.
Hartzmark and Sussma (2019), Bollen (2007), Renneboog et al. (2011) find that investors with a strong interest in social and environmental issues, or investors who attach a great relevance to ethical values, are willing to renounce to financial return in order to invest in sustainable instruments. But, Riedl and Smeets, (2017), Gutsche et al. (2023), Cornell (2021), and Larcker

and Watts (2020) find that there is not a difference in financial returns between traditional and sustainable funds.

3.6 Financial Advice

This last section focuses on the relationship between financial advisors and their clients. It is important to properly analyze this situation because it is a possible source of behavioral biases. Most of the following questions are taken from the new regulatory framework that recently has been subjected to important changes; one of the objectives is to detect if the financial system has followed the new development of the regulatory system.

Q.26. ***"How many years have you been followed by a financial advisor? (Indicate "0" if you are not supported by a consultant)"***

A longer period of relationship with a financial advisor can give an overview of the level of trust that the individuals have with regard to the financial institutions. These results can be found in Lachance & Tang (2012), Burke & Hung, (2021), and Westermann et al. (2020).

It is also found, by Calcagno & Monticone (2015), that investors with a low level of financial literacy are less likely to consult an advisor, but they delegate their portfolio choice more often or do not invest in risky assets at all.

Q.27. ***"How do you control your wallet?"***

If investors control their investments without the financial advisor, it is possible that the investors suffer from some behavioral biases (myopic loss aversion, anchoring, disposition effect, recency bias, etc.) because a high frequency of valuation is associated with these biases. Benartzi & Thaler (1995) and Fellner & Sutter (2009) find that the financial advisor can help the investors to mitigate these biases and to moderate them.

In particular, for the individuals that are evaluating their portfolio more often, loss aversion negatively impacts the amount invested in risky assets, so myopic loss aversion is more present in these situations (Hermans, 2023).

Q.28.*"How frequently do you interact (by email, telephone or in person, on your or his initiative) with your financial advisor?"*

Martenson (2009) shows that human interaction is the best way to increase a client's loyalty and trust to the financial advisor.

It is interesting that Hackethal et al. (2012) finds that advised accounts offer on average lower returns after the consideration of management fees; the higher turnover of these accounts and the commission fee associated with the excessive trading are the major causes of these lower financial returns. This evidence may underline a conflict of interest of financial advisors (Krausz & Paroush, 2002).

Chapter 4: Empirical Design and Discussion of Results

The first part of this chapter provides the description of the sample used and the relative summary statistics.

Instead, in the second part of this chapter there will be the discussion of the research questions, taking into consideration similarities and differences with the existing literature; the development and the analytical procedures will be described with the support of graphs, statistical tests, and regression analysis.

4.1 Experimental Setting

This section will provide an overview on the methods used in the data collection, summary statistics of data and the introduction of the research questions.

4.1.1 Data Collection

This thesis focuses on two main themes: understanding individual investors' preferences and knowledge of sustainable investments and behavioral biases concerning sustainable finance. Therefore, it is important to collect data that can give accurate representations of individual investors who are engaged in sustainable investment.

Given this conceptual framework, the construction of a questionnaire that captures these topics is essential.

The questionnaire can be divided in six macro areas, and it started with demographic and background questions. The second part of the survey has the objective of assessing the risk attitude of respondents. The third part provides evidence of the presence or absence of behavioral biases; the fourth and fifth parts consider sustainable finance literacy and ESG preferences. The relationship with the financial advisor and the exchange of information were questioned in the last section of the questionnaire. For a detailed review of the questionnaire, chapter three of this thesis provides more detailed information and related literature of each question.

As regards the distribution, a heterogeneous group of respondents was asked to answer; in particular, there was not a clear target of people to address the questionnaire. In fact, the questionnaire was fully anonymous, and respondents were asked to respond directly from a link in their devices or pc, then to send back the answers. So, there was not a precise target of individuals.

4.1.2 Data Description

The dataset consists of 48 observations. The data are primary data, in the sense that they are taken directly from respondents and analyzed.

In Table 1 there is the summary statistics of the observations of the dataset.

	Mean
Female	0.47916667
Age	43.87500000
Low_Income	0.27083333
Medium_Income	0.33333333
High_Income	0.39583333
Primary_Education	0.02083333
Secondary_Education	0.20833333
Bachelor's _Degree	0.39583333
Master's_Degree	0.31250000
Phd_or_other	0.06250000
Employee	0.45833333
Self_Employed	0.10416667
Retired	0.27083333
Unemployed	0.16666667
High_FL	0.58333333
High_SFL	0.72916667
Risk_Aversion	0.18750000
ESG_Interest	4.66666667
Overconfidence	3.54166667

Table 1: This table presents the summary statistics for the entire survey sample that consist of 48 observations.

It can be seen from Table 1 that the population is quite balanced. In fact, the 47,92% of respondents are women, the income is almost equally distributed (high income individuals are the majority in the sample) and the largest part of respondents have a quite high level of education (bachelor's degree and master's degree).

It has to be noted that almost half of respondents are employees (45,83%), which is a significant percentage of the sample; another relevant percentage (27,08%) is represented by retired individuals. These values give an interesting hindsight of the distribution of age among respondents. In particular, the average age in the sample is 44 years, but the standard deviation of this variable is 20.94636, so the range of this variable is quite large.

Considering individuals' knowledge of financial related concepts (financial literacy), the overall results need a deeper analysis. In fact, the variable High_FL is constructed as a dummy that takes the value of one if the respondent answers correctly at least at two out of three questions, zero otherwise. The questions were taken from Lusardi and Mitchell (2014) and were related to

basic financial and economic knowledge of the interest rates (Q10), the inflation rate concept (Q11) and the time value of money (Q12). The results from the sample are quite interesting; 58% of respondents show a high level of financial literacy, which is a high value if compared with the result found in the survey conducted by CONSOB (2022), in which only 33% of respondents have a high level of financial literacy.

As regards the level of sustainable finance literacy, the percentage of a high level of this metric is 72,91%, which is very high. In particular, the variable High_SFL is constructed as a dummy that takes the value of one if the respondent answers correctly at all of the three questions proposed in the survey, zero otherwise. The three questions that are present in the questionnaire are related to the concept of sustainable investing (Q19), the definition of green bond (Q20) and the definition of greenwashing (Q21). In contrast with the finding in Filippini et al. (2021), in this sample the percentage of correct answers is higher for sustainable finance literacy with respect to traditional finance literacy. In line with the result of the survey conducted by CONSOB (2022), the notion of greenwashing is the one that has the lowest score (77,08%), which is, however, very high.

The variable Risk_Aversion is a dummy variable which is constructed from two questions based on subjective metrics. One of them deals with the subjective risk tolerance of the respondent (Q8); in fact, it is explicitly asked to the individual to make an estimate of her own capability of bearing financial risks. The other one (Q9) is still a subjective measure, but it is more related to the risk-return trade off; from the combination of these two questions, it is possible to reach a complete overview of respondents' risk profile. By construction, the variable Risk_Aversion takes the value of one if the individual wants to take only little financial risk or no financial risk at all and she is oriented to conservative risk-return trade off, zero otherwise. Given the subjective nature of the questions, the variable Risk_Aversion is conservative, in the sense that the condition of one is very restrictive. In fact, only 18,75% of respondents are risk averse, following the definition given in this thesis.

The variable ESG_Interest is a quantitative, discrete variable that can take the value from one to seven, where one is considered as low interest and seven is interpreted as a high level of interest. The average value is 4,667 which shows an overall high level of interest in sustainable instruments; this value is confirmed also by another question related to sustainable investing (Q24). In this question it was asked if the respondent would be interested in holding sustainable products in the following two years and, on average, it was found that individuals are willing to invest 30% of their portfolios in sustainable instruments. This tendency is also confirmed by

CONSOB (2022), in which it was discovered that 57% of respondents want to increase their holding of sustainable instruments in their portfolio.

Concluding, the variable Overconfidence is a quantitative, discrete variable that can take the value from one to seven, where one is considered as low level and seven is interpreted as a high level of confidence. This variable is constructed from Q15 in which it was asked to compare the individual's ability in making financial decisions with respect to other acquaintances. The value of this variable is 3,542, which is exactly equal to the average of the possible result (3,500). However, this variable is not the one analyzed in research question one.

In the following section there will be the presentation of the regression models used for the discussion of the research questions.

4.1.3 Methods of Data Analysis

The methods used in the data analysis in this thesis is an ordinary least squares (OLS) regression for both research question one and two.

4.1.3.1 Ordinary Least Squares Regression

OLS regression is a statistical method that is commonly used in economics, social sciences, and many other fields to estimate the relationship between a dependent variable and independent variables. This method estimates population parameters by searching the line of best fit that minimize the sum of the squared residuals between observed and predicted responses of the dependent variable (Gujarati, 2021).The following equation shows a simple linear regression model.

$$Y_i = \alpha + \beta X_i + \varepsilon_i \quad (4.1)$$

Where:

- Y_i = dependent variable;
- Xi = independent variable;
- εi = error between the observed responses and what the model predicts.

The OLS technique aims to obtain the value of $\hat{\alpha}$ and $\hat{\beta}$ that minimize the sum of εi .

$$\sum_{\iota=1}^{\eta} (Y_i - (\hat{\alpha} + \hat{\beta} X_i))^2$$

(4. 2)

The value of $\hat{\alpha}$ and $\hat{\beta}$ are as follows.

$$\hat{\alpha} = \bar{Y} - \hat{\beta}\bar{X}$$

(4. 3)

$$\hat{\beta} = \frac{\sum(X_i - \bar{X})\,(Y_i - \bar{Y})}{\sum(X_i - \bar{X})^2}$$

(4. 4)

A linear regression model with *k* number of variables is shown in the following equation

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_k X_{ki} + \varepsilon_i$$

(4. 5)

4.2 Finding and Results

In this section there will be a detailed analysis of the two research questions. In particular, in section 4.2.1 there will be the analysis of the first research question and in section 4.2.2 the second research question will be discussed.

4.2.1 Which are the Relevant Factors and Preferences that Mostly Affect Overconfidence in Subjective Knowledge Concerning Sustainable Finance Literacy in Individuals?

The objective of this research question is to find if individuals, when asked to assess their subjective knowledge with respect to sustainable finance literacy, are able to properly identify their level of comprehension of these topics.

Indeed, it is interesting to investigate which aspects of preferences and attitude towards sustainable instruments, demographic characteristics and behavioral biases influence their level of perception of knowledge.

In the next section there will be an analysis of data and the interactions with variables that can have important effects on the miscalibration of individuals' subjective knowledge.

4.2.1.1 Creation of the Dependent Variable and Independent Variables of Interest

The dependent variable, in this first research question, is the variable called Overconfidence. It is a discrete, numeric variable that is constructed as the arithmetical sum of the answer of four question: *"On a scale from 1 to 7, where 1 indicates very little and 7 very much, indicate your level of knowledge of the following concepts: Sustainable investments, Green bonds, ESG factors, Greenwashing"* (Q18 of the survey). The respondent was asked, in this manner, to assess her subjective knowledge and perception of sustainability related themes. By summing the answers, her degree of overconfidence can be estimated.

The value of this variable ranges from 4 to 28. In Figure 1 there is the graphical representation and statistical distribution of the results.

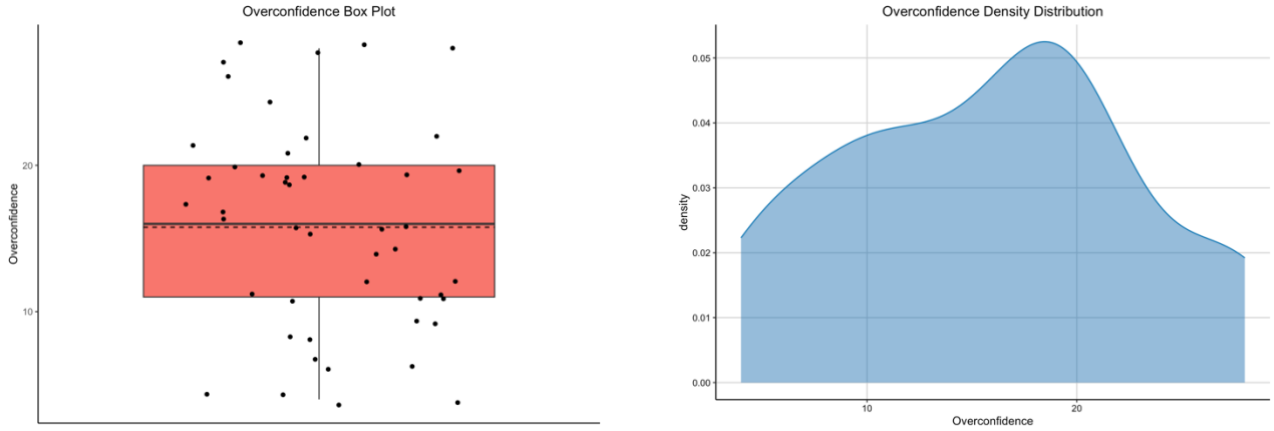

Figure 1: Box plot and density distribution of the dependent variable (Overconfidence)

From the boxplot it can be seen that the mean (dotted line) and the median (continuous line) take almost the same value. Also, the majority of answers assume central values; in fact, most observations are inside the red box. The standard deviation of Overconfidence is 7.0597.

From the density distribution graph, it is possible to see that the distribution is almost symmetric; this is confirmed by the boxplot, in which the mean (15.77083) and the median (16) are very similar.

Now that the dependent variable is defined, it is important to classify the other data.

In order to do that, the first step is to notice how the data are correlated among them; the selection's procedure of the candidates as independent variables takes into consideration the related literature of this topic. In particular, as in Filippini, et al., (2021) and in Rossi, et al., (2019), demographic characteristics, risk preferences, trust, financial literacy and sustainable finance literacy are important factors when evaluating overconfidence.

In addition, Costa, et al (2022) considers financial self-efficacy as an important variable in explaining both underconfidence and overconfidence.

In Figure 2 there are the possible and plausible candidates in explaining the dependent variable.

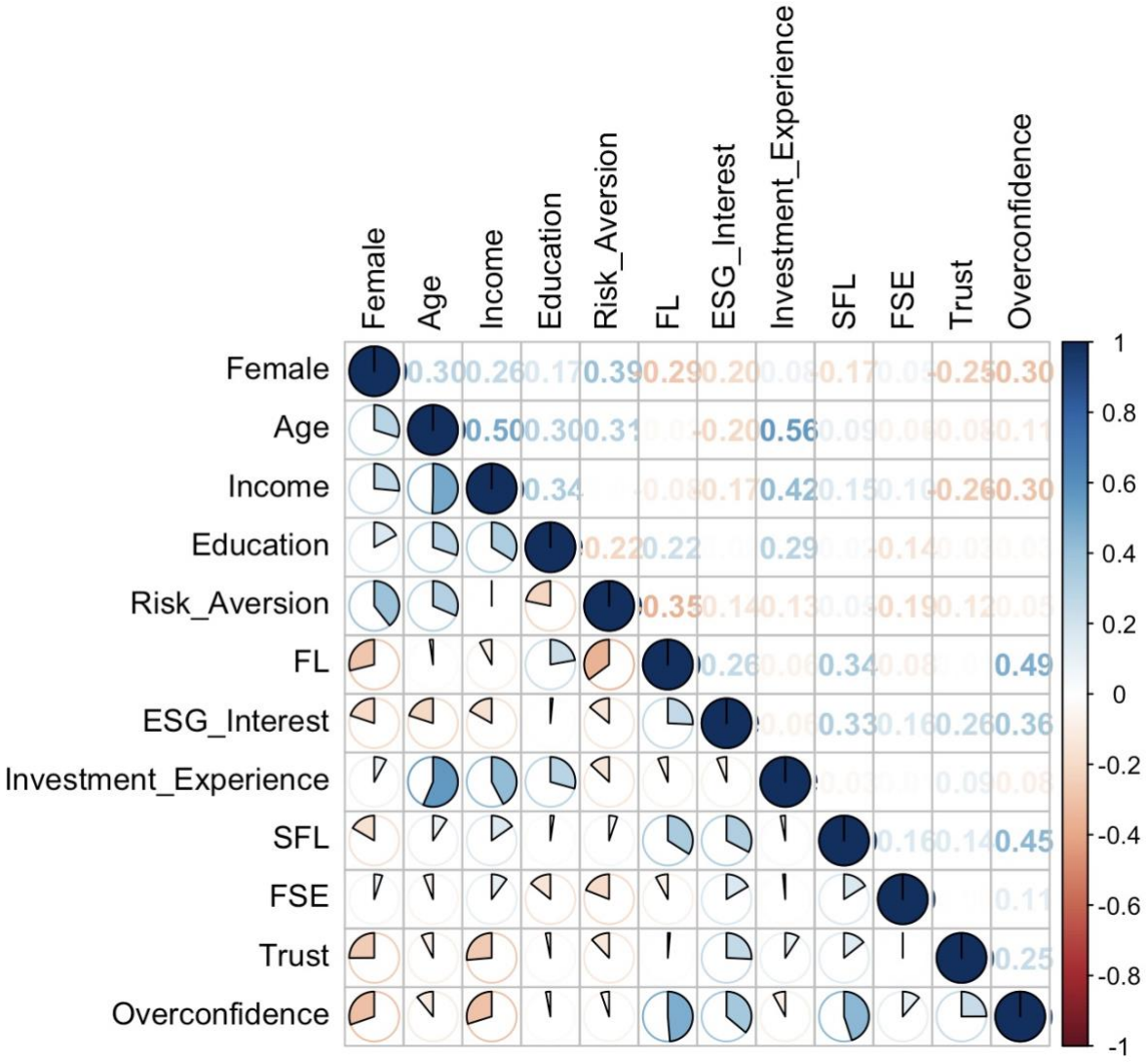

Figure 2: Correlation plot of potential variables that explains overconfidence in the sample.

From Figure 2 some preliminary considerations can be made about the sample. From the correlation plot it can be seen directly that, in the sample, some variables have a high value of correlation. For example, it is found that Age is positively associated with both investment experience (+0,56) and income (+0,50). In fact, higher income and higher investment experience are typically observed in older respondents, in the sample. Also, Risk_Aversion and Financial Literacy (FL) are negatively correlated (-0,35); so, respondents with high level knowledge of financial knowledge are, in the sample, less risk averse with respect to respondents with low level of financial literacy.

Women are found to be more risk averse than men in the sample; the correlation coefficient is positive and takes the value of 0,39. Women are also found to be less interested in ESG instruments (-0,20) with respect to men and to have lower financial literacy (-0,29) and sustainable finance literacy (-0,17) compared to men. On the contrary, women have, in the sample, more investment experience than men (+0,08) and to have a higher level of instruction (+0,17) and income (+0,26).

Another interest coefficient is the one related to the Financial Self Efficacy (FSE); even if the correlations are low, it is interesting to note that higher level of FSE are associated with lower level of Education (-0,14) and Risk_Aversion (-0,19). The variable FSE is constructed as the sum of answers related to the ability of financial planning, budget planning and management, and pension income; individuals who score a high level of this variable are considered more capable in taking financial decisions, to plan their expenses and to manage unexpected expenses.

The next step is to relate the dependent variable to the list of possible independent variables.

In order to do this, box plot graphs and correlation analysis are a good starting point. From the data, FL, SFL, ESG interests are positively and quite highly correlated with Overconfidence. In particular, FL (+0,49) has the higher correlation with Overconfidence, which means that individuals with higher financial literacy are, in the sample, more overconfident about their knowledge with respect to individuals with little financial literacy. The same interpretation can be made on SFL (+0,45), whose value is similar. Also, ESG_Interest (+0,36) is positively correlated with Overconfidence; individuals who score high on the latter variable are more overconfident, in the sample, with respect to individuals who show little interest on ESG instruments, which is plausible if the question (Q 18) from which the dependent variable is based. In fact, it was asked to personally judge their own knowledge about sustainable concepts and so respondents who are more interested in ESG instruments are more propense to judge higher their own abilities and knowledge of these topics compared to respondents who are less interested in these subjects.

Trust is another variable that is interesting to analyze; the correlation is not particularly high (+0,25), but the positive sign can be interpreted as follows. Individuals who have higher levels of trust in family, people that they meet for the first time, financial and political institutions, the academic world (Q6), have also higher levels of trust in themselves, and their opinion on their comprehension of the ESG framework.

FSE is positively associated with overconfidence, but the value of this correlation is not high (+0,11); respondents who show little financial anxiety, high capability of personal money

management and high ability in facing unexpected expenses (high value of FSE), are also, in the sample, more overconfident with respect to respondents who score low values of FSE.

As regards demographic characteristics, women are found to be less overconfident with respect to men (-0,30) and there is evidence that overconfidence decreases with age (-0,11). Also, overconfidence decreases as income increases (-0,30) and with Investment_Experience (-0,08). Instead, there is little, if any, correlation between overconfidence and both Risk_Aversion and Education, whose values are respectively -0,05 and -0,03. So, in the sample, it seems that these variables are not correlated; there is evidence in the data that risk tolerance, and the educational level of respondents are not affecting the individuals' overconfidence.

It has to be noted that some variables are not numeric; for example, of particular interest, the variables Income and Education are not numeric and so their interpretation needs further investigation. In the previous analysis these variables have been made numeric to interpret the correlation with overconfidence; in particular, the original values were transformed into discrete and ordinate variables in order to make a scale and compute the correlation. In this analysis, the original values of the variables are considered. In Figure 3 there are the graphical representations of Education and Income with respect to Overconfidence.

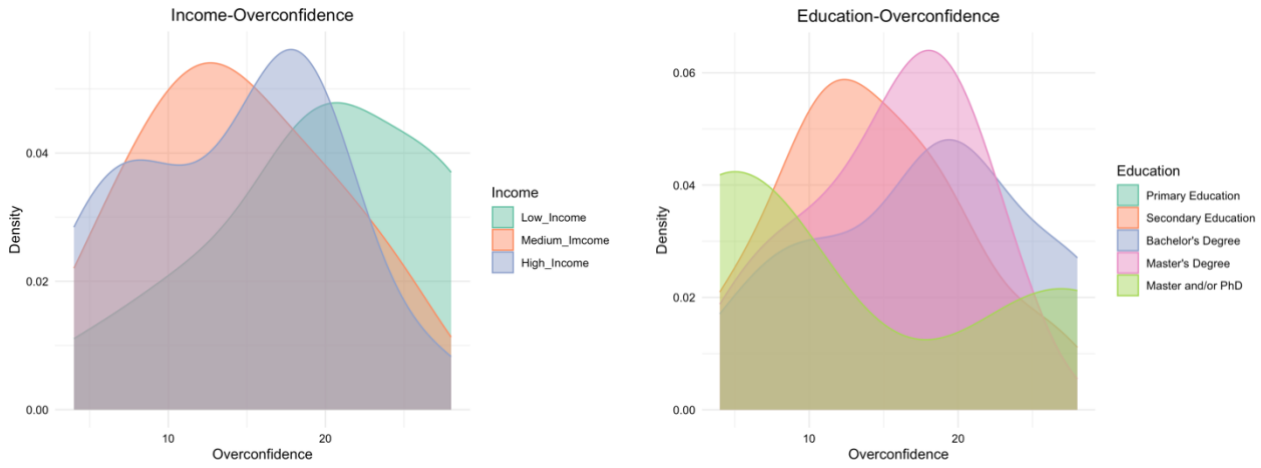

Figure 3: Density distribution of the values of the variable Income and Education

In Figure 3 there is the density distribution of Income and Education; these two variables can take several values and so a graphical representation helps in their understanding.

As regards Income, this variable can take the value of "Low Income" (<1.250€), "Medium Income (between 1.250€ and 3.750€), and "High Income (>3.750€). The density distributions are different if these values are considered. In particular, low-income respondents show higher levels of overconfidence; in fact, the density is higher in the right tail, which means that the majority of the answers, relative to low-income respondents, are in this part of the graph.

Medium-income respondents, on the contrary, are more concentrated in the left tail and in the middle of the distribution, while little evidence is found in the right tail. Similarly, high-income respondents are even more concentrated in the left part of the distribution, which means that these individuals are less overconfident with respect to low-income respondents. However, the combination of these three values, which is found in Figure 2, is positive and takes the value of +0,30.

Education can take various values: "Primary Education", "Secondary Education", "Bachelor's Degree", "Master's Degree" and "Master and/or PhD". The value "Primary Education" is not present in the representation because there is no evidence from the data. "Secondary Education" has more observations in the left part, which means that underconfidence and middle level of confidence are dominant for this population. For "Bachelor's Degree", instead, the observations are more distributed around the medium level of Overconfidence, in the sense that respondents with a bachelor's degree level of education are neither overconfident or underconfident, on average. "Master's Degree" is more distributed around the middle-high level of overconfidence, while there are less observations in the area of very-high overconfidence. It is interesting the distribution of "Master and/or PhD"; the majority of the observations are in the area of underconfidence and in the area of very high overconfidence, while there is little evidence for the middle level of overconfidence. So, the latter respondents are either overconfident or underconfident, on average.

It is important now to focus on the binary variables that affect overconfidence. In Figure 4 there is the graphical representation, the box plots, of the variables.

In order, on the top left of Figure 4 there is the box plot of the relationship between gender and overconfidence; it is found that, on average, men are more overconfident than women (in the literature there is large evidence of this finding, for example in Prims & Moore (2017)). This is clear if the conditional means are considered; the conditional mean of Overconfidence on the variable Female is 13,56, while the conditional standard deviation is 6,98. The mean of Overconfidence, conditional on Male, is, instead, 17,8 and the conditional standard deviation is 6,63. So, the conditional standard deviations are similar, but there is a large difference in conditional means.

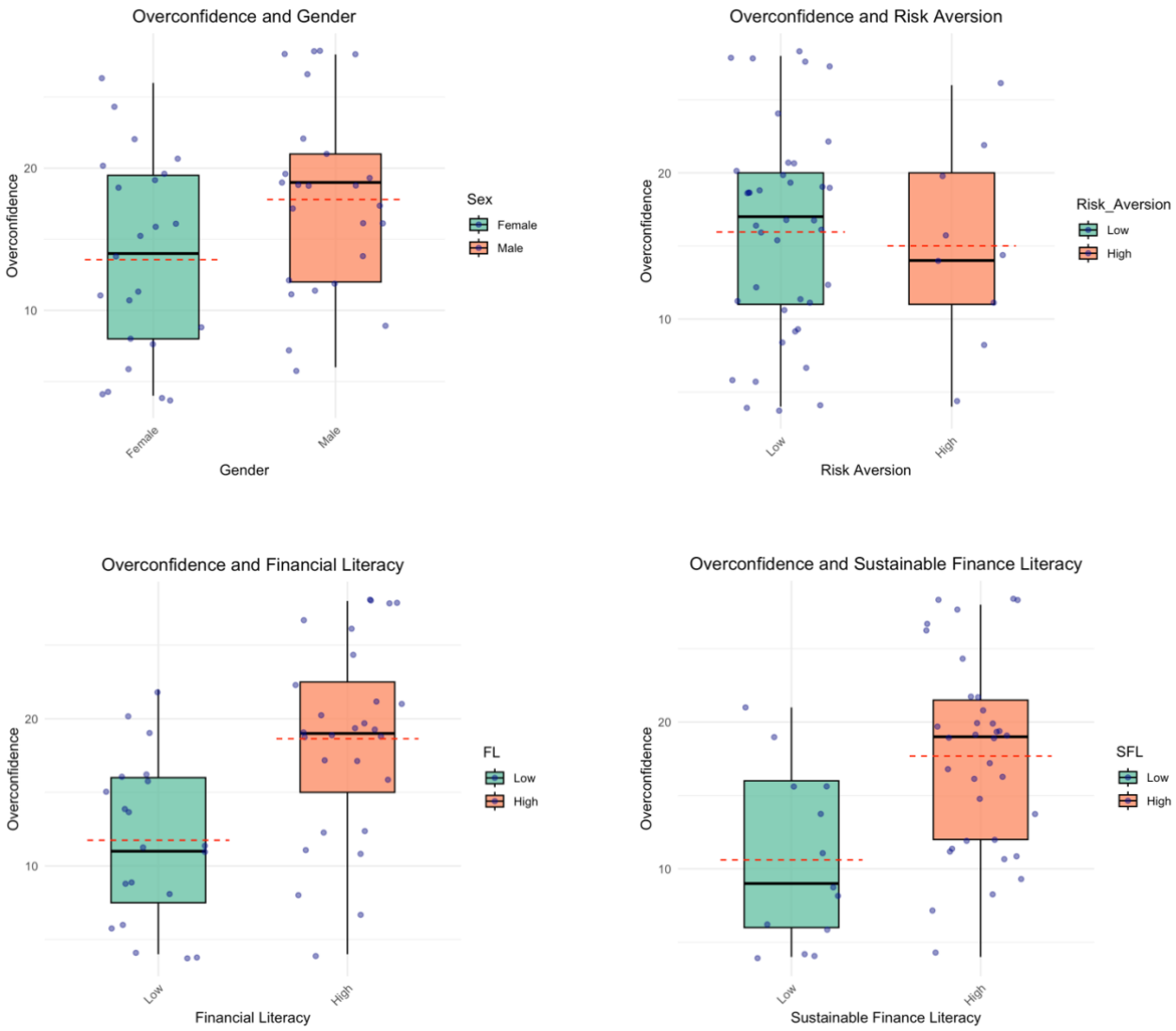

Figure 4: Box Plots of dummy variables, in order, Gender, Risk Aversion, FL and SFL.

On the top right of Figure 4 there is the box plot that summarizes the connections between risk aversion and overconfidence. The conditional mean overconfidence with respect to low level of risk aversion is 15,94, while the conditional standard deviation is 7,17. Instead, the conditional mean of overconfidence with respect to high level of risk aversion is 15, while the conditional standard deviation is 6,93. For this variable the values are similar, but the number of observations is clearly in favor of the risk loving attitude of respondents.

In the bottom left of Figure 4 there is the representation of overconfidence and financial literacy. In particular, the conditional mean of overconfidence with respect to low FL is 11,75 and the conditional standard deviation is 5,51. For high financial literacy the values are very different; the conditional mean is 18,64, while the conditional standard deviation is 6,69.

For sustainable finance literacy the pattern is similar; the conditional mean of overconfidence with respect to low level of SFL is 10l,62 and the conditional standard deviation is 5,99. The values for high SFL are, respectively, 17,69 and 6,50.

In the next section it will be investigated how these variables combined between the affect the overconfidence level of respondents.

4.2.1.2 Regression Model for Research Question One

In this section there is the analysis of the regression model that supports the data analysis of the previous section. In particular, from the analysis before, some variables can be omitted from the regression. In fact, since Education and Income have been studied deeply, a further analysis on their effect on Overconfidence can be omitted; even if their correlations are high and significant, it is difficult to incorporate all their values in the regression model, since their inclusion does not give any further insights about the research. The omission is done because the inclusion of these variables in the specification of the model do not provide any relevant conclusion, since, if included, there were not significant. Instead, the analysis will focus on all the other variables described.

In Table 2 there is the detailed specification of the OLS regression.

```
Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)              2.16801    1.91210   1.134   0.2640
Female                  -1.10436    0.56496  -1.955   0.0580 .
Age                     -0.04450    0.01699  -2.619   0.0126 *
Risk_AverseTrue          1.24125    0.84648   1.466   0.1508
FL                       0.81597    0.61050   1.337   0.1893
SFL                      0.65719    0.63519   1.035   0.3074
ESG_Interest            -0.41579    0.17826  -2.332   0.0251 *
Investment_Experience    0.02763    0.02048   1.349   0.1852
Financial_Self_Efficacy  0.13191    0.07542   1.749   0.0884 .
Trust                    0.08506    0.04791   1.775   0.0839 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.645 on 38 degrees of freedom
Multiple R-squared:  0.3947,    Adjusted R-squared:  0.2513
F-statistic: 2.753 on 9 and 38 DF,  p-value: 0.01396
```

Table 2: OLS specification of the model of all the 48 observations of the dataset.

The regression model shows some patterns that are quite interesting.

The variable that is the most significant is ESG_Interest; it is negative related to the Overconfidence level, and it is significant at 95%. The sign is unexpected with respect to the data exploration analysis; in fact, the single correlation between overconfidence and ESG interest is positive, while in the OLS regression is negative. This could be explained if the statistical background of the construction of an OLS model is considered; in fact, in the regression, the coefficient explains the marginal effect with respect to the dependent variable, net of all the other variables. So, the interpretation is different and, also, the construction of the coefficient is different when there are other variables considered. Overall, it seems, from the data, that a higher ESG interest by respondent is associated with a lower level of overconfidence of the respondent.

The other variable that is most significant is Age; older respondents are found less overconfident than younger respondents. This evidence is a confirmation of a study by Prims & Moore (2017), in which it is underlined that precision in judgment increases with age, and younger individuals tend to be more overconfident than older ones.

Women are found to be less overconfident than men, and the result is significant at 90%. There is large evidence in the literature that confirms this result. Togler et al. (2010), Barber and Odean (2001), Loibl and Hira (2007) found evidence of this pattern.

Both FL and SFL are positive related to Overconfidence, but the coefficients are not statistically significant. However, higher financial and sustainable finance knowledge are both associated with higher levels of overconfidence. Filippini, et al (2021) and Lusardi & Mitchell (2014) find that individuals with higher financial knowledge are better at estimating their knowledge and their ability.

FSE is statistically significant and positively related to overconfidence; the interpretation is similar to Fl, since also FSE establishes a correlation between economic and financial management with individual ability and knowledge.

Trust is positively related to overconfidence and is statistically significant at 90%. Individuals with higher levels of trust with respect to financial and political institutions, family, academic institutions, etc., are also more overconfident about their knowledge of sustainable related concepts.

Investment_Experience and Risk_Aversion are both positively related to overconfidence but are not statistically significant at any level. However, also the sign of these variables are quite surprising since risk aversion is usually found to be negatively related to overconfidence; Chang et al. (2004) and Marinelli et al. (2017) have found this behavioral bias in their observations.

From the previous analysis it is clear which factors most affect overconfidence.

Higher financial self-efficacy and higher level of trust increase overconfidence, as higher financial literacy, and sustainable finance literacy. Higher ESG interest, instead, is associated with lower overconfidence in respondents. As concerning demographic characteristics, women and older respondents are found to be less overconfident with respect to men and younger respondents.

4.2.1.3 Possible Limitations

The statistical model used in the previous section is useful to analyze the dataset and to interpret the results.

But, as every statistical model, it has some limitations and errors.

The first one could be the little number of observations in the dataset. In fact, there are only 48 observations in total, which is enough for making statistical inference, but the results could be affected by little representation of some peculiar cases. For example, in the sample there are only three observations for the answer "Master and/or PhD" of question three, or the observations of high-risk averse individuals are only nine out of 48. So, there is little representation of these categories in the regression models.

The second issue can be related to the creation of the dummy's variables. These are the result of the combination of two or more questions and so the way in which they are constructed is crucial. For example, the variable FL is a dummy that takes the value of one if the respondent answers correctly at least at two out of three questions (Q10, Q11 and Q12), zero otherwise. So, the way in which this variable is constructed influences the results deeply; in this specific case, it was considered the approach suggested in the literature by Lusardi & Mitchell (2014) in the distinction between high financial literacy and low financial literacy, but the result is still an interpretation of an interpretation.

Another possible limitation is the choices of the independent variables that could affect overconfidence. In fact, of course there could be other factors that affect this bias, but when the questionnaire was made It was constructed with some specific aims and objectives, so the list of independent variables is a consequence of previous choices and decisions.

Beside all these possible limitations, the model is still able to give interesting and curious insights that, for sure, enrich the existing literature of this topic.

4.2.2 In Which Manner the Disposition Effect is Affected by the Sustainability Framework?

The disposition effect is a widespread bias that consists in the tendency to sell appreciated stocks too early and to hold depreciated stock too long (Shefrin & Statman, 1985); the objective of this thesis is to understand if the sustainability framework influences this bias and, if so, in which manner.

Once it is understood this, it would be interesting to analyze which demographic. factors, individuals' preferences, and other behavioral biases contribute to the explanation of the disposition effect.

4.2.2.1 Analysis of the Variables of Interest

In developing the analysis of the disposition effect, it is important to start from the definition of the relevant variables that could potentially influence the bias.

But, the first step is to properly identify and define the dependent variable.

In doing so, it has to be considered the objective of the research question: discuss the disposition effect in the sustainability framework. Therefore, the definition of both the "Sustainable" disposition effect and the "traditional" disposition effect is necessary.

From the questionnaire, the individual's behavior with respect to the probability of selling a losing stock (definition of disposition effect) is the reference point to measure this bias (Q27 of the survey). In fact, following the approach suggested in Rubaltelli, et al. (2010), only the domain of losses is considered in the construction of the measure of the disposition effect. In particular, the difference between the "traditional" disposition effect (Q46) and the reference point has, as output, the variable DE. Additionally, the difference between the "sustainable" disposition effect (Q44) and the reference point is used as the measure of the variable SRI_DE. Affect is the name of the variable that considers the difference between SRI_DE and DE, which is similar to the one used by Rubaltelli, et al. (2010). In the latter paper, the authors underline the role of affective reactions concerning the disposition effect; they found that socially responsible funds induce a more positive affect reaction than the ordinary funds.

The dependent variable for this research question is Affect. In Figure 5 there are the box plot representation and the density distribution of this variable.

From the boxplot, it can be noted that the majority of the observations are distributed around the value zero. A confirmation of this first observation is given by the median value, which is exactly zero. The mean, instead, is equal to -9.0625; the standard deviation, however, is equal to 21.1794, a large value, so the range of the distribution is high. In fact, the range is from -70 to

+35. The difference between the mean value and the median value is large and negative, which is a first sign of a not symmetric density distribution.

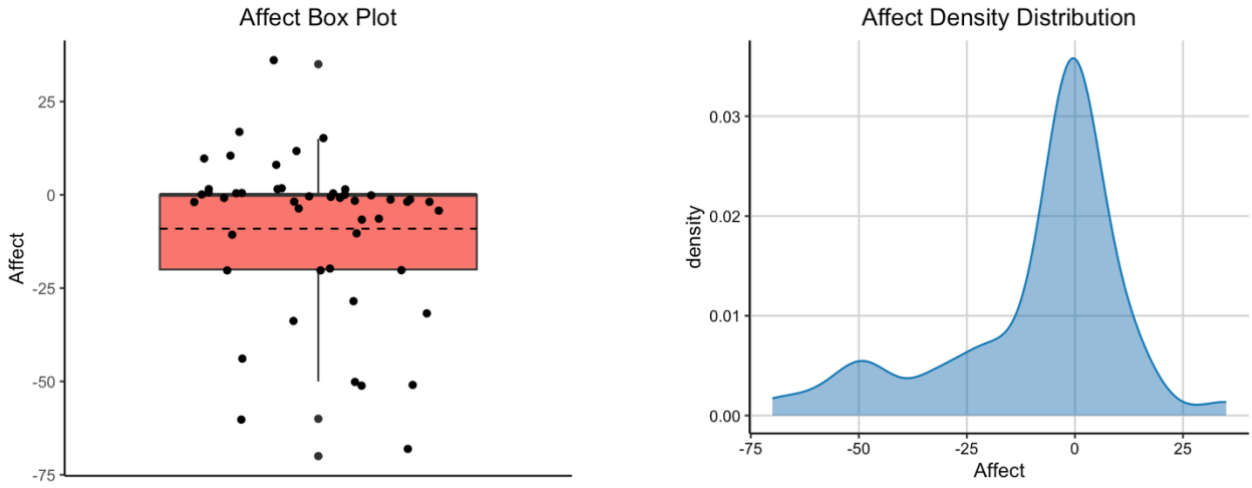

Figure 5: box plot and density distribution for the variable Affect.

From the density distribution of the dependent variable, it can be verified this first insight. It is clear that the majority of the observations are zero or values lower than zero (negative values). Only a few observations are greater than zero.

The interpretation of these results is that most respondents do not show any affective reaction to sustainable instruments with respect to traditional ones; in fact, the percentage of zeros is 45,83, almost half of the sample. Only few individuals show positive affective reaction (14,58%); this means that the value of SRI_DE is bigger than the value of DE, and so respondents sell with higher probability sustainable instruments than traditional ones. The other 39,59% shows negative affective reaction.

The next step is to define a list of possible independent variables that could influence the dependent variable. In doing this, the related literature suggests that demographic characteristics, risk attitude are important. Other findings by Hartzmark and Sussma (2019), Bollen (2007), Renneboog et al. (2011) suggest that environmental characteristics and other related behavioral biases are important predictors of the disposition effect.

In Figure 6 there are the possible and plausible candidates in explaining the dependent variable. On the overall dataset, there are some patterns between variables that quickly emerge; there are some patterns here that were also in the previous analysis because these variables and the dataset are equal in both the models. For example, also in this case the variable Age is positively associated with both investment experience (+0,56) and income (+0,50).

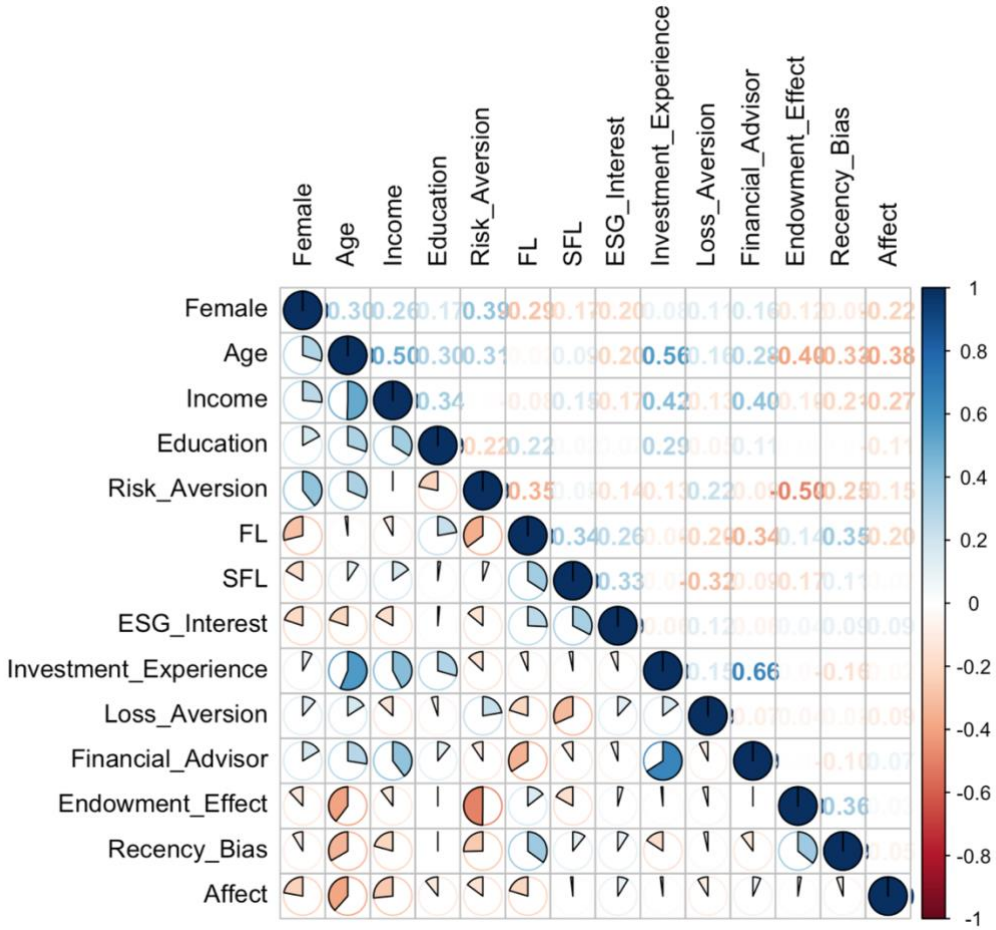

Figure 6: Correlation plot of potential variables that explains overconfidence in the sample.

Among the new variables that this model introduces, Financial Advisor and Investment_Experience are the ones with the higher correlation (+0,66); the possible interpretation is that individuals who invest for longer periods are most likely to be followed by a financial advisor in this process.

Another correlation that it is clear is the negative relationship between Risk_Aversion and Endowment_Effect (-0,50); the Endowment_Effect variable was created from Q15, in which it was asked "*The fear of making a worse choice stops me from changing my financial decisions even when it goes badly, or I would like to".* From the correlation plot, respondents who were more risk averse are the ones who score little at this question. It is a little surprising, since in the literature there is evidence that the endowment effect is positively related to risk aversion (see, for example, Samuelson & Zeckhauser (1988)). Endowment_Effect is also highly correlated with Age (-0,40); older individuals show a higher value of this bias with respect to younger individuals.

The next step is to analyze the relationship between the dependent variable and the list of independent variables.

Affect is negatively related to all the demographic characteristics; in particular, women are found to be less affected by the disposition effect than men (-0,22). The same is found to older respondents (-0,38) and higher risk aversion (-0,15).

FL has negative and high correlation with Affect (-0,20), while SFL has little, if any, negative correlation (-0,01). So, sustainable finance literacy seems to have no effect on Affect, while higher financial literacy is associated with lower Affect.

ESG_Interest is positively correlated to Affect (+0,09), while there is little evidence of a negative correlation with Investment_Experience (-0,02).

Loss_Aversion is negatively associated with Affect (-0,09); this is a little unexpected since, from the literature, loss aversion is reinforcing the disposition effect, in the sense that individuals who show a higher aversion with respect to losses, are also more affected by the disposition effect. Some references of this phenomenon can be found in Dhar and Zhu (2006), Dooren and Galema (2018) and Rau (2014).

Financial_Advisor and Endowment_Effect are both positively correlated with Affect by a factor of 0,07 and 0,02 respectively. Instead, Recency_Bias is negatively correlated with Affect by a factor of -0,05.

In Figure 7 there are the graphical representations of Income and Education with respect to Affect.

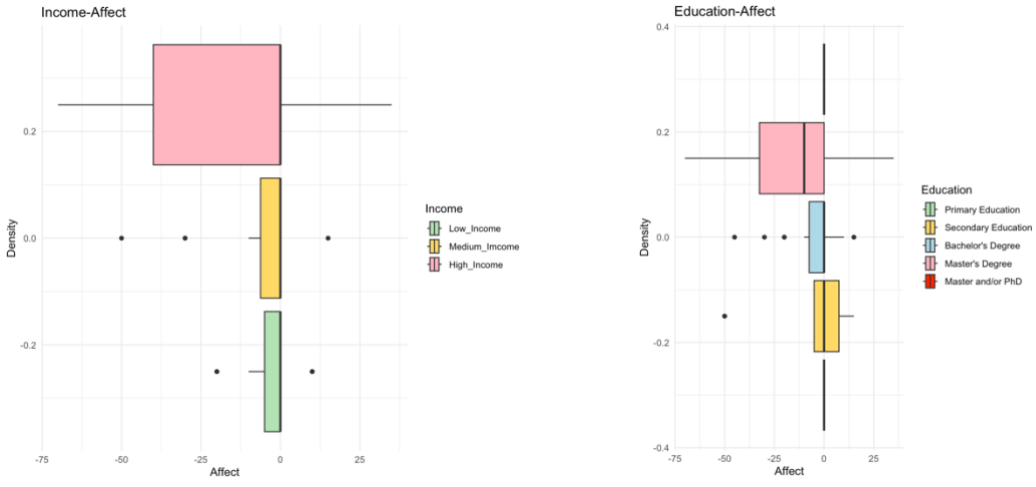

Figure 7: Box plot representation of Income and Education with respect to Affect.

From the first graph it is possible to note that high income respondents are the one characterized by the largest standard deviation; in particular, the conditional mean of Affect with respect to high level of income is -15.52632, while the conditional standard deviation is 28.42606, a huge value. In fact, it can be seen that dispersion for this value is large and greater

than the other values. The conditional mean of Affect with respect to medium level of income is -7.1875, while the conditional standard deviation is 16.01757; for the low-income respondents these values are, respectively, -1.923077 and 9.903379.

If the higher level of education is taken into consideration, the graph on the right can give precious insights. In particular, both the values of "Primary Education" and "Master and/or PhD" have both conditional mean and conditional standard deviation equal to zero; there are few observations for these categories (4 in total) and their conditional measures are equals. "Secondary Education" has a conditional mean of -7,5 and a conditional standard deviation of 23.36308; the values for "Bachelor's Degree" are -5.526316 and 14.13179 respectively. At the end there is "Master's Degree", which conditional mean is -17 and conditional standard deviation is 28.08151; it is difficult to interpret these result since there is not a clear pattern that emerge from the dataset. However, it can be noted that the level "Master's Degree" is the one that have more dispersion in the dataset.

Now, the other step is to study the relationship between Affect and the binary variables; in Figure 8 there is the summary of the box plot analysis.

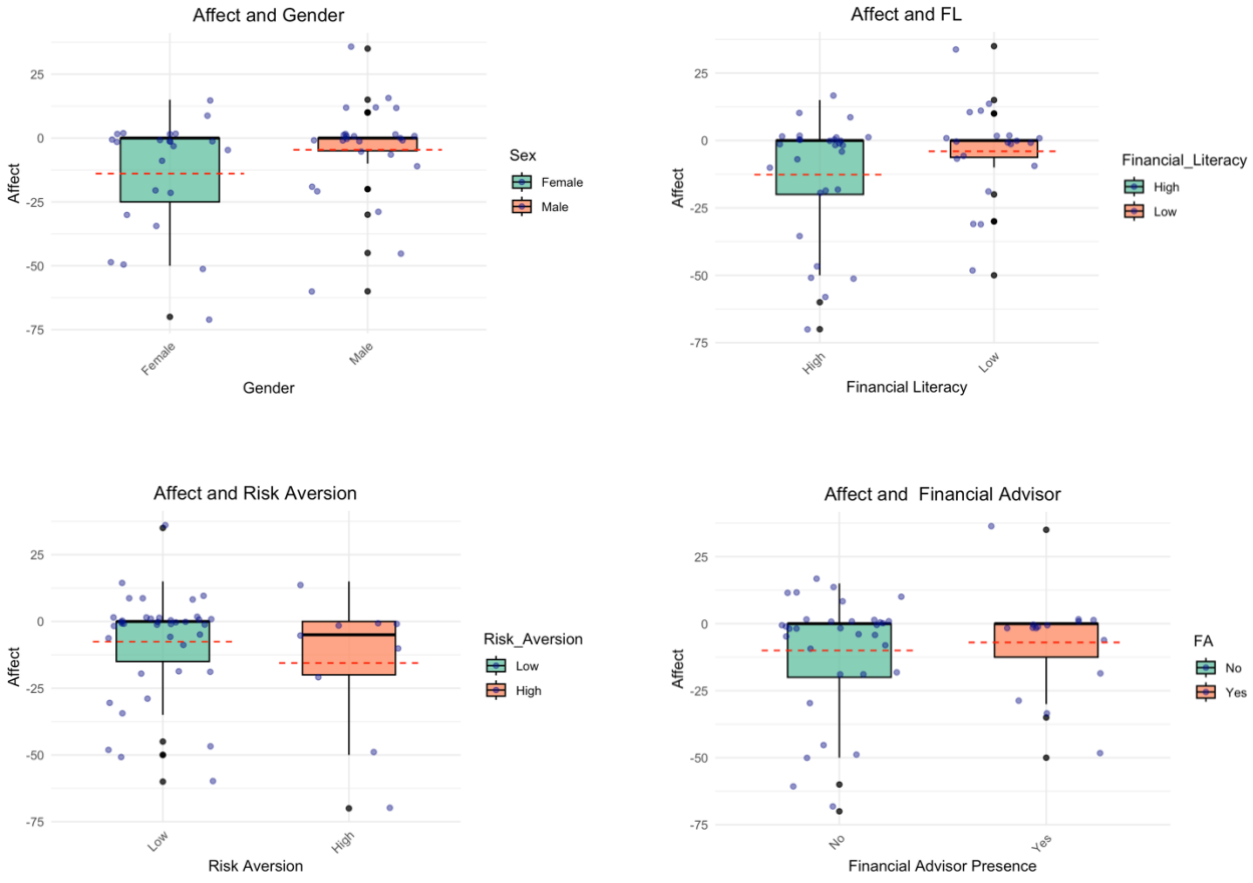

Figure 8: box plots of the binary variables.

In the graph on the top left there is the box plot of Affect and Gender; the conditional mean of Affect with respect to Female is -13.91304, while the conditional standard deviation is 22.71146. For the level Male, the conditional mean is -2.916667, while the conditional standard deviation is 17.44037. Then, it can be concluded that women show, in the sample, lower levels of Affect with respect to men; so, women are affected by lower sustainable disposition effect with respect to men.

In the top right corner, there is the box plot of Affect and FL; the conditional mean for low level of FL is -4 and the conditional standard deviation is 18.03505. For high levels of FL the conditional mean is -12.67857 and the conditional standard deviation is 22.7906. Higher financial literacy is associated with lower positive affection by respondents with respect to lower financial literacy.

Considering the relationship between Affect and Risk_Aversion, the conditional mean for high risk aversion is -15.55556, while the conditional mean is 27.32266; the values for low risk aversion are of -7.564103 and 19.63053 for the conditional mean and the conditional standard deviation.

On the bottom right corner there is the box plot between Affect and Financial_Advisor; the latter variable is a dummy that takes the value of one if the respondent is followed by a financial advisor, zero otherwise. The conditional mean of Affect with respect to the presence of a financial advisor is -7, while the conditional standard deviation is 19.89257; the values for the absence of a financial advisor are -10 and 21.97299 for conditional mean and conditional standard deviation. It is interesting to note that the presence of the financial advisor causes a higher Affect, meaning that these respondents show a higher disposition effect for sustainable instruments than traditional ones.

The last boxplot shows the relationship between Affect and SFL; the conditional mean for low level of sustainable finance literacy is -8.461538, while the conditional standard deviation is 18.18706. The values for the high level of sustainable finance literacy are -9.285714 and 22.43103. In this last case, the values are similar for both the values, even if there are few observations for low level of SFL.

4.2.2.2 Regression Model for Research Question Two

In this section there is the analysis of the regression model that supports the data analysis of the previous section. From the analysis before, some variables can be omitted from the regression; since Education and Income have been already properly studied, a further analysis of their effect on Affect can be excluded, even if their correlations are high and significant. Another motivation in doing so is that it is difficult to incorporate all their values in the regression model, since their inclusion does not give any further insights about the research (they were not significant in the specification).

In Table 3 there is the OLS regression model of Affect and all the relevant independent variables.

```
Coefficients:
                            Estimate Std. Error t value Pr(>|t|)
(Intercept)                   8.9799    21.0756   0.426  0.67233
Female                       -6.8642     6.3175  -1.087  0.28375
Age                          -0.4898     0.1785  -2.744  0.00904 **
Investment_Experience         0.2763     0.3040   0.909  0.36883
High_Finacial_LiteracyTrue  -11.7477     6.4560  -1.820  0.07630 .
Sustainable_Finance_Literacy  4.2739     7.1546   0.597  0.55363
Loss_Aversion                -0.1012     0.2712  -0.373  0.71103
Financial_Advisor             0.1191     0.3940   0.302  0.76394
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Table 3: OLS regression for the dependent variable Affect.

In this specification, most of the variables are not statistically significant; for this reason, also other variables are omitted from the regression. In particular, Risk_Aversion, ESG_Interest, Endowment_Effect, and Recency_Bias are excluded from the OLS regression for two main reasons: from the preliminary analysis made in the previous section, these variables were little correlated with the dependent variable and because a model with too many independent variables can create issues for the analysis. As regard the last motivation, a trade-off between making the model statistically significant (only few independent variables) and making the model useful for the analysis (a great number of independent variables) emerges; the

exploratory data analysis and the study of the correlations among variables can mitigate this trade-off and then model in Table 3 is the result of all this process.

From a first observation of Table 3, it can be noted that Age and Financial Literacy are the only two variables that are significant.

Age is negatively related to Affect, and it is statistically significant at 99%, which is a very high level of significance; this can be interpreted as the fact that older respondents show lower Affect with respect to younger individuals. This means that the "sustainable" disposition effect is greater for these respondents, or the "traditional" disposition effect is lower, or a combination of both.

A similar interpretation is given for the variable Financial Literacy, which is negatively associated with Affect and it is statistically significant at 90% (p-value of 0,07).

Women are found to be less affected by the disposition effect with respect to men, but this result is not statistically significant (p-value higher than 0,10), so, there is not sufficient evidence in the data to generalize the finding.

Investment_Experience is positively associated with Affect, but it is not statistically significant. The sign of this variable is also interesting, since, in the related literature, there is evidence that investors' experience is able to mitigate the disposition effect. For example, Dhar and Zhu (2006) finds that the disposition effect decreases with investors' sophistication, which was composed, among other factors, of investors' experience in investing on financial markets.

Sustainable Finance Literacy is positively associated with Affect, but not statistically significant. It is strange that the sign of this variable is different from the one of Financial Literacy, since both variables are a representation and description of the respondents' knowledge.

Financial_Advisor is positively related with Affect, but not statistically significant; also for this variable, the sign is interesting. Benartzi & Thaler (1995) and Fellner & Sutter (2009) both find that the financial advisor can help the investors to mitigate the disposition effect and other biases and to moderate them.

Loss_Aversion is negatively associated with Affect, but not statistically significant (p-value greater than 0,10). The negative sign is suspicious, since, form the literature, there is large evidence that loss aversion is one of the main factors that explain the disposition effect. Evidence of this can be found in Dhar and Zhu (2006), Dooren and Galema (2018), and Rau (2014). All these studies underline the positive relationship between loss aversion and the disposition effect, so the sign and the significance of this variable, from the regression model, must be taken with skepticism.

Concluding the regression analysis, the most important findings are related to the variable Age and Financial Literacy; older respondents and higher financial literate respondents are found, from the sample, to be less affected from affective reactions with respect to younger and lower literate respondents. The other variables are not statistically significant, but they give interesting findings, most of them in contrast with the relevant literature.

4.2.2.3 Possible Limitations of the OLS Regression

The statistical model used in the previous section is useful to analyze the dataset and to interpret the results. But, as every statistical model, it has some limitations and errors.

The first one could be the little number of observations in the dataset. In fact, there are only 48 observations in total, which is enough for making statistical inference, but the results could be affected by little representation of some peculiar cases. For example, in the sample there are only three observations for the answer "Master and/or PhD" of question three, or the observations of high-risk averse individuals are only nine out of 48. So, there is little representation of these categories in the regression models.

The second issue can be related to the creation of the dummy's variables. These are the result of the combination of two or more questions and so the way in which they are constructed is crucial.

Another limitation is the creation of the variable Affect, the dependent variable. It is able to respond to the research question, but the quantification of the answer is difficult to interpret and discover, since it is the result of the combination of more answers of the questionnaire. In particular, the choice of the question about the "sustainable" disposition effect was arbitrary (there were two questions about this bias in the survey), so it may impact the result of the analysis.

Beside all these possible limitations, the model is still able to give interesting and curious insights that, for sure, enrich the existing literature of this topic.

Chapter 5: Conclusions and Final Remarks

This thesis aims at examining individual investors' preferences, knowledge of sustainable investments and the disposition effect through two empirical studies. The thesis presents analyses and draws relevant conclusions to provide contributions to the literature.

In doing so, chapter one introduces the topic of sustainable finance and the direction that the European Union has adopted to reach its objectives in terms of transparency and homogeneity in the sustainability framework. Chapter two describes the principal instruments that have been developed and commonly used in the market; it also introduces the relationship between biases and sustainability. In chapter three there is the detailed literature review that was used to construct the questionnaire; the principal findings and possible interpretation of the result are present in this section. Chapter four presents the dataset and the development of the two research questions that were investigated in this thesis. The first one is related to the overconfidence's bias, the second one to the "sustainable" disposition effect.

Starting from the realization of a questionnaire, the answers were analyzed and used in the two research questions to find empirical evidence of some patterns in the sustainable framework.

As regards overconfidence with respect sustainable finance knowledge, it was found that respondents show a high degree of knowledge in these topics, compared to the findings in the relevant literature represented by Filippini, et al (2021), for Swiss investors, and by a CONSOB (2022) survey, for Italian retail investors. Also, compared to Italian retail Investors, it was found that respondents were, on average, significantly more financially literate; in fact, 58% of respondents show a high degree of financial knowledge, an impressive data compared to the one found in CONSOB (2022) survey (33%). Higher financial literate respondents are found to be more overconfident about their own abilities with respect to low financial literate respondents; the same conclusions can be extended to the sustainable finance literacy knowledge. Also, financial self-efficacy plays an important role in this context; in particular, a higher ability in managing personal expenses, a better financial planning and lower financial anxiety are found to be positively related to overconfidence. It is found that a higher interest in ESG instruments is positively associated with the degree of overconfidence; this result is a confirmation of a previous research made by Gutsche, et al. (2023). As regards demographic characteristics, women are found to be less overconfident than men and older individuals are more underconfident with respect to younger respondents; these findings have confirmation in

the literature by previous studies done by Prims & Moore (2017), Togler et al. (2010), and Barber and Odean (2001).

Some interesting results are found concerning the disposition effect; following the approach of Rubaltelli, et al (2010), the starting point was the definition of the dependent variable Affect. In particular, this variable was created with the intention of capturing the difference valence of the two disposition effects considered: the "sustainable" disposition effect and the "traditional" disposition effect. The distribution of the variable Affect shows interesting results; most of the observations are zeros, which means that the two effects are equal and so respondents do not evaluate differently sustainable instruments and traditional ones when they are losing values. The distribution is also left-skewed, which means that, apart from the value zero, most observations are found in the negative domain, so the traditional disposition effect is, generally, greater than the sustainable one. Interestingly, the relevant demographic characteristics are found to be negatively correlated with the variable Affect. The result that has to be taken with caution and skepticism is the one related with the variable Loss_aversion; in fact, in the sample, the relationship with Affect is found to be negative, while the relevant literature is in favor of a positive relationship (see, for example, Dhar and Zhu (2006), Dooren and Galema (2018), and Rau (2014)). This may be caused by the relatively small sample size (there are only 48 observations), and, mostly, by the fact that the respondents were not retail investors. In fact, the respondents were taken from acquaintances, a group of friends and relatives of the authors of the survey.

These latter issues can be extended also to the model related to overconfidence. So, when comparing the results of this thesis with the relevant literature, caution and attention have to be considered when the analysis of the results is performed.

Considering the aforementioned limitations, there are some potential avenues for further research to gain a more comprehensive understanding of the sustainable preferences and behavioral biases of individual investors.

Concluding, the sustainability framework is rich with opportunities for the study of behavioral finance and the comparison with more "traditional" results can be driven to more detailed levels. Indeed, it is possible to provide more valuable insights that enable the development of sustainable investment products that align with investors' preferences. It also enables better policy formulations by the authorities to increase the engagement of individual investors in sustainable investments.

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