

RESEARCH ARTICLE

The impact of environmental sustainability on willingness to invest in startups: A survey among private investors

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Abstract

This study investigates the impact of environmental sustainability on willingness to invest (WTI) in startups vs. established companies. Using data from a survey among private investors, we compare measures of WTI and the perceived return–risk ratio (RRR) for both environmentally sustainable and non-environmentally sustainable startups and established companies. The results indicate that environmental sustainability significantly and positively influences WTI for both startups and established companies, with a notably stronger effect for startups. Non-environmental sustainability significantly decreases WTI. Environmental sustainability has a significantly positive impact on the perceived RRR for both startups and established companies, although startups are rewarded more than established companies for environmentally sustainable practices. This highlights that entrepreneurs have a financial incentive to prioritize environmental impact, and the demand for environmental sustainability can provide startups with an advantage in capital raising. This research contributes to the limited literature regarding sustainable entrepreneurship and environmental sustainability's specific impact on WTI.

KEYWORDS

CSR, ESG, impact investing, responsible investments, sustainable entrepreneurship, sustainable finance

1 | INTRODUCTION

Classical asset pricing models suggest that investors base their investment decisions on financial properties such as risk and return (Sharpe, 1964). A number of recent research perspectives have found that non-financial factors relating to sustainability also play a role in investment decisions (Barber et al., 2021; Revelli & Viviani, 2015) due to their effect on *financial performance*, the result of *institutional pressure*, and their alignment (or not) with investors' *personal values*.

As to *financial performance*, companies with superior sustainability performance benefit financially by exploiting broad, future-oriented sustainability indicators as drivers of company value (Lingnau

et al., 2022; Wobst et al., 2023). Research by Cantele and Zardini (2018) and Friede et al. (2015) supports the notion that sustainability enhances business performance, influencing both risk and financial returns positively. Gillan et al. (2020) and Grewatsch and Kleindienst (2017) document the direct and indirect relationships between sustainability and financial performance. A substantial amount of literature, including studies by Gregory et al. (2014) and Margolis et al. (2007), focuses on the beneficial effects of environmental and social responsibility on the return–risk profile.

Regarding *institutional pressure*, investors are increasingly leaning towards sustainable investments due to the rising demand for sustainability performance and reporting (Adebanjo et al., 2016; Li &

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Lu, 2020). The United Nations' 2015 Sustainable Development Goals have amplified the expectation for corporate executives to actively engage in sustainable initiatives. Recently, even the prominent, shareholder-value-lobbyist Business Roundtable (2019) added a sustainability-based component to its "Statement on the Purpose of a Corporation." S&P500 companies' recognition of the increasing demand for sustainability is evidenced by the fact that 86% of them published separate sustainability or responsibility reports in 2018, compared with just 20% in 2011 (Gillan et al., 2020).

In terms of *personal values*, investors increasingly favor sustainable investments beyond the business case alone. Fama and French (2007) have long noted the growing relevance of personal values in shaping investment portfolios, while research by Brodback et al. (2019) and Heinkel et al. (2001) illustrates that investors actively seek investment opportunities that align with their ethical standards. Pasewark and Riley (2010) show that, in an experimental setting, personal values lead investors to choose bonds from companies that align with their ethical principles. This trend is also visible on a wider scale: total inflows into United States (U.S.) Corporate Social Responsibility (CSR) funds more than tripled from \$20.6 billion in 2019 to \$65 billion in 2021 (Hale, 2020; Stankiewicz, 2022). Furthermore, sustainable assets under management make up 36% of total assets under management (GSIA, 2021). In line with this, recent studies by Gutsche et al. (2023) and Gutsche and Ziegler (2019) highlight the increasing significance of personal values in driving investment decisions, demonstrating a strong preference among investors for sustainable investment products driven by both pecuniary and non-pecuniary motives.

However, previous literature concerning sustainable investments barely distinguishes between investing in startups or established companies. Especially, a nuanced understanding of how sustainability specifically influences the willingness to invest (WTI) in startups compared with established companies is an under-researched novelty in this field. Studies such as those by Kölbel et al. (2020) and Lewis et al. (2016) reveal the general trends in sustainable investing and its financial performance but neglect the unique contexts of startups. It is important to address this gap on startups for several reasons: first, startups operate under different dynamics than established companies, but the literature on the specific entrepreneurial context is still limited (Mansouri & Momtaz, 2023). Startups often embody adaptability, potentially being more open to innovations such as sustainable practices (Godelnik & van der Meer, 2019), yet they command fewer resources than established companies for their implementation (Hewitt-Dundas, 2006). Startups are also generally more dependent on external capital inflows which warrants a fine-grained understanding of the WTI in sustainable startups (Samuelsson et al., 2021). While prior studies have investigated sustainable startups (de Lange, 2017), we are not aware of any that compare the impact of environmental sustainability on WTI in startups vs. established companies. Second, the impact of environmental sustainability on investors' return-risk perceptions of startups remains underexplored. Given that startups often represent higher risk but potentially higher reward investments, the influence of environmental, social, and governance (ESG) factors

on these perceptions might affect capital flows into sustainable entrepreneurship (Ashwin Kumar et al., 2016). Third, studies related to sustainable entrepreneurship predominantly address aggregated ESG criteria (Anand et al., 2021) rather than investigating each pillar individually (exception: Lingnau et al., 2022). Assessments of the sustainability of investment funds reveal significant shortcomings in capturing the real-world sustainability impact of investments (Pástor et al., 2021; Popescu et al., 2021). This has also been echoed in the business press: The Economist (2022) now advocates a focus on environmental performance instead of the ambiguous aggregated ESG scores.

To investigate the impact of environmental sustainability in more detail, this article excludes social and governance issues. We pose the research question: *How does environmental sustainability influence private investors' willingness to invest (WTI) in, and the perceived return-risk ratio (RRR) of, startups and established companies?*

To provide a comprehensive answer to this question, we elicit survey data from private investors. This methodology allows us to collect quantifiable information directly from private investment decision-makers, a group which has been providing an increasing share of startup investments since crowdfunding was invented (Böckel et al., 2021).

Our findings highlight the positive impact of environmental sustainability on investor perceptions and actions, with a stronger effect observed on startups. Specifically, environmental sustainability has a notably positive impact on both the WTI and the perceived RRR. This indicates that investors perceive a lower risk and/or higher potential return when investing in environmentally sustainable startups, relative to their non-sustainable counterparts. Additionally, both startups and established companies that are not environmentally sustainable are subject to significant penalties in terms of WTI and perceived RRR, but the magnitude for the penalties is lower for the startups. Interestingly, we find that, overall, investors still exhibit a preference for established companies, suggesting a level of 'ambiguity aversion'. This study, therefore, provides strong evidence for the valuation premium hypothesis in sustainable entrepreneurship research and reinforces the importance of environmental sustainability in shaping investor perceptions and behaviors.

2 | LITERATURE REVIEW

2.1 | Definition of terms

There is no universal definition of socially responsible investing (SRI). The Social Investment Forum (2003, p. 3) defines it as an "investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis." It is a process of identifying and investing in companies that meet CSR standards. Thus, one could say that CSR and SRI are essentially mirror images of one another, the former being from the company's perspective, while the latter describes the investor's perspective (Sparkes, 2001).

Although the literature has different approaches to the concrete definition of these terminologies, they all have the same basis. According to Widyawati (2020), this basis consists of the three pillars of sustainability: environmental, social, and governance issues, the last of which describes ethically solid corporate management and culture. Furthermore, ESG is frequently used as a synonym for CSR.

However, Gillan et al. (2020) distinguish between the two terms by emphasizing that ESG refers to how companies and investors integrate environmental, social, and governance concerns into their business models while CSR refers to what companies achieve in terms of greater social responsibility within the company. As a result, ESG explicitly includes governance, while CSR incorporates governance issues indirectly through environmental and social considerations. Thus, they describe ESG as a “more expansive terminology than CSR” (Gillan et al., 2020, p. 2). However, how one interprets these terminologies is a matter of choice (Berg et al., 2022; Cowton, 1999).

The differences lie not only in the concrete terminology of ESG and CSR on the corporate side, and SRI on the investor side: there are also major differences in the practical application of corporate sustainability rating systems. Harris (2022) demonstrates this with the example of credit ratings having a correlation of 99% between different agencies, while ESG ratings match in only a little over half of the cases. This implies that measuring the size of the ESG market is equally subjective. Moreover, an examination of six ESG rating agencies revealed that they used 709 different metrics across 64 categories (Ryan, 2022a). Harris (2022, p. 2) describes this as an “unholy mess that needs to be ruthlessly streamlined”. According to him, it is better to simply focus on the environmental measure, even though this may not yet be specific enough (Harris, 2022). Since the individual components of CSR, ESG, and SRI are defined and examined differently in the literature, this article focuses only on the environmental aspects of sustainability within companies.

For our study, environmental sustainability is defined by a company's reduced use of natural resources, reduced emissions to air, water and soil, and the avoidance of (hazardous) waste in relation to the size of the company. In addition, environmentally sustainable companies aim to minimize the impact of their products/services on biodiversity. More specifically, environmental sustainability could be defined as a state of equilibrium that allows human society to meet its needs without exceeding the relevant ecosystem's capabilities or compromising biodiversity (Morelli, 2011). Hence, environmentally sustainable companies' main objective is to make positive financial returns while improving, or at least not damaging, the environment (Mansouri & Momtaz, 2023).

Moreover, this study distinguishes between startups and established companies. Although a growing number of scholars have attempted to capture the unique specific characteristics of startups in recent years, there is still no general agreement on a common definition, either among scholars or the entrepreneurs themselves (Breschi et al., 2018). We derive a generic definition based on prior literature (Böckel et al., 2021; Freytag, 2019). First, startups are young, agile companies that are in an advanced stage of formation, and which typically rely on external financing to a larger degree than established

companies. Second, established companies have existed for significantly longer than startups; they usually have more financial resources and are in a slower growth phase. Additionally, established companies tend to operate in a “plan and execute” mode, while startups work more in an “explore and adapt” manner (Freytag, 2019, p. 1).

2.2 | Sustainability in investment decisions

Not all investors base their investment decisions solely on optimizing the RRR of their portfolios as they may derive utility from their investments in different ways. Heeb et al. (2023) find that investors “feel better” when they invest in selected sustainable assets, regardless of the actual environmental impact of the investments. This can be attributed to ethical motives and values when investing in socially responsible ventures (Brodback et al., 2019).

Assuming that investors are not guided purely by financial motives, Andreoni and Miller (2002) find that over 98% of their participants make decisions that are consistent with utility maximization. According to their research, only a quarter of people are pure money maximizers. Mansouri and Momtaz (2023) further describe that investors' experiences can be positive, even in the case of expected financial underperformance, as this is compensated for by non-financial utility which accounts for 16%–31% of the total utility to sustainable startup investors.

Verplanken and Holland (2002) discover that the individual's interpretation of values and how they apply to potential investments is fundamental in investment decision-making. An example of this, albeit in a different empirical context, is Bauer and Smeets' (2015) finding that customers of socially responsible banks invest substantially more if they personally identify with the investment. Brodback et al. (2019) provide further empirical evidence that psychological aspects such as altruism and egoism influence investment decisions: altruistic individuals are more socially responsible in their investments, while the opposite is true for egoistic individuals. Nonetheless, the latter show a higher interest in SRI when expected returns increase.

Derwall et al. (2011) find that value-oriented investors mainly focus on non-controversial investments when investing capital. Profit-oriented investors, on the other hand, use mostly positive scores on environmental and responsibility issues to avoid the most controversial investments. In line with this, Vyvyan et al. (2007) detect differences in investment behavior among individuals committed to environmental sustainability principles. They observe that while these investors uphold SRI criteria, they may still prioritize financial returns over environmental concerns when making investment decisions. This suggests that personal values and attitudes towards the environment may not always directly translate into investment behavior.

To sum up, the literature predominantly finds that ethical values, positive emotions, and psychological aspects positively impact sustainable investment decisions. However, expected return also plays a major role in private investors' investment choices. It should also be noted that the literature on environmentally responsible investment decisions, particularly concerning startups, is scarce.

2.3 | Sustainability and return–risk ratio

Risk and return are interrelated and therefore directly influence each other. The higher (lower) the risk of an investment, the higher (lower) the investors' expected return to offset the risk, and vice versa (Kumthakar & Nerlekar, 2020); (Gregory et al., 2014). The (excess) expected return relative to the expected risk is commonly described as the return–risk ratio (RRR). Since environmental sustainability can exert considerable influence on the perceived RRR, it is important to examine its impact. Thus, we further define the individual influences of environmental sustainability on risk as well as on return.

2.3.1 | Sustainability and financial return

The influence of corporate sustainability, including corporate environmental sustainability, on financial return has been the subject of numerous studies. Although the topic has been examined continuously for decades (Margolis et al., 2007), researchers have found different results. In the following, the theoretical perspectives will be presented, followed by an analysis of the empirical research results.

From the stakeholder perspective, addressing the expectations of different interest groups adds value to the company and can therefore have a beneficial effect on financial return. Generally, communicating with stakeholders can serve as a vehicle to increase corporate value (Freeman, 2010), which is indirectly reflected in return on investment. From this, it can be derived that communicating with stakeholders regarding environmental sustainability can increase financial return. Moreover, Porter and Kramer (2011) argue that companies with high ethical standards can gain a competitive advantage. This, in turn, indicates that sustainable investments may perform better than traditional ones. Furthermore, investors with sustainability preferences could increase demand for responsible assets, thus raising their prices, lowering the cost of capital, and eventually decreasing the costs of investing in sustainability-oriented companies (Mansouri & Momtaz, 2023). By divesting from 'sinful' companies (those involved in alcohol, tobacco and/or gaming) at the same time, responsible investors could push down the stock prices of and increase the cost of capital for non-sustainable companies (Ryan, 2022c, p. 3).

In contrast, a different theoretical perspective, that of Friedman (1970), infers that the relationship between sustainability and financial return should be negative. According to him, companies which are engaged in voluntary activities incur more costs, and thus lower their financial performance. Another conceptual argument supporting the claim that sustainability lowers the RRR of investment portfolios is based on Markowitz's (1952) portfolio theory. This suggests that investing only in sustainable companies reduces investors' ability to diversify their portfolios, resulting in under-diversification (Fama & French, 2007; Lingnau et al., 2022). Moreover, corporate environmental commitment is a mandatory restriction that can limit management agility and thus reduces financial returns (Barber et al., 2021).

The different approaches explaining the impact of sustainability on financial returns are not confined to economic theory; they also appear in empirical studies. Conducting a meta-analysis of corporate

social performance, Margolis et al. (2007) find an overall positive, albeit small, effect on financial return. Remarkably, environmental performance has one of the strongest positive effects on financial return. In addition, Chava (2014) emphasizes an increase in the cost of capital, for both equity and debt, among non-environmentally sustainable companies. In this context, Hong and Kacperczyk (2009, p. 15) find that so-called "sinful" companies are penalized by investors in terms of increased costs of capital. Furthermore, Friede et al. (2015) identified more than 2000 published empirical academic studies for a meta-analysis and observed that around 90% show no negative relationship between sustainability and financial return; in fact, most studies report positive results.

In contrast, the literature on SRI repeatedly finds companies with high sustainability levels performing no better, or even worse, than their benchmarks (Gibson et al., 2020; Liang & Renneboog, 2017). However, most research focuses on the corporate financial return of sustainable companies in general and does not make a direct comparison between startups and established companies (e.g., Friede et al., 2015; Hong & Kacperczyk, 2009; Margolis et al., 2007). Notably, research on the financial returns of sustainable startups is still very limited.

Mansouri and Momtaz (2023) examine a sample of 1043 crowdfunding campaigns for startups. They find that startups with exceptional sustainability goals can raise capital at more favorable valuations, which incentivizes investors to pursue sustainability goals. Yet, compared with conventional startups, their financial performance is worse after the funding phase. This can be taken as an indication that investors value good sustainability attributes and pay a premium for them (Pástor et al., 2021). Consistent with Equilibrium Asset Pricing Theory, high valuations multiples are associated with declining expected returns (Fama & French, 2007). However, the weaker performance compared with conventional startups cannot be linked to the environmental dimension, as it is statistically and economically insignificant (Mansouri & Momtaz, 2023). In addition, Cantele and Zardini (2018) fail to find any positive effect of environmental practices on the formation of competitive advantage for small and medium enterprises, such as startups.

In summary, the findings are controversial. While some scholars find that sustainability has a positive influence on financial return, others find no significant difference or even a negative influence in comparison with conventional assets (Lingnau et al., 2022). While a negative performance is predominantly observed for startups with high sustainability ratings, it cannot yet be attributed to any increased environmental sustainability of the company. There are several possible reasons why the findings vary. These could be related to context, such as time, country, industry, or differences in the observed sustainability aspects; they could also be due to different methodological approaches, such as different financial measures being applied (Gregory et al., 2014).

2.3.2 | Sustainability and risk

Investments are oriented towards future returns, and therefore come with some degree of risk (Kumthakar & Nerlekar, 2020). To

better understand the individual impact of sustainability on corporate risk, the overall risk is divided into systematic risk and company-specific risk, also known as idiosyncratic risk (Gregory et al., 2014).

The systematic or market risk is macroeconomic in nature. It impacts the value of all companies' shares, although some companies are more vulnerable to this sort of risk than others. Unlike systematic risk, the company-specific risk is related to the enterprise itself and implies that an investor can diversify this risk away (Gregory et al., 2014; Lueg et al., 2019; Sharpe, 1964). For instance, looking at practical examples of different forms of risk, the Volkswagen "Dieselgate" scandal can be attributed to company-specific risk (Bouzzine & Lueg, 2020). If the investors' portfolios were broadly diversified at the point of publication, the financial losses would have been limited. During the COVID-19 pandemic outbreak in 2020, on the other hand, the entire global economy was affected. As a systematic risk, it led to unavoidable losses in capital investment.

Moreover, stakeholder theory suggests that a sustainability strategy has a mitigating effect on company-specific risk (Freeman, 2010). In addition, a corporate sustainable orientation could also reduce company-specific risk by decreasing the company's vulnerability to reputational damage or governmental regulation such as environmental laws (Lueg et al., 2019). Perrini et al. (2011) confirm that sustainability performance has risk-reducing effects, but do not distinguish between company-specific and systematic risk effects. Luo and Bhattacharya (2009), however, find that good sustainability performance reduces company-specific risk. Bansal and Clelland (2004) provide evidence that negative environmental reporting increases company-specific risk, while Oikonomou et al. (2012) observe that poor sustainability performance strongly increases systematic risk. Lueg et al. (2019) further reveal that sustainability disclosure can decrease companies' systematic risk in subsequent periods. Specific to environmental performance, Tzouvanas et al. (2020) show that environmental disclosure reduces idiosyncratic risk.

There are significant differences in company-specific risks between startups and established companies. Of all German companies founded in 2015, 77.6% were still in business one fiscal year later, but only 37.1% after 5 years (Statistisches Bundesamt, 2020). This can be explained by the fact that startups generally have lower cash flows than established companies and are thus more frequently affected by corporate insolvencies. It can be inferred that startups generally have a higher company-specific risk than established companies. However, in terms of the impact of sustainability on the total risk level of startups, Mansouri and Momtaz (2023) find no evidence for the assumption that sustainability has a statistically significant impact, whether positive or negative.

In short, the literature indicates that sustainability has a generally positive effect by reducing company-specific and systematic risk, while non-sustainable ventures show higher risk measures. Moreover, startups face greater company-specific risks than established companies. Nevertheless, prior research leaves open to what extent environmental performance affects the total risk of startups.

2.4 | Financing conditions of sustainable startups

Financing sustainable startups has a rather recent history (Böckel et al., 2021). One reason for this is that traditional players in entrepreneurial financing are primarily motivated by financial rents (Vismara, 2019). As a result, a lack of funding frequently limits the potential of sustainable startups (Böckel et al., 2021). Since many conventional financing opportunities are not available to sustainable startups, the ones that can be applied gain even more importance. Hence, in the following, the financing opportunities of startups are discussed.

As most startups are not listed on stock exchanges, they are not publicly traded on the capital market; thus, they have differing sources of funding and access to capital providers. These include: (1) banks and political institutions, which usually participate in financing via loans or credits without co-determination rights; (2) venture capital, also known as risk capital, which provides financing options in which investors usually receive shares and influence in the business; (3) business angels, who are mostly private, wealthy individuals and former entrepreneurs who provide expertise and funding; and, (4) crowdfunding, a "novel method" which allows entrepreneurs to request funding by "drawing on relatively small contributions from a relatively large number of individuals" (Mollick, 2014, pp. 1–2).

However, few banks or public institutions will fund startups before they have demonstrated a solid business model with proven economic viability in the market. Thus, the U.S. Small Business Administration notes that the probability of an entrepreneur obtaining venture capital funding is about $p = .0005$, indicating that 99.95% of entrepreneurs are unable to obtain venture capital backing (Small Business Administration, 2012, cited in Rao, 2013). Moreover, Vismara (2019) finds that startups' sustainability does not attract professional investors in crowdfunding rounds, confirming the finding of Calic and Mosakowski (2016) that startups often face difficulties in obtaining external funding, especially due to the high level of risk involved.

While private investors used to have little access to startup investments, because the amounts needed largely limited this to wealthy individuals, this has changed since the mid-2000s (Hans, 2017). For instance, changes to German law (BGBL, 2015, p. 1115) have enabled crowdfunding as a source of financing, which ultimately increases the impact of private investors in startup financing. By making use of the internet, it enables funding without having to involve traditional financial intermediaries (Mollick, 2014). As a result, crowdfunding is expected to increasingly fill funding gaps of sustainable startups through the support of private investors as a financing source (Hörisch, 2015).

2.5 | Summary

Summarizing the existing literature in the field, previous studies have focused on different aspects. First, most papers deal with the question of whether or not sustainability aspects influence financial risk and return (e.g., Friede et al., 2015; Gillan et al., 2020; Gregory

et al., 2014; Margolis et al., 2007). Second, some studies examine the roots of investing in sustainable companies and find that ethical values, positive emotions, and psychological aspects may drive investment as well as financial incentives (e.g., Brodback et al., 2019; Derwall et al., 2011; Verplanken & Holland, 2002; Vyvyan et al., 2007). Thereby, research focuses on the central concept of sustainability as ESG or CSR and only indirectly on the companies' environmental impact. Moreover, the literature on financing sustainable startups and on sustainable private investors is very limited. However, successful financing rounds are of great relevance, since it seems particularly difficult for startups to obtain funding (Calic & Mosakowski, 2016) and, as Vismara (2019) further discovered that professional investors do not show increased interest in financing them. Accordingly, one question that has hardly been explored in the scientific literature so far is the influence of environmental sustainability on private investors' WTI in startups; this study aims to address this lack.

3 | HYPOTHESES DEVELOPMENT

Classical valuation theory, such as the capital asset pricing model, discusses how company shares are priced in idealized markets (Sharpe, 1964). The most important influencing factors are risk and return, although other financial factors, such as liquidity, also influence asset prices (Amihud et al., 2005). Contemporary research has broadened the set of factors influencing these decisions. The concept of *homo economicus* that once dominated economic theory is being reconsidered in light of empirical evidence showing the significant role that emotions, values, ethics, and psychological traits play in decision-making processes (e.g., Brodback et al., 2019; Derwall et al., 2011; Verplanken & Holland, 2002). Although investors are often not fully sustainability-oriented, they have financial minimal requirements, or mentally account for their *core* portfolios according to classic valuation theory separately from their sustainable *surplus* portfolios (Anand & Cowton, 1993; Mackenzie & Lewis, 1999).

3.1 | General relationships of WTI and environmental sustainability

The theoretical mechanisms behind corporate environmental sustainability's positive influence on private investors' general WTI are multifaceted. In this subsection, we will explain seven independent effects of how environmental sustainability affects the WTI, their underlying mechanisms, and their applicability to startups.

3.1.1 | Reduced risk through improved risk management practices

General effect

Corporate sustainability improves overall risk management, leading to reduced risk (Lueg et al., 2019; Pástor et al., 2021). At a given return,

this increases the value of an investment and thereby the WTI (Berk & DeMarzo, 2023).

Underlying mechanisms

At the strategic level, Pástor et al. (2021) suggest that sustainable practices contribute to a comprehensive risk management strategy. This includes assessing environmental impacts and implementing measures to mitigate these risks, such as reducing carbon footprints, managing waste, and ensuring resource efficiency. These proactive measures result in minimizing the direct risks associated with environmental impacts, and also mitigate broader financial risks related to regulatory fines, cleanup costs, and reputational damage. At the operative level, Lueg et al. (2019) show that companies with strong sustainability initiatives are better at identifying and mitigating risks. These companies proactively address potential environmental and social issues that could escalate into significant risks. By integrating sustainability into their risk management frameworks, companies can foresee and prevent incidents that might otherwise lead to operational disruptions or financial losses.

Applicability to startups

This effect can be observed for startups as well. Shepherd et al. (2000) argue that new ventures can mitigate mortality risks through effective risk reduction strategies, which address the inherent uncertainties and external shocks startups face. They highlight that new ventures benefit from strategies that improve their ability to anticipate and respond to unexpected challenges, thereby enhancing their survival rates. Forlani and Mullins (2000) further emphasize that perceived risks significantly influence new venture decisions. Their research suggests that entrepreneurs who carefully assess and manage these risks can make more informed decisions, reducing the likelihood of failure and enhancing the potential for successful outcomes.

3.1.2 | Reduced risk through increased transparency

General effect

Corporate sustainability increases transparency on a company's operation, thereby reducing the uncertainty that obfuscates a realistic risk assessment and thereby eliminating uncertainty-based discounts (Lueg et al., 2019; Pástor et al., 2021).

Underlying mechanisms

Lueg et al. (2019) and Pástor et al. (2021) argue that sustainability disclosures enhance transparency by providing detailed information about a company's environmental and social practices. This transparency allows stakeholders to better understand the company's operations and long-term strategies, reducing the uncertainty that often clouds risk assessments. By emphasizing sustainability in core reporting practices, companies offer a clearer depiction of their risk management strategies, thereby lowering perceived risk and making the

company more attractive to investors by reducing the risk premiums demanded due to uncertainty.

Applicability to startups

This effect appears valid for startups as well. Shepherd et al. (2000) argue that new ventures can mitigate mortality risks through effective risk reduction strategies, which are enhanced by transparency in their operations and sustainability practices. They emphasize that startups that proactively manage and disclose their sustainability efforts can better navigate external shocks and uncertainties, thereby increasing their chances of survival. Bento et al. (2019) find that transparency in sustainability missions positively influences crowdfunding success and survival rates of sustainability-oriented startups. Their research shows that investors are more likely to support startups with transparent sustainability goals, as the latter reduce financial risk and enhance long-term viability.

3.1.3 | Profitable growth and monetizable innovation through corporate sustainability

General effect

Besides risk reduction, corporate sustainability has been linked to performance improvements both directly and indirectly (Ambec & Lanoie, 2008; Grewatsch & Kleindienst, 2017). Investors believe that environmentally sustainable companies are more likely to succeed in monetizing innovation and enabling future growth (Chen, 2008; Dangelico & Pujari, 2010; Hart, 1995; Nidumolu et al., 2009).

Underlying mechanisms

Nidumolu et al. (2009) assert that sustainable development compels companies to innovate in ways that reduce costs, enhance efficiency, and create new business opportunities. Companies that prioritize sustainability can experiment with new materials, processes, and technologies, leading to innovative products and services. This innovation-driven approach not only lowers costs but also generates additional revenues, enabling startups to capture new markets and achieve sustainable growth. Chen (2008) introduces the concept of *green core competence*, which refers to a company's collective learning and capabilities related to green innovation and environmental management, leading to green innovation performance and a green image. The author argues that such companies are better at developing eco-friendly products and processes. These innovations can lead to cost savings through efficient resource use and waste minimization. Dangelico and Pujari (2010) discuss how green product innovation can become mainstream by integrating environmental considerations into the design and development process. They highlight that sustainable innovation not only meets regulatory requirements but also caters to the growing consumer demand for eco-friendly products. This approach not only boosts sales but also ensures long-term growth by aligning with consumer values and regulatory trends.

Applicability to startups

Startups are subject to this effect as well. Keskin et al. (2013) highlight that startups driven by sustainability engage in innovative processes

that create novel products and services with higher environmental gains, which in turn attract investors focused on sustainable growth. They emphasize that these sustainability-driven innovations help startups navigate uncertainties and position themselves competitively in the market. Hall et al. (2010) further discuss how entrepreneurship can drive sustainable development, suggesting that new ventures adopting sustainable practices can effectively address environmental and social concerns, leading to profitable growth and innovation. Their research underscores the potential for startups to leverage sustainability as a core strategy for achieving long-term success and market differentiation.

3.1.4 | Competitive advantage through corporate sustainability

General effect

Some studies have found that environmental sustainability can lead to a lasting competitive advantage (Lev, 2017; Walsh & Dodds, 2017; Yadav et al., 2017).

Underlying mechanisms

Lev (2017) argues that achieving sustainable competitive advantage involves the successful deployment of strategic assets such as innovative capabilities, unique business processes, and brand value. These strategic assets are valuable, rare, and difficult to imitate, which allows companies to maintain their competitive edge, driving financial performance. Walsh and Dodds (2017) find that environmental sustainability can create a competitive advantage by differentiating a company from its competitors. They argue that adopting green practices can lead to improved brand reputation and customer loyalty, as consumers increasingly prefer environmentally responsible companies. This differentiation not only attracts new customers but also retains existing ones, leading to increased market share and revenue growth. Yadav et al. (2017) discuss how environmental performance can sustain a company's competitive advantage by fostering innovation and operational efficiency. They highlight that companies with strong environmental performance are better positioned to capitalize on new market opportunities and respond to regulatory changes. These companies can then leverage their sustainability credentials to attract investment and talent, further enhancing their competitive position.

Applicability to startups

Startups also profit from this effect. Simpson et al. (2004) explain that small and medium-sized enterprises (SMEs) can gain a competitive advantage by adopting environmentally responsible practices. Although perceived as costly, such practices can improve product quality, increase efficiency, and enhance customer satisfaction, leading to a sustainable competitive advantage. Cai et al. (2016) suggest that new ventures in dynamic and resource-abundant environments can achieve a competitive advantage through effective resource integration that is driven by sustainability. Their study highlights that sustainability practices enable startups to navigate environmental uncertainties and leverage resources more efficiently, thereby

enhancing their competitive position. Song, Benedetto, and Song et al. (2009) further emphasize that new ventures developing their first product can gain a competitive edge by incorporating sustainability-driven innovation. They argue that the skills, resources, and knowledge required for sustainable innovation are critical for achieving positional advantage and ensuring the success of new products, which ultimately leads to improved performance and market differentiation.

3.1.5 | Reputation with customers through corporate sustainability

General effect

Environmental sustainability may also enhance monetizable reputation (Gupta et al., 2013; Kumar & Christodouloupoulou, 2014; Lin et al., 2016).

Underlying mechanisms

Gupta et al. (2013) explain that embedding sustainability into a brand's core values and knowledge base enhances differentiation. This builds brand loyalty of a customer base willing to pay a premium for products associated with strong ethical and environmental values. By doing so, companies can monetize their enhanced reputation. Kumar and Christodouloupoulou (2014) highlight that sustainability practices can significantly boost a brand's value by meeting consumer demand for ethical and eco-friendly products. This positive brand image then fosters customer trust and loyalty, leading to sustained consumer engagement and higher sales. They also link this enhanced reputation also to investors, who view strong sustainability credentials as indicative of lower risk and higher long-term returns. The inverted relationship holds as well: Lin et al. (2016) argue that environmental irresponsibility significantly impairs corporate reputation as perceived by consumers, which directly affects their purchase intentions and loyalty.

Applicability to startups

This effect holds in startups as well. Keskin et al. (2013) propose that sustainability-driven startups create innovative products that meet consumer demand for eco-friendly solutions, thereby enhancing customer loyalty and brand value. Pritchard and Wilson (2018) suggest that introducing green products improves corporate reputation, which boosts customer loyalty and brand value, directly translating into better financial performance.

3.1.6 | Legitimacy through corporate sustainability

General effect

Investors appreciate companies that adopt environmental sustainability in order to ensure compliance that secures them their license to operate (Prakash, 2001).

Underlying mechanisms

Prakash (2001) explains that companies adopt beyond-compliance environmental policies to gain legitimacy from key stakeholders, such as regulatory bodies and the public. This improved reputation helps companies secure a more stable operational environment, reduce regulatory scrutiny, and attract investors who value strong environmental performance, thus enhancing financial stability and growth potential. Parsons et al. (2014) and Lueg et al. (2019) provide analyses of how companies in contested industries, such as the minerals industry and fast fashion, respectively, maintain their social license to operate. They argue that gaining legitimacy involves actively engaging with communities, adhering to environmental standards, and transparently communicating sustainability efforts. This social license reduces community opposition, and ensures continuous access to resources and markets.

Applicability to startups

Startups are much alike established companies in this regard. Djupdal and Westhead (2015) found that environmental certification helps startups accumulate legitimacy, which can buffer against the liabilities of newness and smallness. This accumulation of legitimacy through certification allows them to attract external resources, thereby enhancing their financial performance.

3.1.7 | Alignment of investment principles through corporate sustainability

General effect

Last, investors are increasingly aligning their personal ethics with their investments which directly influences capital allocation in companies and indirectly endorses (stigmatizes) their (non-) investments as well as gaining additional socioemotional wealth for themselves (Hofmann et al., 2008; Kölbel et al., 2020; Nielsen et al., 2021).

Underlying mechanisms

From the moral decision-making perspective, Hofmann et al. (2008) argue that investors' ethical considerations lead them to support companies with sustainable practices, as these investments align with their personal values and contribute to their moral satisfaction, ultimately driving capital towards companies with strong environmental commitments. Taking the company view, Kölbel et al. (2020) identify shareholder engagement, capital allocation, and indirect impacts as key mechanisms through which sustainable investing can influence company practices. They emphasize that investors use their financial power to promote sustainability by engaging with companies to improve their ESG performance and allocating capital to those with positive environmental impacts, thereby reinforcing good practices and discouraging unsustainable behaviors. From the performance evaluation perspective, Nielsen et al. (2021) discuss social return on investment (SROI) as a metric for investors to evaluate the broader impact of their investments. They argue that investors assess in how

far the social and environmental benefits of their investments align with their ethical values and enhancements in their socioemotional wealth, thereby fostering a greater focus on sustainability in their investment choices.

Applicability to startups

Effects for startups are comparable. Bocken (2015) explains that sustainable venture capital significantly increases the likelihood of startup success by aligning investment goals with ethical and sustainable outcomes, which attracts investors who value both financial returns and positive environmental impact. Bento et al. (2019) find that sustainability-focused startups benefit from crowdfunding by appealing to investors' ethical considerations, leading to higher rates of campaign success and long-term business viability.

Synthesizing the effects explained above, we hypothesize:

H1. Corporate environmental sustainability positively influences private investors' willingness to invest in startups.

H2. Corporate environmental sustainability positively influences private investors' willingness to invest in established companies.

3.2 | Startup-specific relationships of WTI and environmental sustainability

In this subsection, we now discuss areas where startups might exhibit some *particularities* compared with established companies.

3.2.1 | Stronger willingness to invest in startups through corporate sustainability

First, entrepreneurs in startups are more purpose-driven in terms of achievement motivation, risk-taking propensity, and preference for innovation (Busenitz & Barney, 1997; Parhankangas et al., 2014; Stewart et al., 1999). We argue that this would make them more likely to promote fashionable environmental sustainability goals. Busenitz and Barney (1997) explain that entrepreneurs are more likely to rely on heuristics and biases in decision-making, which can lead them to embrace innovative and high-risk projects as they seek to create unique market positions. Stewart et al. (1999) demonstrate that entrepreneurs exhibit higher levels of achievement motivation and risk-taking propensity compared to managers, driving them to pursue innovative and sustainable business opportunities that align with their personal goals and values. Specific to sustainable innovation, Parhankangas et al. (2014) argue that entrepreneurs with inherent motivation to create social and environmental value are more likely to adopt sustainable practices than corporate managers.

Second, startups can integrate environmentally sustainable practices and product/service designs from their inception, avoiding

having to transition existing operations towards sustainability (Larson, 2000; Liu et al., 2019). Being able to avoid suboptimal choices in the first place is cost efficient, and thus likely to appeal to investors who value sustainability.

Third, startups are often faster and more effective in adapting to change (Weiblen & Chesbrough, 2015). This may increase WTI in startups since suboptimal decisions can be corrected faster than in established companies.

Fourth, the aforementioned growth potential through sustainability is higher. Tebo (2005) suggests that startups with sustainability-focused business models are better positioned for scalable growth, making them attractive to investors looking for high-growth, responsible investments. We argue that such above-average growth rates will likely increase the WTI.

Fifth, the likelihood that sustainability can spark innovation is more pronounced in startups. Schaltegger and Wagner (2011) argue that they often tend to be more innovative than established companies. We suggest that innovation leads to top line growth and cost reductions, leveraging the WTI.

Sixth, startups with verified environmental sustainability practices are valued higher than conventional companies in funding rounds. Mansouri and Momtaz (2023) find that sustainable startups are often perceived as more innovative and resilient, attracting higher valuations from investors who value the joint benefits of financial returns and positive environmental impact. Their research indicates that the integration of ESG criteria into the business model enhances investor confidence and reduces perceived investment risk, which translates into a valuation premium during funding rounds. Shahid et al. (2024) argues that signaling sustainability through verified environmental practices enhances the attractiveness of startups to business angels by reducing information asymmetry and perceived risk, leading to higher valuations during funding rounds. The credibility gained from such practices reassures investors about the long-term viability and ethical commitment of the startup, thus increasing their WTI at higher valuations. This indicates a premium in terms of WTI in startups. We hypothesize:

H3. Corporate environmental sustainability has a stronger (positive) influence on the willingness to invest in startups than in established companies.

3.2.2 | Higher penalty for non-sustainable startups than rewards for sustainable startups

Findings from the field of psychology illuminate the asymmetrical impact of positive and negative information on decision-making processes. Winkielman et al. (2008) underscore that decision makers possess innate tendencies to process negative and positive stimuli differently. Ito et al. (1998) reveal that negative information exerts a significantly more potent influence on decisions than comparable positive information does. This *negativity bias* has been rigorously examined across different research domains, including political psychology

(Hibbing et al., 2014), consumer behavior (Huang & Luo, 2006), and social cognition (Vaish et al., 2008). It consistently demonstrates an intrinsic predisposition to allocate more attention to negative stimuli.

The implications of the negativity bias extend to the realm of financial decision-making (Kahneman & Tversky, 2013): investors are more likely to react negatively to startups' lack of sustainability than positively to their sustainable practices. Altmeier and Fisch (2023) demonstrate that psychological attributes, such as heightened sensitivity to negative information, significantly influence business angels' investment behaviors. They find that investors' reactions to negative cues are stronger and more immediate, emphasizing that non-sustainability issues could heavily deter investment decisions. Similarly, de Lange (2017) emphasizes that the costs associated with non-sustainable practices in startups are perceived as higher risks by investors. He argues that these perceptions are rooted in the psychological predisposition to overemphasize negative outcomes, thereby making investors more cautious about funding non-sustainable ventures. For family companies, Doluca et al. (2018) discuss that the anticipation of potential backlash from stakeholders, including consumers and regulatory bodies, amplifies the perceived risks of non-sustainable practices. This anticipation leads to higher penalties for non-sustainability compared to the rewards for sustainable practices. Kolk (2003) investigates reporting practices only, and highlights that the increased scrutiny and expectations for sustainability reporting among large corporations have trickled down to startups. Investors, influenced by the broader market trends and their psychological biases, may thus impose stricter penalties on startups that fail to demonstrate sustainability, fearing reputational damage and regulatory consequences. In conclusion, investors should be more likely to penalize startups for environmental shortcomings than reward them for sustainability accomplishments. We hypothesize:

H4. Startups' non-environmental sustainability is penalized more heavily in terms of willingness to invest than good environmentally sustainable behavior is rewarded.

3.2.3 | Effects on the risk–return-ratio

Besides the *WTI* discussed above, there is evidence that environmental sustainability improves the *RRR*. As to reduced risks, Luo and Bhatlacharya (2009) highlight that companies with strong environmental sustainability practices face lower risks due to improved stakeholder relationships and enhanced corporate reputation. These buffer against negative events and reduce volatility in financial performance. Similar, Oikonomou et al. (2012) argue that companies with robust sustainability performance exhibit better risk mitigation strategies, thus lowering the likelihood of costly incidents and regulatory penalties. York and Venkataraman (2010) explain that sustainability helps startups manage both uncertainty (the unpredictability of future conditions) and volatility (the degree of variation in performance over time) by fostering stable relationships with stakeholders and creating a supportive business environment. Sustainability practices reduce

uncertainty by providing clearer expectations, while they mitigate volatility by stabilizing operations, thereby securing long-term commitments from investors and partners (York & Venkataraman, 2010). Perrini et al. (2011) discuss how integrating environmental sustainability into business strategies reduces operational risks by ensuring compliance with environmental regulations and fostering innovation in resource efficiency, which can prevent environmental liabilities.

As to increased returns, Gotschol et al. (2014) investigate the economic benefits of environmental management, suggesting that startups investing in green practices can achieve better long-term economic performance through environmental performance. Furthermore, Yadav et al. (2017) find that improved environmental performance can sustain a company's competitive advantage and complement poorly performing companies' efforts to recover financially. Halberstadt et al. (2024) recommend that entrepreneurs that want to serve a dual mission of profitability with creating societal value, challenging stereotypes, and broadening the understanding of sustainability in entrepreneurship adopt diverse approaches (similar: Carle & Rayna, 2024). In their review, Chatzitheodorou et al. (2019) highlight the diversity in investor motivations for startups focusing on, for example, environmental sustainability. These include environmentally opportunistic investors attracted by the financial prospects of green innovations, and shareholder activists aiming to improve corporate environmental practices. Moreover, investors seek to minimize losses linked to environmental risks, indicating the strategic financial importance of sustainability in attracting different investor types to startups. Wesseh et al. (2024) observe that smaller companies with lower carbon emissions tend to experience a stronger positive relationship between environmental sustainability practices and financial performance. Altogether, this suggests an improved trade-off between risk and return for environmentally sustainable startups. We hypothesize:

H5. Startups' environmental sustainability increases the perceived return–risk ratio.

4 | METHODOLOGY

To test the hypotheses presented, an empirical survey was conducted among German private investors. All data used in the study was collected independently. The research method, survey structure, and detailed procedure of the study are presented below. The original language of the survey was German; a translation is provided in Appendix B.

4.1 | Research design

As is common in economic research, this study is based on a survey. It was conceptualized using the tailored design method, a scientific approach to conducting sample surveys. This method aims to ensure both sufficient coverage of the population and thus allow for a low

coverage error, and a reasonably large sample to minimize the sampling error. As the number of usable responses can also be a key characteristic for obtaining reliable results, high response rates must be ensured to achieve large sample sizes (Hiebl & Richter, 2018). In addition, the chosen method aims to encourage respondents to provide honest and thoughtful responses in order to reduce measurement errors. Therefore, important factors are building trust, emphasizing the benefits of participation, and reducing the costs of participation (Dillmann, 2011).

In this survey, trust was established by, for instance, a guarantee of anonymity and privacy. To increase transparency, information about the topic and survey was provided in advance. Moreover, participants were motivated by the possibility of winning a 20 EUR voucher for online shopping; this served as an additional tool to stimulate the participation rate. To reduce the effort of participation, the survey was designed to be as convenient as possible, subordinate clauses were avoided, and the questionnaire was kept short and simple. As most questions were based on previous literature (Brodback et al., 2019; Lingnau et al., 2022; Williams, 2007), no scale validation, for instance by using Cronbach's Alpha, was required. Despite this, the survey was pre-tested with several subjects who did not participate in the main study. To further ensure the reliability of responses, a 7-point Likert scale was used. In comparison to a 5-point Likert scale, this increases the probability of more accurately reflecting people's objective reality (Joshi et al., 2015).

4.2 | Data collection and survey structure

Data was collected from September 5th to September 19th, 2022 through an online survey on the topic of WTI in environmentally sustainable startups. Initially, we invited about 2000 participants who had experience of investing on the stock exchange. This resulted in 317 participants after controlling for completeness and quality criteria. This represents a response rate of about 15%. The sample includes members from more than 20 different stock exchange groups from various federal states in Germany. The participants were contacted via chat message with a request for voluntary participation; the survey was hosted on a plain website running standard survey software.

The survey consists of different sections (see Appendix B for translation). The first part contains a general introduction and definitions of the most important terms—in this case, startups, established companies, and environmental sustainability. The definitions focus on the most relevant information to keep the survey completion time short and not deter participants with detailed information at the beginning of the survey. Following the literature presented in Section 2 of this article, startups were defined as “young, agile companies that are in an advanced founding phase” which “have fewer financial resources and grow more quickly than established companies.” Established companies, on the other hand, were defined as having “existed for significantly longer than startups and [being] active in the market for many years.” Environmental sustainability was characterized as “reduced use of resources, low emissions to air, water and

soil, and the avoidance of hazardous waste in relation to the size of the company,” again following the literature presented in Section 2 of this article.

In the second part, the questionnaire begins with a general assessment of how environmental sustainability impacts personal investment decisions for both startups and established companies. Therefore, participants were asked to rate how the environmental sustainability of a startup/established company influences their WTI on a 7-point Likert scale, from strongly negative to strongly positive.

Following this, the participants were asked about their WTI in six hypothetical companies. For this, further clarifications were provided to create equal boundary conditions: (1) all companies operate in a comparable industry; (2) all investments have the same transaction fees; and (3) all acquired company shares can be resold at any time. The companies differed in terms of the combination of company type (startup vs. established company) and environmental sustainability (non-sustainable, neutral, and sustainable), following the definitions presented above. The WTI was rated again on a 7-point Likert scale. Afterwards, the participants were asked to rate their perceived return-risk ratio for the same companies, again on a 7-point Likert scale.

Last, we elicited information on the participants' investment experience and preferences in real life, as well as demographic characteristics, including gender, age, marital, educational, and employment status, and monthly net income. This information served as control variables in the analyses conducted in Section 4 and allowed us to draw conclusions regarding the drivers underlying our findings. An attention check question was included in this part of the survey; all but one participant passed, indicating a high data quality (the participant who did not pass the attention check was excluded from all subsequent analysis).

4.3 | Sample characteristics

Table A1 shows the descriptive statistics of participant characteristics (all tables are contained in Appendix A). In the sample, 73.2% are male ($n = 232$) and 25.9% are female ($n = 82$); three individuals did not indicate their gender. The relatively low share of women is consistent with the gender distribution of private investors in Germany (DAI, 2022). The average age in our survey is 30.8 years, most participants being between 16 and 26 (45.4%). Most respondents are employed (56.2%) or in education (33.1%), and the most common monthly net income levels were found to be 1500–3500 EUR (39.7%) and below 1500 EUR (30.9%). A correlation analysis (not reported) indicates that a young age and student status are the main drivers of the high share of low-income participants.

Table A2 shows the self-assessed financial literacy. With an average of 4.39 out of 7 points, the majority claim an above-average investment knowledge (47.3%), 24.3% of participants rated their knowledge as average, and only 16.7% as below average. In line with this, 89.2% of participants stated that they had prior investment experience in the capital market. Interestingly, nearly half (48.6%) specified that they had invested in a company based on its environmental

sustainability at least once. Finally, the most common length of investment experience reported (40.4%) was 1–3 years.

5 | RESULTS

We start our analyses by inspecting averages of WTI and RRR to give an overview for the distributions of our main variables of interest and to provide a first intuition for the validity of our hypotheses (Section 4.1). Afterwards, we verify the validity of the hypotheses based on multivariate regression analyses, where we control for characteristics of our respondents and the data structure (Section 4.2).

5.1 | Descriptive statistics of WTI and RRR

Table A3 compares averages of WTI for startups and established companies by sustainability types. Lending support to Hypotheses 1 and 2, environmental sustainability has a significantly positive impact on WTI for both startups (+0.70, $p < .001$) and established companies (+0.42, $p < .001$) compared with the ‘neutral’ reference category (i.e., companies which do not stand out positively or negatively in terms of environmental sustainability). The effect is stronger for startups than for established companies ($|\Delta| = 0.28$, $p < .001$), which supports Hypothesis 3.

Table A3 also reveals asymmetries in the investors' responses to environmental sustainability and non-sustainability. For startups, non-environmental sustainability significantly decreases WTI by 1.27 to 2.44 (compared with the neutral category; WTI = 3.71), while environmentally sustainable performance significantly increases WTI by 0.70–4.41 (both $p < .001$). That is, non-environmental sustainability of startups is penalized more than good environmental performance is rewarded ($|\Delta| = 0.57$, $p < .001$), being in line with Hypothesis 4.

Albeit we did not state an explicit hypothesis for established companies, it seems important to note that a similar result is found here ($|\Delta| = 1.30$, $p < .001$). This underlines the more general argument that non-environmentally sustainable practices have a strongly negative impact on WTI, irrespective of company type. Furthermore, it indicates that not only are environmentally sustainable startups significantly more rewarded than environmentally sustainable established companies (0.70 > 0.42 with $p < .001$), they are also not as strongly penalized if they are unsustainable (1.27 < 1.73 with $p < .001$).

Table A4 presents the analogous analysis for the perceived return–risk ratio (RRR). Strikingly similar patterns emerge. Importantly, environmental sustainability increases the perceived RRR of startups by 0.50–4.03 (compared with the “neutral” category; WTI = 3.54) with $p < .001$, providing support for Hypothesis 5.

5.2 | Multivariate regression analysis

To improve our understanding and confirm the robustness of the previous findings, Table A5 presents the results of multivariate regression analysis.

Dependent variables are WTI (Models 1–3) and RRR (Models 4–6) for startups (Models 1 and 4), established companies (Models 2 and 5), and the combined sample (Models 3 and 6). We report the results of linear OLS regressions to facilitate the interpretation of the coefficients, and we ensure that ordered probit/logit models that acknowledge the ordinal nature of our dependent variables yield qualitatively identical results. Demographic control variables include gender, age, education, family status, and occupation type. Financial control variables include income, previous investment experience, and self-stated financial literacy. For the sake of conciseness and readability of the results, we treat ordinal control variables as continuous wherever possible (i.e., education, income, investment experience, and financial literacy); using category dummies instead did not alter our results (not reported as this would bloat the table significantly). Standard errors, and thereby significance levels, are adjusted for clustering on the participant level to acknowledge the fact that observations are not independent in our data (i.e., each participant rated WTI and RRR for two company types (startups and established companies) and three scenarios (non-sustainable, neutral, and sustainable).

Model (1) of Table A5 regresses the sustainability characteristics together with the control variables on the WTI in startups. In line with the results of Table A3 and supporting Hypothesis 1, environmental sustainability has a positive impact on the WTI in startups; the effect is economically sizable (+0.70 vs. neutral) and statistically significant ($p < .001$). Among the control variables, (older) age has a significantly negative impact on WTI, which is in line with the notion that younger investors value sustainability aspects more. By and large, we consider that the validity of Hypothesis 1 is not mitigated by demographic or financial control variables.

Model (2) of Table A5 repeats the same regression for established companies. Environmental sustainability has a positive impact on the WTI in established companies (+0.42 vs. neutral, $p < .001$), again supporting the validity of our results from Table A3 and thereby Hypothesis 2. Interestingly, financial literacy becomes highly significant in Model (2) (+0.25; $p < .001$) and R^2 increases by +14.4 pp. to 41.1%. This is consistent with the notion that investments in established companies can be better explained by factors that are commonly found to be relevant in household finance research or—conversely—that investments in startups are driven by different factors. We consider that H2 is broadly supported by our data.

Comparing effect sizes of Models (1) and (2) lends initial support to H3—that environmental sustainability has a stronger positive effect on WTI for startups (+0.70) than for established companies (+0.42). To validate this claim statistically, Model (3) interacts the company type (where startups reflect the base category) with environmental sustainability (where “neutral” reflects the base category) in the combined sample. Confirming our previous notion and thereby Hypothesis 3, the positive effect of sustainability is significantly stronger for startups than for established companies ($|\Delta| = 0.28$, $p < .001$).

To study Hypothesis 4 – that startups' non-environmental sustainability is penalized more heavily than good environmentally sustainable behavior is rewarded—we turn again to Model (1). While non-sustainable behavior of startups reduces WTI by 1.27 (compared to the ‘neutral’ reference category), sustainable

behavior improves WTI by only 0.70 (compared to the 'neutral' reference category). The difference in absolute effect sizes is $|\Delta| = 0.57$ with $p < .001$, providing support to Hypothesis 4; non-sustainable behavior of startups is penalized more heavily (it reduces WTI by 1.27) than good environmentally sustainable behavior is rewarded (it increases WTI by only 0.70).

Models (4)–(6) of Table A5 contains the corresponding analyses with RRR as the dependent variable. Model (4) shows that environmental sustainability is associated with higher RRR expectations for startups (+0.50 vs. neutral, $p < .001$), verifying the validity of Hypothesis 5.

Even though we did not state an explicit hypothesis regarding the impact of environmental sustainability on the perceived RRR of established companies, we explore this relationship for sakes of transparency next. Environmental sustainability has a significantly positive impact on the perceived RRR of established companies as well (Model 5; +0.32 vs. neutral, $p < .001$), but the effect is again significantly weaker than for startups (Model 6; $\Delta = -0.17$, $p < .001$).

By visual inspection, the results of Models (4)–(6) (with RRR as dependent variable) are strikingly similar to the results of Models (1)–(3) (with WTI as dependent variable), which is also reflected in the high positive, overall correlation ($r = 0.65$) between individual WTI and RRR responses of our participants (see Table A6 for detailed results). This is generally consistent to the idea that return and risk expectations may be the underlying psychological channel in the previously documented relationships between environmental sustainability and WTI. A possible mechanism could be that investors subconsciously associate more sustainable companies (and particularly startups) with more positive return and risk prospects, which in turn increases their willingness to invest in those companies. Verifying the psychological channels of how sustainability may affect RRR and in turn WTI is beyond the scope of this article, and we hand over this interesting question to future research.

All in all, we conclude that our hypotheses find broad support in our data, and that the relationships documented in Section 4.1 are not affected by any sociodemographic characteristics of our sample.

6 | DISCUSSION

6.1 | Novelty of main results

We aimed to answer the research question of how environmental sustainability influences private investors' WTI in startups and established companies, and how sustainability affects subjective expectations regarding return and risk prospects of these companies.

The findings provide strong support for the positive impact of environmental sustainability on WTI for both startups and established companies. Upon closer inspection, environmental sustainability has a significantly stronger influence on the WTI for startups than for established companies. This suggests that private investors value environmental sustainability more among startups than among established companies. Furthermore, both types of companies are significantly

penalized with respect to WTI if they are non-environmentally sustainable. It is worth emphasizing that the negative effect (penalty) is significantly greater in absolute terms than the positive effect (reward) for both, although established companies receive significantly stronger punishments in terms of WTI than startups. Still, in absolute terms, WTI is lower for all types of startups compared with their established company equivalent. This suggests that private investors prefer investments in established companies over startups, potentially due to their proven business model.

Across the responses of our survey participants, there is a strong positive correlation between WTI and RRR of $r = 0.65$. This is generally in line with basic economic intuition, that is, more positive beliefs regarding return and risk prospects lead to a higher willingness to invest into these companies. Accordingly, we find similar patterns in the regression analysis with RRR as dependent variable as we have found for WTI as dependent variable. Environmentally sustainable companies (both startups and established ones) are associated with more positive return and risk expectations, while non-sustainable behavior is associated with lower return and risk expectations. Comparing startups and established companies, the positive effect of environmentally sustainable behavior (*RRR premium*) is stronger for startups than for established companies, which is generally consistent to the idea that investors believe that startups may monetize environmentally sustainable innovations quicker or more effectively than established companies can. At the same time, the negative effect of non-sustainable behavior (*RRR discount*) is less pronounced for startups than for established companies. Among other explanations, this could indicate that investors are more forgiving when it comes to lacking sustainability efforts at startup companies (e.g., because investors are aware of the limited financial resources of startups).

All in all, our study offers two substantial novelties to the field. First, it extends the limited literature on sustainable entrepreneurship by examining the isolated impact of environmental sustainability on WTI and RRR in startups vs. established companies. Second, our findings challenge prevailing assumptions by demonstrating that startups are more rewarded for environmental sustainability and less penalized for non-sustainability than established companies.

6.2 | Theoretical contributions

This study makes several important contributions to the development of theory.

6.2.1 | Valuation premium of environmental sustainability

The observed valuation premium on environmental sustainability aligns with the hypothesis posited in sustainable entrepreneurship research as outlined by Mansouri and Momtaz (2023). Moreover, the findings resonate with the literature on SRI discovering that psychological attitudes (e.g., Brodback et al., 2019), ethics, and values

(e.g., Derwall et al., 2011; Verplanken & Holland, 2002) can positively affect sustainable decision-making. Our findings contradict Lingnau et al. (2022) who find a non-significant, small negative effect of environmental sustainability on WTI. This may be explained by their use of vignette analysis which is performed based on different boundary conditions, such as a precise investment amount of 10,000 EUR, different return options, and varying levels and types of sustainability. In addition, their survey does not explicitly target private investors but private individuals in general and does not distinguish between startups and established companies. Nevertheless, they also identify a significant negative effect of poor environmental performance on WTI (Lingnau et al., 2022).

6.2.2 | Emphasis on environmental measures

Our research emphasizes isolated environmental measures as a critical component in investment decisions. This emphasis is aligned with the growing demand for investment practices that contribute tangibly to climate change mitigation. As Pástor et al. (2021) note, while ESG criteria are widely used, there is a pressing need for more specific environmental impact measures (The Economist, 2022).

6.2.3 | Difference between startups and established companies

Unlike previous research, our study distinctly focuses on the difference between startups and established companies. This approach addresses the gap highlighted by Popescu et al. (2021), who call for more detailed analyses of sustainability impacts on various types of investments. By doing so, we provide nuanced insights that are critical for investors, policymakers, and entrepreneurs looking to foster sustainability in the early stages of business development.

6.2.4 | Incorporating investor perspectives

Our study uniquely incorporates the perspectives of private investors specifically interested in startups, thereby offering insights into the decision-making processes of a critical but underexplored investor segment. This contribution is significant because understanding the environmental sustainability considerations of private investors is key to mobilizing capital towards environmentally sustainable startups. Thus far, Barber et al. (2021) have used panel data to assess the impact of social sustainability. Our study fills the relevant gap to assess sustainability from an environmental perspective with survey data.

6.3 | Practical implications

Our study carries practical implications for a wide range of stakeholders.

Entrepreneurs have a financial incentive to take their environmental practices seriously. As various scandals have shown, environmental misconduct can threaten a company's very existence (Bouzzine & Lueg, 2020). This is in line with our finding that penalties for non-sustainable laggards are higher than the rewards of the best-in-class sustainable companies. Environmentally sustainable startups often identify and exploit such opportunities, building their business upon them while maintaining the natural environment (Melay & Kraus, 2012). This is where Schumpeter and Backhaus's (2003) theory of creative destruction can be applied. It shows that the demand for environmental sustainability can have such an added value among investors that non-sustainable companies raise less capital in financing rounds (Chava, 2014; Mansouri & Momtaz, 2023) and can eventually be replaced by others. Moreover, recent literature provides evidence that high environmental performance can protect company values against climate transition risks (Schuster et al., 2023) and physical climate risks (Huynh & Xia, 2023). It is recommended that companies transparently and actively provide, ideally audited, information on their environmentally sustainable practices to their stakeholders (Lueg et al., 2016).

Policy makers can use this research to identify specific attributes of environmental sustainability that influence private WTI in startups. Our study provides actionable insights that can be used in the development of policies aimed at encouraging sustainable entrepreneurship and leveraging private investment instead of public funds. Policy makers should prioritize strategies to improve the environmental sustainability practices of companies that lag behind. This strategic emphasis is particularly relevant for established companies, as the penalties imposed by investors for non-environmental sustainability outweigh the rewards that outstanding sustainability practices can yield.

Shareholders, such as fund managers, should actively demand, at a minimum, industry level best practices of environmental sustainability practices and reporting that might go beyond regulatory requirements. Our findings suggest that improving the standards of laggard companies increases the value of their investment disproportionately. Reporting enables them to improve their risk calculations for assets. Fund managers that convey their seriousness about environmental sustainability may also be able to attract new investments into their funds (Ryan, 2022a).

6.4 | Limitations and future research

The study presents an important step in understanding the impact of environmental sustainability on WTI in startups, which is important for entrepreneurs and investors alike. Due to the tremendous increase in investment volumes (Hale, 2020; Stankiewicz, 2022) and demand for environmental sustainability among startups (Mansouri & Momtaz, 2023), more extensive literature on the financing conditions of sustainable entrepreneurship by private investors may emerge soon. In the following, we reflect on this study and offer some starting points for promising future research.

6.4.1 | Influence of the data collection

The study was conducted at a time when demand for environmental sustainability was relatively high, being regularly discussed by society and governmental authorities. The question arises whether and how results may change in a context of a smaller overall demand for sustainability and less interest in financing it. Moreover, the two-week survey period of the study may have been influenced by the then current news, media reports, and general public sentiment. As a result, this article is limited to one point of measurement and does not examine attitudes towards environmentally sustainable investments over time. Hence, future studies could verify whether this is a crucial factor influencing the results. Furthermore, this study is limited to German participants. Since Europe is perceived as a pioneer in environmental awareness (Teutrine et al., 2024), future research may benefit from investigating geographical regions considered less progressive in terms of environmentalism and climate protection.

6.4.2 | Influence of sociodemographic characteristics

The results are also limited in their representativeness in demographic characteristics such as average investor age, education level, and income. Young, highly-educated, and low-income individuals are over-represented in the sample compared with the overall population. While some literature (e.g., Cheah et al., 2011; Diamantopoulos et al., 2003; Tippet & Leung, 2001) finds that SRI is predominantly associated with women, Williams (2007, p. 52) states that “demographics appear to explain very little” and are mostly statistically insignificant. In line with this notion, we find no indications that our main effects are driven by (latent) characteristics of our sample. However, acknowledging the comment of Siddiqui (2018) that findings on the influence of sociodemographic characteristics on SRI are inconsistent, future studies could explicitly address the fundamental research gap regarding the influence of socio-demographics on WTI in environmentally sustainable endeavors.

6.4.3 | Definition and standardization of environmental sustainability

There are various discussions of the definitions of environmental sustainability as a component of ESG, CSR, and SRI in the academic literature (Gillan et al., 2020). However, there is, as yet, no consensus regarding the question of which factors actually influence companies' environmental score (E-score) (Harris, 2022). For instance, the mere act of disclosing well-developed climate strategies has been found to affect the E-score more than the quality of milestones or the actual steps taken to achieve them (Ryan, 2022b). Accordingly, this study was also guided by a generic formulation of what environmental sustainability means and bases its results on imperfect yet credible environmental sustainability information. In practice, however, the non-standardized environmental reporting by companies is a

significant constraint from the investors' perspective and could encourage greenwashing on the company side (Harris, 2022; Mansouri & Momtaz, 2023). As definitions and interpretations of the E-score vary, the findings of this article are limited in their generalizability. Thus, further investigation needs to explore a standardized definition of environmental sustainability. Moreover, an industry-standard concept that unites both sustainability reporting and ratings, similar to financial statements, should be investigated. Future research could thereby define and disclose key aspects of sustainable entrepreneurship.

6.4.4 | Sustainability efforts and financial returns

Implementing higher sustainability standards incurs costs for companies, but it may also yield benefits such as lower operative costs or easier access to capital (see discussion in Section 2.3). Depending on which factor is predominant, sustainability efforts may affect financial returns of companies in the one or the other direction. In our survey, we merely told participants that all companies operate in comparable industries, but we did not explicitly control for the financial returns of the different companies. We did so to be able to elicit the participants' RRR expectations of sustainable versus non-sustainable companies, and we have found that participants generally associate higher sustainability efforts with a more positive RRR. Future research may explicitly control for return and risk features in the experimental setup, thereby being able to elicit a willingness to pay (or a willingness to sacrifice returns) for higher sustainability standards at startups vs. established companies.

6.4.5 | Impact of environmental performance on WTI

Focusing on the question of whether corporate environmental sustainability increases WTI in companies in general, the study is limited in generalizability regarding different levels of environmental sustainability. As the distinction is restricted to good, bad, and neutral environmental performance, it remains unclear to what extent different levels of environmental performance influence the results. Future research would need to investigate the extent to which varying degrees of environmental sustainability influence WTI and perceived RRR. For instance, this could range from very low to very high, on a 7-point Likert scale. Hence, it remains unknown whether the improvement of environmental standards at environmentally sustainable classified startups would lead to a further increase in WTI and perceived RRR.

6.4.6 | Impact of environmental sustainability on institutional investors' WTI

As the results show, environmental sustainability increases private investors' WTI and perceived RRR. However, since institutional

investors' interests are found to be focused on financial performance (Vismara, 2019), the results of this article are further restricted in their generalizability. Data on institutional investors financing sustainable startups is still scarce and requires further inspection in future research.

6.4.7 | Methodological approach

Finally, although the study's method seems to be appropriate for theoretical derivations, it has several limitations. First, due to its online format, coverage errors may have occurred, in that older groups of private investors may have had less access to the survey. Second, answers do not affect participant remuneration, which leaves it open to debate whether the highly significant results would appear in practice. As a result, future research may look to provide further evidence to eliminate social desirability bias (Grimm, 2010).

7 | CONCLUSION

This study examines the influence of environmental sustainability on WTI in startups. The contribution of this article to the literature is twofold: (1) it provides an overview of the impact of environmental sustainability on the WTI in startups and, (2) it illustrates the influence of environmental sustainability on the perceived return–risk ratio.

Environmentally sustainable startup financing is a crucial area of research from both the private investor and venture capital perspectives. The study's results show that environmental sustainability positively influences both the WTI and the perceived return–risk ratio of private investors. The recorded differences between startups and established companies being sustainable, neutral, or non-sustainable are highly significant to each other. The results further suggest that private investors value the environmental sustainability of startups more than that of established companies. At the same time, startups are punished proportionally less in their WTI and RRR when behaving non-sustainably. Potentially, the results could be used to inspire future models of startup valuation to incorporate environmental sustainability. However, this work only provides an indication of the influence of environmental sustainability on investment decisions and needs to be further investigated. Additional research should further explore private investors' trade-offs between the financial and non-financial incentives behind environmentally sustainable investments. Finally, since research on environmentally sustainable startup financing is still in its infancy, future research should continue to examine the investment preferences of private investors who provide a meaningful source of funding.

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CONFLICT OF INTEREST STATEMENT

The authors state that they do not have a conflict of interest.

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APPENDIX A: Tables

TABLE A1 Descriptive statistics.

Measure	Value	#	%
Gender	Male	232	73.2
	Female	82	25.9
	No answer	3	0.9
Age	16–26	144	45.4
	27–36	103	32.5
	37–46	24	7.6
	47–56	34	10.7
	>57	10	3.2
	No answer	2	0.6
Education	Secondary school diploma	1	0.3
	Sec. modern school diploma	21	6.6
	High school diploma	127	40.1
	University diploma	155	48.9
	PhD	6	1.9
	Other	3	0.9
No answer	4	1.3	

(Continues)

TABLE A1 (Continued)

Measure	Value	#	%
Occupation	Employee	178	56.2
	Self-employed	10	3.2
	Civil Servant	9	2.8
	Homemaker	1	0.3
	Pensioner	1	0.3
	Unemployed	3	0.9
	School	4	1.3
	Student/Trainee	105	33.1
	Other	5	1.6
	No answer	1	0.3
Net Income (monthly)	<1499 EUR	98	30.9
	1500–3499 EUR	126	39.7
	3500–6000 EUR	59	18.6
	>6000 EUR	10	3.2
	No answer	24	7.6
Marital Status	Single	221	69.7
	Married	72	22.7
	Divorced	9	2.8
	Widowed	2	0.6
	Other	3	0.9
	No answer	10	3.2

Note: This table shows the demographic profile of the 317 participants. # refers to the absolute number of participants in a category. % is the number of participants in this category relative to the total sample.

TABLE A2 Self-assessed financial literacy.

Measure	Value	#	%
Investment knowledge	Poor (1–3)	53	16.7
	Average (4)	77	24.3
	Good (5–7)	150	47.3
	No answer	37	11.7
Investment experience	None	30	9.5
	<1 year	25	7.9
	1–3 years	128	40.4
	3–5 years	53	16.7
	5–10 years	34	10.7
	>10 years	43	13.6
Environmental awareness	No	163	51.4
	Yes	154	48.6

Note: This table shows the self-assessed financial literacy of the 317 participants. Investment knowledge is the self-assessed investment knowledge on a 7-point Likert scale. Investment experience indicates how long participants say they have been involved with the financial market. Environmental awareness indicates whether a participant says environmental sustainability of a company has ever influenced his or her investment decisions. # refers to the absolute number of participants in a category. % is the number of participants in this category relative to the total sample.

TABLE A3 Willingness to invest.

	(1) Non-sustainable	(2) Neutral	(3) Sustainable	(2)–(1)	(3)–(2)	(3)–(1)
(A) Established company	3.61 (0.10)	5.34 (0.07)	5.77 (0.06)	1.73*** (0.08)	0.42*** (0.07)	2.15*** (0.11)
(B) Startup	2.44 (0.07)	3.71 (0.09)	4.41 (0.09)	1.27*** (0.08)	0.70*** (0.06)	1.98*** (0.10)
(A)–(B)	1.18*** (0.09)	1.63*** (0.10)	1.35*** (0.09)	0.46*** (0.07)	–0.28*** (0.06)	0.18** (0.07)

Note: All values are averages on a 7-point Likert scale. Standard errors and t-tests based on N = 317 participants are reported in parenthesis. ***, **, * indicate statistical significance at the 1/5/10% level.

TABLE A4 Perceived return–risk ratio.

	(1) Non-sustainable	(2) Neutral	(3) Sustainable	(2)–(1)	(3)–(2)	(3)–(1)
(A) Established company	3.92 (0.08)	5.02 (0.06)	5.34 (0.06)	1.10*** (0.08)	0.32*** (0.06)	1.42*** (0.10)
(B) Startup	2.88 (0.07)	3.54 (0.06)	4.03 (0.07)	0.66*** (0.07)	0.50*** (0.06)	1.15*** (0.09)
(A)–(B)	1.04*** (0.08)	1.49*** (0.08)	1.31*** (0.08)	0.44*** (0.08)	–0.17*** (0.06)	0.27** (0.08)

Note: All values are averages on a 7-point Likert scale. Standard errors and t-tests based on N = 317 participants are reported in parenthesis. ***, **, * indicate statistical significance at the 1/5/10% level.

TABLE A5 Regression results.

	Dependent variable: WTI			Dependent variable: RRR		
	(1) startups	(2) established companies	(3) all	(4) startups	(5) established companies	(6) all
Sustainability (base = neutral)						
Non-sustainable	–1.27*** (0.08)	–1.73*** (0.08)	–1.27*** (0.08)	–0.66*** (0.07)	–1.10*** (0.08)	–0.66*** (0.07)
Sustainable	0.70*** (0.06)	0.42*** (0.07)	0.70*** (0.06)	0.50*** (0.06)	0.32*** (0.06)	0.50*** (0.06)
Established company (base = startup)						
			1.63*** (0.10)			1.49*** (0.08)
Interaction: Established company × Sustainability						
Non-sustainable			–0.46*** (0.07)			–0.44*** (0.08)
Sustainable			–0.28*** (0.06)			–0.17*** (0.06)
Female (base = male)	0.07 (0.15)	–0.01 (0.14)	0.03 (0.10)	0.05 (0.13)	–0.05 (0.11)	0.00 (0.09)
Age	–0.03*** (0.01)	–0.02** (0.01)	–0.02*** (0.01)	–0.00 (0.01)	–0.01 (0.01)	–0.01 (0.01)
Education	–0.04 (0.11)	–0.08 (0.07)	–0.06 (0.07)	0.09 (0.08)	0.03 (0.06)	0.06 (0.05)
Income	0.09 (0.10)	0.10 (0.07)	0.10 (0.06)	0.07 (0.08)	0.01 (0.06)	0.04 (0.06)
Investment experience	0.04 (0.06)	0.09 (0.06)	0.07 (0.04)	–0.01 (0.05)	0.01 (0.05)	–0.00 (0.04)
Financial literacy	0.05 (0.06)	0.25*** (0.05)	0.15*** (0.04)	0.04 (0.05)	0.15 *** (0.05)	0.10 ** (0.04)
Family status (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Occupation type (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
N	951	951	1.902	951	951	1.902
R ²	26.7%	41.1%	42.2%	16.1%	25.5%	35.1%

Note: The table shows the results of linear OLS regressions on WTI (Models 1–3) and RRR (Models 4–6) for startups (Models 1 and 4), established companies (Models 2 and 5), and the combined sample (Models 3 and 6). Missing values have been imputed to the base category. Robust standard errors are shown in parentheses and are adjusted for clustering on the participant level. ***, **, * indicate statistical significance on the 1/5/10% level.

TABLE A6 Correlation matrix.

	Mean	SD	WTI [S0]	WTI [S1]	WTI [S2]	WTI [E0]	WTI [E1]	WTI [E2]	RRR [S0]	RRR [S1]	RRR [S2]	RRR [E0]	RRR [E1]	RRR [E2]
WTI [S0]	3.71	1.51	1											
WTI [S1]	4.41	1.56	0.74	1										
WTI [S2]	2.44	1.31	0.54	0.24	1									
WTI [E0]	5.34	1.29	0.20	0.00	0.26	1								
WTI [E1]	5.77	1.10	0.06	0.26	-0.14	0.53	1							
WTI [E2]	3.61	1.70	-0.04	-0.30	0.47	0.58	0.15	1						
RRR [S0]	3.54	1.14	0.42	0.35	0.30	0.03	-0.01	-0.05	1					
RRR [S1]	4.03	1.24	0.28	0.41	-0.02	-0.14	0.12	-0.26	0.63	1				
RRR [S2]	2.88	1.30	0.31	0.13	0.53	0.14	-0.13	0.34	0.53	0.19	1			
RRR [E0]	5.02	1.00	0.11	0.09	0.20	0.37	0.21	0.27	0.18	0.04	0.26	1		
RRR [E1]	5.34	1.07	0.03	0.18	-0.09	0.20	0.41	-0.02	0.04	0.23	-0.16	0.53	1	
RRR [E2]	3.92	1.47	0.04	-0.12	0.39	0.35	0.04	0.61	0.05	-0.22	0.44	0.41	0.11	1

Note: Results are based on $N = 317$ participants.

Abbreviations: 0, neutral (reference group); 1, environmentally sustainable; 2, non-environmentally sustainable; E, Established Company; RRR, return--risk-ratio; S, startup; WTI, willingness to invest.

APPENDIX B: Survey

Welcome to my survey!

Dear Participant,

[information on the University of the researchers]

The study will take about 5 min. I ask you to answer all questions after careful consideration so that the collected data of all participants is correctly reflected. Your data will be processed anonymously and in aggregated form. By clicking on "continue" you confirm that your data may be used in anonymized form and may be processed in aggregated form. You are thus aware that no conclusions are drawn about your person you are voluntarily participating in the study and can withdraw at any time. After truthfully completing the questionnaire you have the possibility to participate in a raffle of 5× Amazon vouchers worth 20 Euros.

Part A: Important information.

The environmental sustainability of companies is characterized, among other things, by reduced use of resources, low emissions to air, water and soil, and the avoidance of hazardous waste in relation to the size of the company. In addition, environmentally sustainable companies strive to minimize the impact of their products/services on

biodiversity. Please distinguish between two forms of companies in the following.

Startups represent young, agile companies that are in an advanced founding phase. They usually have fewer financial resources and grow more quickly than established companies.

Established companies have existed for significantly longer than startups and have already been active in the market for many years. They usually have more financial resources and grow much more slowly than startups.

Part B: Influence of environmental sustainability.

Scale: 1 (very negatively) to 7 (very positively).

Bl. Please complete the following statements.

- A startup's environmental sustainability influences my willingness to invest...
- The environmental sustainability of an established company influences my willingness to invest...

Part C: Investment decisions.

Now imagine that the startups and established companies presented are in a comparable industry and all investments have the same transaction fees. Acquired company shares can be sold again at any time.

C1. *How likely are you...*

Scale: 1 (very unlikely) to 7 (very likely)

- ...to invest in a startup?
- ...to invest in a startup that is environmentally sustainable?
- ...to invest in a startup that is environmentally unsustainable?
- ...to invest in an established company?
- ...invest in an established company that is environmentally sustainable?
- ...invest in an established company that is environmentally unsustainable?

Part D: Return-risk ratio

D1

Scale: 1 (very poor) to 7 (very good)

- How do you assess the return-risk ratio of investing in startups?
- How do you assess the return-risk ratio of investing in environmentally sustainable startups?
- How do you assess the return-risk ratio of investing in environmentally unsustainable startups?
- How do you assess the return-risk ratio of investments in established companies?
- How do you assess the return-risk ratio of investing in environmentally sustainable established companies?
- How do you assess the return-risk ratio of investing in environmentally unsustainable established companies?

Part E: Control question

E1. *This survey is about....*

Single Choice

- The impact of environmental sustainability in subsets on investment readiness.
- Fiscal policy and the German pension system.
- I don't know, I clicked on something.

Part F: Investment behavior to date.

F1. *Do you or have you ever owned shares in companies? (e.g. in the form of shares, or share-based ETFs/funds).*

Single Choice

- Yes, I own/have owned shares in a company.
- No, I do not own any company shares, and never have.

F2. *Has the environmental sustainability of a company ever influenced your investment decisions?*

Single Choice

- It had influence at least once.
- I have considered it, but have not bought or sold any stocks/equity-based ETFs/funds because of it.
- It has never affected my stock/share based ETFs/fund purchases or sales.

F3. *Please answer the following question.*

Scale: 1 (very poor) to 7 (very good)

- How would you rate your knowledge of investments?

F4. *How long have you been investing?*

Single Choice

- not at all
- < 1 year
- 1–3 years
- 3–5 years
- 5–10 years
- >10 years

Part G: Demographic data.

G1. *What is your gender?*

Single Choice

- Male
- Female
- Other

G2. *How old are you?*

Numerical format.

G3. *What is your marital status?*

Single choice

- Single
- Married
- Divorced
- Widowed
- Other [with text field]

G4. *What is your highest educational degree?*

Single choice

- Secondary school diploma
- Secondary modern school diploma
- High school diploma
- University diploma
- PhD
- No answer
- Other [with text field]

G5. *What is your occupational status?*

Single choice

- Employee
- Self-employed
- Public servant
- Housemaker
- Pensioner
- Unemployed
- School
- Student / trainee
- Other [with text field]

G6. What is your monthly net income?

Single choice

- <1499 EUR
- 1500–3499 EUR
- 3500–6000 EUR
- >6000 EUR
- Other [with text field]

Thank you for your participation! I would like to thank you very much for your assistance. If you have any further questions, please feel free to contact me at: [e-mail address]. Have a great day! Your answers have been saved, you can close the browser window.

[The survey was originally conducted in German].