Universiteit Utrecht

EQUITY CROWDFUNDING FOR SUSTAINABILITY:

Unpacking Investor Behavior

Written by

LIANNE PIETERSON

Date: June 28th, 2024

ID: 6779786

Title: Master Thesis

University Supervisor: Dr. Friedemann Polzin

Faculty: Law, Economics and Governance

Number of words: 9526 (including in-text references)

Abstract

Equity crowdfunding has revolutionized sustainable entrepreneurship by circumventing traditional capital market barriers, enabling ventures to attract funding from a diverse online investor base. This study examines how investors' societal impact motivations influence the success of sustainability-oriented campaigns on equity crowdfunding platforms. Using collective action theory, it analyzes data from 521 investor surveys and transaction records from OnePlanetCrowd (2013-2018). Investors are classified into cooperators, conditional cooperators, and free riders via k-means clustering based on behavior and characteristics. Mediation analysis explores how conditional cooperation mediates the relationship between investors' societal impact motivation and campaign success metrics. Results indicate that investors driven by societal impact tend to act as cooperators or conditional cooperators rather than free riders. Conditional cooperation significantly accelerates funding times and boosts funding rates compared to free riding. The study identifies a positive indirect-only mediation effect of conditional cooperation on the link between societal impact motivation and campaign success. These findings underscore the importance of aligning societal values with venture missions to foster cooperative investor behavior in sustainable equity crowdfunding. Practical implications include optimizing campaign design and regulatory frameworks to support sustainable finance initiatives. This research enhances understanding of crowdfunding dynamics and offers practical guidance for stakeholders seeking financial support aligned with environmental and social goals.

Keywords: Equity Crowdfunding, Entrepreneurial Finance, Collective Action Theory, Sustainable Entrepreneurship, Sustainable Finance

I. Introduction

Heightened environmental awareness and societal demands for ethical practices, alongside regulatory shifts toward sustainability, have spurred sustainable entrepreneurship (SE). These enterprises tackle social inequality and environmental degradation through innovative strategies prioritizing future generations' needs (Cohen and Winn, 2007; Gibbs, 2006; Shepherd and Patzelt, 2011). However, they face persistent early-stage challenges in accessing funds from traditional capital markets due to their triple bottom line approach (Maehle et al., 2020), which often involves issues such as lack of track record, collateral, and high technological risks (Toxopeus, 2019). Additionally, they encounter difficulties in realizing societal impact benefits, known as the 'double externality problem' (Faber & Frenken, 2009; Rennings, 2000). This results in principal-agent problems where investors face asymmetric information, moral hazard, and adverse selection, making them reluctant to invest (Hall, 2010).

In this context, equity crowdfunding has become pivotal for funding sustainability-oriented ventures (Toxopeus, 2019), allowing early-stage enterprises to raise funds by offering equity shares to a diverse pool of online investors (Vismara, 2019). The global equity crowdfunding market raised $1.52 billion in 2020, underscoring its growing importance (Vismara, 2022). According to legitimacy theory, this approach aligns well with sustainable ventures by emphasizing an enterprise's mission and involving numerous small funders (Calic & Mosakowski, 2016; Lehner, 2013). Sustainable entrepreneurs' limited monetary incentives signal their outcome-focused nature, thereby mitigating moral hazard risks and appealing to both prosocial and financially motivated investors (Hörisch, 2015; Lehner, 2013; Toxopeus, 2019). Research suggests that crowdfunding for sustainable enterprises functions as a social dilemma, promoting collective action via transparent investor participation and strategic funding mechanisms such as deadlines and target amounts (Carr, 2013; Cheng & Bernstein, 2014; Toxopeus, 2019). Specifically, conditional cooperation has been shown to enhance campaign success by mobilizing support, influenced by the visibility of others' behaviors (Toxopeus, 2019; Olson, 1989; Frey & Meier, 2004).

Despite numerous scholars highlighting the effectiveness of equity crowdfunding in financing sustainability-oriented ventures, there is still a notable gap in understanding the factors driving this success (Vismara, 2019). The intersection of sustainability and equity crowdfunding still remains relatively unexplored (Petruzzelli et al., 2019). So far existing

research has predominantly focused on reward-based crowdfunding (Walthoff-Borm et al., 2018). Moreover, research on investor behavior and the presence of collective action in sustainable equity crowdfunding remains limited, with existing studies mainly focusing on analyzing mechanisms rather than assessing their practical implications (Toxopeus, 2019). Furthermore, while academic research generally agrees on the effectiveness of sustainability-oriented campaigns in meeting funding targets through equity crowdfunding, controversies persist. Hörisch (2015) notes that despite a project's environmental focus, funding success isn't guaranteed due to backers' concerns about the free-riding problem in collective sustainability, prioritizing financial returns over altruism, while Signori and Vismara (2018) found no significant impact on the success of sustainable crowdfunding campaigns. Maehle (2020) argues that sustainable enterprises face barriers in crowdfunding, struggling to align their sustainability orientation with the community spirit of crowdfunding, together with challenges in platform selection and dealing with higher costs related to intangible claims. Additionally, concerns exist regarding current crowdfunding regulations' adequacy in safeguarding inexperienced investors, particularly those prioritizing societal impact over financial returns (Hornuf and Schwienbacher, 2018). Tailored measures for diverse crowdfunder behaviors are crucial for increasing trust in sustainable crowdfunding and ensuring campaign success.

This study investigates how investors driven by societal impact invest in equity crowdfunding for sustainable enterprises and how this influences their portfolio campaign success. Utilizing collective action theory, the research aims to understand and predict investor behavior. The central research question is: "How does investors' societal impact motivation influence the success of portfolio campaigns on sustainability-oriented equity crowdfunding platforms, and how is this relationship mediated by conditional cooperation?" To address this question, the paper analyzes investor behavior within sustainability-oriented equity crowdfunding campaigns on the OnePlanetCrowd platform, using data from 2013 to 2018. A robust dataset combining 521 valid investor survey responses and transaction data is utilized. Investors are classified into three collective action typologies—cooperators, conditional cooperators, and free-riders—using a k-means clustering method based on their characteristics and behaviors. Mediation analysis is employed to investigate how conditional cooperation mediates the relationship between investors' societal impact motivation and their portfolio campaign success. The results indicate that investors motivated by societal goals are more likely to act as cooperators or conditional cooperators, and less likely to act as free riders. Comparisons

between free riders and conditional cooperators reveal that conditional cooperation slightly accelerates funding times and boosts funding rates. The study observes an indirect-only mediation of conditional cooperation, compared to free riding, between investors' societal impact motivation and both their funding times and funding rates.

This research proposal seeks to address the gap in academic literature concerning the relationship between equity crowdfunding and sustainable enterprises. By integrating collective action theory, the study aims to provide a comprehensive understanding of the complex dynamics influencing crowdfunding success for sustainability-focused ventures. Drawing from established frameworks and prior research, the study offers insights tailored to the specific context of sustainable ventures and equity crowdfunding success factors (Vismara, 2019; Dart, 2004; Olson, 1989). Expanding the application of these frameworks to the emerging domain of equity crowdfunding for sustainable enterprises, this research aims to enhance theoretical foundations and contribute to a nuanced understanding of this evolving financial landscape. Beyond academic contributions, the research holds practical significance for entrepreneurs, crowdfunding platforms, and investors by informing strategic campaign crafting (Hörisch, 2015), platform design (Ahlers et al., 2015; Signori & Vismara, 2018), and investment decisions (Shneor & Torjesen, 2020). Through an in-depth exploration of the underlying mechanisms in equity crowdfunding and the behavior exhibited by the crowd, this study provides valuable insights into mitigating funding disparities within sustainable enterprises. By doing so, it promotes economic growth aligned with environmental and social goals, thus contributing to a more sustainable future (Hornuf et al., 2021). Overall, the research aims to offer actionable insights for funding sustainable enterprises through equity crowdfunding, bridging academic, practical, and economic dimensions.

In the following section, hypotheses derived from a theoretical exploration of equity crowdfunding mechanisms and the dynamics of its "crowd" in the context of sustainability-oriented campaigns are presented. Next, the research methodologies used to test these hypotheses are outlined, followed by an analysis of the results, interpretation of the findings, and suggestions for future research.

II. Theoretical Framework

a. Functions and mechanisms of equity crowdfunding

Emerging financial mechanisms like crowdfunding have the potential to mitigate financial constraints for entrepreneurs (Böckel et al., 2021; Cumming et al., 2019; Hörisch & Tenner, 2020). Crowdfunding offers unique opportunities for funding innovative projects often deemed too risky by traditional lenders (Hornuf & Schmitt, 2016). Unlike conventional financing, crowdfunding draws funds from a large audience via online platforms, bypassing banks and venture capitalists (Belleflamme et al., 2014; Caputo et al., 2022). Ethan Mollick (2014) defines crowdfunding as entrepreneurial efforts to fund ventures through small contributions from many individuals via the internet, without standard financial intermediaries. For early-stage businesses, crowdfunding not only provides funding (Moritz & Block, 2016) but also leverages collective wisdom to support innovation (Hervé & Schwienbacher, 2018; Troise & Tani, 2020). Entrepreneurs register projects on digital platforms and create campaigns to raise funds using the internet and social media (Baumgardner et al., 2017; Brem et al., 2019). Platforms may specialize in niches like innovation, startups, sustainability, or charity, or be generalists (Presenza et al., 2019). Crowdfunding types include:

- **Donation-based:** Philanthropic contributions without expecting returns (Kang et al., 2016).
- **Lending-based** (debt-based): Small investors seeking returns on loans (Bruton et al., 2015).
- **Reward-based:** Supporters receive discounted products/services once launched (Schwienbacher, 2018).
- **Equity-based**: Supporters gain potential equity in the project's success (Ari et al., 2021).

Equity crowdfunding, though complex and legally demanding, is growing rapidly (Walthoff-Borm et al., 2018; Ari et al., 2021). Entrepreneurs sell equity or bond-like shares to small investors via online platforms (Ahlers et al., 2015), linking them with investors seeking financial returns (Schwienbacher, 2019; Vismara, 2019). It prioritizes long-term returns with shares subject to trading restrictions (Rosli & Shahida, 2019). Its digital nature enables access to a broader audience and facilitates network building, user engagement, and knowledge sharing (Cosma et al., 2022; Vismara, 2016). These interactions improve innovation, fundraising, and scalability (Troise & Tani, 2020). In early business stages, equity

crowdfunding reduces transaction costs associated with soft information and allows for small contributions, thereby mitigating perceived investment risks (Vismara (2019); Estrin et al., 2022; Mazzocchini & Lucarelli, 2023). It fosters innovation by introducing new capital sources and involving the crowd in the process, generating social and intellectual capital for collaborative innovation (Hervé & Schwienbacher, 2018; Freudenreich et al., 2020).

b. Dynamics of "the crowd" in equity crowdfunding

Investors Characteristics

The 'crowd' in crowdfunding includes a diverse group of investors who, like traditional capital providers, invest despite information asymmetry, high risk, and low transparency (Mollick, 2013; Moritz et al., 2015). However, these participants are not always well-informed or professional investors (Mollick, 2013). Equity crowdfunding attracts individuals with varying experience, backgrounds, and degrees of professionalism (Lukkarinen et al., 2020; Cumming et al., 2019). The crowd in crowdfunding includes family, friends, unsophisticated investors, and professional investors like business angels and venture capitalists (Baeck et al., 2014; Brown et al., 2019). Professional investors are typically high-net-worth middle-aged males with entrepreneurial experience (Joo-Kitano, 2022), whereas non-professional investors generally lack financial knowledge (Remund, 2010). A significant portion of equity crowdfunding investments comes from these non-professional investors (Guenther et al., 2018), who contribute modest sums for small stakes in companies (Ahlers et al., 2015; Malmendier & Shanthikumar, 2007).

Unlike venture capitalists and angel investors, who possess sophisticated valuation and team assessment skills (Freear et al., 1995), small or restricted investors typically lack such expertise, leading to higher information-processing costs and challenges in evaluating investment opportunities (Ahlers et al., 2015). These investors may not find it economically viable to conduct thorough due diligence due to their limited investments (Vismara, 2019). In contrast, professional investors benefit from greater financial knowledge and resources, enabling them to make more informed decisions and select high-quality investment opportunities (Vismara, 2019). Higher annual incomes are associated with increased financial literacy, influencing decisions in risky assets and facilitating diversification, including through equity crowdfunding (Volpe et al., 2002; Joo-Kitano, 2022). Though most investments are made by unsophisticated investors, recent trends show increasing interest from angel investors and venture capitalists using equity crowdfunding for efficient portfolio

diversification through streamlined online processes (Bessière et al., 2020; Wang et al., 2019). This evolution also presents opportunities to address moral hazard concerns through enhanced professional monitoring roles within crowdfunding ecosystems (Coakley et al., 2022). This is particularly pertinent for sustainable entrepreneurs, whose ventures entail higher risk due to the dual externality problem, struggling to capture both private and societal value, complicating the attraction of private capital (Rennings, 2000).

Women in equity crowdfunding exhibit gender disparities, including lower stock market participation and financial literacy (Harrison & Mason, 2007), less investment experience, and higher risk aversion (Barber & Terrance, 2001). Despite these trends, women are increasingly participating in crowdfunding, investing more, and supporting campaigns with female role models (Hervé & Schiebwacher, 2018; Vismara et al., 2017; Vaznyte et al., 2023). Their investment motives are influenced by labor market dynamics, domestic responsibilities, and feminist perspectives (Harrison & Mason, 2007).

Investors Motivation

Given the diversity of investors in equity crowdfunding (Goethner et al., 2020; Lukkarinan et al., 2019), their motivations for supporting campaigns vary significantly (Allison et al., 2015; Lin et al., 2014). Self Determination Theory provides insights into both intrinsic and extrinsic motives (Herzenstein et al., 2011; Ryan & Deci, 2015). While financial gain is a primary motivator, especially for early-stage ventures where investors prioritize profitable returns (Herzenstein et al., 2011, Moritz & Block, 2016), the appeal of early access and specialized information further motivates investors seeking personal gain and strategic advantage (Cherubini, 2023). However, recent studies indicate a shift towards intrinsic motives among equity crowdfunding investors, especially those drawn to its social network possibilities and collaborative community support (Cherubini, 2023). Investment decisions are increasingly shaped by empathy and alignment with founders' visions (Agrawal et al., 2015; Mollick, 2014), reflecting Social Cognitive Theory, where peer interactions and shared values significantly influence choices (Kuo et al., 2020). These intrinsically motivated investors, often referred to as restricted investors, adhere to a community logic characterized by cooperative capitalism, community values, trust, and reciprocity (Thornton & Ocasio, 2008).

In sustainability-oriented equity crowdfunding, there is a notable increase in investors motivated by non-financial and community-oriented reasons (Signori and Vismara, 2018), driven by dual goals of social/environmental impact and financial return (Toxopeus, 2019).

Signori and Vismara (2018) categorize investors into market-oriented professionals and community-focused restricted investors, with the latter favoring sustainability-oriented ventures. This trend underscores the growing importance of Socially Responsible Investments (SRI) and impact investments, where ethical considerations and social contributions play a pivotal role in decision-making, diminishing the influence of traditional metrics like collateral and business plans (Hörisch, 2015; Lehner, 2013; Toxopeus, 2019). Investors in sustainability-oriented ventures derive benefits such as community building, 'community benefits,' and the 'warm-glow' effect of contributing to societal causes (Gerber and Hui, 2012; Hörisch and Tenner, 2020). Moreover, these investors demonstrate heightened sensitivity to default risks, reflecting broader concerns for the ventures' impacts beyond financial returns (Hornuf et al., 2021). Past research indicates that crowdfunders of sustainable enterprises are motivated by prosocial concerns and project impact perceptions (Allison et al., 2015; Gerber & Hui, 2012; Kuppuswamy & Bayus, 2017).

Some researchers emphasize recognition and strategic influence as significant motivators, with intrinsic motives generally secondary (Bretschneider and Leimeister, 2017; Hörisch, 2015). Vismara (2019) notes the role of societal considerations in attracting investors but underscores that financial returns typically remain paramount. Additional literature suggests that equity crowdfunding investors are driven by a blend of intrinsic and extrinsic goals (Collins and Pierrakis, 2012). In the context of sustainable enterprises, Toxopeus (2019) finds that a majority of investors are motivated by both impact and financial returns compared to traditional enterprises, aligning with the integrated approach of creating societal and financial value (Shepherd & Patzelt, 2011).

The success of crowdfunding initiatives often depends on participant motivation. Research indicates that investors aligned with a venture’s values are more likely to engage, thereby broadening its reach and improving campaign outcomes (Petruzzelli et al., 2019). Legitimacy theory underscores that disclosing social and environmental impacts enhances a company’s resource acquisition by signaling an outcome-focused approach (DiMaggio & Powell, 1983, Vismara, 2018). Moreover, Hornuf et al. (2021) demonstrate that sustainability-oriented investors pledge higher amounts and engage in more campaigns compared to conventional crowdfunders. However, empirical evidence on the impact of investor motivation in sustainability-oriented equity crowdfunding presents mixed findings (Vismara, 2019). While some studies indicate a positive correlation between emphasizing societal impact and

crowdfunding success (Lehner, 2013), others find no significant relationship (Hörisch, 2015; Vismara, 2019). Despite varying evidence on funding success, no study has demonstrated that a social impact orientation of a campaign decreases the likelihood of funding (Hornuf et al, 2021). This study, therefore, posits that investors motivated by societal impact pledge larger amounts and invest more frequently in sustainability-oriented campaigns, thereby potentially increasing their average portfolio campaign success. Accordingly, this study proposes the following hypothesis:

Hypothesis 1: Investors who prioritize societal impact on sustainability-oriented equity crowdfunding platforms are more likely to achieve higher portfolio campaign success.

Investor Behavior and Collective Action

Investor behavior on equity crowdfunding platforms and during campaigns, primarily examined through the lenses of information asymmetries and signaling theory, varies significantly (Akerlof, 1970; Spence, 1973; Hoegen et al., 2017). Lukkarinen et al. (2019) categorized investors into three types: donation-oriented supporters, return-oriented supporters, and pure investors. These investors make modest investments with minimal due diligence due to significant information asymmetry, underscoring the agency problem and complicating risk assessment (Piva & Rossi-Lamastra, 2018; Guenther et al., 2015; Mazzocchini & Lucarelli, 2023). Investors tend to focus on visible campaign elements such as videos, social media presence, and minimum investments, while also considering the clarity of the business model and the credibility of the entrepreneur (Moritz et al., 2015; Piva and Rossi-Lamastra, 2018). They are influenced by indicators of venture quality and often imitate actions of early investors, a phenomenon known as herding behavior (Vulkan et al., 2016; Kleinert et al., 2020). Positive feedback and early investments significantly impact their decisions (Vismara, 2019). Despite a growing interest in cross-border opportunities, a local bias persists, with investors showing a preference for domestic ventures (Guenther et al., 2018).

Helen Toxopeus (2019) argues that understanding investment decisions in sustainable enterprises requires considering the behavioral influence of the crowd. She argues that while legitimacy theory suggests individual crowdfunders support sustainable enterprises due to societal backing, it overlooks the distinct institutional setting of crowdfunding, which differs from traditional financial institutions. Crowdfunders' willingness to finance sustainable enterprises represents a social dilemma: collective payoffs from investments benefit neither

the enterprise nor individual investors directly (Toxopeus, 2019). Yet, investors continue to fund these enterprises, indicating that crowdfunding fosters collective actionThe Collective Action theory, based on Olson (2009) and Hardin (1971), examines decision-making in interdependent situations, where individuals often prioritize self-interest over the common good, leading to suboptimal outcomes without cooperation mechanisms (Ostrom, 2010). This theory identifies three behavioral types: cooperators (driven by communal values), conditional cooperators (following expected norms), and free riders (aligned with rational choice theory) (Toxopeus, 2019). Helen Toxopeus (2019) categorizes three key mechanisms through which crowdfunding facilitates collective action in sustainable enterprise financing. First, crowdfunding utilizes social networks to disseminate project information, mitigate moral hazards, and build trust, fostering cooperative dynamics and emphasizing long-term relationships over financial incentives (Toxopeus, 2019). Second, "fine-grained matching" aligns heterogeneous contributions and payoff structures with investor preferences and enterprise characteristics, promoting greater engagement in sustainable crowdfunding campaigns (Toxopeus, 2019). Finally, aggregation through thresholds encourages conditional cooperation among funders, supported by Vollan and Ostrom's (2010) findings on stakeholder communication facilitated by crowdfunding platforms in addressing common-pool resource dilemmas.

The involvement of additional investors underscores the enterprise's efficacy in achieving its goals (Lehner, 2013). According to Toxopeus (2019), data on investor decisions in crowdfunding platforms are biased due to selective visibility, shaping how conditional cooperators rely on the number of early backers within a short timeframe (Caputo et al., 2022). These initial supporters, typically consisting of cooperators driven by community values and societal impact, play a pivotal role in catalyzing collective action. Investments from others legitimize campaigns, signifying the enterprise's capability to achieve its goals (Lehner, 2013). In contrast, free riders postpone participation to exploit early contributions during periods of uncertainty, prioritizing personal gain over altruism (Anwar & Georgalos, 2024). Conditional cooperators in social dilemmas tend to base their decisions on others' prosocial behaviors, influenced by the prevalence and visibility of cooperators in their community (Vollan & Ostrom, 2010). This behavior is motivated by factors such as conformity to social norms, prioritizing fairness through reciprocity, and interpreting others' contributions as indicators of public good quality or organizational integrity (Frey & Meier, 2004).

As previously noted, investors in sustainability equity crowdfunding increasingly prioritize societal impact alongside financial returns (Cherubini, 2023; Agrawal et al., 2015; Mollick, 2014). This trend is consistent with conditional cooperation theory, which posits that individuals are more inclined to cooperate when they perceive others reciprocating or sharing similar goals (Frey & Meier, 2004). Conditional cooperators adopt prosocial behaviors to maximize collective benefits, anticipating reciprocal contributions (Gächter, 2007). This movement reflects a broader trend where social preferences and mutual benefit drive investors to collaborate with like-minded individuals (Kuo et al., 2020). Despite supporting evidence for the theory of conditional cooperation (Frey & Meier, 2004), few studies have thoroughly investigated this relationship, leaving the direction of causality unclear. To deepen understanding, this study investigates whether investors driven by societal impact are more likely to participate in collective action on sustainability-focused equity crowdfunding platforms via conditional cooperation. The hypothesis is formulated as follow:

Hypothesis 2: Investors prioritizing societal impact on sustainability-oriented equity crowdfunding platforms are more likely to conditionally cooperate.

Conditional cooperation, as observed in studies by Croson (2007) and Fischbacher and Gächter (2006), plays a crucial role in fostering the success of crowdfunding efforts. This behavior hinges on individuals' expectations of others' contributions, influencing their own willingness to participate. Frey and Meier (2004) found that more than half of crowdfunding participants adjust their support based on perceived collective action levels. Thöni and Volk (2018) expand on this, showing that 62% of contributors in laboratory public good games are conditional cooperators. Research has shown that early contributions significantly influence signaling levels of cooperation and deterrence of free riding (Cason et al., 2021). Cooperators' initial investments signal trust and commitment, fostering conditional cooperation and encouraging further participation (Colombo et al., 2015; Vismara, 2022). Conditional cooperators often mirror the behavior of initial contributors with similar-sized investments (Gächter, 2007), thereby monitoring overall participation levels and influencing total investment amounts in equity crowdfunding campaigns (Toxopeus, 2019). Increased cooperation attracts more investors, amplifying financial support for sustainable enterprises and enhancing the likelihood of meeting campaign targets (Caputo et al., 2022). Cason et al. (2021) highlight the pivotal role of early contributions, showing that a lack of cooperation early on reduces both the likelihood and amount of later contributions by conditional

cooperators, aligning with equilibrium tit-for-tat strategies. Reinstein and Riener (2012) support this dynamic by demonstrating that highlighting cooperators' monetary contributions on crowdfunding platforms can enhance the psychology of charitable giving and increase conservation funding. This underscores the critical role of conditional cooperators in fostering collective action within sustainability-oriented equity crowdfunding, shaping financial contributions that determine campaign success. Therefore, this paper proposes the following hypothesis:

Hypothesis 3: Increased levels of conditional cooperation are associated with improved portfolio campaign success.

Building upon literature insights on the impact of investors' societal motivations in sustainable equity crowdfunding campaigns, this study explores their correlation with campaign success, focusing on collective action mechanisms identified by Toxopeus (2019). Previous research has shown that investors with prosocial motives tend to act as conditional cooperators (Kuo et al., 2020), crucially influencing campaign outcomes through more frequent and larger investments (Colombo et al., 2015; Vismara, 2022). This study, therefore, hypothesizes that the positive relationship between investors' societal impact motivations and campaign success is mediated by their behavior as conditional cooperators. This hypothesis is supported by the conceptual model illustrated in Figure 1.

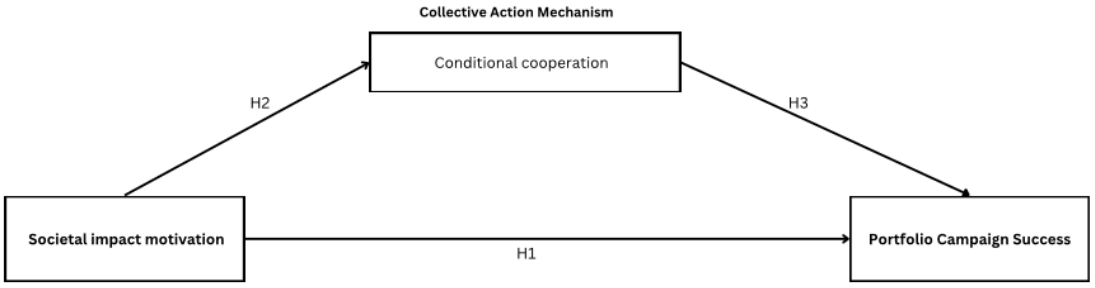

Figure 1: Conceptual Model

III. Methodology

A deductive research design has been employed to address the research question and test hypotheses. In order to analyze the relationship among multiple variables, a quantitative study was identified as the most appropriate approach.

a. Empirical Setting and Sample

To address the research question and delve into investor dynamics in equity crowdfunding, this study draws upon data extracted from equity crowdfunding campaigns hosted on OnePlanetCrowd, a sustainability-focused platform in the Netherlands. In May 2023, it merged with Europe's largest platform, Invesdor (Invesdor, n.d). OnePlanetCrowd prioritizes campaigns that promote sustainable enterprises, making it an ideal environment for examining investor behavior in sustainability-oriented crowdfunding. However, because the data collection time frame only covers the period from 2013 to 2018, predating the merger of both platforms, this study is limited to the Dutch market. Therefore, the population of this study encompassess all investors who participated in equity crowdfunding campaigns on the OnePlanetCrowd platform during this time period. This study further narrowed down the research to a specific segment of this population, namely investors from whom survey responses and transactional records were available within three distinct successful campaigns on OnePlanetCrowd: Peerby, VanMoof, and Seepje. These particular campaigns were chosen for their sustainability focus and proven success. Sampling techniques, therefore, included purposive sampling for selecting successful sustainability-oriented campaigns and convenience sampling for survey distribution among investors, ensuring both representativeness and feasibility (Bryman, 2016).

b. Data Collection and Procedures

To examine investor motivation and behavior in sustainability-oriented equity crowdfunding campaigns and their impact on campaign success, this study utilizes a dataset combining binary, nominal, ordinal, and continuous variables. The dataset integrates survey responses and transaction logs from the Dutch OnePlanetCrowd platform, meticulously aligning 625 survey participants with their investment activities using precise timestamps and postal codes. The survey data provides demographic details including age, gender, and income, along with characteristics like risk aversion, financial literacy, and investment experience. Variables such as 'time spent' and 'search effort' proxy investment behavior, indicating the research depth before investment decisions. Analysis of transaction data includes timing of investments, total and average amounts invested across campaigns, and participation in other projects. Metrics derived from transaction data assess portfolio campaign success based on target amount reached, funding rate, average investors per campaign, and timing of success. Despite encountering 71 unmatched entries and 25 duplicates, the dataset maintained its integrity with 521 observations available for analysis. This sample provides a robust foundation for

conducting statistical analyses and deriving meaningful conclusions about investor behavior in sustainability-oriented equity crowdfunding on OnePlanetCrowd.

c. Measures

This study investigates the efficacy of equity crowdfunding campaigns for sustainable enterprises by analyzing investor motivation and behavior through the lens of collective action theory and their impact on portfolio campaign success. To rigorously test the study's hypothesis, a set of key variables is employed (see Appendix 1).

To evaluate the success of investments in sustainable-oriented crowdfunding campaigns, proxies for campaign success provide insights into how an investor's behavior influences portfolio outcomes, serving as the dependent variables in this study. The primary metric is the 'success rate' of an investor's portfolio, indicating the proportion of campaigns that meet their funding targets (Ahlers et al., 2015; Shafi, 2019; Vismara, 2016). A higher success rate reflects effective decision-making and suggests greater potential for campaign success and returns. Another critical metric is the 'funding rate' (Mollick, 2014), comparing the total funded amount to the campaign targets across all portfolio campaigns. A high funding rate signifies substantial investor contributions toward meeting or surpassing funding goals. Additionally, 'funding time' (dos Santos Felipe et al., 2022) measures how long campaigns take to reach their targets relative to their duration, with longer times indicating slower achievement of funding goals. The 'number of investors' across portfolio campaigns (Vismara, 2016), measured by the log of average participants. A higher number of investors typically correlates with success by demonstrating broader support and validation, thereby enhancing the likelihood of campaigns achieving their funding goals.

To deepen our understanding of decision-making within sustainable enterprises, the study explores how portfolio campaign success correlates with investors' 'societal impact motivation' as our independent variable. Sustainable enterprises promise both financial and societal returns, raising the question of whether financial rewards overshadow intrinsic motivations (Bénabou & Tirole, 2003). In our survey, investors indicated their primary motivations—financial return, societal impact, or uncertainty. Using this data, a dummy variable was created to distinguish investors driven by societal (non-financial) returns from others. "Societal impact motivation" refers to prioritizing investments aimed at maximizing societal impact, such as creating social or environmental value (Toxopeus, 2019). This sheds

light on crowdfunders' intrinsic motivations, aiding in understanding and predicting their decision-making.

The study focuses on conditional cooperation as a mediation variable, categorized into three investor typology clusters: cooperators, conditional cooperators, and free riders (Toxopeus, 2019). These clusters are based on factors like risk aversion, financial literacy, investment experience, and behaviors such as search effort, due diligence, time taken, average investment amounts and investment timing. Appendix 1 details the measurement methodology for each variable. Conditional cooperators' prevalence in crowdfunding indicates collective action dynamics, facilitating exploration of relationships with investment motivations and portfolio campaign success.

Additionally, this research includes control variables for age, gender, and income, as previous studies indicate that these factors may influence investor behavior. Gender has been found to impact investment behavior broadly (Lusardi and Mitchell, 2008), including within the context of crowdfunding (Mohammadi and Shafi, 2017). Income is considered because it affects the scale of individual investments relative to an investor's overall wealth or portfolio, which is expected to influence investment decision-making (Ahlers et al., 2015).

d. Analysis

This study leverages the theoretical framework of collective action theory to identify the typology of conditional cooperators (Olson, 2009; Hardin, 1971; Toxopeus, 2019). The k-means clustering algorithm by Hartigan and Wong (1979) is employed using STATA's clustering analysis capabilities. This algorithm partitions the data into k groups through an iterative process. Initially, k random centroids are chosen, and observations are assigned to the nearest centroid. The mean of observations in each cluster is then calculated to determine new centroids (Kanungo et al., 2002). This iterative refinement continues until convergence. The k-means algorithm allows for specifying the desired number of clusters, k. In this study, the data is segmented into three clusters based on various investor attributes such as risk aversion, financial literacy, and investment experience, as well as behaviors like search effort, due diligence, time taken, timing of investment and average amount per campaign. To mitigate the influence of variations in levels and variances across variables on the clustering process, the data was standardized, transforming each variable to have a mean of zero and a standard deviation of one. This normalization ensures that each variable contributes equally to the clustering process, enhancing the robustness of the analysis (Hastie et al., 2009).

Following the identification of clusters, t-tests were conducted to assess statistically significant differences in relevant variables among the clusters. The means of the variables within each cluster were then interpreted to identify the corresponding investor typologies: cooperator, conditional cooperator, or free rider. These typologies were determined based on individual behaviors aligned with the theoretical framework of collective action theory.

The study proceeds with a mediation analysis employing regression models to investigate whether collective action through conditional cooperation predicts investors' portfolio campaign success, while accounting for their societal impact motivation. To test this, regression models are constructed where the dependent variables (portfolio campaign success proxies) are predicted by both societal impact motivation (independent variable) and conditional cooperation (mediator), while controlling for relevant covariates (age, gender and income). Following Baron and Kenny's (1986) framework (Figure 1), the research first examines the total effect of societal impact motivation on portfolio campaign success (***path c, Hypothesis 1***), using four proxies across distinct models and controlling for age, gender, and income. It then investigates how societal impact motivation influences investor typology (***path a, Hypothesis 2***), specifically examining its impact on the adoption of conditional cooperation behavior using logistic regression due to the categorical nature of investor typology. Conditional cooperators are compared against cooperators and free riders as the reference group. Finally, the study analyzes whether collective action via conditional cooperation predicts portfolio campaign success (***path b, Hypothesis 3***), incorporating societal impact motivation and covariates. Coefficients of societal impact motivation illustrate its direct effect (***path c'***) in the mediation model. Based on the obtained coefficients and their statistical significance, the study assesses the mediation effects. Utilizing STATA software ensures robust statistical procedures and thorough hypothesis testing, thereby enhancing the reliability of our findings.

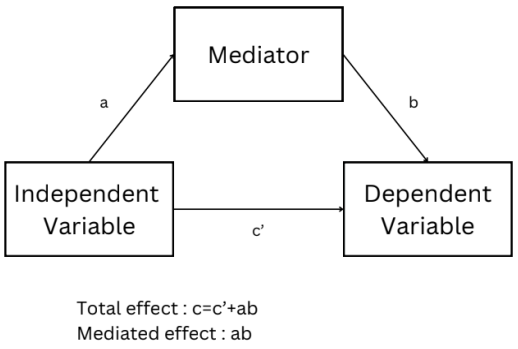

Figure 2: Baron and Kenny Mediation Model (Joyce et al., 2013)

IV. Results

a. Identifying Investor Typology

After performing the k-means clustering analysis, three distinct clusters were identified. Table 1 presents the mean values for each variable across the clusters, along with t-test results that highlight significant differences. These findings enable us to characterize the clusters and assign an appropriate investor typology, grounded in theoretical frameworks of collective action.

Cluster 1 primarily consists of significantly older investors, with an average age range of 45 to 64 years. These investors demonstrate a significantly lower proportion of females compared to Cluster 3 and higher proportion compared to Cluster 2. In terms of income, Cluster 1 exhibits significantly higher levels than Cluster 3, though no statistical difference is observed with Cluster 2. Regarding risk aversion, investors in Cluster 1 demonstrate moderate risk aversion with a slight inclination towards risk tolerance, showing significantly lower risk aversion than Cluster 3 and higher than Cluster 2. Financial literacy in Cluster 1 is notably high, similar to Cluster 2 but significantly surpassing that of Cluster 3. Their investment motivation shows a tendency for societal value, similar to Cluster 3 but significantly higher than Cluster 2. Investment behavior in Cluster 1 is distinct: they typically spend 0 to 30 minutes evaluating campaigns, significantly less time compared to other clusters, with Cluster 2 spending the most time followed by Cluster 3. Due diligence rates are relatively low in Cluster 1, indicating a reliance on crowdfunding platforms for information, a trend consistent across clusters. In terms of investment timing, Cluster 1 significantly differs from the others by investing shortly after Cluster 3 and largely before Cluster 2. They allocate amounts similar to Cluster 3 but significantly smaller amounts compared to Cluster 2. Their societal impact, motivation and investment behavior, characterized by rapid decision-making and minimal search efforts, mirrors that of Cluster 3, suggesting a tendency to synchronize actions with others in their cluster. This synchronization aligns with conditional cooperation theory, where individuals cooperate based on expectations of others' actions (Fischbacher et al., 2001). The behavior of Cluster 1 in terms of investment timing and amounts closely resembles that of Cluster 3, indicating a propensity to mimic initial contributors, as seen in prior research (Gächter, 2007). Thus, Cluster 1 can be identified in this study as participants who act as conditional cooperators, influenced by the behavior of others.

Following this rationale, Cluster 3 can be categorized as cooperators due to their significantly stronger motivation for impact compared to Cluster 2, and their significantly earlier engagement in investments compared to the other clusters. This pattern underscores their alignment with values-driven investing principles, which emphasize the importance of social and environmental impact alongside financial returns (Derwall et al., 2011). Demographically, they are significantly younger than conditional cooperators and have a significantly higher representation of female investors, alongside significantly lower incomes compared to both clusters. They exhibit moderate risk aversion, significantly higher than the other clusters, indicating a cautious yet proactive approach to investing. Their financial literacy is significantly lower compared to other clusters, with investors typically answering only one question correctly, resulting in very high t-values compared to others. In terms of investment experience, they also have significantly less experience compared to other clusters, typically having invested between one to five times previously. In the sample, cooperators typically spend between half an hour and an hour considering their investments and conduct a moderate level of search effort, both significantly different from other clusters.

Cluster 2 stands out significantly from other clusters due to its distinct characteristics related to impact motivation and investment timing. Unlike counterparts in other clusters, investors in Cluster 2 prioritize personal financial gain over broader social or environmental impacts. This preference for financial gain suggests a tendency toward free riding behavior, where they delay investment until others commit, thereby minimizing their own risk while seizing opportunities (Anwar & Georgalos, 2024). This strategic approach enables them to maximize personal gains while leveraging the efforts and investments of others. Moreover, investors in Cluster 2 are significantly different in demographic and behavioral aspects. They are predominantly male, possess high financial literacy, and boast extensive investment experience, averaging at least 10 investments. These investors dedicate considerable time—typically between half an hour and three hours—to investment considerations and engage in more extensive research compared to their peers in other clusters. Furthermore, they allocate significantly larger investment amounts, underscoring their calculated approach to achieving financial gains through strategic investment practices.

Table 1: The mean values of investor characteristics and behavior per clusters

	Mean			T-test		
Cluster	Conditional Cooperators (1)	Free Riders (2)	Cooperators (3)	Conditional Cooperators vs. Cooperators	Free Riders vs. Cooperators	Conditional Cooperators vs. Free Riders
Age	4.25	3.97	3.79	2.58**	1.05	1.85*
Gender	0.25	0.12	0.48	-4.05***	-7.31***	3.09***
Income	3.54	3.7	2.94	4.48***	5.2***	-1.24
Risk Aversion	0.41	0.27	0.52	-1.72*	-4.27***	2.72***
Financial Literacy	1.93	1.9	0.75	28.23***	26.84***	0.79
Investment Experience	3.41	4.18	1.13	8.41***	11.33***	-2.76***
Impact Motivation	1.15	0.79	1.33	-1.59	-5.02***	3.62***
Time Taken	1.83	3.7	3.07	-9.96***	4.6***	-18.07***
Search effort	1.7	2.98	2.31	-6.2***	6.17***	-14.53***
Due Diligence	0.34	0.39	0.31	0.46	1.35	-1.01
Timing of investment	0.18	0.3	0.14	1.89*	6.77***	-5.5***
Average amount per campaign	6.56	7.11	6.53	0.25	3.96***	-4.5***
Observations	167	178	110			

*Note: T-values are reported on the left side. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

When examining the impact of different investor clusters on the success of portfolio campaigns (see Table 2), significant differences emerge, particularly between cooperators, conditional cooperators, and free riders. Conditional cooperators, compared to free riders, exhibit a significantly shorter funding time, indicating a faster-than-expected pace in reaching their campaign targets within the designated duration. Additionally, conditional cooperators demonstrate a significantly higher funding rate, suggesting their contributions more significantly influence the success in achieving intended funding goals. There are no significant differences between conditional cooperators and cooperators in terms of overall

portfolio campaign success, except for the number of investors across their portfolio investments, with cooperators typically having a higher participation rate in campaigns. However, the percentage of campaigns in a crowdfunder's portfolio that reached their target amount does not statistically differ across investor typologies.

Table 2: The mean values of portfolio campaign success per clusters

	Mean			T-test		
Cluster	Conditional Cooperators (1)	Free Riders (2)	Cooperators (3)	Conditional Cooperators vs. Cooperators	Free Riders vs. Cooperators	Conditional Cooperators vs. Free Riders
Funding Time	0.12	0.22	0.09	0.79	3.72***	-3.16***
Funding Rate	4.38	3.72	4.69	-1.14	-3.95***	3.01***
Number of Investors	6.52	6.59	6.66	-2.58**	-1.47	-1.41
Success Rate	1	0.99	1	0.38	-0.31	0.81
Observations	167	178	110			

*Note: T-values are reported on the left side. *** p < 0.01, ** p < 0.05, * p < 0.1*

b. Causal Mediation Analysis

Following Baron and Kenny's (1986) mediation analysis framework, this research conducts three separate regressions to identify the total, indirect, and direct effects of investors' societal impact motivation on portfolio campaign success, thus exploring the mediating role of conditional cooperation in this relationship.

Regressions without mediation effect

The initial series of regressions investigates the total effect of investors' motivation towards societal impact on the success rate of their portfolio campaigns. Given that portfolio campaign success is assessed across four proxy variables, four separate regressions are conducted and interpreted. The formulation is as follows:

Reg. 1a. $Success\ Rate = \beta 0 + \beta 1 \cdot Societal\ Impact\ Motivation + \epsilon$

Reg. 1b. $Funding\ Time = \beta 0 + \beta 2 \cdot Societal\ Impact\ Motivation + \epsilon$

Reg. 1c. $Funding\ Rate = \beta 0 + \beta 3 \cdot Societal\ Impact\ Motivation + \epsilon$

Reg. 1d. $Number\ of\ Investors = \beta 0 + \beta 4 \cdot Societal\ Impact\ Motivation + \epsilon$

Here, β1, β2, β3, and β4 represent the coefficients quantifying the total impact of societal impact motivation on various success variables across portfolio campaigns (***path c***). The outcomes of these regressions, detailed in Table 3, show that none of the coefficients are statistically significant. This lack of significance suggests that the observed relationships in the data are unlikely to reflect meaningful effects in the broader population.

Table 3: OLS regression of societal impact motivation on portfolio campaign success

	(1)	(2)	(3)	(4)
VARIABLES	Success Rate	Funding Time	Funding Rates	Number of Investors
Societal Motivation	-0.001	-0.04	0.231	-0.024
	(0.004)	(0.029)	(0.168)	(0.043)
Age	-0.002	0.036***	-0.679***	-0.122***
	(0.002)	(0.011)	(0.061)	(0.015)
Gender	-0.004	-0.085**	0.134	-0.026
	(0.005)	(0.035)	(0.201)	(0.051)
Income	-0.002	0.006	0.028	0.043**
	(0.002)	(0.013)	(0.071)	(0.018)
Constant	1.002***	0.035	6.526***	6.859***
	(0.008)	(0.056)	(0.331)	(0.084)
Observations	521	438	521	521
R-squared	0.006	0.047	0.201	0.119

*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Regressions with mediation effect

Next, the effect of investors' societal impact motivation on the likelihood of adopting conditional cooperator behavior (hypothesis 2) is tested using the following regression:

Reg 2. $\quad Conditional\ Cooperation = \alpha 0 + \alpha 1 \cdot Societal\ Impact\ Motivation + \epsilon$

Here, α1 quantifies the impact of societal impact motivation on investors' typology, specifically regarding conditional cooperation ***(path a***). Given the categorical dependent variable representing each cluster, logistic regression is conducted with conditional cooperators as the baseline. This analysis compares their behavior with other clusters, assessing whether conditional cooperators are more likely to prioritize societal impact compared to cooperators and free riders. Results of these regressions are detailed in Table 4.

Table 4: OLS regression of societal impact motivation on investor typology

VARIABLES	(2) Free Riders	(3) Cooperators
Societal Impact Motivation	-0.729***	0.095
	(0.227)	(0.262)
Age	-0.0996	-0.225**
	(0.083)	(0.093)
Gender	-0.667**	0.89***
	(0.305)	(0.283)
Income	0.0778	-0.346***
	(0.0958)	(0.126)
Constant	0.625	1.227**
	(0.450)	(0.529)
Observations	455	455

*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

In the logistic regression model examining the impact of societal impact motivation on investor typology, with conditional cooperators as the baseline, the coefficient for free riders is -0.729 (se = 0.227), indicating a highly significant result ($p < 0.001$). This negative coefficient suggests that higher societal impact motivation significantly reduces the likelihood of an investor being a free rider compared to a conditional cooperator. Specifically, the odds ratio of 0.482 (e^(-0.729)) indicates a 51.8% decrease in the odds of being a free rider with each unit increase in societal impact motivation. Conversely, this implies an increased likelihood of being a conditional cooperator as societal impact motivation rises. The reciprocal of the odds ratio shows that conditional cooperators are approximately 2.07 (1/0.482) times more likely to be motivated by societal impact compared to free riders. Comparing cooperators to conditional cooperators, the logistic regression shows a negligible positive effect (coefficient = 0.095, se = 0.262) of societal impact motivation on the likelihood of being a cooperator rather than a conditional cooperator, which is not statistically significant. Therefore, it can be concluded that societal impact motivation predominantly influences conditional cooperation over free riding among investors.

Building on these findings, the effect of conditional cooperation among investors on the success of their portfolio campaigns (hypothesis 3) is analyzed, controlling for societal impact motivation. Four regression tests are conducted to explore the relationships for each variable. The formulation is as follows:

Reg 3a. Success Rate $= \gamma 0 + \gamma 1 \cdot$ *Societal Impact Motivation* $+ \gamma 2 \cdot$ *Conditional Cooperation* $+ \epsilon$

Reg 3b. Funding Time = δ0 + δ1 · *Societal Impact Motivation* + δ2 · *Conditional Cooperation* + ϵ

Reg 3c. Funding Rate = θ0 + θ1 · *Societal Impact Motivation* + θ2 · *Conditional Cooperation* + ϵ

Reg 3d. No. of Investors = φ0 + φ1 · *Societal Impact Motivation* + φ2 · *Conditional Cooperation* + ϵ

The coefficients γ1, δ1, θ1, and φ1 indicate the direct effect of societal impact motivation on portfolio campaign success (***path c'***), respectively, while γ2, δ2, θ2, and φ2 represent the effect of conditional cooperation on the same variables (***path b).*** Results are reported in Table 5.

Table 5: OLS regression of investor typology on portfolio campaign success

	(1)	(2)	(3)	(4)
VARIABLES	Success Rate	Funding Time	Funding Rate	Number of Investors
Free Riders	-0.004	0.095***	-0.849***	0.014
	(0.004)	(0.029)	(0.205)	(0.048)
Cooperators	0	0.011	0.04	0.154**
	(0.004)	(0.033)	(0.238)	(0.055)
Societal Impact Motivation	-0.002	-0.035	0.06	-0.042
	(0.003)	(0.026)	(0.182)	(0.042)
Age	-0.001	0.036***	-0.687***	-0.105***
	(0.001)	(0.009)	(0.065)	(0.015)
Gender	-0.004	-0.064**	-0.06	-0.099*
	(0.004)	(0.031)	(0.22)	(0.051)
Income	0.001	0.001	0.052	0.046**
	(0.001)	(0.011)	(0.078)	(0.018)
Constant	0.997***	-0.004	7.094***	6.845***
	(0.007)	(0.053)	(0.384)	(0.089)
Observations	455	427	455	455
R-squared	0.01	0.087	0.238	0.143

*Note: Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1*

Results reveal that free riders do not significantly differ from conditional cooperators in terms of campaign success rates or the number of investors attracted. However, campaigns involving free riders experience significantly longer funding times (coefficient = 0.095, $p < 0.001$), indicating an average delay of 0.095 units in securing funding compared to campaigns with conditional cooperators. Furthermore, free rider campaigns exhibit markedly lower funding rates (coefficient = -0.849, $p < 0.001$) compared to conditional cooperators, suggesting an average funding rate that is 0.849 units lower than campaigns with conditional

cooperators. These results underscore that conditional cooperators achieve faster and higher funding rates across their portfolios. Regarding cooperators, the findings indicate no significant differences in portfolio campaign success, except for the number of investors across their portfolios. They are associated with a higher number of investors (coefficient = 0.154, $p < 0.005$) compared to conditional cooperators. This suggests that campaigns involving cooperators attract approximately 15.4% more investors on average compared to those involving conditional cooperators.

Mediation effect

The final step is to determine whether there is complete, partial, or no mediation. According to Baron and Kenny (1986), complete mediation occurs when the direct effect (path c') is zero, meaning the mediator fully accounts for the relationship between the independent and dependent variables. Table 5 shows that the regression of investor typology on portfolio campaign success variables reveals no significant effect of societal impact, indicating no complete mediation. Additionally, the effect of societal impact on portfolio campaign success (path c) is also insignificant, indicating no partial mediation by conditional cooperation.

Zhao et al. (2010) propose a modern approach that redefines mediation by focusing on the significance of the indirect effect (a * b) rather than requiring a significant total effect. They suggest that if the bootstrap test indicates significance for the indirect effect while the total effect (path c) does not, there is indirect-only mediation. Given that societal impact significantly influences whether investors become conditional cooperators or free riders (path a), and that these behavioral types significantly impact both funding time and funding rate (path b), our study suggests the potential presence of indirect-only mediation. To calculate this indirect effect, the study creates a dummy variable separating conditional cooperators from free riders. Using the `medsem` command in STATA software, 5,000 bootstrap samples were utilized to calculate the indirect effects on funding time and funding rates between conditional cooperators and free riders, and to assess their statistical significance. The results indicate that investors' societal impact motivation influences funding times and funding rates through their tendency to cooperate conditionally rather than free ride. This indirect effect results in a statistically significant reduction in funding times by 0.021 units (95% CI: -0.038, -0.004). Similarly, the indirect effect on funding rates results in a statistically significant increase of 0.152 units (95% CI: 0.034, 0.269).

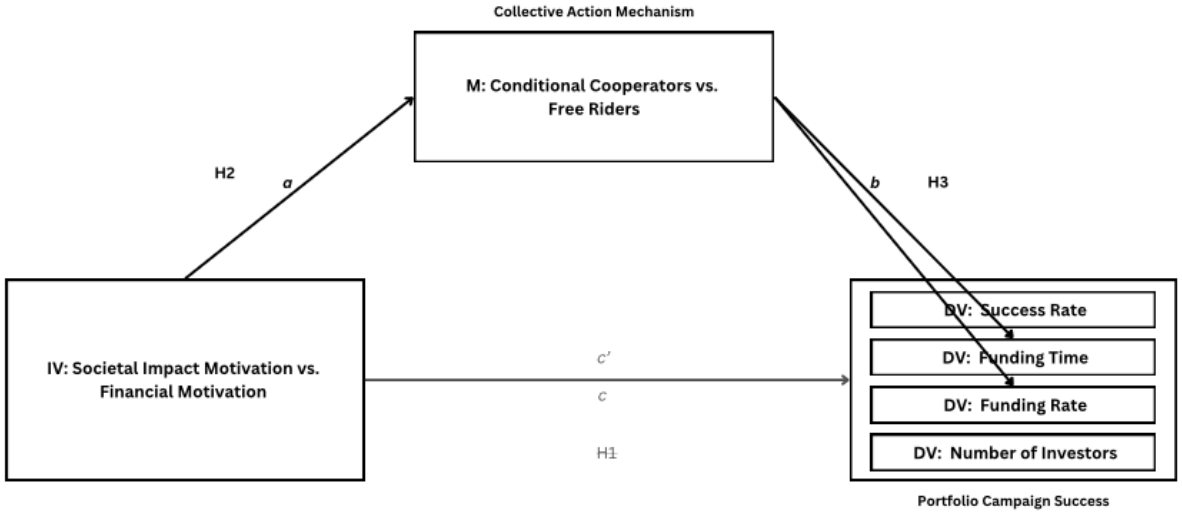

Figure 3: Indirect-only Mediating Effect of Conditional Cooperation

V. Discussion

Previous studies on sustainable enterprise crowdfunding primarily rely on legitimacy theory to elucidate why sustainable enterprises may outperform mainstream ones in crowdfunding, despite expectations from rational choice theory (Calic & Mosakowski, 2016; Hörisch, 2015; Lehner, 2013). However, empirical evidence on this topic remains limited and inconclusive. This research contributes by applying collective action theory to sustainable equity crowdfunding platforms, aiming to enhance understanding of underlying mechanisms through investor behavior and their impact on financial support for sustainable enterprises. The study, therefore extends Toxopeus (2019) identification of collective action mechanisms within crowdfunding by proposing theoretical advancements in investor typology, examining their characteristics, motivations, and behaviors and how these relate to higher portfolio campaign success.

a. Collective Action in Sustainable Equity Crowdfunding

Based on the findings of our k-means clustering analysis, three distinct investor clusters—conditional cooperators, cooperators, and free riders—emerge from the data. These clusters exhibit diverse demographic, financial, behavioral, and motivational profiles, providing insights into their roles within sustainable equity crowdfunding platforms.

Conditional cooperators in Cluster 1, predominantly aged 45 to 64, exhibit moderate risk aversion and high financial literacy. They typically spend less time evaluating crowdfunding campaigns compared to other clusters, averaging no more than 30 minutes. Their search

efforts are minimal and rely heavily on platform-provided information, which indicates lower rates of due diligence. Despite this, they still make significant investments, suggesting other motivations are at play (Toxopeus, 2019). Therefore, their behavior aligns with the concept of collective action, where investor decisions are influenced by observing others' investments, leading to the belief that additional contributions will follow (Keser & van Winden, 2000; Croson, 2007). This is reflected in their tendency to match their peers' timing and allocation of investments, showing a pattern of reciprocal rather than purely risk-averse behavior (Bénabou & Tirole, 2006). They mimic initial contributors, adhering to group norms within their investment community (Toxopeus, 2019). While previously conducted experiments indicate that conditional cooperators often represent the largest group of investors, typically about half (Fischbacher et al., 2001), our sample shows similar numbers of conditional cooperators and free riders. A high number of free riders could harm a sustainability-oriented crowdfunding platform in the long-run by reducing its legitimacy and credibility among conditional cooperators, leading to less investment (Berrone et al., 2017). This discrepancy however might be due to sample size, as larger samples tend to show higher cooperation rates (Li & Noussair, 2023), or nuances in clustering algorithms.

The cooperators identified in our study exhibit behaviors aligned with collective action theory, demonstrating the highest level of motivation for social impact among the clusters, showcasing behavior driven by communal values (Caputo et al., 2022). They also stand out with the highest representation of female investors, which could be indicative of a trend where women's participation in crowdfunding is more influenced by communal values compared to men (Harrison & Mason, 2007). Additionally, higher income levels are often associated with greater financial literacy and investment experience, influencing decisions in risky assets (Volpe et al., 2002; Joo-Kitano, 2022). Cooperators with the lowest income levels exhibit very low financial literacy, little investing experience, and limited due diligence. Despite this, they are the most risk-averse, leading them to invest significant time and effort in researching campaigns. This cautious approach helps mitigate their perceived risks despite their lack of financial expertise. Finally, they are the first to invest in sustainability compared to other clusters in sustainable-oriented campaigns, further underscoring their prioritization of ventures aligned with ethical and social objectives and highlighting communal values that drive cooperative behavior in contributing to collective goods (Hardin, 1971; Toxopeus, 2019).

Lastly, investors identified as free riders prioritize personal financial gain over broader societal impacts. Unlike other clusters, they delay investment until others commit, minimizing their own risk while seizing opportunities (Anwar & Georgalos, 2024). This behavior aligns with rational choice theory in collective action, where individuals seek to maximize personal benefits without proportional contribution to the collective good (Olson, 2009; Toxopeus, 2019). Demographically, free riders in our sample are predominantly male, with high levels of income, financial literacy and extensive investment experience. Therefore, it could be argued that free riders often behave more like professional investors seeking portfolio diversification through sustainable equity crowdfunding (Vismara, 2019; Volpe et al., 2002; Joo-Kitano, 2022). They possess the resources and knowledge to conduct thorough research, leading to greater search effort and longer deliberation times when considering investments in campaigns and higher investment amounts.

b. Implications for Sustainable Equity Crowdfunding Research

To contribute to the literature on equity crowdfunding for sustainable enterprises (Böckel et al., 2020; Hörisch & Tenner, 2020; Vismara, 2022), this study investigates whether investors motivated by societal impact achieve higher campaign success. These insights can help sustainable enterprises understand how effectively communicating their social and sustainable goals attracts investors and increases funding within sustainable crowdfunding (Wehnert & Beckmann, 2021), potentially boosting their funding success rates. Moreover, it informs investors that supporting enterprises with strong societal impact motivations may lead to greater portfolio campaign success (Vismara, 2019). The study also contributes theoretically by examining whether conditional cooperation mediates the relationship between societal impact motivation and campaign success, thereby advancing our understanding of collective action mechanisms in this context.

Societal Impact Motivation

To start with, the logistic regression analysis offered significant insights into the influence of societal impact motivation on investor behavior in sustainability equity crowdfunding. Specifically, investors driven by societal impact show a strong tendency towards cooperative and conditional cooperative behaviors rather than free riding. They are more than twice as likely to engage as conditional cooperators compared to free riders. This indicates that aligning financial goals with broader societal benefits not only attracts but also activates a segment of investors predisposed towards cooperative behaviors. This alignment is crucial for fostering trust and commitment among early backers, essential for campaign legitimacy and

subsequent investor participation (Lehner, 2013). Moreover, investors motivated by societal impact significantly reduce their likelihood of free riding by more than half compared to conditional cooperators. This finding underscores how emphasizing societal impact can mitigate opportunistic behaviors that can undermine collective efforts in crowdfunding initiatives (Anwar & Georgalos, 2024). Therefore, a higher proportion of societal impact-motivated investors can reduce the occurrence of free riding within sustainability-oriented equity crowdfunding campaigns.

These findings contribute to the theoretical understanding of conditional cooperation in social dilemmas, particularly within equity crowdfunding, supporting existing theories that individuals are more likely to cooperate when they perceive others reciprocating or when collective benefits are maximized (Frey & Meier, 2004). This trend aligns with broader investor behavior where there is an increasing preference for opportunities that align with social preferences and values (Kuo et al., 2020). From a practical standpoint, these insights suggest that crowdfunding platforms and sustainability-focused enterprises can enhance their strategies by appealing to and reinforcing societal impact motivations among potential investors. By highlighting the social and environmental benefits of their projects, enterprises can attract significant early-stage support and sustain momentum by building a community of like-minded investors committed to shared goals (Cherubini, 2023).

Campaign Success Factors

Moreover, the regression analyses examined how investors' societal impact motivation in sustainable crowdfunding affects portfolio campaign success metrics, including success rates, funding times, funding rates, and investor numbers. None of the coefficients were found to be statistically significant, indicating that societal impact motivation alone does not have a substantial influence on campaign success. This contrasts with previous research suggesting a significant impact (Lehner, 2013; Messeni Petruzzelli et al., 2019), but aligns with studies that have reported mixed or non-significant relationships (Hörisch, 2015; Vismara, 2019). This finding supports Toxopeus' (2019) observations in the context of sustainable enterprises, where investors are often motivated by both societal impact and financial returns, unlike in traditional enterprises. Investors seek dual benefits, which may explain why societal impact motivation alone does not predict portfolio success comprehensively.

Nevertheless, investor typology does significantly influence portfolio campaign success metrics. Campaigns involving conditional cooperators achieve shorter funding times and

higher funding rates compared to those with free riders, highlighting their effectiveness in securing timely funding and garnering greater overall support. Our mediation analysis reveals that investors driven by societal impact, when adopting conditional cooperation behavior, indirectly experience faster funding times and higher funding rates compared to when they exhibit free rider behavior. These findings are consistent with literature on conditional cooperation, emphasizing how adherence to prosocial norms and reciprocity enhances campaign outcomes (Frey & Meier, 2004). Prompt engagement by conditional cooperators fosters momentum and trust among backers, reinforcing campaign credibility. Conversely, the tendency of free riders to delay contributions and focus on personal gains undermines trust and prolongs funding periods, potentially reducing campaign success rates (Anwar & Georgalos, 2024). This research contributes to understanding the free rider problem in crowdfunding by illustrating how different investor motivations influence the prevalence of free riders within campaigns, thus impacting funding times and rates. Ultimately, these insights underscore the importance of fostering prosocial motivations among investors to enhance the success of sustainable projects on crowdfunding platforms (Vismara, 2019).

Furthermore, the observed difference in investor numbers between portfolios of conditional cooperators and cooperators can be attributed to their distinct behavioral inclinations and risk perceptions. Conditional cooperators base their investment decisions on others' prosocial behaviors, adhering to social norms, prioritizing fairness through reciprocity, and interpreting contributions as signals of public good quality or organizational integrity (Frey & Meier, 2004; Vollan & Ostrom, 2010). This focused approach may limit their portfolio diversification, as they prefer to invest where they anticipate others will also contribute (Keser & van Winden, 2000; Croson, 2007). In contrast, cooperators prioritize communal values and societal impact, leading them to diversify their investments across campaigns that emphasize broader societal benefits or community goodwill (Agrawal et al., 2015). This diversified strategy likely enhances their ability to attract a larger number of investors across their portfolios. These findings build upon previous research by underscoring the critical role of cooperators in sustainable campaigns. They facilitate cooperation by drawing a significant number of investors to the campaign, thereby increasing its likelihood of successfully reaching its funding target (Toxopeus, 2019).

c. Policy Implications

The research on societal impact motivation, collective action, and campaign success in sustainability equity crowdfunding offers crucial insights for policymakers aiming to promote sustainable finance and cooperative behaviors on crowdfunding platforms.

Firstly, enhancing metrics to assess societal impact is essential for attracting socially motivated investors who value financial returns and positive societal contributions (Toxopeus, 2019). Standardizing these metrics could significantly influence corporate reporting standards, enhancing transparency and accountability, and serving as reliable benchmarks for campaign quality (Watts, 2015). This approach reduces information asymmetries in crowdfunding and improves risk assessment accuracy (Mazzocchini & Lucarelli, 2023), fostering collaboration among stakeholders who prioritize communal values and recognize societal benefits (Caputo et al., 2022). Ultimately, this supports sustainable finance initiatives and encourages investment in socially responsible endeavors.

Moreover, regulatory efforts should focus on enhancing the visibility of investor commitments in sustainability crowdfunding to address issues related to free riding. Research indicates that investors, especially conditional cooperators, are motivated by observing others' contributions, which boosts confidence and participation (Keser & van Winden, 2000; Croson, 2007). Platforms that prominently display early investor commitments catalyze collective action, signal campaign quality, and attract additional investments from socially motivated investors (Toxopeus, 2019). This visibility strengthens investor trust and commitment throughout the crowdfunding process.

Lastly, given the diversity among investor types like conditional cooperators and free riders, regulation should prioritize tailored investor protection measures. Societally motivated investors face risks related to collective action and may benefit from protections against free riding behaviors (Frey & Meier, 2004). Advocating for investor protection regulations, including education, assurances of fair treatment, and effective recourse mechanisms, can bolster sustainable investment practices (Ferri & Acosta, 2019). Strengthening investor protection not only safeguards individual investors but also promotes stability and growth in the crowdfunding sector, advancing broader sustainability objectives (Hornuf et al., 2021).

VI. Conclusion

In conclusion, this study significantly advances the understanding of sustainable equity crowdfunding by applying collective action theory to investor behavior, identifying distinct typologies—conditional cooperators, cooperators, and free riders—and their impacts on campaign success. Cooperators and conditional cooperators, influenced by social signals, are key contributors, while free riders, focused on personal gain, often hinder success. The findings emphasize the importance of societal impact motivation in fostering cooperative behavior, potentially enhancing timely funding and higher rates. These insights suggest that crowdfunding platforms and sustainable enterprises should prioritize social impact to engage investors and reduce free riding. Policy measures should focus on enhancing impact assessment metrics, promoting transparency, and implementing tailored regulations to support sustainable finance initiatives.

Limitations

This research has several notable limitations. Firstly, its generalizability is constrained because the sample is exclusively drawn from a single equity crowdfunding platform in the Netherlands, covering only a five-year period, which may overlook recent trends. Additionally, the matched sample of 521 participants' investor survey responses and transaction data further complicates broad generalization. Moreover, the reliance on self-reported surveys increases the risk of response bias. There may also be sampling bias since the investor sample initially stemmed from three successful sustainability equity crowdfunding campaigns. This bias could influence investor motivation towards societal benefit and the outcomes of portfolio campaign success. Including investors from these successful campaigns in the transaction data might skew the overall platform investments, as these investors may naturally favor successful campaigns. Additionally, the study's methodology presents limitations. The K-means clustering analysis assumes clusters are spherical and of similar size, which might not accurately represent the actual structure of investor behavior data and can yield varying results based on the initial placement of centroids (Davidson, 2002). Moreover, it necessitates the pre-specification of the number of clusters (k), which may not always be optimal and can be influenced by outliers despite efforts to standardize the data (Davidson, 2002). The study employs the Baron and Kenny (1986) framework and adaptations by Zhao et al. (2010) for mediation analysis which might

also potentially have oversimplified the complexity of indirect effects regarding societal impact motivation on campaign success.

Future Research

Moving forward, future research should aim to broaden its scope by investigating larger and more diverse samples across multiple equity crowdfunding platforms, encompassing various campaign types beyond sustainability and spanning different countries. This approach would enhance the generalizability of findings by capturing global trends and variations in investor behavior across platforms with varying demographic compositions and regulatory environments. Extending the study period to include recent years would offer insights into evolving investor preferences and behaviors within the rapidly evolving crowdfunding landscape. This longitudinal approach is crucial for assessing the persistence or evolution of observed trends over time, thereby providing a more comprehensive understanding of crowdfunding dynamics. Furthermore, there is a need for experimental research to refine typologies by systematically manipulating campaign variables and observing how different investor segments respond under controlled conditions. This methodological approach would elucidate preferences and decision-making criteria, validating typological classifications and uncovering the underlying mechanisms that drive investor behavior in equity crowdfunding contexts. Integrating experimental findings with existing data would provide robust empirical support and strengthen theoretical frameworks. Additionally, employing a mixed-methods approach could significantly enrich future research endeavors in equity crowdfunding. By integrating qualitative methods, such as interviews or focus groups with investors and platform operators, researchers can gain deeper insights into motivations, perceptions, and decision-making processes that quantitative data alone may overlook.

VII. References

Agrawal, A., Catalini, C. & Goldfarb, A., 2015. Crowdfunding: Geography, Social Networks, and the Timing of Investment Decisions. Journal of Economics & Management Strategy, 24(2), 253-274. Retrieved from: DIO:10.1111/jems.12093.

Ahlers, G. K. C., Cumming, D., Günther, C., & Schweizer, D. (2015). Signaling in Equity Crowdfunding. Entrepreneurship Theory and Practi*ce, 39(4)*, 955-980. Doi:10.1111/etap.12157

Akerlof, G.A., (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics,* 84, 488–500. Retrieved from: DOI:10.2307/1879431

Allison, T. H., Davis, B. C., Short, J. C., Webb, J. W. 2015. Crowdfunding in a prosocial microlending environment: examining the role of intrinsic versus extrinsic cues. *Entrepreneurship Theory and Practice 39*(1): 53–73. Retrieved from: DOI:10.1111/etap.12108

Anwar, C. M. S., & Georgalos, K. (2024). Position uncertainty in a sequential public goods game: an experiment. *Experimental Economics*, 1-34. Retrieved from: DOI:10.1007/s10683-024-09831-3

Ari, I., Aladdasi, M., & Koc, M. (2021). Equity crowdfunding and venture capital as complementary financing models for sustainable entrepreneurs: A comprehensive review. Retrieved from: DOI:10.2139/ssrn.4023847

Baeck, P., Collins, L., & Zhang, B. (2014). Understanding alternative finance. *The UK alternative finance industry report*, *2014*.

Barber, B. M., & Odean, T. (2001). The internet and the investor. *Journal of Economic Perspectives*, *15*(1), 41-54. Retrieved from: https://www.jstor.org/stable/2696538

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51 6*, 1173-82. Retrieved from: DOI:10.1037/0022-3514.51.6.1173

Baumgardner, T., Neufeld, C., Huang, P. C. T., Sondhi, T., Carlos, F., & Talha, M. A. (2017). Crowdfunding as a fast‐expanding market for the creation of capital and shared value.

Thunderbird International Business Review, *59*(1), 115-126. Retrieved from: DOI:10.1002/tie.21766

Belleflamme, P., Lambert, T., & Schwienbacher, A. (2014). Crowdfunding: Tapping the right crowd. *Journal of business venturing*, *29*(5), 585-609. Retrieved from: DOI:10.1016/j.jbusvent.2013.07.003

Bénabou, R., & Tirole, J. (2003). Intrinsic and extrinsic motivation. *The review of economic studies*, *70*(3), 489-520. Retrieved from: DOI: 10.1111/1467-937X.00253

Berrone, P., Fosfuri, A., & Gelabert, L. (2017). Does greenwashing pay off? Understanding the relationship between environmental actions and environmental legitimacy. *Journal of Business Ethics,144*(3), 363–379. Retrieved from: DOI:10.1007/s10551-015-2816-9

Bessière, V., Stéphany, E., & Wirtz, P. (2020). Crowdfunding, business angels, and venture capital: an exploratory study of the concept of the funding trajectory. *Venture Capital*, *22*(2), 135-160. Retrieved from: DOI:10.1080/13691066.2019.1599188

Böckel, A., Hörisch, J., & Tenner, I. (2021). A systematic literature review of crowdfunding and sustainability: highlighting what really matters. *Management review quarterly*, *71*, 433-453. Retrieved from: DOI: 10.1007/s11301-020-00189-3

Brem, A., Bilgram, V., & Marchuk, A. (2019). How crowdfunding platforms change the nature of user innovation–from problem solving to entrepreneurship. *Technological Forecasting and Social Change*, *144*, 348-360. Retrieved from: DOI:10.1016/j.techfore.2017.11.020

Bretschneider, U., & Leimeister, J. M. (2017). Not just an ego-trip: Exploring backers' motivation for funding in incentive-based crowdfunding. *The Journal of Strategic Information Systems*, *26*(4), 246-260. Retrieved from: DOI: 10.1016/j.jsis.2017.02.002

Brown, R., Mawson, S., & Rowe, A. (2019). Start-ups, Entrepreneurial Networks and Equity Crowdfunding: A Processual Perspective. *Industrial Marketing Management, 80*, 115–125. Retrieved from: DOI:10.1016/j.indmarman.2018.02.003

Bruton, G., Khavul, S., Siegel, D., & Wright, M. (2015). New financial alternatives in seeding entrepreneurship: Microfinance, crowdfunding, and peer–to–peer

innovations. *Entrepreneurship theory and practice*, *39*(1), 9-26. Retrieved from: DOI:10.1111/etap.12143

Bryman, A. (2016). Social Research Methods. Oxford University Press.

Calic, G., & Mosakowski, E. (2016). Kicking off social entrepreneurship: How a sustainability orientation influences crowdfunding success. *Journal of Management Studies*, *53*(5), 738-767. Retrieved from: DOI:10.1111/joms.12201

Caputo, A., Schiocchet, E., & Troise, C. (2022). Sustainable business models as successful drivers in equity crowdfunding. *Business Strategy and the Environment*, *31*(7), 3509-3522. Retrieved from: DOI: 10.1002/bse.3102

Carr, S. (2013). Collective Action and the Financing of Innovation: Evidence from Crowdfunding. *Darden Business School Working Paper*. Retrieved from: DOI:10.2139/ssrn.2450510

Cason, T. N., Tabarrok, A., & Zubrickas, R. (2021). Early refund bonuses increase successful crowdfunding. *Games and Economic Behavior*, *129*, 78-95. Retrieved from: DOI:10.1016/j.geb.2021.05.006

Cheng, J., & Bernstein, M. (2014). Catalyst: Triggering Collective Action with Thresholds. Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing. Retrieved from: DOI:10.1145/2531602.2531635

Cherubini, J. C. (2023). For Love or Money: Investor Motivations in Equity-Based Crowdfunding. *University of South Florida*. Retrieved from: https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=11160&context=etd

Coakley, J., Lazos, A., & Liñares-Zegarra, J. (2022). Strategic entrepreneurial choice between competing crowdfunding platforms. *The Journal of Technology Transfer*, *47*(6), 1794-1824. Retrieved from: DOI:10.1111/1467-8551.12494

Cohen, B., & Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. *Journal of business venturing*, *22*(1), 29-49. Retrieved from: DOI:10.1016/jj.jbusvent.2004.12.001

Collins, L., & Pierrakis, Y. (2012). The venture crowd: crowdfunding equity investments into business. *Nesta.* Retrieved from: https://eprints.kingston.ac.uk/id/eprint/29089/1/the_venture_crowd.pdf

Colombo, M.G., Franzoni, C., Rossi-Lamastra, C., 2015. Internal Social Capital and the Attraction of Early Contributions in Crowdfunding. Entrepreneurship Theory and Practice 39, 75–100. Retrieved from: DOI:10.1111/etap.12118

Croson, R. T. (2007). Theories of commitment, altruism and reciprocity: Evidence from linear public goods games. *Economic Inquiry*, *45*(2), 199-216. Retrieved from: DOI:10.1111/j.1465-7295.2006.00006.x

Cumming, D., Meoli, M., & Vismara, S. (2019). Investors' choices between cash and voting rights : evidence from dual-class equity crowdfunding. *Research Policy*, *48*(8). Retrieved from: DOI:10.1016/j.respol.2019.01.014

Dart, R. (2004). The legitimacy of social enterprise. *Nonprofit Management & Leadership*, 14(4), 411–424. Retrieved from: Doi: 10.1002/nml.43

Davidson, I. (2002). Understanding K-means non-hierarchical clustering. *Computer Science Department of State University of New York (SUNY), Albany*. Retrieved from: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=eff67c0447c1c37bbbeb7638813848d2206ddace

Derwall, J., Koedijk, K., & Ter Horst, J. (2011). A tale of values-driven and profit-seeking social investors. *Journal of Banking & Finance*, *35*(8), 2137-2147. Retrieved from: DOI:10.1016/j.jbankfin.2011.01.009

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147–160. Retrieved from: DIO:10.2307/2095101

dos Santos Felipe, I.J., Mendes-Da-Silva, W., Leal, C.C., Santos, D.B. (2022). Reward crowdfunding campaigns: Time-to-success analysis. *Journal of Business Research,* 138, 214–228. Retrieved from: DOI:10.1016/j.jbusres.2021.09.004

Estrin, S., Khavul, S., & Wright, M. (2022). Soft and hard information in equity crowdfunding: network effects in the digitalization of entrepreneurial finance. *Small Business Economics*, *58*(4), 1761-1781. Retrieved from: DOI:10.1007/s11187-021-00473-w

Faber, A., & Frenken, K. (2009). Models in evolutionary economics and environmental

policy: Towards an evolutionary environmental economics. *Technological Forecasting and Social Change, 76*(4), 462–470. Retrieved from: DOI:10.1016/j.techfore.2008.04.009

Ferri, G., & Acosta, B. A. (2019). Sustainable finance for sustainable development. *Center for Relationship Banking and Economics Working Paper Series*, *30*. Retrieved from: https://iwfsas.org/iwfsas2019/wp-content/uploads/2017/02/Sepecial-session-P2.pdf

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics letters*, *71*(3), 397-404. Retrieved from: DOI:10.1016/S0165-1765(01)00394-9

Fischbacher, U., & Gächter, S. (2006). Heterogeneous social preferences and the dynamics of free riding in public goods. *Institute for the Study of Labor.* Retrieved from: DOI:10.2139/ssrn.874928

Freear, J., Sohl, J. E., & Wetzel Jr, W. E. (1995). Angels: personal investors in the venture capital market. *Entrepreneurship & Regional Development*, *7*(1), 85-94. Retrieved from: DOI:0.1080/08985629500000005

Freudenreich, B., Lüdeke-Freund, F., & Schaltegger, S. (2020). A stakeholder theory perspective on business models: Value creation for sustainability. *Journal of business ethics*, *166*(1), 3-18. Retrieved from: DOI:10.1007/s10551-019-04112-z

Frey, B. S., & Meier, S. (2004). Social comparisons and pro-social behavior: Testing "conditional cooperation" in a field experiment. *American economic review*, *94*(5), 1717-1722. Retrieved from: DOI: 10.1257/0002828043052187

Gächter, S. (2007). Conditional cooperation: Behavioral regularities from the lab and the field and their policy implications. *Economics and Psychology, 19-50.* Retrieved from: https://www.nottingham.ac.uk/cedex/documents/papers/2006-03.pdf

Gerber, E., Hui, J., & Kuo, P. (2012). Crowdfunding : Why People Are Motivated to Post and Fund Projects on Crowdfunding Platforms.*Computer Science, Business.* Retrieved from: http://www.researchgate.net/Publication/261359489_Crowdfunding_Why_People_are_Motivated_to_Post_ and_Fund_Projects_on_Crowdfunding_Platforms

Gibbs, D. (2006). Sustainability entrepreneurs, ecopreneurs and the development of a

sustainable economy. *Greener management international*, (55), 63-78. Retrieved from:
DOI:10.9774/GLEAF.3062.2006.au.00007

Goethner, M., Luettig, S. & Regner, T. (2021).Crowdinvesting in entrepreneurial projects: disentangling patterns of investor behavior. *Small Bus Econ,* 57, 905–926. Retrieved from:
DOI:10.1007/s11187-020-00332-0

Guenther, C., Hienerth, C., & Riar, F. (2015). The due diligence of crowdinvestors: thorough evaluation or gut feeling only? *Academy of management proceedings*. Retrieved from:
DOI:10.5465/AMBPP.2015.16862abstract

Guenther, C., Johan, S., & Schweizer, D. (2018). Is the Crowd Sensitive to Distance? How Investment Decisions Differ by Investor Type. *Small Business Economics, 50*(2), 289–305. Retrieved from:
DOI:10.1007/s11187-016-9834-6

Hall, J. K., Daneke, G. A., & Lenox, M. J. (2010). Sustainable development and entrepreneurship: Past contributions and future directions. *Journal of Business Venturing*, 25(5), 439–448. Retrieved from:
DOI:10.1016/j.jbusvent.2010.01.002

Hardin, R. (1971). Collective action as an agreeable n‐prisoners' dilemma. *Behavioral science*, *16*(5), 472-481. Retrieved from:
DOI:10.1002/bs.3830160507

Harrison, R. T., & Mason, C. M. (2007). Does gender matter? Women business angels and the supply of entrepreneurial finance. *Entrepreneurship theory and practice*, *31*(3), 445-472. Retrieved from:
DOI:10.1111/j.1540-6520.2007.00182.x

Hartigan, J. A., & Wong, M. A. (1979). Algorithm AS 136: A k-means clustering algorithm. *Journal of the royal statistical society*, *28*(1), 100-108. Retrieved from:
DOI:10.2307/2346830

Hastie, T., Tibshirani, R., & Friedman, J. (2009). The Elements of Statistical Learning: Data Mining, Inference, and Prediction (2nd ed.). Springer.

Hervé, F., & Schwienbacher, A. (2018). Round-number bias in investment: Evidence from equity crowdfunding. *Finance*, *39*(1), 71-105. Retrieved from:
DOI:10.3917/fina.391.0071

Herzenstein, M., Sonenshein, S., & Dholakia, U. M. (2011). Tell me a good story and I may lend you money: The role of narratives in peer-to-peer lending decisions. *Journal of Marketing Research*, *48*(SPL), S138-S149. Retrieved from: DOI:10.1509/jmkr.48.SPL.S138

Hoegen, A., Steininger, D.M., Veit, D., (2017). How do investors decide? An interdisciplinary review of decision-making in crowdfunding. *Electron Markets,* 1–27. Retrieved from: DOI:10.1007/s12525- 017-0269-y

Hörisch, J. (2015). Crowdfunding for environmental ventures: An empirical analysis of the influence of environmental orientation on the success of crowdfunding initiatives. Journal of Cleaner Production, 107, 636–645. Retrieved from DOI:10.1016/j.jclepro.2015.05.046

Hörisch, J. (2019). Take the money and run? Implementation and disclosure of environmentally-oriented crowdfunding projects. *Journal of Cleaner Production,* 223, 127-135. Retrieved from: DOI:10.1016/j.jclepro.2019.03.100

Hörisch, J., & Tenner, I. (2020). How environmental and social orientations influence the funding success of investment-based crowdfunding: The mediating role of the number of funders and the average funding amount. *Technological Forecasting and Social Change*, *161*, 120311. Retrieved from: DOI:0.1016/j.techfore.2020.120311

Hornuf, L., & Schmitt, M. (2016). Success and failure in equity crowdfunding. *CESifo DICE Report*, *14*(2), 16-22. Retrieved from: https://www.researchgate.net/publication/306215771_Success_and_failure_in_equity_crowdfunding

Hornuf, L., & Schwienbacher, A. (2018). Market mechanisms and funding dynamics in equity crowdfunding. *Journal of Corporate Finance*, *50*, 556-574. Retrieved from: DOI:10.1016/j.jcorpfin.2017.08.009

Hornuf, L., Stenzhorn, E., & Vintis, T. (2021). Are sustainability-oriented investors different? Evidence from equity crowdfunding. *The Journal of Technology Transfer*, 1-28. Retrieved from: DIO:10.1007/s10961-021-09896-9

Invesdor (n.d). *Why Invesdor*. Retrieved from: https://www.invesdor.com/academy/whyinvesdor#/

Joo-Kitano, H. (2022). The Role of Expertise and Risk Diversification Strategies in Equity Crowdfunding. *European Academic Journal-I*, *1*(001). Retrieved from: https://eaj.ebujournals.lu/index.php/EAJ/article/view/5

Joyce, J. A., O'Neil, M. E., Stormshak, E. A., McWhirter, E. H., & Dishion, T. J. (2013). Peer associations and coping: The mediating role of ethnic identity for urban, African American adolescents. *Journal of Black Psychology*, *39*(5), 431-454. Retrieved from: DOI: 10.1177/00957984124546

Kang, M., Gao, Y., Wang, T., & Zheng, H. (2016). Understanding the determinants of funders' investment intentions on crowdfunding platforms: A trust-based perspective. *Industrial Management & Data Systems*, *116*(8), 1800-1819. Retrieved from: DOI:10.1108/IMDS-07-2015-0312

Kanungo, T., Mount, D. M., Netanyahu, N. S., Piatko, C. D., Silverman, R., & Wu, A. Y. (2002). An efficient k-means clustering algorithm: Analysis and implementation. *IEEE transactions on pattern analysis and machine intelligence*, *24*(7), 881-892. Retrieved from: DOI: 10.1109/TPAMI.2002.1017616

Keser, C., & Van Winden, F. (2000). Conditional cooperation and voluntary contributions to public goods. *scandinavian Journal of Economics*, *102*(1), 23-39. Retrieved from: DOI:10.1111/1467-9442.00182

Kleinert, S., Volkmann, C., & Grünhagen, M. (2020). Third-party signals in equity crowdfunding: the role of prior financing. *Small Business Economics*, *54*(1), 341-365. Retrieved from: DOI:10.1007/s11187-018-0125-2

Kuo, Y. F., Lin, C. S., Wu, C. H., & Tsai, T. H. (2020). Why Do People Back Crowdfunding Projects? A perspective on social cognitive theory. *Journal of Electronic Commerce Research*, *21(3)*, 180-196. Retrieved from: https://www.researchgate.net/publication/346484003_Why_do_people_intend_to_back_crowdfunding_projects_A_perspective_on_social_cognitive_theory

Kuppuswamy, V., & Bayus, B. L. (2017). Does my contribution to your crowdfunding project matter?. *Journal of business venturing*, *32*(1), 72-89. Retrieved from: DOI:10.1016/j.jbusvent.2016.10.004

Lehner, O. M. (2013). Crowdfunding social ventures: a model and research agenda. *Venture Capital, 15(4),* 289–311. Retrieved from: DIO:10.1080/13691066.2013.782624

Lehner, O.M. & Nicholls, A. (2014). Social finance and crowdfunding for social enterprises: A public-private case study providing legitimacy and leverage. *Venture Capital*, 16(3), 271-286. Retrieved from: DIO:10.1080/13691066.2014.925305.

Lin, M., Prabhala, N. R., Viswanathan, S. (2013). Judging borrowers by the company they keep: Friendship networks and information asymmetry in online peer-to-peer lending. *Management Science, 59*(1), 17–35. Retrieved from: https://www.jstor.org/stable/23359603

Lukkarinen, A., Teich, J. E., Wallenius, H., & Wallenius, J. (2016). Success drivers of online equity crowdfunding campaigns. *Decision Support Systems*, *87*, 26-38. DOI:10.1016/j.dss.2016.04.006

Lukkarinen, A., Wallenius, J., & Seppälä, T. (2019). Investor Motivations and Decision Criteria in Equity Crowdfunding. *CSN: Economics (Topic)*. Retrieved from: DOI:10.2139/ssrn.3263434

Lukkarinen, A. (2020). Equity crowdfunding: Principles and investor behaviour. *Advances in Crowdfunding: Research and Practice*, 93-118. Retrieved from: DOI:10.1007/978-3-030-46309-0_5

Lusardi, A., Mitchell, O.S. (2008). Planning and Financial Literacy: How Do Women Fare? *American economic review, 98(2), 413-417.* Retrieved from: DOI: 10.1257/aer.98.2.413

Maehle, N. (2020). Sustainable crowdfunding: insights from the project perspective, Baltic Journal of Management, 15 (2), 281-302. Retrieved from: DOI:10.1108/BJM- 02-2019-0079

Malmendier, U., & Shanthikumar, D. (2007). Are small investors naive about incentives?. *Journal of Financial Economics*, *85*(2), 457-489. Retrieved from: DOI/10.1016/j.jfineco.2007.02.001

Mazzocchini, F. J., & Lucarelli, C. (2023). *Investors' Preferences in Financing New Ventures: A Data Mining Approach to Equity.* Springer Nature.

Mohammadi, A., Shafi, K. (2017). Gender differences in the contribution patterns of equity-crowdfunding investors. *Small Business Economics*, *50*, 275-287. Retrieved from: DOI:10.1007/s11187-016-9825-7

Moritz, A., Block, J., & Lutz, E. (2015). Investor communication in equity-based crowdfunding: a qualitative-empirical study. *Qualitative Research in Financial Markets*, *7*(3), 309-342. Retrieved from:

DOI:10.1108/QRFM-07-2014-0021

Moritz, A., & Block, J. H. (2016). *Crowdfunding: A literature review and research directions*. Springer International Publishing.

Petruzzelli, A. M., Natalicchio, A., Panniello, U., & Roma, P. (2019). Understanding the crowdfunding phenomenon and its implications for sustainability. *Technological Forecasting and Social Change*, *141*, 138-148. Retrieved from: DIO:10.1016/j.techfore.2018.10.002

Mollick, E. (2013) Swept Away by the Crowd? Crowdfunding, Venture Capital, and the Selection of Entrepreneurs. *SSRN.* Retrieved from: DOI:10.2139/ssrn.2239204

Mollick, E. (2014) The Dynamics of Crowdfunding: An Exploratory Study. *Journal of Business Venturing*, 29, 1-16. Retrieved from: DIO:10.1016/j.jbusvent.2013.06.005

Olson, M. (1989). Collective action. In *The invisible hand* (pp. 61-69). London: Palgrave Macmillan UK.

Olson, M. (2009). *The logic of collective action*. Cambridge, MA: Harvard University Press.

Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review, 100*(3), 641–672. Retrieved from: DOI:10.1257/aer.100.3.641

Piva, E., & Rossi-Lamastra, C. (2018). Human capital signals and entrepreneurs' success in equity crowdfunding. *Small Business Economics*, *51*, 667-686. Retrieved from: DOI:10.1007/s11187-017-9950-y

Presenza, A., Abbate, T., Cesaroni, F., & Appio, F. P. (2019). Enacting social crowdfunding business ecosystems: The case of the platform Meridonare. *Technological Forecasting and Social Change*, *143*, 190-201.Retrieved from: DOI:10.1016/j.techfore.2019.03.001

Reinstein, D., & Riener, G. (2012). Decomposing desert and tangibility effects in a charitable giving experiment. *Experimental Economics*, *15*, 229-240. Retrieved from: DOI:10.1007/s10683-011-9298-0

Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of consumer affairs*, *44*(2), 276-295. Retrieved from: DOI: 10.1111/j.1747- 6606.2010.01169.x.

Rennings, K. (2000). Redefining innovation—eco-innovation research and the contribution

from ecological economics. *Ecological Economics, 32*(2), 319–332. Retrieved from: DOI:10.1016/S0921-8009(99)00112-3

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary educational psychology*, *61*, 101860. Retrieved from: DOI:10.1016/j.cedpsych.2020.101860

Rosli, F. I., & Shahida, S. (2019). Adressing the principal-agent problem in equity crowdfunding in Malaysia. *International Journal of Islamic Economics and Finance Research*, *2*(1), 26-40. Retrieved from: DOI: doi.org/10.53840/ijiefer24

Shafi, K. (2021). Investors' evaluation criteria in equity crowdfunding. *Small Business Economics*, *56*(1), 3-37. Retrieved from: DOI:10.1007/s11187-019-00227-9

Schwienbacher, A. (2018). Entrepreneurial risk-taking in crowdfunding campaigns. *Small Business Economics*, *51*, 843-859. Retrieved from: DOI: 10.1007/s11187-017-9965-4

Schwienbacher, A. (2019). Equity crowdfunding: anything to celebrate?. *Venture Capital*, *21*(1), 65-74. Retrieved from: DOI:10.1080/13691066.2018.1559010

Shepherd, D. A., & Patzelt, H. (2011). The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking "What is to be Sustained" with "What is to be Developed". Entrepreneurship Theory and Practice, 35(1), 137-163. Retrieved from: DIO: 10.1111/j.1540-6520.2010.00426.x

Shneor, R., & Torjesen, S. (2020). Ethical considerations in crowdfunding. *Advances in Crowdfunding: Research and Practice*, 161-182. Retrieved from: DOI:10.1007/978-3-030-46309-0_8

Signori, A., & Vismara, S. (2018). Does success bring success? The post-offering lives of equity-crowdfunded firms. *Journal of Corporate Finance*, 50, 575–591. Retrieved from: DOI:10.1016/J.JCORPFIN.2017.10.018

Spence, M., (1973). Job Market Signaling. *The Quarterly Journal of Economics,* 87, 355–374. Retrieved from: DOI:10.2307/1882010

Thöni, C., & Volk, S. (2018). Conditional cooperation: Review and refinement. *Economics Letters*, *171*, 37-40. Retrieved from: DOI:10.1007/s10683-022-09756-9

Thornton, P. H., & Ocasio, W. (2008). Institutional logics. *The Sage handbook of organizational institutionalism*, *840*(2008), 99-128. Retrieved from: DOI:10.4135/9781849200387.n4

Toxopeus, H. (2019). *Financing sustainable innovation: From a principal-agent to a collective action perspective*. Doctoral Dissertation. Rotterdam: Erasmus Research Institute of Management, Erasmus University.

Troise, C., & Tani, M. (2020). Exploring entrepreneurial characteristics, motivations and behaviours in equity crowdfunding: some evidence from Italy. *Management Decision*, *59*(5), 995-1024. Retrieved from: DOI:10.1108/MD-10-2019-1431

Vaznyte, E., Andries, P., & Manigart, S. (2023). Are you part of the crowd? The role of sex and environmental characteristics for crowdfunding awareness. *Journal of Small Business Management*, *61*(2), 1062-1094. Retrieved from: DOI:10.1080/00472778.2020.1831808

Vismara, S. (2016). Equity retention and social network theory in equity crowdfunding. *Small Business Economics*, *46*, 579-590. Retrieved from: DOI: 10.1007/s11187-016-9710-4

Vismara, S., Benaroio, D., & Carne, F. (2017). Gender in entrepreneurial finance: Matching investors and entrepreneurs in equity crowdfunding. *Gender and entrepreneurial activity*. Retrieved from: DOI:10.4337/9781785364747.00015

Vismara, S. (2018). *Signaling to overcome inefficiencies in crowdfunding markets*. Springer International Publishing.

Vismara, S. (2019). Sustainability in equity crowdfunding. *Technological Forecasting and Social Change*, *141*, 98-106. DOI:10.1016/j.techfore.2018.07.014

Vismara S. (2022). Expanding corporate finance perspectives to equity crowdfunding. *The Journal of technology transfer*, *47*(6), 1629–1639. Retrieved from: DOI:10.1007/s10961-021-09903-z

Vollan, B., & Ostrom, E. (2010). Cooperation and the commons. *Science, 330*(6006), 923–924. Retrieved from:

DOI:10.1126/science.1198349

Volpe, R. P., Kotel, J. E., & Chen, H. (2002). A survey of investment literacy among online investors. *Journal of Financial Counseling and Planning*, *13*(1), 1. Retrieved from: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=c344af9fd2eeb9cb918e1d9956b478f542d77760

Vulkan, N., Åstebro, T., & Sierra, M. F. (2016). Equity crowdfunding: A new phenomena. *Journal of Business Venturing Insights*, *5*, 37-49. Retrieved from: DOI:10.1016/j.jbvi.2016.02.001

Walthoff-Borm, X., Schwienbacher, A., & Vanacker, T. (2018). Equity crowdfunding: First resort or last resort? Journal of Business Venturing, 33(4), 513–533. DOI: 10.1016/j.jbusvent.2018.04.001

Wang, W., Mahmood, A., Sismeiro, C., & Vulkan, N. (2019). The Evolution of Equity Crowdfunding: Insights from Co-investments of Angels and the Crowd. *Research Policy, 48*(8). Retrieved from: DOI: 10.1007/978-3-030-46309-0_5

Watts, S. (2015). Corporate social responsibility reporting platforms: enabling transparency for accountability. *Information Technology and Management*, *16*, 19-35. Retrieved from: DOI: 10.1007/s10799-014-0192-2

Wehnert, P., & Beckmann, M. (2021). Crowdfunding for a sustainable future: A systematic literatuur review. *IEEE Transactions on Engineering Management*, *70*(9), 3100-3115. Retrieved from: DOI:10.1109/TEM.2021.3066305

Zhao, X., Lynch Jr, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of consumer research*, *37*(2), 197-206. Retrieved from: DOI:10.1086/651257

VIII. Appendix:

Appendix 1: Description of variables

Type of variable	Name variables	Conceptual dimension	Dataset variable	Measurement	Source	Obs	Mean	Std. Dev	Min	Max
Dependent variable	Portfolio campaign success		Success rate	Percent of campaigns in a crowdfunder's portfolio that reached their target amount.	Transaction data	521	0.988	0.048	0.5	1
			Funding rate	The total funded amount per campaign vis-à-vis the target amount, averaged across a crowdfunder's portfolio investments.	Transaction data	521	3.99	2.087	1.171	6.81
			Funding time	The time taken for campaigns to reach the target of a crowdfunder's portfolio investments, measured vis-à-vis the campaign duration.	Transaction data	438	0.157	0.304	-0.728	3.074
			# investors	The logarithm of average investors of a crowdfunder's portfolio investments.	Transaction data	521	6.491	0.505	5.244	6.963
Independent variable:	Societal impact motivation	***Investor motivation***	Societal impact motivation	Binary variable based on the impact motivation results (societal impact motivation (1), no societal impact motivation (0))	Survey					
			Impact motivation	Investors' primary consideration in their investment decision: financial return (0), uncertainty (1), or societal impact (2).	Survey	625	0.992	0.94	0	2
Mediation variable:	Conditional cooperation									
		Investor characteristics								
			Risk aversion	Binary variable using a basic risk aversion survey question (1 = 50 Euro; 0–75% chance of winning 100 Euro)	Survey	625	0.382	0.486	0	1
			Financial literacy	Combining two questions: (1) Participants were asked about the outcome of leaving EUR 100 in a savings account with a 2% interest rate for five years. Responses were coded as 1 for "More than EUR 110" (correct) and 0 for other answers. (2) Participants also assessed the risk level between owning shares in a company versus an investment fund, with 1 indicating "False" (correct) and 0 indicating "True" (incorrect).	Survey	625	1.666	0.571	0	2

Type of variable	Name variables	Conceptual dimension	Dataset variable	Measurement	Source	Obs	Mean	Std. Dev	Min	Max
			Investment experience	Each activity, from stock exchange investment to crowdfunding via OnePlanetCrowd, was rated on a 5-point Likert scale, ranging from 0= None; 1 = Once; 2 = 2–5 times; 3 = 6–10 times; 4 = 10–30 times; 5 = more than 30 times	Survey	625	3.446	2.748	0	5
		Investor behaviour	Time taken	Measure of time investors spent considering Peerby/Seepje/VanMoof before investing, categorized into six time intervals ranging from less than 15 minutes to more than 5 hours.	Survey	625	2.81	1.317	1	6
			Search effort	Investors' evaluation of crowdfunding websites included watching videos, partially or fully reviewing project descriptions, examining investment sheets, and considering names of crowdfunders. Scores ranged from 0 to 5, reflecting cumulative engagement with these elements.	Survey	625	2.355	1.017	0	5
			Due diligence	Whether investors sought information outside the crowdfunding website before deciding to invest, coded as 1 for "Yes" and 0 for "No."	Survey	625	0.346	0.476	0	1
			Timing of investment	Mean of the duration between the start time of a campaign and investors' investment time divided by campaign duration.	Transaction data	467	0.221	0.207	0	1.074
			Average amount per campaign	The logarithm of a crowdfunder's average investments.	Transaction data	521	6.764	1.129	4.605	11.608
Control Variables			Age	The categorical variable where respondents select from the following age ranges: 1 = 18–24 years, 2 = 25–34 years, 3 = 35–44 years, 4 = 45–54 years, 5 = 55–64 years, and 6 = 65 years or older.	Survey	625	4.024	1.413	1	6
			Gender	Investors' gender is measured as a binary variable, where 0 indicates male and 1 indicates female.	Survey	625	0.235	0.424	0	1
			Income	The categorical variable where respondents select from the following income ranges: 1 = Less than 1.000 EUR, 2 = 1.000– 2.500 EUR, 3 = 2.500–5.000 EUR, 4 = 5.000–7.500 EUR, 5 = 7.500–10.000 EUR, 6 = 10.000 EUR–20.00, 7 = more than 20.000 EUR.	Survey	625	3.472	1.223	1	7