

Three Essays on Social Impact Venture Capital



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Submitted: Michaelmas Term
January 18th, 2025

This thesis is submitted to the Saïd Business School, University of Oxford, for the degree of Doctor of Philosophy in Management Studies.

Acknowledgements

I started my doctoral studies during the COVID-19 pandemic. I could not enter the UK, so I took my first-year courses online from Istanbul. I did not feel lonely, either then or during the rest of my studies, thanks to the many people who supported me intellectually and personally throughout my doctoral journey.

I thank Professor Pinar Ozcan for helping me identify my research context and for connecting me with the right people. Through our work at the Oxford Future of Finance and Technology Initiative, I met exceptional entrepreneurs and investors working on important problems. They were extending banking access to immigrants in the UAE, reducing the digital divide in Kenya, empowering disadvantaged girls in Türkiye, and mobilizing resources for earthquake relief around the world. They shaped my understanding of social innovation and motivated the questions I ask in this thesis.

I thank Professor Thomas Hellmann for his time and mentorship. He was always willing to brainstorm with me and to challenge and refine my ideas. His expertise in the methodologies I used in this thesis improved my research and shaped how I think as a researcher. I am very fortunate to have benefited from his guidance.

I am grateful to Saïd Business School and the University of Oxford for the scholarly environment they provided. I learned from an outstanding network of researchers. I am especially thankful to Eero Vaara, Eric Zhao, Daniel Armanios, Marya Besharov, Marc Ventresca, and other colleagues who offered encouragement and advice. I also benefited from interactions with entrepreneurs and investors through the School's Executive Education and MBA programs.

Many colleagues improved this thesis through feedback at workshops and conferences, including the INSEAD Doriot Entrepreneurship Conference, the Social Entrepreneurship Conference, Impact Investing Days, the Medici Summer School, and the

annual meetings of the Strategic Management Society and the Academy of Management. I also thank Green Templeton College for the research grant that helped me travel.

I cannot thank my family enough. My father, mother, grandmother, and brothers taught me to ask important questions. They also taught me patience, which I have come to see as essential for an academic career. Ten years ago, I scored highly enough in the university entrance exams to choose what to study for my bachelor's degree. A week before I made that decision, my father recommended a book. I am grateful for my father's *Nudge* that led me toward studying economics and, ultimately, toward becoming a social scientist.

Finally, a more personal note. Above all, I thank Yağmur. Your support made the last four years the best four years of my life so far. You were with me through every high and low of the doctoral journey. You were always the first to hear a new paper idea and the first to see my presentations. Moving to a new country is a big decision, and I will always be thankful that you took that step with me. Because of you, I am finishing this PhD not only with a thesis but also as someone who can dance salsa, who makes time to read fiction, and who can dock a boat.

To all of you, thank you.

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Abstract

This thesis explores how social impact-oriented venture capital (IVC) firms integrate the pursuit of social impact with financial objectives and how this dual focus shapes their investment decisions and outcomes. Each of the three papers contributes to this broader exploration. The first paper uses signaling theory to compare how traditional VCs, governmental VCs, and IVCs interpret signals of financial and social potential from new ventures. The findings show that while traditional VCs prioritize financial signals and governmental VCs focus on social signals, IVCs uniquely treat both financial and social signals as complementary. It provides an example of how dual motivations shape investment decision-making. The second paper investigates the concept of additionality. It demonstrates that IVCs possess expertise to identify and fund social ventures overlooked by traditional VCs. In this way, IVCs play a catalytic role. Not only do they fund otherwise neglected ventures, but their involvement also encourages follow-on investment from traditional VCs. The third paper explores the regional impacts of VC activity and exposes a dark side of traditional VC - it is associated with rising income inequality in targeted regions. In contrast, IVCs avoid these negative distributive effects. However, they produce lower gains in local economic growth than traditional VCs, revealing a trade-off in pursuing both financial and social objectives. Taken together, these three studies provide an empirical and theoretical basis for understanding how IVCs operate, the extent to which they realize their dual objectives, and the broader societal implications of their investment strategies.

Introduction

There is a growing need for financial investment to tackle societal issues such as climate change and social inequality. Although governments and charities provide funds for these causes, relying only on their support falls short in tackling societal challenges. A recent shift in private investors' attitudes towards more socially responsible practices has led to an increase in impact investing, an approach that combines financial returns with positive societal impact. A total of \$1.571 trillion was under management by impact investors as of 2024 (Hand et al., 2024).

The impact investing ecosystem consists of four main actors: asset owners, investment managers, investees, and beneficiaries. Asset owners provide the capital. It is the responsibility of investment managers to pool resources from asset owners and ensure that they are invested in investments with strong impact potential. Investees are the businesses or projects that receive the funding. Lastly, the beneficiaries are the people or communities who ultimately enjoy the benefits of these investments. The objective of asset owners and managers is making a significant impact on these beneficiaries. They do this by providing financial and nonfinancial resources, such as capital, networks, and expertise to their investees. The term *impact* refers to the change brought to target populations. These changes address societal or systemic issues and can be about alterations in the behaviors of populations or reductions in poverty levels.

Impact investing has experienced significant growth since its establishment. Global Impact Investing Network's (GIIN) 2022 report presents the industry's worldwide reach (Hand, Ringel, & Danel, 2022). Most impact investors, 74%, target risk-adjusted market-rate returns. Geographically, most of these organizations are based in developed markets, with 50% headquartered in the North America and 31% in Europe. The United States & Canada (29%), Western, Northern & Southern Europe (23%), and sub-Saharan Africa (10%)

are key regions for impact investing. In terms of industry allocations, impact investors have a significant focus on energy, financial services, and healthcare sectors. The amount of funds allocated in these areas also show the growing concern for climate change mitigation and adaptation, financial services in emerging markets, and challenges in education and sanitation (Hand, Sunderji, & Pardo, 2023).

Impact investors are active across different asset classes such as public and private markets, while private equity accounts for the largest percentage. On the other hand, funds are allocated across various business stages. The greatest share of impact assets is allocated to mature, private companies, followed by early-stage companies (Hand et al., 2023). The allocation to seed stage companies is significant in the number of investors involved. This shows a growing interest in nurturing early-stage business models with substantial impact potential.

Impact investing has recently started to attract academic attention. Researchers explore this field from several perspectives. One stream explores global trends in impact investing. The global expansion of impact investment practices was slow due to limited government support. Studies suggest that implementing tax incentives and building supportive infrastructure can be effective solutions (Glänzel & Scheuerle, 2016; León et al., 2019; Phillips & Johnson, 2021). Other researchers have paid attention to how impact investors make decisions. They found that impact investors value founder characteristics such as authenticity, integrity, and a commitment to social change (Block, Hirschmann, & Fisch, 2021; Croce et al., 2021; Lall, 2019; Lyon & Owen, 2019).

Another research area is the investor and investee dynamics. Impact investing is a unique empirical phenomenon to study this relationship as both parties are driven by dual objectives. This dual focus often leads to differences in language, mindset, and beliefs, thus creating tension between organizations. Studies showed that fostering collaboration,

building trust, and actively sharing knowledge within and between organizations help easing these tensions (Chen & Harrison, 2020). Other researchers argue that impact investors prioritize relationship-building and take on a stewardship role when working with investees which is a different approach compared to traditional investors (Scarlata & Alemany, 2010). Finally, impact evaluation is another crucial topic. Although the disclosure of social performance plays a key role in reducing the information gap between investors and investees (Chen & Harrison, 2020; Lall, 2019), the absence of standardized measurement methods and the use of qualitative evaluations over quantitative ones as well as the costly nature of impact measurement creates problems in measuring social impact (Casasnovas et al., 2025; Hehenberger, 2023).

So far, impact investing has largely been the subject of conceptual and qualitative research. While this body of work has created a theoretical foundation and offered insights through case studies, it falls short in providing generalized conclusions. This research gap necessitates a closer look especially at two specific areas: the practices of impact investors and the actual impact of their investments.

The first under-explored area is the operational practices of impact investors. How these investors integrate their dual objectives of financial return and social impact into their decision-making processes? What strategies do they employ in selecting investees? Existing literature acknowledges the dual objectives that guide these investors, but how these objectives translate into operational decisions is still unclear. To address this, a comparative approach analyzing large-scale data is necessary.

Second, an essential topic of study is evaluating the actual impact created by impact investors. The primary aim of impact investing is to generate social impact but there is a significant lack of knowledge about the scope and nature of this impact. It is important to understand if and how impact investors create impact. This includes assessing improvements

in investees' financial performance, social performance, and the broader effects on beneficiaries, consumers, employees, governance, and the environment. Does impact investors boost their investees' performance? Does impact investing foster inclusive growth in communities? Addressing this gap can validate the legitimacy of impact investing and encourage further investments in this sector.

To bridge these gaps, I focus on impact-oriented venture capital firms. These firms aim to generate both social impact and financial returns through investments in early-stage ventures. They adopt the traditional venture capital (VC) model and integrate it with a dual focus on social and financial objectives. Besides financial support, they offer non-financial assistance to help their investees establish and grow. Studying this new VC firm model is particularly relevant for this thesis for several reasons. Firstly, there is extensive academic literature on VC firms within finance and organizational studies. The organizational structure of VCs serves as an ideal framework for understanding the operational practices and decision-making processes of impact investors. Existing research provides insights into the decision-making of purely financial (private VCs) or purely social (governmental VCs) investors. This thesis aims to build upon these findings to explore the dynamics of socially and financially oriented VCs. Secondly, VC firms have a documented impact on the organizations, industries, and economies they invest in. VC is an effective investment model capable of changing growth trajectories. Therefore, by analyzing 15 years of longitudinal data on impact-oriented VC firms, we can assess the actual impact of these investors and determine whether they achieve the promised social impact.

I present my research in three papers. The first study examines how new ventures can attract investment despite significant information asymmetries. Signaling theory offers a framework for addressing these asymmetries (Higgins & Gulati, 2006; Hoehn-Weiss & Karim, 2014). While prior studies have identified signals that attract investors such as

educational credentials, experience, and affiliations, these studies have focused on signal senders and overlooked the role of signal receivers in the process (Blevins & Ragozzino, 2018; Cohen & Dean, 2005, Ozmel, Reuer, & Gulati, 2013; Townsend & Busenitz, 2015). This study argues that the effectiveness of signals depends not only on their senders but also on the characteristics of signal receivers, whose varying goals and information needs influence their interpretation of signals. It explores to what extent early-stage funding signals - angel and grant funding – attract three types of VC firms: private venture capital (PVCs), governmental venture capital (GVCs), and social impact venture capital (IVCs). Using a dataset of 8,300 ventures, the study finds that angel funding, signaling financial potential, appeals to PVCs; grant funding, signaling technical quality and social value, is more effective for GVCs; and both signals complement each other for IVCs. Furthermore, financial uncertainty amplifies the differences in how VCs respond to these signals. The findings highlight the importance of aligning signaling strategies with investor characteristics.

The second study investigates whether IVCs help close the funding gap faced by social ventures. Despite their potential to address global challenges, social ventures struggle to secure investment due to heightened information asymmetries (Austin et al., 2006; Miller et al., 2012; Lee et al., 2020). Building on the concept of additionality (Brest & Born, 2013; Hockerts et al., 2022), the study hypothesizes that IVCs play a dual role: directing resources to underfunded social ventures and enhancing their commercial viability to attract traditional VC (TVC) funding. Analyzing data from VC-backed startups from 2008 to 2022 through negative binomial regression and instrumental variable analysis, the study reveals that IVCs invest in ventures overlooked by TVCs and enhance TVC involvement in subsequent funding rounds. This certification effect is only effective for early-stage ventures with high information asymmetries and when IVCs have strong contextual expertise. The

findings provide empirical support for the additionality of impact investors in catalyzing funding for social ventures.

The third study explores whether IVCs can drive economic growth while reducing income inequality. Traditional VC, while fostering innovation and growth, has been criticized for exacerbating inequality by concentrating wealth and favoring privileged demographics (Lerner & Nanda, 2020; Kwon & Sorenson, 2023). This study hypothesizes that IVC offers a more inclusive alternative by targeting underserved regions, creating diverse employment opportunities, and supporting underrepresented founders. Using data from 2013 to 2022, the findings show that while traditional VC investments are associated with increased income inequality, IVC investments exhibit a negative (albeit not significant) relationship with inequality. Both VC types drive economic growth, but traditional VC has a stronger effect. These findings suggest that IVC fosters more inclusive growth and represents a promising mechanism for addressing inequality through investment.

In conclusion, these three papers collectively aim to fill gaps in our current understanding of impact investing, focusing specifically on their practices and social impact. This is essential for validating and advancing the field, and potentially leading to more informed decision-making and policy development in social impact financing.

Literature Review

Overview of Impact Investing

Funding is becoming increasingly important in addressing social issues such as climate change and social inequality. Although governments and charities provide funds to tackle with these challenges, they are not enough to meet the needs. Private investors' attention is needed to fill the funding gap. It is typical for private financing to focus on maximizing financial returns and overlook social and environmental challenges. However, the increasing interest in socially responsible practices boosted funds for impact investing.

The "impact investing" concept was coined in 2007 in a Rockefeller Foundation meeting (Harji & Jackson, 2012). As defined by the Global Impact Investing Network (GIIN), impact investing is making investments “with the intention to generate positive, measurable social and environmental impact alongside a financial return” (Global Impact Investing Network, 2021). This approach evolved from the venture philanthropy movement, which began in the early 2000s and used the venture capital model in philanthropic efforts. It supports long-term commitments to organizations that have the potential to create social change (Hockerts et al., 2022; Mair & Hehenberger, 2014). Around the same time, financial institutions started their transition from screening out assets based on preferred ethical considerations to actively looking for investments that could generate positive social outcomes (Höchstädter & Scheck, 2015). The merging of these trends increased attention to impact investing, with the total value of assets under management reaching \$1.571 trillion by 2024 (Hand et al., 2024). This concept is notably different from related concepts such as socially responsible investing (SRI), environmental, social, and governance (ESG) investing, and ethical investing.

Impact investing differentiates itself with its three key dimensions: intentionality, measurability, and additionality. Intentionality is about having an explicit goal to generate

social or environmental impact as well as financial returns. This focus on dual objectives distinguishes impact investing from other forms of investment where social impact may just be an incidental result (Barman, 2015; Findlay & Moran, 2019). There is also a strong emphasis on measurability, which involves monitoring and documentation of investment outcomes (Ebrahim & Rangan, 2011). The third dimension, additionality, evaluates whether the investment creates impact that would not have materialized otherwise (Brest & Born, 2013).

Key Players and their Roles in the Ecosystem. Asset owners, investment managers, investees, and beneficiaries are the four main actors in the impact investing ecosystem (Hockerts et al., 2022). Capital comes from asset owners, including individuals, foundations, pension funds, and public investment entities. They are crucial in initiating and sustaining investments. They decide where their capital goes and set their impact objectives. In this way, they shape the broad-level goals and results of the impact investing field. On the other hand, investment managers are responsible for pooling resources from asset owners and channeling them into investments that have a strong impact potential. Their compensation may consist of a management fee and a profit share that is tied to both the financial and social outcome of the investments. Funded businesses or projects are referred to as investees. They are instrumental in achieving the objectives set by the asset owners as their business models create the targeted impact (Agrawal & Hockerts, 2019; Kickul & Lyons, 2015). Finally, beneficiaries are the individuals or communities that benefit from these impact investments. Contributing to these beneficiaries is the main objective of asset owners and managers.

The Impact of Impact Investing. Impact investments are about creating social or environmental change for the communities they target. An important concept in understanding how this happens is the *impact value chain*. This framework breaks down the

process into 'Inputs', 'Activities', 'Outputs', and 'Outcomes' (Clark & Rosenzweig, 2004). 'Inputs' are the resources that investors bring to the table. They include financial and non-financial assets like networks and passion (Hockerts et al., 2022). 'Outputs' are the immediate results of these investments which are quantifiable in terms like the number of products sold or the extent of user engagement. 'Outcomes' are about the short to medium-term effects on people or communities, such as improvements in health or economic growth. Lastly, 'Impact', in this context, refers to long-lasting transformations in populations such as shifts in population behaviors or large-scale poverty reduction (Hockerts et al., 2022).

History and Evolution. Since its inception, impact investing has witnessed considerable growth. Global Impact Investing Network's (GIIN) 2024 report notes that 3,907 organizations are actively managing assets totaling 1.571 trillion US dollars (Hand et al., 2024). Investor's funding allocations to impact strategies have strongly increased with an 18% compound annual growth rate in total Asset Under Management (AUM) over the past five years (Hand et al., 2023). A significant portion of these organizations are fund managers who account for 61% of the total AUM. Other organizations include development finance institutions (DFIs), foundations, and family offices. A notable 74% of impact investors aim for market-rate returns and larger investors even more commonly look for such return levels (Hand et al., 2023). A large proportion of these organizations operate in developed economies, with North America hosting 50% and Europe 31%. Impact investors have smaller representation in emerging markets such as sub-Saharan Africa, Latin America & the Caribbean, and Southeast Asia (Hand et al., 2022).

On the other hand, when we look at the allocation of impact investing capital globally, the United States & Canada (29%), Western, Northern & Southern Europe (23%), and sub-Saharan Africa (10%) emerge as main areas for impact investment activities. In terms of industry allocations, impact investors primarily focus on energy, financial services,

and healthcare (Hand et al., 2023). Their preferences align with United Nations' Sustainable Development Goals such as those targeting decent work and economic growth, climate action, and gender equality.

In terms of asset classes, impact investors are engaged in both public and private markets. While private equity accounts for the largest percentage, 26%, of AUM, public equity and debt also play significant roles, each holding 14% of the assets (Hand et al., 2023). On the other hand, these funds are distributed across different stages of business development. The largest portion of impact investment assets is directed towards mature, private companies, with a large amount also going to early-stage firms (Hand et al., 2023). Allocation to seed-stage companies shows an increasing interest in supporting early-stage enterprises that have impact potential (Hand et al., 2023).

Lastly, the flow of capital from asset owners to investment managers is an important aspect in the impact investing ecosystem. Pension funds are significant source of capital which account for the largest proportion of investment managers' capital (20%), followed by family offices, development finance institutions, insurance companies, and banks (Hand et al., 2023). This diverse scene shows a broadening investor base and a growing recognition of the potential of impact investing as a tool to solve social challenges.

Academic Literature on Impact Investing

There is growing interest in impact investing among academic researchers, and they study the field from different perspectives. One area of focus is the evolving global landscape of impact investing. Studies investigate how different countries and regions adopt and integrate impact investing practices within their unique governmental, regulatory, and economic frameworks. Another study area focuses on the decision-making processes of impact investors. They examine the criteria they use in their decision-making process when choosing investees. Other researchers study what happens after investors choose their

investees and start working with them. In other words, they aim to understand the dynamics of the relationship between investors and the ventures they support, especially in terms of shared challenges. They look at how partnerships develop and how both parties balance financial and social goals. Lastly, large portion of academic research concentrates on the evaluation and measurement of impact. They explore the methodologies and challenges in quantifying and reporting the social effects of investments.

Global Trends in Impact Investing. The spread of impact investment practices is slow. This pace is due to limited government support, regulatory shortcomings, and a mindset that prioritizes financial return. Studies suggest that tax incentives and the development of supportive infrastructures could be effective strategies to enhance impact investing activities (Glänzel & Scheuerle, 2016; León et al., 2019; Phillips & Johnson, 2021). These measures could increase the attractiveness of impact investments by stimulating financial contributions and reducing transaction costs (Tekula & Andersen, 2019). For example, the rapid growth of the impact investing market in the UK, the US, Australia, and Canada has been driven largely by government support and the role of large foundations (Castellas, Ormiston, & Findlay, 2018; León et al., 2019; Phillips & Johnson, 2021).

Decision-Making in Impact Investing. Scholars have closely examined the decision-making processes of impact investors. Similar to traditional investors, impact investors evaluate financial aspects of their potential investments. They look at factors such as the financial history, innovation potential, and scalability of the business model (Block et al., 2021; Serrano-Cinca & Gutiérrez-Nieto, 2013). Moreover, they also assess the social impact potential of the organizations they consider investing in (Lall, 2019). Detailed evaluations of both financial and social factors help aligning investor's goals with the values of their investees and improve the chances of successful partnership (Agrawal & Hockerts,

2019). Moreover, the characteristics of individual entrepreneurs play a role in impact investment decisions. Impact investors evaluate the founding team's authenticity, business expertise, as well as qualities such as integrity and a commitment (Block et al., 2021).

Investor and Investee Dynamics. The study of the investor – investee dynamics in impact investing is important due to its complexity, and it has become another research stream. Their relationships are unique because they are both driven by both commercial and social goals. This often results in divergent languages, mindsets, and beliefs, leading to potential tensions between actors. (Agrawal & Hockerts, 2019; Mogapi et al., 2019). Research has shown that enhancing collaboration, fostering trust, and encouraging active knowledge sharing can help alleviate these tensions (Chen & Harrison, 2020). On the other hand, the literature has paid less attention to the positive aspects of impact investing relationships. From the investees' point of view, a successful partnership can improve organizational credibility and strengthen business strategies.

In impact investing, non-financial support of investors plays an important role in providing competitive advantage to investee companies. This support can take form of offering critical business advice, creating valuable industry connections, and enhancing organizational credibility (Holtslag et al., 2021). In this context, Social Impact Venture Capital (IVC) firms are particularly significant and different from other type of impact investors. They differ from traditional venture capital models by prioritizing relationship-building and adopt a stewardship role with their investees (Scarlata & Alemany, 2010).

Impact Evaluation. Impact investing differs from traditional investing in its emphasis on measuring and reporting impact. The disclosure of social performance is crucial in bridging the information gap between investors and investees (Chen & Harrison, 2020; Lall, 2019; Ebrahim & Rangan, 2014). Furthermore, impact assessment improves the credibility of impact investors and investees among their stakeholders (Glänzel & Scheuerle,

2016; Urban & George, 2018). However, investees may hesitate to share detailed information as impact measurement can be resource intensive. The lack of standardized measurement methods and the preference for qualitative over quantitative evaluations add to this challenge (Casasnovas et al, 2025; Hehenberger, 2023). Nevertheless, impact investors employ diverse evaluation strategies ranging from individual case assessments to broader approaches (Reeder et al., 2015).

As I detailed before, the impact value chain framework is important to understand impact measurement. While measuring 'Outcomes' is crucial, it is also complex and costly (Clark & Rosenzweig, 2004). There are multiple challenges in outcome evaluation such as the lack of data before interventions and the challenge of choosing appropriate evaluation methods. However, measuring 'Outputs' is a more viable alternative (Ebrahim & Rangan, 2014). Ideally, outcomes should be assessed where there is a straightforward cause-and-effect relationship, but such situations are rare due to the complex nature of interactions. Therefore, impact investors often measure outputs and use existing research to link these to potential outcomes (International Finance Corporation, 2019).

The growing academic interest in impact investing has led to the development of theoretical arguments, conceptual frameworks, and qualitative evaluations concerning impact investors and their interactions with investees. However, as I detailed in the introduction, our understanding of their practices and impact is limited. To broaden our understanding in these areas, I apply quantitative methods and utilize large panel data on social impact venture capital (IVC) firms in the three research papers that constitute this thesis.

**Paper 1 - Effectiveness of Early-Stage Funding Signals for Attracting Venture
Capital: A Comparison between Private, Governmental, and Social Impact Venture
Capital Firms**

ABSTRACT

This study extends research on new venture signaling by examining if the effectiveness of early-stage funding signals varies at attracting different types of investors. We argue that investors with varying characteristics and information needs respond to signals differently, and therefore signaling effectiveness is audience dependent. Empirically, we investigate the relative effectiveness of angel and grant funding signals at attracting different types of Venture Capital firms (Private Venture Capital, Governmental Venture Capital, and Social Impact-oriented Venture Capital). We find that angel funding, compared to grant funding, is 1.51 times more effective at attracting PVC investment but is 0.38 times less effective at attracting GVC investment. Moreover, we find that the effectiveness difference between angel and grant funding signals widens as the financial uncertainty in new ventures' operating environment increases. On the other hand, we find that angel and grant funding signals are equally effective and complementary signals at attracting IVCs. Taken together, our findings improve our understanding of how new ventures can strategize to attract different types of investors in different contexts.

INTRODUCTION

New ventures seek external funding to start and grow their businesses. However, only a few attract investors (Clough et al., 2019). One important reason for this is the large information asymmetries between new ventures and investors (Sanders & Bovie, 2004). Information asymmetry, in this entrepreneurial context, occurs as the resource seeker knows more about the quality of their venture than the resource provider. New ventures need to find strategies to reduce these asymmetries and obtain resources.

Signaling theory offers one way to understand how new ventures can reduce information asymmetries. According to this view, high quality ventures can inform investors about their unobservable quality by communicating observable signals that are hard to imitate by low quality ventures (Higgins & Gulati, 2006; Hoehn-Weiss & Karim, 2014). Investors then rely on these signals to assess venture quality and invest in ones with high potential. For example, studies have shown that ventures can signal high quality with their founding team's educational credentials (Piazza, Reese, & Chung, 2023; Townsend & Busenitz, 2015), founding team's previous experience (Cohen & Dean, 2005), affiliations with high status actors (Blevins & Ragozzino, 2018; Ozmel, Reuer, & Gulati, 2013), and early-stage funding relationships (Chen et al., 2023; Hallen, Cohen, & Park, 2023; Stevenson, Kier, & Taylor, 2020). These studies revealed that signals can be effective at attracting investors. However, they mainly focused on signal senders and overlooked the role of signal receivers in the signaling process.

Signal receivers use signals only if they are attentive to them and perceive them as valuable (Connelly et al., 2011). As different audiences have differing characteristics, they may look for different type of information in a signal when they evaluate investees. In this way, the effectiveness of signals at attracting signal receivers would depend on their specific information needs (Bitektine, 2011; Suchman, 1995). As Fisher et al. (2016: 384) observed,

“there is a recognized need for research exploring how assessments of new ventures differ across different audience contexts”. This paper is accordingly set out to investigate which new venture signals are most effective with which audiences.

This is important for several reasons. First, new venture funding landscape has recently attracted many types of new investors with different characteristics (Colombo, 2021; Drover, Busenitz et al., 2017a). The growth of funding alternatives necessitates equipping a comparative approach to understand investors’ similarities and differences. Although signaling theory traditionally considered the signaling transmission as an automatic process, new research highlights that effective signaling depends on signal receivers’ attention allocation and signal interpretation (Drover, Wood, & Corbett, 2018). Therefore, studying multiple investors comparatively would enable us to understand their role in the signaling process. Secondly, the increasing choice set of funding alternatives gave more power and agency to ventures when selecting their investors. Since the entrepreneurial finance research has so far placed agency to resource holders (Clough et al., 2019), we lack research on how entrepreneurs can differentiate their strategies to attract different investors. However, understanding how their target audience interprets signals would help new ventures strategize better to effectively convey the right message to their potential investors.

To test whether signaling effectiveness is signal receiver dependent, we focus on venture capital (VC) firms as there are many types of VCs with different characteristics, e.g., private venture capital firms (PVC), governmental venture capital firms (GVC), and social impact-oriented venture capital firms (IVC). PVCs typically aim to maximize financial returns whereas GVCs are known to promote public good. On the other hand, IVCs, a newer type of VC firm, aim to create financial returns and social impact simultaneously. Within this context, we use new ventures’ early-stage funding ties with angel investors and grant providers as signals. Prior research showed that receiving funding

from an angel investor certifies the confidence of an external actor in ventures' financial potential and founders' commercialization expertise (Drover, Wood, & Zacharakis, 2017b). On the other hand, receiving a grant certifies ventures' technical quality and social value (Chen et al., 2023; Islam, Fremeth, & Marcus, 2018).

In our study, we compare the signaling effectiveness of prior angel and grant funding at attracting different type of VC firms. We argue that VCs' characteristics and information need influence them to attend signals differently. Therefore, angel funding, compared to grant funding, is a more effective signal at attracting PVC investment but is a less effective signal at attracting GVC investment. Moreover, as IVCs expect both financial and social returns from their investees, angel and grant signals are equally effective and complementary signals for them. Lastly, we posit that the financial uncertainty in their operating environment leads VCs to base their decision-making more on their main information needs and thus increase the signaling effectiveness gap between angel and grant signals at attracting PVC and GVC investment. We found support for our hypotheses using a dataset of 8300 angel or grant-backed new ventures. Overall, our findings show that the effectiveness of early-stage funding signals at attracting VC firms depends on the characteristics of the evaluating VC and the signaling environment.

In this way, we contribute to the management literature on new venture signaling. First, we extend our understanding of the signaling process by focusing on the entirety of the signaling ecosystem with a more comprehensive view which includes the signal receiver and signaling environment. While prior literature had an extensive focus on ventures to understand signal effectiveness, we highlight that new ventures have heterogenous audiences that evaluate signals differently (Fisher et al., 2016). In this way, we offer a dynamic and context-dependent view of how signals are interpreted based on the varied informational needs of different investors. Second, we explore the interactions between

multiple signals. While previous research has illustrated how multiple signals can complement or substitute one another, we demonstrate that their relative effectiveness and interactions are contingent upon the specific characteristics of the evaluating venture capitalists and the signaling environment. Doing so, we theorize that investors' characteristics establish their information needs and thus the effectiveness of signals varies at attracting different investors. Third, we enrich literature on an emerging player in venture capital: Social Impact-oriented Venture Capital (IVC) firms. We show how IVCs uniquely interpret signals, highlighting their distinct evaluative criteria compared to traditional VCs. Notably, we inspect a previously unexplored aspect in the literature by examining how changes in environmental conditions affect IVCs' focus. We provide empirical evidence that their signal preferences remain the same regardless of financial uncertainty in the environment. In this way, we ask for further research on IVCs.

THEORETICAL BACKGROUND

Signaling theory suggests that when there are information asymmetries between parties, a party can communicate its quality to others by sending expensive and difficult to imitate signals (Spence, 1974). In the context of new venture resource mobilization, the signaling theory has been widely used to explain how new ventures can decrease the uncertainty in the eyes of their potential investors (Clough et al., 2019; Colombo, 2021). As an example, ventures can signal their ability to learn, identify opportunities, and adapt to change with their founders' educational background (Piazza et al., 2023; Townsend & Busenitz, 2015) and founders' prior working experience (Higgins & Gulati, 2006; Plummer, Allison, & Connelly, 2016). Moreover, ventures can provide indication about their financial, technical, and social potential with their affiliations to high status actors (Colombo, Meoli, & Vismara, 2019; Pollock et al., 2010), and early-stage funding relationships (Islam et al., 2018; Drover et al., 2017b; Epure & Guasch, 2020). In these studies, researchers assumed

audience homogeneity and examined signals in terms of their effectiveness at attracting one type of investor. However, recent literature has called for a new perspective that considers signal receiver heterogeneity to understand signaling process differences among different audiences (Clough et al., 2019; Colombo, 2021; Fisher et al., 2016).

A signal is only effective when investors allocate attention to receive it, interpret it as an important cue for their evaluation, and then process the signal (Colombo, 2021; Connelly et al., 2011). As signal receivers make decisions based on their cognitive mechanisms, beliefs, and norms (Drover et al., 2018; Fisher et al., 2017), they may not attend to and value signals in a similar way. Due to the varying information needs of investors, this perspective raises the question of whether signals' effectiveness is dependent on the audience. For example, a signal that is important for one investor may not be relevant for another investor. This can cause investors to rely on signals to varying degrees when making investment decisions.

This is especially important in the current funding landscape in which more and more actors start to play active roles in providing resources to new ventures. For example, new ventures can raise external funds via crowdfunding, incubators, and accelerators that were not traditionally available (Drover et al., 2017a). Moreover, the growth of funding alternatives has provided selection power to new ventures. Resource mobilization research has so far considered investors as key decision-makers and thus lacked attention on resource seeker's agency (Clough et al., 2019). However, as the modern funding landscape expanded ventures' choice set, they need specific information about their target audiences to strategize for investor attraction. Taken together, these developments necessitate a more detailed understanding of the signaling process that pays attention to signal receiver heterogeneity. In this way, we question if and why effectiveness of signals depends on signal receivers'

characteristics. Accordingly, we equip a comparative design and focus on multiple type of venture capital (VC) investors to understand their differences as signal receivers.

VC firms are important actors in the venture funding landscape. They supply financial resources to startups in return for equity stakes. Drawing funds from institutional investors, VCs offer strategic decision-making support, mentorship, and networking opportunities to ventures (Hellmann & Puri, 2000; Pahnke, Katila, & Eisenhardt, 2015). These firms' investment choices are led by individuals, often with prestigious managerial and educational backgrounds (Pahnke et al., 2015). Through socialization within an apprenticeship-based model of VCs, managers develop strong screening capabilities by learning industry knowledge, building external networks, and developing expertise in venture management (Guerini & Quas, 2016). VC firms diverge into Private VC firms, aiming purely for economic returns; Governmental VC firms targeting regional societal benefits; and Social Impact VC firms, which merge financial gains with societal impact. This granular perspective on VCs provides insight into their varied roles as signal receivers in the investment ecosystem.

Private Venture Capital

Private venture capital firms (PVCs) raise funds from institutional investors, aiming to maximize these investors' financial returns by investing in ventures with high economic potential. Since they operate within fixed-length terms for liquidating funds, PVCs establish specific milestones for their investee ventures, such as product progress and exit strategies (Pahnke et al., 2015). To achieve these milestones and meet their financial objectives, PVCs hire investment managers who possess extensive business expertise (Fisher et al., 2017). Additionally, they often secure board seats and adopt a hands-on approach in their relationships with investee companies, thereby influencing strategic decisions (Hallen, Katila, & Rosenberger, 2014).

PVCs' financial objectives does not only reflect in their post-investment strategies but also in the methods they use to screen and select ventures. These firms seek signals that diminish uncertainty regarding the financial potential of their investees. First, PVCs pay close attention to the founding teams of ventures, understanding that the teams' backgrounds play an important role in determining the ventures' likelihood of success (Fisher et al., 2017). Second, they assess product quality and market potential, knowing that firms with a competitive edge are more likely to generate higher economic returns. Therefore, PVCs concentrate on ventures that can prove their strategic advantages, often indicated by elements such as intellectual property rights (Block et al., 2014). Third, PVCs value certifications by other actors within their investor community. In these exclusive ecosystems, the decisions and reputations of known actors carry considerable weight, making PVCs more inclined to invest in ventures that have established credibility with other reputable investors (Fisher et al., 2017).

Governmental Venture Capital

Governmental Venture Capital Firms (GVC) is a type of VC fund that is owned and managed by governmental or public administration bodies (Bertoni, Colombo, & Quas, 2019; Colombo, Cumming, & Vismara, 2016; Cumming, Grilli, & Murtinu, 2017). These funds are created to fill the funding gap for ventures and reduce market failures caused by limited PVC supply (Brander, Du, & Hellmann, 2015; Colombo et al., 2016; Guerini & Quas, 2016). In this way, GVCs aim to help a specific geographical region or industry grow by creating jobs and fostering economic growth (Bertoni et al., 2019).

GVCs actively pursue social objectives, distinguishing themselves from PVCs. They focus on broader developmental objectives over profit motives and make decisions aligned with political institutions' goals (Cumming et al., 2017). As an example, GVCs invest in ventures in geographically remote locations, whereas PVCs invest locally in economically

advanced geographies and industries. This is to foster development in economically lagging regions and to increase employment opportunities (Bertoni et al., 2019; Cumming et al., 2017).

Social Impact-oriented Venture Capital

IVC firms have grown rapidly in recent years as part of the impact investing movement. Impact investing integrates philanthropic goals and mainstream financial decision making to generate social impact and financial returns (Hehenberger, Mair, & Metz, 2019; Lee, Adbi, & Singh, 2020; Logue & Grimes, 2022). The impact investing market worldwide is now \$1.164 trillion (Hand, Ringel, & Danel, 2022) and consists of venture philanthropy funds, banks, philanthropic foundations, nongovernmental organizations (NGOs), and IVCs. IVCs aim to generate financial returns and create a measurable positive impact on society by utilizing established VC investment practices (Agrawal & Hockerts, 2019; Cetindamar & Ozkazanc-Pan, 2017; Croce et al., 2021). They do this by investing in social ventures that address some of the most pressing societal problems such as climate change, poverty, access to microfinance and basic services such as healthcare, water, and education (Croce et al., 2021; Geczy et al., 2021). IVCs span across geographies and serve both in developing and developed countries to benefit the society at large (Hochstadter & Scheck, 2015).

In VC context, financial and social objectives have been traditionally targeted separately by PVC and GVCs. However, as IVCs pursue these goals simultaneously, their hybrid model brings differences to their organizational practices. As an example, IVCs demonstrate their commitment to social missions through using contracts that assign rights and duties based on impact (Geczy et al., 2021), and by communicating their identities and actions to external stakeholders (Toschi, Ughetto, & Fronzetti Colladon, 2022). In this way, they not only provide financial resources to social ventures, but also improve ventures'

operational and strategic competencies that are essential for the successful achievement of both objectives (Croce et al., 2021). Moreover, IVCs actively develop impact measures and implement them with their investees to achieve measurable and scalable social impact. For this purpose, IVCs often develop their own in-house toolbox that is implemented by a dedicated impact officer who is responsible for implementing, collecting, and compiling data from investee organizations (Agrawal & Hockerts, 2019).

IVCs' hybridity is also reflected in their screening processes. Similar to the PVCs, IVCs look for strong and authentic founding teams as well as high growth potential in their investees (Block, Hirschmann, & Fisch, 2021). They, however, also require a fit to their socially oriented investment thesis. Thus, they expect investees to address important and scalable societal problems with their business models (Roundy, Holzhauser, & Dai, 2017). In this way, some IVCs have begun using rigorous methods for measuring ventures' social impact orientation such as through the BCorp certification whereas others only evaluate the alignment of the founders' background and ventures' social objectives (Roundy et al., 2017). We summarize the objectives, characteristics, selection criteria, and give examples of PVCs, GVCs, and IVCs in Table 1.

Table 1. Summary of Private Venture Capital (PVC), Governmental Venture Capital (GVC), and Social Impact-oriented Venture Capital (IVC) Firms

Investor Type	PVC	GVC	IVC
Objectives	- Maximizing economic returns for fund investors	- Generating and promoting public good - Job creation	- Generating financial returns and creating a positive and measurable effect on society and the environment simultaneously
Examples	- Andreessen Horowitz - Greylock	- Shenzhen Capital Group - Biotech Fonds Vlaanderen	- Bethnal Green Ventures - Social Impact Capital - Novastar Ventures
Characteristics	- Employ investment managers with an extensive business expertise - Have deep engagement with ventures - Have routinized timetables and milestones for venture progress	- Employ investment managers with previous working experience in governmental institutions - Organize to alleviate market failures arising from limited supply of equity capital for new ventures	- Develop impact measures and employ dedicated impact officers to create measurable and scalable social impact - Take a slow money approach - Use contracts that assign rights and duties based on impact - Actively communicate social identities and actions to external stakeholders
Selection Criteria	- Competitive advantage - Founding team potential - Product quality - Market potential	- A potential to contribute to public knowledge and good - Operating in economically lagging regions	- Authenticity of founding team - Ventures' ability to grow - Having an important and scalable social impact orientation

Signal Effectiveness for Different Venture Capital Firms

Signals are only effective when they communicate an information about signal provider that the signal receiver is seeking to learn. Investors, however, have unique methods of evaluating potential investments, methods influenced by their individual characteristics (Suchman, 1995). They assess ventures differently by employing a distinct set of evaluation standards. In this context, PVC, GVC, and IVCs would attach varying importance to signals and use them in their decision making differently. PVCs look for signals that help reduce uncertainty related to investees' financial potential. GVCs, on the other hand, utilize signals that share information about investees' social value. Lastly, IVCs value both type of signals that reveals information on social value and financial potential of investees. To compare the signal effectiveness differences for different VC firms, we focus on two specific early-stage funding signals – angel and grant funding – that reveal different types of information about ventures for later stage investors.

Angel investors are high-net-worth individuals with entrepreneurial or business experience who use their own funds to finance young ventures (Drover et al., 2017b). They operate in a market-driven environment, and their decisions are based on personal capitalism and self-interest. As such, they look for opportunities to make economic returns from their investments (Fisher et al., 2017). To identify the most promising investment opportunities, angel investors employ a rigorous screening process. In their evaluations, angels consider many factors including ventures' founder team, product potential and market attributes (Capizzi, Croce, & Tenca, 2022). As an example, angel investors look for leaders who possess commercialization expertise as they assess their ability to navigate challenges associated with taking new technologies to market (Fisher et al., 2017). Therefore, the signals sent by angel investors to later-stage investors are rich in information about the financial potential of the venture. Drover and colleagues (2017b) find, for instance, that

ventures' relationships with angel investors produce certification effects for VCs by revealing information about ventures' financial viability as well as founders' commercial capacity. This serves to reduce uncertainty concerning financial potential for later-stage investors, particularly PVCs and IVCs that prioritize these aspects.

On the other hand, grant providers operate under a different paradigm. These organizations have broader social goals than the financial success of ventures, such as accelerating innovation and advancing knowledge for the public good (Chen et al., 2023). The funding they provide is allocated through competitive screening processes designed to identify ventures capable of contributing to scientific, social, and knowledge advancements (Islam et al., 2018; Pahnke et al., 2015). As a result, the signals sent by grant providers reveal information about the venture's social value and technical potential to later stage investors. For instance, Islam and colleagues (2018) show that grant-backed ventures were 12% more likely to receive late-stage external funding in US clean energy sector. Stevenson and colleagues (2020) also found that obtaining a grant enhances the likelihood of startups securing subsequent investment funds. Therefore, grant signals are particularly important for GVCs and IVCs, given the early-stage funders' alignment with their own investment theses.

Given these foundational differences, we argue that the effectiveness of these signals diverges based on the informational content they convey. For PVCs, angel funding serves as a stronger indicator of a venture's prospects, given its certification of financial return and market potential of the early-stage venture. GVCs, however, favor grant funding signals, as these better align with their investment criteria focused on social impact and technical innovation. IVCs, aiming to select ventures to generate both social impact and financial return, find both types of signals equally valuable, given their dual focus. Therefore, we hypothesize:

Hypothesis 1a (H1a): *Prior angel funding is a more effective signal than prior grant funding at attracting PVCs.*

Hypothesis 1b (H1b): *Prior grant funding is a more effective signal than prior angel funding at attracting GVCs.*

Hypothesis 1c (H1c): *Prior angel funding is an equally effective signal as prior grant funding at attracting IVCs.*

Signal Interactions and Complementarity

In addition to the signal effectiveness, we argue that signal interactions also depend on signal receiver characteristics. Recent research suggests that ventures can send multiple signals at the same time (Bapna, 2019). When the combined effect of two signals is stronger than their individual effects, these signals are complementary signals (Stern, Dukerich, & Zajac, 2014). Bapna (2019) showed that two signals can complement each other when they address distinct dimensions of an uncertainty in a decision-making process, rather than overlapping ones. As an example, their study found that signals of product certification and prominent customers are complementary signals for technology venture evaluations (Bapna, 2019). Furthermore, Colombo et al. (2019) found that affiliations to a prestigious university and a prestigious underwriter complement each other in biotech ventures' initial public offering (IPO) evaluation. On the other hand, two signals are substitutes when they do not reduce greater uncertainty together (Higgins, Stephan, & Thursby, 2011). Higgins et al. (2011) explained that a new signal is redundant when a previous signal already conveys superior or equal information on the dimensions the new signal addresses. For example, their study showed that affiliations to Nobel laureates and patents substitute each other in technology firms' IPOs. Moreover, Islam et al. (2018) found that government grants and patents substitute each other in attracting VCs.

With limited resources and a few signals available for new ventures to attract investors, it is critical for them to know which signals are effective and how multiple signals can alleviate information asymmetries better. In this way, ventures can develop strategies on possessing extra signals. Especially because these signals are costly to get, multiple signals' interactions are valuable for new ventures. However, it is not clear in this research stream whether signals interact in the same way for different investors. We argue that the value of signal interactions depends on signal receivers' characteristics as they have distinct information needs and screening processes.

In the VC context, PVC firms attend to signals that share information on investees' financial potential. As an example, receiving an angel investment can reduce the financial uncertainty associated with a venture in the eyes of PVCs. If this venture receives a grant on top of angel funding, this signal reveals new information on the venture's social value but repeats the known information on its financial aspects. This is because a grant funding, compared to an angel funding, reveals equally or less valuable information on ventures' financial aspects. Therefore, we argue that grant and angel signals are not complementary at attracting PVCs. Similarly, if a venture with a prior grant receives a new angel funding, this new signal will not reveal additional information about ventures' social dimensions for GVCs. We argue, however, that the interaction of angel and grant signals are different for IVCs. IVCs have dual objectives and look for multiple dimensions in their investees for creating economic return and generating social impact. Therefore, the positive effects of the angel and grant signals on attracting IVCs are additive as they signal quality in different domains that IVCs look for. Therefore, we hypothesize:

Hypothesis 2a (H2a): *Prior angel and grant funding together are not more effective signals than prior angel funding alone at attracting PVCs.*

Hypothesis 2b (H2b): *Prior angel and grant funding together are not more effective signals than prior grant funding alone at attracting GVCs.*

Hypothesis 2c (H2c): *Prior angel and grant funding together are more effective signals than prior angel funding or grant funding alone at attracting IVCs.*

Financial Uncertainty in the Signaling Environment

The signaling environment, *the medium where signals are transferred from signal sender to receiver*, is another factor that affects the signaling process (Connelly et al., 2011). First, the signaling environment can change the observability of signals. Noisier environmental contexts distort the observability of signals and reduce the signaling effectiveness (Drover et al., 2018; Vanacker et al., 2020). Second, the availability of information in the signaling environment determines the extent to which decision makers attend to signals. Higher information availability lowers information asymmetry and decreases the value of signals in an environment. Studies showed that signals are more effective in informationally opaque countries and industries (Ramchander, Schwebach, & Staking, 2012; Vasudeva, Nachum, & Say, 2018).

However, we argue that environments can also have a direct effect on signal receivers' selection preferences. This is because organizational practices are shaped as firms try to increase fit to their environment (Cobb, Wry, & Zhao, 2016). As a response to the contextual contingencies in their environment, firms update their behavior. In the entrepreneurial finance context, we expect that the financial uncertainty in operating countries is one of the important factors that affects VCs in altering their decision-making process. Financial uncertainty is associated with "a country's ability to finance its sovereign, commercial, and trade obligations" and its likelihood of having financial crises (Cobb et al., 2016: 2111). Therefore, it changes the availability of funds for VCs and VCs' risk appetite. As decision makers' characteristics affect how they respond to external stimuli, we expect

that VCs shift their investing behavior according to their characteristics when they are faced with financial uncertainty.

In more stable times, VCs take more risks to explore new industries and geographies as they have abundance of resources and their opportunity cost of failing is low (Conti et al., 2019; Nanda & Rhodes-Kropf, 2017). However, under financial uncertainty, the availability of capital diminishes and their cost of failing increases. VCs allocate their attention and resources to the core areas they have the most expertise in. Therefore, we argue that VCs get stricter in their selection process and focus more on their main objectives as the financial uncertainty in the environment increases. In this way, when faced with higher uncertainty, we expect PVCs to be stricter in selecting ventures with high financial potential and value angel funding signals even more compared to grant signals. Similarly, we expect GVCs to be stricter in selecting ventures with high social potential and value grant signals even more compared to angel funding signals. On the other hand, as we explained above, we expect angel and grant funding signals to be equally effective in attracting IVCs. We do not expect financial uncertainty to change this relationship.

Hypothesis 3a (H3a): *Financial uncertainty in the operating environment increases the signaling effectiveness of prior angel funding over grant funding at attracting PVCs.*

Hypothesis 3b (H3b): *Financial uncertainty in the operating environment increases the signaling effectiveness of prior grant funding over angel funding at attracting GVCs.*

Hypothesis 3c (H3c): *Financial uncertainty in the operating environment does not change the signaling effectiveness of prior grant funding over angel funding at attracting IVCs.*

METHODS

Sample

We test our hypotheses utilizing Crunchbase (www.crunchbase.com), a publicly accessible database that provides comprehensive information on venture capital funding. It includes data on new ventures, their investors, and funding rounds. Crunchbase collects and triangulates information from press releases, SEC filings, and VentureSource database. The accuracy of the Crunchbase data is also validated by recent scholarship (Ter Wal et al., 2016; Wang, Pahnke, & McDonald, 2022).

We collected our data from Crunchbase in October 2022. As we are interested in the impact of angel and grant funding on VC attraction, we considered only for-profit ventures that have received an angel or grant funding in their early stages. We examined ventures that received an angel or grant funding between 2000 and 2019 so that even the most recently established ventures in the period had sufficient time to attract VCs. We obtained a set of 19,950 ventures after removing those with missing data in the key explanatory and control variables. These ventures operate all over the world and are from different industries. We collected information on all funding rounds and investors of these ventures.

As we elaborate more in our empirical strategy section, we test our hypotheses by matching and comparing different venture groups. Our first group contains ventures that have received angel funding in their early stages. Our second group contains ventures which obtained grant funding. Lastly, we identified ventures that have received both angel and grant funding in their early stages.

Variables

Dependent Variables. We created dichotomous variables indicating whether the venture received PVC, GVC, IVC investment within three years after their angel or grant

funding¹. *PVC* is coded 1 for ventures that received PVC investment and 0 otherwise. *GVC* and *IVC* variables are also created in the same way.

We used Crunchbase’s identification for Private and Governmental VC firms. Then, we used the impact investor list created by Cole and colleagues (2023) to designate IVCs. They constructed their list manually by looking up if an institutional investor states dual goals of generating social impact and earning financial returns with their investments. Some examples of IVCs include *Bethnal Green Ventures*, “Europe’s leading early-stage tech for good VC, investing in ambitious and diverse founders that use technology to create positive impact at scale” (Bethnal Green Ventures, 2022). *Social Impact Capital* is a New York based IVC that focuses on the “essentials of human need as energy, water, food, health, environment, education, housing, access to capital, and social justice”. They aim to make “investments that can deliver top decile returns in addition to a positive social impact” (Social Impact Capital, 2023). As a last example, *Novastar Ventures* is a Nairobi based IVC that aims to “fuel an entrepreneurial revolution to transform markets and sectors in Africa” and to “create lasting value for the many, not just the few, for people and planet – for good” (Novastar, 2022).

Independent Variables. *Angel* is the main independent variable that indicates whether the venture has been funded by angels or grants. It is set to 1 if the venture received angel funding, and 0 if it received grant funding. To test our hypotheses on signal complementarity (H2a, H2b, and H2c), we created a binary variable (*Both*) that indicates that the venture received both an angel and grant funding in its early stages. To test our H3a, H3b, and H3c we operationalized the financial uncertainty in the country of the operation in the year of receiving the angel or grant funding. We utilized the International Country Risk

¹ Our analyses that operationalized our DVs using VC investment within one year and five years provided similar results.

Guide (ICRG) dataset of the PRS Group which is widely used by researchers (Cobb et al., 2016). The *Financial Uncertainty* reflects “a country’s ability to meet its commercial and trade debt obligations” (Cobb et al., 2016: 2114).

Control Variables. We added various control variables and fixed effects that can affect the likelihood of obtaining investment from VCs. Most importantly, we controlled for ventures’ *Economic Value Proposition and Social Value Proposition*. Organizations emphasizing their high potential for value generation are more likely to attract external funding sources (Moss et al., 2018). Independent from their angel and grant signals, ventures can attract VCs with their economic and social value propositions. In the context of VC financing, "Economic Value Proposition" (EVP) refers to the emphasis a venture places on its potential for financial success and return on investment. For ventures seeking VC funding, EVP is demonstrated through a focus on high growth, scalability, and profitability. Ventures with a strong EVP communicate their potential for significant market impact, competitive advantage, and financial returns to investors. They typically highlight their revenue models, market size, competitive positioning, and long-term financial projections. The goal is to assure VCs of the economic viability and potential for exits.

On the other hand, "Social Value Proposition" (SVP) in VC financing is the emphasis a venture places on creating positive social or environmental impact with its business model. While traditionally less emphasized in conventional venture capital, SVP is increasingly important, especially for impact investing. Ventures with a strong SVP articulate how their products, services, or business practices contribute to social or environmental improvements. This may include addressing social issues, fostering sustainable practices, or enhancing community development.

To distinguish the effect of early-stage funding signals from the value proposition of ventures’ business model, we controlled for ventures’ economic and social value

propositions. To do this, we employed the Linguistics Inquiry and Word Count (LIWC) tool to assess business descriptions of ventures as presented on Crunchbase. This process measures how much ventures used social and economic linguistic elements when explaining their business models. We utilized the economic value orientation and social value orientation dictionaries developed by Moss et al. (2018). We coded the LIWC results as Economic Value Proposition (EVP) and Social Value Proposition (SVP).

We also accounted for specific founder attributes. The gender of a founder can influence venture capital distribution (Kanze et al., 2018). For ventures with at least one female founder on their team, we coded the variable *Female Entrepreneur* as 1. Additionally, serial entrepreneurs have advantages in funding and performance in subsequent ventures because of the knowledge and network gained from their prior experiences (Buttice, Colombo, & Wright, 2017; Gruber, MacMillan, & Thompson, 2008). Thus, we coded *First Time Entrepreneur* 1 for ventures with founders lacking prior founding experience. We also controlled for the founders' *University Prominence* by categorizing the highest-ranking university from which a founder graduated, using the QS World University Rankings. Specifically, 'University Prominence 1' was designated for graduates from universities ranked 1-10, 'University Prominence 2' for ranks 11-100, 'University Prominence 3' for ranks 101-500, and 'University Prominence 4' for institutions outside these specified rankings.

Additionally, we controlled for the *Age* of the venture, defined as the number of years from its establishment to the point of receiving angel or grant funding. Another important control variable was the connectedness of the venture's angel and grant providers within the VC ecosystem. Investor expertise, which enhances their ability to select successful ventures and develop their network, is accrued over time (Drover et al., 2017b). We quantified this by counting the joint funding rounds the angel or grant provider had participated in with

specific types of VC firms prior to investing in the venture (*PVC Connectedness*, *GVC Connectedness*, *IVC Connectedness*). As our study examines the relative signaling power of angel and grant providers, it was vital to mitigate any potential biases arising from reputation or network effects by including this control. Moreover, we controlled for the *Funding Amount* received from angel or grant providers, recognizing that ventures can leverage these funds to attract subsequent investors. Lastly, to adjust for unobserved heterogeneity, we included control variables for country-specific factors (*Country*), industry-related factors (*Industry*), and the temporal dynamics associated with the early-stage funding year (*Year*).

Empirical Strategy

The main challenge in our analysis is that angel and grant providers do not randomly select their investee ventures. After their intense evaluation processes, they fund only a few ventures. Therefore, regressing subsequent VC investment decisions to the angel or grant funding signals would be biased due to the endogeneity in the selection. We used propensity score analysis to account for this endogeneity issue (Rosenbaum & Rubin, 1983). This approach creates a matched sample of groups based on specified factors. In our analysis, propensity score matching (PSM) method matches angel-backed ventures and grant-backed ventures that were equally likely to get funding from an angel or grant provider at the point of their early-stage funding. Using this new matched sample, we then used logistic regressions to estimate the effect of receiving an angel funding (rather than a grant funding) on subsequent VC investments.

Our empirical methodology involved three steps. First, we generated propensity scores for all ventures using the one-to-one PSM procedure. To do that, we used our control variables (*Economic Value Proposition*, *Social Value Proposition*, *Age*, *Funding Amount*, *Female Entrepreneur*, *First Time Entrepreneur*, *University Prominence*, *Country*, *Industry*, *Year*). By using a logistic regression with receiving an angel funding (rather than a grant) as

the dependent variable, we were able to generate propensity scores to be applied to the next step. In our second step, we matched each grant-backed venture to another angel-backed venture that has the closest propensity score.

This process creates two groups of ventures that are comparable in their chances of attracting subsequent VC investment. Most importantly, we paired ventures with similar value propositions at the time of receiving early-stage funding from an angel investor or grant provider. For instance, a grant-backed venture with a high social value proposition is matched with an angel-backed venture with a high social value proposition. These matched ventures also have similar level of economic value proposition. Moreover, the founder teams of the matched ventures have a similar level of gender composition, entrepreneurial experience, and are graduated from universities with similar prominence. Lastly, they operate in the same industry, country and obtained their early-stage funding during the same calendar year. They only differ in terms of their early-stage funder type.

This process yielded 8,300 observations of 4,150 grant-backed and 4,150 angel-backed ventures. Third, we examined our hypotheses using logistic regression. We included our control variables and fixed effects (e.g., country, industry, and funding year) in this regression. Below are the representations of our regressions:

$$PVC = \beta_1 * Angel + \beta_2 * X + e$$

$$PVC = \beta_1 * Both + \beta_2 * X + e$$

$$GVC = \beta_1 * Angel + \beta_2 * X + e$$

$$GVC = \beta_1 * Both + \beta_2 * X + e$$

$$IVC = \beta_1 * Angel + \beta_2 * X + e$$

$$IVC = \beta_1 * Both + \beta_2 * X + e$$

To examine the interaction effect of the financial uncertainty in the environment (H3a, H3b), we added the *Financial Uncertainty* variable to the equations:

$$PVC = \beta_1 * Angel + \beta_2 * Financial\ Uncertainty + \beta_3 * Angel * Financial\ Uncertainty + \beta_4 * X + e$$

$$\text{GVC} = \beta_1 * \text{Angel} + \beta_2 * \text{Financial Uncertainty} + \beta_3 * \text{Angel} * \text{Financial} \\ \text{Uncertainty} + \beta_4 * X + e$$

RESULTS

Our first step was calculating propensity scores for the ventures. We regressed receiving angel funding (rather than grant) on ventures' economic value proposition, social value proposition, age, funding amount, founder team gender composition, entrepreneurial experience, university prominence, country, industry, and early-stage funding year. Based on estimates from this regression, we calculated propensity scores. Based on these scores, we constructed a matched sample of 4,150 angel-backed and 4,150 grant-backed ventures. Table 2a and 2b show the means of these matched samples.

Table 2a. Descriptive Statistics for Ventures in the Full and Matched Samples

Variables	Full sample	Full sample	Full sample T-test p-value	Matched sample	Matched sample	Matched sample T-test p-value
	Angel-backed ventures (15,730 observations)	Grant-backed ventures (4,220 observations)		Angel-backed ventures (4,150 observations)	Grant-backed ventures (4,150 observations)	
	Mean	Mean		Mean	Mean	
Economic Value Proposition	3.05	1.99	0.00	2.10	1.99	0.07
Social Value Proposition	2.19	2.68	0.00	2.67	2.68	0.86
Female Founder	0.16	0.15	0.82	0.16	0.15	0.65
First Time Founder	0.31	0.57	0.00	0.57	0.57	0.69
University Prominence 1	0.15	0.10	0.00	0.11	0.10	0.96
University Prominence 2	0.17	0.11	0.00	0.10	0.11	0.30
University Prominence 3	0.18	0.16	0.00	0.15	0.16	0.18
University Prominence 4	0.49	0.63	0.00	0.64	0.63	0.54
Age	3.08	3.91	0.00	3.85	3.91	0.19
Funding Amount	5.98	5.15	0.00	5.11	5.15	0.02
Industry						
Computer and Electronics	0.53	0.39	0.00	0.41	0.39	0.29
Biotechnology and Health-related	0.14	0.34	0.00	0.34	0.34	0.61
Communication and Media	0.13	0.04	0.00	0.04	0.04	0.66
Services - Non High-tech	0.09	0.09	0.32	0.08	0.09	0.64
Consumer Goods	0.10	0.05	0.00	0.04	0.05	0.06
Energy	0.02	0.09	0.00	0.09	0.09	0.62

Table 2b. Descriptive Statistics for Ventures in Matched Samples for Hypotheses 2a, 2b, 2c

Variables	Matched sample	Matched sample	Matched sample T-test	Matched sample	Matched sample	Matched sample T-test
	Angel and Grant backed ventures (1,910 observations)	Angel-backed ventures (1,910 observations)		Angel and Grant backed ventures (1,150 observations)	Grant-backed ventures (1,150 observations)	
	Mean	Mean	p-value	Mean	Mean	p-value
Economic Value Proposition	2.35	2.31	0.65	2.32	2.06	0.02
Social Value Proposition	2.68	2.73	0.58	2.60	2.56	0.76
Female Founder	0.22	0.20	0.17	0.20	0.21	0.61
First Time Founder	0.35	0.34	0.46	0.35	0.34	0.72
University Prominence 1	0.18	0.18	0.84	0.19	0.18	0.41
University Prominence 2	0.18	0.19	0.32	0.19	0.15	0.02
University Prominence 3	0.18	0.19	0.28	0.18	0.18	1.00
University Prominence 4	0.46	0.44	0.15	0.44	0.48	0.02
Age	2.95	3.08	0.90	2.89	2.97	0.23
Funding Amount	6.04	6.03	0.68	5.95	5.96	0.65
Industry						
Computer and Electronics	0.44	0.44	0.77	0.45	0.45	0.97
Biotechnology and Health-related	0.32	0.31	0.47	0.31	0.33	0.18
Communication and Media	0.06	0.06	0.54	0.06	0.07	0.70
Services - Non High-tech	0.06	0.57	0.50	0.06	0.05	0.17
Consumer Goods	0.05	0.05	0.72	0.06	0.05	0.45
Energy	0.07	0.08	0.11	0.55	0.05	0.45

Without the matching process, we observe several distinctions between angel-backed and grant-backed ventures. Angel-backed ventures, in contrast to grant-backed ones, demonstrate a higher economic value proposition and a lower social value proposition. Serial entrepreneurs and founders with degrees from prestigious universities are more likely to obtain angel funding. Moreover, these ventures were typically younger and secured larger amounts of early-stage capital. Industry-wise, ventures in the computer and electronics, communication and media, and consumer goods sectors showed a higher propensity for angel funding. In contrast, ventures in the biotechnology and energy sectors exhibited a greater inclination towards grant funding. After our matching process, the specified variables for these two groups are statistically similar based on a two-sample test of proportion which reassures our matching process.

Table 3 presents the results for our logistic regression that is testing our first hypotheses (H1a, H1b, H1c). Model 1 provides support for Hypothesis 1a, showing that prior angel funding is a more effective signal than prior grant funding at attracting PVCs ($b = 0.41$; $p < 0.001$). Angel-backed ventures were 1.51 times more likely to receive PVC investment compared to grant-backed ventures ($\exp 0.41 = 1.51$). Moreover, Model 2 provides support for Hypothesis 1b, showing that prior grant funding is a more effective signal than prior angel funding at attracting GVCs ($b = -0.97$; $p < 0.001$). Angel-backed ventures were 0.38 times less likely to receive GVC investment compared to grant-backed ventures ($\exp -0.97 = 0.38$). Furthermore, Model 3 provides support for Hypothesis 1c, showing that prior grant funding and prior angel funding are equally effective signals at attracting IVCs ($b = -0.10$; $p = 0.72$).

Table 3. Logistic Regression Results for the Likelihood of Receiving VC Investment (Angel vs Grant-backed Ventures)

	PVC Investment (Model 1)	GVC Investment (Model 2)	IVC Investment (Model 3)
Angel (vs Grant)	0.41*** (0.06)	-0.97*** (0.23)	-0.10 (0.29)
Economic Value Proposition	0.02 (0.01)	.070* (0.03)	0.05 (0.05)
Social Value Proposition	-0.01 (0.01)	0.01 (0.03)	0.14*** (0.03)
Female Founder	-0.04 (0.08)	-0.10 (0.27)	0.19 (0.33)
First Time Founder	-0.63*** (0.06)	-0.14 (0.21)	-0.79* (0.33)
University Prominence 2	0.10 (0.11)	-0.37 (0.35)	-0.59 (0.47)
University Prominence 3	-0.11 (0.1)	-0.87* (0.37)	0.03 (0.39)
University Prominence 4	-0.27*** (0.9)	-0.65* (0.3)	-0.86* (0.41)
Age	-0.90*** (0.01)	-0.16*** (0.05)	0.13* (0.06)
Funding Amount	0.35*** (0.04)	0.45*** (0.13)	0.31 (0.20)
PVC Connectedness	0.88*** (0.06)		
GVC Connectedness		1.11* (0.52)	
IVC Connectedness			1.38*** (0.33)
Constant	-4.46*** 1.06	-7.46*** 1.45	-6.98*** 1.74
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	8,300	8,300	8,300
Prob. > chi2	0	0	0
Log pseudo likelihood	1,133.27	529.05	121.44
Pseudo R2	0.12	0.33	0.18

Note: Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

Table 4 presents the results for our logistic regression that is testing our second set of hypotheses (H2a, H2b, H2c). The matched samples are different for this regression. Here, ventures that have received both angel and grant funding are matched to ventures that have received only one type of early funding. This process results in 1,910 pairs of angel-backed and angel and grant-backed ventures. Lastly, we matched 1,160 grant-backed ventures to 1,160 angel and grant-backed ventures.

Model 4 provides support for Hypothesis 2a ($b = -0.13$; $p = 0.09$). This means that the angel and grant signals are not complementary signals for PVCs, and interestingly, results show that a grant signal on top of an angel signal is negatively related to ventures' PVC attraction. Moreover, Model 5 provides support for Hypothesis 2b, showing that prior angel and grant funding together are equally effective signals as prior grant signal at attracting GVCs ($b = 0.17$; $p = 0.46$). Furthermore, Models 6 and 7 provide support for Hypothesis 2c. Model 6 shows that prior angel and grant funding are complementary signals ($b = 1.09$; $p < 0.001$) and together they are 2.97 times more effective than prior angel funding alone at attracting IVCs ($\exp 1.09 = 2.97$). On the other hand, Model 7 shows that prior angel and grant funding together are 7.46 times more effective than prior grant funding alone at attracting IVCs ($b = 2.01$; $p < 0.001$; $\exp 2.01 = 7.46$).

Table 4. Logistic Regression Results for the Likelihood of Receiving VC Investment (Angel and Grant-backed Ventures vs Angel or Grant-backed Ventures)

	PVC Investment (Model 4)	GVC Investment (Model 5)	IVC Investment (Model 6)	IVC Investment (Model 7)
BOTH (vs only Angel)	-0.13* (0.07)		1.09*** (0.24)	
BOTH (vs only Grant)		0.17 (0.23)		2.01*** (0.38)
Economic Value Proposition	0.04*** (0.01)	0.12*** (0.03)	0.06+ (0.03)	0.09* (0.04)
Social Value Proposition	-0.01 (0.01)	0.06 (0.04)	0.10*** (0.03)	0.09* (0.04)
Female Founder	-0.01 (0.09)	0.34 (0.30)	0.66*** (0.23)	0.38 (0.30)
First Time Founder	-0.24*** (0.08)	-0.27 (0.27)	-0.44* (0.26)	-0.62+ (0.34)
University Prominence 2	-0.11 (0.12)	-0.10 (0.39)	0.02 (0.29)	-0.15 (0.37)
University Prominence 3	-0.17 (0.12)	-0.64 (0.42)	-0.39 (0.34)	-0.44 (0.42)
University Prominence 4	-0.47*** (0.11)	-0.35 (0.37)	-0.35 (0.3)	-0.26 (0.37)
Age	-0.10*** (0.02)	-0.10 (0.07)	0.16** (0.06)	0.18* (0.07)
Funding Amount	0.12* (0.05)	0.06 (0.16)	0.05 (0.15)	-0.05 (0.19)
PVC Connectedness	0.88*** (0.06)			
GVC Connectedness		-0.30 (0.49)		
IVC Connectedness			1.21*** (0.24)	1.47*** (0.28)
Constant	-0.89 0.78		-3.83*** 1.32	-5.66*** 1.7
Country fixed effects	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	3,820	2,300	3,820	2,300
Prob. > chi2	0	0	0	0
Log pseudo likelihood	566.93	251.56	177.3	163.74
Pseudo R2	0.11	0.28	0.19	0.25

Note: Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

We evaluate our third hypotheses (H3a, H3b, and H3c) graphically. Whereas the interaction terms can be evaluated by their coefficients in OLS regressions, such evaluation is not sufficient for logistic regressions (Greene, 2010; Grimes, Gehman, & Cao, 2018). Therefore, following Hoetker (2007) and Greene (2010), we used Stata's *margins* and *marginsplot* commands to calculate and plot marginal effects. This is currently considered as the best practice in the management scholarship (Grimes et al., 2018).

Figures 1a, 2a, and 3a present the predicted marginal effects for both angel-backed ventures and grant-backed ventures as well as their 95% confidence intervals (CIs). Figures 1b, 2b, and 3b plot the differences between angel-backed and grant-backed ventures. The x-axis shows the financial uncertainty in ventures' country of operations. The y-axis presents the predicted probability that a venture receives a PVC investment (Figure 1a), GVC investment (Figure 2a), and IVC investment (Figure 3a). Figure 1a reveals that as the financial uncertainty in the operating environment increases, the probability of receiving a PVC investment increases for angel-backed ventures whereas it decreases for grant-backed ventures. Furthermore, the difference line in Figure 1b is positive and above $y = 0$. Therefore, H3a is supported. On the other hand, Figure 2a and 2b reveal that as the financial uncertainty in the operating environment increases, the probability of receiving a GVC investment increases for grant-backed ventures whereas it is stable for angel-backed ventures. Furthermore, the difference line in Figure 2b is positive and above $y = 0$. Therefore, H3b is also supported. However, we also see that the 95% CIs include $y = 0$ for a portion of our sample in which financial uncertainty is low. After investigating, we found that only 10% exceeded this threshold. We set these cases aside and interpret the plots as supporting H3b. Finally, Figures 3a and 3b present that there is no difference between angel and grant backed ventures in obtaining IVC investment, supporting H3c.

FIGURE 1a. Predictive Margins of Having Angel and Grant Funding on PVC Investment with 95% CIs

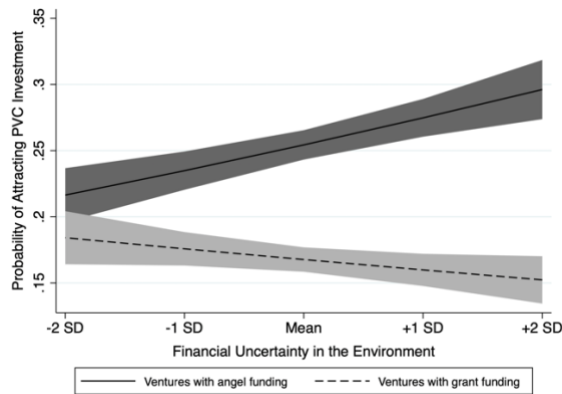


FIGURE 1b. Average Marginal Effects of Having Angel vs Grant Funding on PVC Investment with 95% CIs

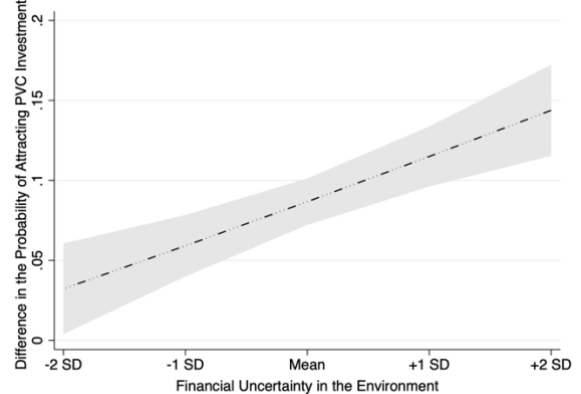


FIGURE 2a. Predictive Margins of Having Angel and Grant Funding on GVC Investment with 95% CIs

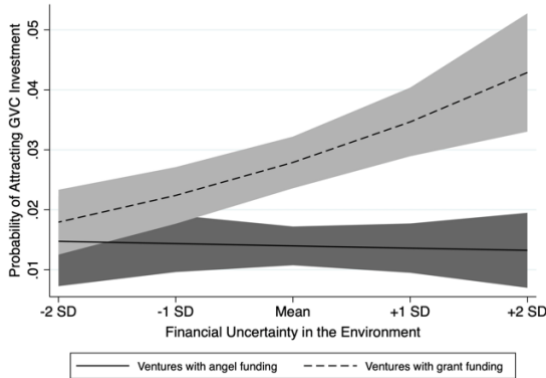


FIGURE 2b. Average Marginal Effects of Having Grant vs Angel Funding on GVC Investment with 95% CIs

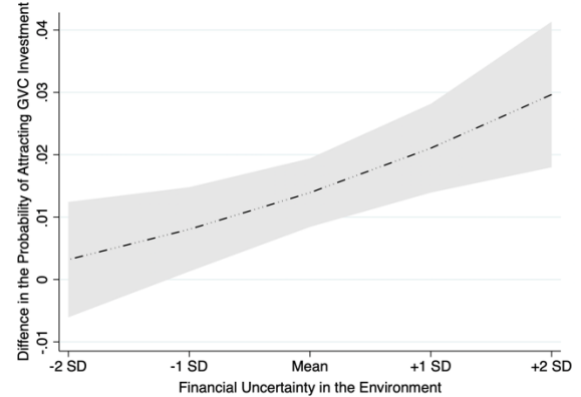


FIGURE 3a. Predictive Margins of Having Angel and Grant Funding on IVC Investment with 95% CIs

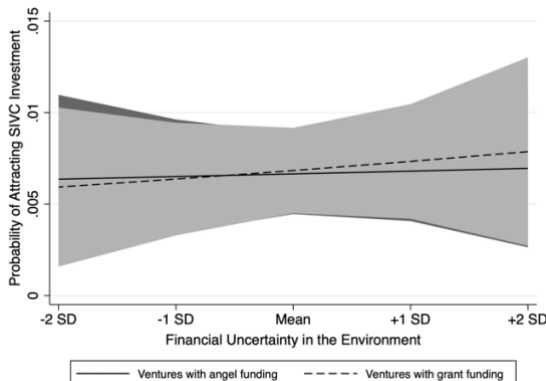
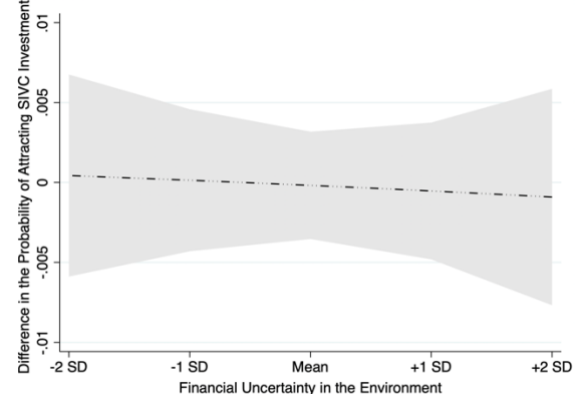


FIGURE 3b. Average Marginal Effects of Having Angel vs Grant Funding on IVC Investment with 95% CIs



DISCUSSION

It is well established that ventures can signal their unobserved quality with observed signals. However, we know little about the effectiveness of signals for different investors. In other words, scholars have studied signals for a homogenous set of signal receivers which does not fully represent the evolving entrepreneurial financing landscape. New ventures are presented with different types of investors, and they need to understand how they can strategize to maximize their chances of securing funding from them. Therefore, we investigate the signal effectiveness of two third-party signals (angel and grant funding) comparatively for different types of VC firms: Private VCs, Governmental VCs, Social Impact-oriented VCs. Testing our hypotheses with a dataset of 8,300 ventures, we found that the signaling effectiveness of angel and grant funding vary depending on the VC type and the signaling environment. Specifically, we found that prior angel funding signal is 1.51 times more effective at attracting PVC investment compared to prior grant funding. However, prior angel funding signal is 0.38 times less effective at attracting GVC investment compared to prior grant funding. For attracting IVC investment, angel and grant funding signals are equally effective.

Looking at the interaction effects between various signals, we also found that prior angel and grant funding are complementary signals at attracting IVC investment. Together they are 2.97 (7.46) times more effective at attracting IVC investment compared to prior angel (grant) funding alone. However, this effect is only for IVC investments; prior angel and grant funding are not complementary signals at attracting PVC nor GVC investment.

Lastly, we found that as the financial uncertainty in the operating environment increases, the signaling effectiveness of prior angel funding at attracting PVC investment increases whereas it is stable for prior grant funding. On the other hand, the signaling effectiveness of prior grant funding at attracting GVC investment increases while being

stable for prior angel funding. In the next section, we provide a summary of the theoretical contributions of our findings.

Theoretical Contributions

Our findings contribute to the management literature on new venture signaling. Firstly, we extend the understanding of the signaling process in entrepreneurial contexts by examining not only the signal senders but also the signal receivers and the signaling environment (Etzion & Pe'er, 2013). Prior studies have predominantly focused on the attributes and actions of new ventures in conveying quality signals (Connelly et al., 2011; Colombo, 2021). However, we emphasize the role of signal receivers, highlighting how different investors with varying characteristics and information needs process these signals. By doing so, unlike traditional views that treat signaling as an automatic process, our comprehensive view presents the dynamic interplay between signal senders and receivers. In this way, we enrich the literature on new venture signaling with a more dynamic and context-dependent perspective. This approach aligns with recent developments in signaling theory, as highlighted by Drover et al. (2018), who advocate for a cognitive perspective in understanding how decision-makers process organizational signals. Their emphasis on attention and the interpretation of signals highlights the complexity of signal processing. Our study aligns with this view and adds a new understanding of how different investors, each with unique characteristics and information needs, engage with and interpret these signals. Further, our findings resonate with Colombo's (2021) insights on VCs as a distinct group of signal receivers. Their literature review categorizes crowdfunding investors, angel investors, VC investors, and other equity investors as signal receivers with different characteristics to understand their roles in new-venture signaling. This complements our argument that understanding the diversity among signal receivers is important. We further

this discussion by illustrating how different type of VCs' interpretations of signals differ from each other (Connelly et al., 2011).

Secondly, our research advances the understanding of simultaneous signals in venture funding. Ventures often send multiple signals. Depending on the informational content of the signals, they can act as complements, providing a more substantial reduction in uncertainty than when considered in isolation. In other situations, one signal can substitute for another and not reduce uncertainty further (Bapna, 2019). Plummer et al. (2016) emphasized the challenges ventures face in managing multiple signals within a noisy signaling environment, where investor sensemaking is critical. Our findings extend this discussion by demonstrating the contingent nature of multiple signals. Unlike previous research which often viewed signal interactions as static (Bapna, 2019), our study reveals that the effectiveness of multiple signals like prior angel and grant funding in attracting VC investment is not universal but significantly influenced by the characteristics of the evaluating VCs and the signaling environment. This is in line with Drover et al. (2018), who theorized on the concept of 'signal sets' and their effects on decision-makers, which matches our findings on the signal combinations in VC contexts. Furthermore, our study fills a gap identified by Colombo et al. (2019), who noted the limited attention given to how receivers aggregate simultaneous signals. We provide empirical evidence that VCs do not interpret multiple signals in the same way; instead, their perceptions are influenced by specific organizational and environmental factors.

Thirdly, we enrich the literature on venture capital firms by studying a new type of VC firm: Social Impact-oriented VC (Barber, Morse, & Yasuda, 2021; Geczy et al., 2021)

². Our study furthers our understanding of IVCs beyond how they carry dual objectives by

²After the recent emergence of impact investing, impact investors have invested in 6066 ventures in 8125 financing rounds which represents 2% of all investment rounds (Cole et al., 2023)

discussing how their hybrid characteristics translate into unique investment behaviors. We show that IVCs place equal and complementary value on signals that convey information about both financial and social potential, differing from traditional private and government-owned VCs. This enriches our understanding of this emerging class of investors by highlighting their unique evaluative criteria and decision-making processes. In this way, we complement the insights from Block et al. (2021) who explored the screening criteria of impact investors. While Block et al. identified criteria such as the authenticity of the founding team and societal problem importance, our study extends this understanding by demonstrating how these criteria are practically applied by IVCs in their investment decisions. This bridges the gap between theoretical criteria and actual investment practices and offers a more comprehensive view of IVCs' operations. Moreover, our research builds on the conversation introduced by Scarlata, Walske, and Zacharakis (2017), who discussed the human capital differences between IVC and traditional VC firm founders. While they highlighted the variation in backgrounds and experiences, our findings contribute by revealing how these differences lead to unique investment behaviors and criteria within IVCs. Furthermore, our study fills a gap in the literature by examining how IVCs operate under varying market conditions. Previous research has not adequately addressed how environmental fluctuations impact IVC investment behavior. By showing that angel and grant signals remain equally effective in attracting IVCs, regardless of the level of financial uncertainty in ventures' operating environment, our findings offer a unique contribution to understanding the resilience and consistency of IVCs' investment strategies. In this way, we encourage further research into IVCs.

Our findings have significant implications for entrepreneurs in strategizing their fundraising efforts. We empirically show that different investors value signals differently, indicating that entrepreneurs need a more detailed approach. For instance, third-party

relationships, an important signal for new ventures to raise subsequent rounds, are interpreted differently by investors based on their distinct information needs. This implies that entrepreneurs should not only think about their signals but also tailor them to align with the specific expectations and investment focus of their target investors. In practical terms, this means entrepreneurs should conduct research on potential investors to understand their unique preferences and investment criteria. For example, if targeting private venture capital firms (PVCs), entrepreneurs might emphasize signals such as previous angel investor backing, which PVCs see as a proof of financial potential. Conversely, when approaching governmental venture capital firms (GVCs), entrepreneurs might highlight grants received, signaling technical quality and social value that align with GVCs' focus on public good. This strategic alignment of signals with investor characteristics can enhance the effectiveness of fundraising efforts.

Limitations and Future Research

Our study has several limitations. First, since our analyses were correlational, we were unable to draw causal conclusions. Our use of propensity score analysis with matched samples reduces endogeneity issues and allows for causal inference; however, an experimental design would have an advantage of providing a more definitive conclusion about causation. Second, path dependency in entrepreneurial financing may provide an alternative explanation for our findings. Angel-backed ventures may be more likely to be introduced to PVCs, rather than GVCs, by their early-stage funders. To control for this, we first matched angel and grant backed ventures according to their economic value proposition, social value proposition, founder team gender composition, entrepreneurial experience, university prominence, age, funding amount, country, industry, and early-stage funding year. Ventures with similar business models and founders that are operating in the same industry and country at the same time will have similar likelihood of applying to a

particular type of funding. Moreover, we control for this potential network and reputation effect by controlling for the number of funding rounds angel and grant funders raised previously with a specific type of VC.

Third, we hypothesize and test the comparative effect of different signals on different types of VCs. However, ventures often raise funding from syndicates formed by different VC firms. Future research on signals can consider different investor compositions in syndicates to study how they interpret signals. Lastly, in our study, we only used two third-party affiliation signals. There are other signals about a new venture (e.g., founders' working and founding experience, educational background) that different types of signal receivers may interpret in different ways. Further studies can provide empirical evidence for the effect of such signals.

CONCLUSION

Despite the recent growth of new investor types in venture financing, scholars studying signaling theory in this context have largely assumed homogeneity among investors. To address this gap, we investigated the effectiveness of signals for different signal receivers and in different environmental contexts. We found that new ventures' angel and grant funding signals have different effects in attracting Private Venture Capital, Governmental Venture Capital, and Social Impact-oriented Venture Capital firms. We hope this paper encourages further research studying the role of the signal receiver and the signaling environments in the signaling process.

**Paper 2 - Examining The Additionality of Impact Investors: How Certification
Effects Mobilize Funding for Social Ventures**

ABSTRACT

Social entrepreneurs address systemic issues such as poverty and climate change but face significant funding challenges due to information asymmetries that deter traditional investors. Social impact-oriented venture capitalists (IVC) offer a potential solution by investing in social ventures and enhancing their attractiveness to traditional, non-impact venture capitalists (TVC). Using data on VC-backed ventures from 2008 to 2022, we combine negative binomial regression and instrumental variables analyses to distinguish between selection and treatment effects of IVC-backing. Results show that IVCs target social ventures struggling to attract TVCs and increase TVC participation in subsequent funding rounds. This certification effect is observed only for social ventures with high information asymmetries and IVCs with expertise in the venture's context. Our study advances the impact investing literature by providing empirical evidence for the principle of additionality, demonstrating how IVCs mobilize traditional capital to address social challenges, and introducing a methodology for analyzing additionality in venture funding.

INTRODUCTION

How to close the persistent funding gap for social entrepreneurs? Social entrepreneurs tackle systemic challenges such as poverty and climate change through for-profit business models (Markman et al., 2019; Saebi et al., 2019; Vedula et al., 2022). Over the past 25 years, they have collectively impacted the lives of more than a billion people in over 190 countries (World Economic Forum, 2024a). However, their dual orientation complicates their ability to attract essential resources (Austin et al., 2006; Miller et al., 2012; Lee et al., 2020). Compared to commercial ventures, social ventures present heightened information asymmetries to investors who lack experience evaluating dual-purpose organizations. This uncertainty deters traditional, non-impact-oriented investors from engaging with social ventures. Therefore, governments, philanthropic entities, crowdfunders, and recently impact investors have provided financial support for social ventures' funding needs (Barber et al., 2021; Calis & Mosakowski, 2016; Lall & Park, 2020). While these efforts are crucial, they have been insufficient. There is still an annual \$1.1 trillion funding gap for developing business models help solving the social and environmental problems (World Economic Forum, 2024b).

Impact investors are a growing class of private capital providers who are characterized by their dual focus on generating financial returns and achieving measurable social impact (Boulongne et al., 2024; Hehenberger et al., 2019; Logue & Grimes, 2022). They have extensive knowledge and expertise in social sectors and are experts in impact measurement practices (Scarlata et al., 2017; Thirion et al., 2022). They provide financial and non-financial resources to their investees to expand operations. Yet impact investors' reach remains small and the amount of funding they deploy does not match the vast reserves of non-impact-oriented private capital (Hand et al., 2024). We propose that attracting traditional investors into the social entrepreneurship ecosystem offers an effective approach

to bridging the funding gap faced by social ventures. To address this, we examine two related questions. First, we investigate whether impact investors enhance the funding appeal of social ventures for non-impact investors. Second, we analyze the mechanisms through which impact investors increase the funding attractiveness of their investees.

According to the principles of ‘*additionality*’, the ability of impact investors to help decrease the funding gap depends on two conditions (Brest & Born, 2013; Hockerts et al., 2022). First, they must direct capital toward social ventures that struggle with raising resources from traditional investors. If impact investors allocate resources to ventures that could have accessed traditional capital independently, their contributions risk being redundant rather than additional. Second, impact investors must enhance the attractiveness of their investees to traditional investors and facilitate follow-on funding in subsequent financing rounds. If impact investors fail to improve the perceived commercial viability of the social ventures they support, traditional investors may remain reluctant to provide external funding. We argue that these two conditions need to be satisfied for impact investors to create additional value in closing the funding gap for social ventures.

We focus on the venture capital market to explore if social impact-oriented venture capitalists (IVCs) help reduce the funding gap for early-stage social ventures. We hypothesize that IVCs invest in social ventures that struggle to raise funding from traditional, non-impact-oriented venture capitalists (TVC) and increase TVCs’ attraction in their investees in subsequent funding rounds through certifying their investees’ potential. Social ventures present high levels of information asymmetry for traditional investors, who are often unfamiliar with their hybrid business models. IVCs play a critical role by distinguishing between social ventures with high economic potential and those with lower economic potential, effectively conducting due diligence on behalf of traditional investors. We further develop argumentation about the mechanisms underlying this certification effect.

We hypothesize that certification by IVCs is effective only under specific boundary conditions. First, the mechanism works only for social ventures with high information asymmetries. Second, the certifying IVC must have expertise in the investee's geographic and industry context.

We study the full sample of VC-backed startups between 2008 and 2022. We use three sources of variation. We explore whether the number of TVC investors of a venture in follow-on rounds is sensitive to investor type in first funding round (i.e., IVC versus TVC), and, specifically, the factors affecting social impact-oriented VCs' certification effect (e.g., the level of information asymmetry in ventures, and the VCs' experience with the investee's geography and industry). We use negative binomial regression and instrumental variables analyses together to distinguish the selection and certification (i.e., treatment) effect of first round VC type to subsequent round performance. Our negative binomial regression model does not account for endogeneity and captures the combined effect of selection and certification (does IVC-backed social ventures have more TVCs in their subsequent rounds compared to TVC-backed commercial ventures?), whereas a two-stage instrumental variables estimation isolates the causal effect of the certification (does IVCs increase TVC attraction into their investees more than TVCs?). The difference between estimations of these two models gives us the selection effect (does IVCs invest in social ventures struggling to attract TVCs in their first round?).

Results support our hypotheses. First, we find that IVCs invest in social ventures that are having hard time in the traditional VC market. Second, we find that social impact-oriented VC-backing increases the number of subsequent TVC investors of social ventures more than traditional VC-backing increases for commercial ventures. Taken together, our findings reveal that IVCs help close the funding gap for social ventures. Importantly, the results highlight the mechanisms by which social ventures benefit from IVC certification.

In line with the hypothesized mechanism, the certification effect is exclusive to social ventures with high information asymmetries (young social ventures, seed stage social ventures) and IVCs with high experience in their investees' city and industry.

We make several contributions to the literature. First, we contribute to the impact investing literature by empirically examining the principle of additionality, a core concept that has been primarily theoretical (Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2020). While prior research has defined additionality and explained its mechanisms (Brest & Born, 2013; Hockerts et al., 2022), our study extends this literature by offering an empirical analysis of additionality within a specific investor category: social impact-oriented VC firms. We provide empirical evidence that IVCs generate additional social value by drawing the attention and resources of non-impact investors to social ventures they fund. Our evidence shows that, over the past 15 years, many social ventures would have remained unfunded without these investors. This illustrates that impact investing holds significant potential for addressing social challenges through financing.

Our study also contributes to social entrepreneurship research by addressing the funding challenges faced by social ventures. Social entrepreneurs face significant information asymmetries that discourage traditional investors (Austin et al., 2006; Miller et al., 2012; Vedula et al., 2022), which results in a substantial funding gap for ventures tackling social and environmental problems. Previous studies have suggested alternative funding mechanisms like crowdfunding (Calis & Mosakowski, 2016) and grants (Lall & Park, 2020), which offer partial solutions to the problem. In this paper we argue that attracting traditional investors into the social entrepreneurship ecosystem represents a more robust solution to addressing the social venture funding gap. Our findings demonstrate that IVC firms effectively bridge this gap by attracting traditional VCs to social ventures.

Lastly, our study introduces an innovative methodology for assessing additionality. While previous research has conceptualized additionality, our approach is the first, to our knowledge, to employ endogeneity-correcting models alongside standard models in order to distinguish selection from treatment effects when testing additionality. This dual-model design clarifies which ventures are chosen by impact investors and how investor involvement influences venture outcomes. We encourage future research to replicate this method across diverse contexts.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Funding Gap for Social Ventures

Social entrepreneurs use innovative business practices to address societal problems while generating financial returns (Bacq & Janssen, 2011; Mair & Martí, 2006). They go beyond profit maximization by putting the well-being of others at the center of their mission (Bacq & Alt, 2018; Miller et al., 2012). These ventures tackle systemic challenges such as poverty, unequal access to education, inadequate healthcare access, and environmental issues (Markman et al., 2019; Saebi et al., 2019; Vedula et al., 2022). These challenges arise due to institutional deficiencies which create opportunities for entrepreneurial solutions. By leveraging market-based mechanisms, social ventures fulfill unmet societal needs (Battilana & Lee, 2014; Dacin et al., 2010). One example of such solution is microfinance which helps underserved populations climb out of extreme poverty (Cobb et al., 2016). Grameen Bank, for instance, has provided microloans totaling more than \$27 billion to over 8.4 million borrowers, most of whom are women in rural areas of Bangladesh (Yunus & Weber, 2010). Further research highlights how social ventures create opportunities for individuals disadvantaged by systemic inequities (Bloom & Chatterji, 2009; Zhao & Wry, 2016).

Social ventures often need external financial support to initiate operations and grow. However, resource mobilization is particularly challenging for social ventures due to several

reasons. Unlike traditional businesses that focus only on financial returns, social ventures operate as hybrid organizations that aim to achieve both social and financial outcomes (Battilana & Lee, 2014; Markman et al., 2016; York et al., 2016). As funders often lack the expertise to assess the financial viability of social business models, social ventures inherently present heightened information asymmetries to their investors. These asymmetries are exacerbated by a lack of standardized metrics to evaluate social impact. Moreover, social ventures operate in underserved markets where traditional investors have little familiarity or expertise. Hence, traditional investors tend to approach social ventures with hesitation. Government agencies, philanthropic organizations, and crowdfunders on the other hand, have offered financial support through seed funding or subsidized loans to accommodate social ventures' needs (Barber et al., 2021; Calis & Mosakowski, 2016; Lall & Park, 2020). However, their resources have not grown in line with the increasing scale of societal challenges. These factors have led to social venture funding gap, where promising ventures cannot obtain the resources they need to expand. New funding mechanisms are necessary to support social ventures.

Role of Impact Investors in Closing the Social Venture Funding Gap

Impact investing is an emerging field that aims to create financial returns and quantifiable positive social or environmental impact simultaneously (Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2020; Logue & Grimes, 2022). A wide range of investors that include pension funds, philanthropic foundations, NGOs, hedge funds, banks, and social impact-oriented venture capital (IVC) firms have joined this area, with assets totaling \$1.571 trillion as of 2024 (Hand et al., 2024). As we study the funding challenges of early stage social ventures, we focus on IVCs in this paper. IVCs draw on traditional venture capital practices but distinguish themselves by developing solutions for social or environmental challenges (Barber et al., 2021; Scarlata & Alemany, 2010).

Social impact-oriented VCs can play a role in closing the social venture funding gap. They find ventures with aligning social causes and provide them with financial and non-financial resources. Despite their significance, IVCs operate on a small scale. Since their start in 2008, they only participated in 2% of all venture capital investment rounds and funded 3% of all VC-backed ventures (Cole et al., 2023). Moreover, whereas traditional investors have an average deal size of \$8.7 million, impact investors have \$4.9 million (Cole et al., 2023). IVCs have significantly less assets under management compared to traditional VC firms which limits their potential. However, their primary contribution in closing the social venture funding gap may be an indirect one. We argue that IVCs can help bridge the funding gap by integrating traditional, non-impact VCs into the social entrepreneurship ecosystem by certifying their investees potential.

Additionality Imperative

The concept of *additionality* is helpful in designing our methodological approach to test if IVCs attract traditional VC firms to the social entrepreneurship ecosystem. Additionality refers to the idea that “The investment must increase the quantity or quality of the social or environmental outcome beyond what would otherwise have occurred. The counterfactual is that ordinary, socially neutral investors would have provided the same capital in any event.” (Brest & Born, 2013, p. 25). An IVC investment needs to be additional to the traditional VC ecosystem to be able to attract traditional, non-impact VCs to their investees.

When is an investment additional? Grants, donations, and below-market loans, which do not prioritize market-level financial returns, are often additional as they provide resources that traditional investors would otherwise avoid directing towards social or environmental projects (Brest & Born, 2013). By willingly accepting reduced financial returns, these investments reduce the overall cost of capital for social ventures. For example,

a social enterprise providing affordable healthcare in low-income regions might receive a concessional loan with favorable terms, allowing it to expand services while maintaining affordability. In this way, these investments can fill gaps left by traditional funding sources and thus exhibit clear additionality.

Additionality is more complex when impact investors, such as IVCs, expect market-rate returns. If a socially oriented investment is financially attractive, purely profit-driven investors would also step in. However, impact investors can still produce additional benefits by leveraging specialized information or expertise, particularly in underexplored social or environmental niches with imperfect information (Kickul & Lyons, 2015). Imperfect knowledge of risk and potential returns among the broader investing community may lead socially neutral investors to misjudge certain opportunities. As a result, impact investors equipped with better data or local insights can step in and recognize social ventures with strong growth potential that remain overlooked. This approach would maintain additionality, even at market-level or higher returns, by supplying capital in places where it might otherwise not flow (Brest & Born, 2013; Hockerts et al., 2022).

Turning to IVCs, if a social venture is already able to attract a traditional non-impact VC, an IVC funding it does not bring additional funds to the social entrepreneurship ecosystem. However, if a social venture struggle to attract traditional VC and IVC-backing enable the social venture to raise additional funding from traditional venture capitalists (TVCs), IVC is additional. We hypothesize that IVCs satisfy both conditions as they are uniquely positioned to discover and support promising social ventures.

According to the previous literature on impact investing, there are several organizational characteristics that sets IVCs apart from traditional VC investors. First, IVCs operate with a unique model that combines dual (social and financial) objectives (Croce et al., 2021). They establish strategic impact objectives that target specific social or

environmental benefits in their initial fund creation. Later during the investment management process, IVCs employ systematic impact measurement frameworks to quantify and monitor the intended impact of each investment (Mityushina et al., 2019; Rawhouser et al., 2019).

Second, IVCs take a distinctive approach to human capital. While traditional VC founders often have backgrounds in science, business, and law, IVC founders possess extensive experience in the social sector (Scarlata et al., 2017). Our data further reveals that IVCs exhibit a significantly higher representation of female partners and consist of individuals who have graduated from more prominent universities. Furthermore, IVCs are innovative in their compensation policies, and they frequently implement impact-based incentives. For instance, they may offer carried interest tied to social impact performance or introduce time-specific impact bonuses (Thirion et al., 2022). Another characteristic of IVCs is their long-term orientation and patient capital approach, both of which are important for creating social impact. Because social and environmental changes take time, IVCs plan their exit strategies from the start and are willing to accept longer wait times for successful exits compared to traditional VCs (Cole et al., 2023).

To summarize, IVCs combine social impact focus, patient capital, and diverse VC professionals with social expertise. Their expertise in social sectors enhance their capability to evaluate the commercial viability of social ventures. With a thorough due diligence, IVCs identify social ventures with high potential that TVCs overlook due to high information asymmetries.

Hypothesis 1 (H1): *IVCs invest in social ventures that are having a hard time attracting TVCs in their first funding round.*

In addition to selecting social ventures in need, we argue that IVCs improve their investees' ability to attract traditional capital by acting as certifiers of venture quality. Literature on signaling and certification posits that endorsements by credible entities reduce information asymmetries and increase the legitimacy of ventures in the eyes of third parties (Colombo, 2021; Plummer et al., 2016; Spence, 1973). For TVCs, who face high information asymmetries when evaluating social ventures, IVC certification mitigates uncertainties by signaling scalability and financial viability. The value of certification stems from IVCs' thorough due diligence and expertise in assessing both social and financial performance while seeking market-rate returns. Moreover, IVCs incur the high search and transaction costs associated with identifying and supporting social ventures, particularly in their early stages. These activities reduce the uncertainties faced by TVCs. By taking over these initial costs and risk, IVCs lower the barriers for TVCs to engage in follow-on funding. As a result, we propose that IVCs play a role in enabling social ventures to secure additional funding from TVCs.

Hypothesis 2 (H2): *IVC-backing increases subsequent TVC attraction in social ventures.*

The proposed certification mechanism is that expert IVCs engage in rigorous due diligence and reduce information asymmetries for TVCs. We examine the boundary conditions for this mechanism to provide further support. Specifically, the ability of IVCs to certify social ventures and attract TVCs depends on two factors: the level of information asymmetry surrounding the venture and the expertise of the IVC. Ventures characterized by high levels of information asymmetry—such as those in the seed stage or newly established—present significant evaluation challenges. In these cases, IVC certification becomes especially valuable. This aligns with signaling theory, which posits that the effectiveness of signals depends on the degree of information asymmetry in the market

(Spence, 1973; Connelly et al., 2011). Hallen et al. (2014) highlight that ventures in resource-scarce contexts often require intermediaries to bridge the gap between financial providers and entrepreneurs. IVCs act as such intermediaries, leveraging their expertise and knowledge to certify the quality of ventures that TVCs might otherwise overlook. However, when information about a venture is available, TVCs can conduct independent evaluations, reducing the need for IVC certification. Therefore, we argue that the IVC certification is only effective for ventures with high information asymmetry.

Hypothesis 3 (H3): *IVC-backing increases subsequent TVC attraction only for social ventures with high levels of information asymmetry.*

The second boundary condition is the expertise of the IVC. The effectiveness of certification depends heavily on the credibility and capabilities of the certifying entity (Ozmel et al., 2012; Shane & Cable, 2002; Vanacker & Forbes, 2016). Expertise allows IVCs to conduct due diligence, assess the dual financial and social impact potential of ventures, and make informed investment decisions that TVCs cannot easily replicate. For instance, in ventures with unconventional business models or those operating in underdeveloped markets, IVCs' specialized knowledge becomes a critical factor in reducing information asymmetry. Without this expertise, IVCs are unable to provide meaningful evaluations, and their endorsements lose credibility in the eyes of TVCs. Thus, only IVCs with the necessary expertise can effectively enhance TVC attraction to social ventures.

Hypothesis 4 (H4): *IVC-backing increases subsequent TVC attraction only when IVCs possess high level of expertise.*

METHODS

Sample

We collect information on early-stage ventures, their VC investors, and associated funding rounds from Crunchbase (www.crunchbase.com). It is a platform known for its comprehensive data on VC funding, sourced from press releases, SEC filings, and the VentureSource database. Crunchbase's accuracy is validated by recent academic studies (e.g., Wang et al., 2022). As our research focuses on VC-backed ventures, we collect data on 'impact' and 'non-impact' VC firms' data from 2008 to October 2022. We select 2008 as the starting point based on its recognition in literature as a pivotal year for the impact investing movement, influenced by the Rockefeller Foundation event in 2007 and the financial crisis of 2008 (Block et al., 2021; Hehenberger et al., 2019).

We identified 131 IVCs by utilizing the impact investor list created by Cole and colleagues (2023). They came up with impact investors in the private equity sector verifying whether an institutional investor have clearly articulated dual objectives of achieving social impact alongside financial gains from their investments. On the other hand, 'traditional VC' refers to other independent VC investors that are categorized as 'venture capital' on Crunchbase.

Empirical Strategy

We theorized that the relationship between an IVC and a social ventures' TVC attraction is influenced by both selection (H1) and certification (i.e., treatment) (H2, 3, 4) effects. The counterfactual is that social ventures could have received TVC backing in their first round. To be able to test this, we have a comparative design that compares IVC-backed ventures to TVC-backed ventures. Our empirical strategy accounts for selection and certification effects to be able to isolate each one.

We use the number of subsequent traditional VC investors as dependent variable. It counts the TVCs that invested in a venture in its second and further funding rounds and it only takes nonnegative integer values. Therefore, we use a negative binomial regression model and an instrumental variable approach together to tease out the selection and certification effects. We regress our dependent variable on a ventures' type of first round VC backing (i.e., IVC versus TVC). As these VCs select different type of ventures to invest, there will be endogeneity. Our model with instrumental variables accounts for endogeneity and the coefficient identifies the certification effect to test the Hypothesis 2, 3, and 4. On the other hand, the negative binomial regression model does not account for endogeneity and its coefficient presents the joint effect of selection and certification. The difference between these coefficients gives us the selection effect to test the Hypothesis 1.

Our model captures two stages: (1) the initial stage evaluates the likelihood of an IVC choosing to invest in a social venture during the first funding round, and (2) the subsequent stage assesses the number of TVCs investing in the venture by the end of the observation period. By holding other factors constant, this approach enables a comparison of the ability of IVC-backed social ventures to attract TVC investors in their subsequent rounds relative to commercial ventures backed by TVCs.

For this, we need instruments correlating with the type of funding a venture receives. We draw from recent studies leveraging local market conditions such as the supply of VCs in a venture's country-industry-year context (Alvarez-Garrido & Dushnitsky, 2016; Alvarez-Garrido & Guler, 2018; Brander, Du, & Hellmann, 2015). Our instrument, IVC Availability, measures the local availability of IVC funding in a venture's market (country-industry-year). Once a startup secures funding, the remaining IVC firms in the market likely have no effect on that startup's subsequent TVC attraction, satisfying the exogeneity condition.

Variables

Our dependent variable is *Subsequent Traditional VC Attraction*, and we measure this by counting the number of traditional VC investors that participate in follow-on funding rounds of a venture (i.e., second and further rounds). This operationalization captures the extent to which IVC-backed social ventures attract attention from traditional VC firms in subsequent financing rounds.

Our independent variable looks at the investor type in the first funding round and distinguishes between ventures initially funded by IVCs and those backed by traditional VCs. *Impact VC* is a binary variable. It is equal to 1 if a venture received its first round from an IVC, and 0 if a venture received its first round from a TVC. This operationalization is important as it rules out alternative potential mechanisms that both IVC and TVC firms provide such as financial resources, and isolates the unique certification effect of IVCs compared to TVCs. This approach aligns with prior studies that examine the value-add effects of investor type on subsequent funding outcomes (e.g., Alvarez-Garrido & Dushnitsky, 2016; Chemmanur et al., 2014).

Two boundary conditions of the certification effect are the extent of information asymmetries between an early-stage venture and the VC, and the level of VC's expertise in ventures business model and geography.

We operationalized ventures' information asymmetry levels utilizing two separate variables: *venture age*, and *first funding round type* (e.g., seed versus early stage). Venture age was measured as the number of years since the firm's founding date up to the point of the first funding round. Younger ventures are expected to exhibit higher levels of information asymmetry due to their limited operating history, lack of established market presence, and less-developed business models, consistent with prior research on early-stage financing. The first funding round type was coded as a binary variable, with seed funding

rounds indicating higher information asymmetry and early-stage funding rounds suggesting comparatively lower asymmetry. Seed rounds are characterized by smaller investment amounts and occur earlier in the venture's lifecycle, when critical business metrics and growth trajectories are still uncertain. These variables are separately included to capture the heterogeneity in the information environment faced by VCs evaluating early-stage ventures.

We operationalized VCs' expertise by counting the number of prior funding rounds the VC have participated in the venture's industry, and separately, in venture's city. The first variable, *VCs' Prior Industry Experience*, captures the depth of a VC's domain expertise. VCs with extensive experience in a specific industry are likely to possess superior knowledge about market dynamics, competitive landscapes, and growth potential, reducing the uncertainty associated with evaluating early-stage ventures. The second variable, *VCs' Prior Location Experience*, reflects the VC's local expertise. VCs with a strong presence in a particular location are better positioned to leverage local knowledge, relationships, and resources, which can mitigate informational disadvantages and improve the accuracy of their investment evaluations. These variables account for the heterogeneity in VCs' ability to assess ventures based on their familiarity with the industry and geographic context.

To test our hypotheses on boundary conditions, we follow Shaver (2019)'s recommendation of using segmented regressions and split the samples by the median for *venture age*, *VCs' Prior Industry Experience*, *VCs' Prior Location Experience* variables.

We include other control variables as well. The *funding amount raised in the first round* serves as a proxy for the initial resources available to the venture. Larger funding amounts may signal higher quality ventures that are more likely to attract subsequent investors, irrespective of the type of initial VC backing (Guler, 2007; Hsu, 2006). This is measured as the total capital raised by the venture in its first funding round, expressed in U.S. dollars. *Female founders* variable captures whether the venture is led by female

founders. Prior research suggests that female led ventures may face challenges in accessing capital due to biases in the VC ecosystem (Kanze et al., 2018). This variable was coded as 1 if at least one of the venture's founders is female, and 0 otherwise.

RESULTS

Table 1 presents the descriptive statistics and correlation matrix for the 55,737 ventures in the sample, including 1,165 (2%) that are social ventures backed by a social impact-oriented venture capital (IVC) fund in their initial financing round. On average, each venture receives follow-on funding from 2.3 Traditional Venture Capital (TVC) investors in subsequent rounds. Table 2 details the results of the first-stage regression that estimates the probability of a venture being funded by an IVC. In this model, the instrumental variable—IVC Availability—is positive and statistically significant.

Tables 3 through 7 present negative binomial regressions that estimate the number of follow-on TVC investors. Each table provides two different tests: one set of models does not address endogeneity and jointly captures selection and certification (i.e., treatment) effects, while the other set employs endogeneity corrections to identify the certification effect in isolation.

Table 3 summarizes the main findings. The control variables are in line with theoretical expectations. For instance, ventures that secure larger initial funding rounds, receive backing from more experienced VC investors, are older in age are associated with a larger number of subsequent TVC investors. Model 1, which does not correct for endogeneity, shows a negative and nonsignificant coefficient of -0.07 for IVC-backing. This indicates that the joint effect of selection and certification is neutral and that IVC-backed social ventures have the same number of follow-on traditional VC investors as TVC-backed commercial ventures. By contrast, Model 2 addresses endogeneity, revealing a significantly positive coefficient of 0.35 for IVC-backing. This suggests that IVCs provide a certification

benefit, increasing the number of follow-on traditional VC investors more than TVC-backing does.

These results illustrate a tension between selection and certification effects. IVC firms select ventures that would otherwise have a smaller number of TVC investors, and then contribute to increase this number. This supports Hypothesis 1 and Hypothesis 2. The magnitude of the certification effect is economically important. IVC-backing increases subsequent number of TVCs by 1.42 ($e^{0.35}$) times more than a TVC-backing does. However, when the selection effect is also taken into account, because IVCs initially fund social ventures that are at a disadvantage in the traditional VC market, IVC-backed social ventures end up with the same number of follow-on TVCs as traditional VC-backed commercial ventures.

Table 1. Descriptive Statistics and Correlations

Variables	Observations	Mean	SD	1	2	3	4	5	6	7	8
1 Subsequent Traditional VC Attraction	55,737	2.34	4.40								
2 Impact VC	55,737	0.02	0.14	-0.01							
3 Amount Raised First Round	55,737	6.22	0.81	0.09	-0.02						
4 Seed Round vs Early-Stage First Round	55,737	0.55	0.50	-0.02	0.00	-0.57					
5 Venture Age	55,737	2.80	0.69	-0.15	0.03	0.29	-0.31				
6 VC's Prior Location Experience	55,737	0.60	0.69	0.11	0.01	-0.04	0.14	-0.11			
7 VC's Prior Industry Experience	55,737	1.12	0.80	0.16	0.01	0.11	0.04	-0.05	0.53		
8 Female Founder	55,737	0.17	0.37	-0.01	0.03	-0.09	0.09	-0.03	0.05	0.03	
9 Impact VC Availability	55,737	0.02	0.06	0.01	0.44	-0.03	0.01	0.02	-0.01	0.02	0.02

Table 2. First stage: Probit regression of Impact VC investment

Dependent Variable: Impact VC	
Impact VC Availability	6.96*** (0.16)
Amount Raised First Round	-0.09*** (0.02)
Seed Round vs Early-Stage First Round	0.01 (0.04)
Venture Age	0.12*** (0.02)
VCs Prior Location Experience	0.21*** (0.02)
VCs Prior Industry Experience	0.06* (0.02)
Female Founder	0.19*** (0.03)
Constant	-2.64*** (0.17)
Industry Fixed Effects	Yes
Observations	55,737
Pseudo R2	0.28

Note: All continuous independent variables are logged. Robust standard errors are in parentheses.
 ***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

Table 3. Second Stage: Negative Binomial Regression of Subsequent Traditional VC Attraction

Endogeneity Correction	No	Yes
	Model 1	Model 2
Impact VC	-0.07 (0.06)	0.35*** (0.09)
Amount Raised First Round	0.31*** (0.01)	0.26*** (0.01)
Seed Round vs Early-Stage First Round	-0.04+ (0.02)	-0.04+ (0.02)
Venture Age	-0.62*** (0.02)	-0.41*** (0.01)
VCs Prior Location Experience	0.10*** (0.01)	0.10*** (0.01)
VCs Prior Industry Experience	0.25*** (0.01)	0.26*** (0.01)
Female Founder	-0.05* (0.02)	-0.04* (0.02)
Constant	.22* (0.10)	-0.08 (0.08)
Industry Fixed Effects	Yes	Yes
Observations	55,737	55,737
Log likelihood	-103,033	
LR chi2	3599.01***	

Note: All continuous independent variables are logged. Robust standard errors are below coefficients.
 ***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

We now proceed to test our argument regarding the mechanism underlying the certification effect. Specifically, we posit that experienced IVCs certify the potential of social ventures by mitigating the information asymmetries faced by TVCs when evaluating social ventures. First, we examine the certification effect separately for ventures characterized by high and low levels of information asymmetry (Hypothesis 3). Then we assess the certification effect across experienced and inexperienced VCs (Hypothesis 4).

Table 4 splits the sample at the median venture age of three years, showing that the certification effect is significant among younger ventures (Model 4), where information asymmetries are more pronounced. Indeed, IVC-backing for younger startups corresponds to a 1.88-fold increase in attracting follow-on TVC investors, compared to traditional VC-backing. Among older ventures with reduced information asymmetries, the certification effect is not statistically significant (Model 6). Similarly, Table 5 splits the sample by the type of the first funding round. A venture raising its first round as a seed round rather than an Early Stage (e.g., Series A) have higher information asymmetries. Model 8 presents that IVC-backing increases the follow-on TVC attraction for seed stage ventures, whereas Model 10 shows that this certification is not significant for early-stage ventures, providing further support to Hypothesis 3.

Table 6 splits the sample by VCs' prior experience in the city where the investee operates. Models 11 and 12 present the results for experienced VCs. As expected, the certification effect is significant. Experienced IVCs' support in first round increases their investees follow-on TVC investors 2.59 times more than experienced TVCs do. However, there is no significant certification effect for inexperienced IVCs. This supports our Hypothesis 4. Moreover, Table 7 splits the sample by VCs' prior experience in investee's industry. As expected, Model 16 shows that experienced IVCs' support increases the follow-

on TVC attraction for their investees, however Model 18 shows that this certification is not significant for inexperienced IVCs, providing further support to Hypothesis 4.

Taken together, these results suggests that ventures backed by IVCs benefit from increased follow-on TVC participation. This is despite the lower initial attractiveness of social ventures, which IVCs tend to select. Our findings highlight the dual role of IVCs in both selecting impact-oriented yet struggling ventures and certifying them to the market. Consequently, IVCs bridge the gap between social ventures and traditional capital sources by serving as a credible endorsement that mitigates informational gaps and catalyzes subsequent financing.

Table 4. Second stage: Negative binomial regression of Subsequent Traditional VC Attraction, by venture age

Sample, by venture age	New Ventures	New Ventures	Older Ventures	Older Ventures
Endogeneity Correction	No	Yes	No	Yes
	Model 3	Model 4	Model 5	Model 6
Impact VC	-0.05 (0.07)	0.63*** (0.12)	0.00 (0.09)	0.16 (0.14)
Amount Raised First Round	0.36*** (0.02)	0.31*** (0.01)	0.21*** (0.03)	0.18*** (0.02)
Seed Round vs Early-Stage First Round	-0.10*** (0.02)	-0.12*** (0.02)	-0.15*** (0.04)	-0.21*** (0.04)
Venture Age	-0.22*** (0.02)	-0.20*** (0.01)	-1.17*** (0.05)	-1.27*** (0.06)
VCs Prior Location Experience	0.08*** (0.02)	0.08*** (0.01)	0.08** (0.03)	0.03 (0.02)
VCs Prior Industry Experience	0.20*** (0.015)	0.20*** (0.01)	0.29*** (0.02)	0.31*** (0.02)
Female Founder	-0.04+ (0.03)	-0.04+ (0.02)	-0.10* (0.04)	-0.11** (0.04)
Constant	-0.92*** (0.11)	-0.69*** (0.10)	2.47*** (0.24)	3.07*** (0.25)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,494	33,494	22,243	22,243
Log-Likelihood	-69914.54		-32406.47	
LR chi2	1679.18***		1160.71***	

Note: All continuous independent variables are logged. Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

Table 5. Second stage: Negative binomial regression of Subsequent Traditional VC Attraction, by venture stage

Sample, by venture stage	Seed Stage	Seed Stage	Early Stage	Early Stage
Endogeneity Correction	No	Yes	No	Yes
	Model 7	Model 8	Model 9	Model 10
Impact VC	-0.13+ (0.08)	0.81*** (0.11)	0.04 (0.08)	-0.04 (0.14)
Amount Raised First Round	0.43*** (0.02)	0.41*** (0.02)	0.10*** (0.02)	0.07*** (0.02)
Seed Round vs Early-Stage First Round				
Venture Age	-0.47*** (0.02)	-0.34*** (0.01)	-0.87*** (0.03)	-0.50*** (0.01)
VCs Prior Location Experience	0.13*** (0.02)	0.13*** (0.02)	0.04 (0.02)	0.04* (0.02)
VCs Prior Industry Experience	0.18*** (0.02)	0.17*** (0.02)	0.36*** (0.02)	0.38*** (0.02)
Female Founder	-0.06* (0.03)	-0.06* (0.03)	-0.05 (0.03)	-0.02 (0.03)
Constant	-0.92*** (0.11)	-1.15*** (0.10)	2.26*** (0.16)	1.41*** (0.11)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	30,274	30,274	25,463	25,463
LR chi2	1,766		2,238	
Log-Likelihood	-55685.20		-47130.345	

Note: All continuous independent variables are logged. Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

Table 6. Second stage. Negative binomial regression of Subsequent Traditional VC Attraction, by VCs' Prior Location Experience

Sample, by VCs' Prior Location Experience	High		Low	
	No	Yes	No	Yes
Endogeneity Correction	Model 11		Model 14	
Impact VC	-0.08 (0.07)	0.95*** (0.13)	-0.05 (0.09)	0.05 (0.13)
Amount Raised First Round	0.37*** (0.02)	0.31*** (0.01)	0.21*** (0.02)	0.17*** (0.02)
Seed Round vs Early-Stage First Round	-0.02 (0.03)	-0.04 (0.03)	-0.07* (0.03)	-0.05 (0.03)
Venture Age	-0.58*** (0.02)	-0.41*** (0.01)	-0.66*** (0.02)	-0.41*** (0.01)
VCs Prior Location Experience	0.07*** (0.02)	0.06*** (0.02)		
VCs Prior Industry Experience	0.24*** (0.02)	0.24*** (0.02)	0.27*** (0.02)	0.28*** (0.02)
Female Founder	-0.03 (0.03)	-0.04 (0.03)	-0.07* (0.04)	-0.07* (0.03)
Constant	-0.27* (0.12)	-0.35** (0.10)	0.92*** (0.16)	0.50*** (0.14)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	31,571	31,571	24,166	24,166
LR chi2	1996.56***		1239.09***	
Log-Likelihood	-62293.20		-40677.032	

Note: All continuous independent variables are logged. Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

Table 7. Second stage: Negative binomial regression of Subsequent Traditional VC Attraction, by VCs' Prior Industry Experience

Sample, by VCs' Prior Industry Experience	High	High	Low	Low
Endogeneity Correction	No	Yes	No	Yes
	Model 15	Model 16	Model 17	Model 18
Impact VC	-0.03 (0.07)	0.54*** (0.11)	-0.14 (0.09)	0.15 (0.14)
Amount Raised First Round	0.37*** (0.02)	0.29*** (0.01)	0.22*** (0.02)	0.20*** (0.02)
Seed Round vs Early-Stage First Round	-0.05* (0.03)	-0.06* (0.03)	-0.02 (0.03)	0.02 (0.03)
Venture Age	-0.64*** (0.02)	-0.42*** (0.01)	-0.59*** (0.02)	-0.39*** (0.01)
VCs Prior Location Experience	0.09*** (0.02)	0.09*** (0.01)	0.14*** (0.03)	0.15*** (0.03)
VCs Prior Industry Experience	0.17*** (0.02)	0.17*** (0.02)	0.18*** (0.04)	0.20*** (0.04)
Female Founder	-0.05+ (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.05 (0.03)
Constant	0.02 (0.14)	-0.06 (0.11)	0.66*** (0.15)	0.18 (0.14)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	29,373	29,373	26,364	26,364
LR chi2	1680.55***		984.32**	
Log-Likelihood	-60270.43		-42676.193	

Note: All continuous independent variables are logged. Robust standard errors are below coefficients.

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.10

DISCUSSION AND CONCLUSION

Theoretical Contributions

To address how to close the funding gap for social entrepreneurs, we examine social impact-oriented venture capital firms and their ability to attract non-impact-oriented investors to the social entrepreneurship ecosystem. Focusing on venture capital-backed commercial and social ventures from 2008 to 2022, we employ a comparative lens between IVCs and traditional VCs. Our findings reveal that IVCs provide initial funding to social ventures that have hard time attracting TVCs in their first rounds. However, after receiving IVC funding, these ventures become more attractive to TVCs, leading to follow-on investments from TVCs. Specifically, an IVC-backing is associated with bringing 1.4 times more follow-on TVCs compared to a TVC-backing.

In addition, we show that this certification effect depends on IVC expertise and is limited to ventures with high information asymmetries. IVCs with substantial domain knowledge in a venture's geography or industry certify social ventures. However, IVCs lacking this expertise do not generate a significant certification effect. We also find that social ventures with low information asymmetries do not benefit from IVC endorsement, likely because potential investors already have enough data to evaluate their potential.

Our research contributes to the growing body of literature on impact investing. Impact investing is the allocation of financial and non-financial resources to businesses that seek to achieve additional social or environmental impact and financial returns (Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2019). A defining feature of impact investing is the principle of additionality. This criterion necessitates that an impact investment generates social impact that would not have materialized in its absence, recognizing that other investors without a social focus might have provided equivalent funding (Brest & Born, 2013; Hockerts et al., 2022). Impact investors create impact by

financing ventures that address societal challenges and eventually improve the lives of those impacted by these businesses. However, the absence of additionality implies that impact investors fail to create social value if a social venture can secure resources without their intervention. Despite its theoretical importance, empirical research on the additionality of impact investments remains underdeveloped.

To address this gap, we present what is, to our knowledge, the first empirical examination of additionality within a specific impact investor category: social impact-oriented venture capital firms. IVCs are unique in several ways. Their investment managers possess substantial experience in the social sector (Scarlata et al., 2017), they align managerial incentives with social objectives (Thirion et al., 2022), they excel in impact measurement practices (Mityushina et al., 2019), and they focus on supporting ventures in disadvantaged regions and emerging industries (Cole et al., 2023). We argue and find that these characteristics enable IVCs to identify and support social ventures with significant potential that traditional VCs overlook and certify their potential. In other words, over the past 15 years, the absence of social impact-oriented VCs would have left numerous social ventures unfunded by traditional VCs. Therefore, we provide evidence that IVC is a working model example of impact investing in creating additional impact.

Another contribution is to the practicing impact investors by explaining the underlying mechanism of their certification. Only expert impact investors can endorse social ventures effectively, and only social ventures with high information asymmetries benefit substantially from such endorsements. This indicates that to achieve additionality, impact investors must leverage their specialized knowledge of specific regions, technologies, or business models when evaluating prospective investees. When an impact investor moves into unfamiliar sectors or geographies, they might consider forging relationships with local stakeholders or hiring individuals with regional and sector-specific knowledge to mitigate

credibility and information gaps. On the other hand, expert impact investors are in a position to assume greater risks in their portfolio and thereby foster a stronger impact creation process. When they have well-established competence, they can catalyze follow-on investments from traditional venture capitalists by providing credible signals of viability. Nonetheless, only early-stage social ventures with high information asymmetries appear to have the benefits from such certification. This reveals a tradeoff for impact investors: they can pursue early-stage, riskier deals that maximize additionality or select more mature social ventures that present fewer uncertainties but might generate less social impact.

Our study also advances the literature on social entrepreneurship, which has been identified as a critical avenue for addressing the grand challenges facing society today (Markman et al., 2019; Miller et al., 2012; Vedula et al., 2022). Despite its potential, social entrepreneurship is inherently challenging, particularly in resource mobilization, where social ventures are often at a disadvantage compared to commercial ventures. The embedded social purpose and the framing of social goals are not easily understood or evaluated by traditional investors (Austin et al., 2006; Miller et al., 2012). Additionally, social entrepreneurs frequently operate in failed markets characterized by institutional voids (Dart, 2004; Mair & Martí, 2009). These contexts exacerbate information asymmetries, discouraging resource providers from investing in social ventures. As a result, the funding gap for establishing and scaling business models that address social and environmental problems amounts to an estimated \$1.1 trillion annually (World Economic Forum, 2024b).

Although this funding challenge is a critical area of concern, research on social entrepreneurship has not primarily focused on funding-related outcomes (Vedula et al., 2022). Exceptions include studies exploring alternative funding mechanisms such as crowdfunding (Calis & Mosakowski, 2016), philanthropic grants (Lall & Park, 2020), and social stock exchanges (Logue & Grimes, 2022). However, the financial resources managed

by these mechanisms remain limited in comparison to traditional profit-oriented investors like VC firms. In this paper, we argue that integrating traditional investors into the social entrepreneurship ecosystem represents a more robust solution to addressing the social venture funding gap. Our findings demonstrate that social impact-oriented VC firms successfully draw traditional investors' attention to ventures addressing social challenges. In doing so, we highlight a promising mechanism for bridging the funding gap while opening new avenues for research on the positive and negative indirect effects of socially oriented investors on entrepreneurial ecosystems.

Our study further contributes to the literature by employing a novel methodology to test additionality. While prior research has defined additionality and outlined the mechanisms through which impact investors can achieve it, our study, to the best of our knowledge, introduces a methodological approach not previously applied to measure the additionality of impact investors. Specifically, we employ endogeneity-correcting models alongside models that do not address endogeneity, enabling us to separately examine selection effects (i.e., which ventures impact investors fund) and treatment effects (i.e., what changes these investors bring about). This methodology allows us to assess and provide evidence for the additionality of impact investors in relation to the traditional VC market. We encourage future research to adopt this methodology to evaluate the additionality of other forms of impact investors or funding mechanisms that support social ventures or innovations. Extending this approach to diverse contexts could enhance understanding of how various actors contribute to integrating social ventures into traditional investment markets and advancing their scalability and impact.

Paper 3 - Venture Capital, Impact Investing, and Inclusive Economic Growth

ABSTRACT

Organizations shape economic inequalities. While venture capital (VC)-backed entrepreneurship has been a catalyst for economic growth, the benefits of this growth are not experienced by all. How does social impact-oriented VC differ from traditional VC in targeting inequality and promoting inclusive economic growth? Our analysis across U.S. metropolitan statistical areas from 2013 to 2022 shows that: (i) traditional VC activity is positively related to income inequality; (ii) social impact-oriented VC activity is not related to income inequality; and (iii) social impact-oriented VC activity is positively related to the number of businesses, employment, and average income in a region, though these effects are smaller compared to traditional VC. Therefore, although social impact-oriented VC supports economic growth on a smaller scale compared to traditional VC, it plays an important role in promoting inclusive economic growth.

INTRODUCTION

Can organizations drive economic growth and decrease economic inequalities simultaneously? Organizations shape economic inequalities through their employment practices and broader influence on society (Amis et al., 2020; Bapuji et al., 2020; Cobb, 2016; Mair et al., 2016). For decades, companies have prioritized shareholder wealth, which has driven compensation practices that reward executives far more than other employees (Lemieux, 2006; Lin, 2016). The rise of nonstandard work arrangements—such as temporary jobs, outsourcing, and contracting—has deepened this divide, with lower wages and fewer benefits for many workers (Bidwell et al., 2013; Cobb, 2016). Organizations also impact inequalities by embedding norms within hiring, promotion, and governance decisions that can marginalize people based on race, gender, and class (Gray & Kish-Gephart, 2013; Hamann & Bertels, 2018). Beyond these direct impacts, they also affect broader communities through creating externalities that shape access to essential resources (Elmes, 2018; Jorgenson, 2007).

Venture capital (VC)-backed entrepreneurship is one example of how organizational activities can influence economic inequality. While VC has been a driver of economic development fueling innovation (Samila & Sorenson, 2011), the distribution of its benefits remains uneven. VC investments drive economic polarization by reducing opportunities for middle-income employment and widening the gap between high- and low-income residents (Kwon & Sorenson, 2023). By concentrating only in specific urban areas and on high-growth sectors, VCs drive up living costs, particularly for housing, and pushes out lower-income residents (Kwon & Sorenson, 2023). Furthermore, VC's selection criteria and funding practices often favor certain demographic profiles and limit access to entrepreneurial opportunities for others such as female and minority founders (Guzman & Kacperczyk, 2019; Kanze et al., 2018). As a result, we see patterns like the "Silicon Valley

Syndrome," where economic benefits are limited to those directly involved in VC-backed high-growth ventures, while low-income residents experience financial stress (Kwon & Sorenson, 2023; Lee & Clarke, 2019). These dynamics raise questions about the inclusivity of VC-backed entrepreneurship as a growth model and whether it serves broader societal interests.

Our research examines whether impact investing, a recently emerged funding model, creates economic growth more inclusively. Unlike traditional VC, which focuses on rapid growth and high returns, impact investors consider social outcomes when making investment decisions and adopt a patient capital model that emphasizes long-term benefits (Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2020; Logue & Grimes, 2022). We argue that while traditional VC investment increases income inequalities, social impact-oriented VC (IVC) investment decreases income inequalities in the areas of operation. They do so through creating jobs tailored to different skill levels in disadvantaged regions with high unemployment. IVCs also influence industry norms through their operational practices such as linking managerial compensation to social outcomes and channeling funds into underserved founders, such as women and minority entrepreneurs (Schlütter et al., 2024). They further create positive externalities that benefit local communities such as better and cheaper access to education, healthcare, and energy. However, this comes with a tradeoff. We predict that IVC generates lower economic growth compared to traditional VC in the short term. This is due to their willingness to accept lower returns, lower risk appetite, and patient investment approach (Barber et al., 2021; Cole et al., 2023; Jeffers et al., 2024).

We examine the short to medium-term effects of traditional and IVC investments across U.S. metropolitan statistical areas (MSAs) from 2013 to 2022. We look at each region-year as a separate analysis unit and aim to measure how an increase in traditional and social impact-oriented VC funding affects income inequality and several economic growth

indicators. These include the number of businesses, number of jobs, and average income over the five years following the investment.

Our findings reveal three patterns about the impact of IVC and Traditional VC on income inequality and economic growth. Firstly, we find differences between the effects of impact and traditional VC on income inequality. Traditional VC investment is positively associated with income inequality. On contrast, IVC has a negative but not significant effect on income inequality. Secondly, IVC investments have a positive effect on economic growth, and this effect is smaller compared to Traditional VC. Specifically, while IVC is positively correlated with the number of establishments, jobs, and average income, the magnitude of these effects is smaller when compared to the effects of Traditional VC. This suggests that while IVC contributes to economic development, it does so at a more modest scale than Traditional VC.

Lastly, we conduct an instrumental variable analysis as our independent variable may suffer from endogeneity due to reverse causality if IVC and traditional VCs target regions with different levels of economic growth and income inequality. For instance, traditional VCs might favor high-growth regions, while IVCs may be drawn to areas with greater inequality. To address this, employ a Bartik-style instrument. This instrument mitigates endogeneity by isolating variation in VC investment activity driven by predetermined, exogenous factors. Our results show that, although IVC generates fewer businesses and less average income compared to Traditional VC; it creates more jobs. This indicates that the ventures funded by IVCs employ more individuals but at lower wage levels due to their sectors or business models. Moreover, when compared to Traditional VC, IVC has a significant negative effect on income inequality. All in all, our results provide evidence that IVC is a promising funding method to boost inclusive economic growth.

We make three key contributions to the literature. First, we contribute to the literature on organizations' roles in creating and addressing economic inequalities (Amis et al., 2020; Bapuji et al., 2020; Cobb, 2016; Davis & Cobb, 2010; Mair et al., 2016) by examining an alternative financing model that challenges traditional institutions contributing to inequality. While prior research has explored organizational structures and organization types (i.e., development organizations, humanitarian organizations) as mechanisms for mitigating economic inequalities, our study extends this literature by demonstrating how motivations and practices of a novel for-profit organization type, impact investors, can create different societal outcomes while being deeply rooted in traditional financing methods. Our results highlight that alternative financing mechanisms has potential to disrupt inequality-inducing practices.

Second, we advance the literature on impact investing by addressing an important but unexplored question regarding the tangible outcomes of such investments. While previous studies have focused on the risk preferences, selection processes, and impact measurement practices of impact investors (Boulongne et al., 2024; Lee et al., 2020; Jeffers et al., 2024), we miss an understanding of the "impact" in impact investing (Agrawal & Hockerts, 2021; Hockerts et al., 2022; Schlütter et al., 2024). We contribute to filling this gap by evaluating the regional economic and social impacts of social impact-oriented VC. Specifically, we show that these investors foster economic growth without exacerbating income inequality, which is significantly different from the traditional VC model.

Finally, we contribute to the growing literature on venture capital by offering a balanced perspective on its regional effects. Previous research has documented the positive contributions of VC, including professionalizing small firms, driving innovation, and boosting employment and wages (Hellmann & Puri, 2002; Samila & Sorenson, 2011). However, little is known about its adverse effects on communities, despite growing concerns

raised by recent academic research, policy think tanks, and news (Kwon & Sorenson, 2023; Lerner & Nanda, 2020; Vey, 2017). Our findings provide empirical evidence of traditional VC's role in exacerbating income inequality in the regions they operate and call for further research.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Organizations' Role in Creating and Maintaining Economic Inequalities

Organizations influence economic inequalities directly and indirectly through employment practices, institutional work, and externalities (Amis et al., 2020; Bapuji et al., 2020; Cobb, 2016; Mair et al., 2016). First of all, organizations' focus on maximizing shareholder value has become an important factor in rising economic inequality. It leads companies to pursue short-term financial gains at the expense of fair employment practices. To meet the demands of shareholders, especially those focused on quick returns like institutional investors and private equity firms, firms adopt cost-cutting measures that benefit executives and shareholders over employees (Bapuji et al., 2018; Cobb, 2016). Companies may freeze wages, reduce benefits, and shift resources toward increasing executive compensation rather than investing in their broader workforce (Lin, 2016). These decisions ultimately benefit top executives, whose compensation packages include performance-based incentives like stock options and bonuses linked to company profits. As a result, executive earnings grow disproportionately, widening the income gap between senior leaders and other employees (Lemieux, 2006; Piketty & Saez, 2003).

The focus on shareholder returns also drives companies to adopt more flexible yet less secure work arrangements that contribute to inequality. Firms rely on nonstandard roles like contract, part-time, and gig work to cut costs. But these types of jobs come with lower wages, limited benefits, and minimal job security (Bidwell et al., 2013; Cappelli & Keller, 2013). They leave workers more vulnerable to economic instability while reducing

opportunities for upward mobility. Furthermore, outsourcing and offshoring practices replace mid- and high-paying domestic roles with lower-paying positions (Dube & Kaplan, 2010). Together, these employment practices result in a labor market with significant income disparity, reduced job quality, and fewer stable employment opportunities.

Organizations further contribute to economic inequalities through institutional work that shapes societal norms and institutions (Lawrence & Suddaby, 2006). Their practices in hiring, promotion, role assignments, and governance decisions that can lead to marginalization based on gender, race, and class within organizational structures (Gray & Kish-Gephart, 2013; Hamann & Bertels, 2018). For example, discriminatory hiring and promotion policies can limit opportunities for women and ethnic minorities (Kang et al., 2016). Such practices get institutionalized as they become embedded in organizational routines (Thornton et al., 2012).

Organizations increase economic inequalities also through their indirect effects on broader communities (Bapuji, Ertug, & Shaw, 2020). These externalities can affect access to essential resources and opportunities for affected populations. For instance, the industrial food system enables producers and distributors to maximize their profits while undermining long-term benefits for consumers and farmers (Elmes, 2018). As this system limited access to nutrition for poorer communities, it reduced their ability to participate in organizations and societies. Moreover, organizational practices can lead to environmental degradation that disproportionately affects disadvantaged groups. Large manufacturing firms' use of inefficient and polluting technologies in less developed countries results in higher carbon dioxide emissions which contributes to health disparities, including higher rates of child and infant mortality among the poor (Jorgenson, 2007; Jorgenson, 2009). In this way, these externalities reinforce existing economic inequalities by limiting disadvantaged communities' access to essential resources.

Venture Capital and Economic Inequalities

Venture capital (VC) is a form of private equity investment targeting high-growth startups with the goal of achieving high returns. VC has a strong impact on economic growth. Regions with VC funding experience increased entrepreneurial activity that drive the area's economic development. This is visible in Silicon Valley and Boston, where dense networks of VCs have helped nurture tech hubs, leading to more firm starts, more employment, and higher average income (Da Rin, Hellmann, & Puri, 2013; Samila & Sorenson, 2011). However, the distributional effects of VC investment raise questions about its impact on income inequality within those regions.

Increased VC investments into high-tech industries in a region can drive economic polarization by reducing opportunities for middle-income employment and widening the income gap between high- and low-income residents (Kwon & Sorenson, 2023; Lee & Clarke, 2019). VC investment build high-tech ecosystems in a region with high-paying jobs aimed at highly skilled and educated workers. These VC-backed roles pay more than traditional jobs, leading to a wage divide between tech workers and those in lower-wage sectors. As tech sectors grow, middle-class jobs often disappear as automation and specialized skill demands change employment patterns (Autor, 2019). Being under pressure to satisfy investor expectations of rapid growth, VCs contribute to the human resource policy development of their investees (Hellmann & Puri, 2002). However, prioritizing cost-saving measures over employee welfare results in job insecurity and lack of benefits for workers compared to traditional employment models. For example, VC-funded gig economy platforms, like ridesharing or food delivery services, classify workers as independent contractors and limit their access to minimum wage protections and benefits (Fleming, 2017). We argue that mix of high-paying tech roles and low-wage service positions increases income inequality in areas with high VC investment activity.

VC practices further shape economic inequalities by influencing industry norms, practices, and narratives. VCs maintain biases about what a founder and business model should look like. Indeed, access to VC is not evenly distributed among entrepreneurs. Historically, VC funding has been concentrated in certain regions—predominantly urban, innovation-heavy cities like San Francisco, New York, and Boston—which receive a large share of national and global venture capital investment (Chen et al., 2010; Samila & Sorenson, 2011). Therefore, the economic benefits of innovation, productivity, and high-paying jobs become concentrated within certain neighborhoods. Further disparities exist within these regions. Structural biases and network effects can limit opportunities for entrepreneurs from underrepresented groups to secure funding. For example, women and minority founders receive disproportionately less funding than their white, male counterparts (Guzman & Kacperczyk, 2019; Kanze et al., 2018). This lack of diversity in VC investment means that the economic benefits are concentrated among certain demographics, which can reinforce existing income inequalities related to race, gender, and socioeconomic background.

VC also has indirect effects on local economies. The presence of high-income professionals increases demand for goods and services, which can lead to higher prices for housing, education, and healthcare. While this economic activity can stimulate job creation in service sectors, these jobs often offer lower wages and less job security (Lee & Clarke, 2019). Higher costs of living disproportionately impacts lower-income households, particularly for housing. As employees of VC-backed companies move into an area, they drive up local property values, leading to an inflated real estate market that pushes out long-term, lower-income residents. For instance, the rapid expansion of VC-backed tech firms in San Francisco has been associated with rising housing costs and gentrification, leading to

the displacement of lower-income residents and increased pressure on housing availability (Florida, 2017).

Moreover, the financial gains from successful VC investments are disproportionately realized by a small group of individuals, including company founders, early employees with equity stakes, and the venture capitalists themselves. VCs inherently have "winner-takes-all" nature, where returns are highly skewed toward a few "unicorns" that succeed, while most VC-backed ventures fail (Dimov & De Clercq, 2006; Sahlman, 2010). The concentration of wealth in a few successful VC-backed firms generates wealth for a relatively small, privileged segment of the population, who already was in privileged positions with the resources to take on high-risk opportunities (Ewens & Rhodes-Kropf, 2015). This concentration of wealth is further amplified when these individuals reinvest their earnings into new ventures or local real estate which drives up the cost of living for lower-income residents. All in all, we argue that traditional VC investment can intensify economic divides and contribute to a polarized income structure within a region.

Hypothesis 1 (H1): *Higher levels of traditional venture capital investment in a region are associated with greater income inequality within that region.*

Impact Investing and Inclusive Economic Growth

Impact investors aim to create financial returns and positive social or environmental impacts simultaneously (Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2020; Logue & Grimes, 2022). As of 2024, global assets in impact investing reached over \$1.571 trillion (Hand et al., 2024). Social impact-oriented venture capital (IVC), a subset of this approach, channels capital into early-stage, high-growth enterprises that tackle societal challenges such as economic inequality, climate change, and inadequate access to healthcare and education (Barber et al., 2021; Scarlata & Alemany, 2010). Their investment thesis and practices are different to traditional VC. To focus on both financial and social returns, they

make enforceable commitments to impact goals in their contracts with their investors and portfolio firms (Geczy et al., 2021). Moreover, IVCs utilize innovative investment practices such as employing decision makers with deep expertise in social issues (Scarlata et al., 2017), using social impact measurement tools (Mityushina et al., 2019; Rawhouser et al., 2019), linking their employees' compensation to social performance outcomes (Thirion et al., 2022), and providing funding over longer periods to allow for sustainable growth (Cole et al., 2023).

We argue that IVC investments influence regional income inequality through the types of jobs they create, the business practices they promote, and their positive externalities. Unlike traditional VCs, IVC prioritizes investments in disadvantaged regions characterized by high unemployment, poverty, violence, and resource scarcity (Boulongne et al., 2024; Cole et al., 2023). These systemic barriers limit local entrepreneurial activity and constrain businesses' capacity to hire or grow (Campbell et al., 2012). IVCs recognize opportunities in these regions. By supporting local social entrepreneurs, they foster job creation tailored to varying skill levels and educational backgrounds. These ventures allow unemployed and low-wage workers to enter the workforce and access career advancement opportunities. One example is NextStep, a VC-backed social venture that trains unemployed and low-income workers for entry-level healthcare roles such as certified nursing assistants by providing job-specific skills and certifications. NextStep helped addressing the shortage of frontline healthcare workers during the COVID-19 pandemic (Gallo, 2020). Such initiatives can enhance short-term financial stability for disadvantaged workers and contribute to long-term regional economic growth.

Beyond direct employment, IVCs influence industry norms through their operational practices. They channel funds into underfunded regions, nascent industries, and underserved founders, such as women and minority entrepreneurs (Cole et al., 2023). This creates

economic activity where traditional investments neglect. By demonstrating the profitability of investing in these overlooked areas and populations, IVCs can provide a proof of concept that encourages mainstream investors to follow. Moreover, their integration of impact measurement tools like the Global Impact Investing Rating System (GIIRS) and BLAB assessments ensures that social outcomes, such as job creation and community upliftment, are systematically evaluated and monitored (Scarлата & Alemany, 2010). By linking these metrics to their own compensation structures, IVCs align shareholder incentives with societal benefits (Thirion et al., 2022). This offers an alternative to traditional equity-based compensation schemes that are solely tied to financial performance which increases income inequalities.

Another defining feature of IVCs is their commitment to patient capital (Cole et al., 2023; Geczy et al., 2021). This approach challenges the traditional VC model's prioritization of rapid scaling and short-term returns by extending investment horizons and de-emphasizing "growth-at-all-costs" mentality. Cole et al. (2023) found that impact investor backed companies take, on average, 16 months longer to reach a successful exit compared to firms with traditional investors. This reflects a 25% longer timeline, with traditionally funded companies averaging 62.6 months to exit in their sample. By reducing the urgency for rapid exits, IVCs allow companies to follow sustainable practices and create business outcomes that align with long-term societal benefits. By institutionalizing these practices, IVCs can embed norms of inclusivity and a long-term focus to the entrepreneurial ecosystem.

Lastly, IVCs also create positive externalities that benefit local economies. The business models funded by impact investors aim to improve access to essential resources such as education, healthcare, and energy for underserved populations. For example, backed by LeapFrog Investments, Sun King's approach to providing affordable solar energy

solutions addresses energy poverty in off-grid communities in Africa and Asia. By offering cost-effective energy alternatives, the company reduced household expenditures of 106 million people (Leapfrog Investments, 2023). Similarly, MedGenome improves healthcare access by offering affordable genetic testing and diagnostics in emerging markets. In this way they supported early detection of diseases and enabled personalized treatment options to more than 200 thousand individuals that were excluded from healthcare systems (Leapfrog Investments, 2024). The improved access to essential resources enhances individual well-being and stimulates regional economic activity through increased consumer spending and job creation. Therefore, the combined direct and indirect effects of impact-oriented investments have the potential to create more inclusive local economies and reduce income inequality.

Hypothesis 2 (H2): *Higher levels of social impact-oriented venture capital investment in a region are associated with lower income inequality within that region.*

Social impact-oriented VCs' novel investment strategies may come with a trade-off. We argue that IVC lead to less economic growth compared to traditional VC investments, in the short term. Research have long showed that VCs improve economic growth in their activity regions (Da Rin, Hellmann, & Puri, 2013; Samila & Sorenson, 2011). The lack of financial resources prevents individuals from starting their businesses. VCs alleviate this limitation by providing the necessary funding for promising ideas. Beyond financial support, they also offer strategic advice and resources that help startups grow (Hellmann & Puri, 2002). VCs further drive growth by shaping entrepreneurial expectations (Samila & Sorenson, 2011). When a region benefits from VC investments, it creates a ripple effect and encourages more entrepreneurs to pursue their business ideas. The expectation of receiving

financial and developmental support motivates individuals to innovate and establish new ventures. However, IVCs differ to traditional VCs in their motivations and practices.

First, IVCs have a different objective function. Whereas traditional VCs aim to maximize their financial returns and therefore economic growth, impact investors accept lower financial returns in exchange for generating positive societal outcomes. Barber et al. (2021) found that impact investors accept 2.5 – 3.7 percent lower annual rate of returns compared to traditional investors to derive nonpecuniary utility from their impact investments. Their sacrifice means that capital is allocated to projects that may not maximize growth from a purely economic standpoint. Therefore, IVC investments may contribute less to economic growth compared to traditional VC investments which are designed to maximize economic growth.

Second, IVCs have a different appetite for risk and innovation. Traditional VCs are known for investing in high-risk, high-reward ventures that have the potential to lead to technological advancements and disruptive innovations. These investments can drive significant economic growth by creating new markets or transforming existing ones. Impact investments, however, are less risky (Jeffers et al., 2024). IVCs allocate funds to less scalable ventures addressing niche social issues or local community needs, which may not scale as efficiently as the high-growth enterprises favored by traditional VCs. Their sector constraints and conservative approach towards market risk may limit innovations that carry higher risks but also the potential for substantial economic returns. On the other hand, traditional VCs employ aggressive growth strategies to rapidly expand and capture market share. Their focus on scalability and higher risk appetite can contribute to higher economic growth.

Finally, IVCs are patient (Cole et al., 2023). The longer time horizons associated with sustainable growth in impact investments suggest that the economic benefits of IVCs

take longer to materialize. IVCs' extended timeframe means that expected positive effects on economic growth are delayed. Traditional VCs, in contrast, seek quicker returns and invest in ventures that can contribute to economic growth in the short to medium term. The longer maturation period of impact investments may therefore result in a slower pace of economic expansion.

Hypothesis 3 (H3): *The positive relationship between social impact-oriented venture capital investment and economic growth within a region is weaker than the positive relationship between traditional venture capital investment and economic growth within a region.*

METHODOLOGY

The Data

We developed a panel to explore Metropolitan Statistical Areas (MSAs) in the United States from 2013 to 2022. The data was sourced from several publicly available databases. Economic activity information for each region came from the Quarterly Census of Employment and Wages (QCEW) provided by the Bureau of Labor Statistics (BLS). We also used the US Census Bureau to gather data on income inequality and population metrics. Patent data was collected from the United States Patent and Trademark Office. For our venture capital analysis, we relied on data from the Crunchbase database.

MSAs were chosen as our unit of analysis because they represent the most detailed regions considered economically independent (Samila & Sorenson, 2011). The U.S. Office of Management and Budget (OMB) defines an MSA by a core urban area with a minimum of 50,000 people and includes surrounding counties that have strong social and economic ties to this core. These ties are often measured by commuting patterns, with counties included in an MSA if more than 25% of their residents commute to the urban core for work.

The US government recognizes 387 MSAs. We excluded eight in Puerto Rico from our analysis. Due to missing QCEW data on two regions, our final dataset included 377 MSAs.

Our study spanned a decade, from 2013 to 2022, beginning data collection in 2008. This start aligns with main events in impact investing, including the 2007 Rockefeller Foundation event and the 2008 financial crisis. To operationalize our independent variable, we aggregated VC activity from the preceding five years, starting from 2013.

The MSA-year serves as our unit of observation. We leveraged the panel structure of the data and used two-way fixed effects for regions and years.

Dependent Variables

Firstly, we want to test the effect of traditional and social impact-oriented VCs on income inequality. Income inequality is often measured through the Gini coefficient (Easterly, 2007). This coefficient quantifies income distribution on a scale ranging from 0 to 1. A value of 0 represents perfect equality, where all individuals have identical income levels. In contrast, a value of 1 shows complete inequality, meaning that a single individual holds all income. We use the Gini coefficient to calculate the income inequality level within an MSA.

Secondly, we want to test the effect of traditional VCs and IVCs on economic growth. To do so, similar to Samila and Sorenson (2011) and Kwon and Sorenson (2023), we utilize the number of establishments, jobs, and average weekly income in MSAs.

The number of establishments is the total count of business facilities within each MSA. Jobs represent the total number of jobs within each MSA. It reflects the employment opportunities available to the local population. The third dependent variable is the average weekly income per job. We logged these numbers for our analyses.

Traditional and Social Impact-Oriented Venture Capital

We identified social impact oriented VC investments using the impact investor list created by Cole et al. (2023), which manually screened institutional investors to find out if they aim to both create social impact and generate financial returns with their investments. One example of Impact oriented VCs is Ananda Impact Ventures who “back game-changing companies across Europe to achieve social and environmental impact on a global scale” (Ananda Impact Ventures, 2023). Another one is Sao Paulo-based Vox Capital who explains that “the products and services of the businesses in which we invest impact, directly and indirectly, people and the planet, generating measurable social and environmental transformations that go beyond financial return” (Vox Capital, 2023). On the other hand, 'traditional VC' refers to other independent VC investors who categorize themselves as 'venture capital' on Crunchbase.

We measured the supply of venture capital by summing the total number of investments rounds in an MSA over 5 years prior to each year and logging them. Similar to previous research (Kwon & Sorenson, 2023), we aggregate this measure for two reasons. Firstly, the limited number of companies receiving funding can cause fluctuations in annual data. By aggregating data across multiple years, we mitigate the risk of underestimating these metrics. Secondly, the impact of VC investments manifests over a long period. For instance, Samila and Sorenson (2011) found that VC influenced regional economic growth for at least three years post-investment.

RESULTS

Fixed Effect Estimates

In our analysis, we employed log-on-log fixed effects models to estimate the relationships between various dependent variables and the levels of VC activity across Metropolitan Statistical Areas (MSAs) and years. The model formula can be represented as:

$$Y_{jt} = \beta_1 * \text{Impact } VC_{jt} + \beta_2 * \text{Traditional } VC_{jt} + \beta_3 * \text{Pop}_{jt} + \beta_4 * \text{Pat}_{jt} + \rho_j + \varphi_t + \varepsilon_{jt}$$

In this model, Y_{jt} represents the dependent variables, such as the income inequality GINI, number of establishments, jobs, and average income for each region j and year t . Impact VC_{jt} (and Traditional VC_{jt}) represent our independent variables and are the logged values of the number of social impact-oriented (and traditional) VC investment rounds in the MSAs. The variable Pop_{jt} denote the population level and the term Pat_{jt} , stands for the number of patents, included as a control to account for innovation within the MSAs.

Region-specific fixed effects ρ_j control for unobserved heterogeneity across different MSAs that could influence the dependent variables, such as local policies, infrastructure, or labor market conditions. Year-specific fixed effects φ_t account for common external shocks or trends affecting all regions in a particular year, such as national economic cycles or changes in federal policy. The error term ε_{jt} captures the residual influences not explained by the model. Errors are clustered within regions and years to address potential correlations.

Our model's log-on-log specification (only for the economic growth indicators) implies that the coefficients represent elasticities which provides a measure of how responsive the dependent variables are to changes in venture capital activity.

Table 1 presents the descriptives. Table 2 summarizes the results of our analysis featuring four regressions. Traditional VC investments exhibit significant and substantial positive effect on income inequality. Specifically, doubling Traditional VC investments in a region increases the income inequality Gini by 0.0075037. On the other hand, IVC is associated with a minor decrease in income inequality but this result lacks statistical significance (at the 5% level).

Moving on to our analysis for economic growth, for traditional VC investments, the coefficient of 0.0316923 for establishments indicates that a doubling of traditional VC investments increases the number of establishments by 2.2% ($0.0127192 \times \ln(2)$). In terms

of jobs, a doubling of traditional VC investments leads to an increase of 1.2% in employment, whereas, for average income, the positive effect is higher at 6.4%. These are comparable to previous findings using data from 1993 – 2002 (Samila & Sorenson, 2011) which found 0.8%, 0.6%, 1.8% and 2003 – 2012 (Kwon & Sorenson, 2023) which found 2.8%, 5.1%, 1.5% increase in dependent variables, respectively.

Turning to IVC investments, the results demonstrate weaker economic impact. A doubling of IVC investments boosts the number of establishments by 0.9%. For employment, the corresponding increase is about 0.9%. Lastly, doubling of impact-oriented VC investments raises average income by approximately 0.7%. Overall, Traditional VC investments show a more substantial impact on all three economic indicators compared to Impact VC, suggesting that Traditional VC is more effective in stimulating economic growth. However, although Impact VC investments have a less pronounced effect on economic growth, they offer more inclusive economic benefits compared to Traditional VCs.

Table 1. Descriptive Statistics

	Observations	Mean	SD	Min	Max
Dependent Variables					
Establishments	3,770	21,274	55,586.25	935	676,178
Jobs	3,770	321,805	752,009.6	18819	9,542,659
Average Income (USD)	3,770	924.73	202.13	582	3,524
Income Inequality Gini	3,770	0.46	0.02	0.39	0.56
Independent Variables					
Impact VC rounds (5-year aggregate)	3,770	2.5	14.92	0	325
Traditional VC rounds (5-year aggregate)	3,770	215	1,108.44	0	18,927
Rate of Impact VC in Total VC	3,470	0.02	0.08	0	1

Regional unit is the Metropolitan Statistical Areas (MSA) in United States. Our panel data covers the 2013 - 2022 period.

Table 2. Fixed Effects Estimates of the Effects of Venture Capital Investments on Economic Growth

	Dependent Variables			
	Income Inequality	Establishments	Employment	Average Income
Impact VC rounds	-0.0004 (0.0009)	0.0128*** (0.0029)	0.0123*** (0.0022)	0.0096* (0.0044)
Traditional VC rounds	0.0075*** (0.0007)	0.0317*** (0.0021)	0.0170*** (0.0015)	0.0924*** (0.0031)
Population	-0.0131+ 0.0076	0.8477*** (0.0240)	0.5164*** (0.0179)	0.8049*** (0.0361)
Patents	0.0021** (0.0008)	0.0317*** (0.0026)	-0.0010 (0.0019)	0.0833*** (0.0039)
Region FE	377 groups	377 groups	377 groups	377 groups
Year FE	10 groups	10 groups	10 groups	10 groups
R-squared	0.0187	0.965	0.9799	0.3302
Observations	3770	3770	3770	3770

Note: Standard errors clustered on regions and years. Independent variables are the logged total supply of traditional, and impact-oriented, VC investment rounds in an MSA over 5 years prior to each year.

+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

Given the high correlation between the number of Impact VC and Traditional VC investments in MSAs, which could potentially confound the interpretations of Tables 2, we employed an additional analytical step. To further clarify the unique effects of impact VC, we regressed the dependent variables against the rate of impact-oriented VC within an MSA-year unit, while controlling for total VC funding.

Table 3 presents these results. As this variable is a rate of impact VC over the total number of VC, coefficients compare the effect of impact VCs to traditional VCs. Increase in the impact VC rate significantly contributes to a decrease in income inequality. However, the impact VC rate negatively affects the number of establishments and average income. Conversely, the impact VC rate has a very small and statistically insignificant impact on employment. This may reflect the sectors or job types that impact oriented VC typically supports, which could be lower paying than those supported by traditional VCs. Impact VC appears more favorable in creating jobs without increasing income inequality and thus promoting inclusive growth.

Table 3. Fixed Effects Estimates of the Effects of Impact VC Rate on Economic Growth

	Dependent Variable			
	Income Inequality	Establishments	Employment	Average Income
Impact VC Rate	-0.0113*** (0.0025)	-0.0348*** (0.0084)	-0.0001 (0.0063)	-0.0716*** (0.0122)
Total VC rounds	0.0094*** (0.0007)	0.0415*** (0.0025)	0.0220*** (0.0018)	0.1076*** (0.0036)
Population	-0.0187* (0.0075)	0.8312*** (0.0252)	0.5152*** (0.0188)	0.7928*** (0.0365)
Patents	0.0017* (0.0008)	0.0338*** (0.0028)	0.0002 (0.0021)	0.0847*** (0.0040)
Region FE	347 groups	347 groups	347 groups	347 groups
Year FE	10 groups	10 groups	10 groups	10 groups
R-squared	0.0015	0.9662	0.9817	0.3238
Observations	3470	3470	3470	3470

Note: Standard errors clustered on regions and years. Independent variables are the logged total supply of traditional, and impact-oriented, VC investment rounds in an MSA over 5 years prior to each year.

+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

Instrumental Variable Estimates

While our two-way fixed effects models control for confounding factors, there is a risk of endogeneity. Endogeneity arises if an explanatory variable in a regression model is correlated with the error term. In our model, the independent variable is the rate of impact-oriented VC investment over traditional VC investment. This measure may suffer from endogeneity due to reverse causality if impact-oriented and traditional VC firms invest in areas with different levels of economic growth and income inequality. For example, regions experiencing higher economic growth might attract traditional VCs more whereas, regions with higher income inequality may have conditions that make them more favorable for impact-oriented VCs. To tackle this, we first investigate impact-oriented VCs investing behavior compared to traditional VCs and then use instrumental variable analysis.

Table 4 presents investment behavior of impact-oriented VC compared to traditional VC. We regressed DVs to a binary variable indicating if any impact-oriented VC has invested in an MSA in a particular year. Out of 2810 MSA-year combinations that has received VC investment, 19% has received an impact-oriented VC investment. Results show that impact-oriented VCs, compared to traditional VCs, invest in regions with lower number of establishments and lower average income.

Table 4. Investment Differences Between Impact-oriented VC and Traditional VC

	Dependent Variable			
	Income Inequality	Establishments	Employment	Average Income
Impact VC	0.0002 (0.0005)	-0.0041+ (0.0023)	-0.0006 (0.0015)	-0.0069* (0.0035)
Region FE	368 groups	368 groups	368 groups	368 groups
Year FE	10 groups	10 groups	10 groups	10 groups
R-squared	0.0387	0.2794	0.2698	0.138
Observations	2810	2810	2810	2810

Note: Standard errors clustered on regions and years.

+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

Similar to the recent research on the economic effects of VC investments, such as that by Kwon & Sorenson (2023), we employ a Bartik-style instrument (Goldsmith-Pinkham et al., 2020). This approach involves estimating the expected volume of VC for a region over a specific five-year period based on historical trends and exogenous national-level shocks to VC investment activity. We calculate the expected VC levels by multiplying the share of VC investment in the region between 2007 and 2012 with the aggregate amount of VC invested nationally during five-year intervals. We do this separately for impact and traditional VC levels to calculate the expected level of these two VC types. As a last step, we calculate the expected rate by dividing the expected impact-oriented VC by the expected total VC in a region. Regional fixed effects account for the potential endogeneity in the distribution of VC from the earlier period (2007-2012), while year fixed effects absorb fluctuations in national VC availability. This approach help mitigate endogeneity by addressing reverse causality by isolating variation in the rate of impact VC that is determined by predetermined, exogenous factors. The expected rate reflects regional characteristics

combined with national-level trends, which are unlikely to be influenced by regional income inequality or economic growth.

Table 5 presents the results of the first-stage regression, which estimates the impact-oriented VC rate. The Bartik-style instrument, representing the expected rate of impact-oriented VC, is both positive and statistically significant. Additionally, The Cragg–Donaldson joint significance test for our instruments shows values surpassing the threshold of 10, indicating robust instrument validity in each regression.

Table 6 presents the second-stage results for our dependent variables. Impact oriented VC rate decreases income inequality. The number of establishments and the average income levels decrease as well. This is consistent with the fixed effects results. Number of Jobs, however, increases with the impact VC Rate. These results highlight that impact-oriented VC, compared to traditional VC creates more jobs. But these jobs are concentrated in fewer businesses, and they come with lower wage levels.

Table 5. First stage regression - Bartik Style Impact-oriented VC Rate Expectation on Impact-oriented VC Rate

	Dependent Variable
	Impact VC Rate
Bartik Style Impact-oriented VC Rate Expectation	0.3779*** (0.0119)
Total VC rounds	0.0034 (0.0035)
Population	0.0071 (0.0049)
Patents	-.01427*** (0.0034)
Region FE	347 groups
Year FE	10 groups
Observations	3470
F statistic	267.89***
Pseudo R2	0.2374

Note: Standard errors clustered on regions and years.
 +p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

Table 6. Instrumental Variable Estimates of the Effects of Impact VC Rate on Economic Growth – Second Stage

	Dependent Variable			
	Income Inequality	Establishments	Employment	Average Income
Impact VC Rate	-0.0369*** (0.0100)	-0.0561+ (0.0323)	0.0679** (0.0248)	-0.2988*** (0.0518)
Total VC rounds	0.0093*** (0.0008)	0.0410*** (0.0025)	0.0219*** (0.0019)	0.1065*** (0.004)
Population	-0.0193+ (0.0078)	0.8315*** (0.0253)	0.5181*** (0.0194)	0.7860*** (0.0405)
Patents	0.0014 (0.0009)	0.0335*** (0.0028)	0.001 (0.0022)	0.0817*** (0.0045)
Region FE	347 groups	347 groups	347 groups	347 groups
Year FE	10 groups	10 groups	10 groups	10 groups
Observations	3470	3470	3470	3470
Cragg-Donald Wald F statistic	143.37	143.37	143.37	782.31
Under identification Test (Anderson canon. corr. LM statistic)	137.163***	137.163***	137.163***	137.163***

Note: Standard errors clustered on regions and years.

+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.

DISCUSSION AND CONCLUSION

To address whether organizations can drive economic growth while decreasing economic inequalities, we examine traditional and social impact-oriented venture capital investments in the United States. Although VC-backed entrepreneurship has historically fueled innovation and economic development, it has also contributed to social concerns, particularly in specific urban areas that it is densely cumulated in. Focusing on U.S. metropolitan statistical areas (MSAs) from 2013 to 2022, we employ a comparative lens between traditional VC and IVC and analyze how these two different funding models affect income inequality and economic growth.

Our findings reveal that traditional VC investment activity is positively related to income inequality, confirming our first hypothesis. Specifically, regions that received higher levels of traditional VC funding experienced a rise in the Gini coefficient over the five years following the investment. In contrast, social impact-oriented VC investment activity is not associated with income inequality, rejecting our second hypothesis. Increase in IVC funding did not affect income disparity metrics. Additionally, while traditional VC investment activity led to higher overall economic growth, as evidenced by greater increases in the number of businesses and average income, IVC investments resulted in more job creation. These results provide evidence on how social impact-oriented VC may offer a more inclusive approach to economic development compared to its traditional counterpart.

Our results have important implications for theory and practice. Prior theoretical work has focused on how organizations create and maintain economic inequalities (Amis et al., 2018; Amis et al., 2020; Bapuji et al., 2020; Cobb, 2016) and how they can contribute alleviating it (Davis & Cobb, 2010; Ferraro et al., 2015; Mair et al., 2012; Mair et al., 2016). Organizations influence economic inequalities through direct mechanisms, such as employment practices and corporate governance, and indirect channels, including

institutional work and externalities. Non-profit organizations such as development organizations and humanitarian organizations are important actors in mitigating economic inequalities. However, we lack understanding of for-profit organizations ability to alleviate economic inequalities. Empirical insights into the mechanisms through which for-profit organizations can mitigate inequalities remain underdeveloped. Although addressing economic inequalities is a complex process, recent research highlights the need to focus on identifying which actors can play a role in advancing this effort (Bapuji et al., 2020). Our findings reveal that impact investors—a new for-profit organization type—can achieve different societal outcomes through their unique motivations and practices, even while operating within traditional financing frameworks. Our results highlight that alternative financing mechanisms have the potential to disrupt practices that contribute to inequality. As such, we try to open an avenue for future work on the role of for-profit organizations with social motivations to help solve social challenges.

We also contribute to the emerging literature on impact investing by measuring its impact at the regional level. This is particularly important given the increasing emphasis on understanding the actual "impact" of impact investing and the lack of quantitative research in the field. "Impact investors need to show that they have impact for others. (Hockerts et al., 2022; 945). However, "the literature fails to address the real impact of II (impact investing) as previous studies ... take the aggregate societal impact of II (impact investing) for granted." (Schlütter et al., 2024; 2696). To this respect, we offer quantitative empirical evidence on the impact created by impact-oriented VCs. In this way we also contribute to the ongoing discussions on the different characteristics and practices of impact investors by showing that these differences indeed turn into different outputs. Impact investors willingly pay around 3 percent annual returns to create social impact (Barber et al., 2021). They are less exposed to market risk (Jeffers et al., 2024). And they have a longer time horizon and

let their investees focus on sustainable growth rather than a quicker scaling (Cole et al., 2023). We show that, in fact, impact investors' unique characteristics help them targeting income inequality in the communities they invest in.

Although social impact-oriented VC activity promotes a more inclusive economic growth compared to traditional VC activity, our findings show a neutral direct effect of social impact-oriented VC activity on income inequality. We think that their ability to reduce inequalities may be constrained by several factors. One limitation is the relatively small scale of the impact investing sector compared to the broader private equity industry. This limited scale restricts the number of employees and communities that can benefit from these investments and makes it insufficient to address systemic inequalities on a larger scale. Increase in impact investing activity may improve its effectiveness. Financial return expectations can further limit the potential of social impact-oriented VCs. They look for opportunities that offer both social impact and reasonable financial returns, which can lead to the exclusion of marginalized regions that carry highest risks or lowest profitability. This selective approach reduces the potential for creating broader positive externalities and limits the ability to address deeper economic inequalities.

Building upon, further studies could investigate and quantify the impact created by impact investors, or other alternative funding models, and compare their outputs to traditional financial instruments to understand alternative ways of growth that are better able to support innovative solutions addressing inequality. In addition, we call for more work on impact investors' impact at different levels such as at the portfolio organization level. We provide evidence about their effects on communities, but they create this effect through the social ventures they fund. Do they really contribute 'additional' value to their investee/portfolio companies' social and financial success through financial and non-

financial means? Through normalizing investing in social ventures, do they encourage traditional non-impact focused investors to invest in social entrepreneurs?

Finally, we contribute to the research on venture capital by focusing on an unconventional dependent variable. While venture capitalists are known to professionalize small firms, drive innovation, and stimulate employment and wages (Da Rin, Hellmann, & Puri, 2013; Hellmann & Puri, 2002; Samila & Sorenson, 2011), less attention has been paid to their potential negative effects on communities. Recent studies have begun to raise concerns (Lerner & Nanda, 2020; Kwon & Sorenson, 2023). For instance, Lerner and Nanda (2020) highlighted several critical issues: the limited scope of technological innovations supported by venture capital, the concentration of decision-making power among a small group of investors controlling substantial capital, and the loosening of corporate governance standards by VC firms in recent years. They warned that these trends could have lasting adverse effects on the direction of innovation for the broader economy. Building on this, Kwon and Sorenson (2023) demonstrated that regions experiencing increased VC activity often see a contraction in the tradable sector, which provides higher-paying jobs, and an expansion in the non-tradable sector. Our findings add to this discourse by providing empirical evidence that traditional VC activity increases income inequality in the regions where it operates. In doing so, we expand the conversation on the societal impacts of venture capital and emphasize the need to critically reassess its role in regional economic development.

Academic and Practical Implications of Research

Academic Implications

Contribution to the Literature on Venture Capital

Venture capital firms invest in innovative early-stage businesses for their exponential growth potential (Hallen, Katila, & Rosenberger, 2014; Ozmel et al., 2013; Pahnke et al., 2015). This model is inherently risky, as only a small fraction of investments provides the desired returns; many ideas fail to turn into viable products or scale enough to justify the investment. The VC industry is thus characterized by a highly skewed distribution of returns with a few firms achieving outsized success while many others deliver average or submarket performance. Within this high-risk, high-reward sector, IVCs introduce an additional layer of complexity by prioritizing social or environmental value creation alongside financial returns. This dual mission creates unique challenges for their management and decision-making processes. Being in operation for roughly 15 years, IVCs present a novel lens and data to examine how motivational differences in VCs influence organizational practices and outcomes. In this way, this thesis makes several contributions to the VC literature.

First, the thesis addresses how dual motivations influence IVC decision-making and outcomes. The first paper shows that dual orientations reflect in investee selection processes. On the other hand, the second and third papers reveal that dual motivations often result in trade-offs. IVCs directly and indirectly contribute to social impact creation at the investee and community level but it comes with diminished economic growth. This exemplifies the inherent tension in pursuing dual objectives.

Second, this thesis explores the under-researched "dark side" of VC activity. While traditional VCs are celebrated for fostering innovation and economic growth (Da Rin, Hellmann, & Puri, 2013; Hellmann & Puri, 2002; Samila & Sorenson, 2011), this research

presents their association with rising income inequality and regional disparities. The findings suggest that VC investments disproportionately benefit select geographic areas and contribute to income polarization. This aligns with recent critiques about the concentration of VC capital among a few dominant firms and the broader consequences of their activities (Lerner & Nanda, 2020; Kwon & Sorenson, 2023). In this way, we call for further research on the societal implications of VC practices.

Contribution to the Literature on Impact Investing

The growing field of impact investing addresses the need for financial mechanisms to tackle grand societal challenges (Barber et al., 2021; Boulongne et al., 2024; Hehenberger et al., 2019; Lee et al., 2019; Logue & Grimes, 2022). While the theoretical foundations of impact investing have been established, there is a notable gap in empirical research quantifying its outcomes (Hockerts et al., 2022; Schlütter et al., 2024). This thesis contributes to the literature by providing two empirical studies that test the promises and effectiveness of impact-oriented investing within the VC ecosystem.

The research provides evidence that IVC is a functional impact investing mechanism that can achieve additional social impact. Additionality concept is fundamental to impact investing (Brest & Born, 2013; Hockerts et al., 2022). It requires these firms to create social or environmental outcomes that would not materialize without their involvement. In other words, IVCs must act differently from profit-driven investors to be able to generate impact. This necessitates specialized skills that enable IVCs to identify and support opportunities overlooked by traditional investors. The second paper presents how IVCs' expertise contributes to drawing additional funding to their investees. This study also offers a novel methodological approach to evaluating the contributions of impact investors. Moreover, the third paper shifts focus to the direct positive effects of IVC activity on regional communities and highlights the potential of IVCs to address systemic issues.

Contribution to the Literature on New Venture Signaling

Studies on entrepreneurial finance use signaling theory to examine how actors communicate their unobservable characteristics through observable signals (Bapna, 2019; Connelly et al., 2011; Colombo, 2021; Plummer et al., 2016). This research stream focusses on signal senders and the content they deliver. However, recent studies emphasize the importance of differences in signal receivers' characteristics which shape the success of signaling processes (e.g., Drover et al., 2018). This thesis aligns with and extends this line of research by examining how different types of VC firms interpret and prioritize signals in their decision-making processes.

Our findings reveal that signal interpretation is not universal but depends on the characteristics of the receiver and the broader signaling environment. Traditional VCs prioritize financial signals, while government-backed VCs respond to social signals. In contrast, IVCs uniquely integrate both types of signals and treat them as complementary rather than substitutive. This demonstrates that signal interactions are contingent on the evaluator's goals and context. Moreover, this research advances the understanding of simultaneous and multi-dimensional signaling. The evaluation of dual signals - financial and social potential - provides empirical insights into how different investors process complex information. We find that dual-motivated investors such as IVCs look for both financial and social potential in ways that reflect their dual goals. These findings contribute to the theoretical development of signaling in multi-dimensional contexts and provide practical implications for social entrepreneurs seeking investment.

Practical Implications

Implications for Impact Investors

For impact investing practitioners, such as limited partners (LPs) and general partners (GPs), this thesis provides several practical insights. Firstly, the research offers

evidence that social impact-oriented VCs play a role in creating social impact while still pursuing financial returns. While there may be trade-offs, such as lower economic growth compared to traditional venture capital, IVCs' ability to avoid contributing to income inequalities makes them appealing to LPs focused on reducing economic inequalities.

Additionally, IVCs perform an important role in certification and risk mitigation. By identifying and supporting promising social ventures early on, they help de-risk these opportunities and make them more attractive to traditional VCs for follow-on funding. This is especially relevant for ventures operating in niche markets or those developing novel technologies which traditional investors might otherwise overlook due to perceived risks or complexities.

The research also highlights how IVCs excel in environments with significant information gaps. Their expertise enables them to identify and nurture ventures that might otherwise struggle to secure funding. For LPs aiming to channel capital into underserved communities or emerging industries, collaborating with GPs who have deep technical expertise, regional insights, or experience in specific social impact areas can be particularly effective to attract more attention for their social cause later.

Moreover, the finding that IVCs do not increase regional inequalities aligns well with investment strategies focused on responsible capitalism. However, the thesis also identifies inherent trade-offs. LPs must recognize that impact-focused funds may not deliver the same level of local GDP growth as traditional investments.

Implications for Social Entrepreneurs

For social entrepreneurs tackling societal challenges through for-profit ventures, the thesis offers guidance on how to align with impact-focused investors. One key takeaway from the research is that IVCs seek ventures that demonstrate both commercial viability and the potential to deliver social impact. As such, social entrepreneurs should present a strong

business model alongside a clear plan for achieving social outcomes in their fundraising efforts.

Importantly, IVCs bring more than just funding. Their specialized knowledge in supply chain management, community engagement, and impact measurement can enhance a social venture's ability to scale its impact. Entrepreneurs can refine their business strategies by leveraging these resources and networks. Lastly, working with IVCs can lead to additional funding opportunities in the future. By validating the credibility and potential of social ventures, IVCs enhance their visibility and appeal to traditional VCs, who might otherwise be hesitant to invest. For social entrepreneurs, this validation effect helps overcome biases and facilitates access to a wider range of investment opportunities.

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