The Impact of Venture Capital Backing on the Post-IPO Performance of FemTech Firms in the US.

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Dissertation submitted in partial fulfilment of requirements for the International MSc in Finance, at Universidade Católica Portuguesa and for the MSc in Management at WHU – Otto Beisheim School of Management, 11th of September 2025.

English Abstract

The Impact of Venture Capital Backing on the Post-IPO Performance of FemTech Firms in the US

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This dissertation examines the role of venture capital (VC) in shaping the post-initial public offering (IPO) performance of FemTech firms in the United States. The aim is to ascertain whether VC backing provides certification benefits that enhance post-IPO results and whether such effects intensified during the COVID-19 pandemic.

The research analyses 45 FemTech IPOs completed between 1995 and 2023, identified through healthcare classifications and FemTech-specific keyword searches. Performance is evaluated using cumulative abnormal returns (CAR) and buy-and-hold abnormal returns (BHAR) over 3-, 6-, and 12-month intervals. Statistical analyses include t-tests and ordinary least squares regressions, controlling for firm size, age, profitability, R&D intensity, and pandemic timing.

Findings suggest that VC-backed FemTech firms outperform their non-VC-backed counterparts in the short to medium term, with CARs showing statistically significant gains at 12 months. However, BHAR analysis indicates long-term underperformance, implying that certification benefits do not guarantee sustained value. The moderating effect of COVID-19 appears limited, with only marginal evidence of stronger certification effects during the crisis.

The dissertation concludes that while VC support enhances early market confidence, it does not ensure long-term success. By focusing on the less explored FemTech sector, this study contributes new empirical insights to IPO and VC literature and offers practical guidance for investors, entrepreneurs, and policymakers involved in women's health innovation.

Keywords: Venture capital, FemTech, IPO, CAR, BHAR, post-IPO performance, gender innovation

Português abstrato

O Impacto do Apoio de Capital de Risco no Desempenho Pós-IPO de Empresas FemTech nos Estados Unidos

Costanza Vittoria Maria Ciambrone

Esta dissertação analisa o impacto do capital de risco (venture capital, VC) no desempenho pós-oferta pública inicial (IPO) de empresas FemTech nos Estados Unidos. O objetivo é verificar se o apoio de VC gera benefícios de certificação que melhoram os resultados após o IPO e se tais efeitos se intensificaram durante a pandemia de COVID-19.

O estudo abrange 45 IPOs realizados entre 1995 e 2023, identificados por classificações do setor de saúde e termos específicos de FemTech. O desempenho foi medido por retornos anormais acumulados (CAR) e retornos anormais de compra e manutenção (BHAR) em 3, 6 e 12 meses. As análises incluíram testes t e regressões de mínimos quadrados ordinários, controlando tamanho, idade, lucratividade, intensidade em P&D e pandemia.

Os resultados mostram que empresas apoiadas por VC superam as não apoiadas no curto e médio prazo, com ganhos significativos em CAR aos 12 meses. Contudo, a análise de BHAR aponta para baixo desempenho no longo prazo, indicando que os benefícios iniciais não garantem valor sustentado. O impacto da COVID-19 foi limitado, com apenas evidências marginais de reforço da certificação.

Conclui-se que o apoio de VC aumenta a confiança inicial do mercado, mas não assegura sucesso duradouro. Este estudo, ao focar no setor FemTech, ainda pouco explorado, amplia a literatura sobre IPOs e capital de risco e oferece orientações a investidores, empreendedores e formuladores de políticas em saúde da mulher.

Palavras-chave: Capital de risco, FemTech, IPO, CAR, BHAR, desempenho pós-IPO, inovação de gênero

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1. Introduction

This section presents the essential ideas and rationale supporting the thesis. It starts by analysing the role of Venture Capital (VC) in funding early-stage enterprises. Businesses that frequently exhibit significant uncertainty, a restricted operating history, and innovation-focused models. They often face challenges in accessing conventional financing options. VC firms provide essential funding while also offering strategic guidance, managerial know-how, and governance support, which assist startups in overcoming growth hurdles and enhancing their likelihood of success (Megginson & Weiss, 1991; Kaplan & Strömberg, 2003).

Thereafter, attention turns to the FemTech sector, a swiftly growing field in digital health that creates products and services catering to women's distinct biological and reproductive health requirements. Despite its potential for development and social impact, FemTech is underfunded and faces significant structural barriers, including gender biases in venture finance and a lack of female representation among investors (Forbes, 2022; Brush et al., 2018). These problems highlight the significance of VC as a funding source and evaluation method in this industry.

The section concludes by outlining the study's objective: to investigate the impact of VC support on the performance of FemTech companies following their initial public offering (IPO), particularly in the unique market conditions created by the COVID-19 pandemic. By investigating this relationship, the thesis aims to fill a gap in the literature at the intersection of VC finance, IPO outcomes, and gender-focused innovation (Brav & Gompers, 1997; Basnet, 2025).

VC funding refers to the deployment of capital by professional investment firms (Venture Capitalists) to early-stage, high-potential ventures, also known as startups, in exchange for ownership or shares. Substantial uncertainty, limited historical performance data, and a high risk of failure often characterise these companies, making them less suitable for traditional financing sources, such as bank loans. Venture capitalists are willing to assume this elevated risk in exchange for the prospect of outsized returns, especially in industries where innovation drives value creation. In fact, VC funding plays a critical role in fostering technological advancement and entrepreneurship, particularly in sectors like information technology (IT), biotechnology, healthcare, and the focus of this study, FemTech, a rapidly emerging field which prioritises innovation in women's health (Kortum & Lerner, 2000; Lerner & Nanda, 2020).

Given the high-risk and uncertain nature of startup business models, VC funds typically provide active monitoring and guidance by supporting the company's internal development, product or service offerings, and business scale-up. Their involvement helps reduce information asymmetries between entrepreneurs and investors and supports better managerial discipline. Organizationally, VC firms are structured as limited partnerships: the general partners (VCs) manage the fund and make investment decisions, while the limited partners (institutional investors, HNWI, Funds of Funds, etc.) supply the capital but remain passive (Sahlman, 1990; Gompers, 1995; Kaplan & Strömberg, 2003).

VC financing typically follows a staged process, allowing investors to mitigate risk and monitor progress over time (Sahlman, 1990; Gompers, 1995). Early phases, such as pre-seed and seed rounds, are generally supported by close networks, angel investors, or micro VC funds once a product or initial business model is established (SVB, 2024). Subsequent rounds, such as Series A, B, and beyond, involve progressively larger VC commitments as firms expand operations, scale production, and enter new markets (Gompers, 1995; SVB, 2024; Hellmann & Puri, 2002). At later stages, additional financing may also come from private equity firms, hedge funds, or banks. Ultimately, many ventures pursue an exit through an IPO, although alternatives such as SPACs or M&A transactions are also common (Sahlman, 1990; Gompers, 1995).

FemTech (short for “female technology”) is a subset of MedTech (short for “medical technology”). The term was coined in 2016 by the founder of Clue, a menstrual health app startup that now has 15 million users across 180 countries. It describes ventures aimed at providing technological solutions that address women’s specific biological and reproductive needs. This includes products and services related to menstruation, fertility, contraception, pregnancy, menopause, chronic gynaecological conditions, and broader reproductive diagnostics.

As an industry, FemTech sits at the crossroads of healthcare, technology, and gender equity. Its goal is to close long-standing gaps in medical research and product development concerning women’s health. However, despite its social and clinical importance, FemTech remains underrepresented in academic research and underserved in financial markets (Deloitte, 2024). The sector is more developed in the United States (US), which hosts 50% of FemTech ventures, while Europe accounts for 27% (DKV, 2022). A noteworthy fact reflecting the industry's novelty is that over 60% of FemTech companies were founded between 2016 and 2022 in the US (Deloitte, 2024; McKinsey, 2024).

Over the past decade, the FemTech sector has experienced rapid innovation and growing investor interest. According to Deloitte (2024), FemTech attracted more than $629 million in venture funding across 39 deals in 2021, and it is projected to surpass $103 billion by 2030, with robust compound annual growth rates. However, this growth masks significant funding disparities. While 85% of FemTech companies are female-founded, women, who are more likely to invest in female-led ventures, currently make up only 12% of decision-makers in VC funds (Forbes, 2022; Brush et al, 2018). In 2023, FemTech ventures accounted for 2% of overall health tech VC funding, marking a 5% increase from the previous year (Deloitte, 2024).

Consequently, FemTech firms often depend heavily on VC as a form of external validation, which significantly influences how public markets perceive these companies (Megginson & Weiss, 1991; Brav & Gompers, 1997). This context creates a compelling motivation to study FemTech from a finance and IPO perspective. While IPOs remain a major exit route for VC-backed firms, little is known about how FemTech companies perform after going public, or whether the presence of VC influences their post-listing outcomes. The broader literature on IPO performance has long documented that newly listed firms tend to underperform in the long run (Ritter, 1991; Loughran & Ritter, 1995). However, whether these patterns hold in mission-driven, gender-specific industries like FemTech remains unexplored. Moreover, the impact of VC as a certification mechanism, widely studied in more traditional tech and biotech sectors (Megginson & Weiss, 1991; Brav & Gompers, 1997), has not yet been tested in FemTech, where investor scepticism and informational frictions may be more pronounced.

Additionally, the COVID-19 pandemic added further layers of complexity. The period between 2020 and 2021 saw heightened volatility in IPO markets, delays in public offerings, and shifting investor preferences. Recent evidence also shows that IPOs launched during COVID faced higher pricing uncertainty and stronger dependence on reputable backers for market reception (Pástor & Vorsatz, 2020). In such an environment, VC backing may play an even greater signalling role, helping investors navigate uncertainty.

This thesis makes three main contributions. First, it extends established findings on IPO underperformance and VC certification (Ritter, 1991; Megginson & Weiss, 1991; Brav & Gompers, 1997) to the underexplored FemTech sector, providing the first systematic evidence of post-IPO performance in this industry. Second, it constructs a novel dataset of FemTech firms that went public between 1995 and 2023 and applies both cumulative abnormal returns (CAR) and buy-and-hold abnormal returns (BHAR) methodologies, together with regression models, to generate a robust empirical assessment. Third, it introduces a crisis-related dimension by examining how COVID-19 conditions shaped the relationship between VC backing and post-IPO outcomes. Collectively, these contributions advance the finance literature on gendered innovation, offering practical insights for investors, entrepreneurs, and policymakers.

The thesis is structured as follows. Chapter 1 introduces the research context, motivation, and objectives. Chapter 2 reviews the literature on venture capital, IPO performance, and the FemTech sector, identifies research gaps, and concludes with the theoretical framework and the development of the hypotheses. Subsequently, Chapter 3 outlines the data collection and sample formation, and details the methodology, including the event study design and regression models. Followed by Chapter 4, where the empirical findings and robustness checks are presented. Finally, Chapter 5 concludes by summarising the key contributions, acknowledging limitations, and suggesting avenues for future research.

2. Literature Review

2.1 Theoretical Framework

The influence of venture capital on IPO outcomes can be understood through a combination of theories that explain how investors interpret signals, how entrepreneurs and financiers interact, and how firms secure the resources needed for growth. Together, these perspectives create a foundation for analysing FemTech IPOs, where uncertainty, novelty, and structural funding gaps are particularly pronounced.

At the centre of this discussion lies signalling theory (Spence, 1973), which argues that markets rely on observable indicators of quality when information is incomplete. Venture capitalists provide one of the strongest signals in IPO markets, as their financial and reputational commitments reassure outside investors that a firm has undergone rigorous screening (Megginson & Weiss, 1991; Chemmanur, Krishnan, & Nandy, 2011). This certification effect can enhance valuations and attract demand at listing, but its persistence varies across industries. In sectors such as biotechnology or digital health, where product development is lengthy and outcomes remain uncertain, even strong VC backing cannot fully eliminate risk (Cumming &

Dai, 2010; Deloitte, 2024). FemTech falls squarely within this high-uncertainty space, making the credibility provided by VC both vital and fragile.

The role of venture capitalists also aligns with agency theory (Jensen & Meckling, 1976), which highlights conflicts of interest between managers and investors. Entrepreneurs may pursue objectives that do not maximise shareholder value, such as retaining control or delaying difficult decisions. VCs mitigate these risks by monitoring management, influencing strategic choices, and ensuring greater alignment with investors' interests (Kaplan & Strömberg, 2003; Gompers, 1996). Yet agency conflicts can also emerge between VCs and entrepreneurs themselves, particularly when investors push for rapid scaling or premature exits (Hellmann & Puri, 2002). For FemTech firms, whose products often require long clinical validation and sensitive regulatory navigation, such pressures may compromise sustainable performance, making agency dynamics especially important.

While agency theory explains governance effects, the resource-based view (RBV) (Barney, 1991) captures the strategic assets that VCs bring to their portfolio firms. Beyond capital, they provide access to networks, managerial expertise, and reputational endorsements that are difficult for competitors to replicate. These resources are especially valuable in FemTech, where underfunding and gender bias can otherwise constrain growth (Harvard Kennedy School, 2023; McKinsey Health Institute, 2024). VC involvement, therefore, enriches the firm's resource base, facilitating IPO readiness and improving credibility with both regulators and investors.

From a financing perspective, the reliance on venture capital is consistent with pecking order theory (Myers & Majluf, 1984). Young, innovative firms often lack internal cash flows and tangible collateral, making debt financing unattractive or inaccessible. Equity provided by VCs becomes a natural choice, bridging the gap to public markets. This pathway is particularly evident in FemTech, where firms operate with uncertain revenue models and limited comparables, reinforcing the role of VC as a prerequisite for accessing IPO financing (Puri & Zarutskie, 2012).

Finally, market timing theory (Loughran & Ritter, 1995) offers a cautionary lens. VCs have strong incentives to take firms public during periods of favourable investor sentiment, when valuations are high and exit opportunities are abundant (Loughran & Ritter, 2002). While this can generate short-term gains, it often contributes to long-run underperformance as initial enthusiasm fades. For FemTech firms, IPO timing may be even more sensitive, as investor interest in women's health technologies remains nascent and easily swayed by broader health or technology market cycles (Baker et al., 2020).

Taken together, these theories suggest that VC involvement in FemTech IPOs exerts its influence through signalling, governance, resource provision, financing pathways, and timing decisions. Each mechanism can improve IPO outcomes, yet each also carries limitations: signals may fade, agency conflicts may emerge, resources may be insufficient to offset systemic funding gaps, and favourable timing may not guarantee durable performance. This complex interplay underscores why FemTech provides a particularly relevant setting for re-examining the impact of venture capital on post-IPO performance.

2.2 Literature Review

VC funding plays a crucial role in facilitating the growth of innovative, high-risk firms by providing both capital and governance resources (Gompers, 1995; Sahlman, 1990; Gompers & Lerner, 2004; Kaplan & Strömberg, 2003). The academic finance literature extensively investigates the impact of VC backing on IPO performance, generally concluding that VC involvement improves short-run market outcomes through certification effects but may not guarantee long-term outperformance (Brav & Gompers, 1997; Megginson & Weiss, 1991; Chemmanur et al., 2011; Hsu, 2004).

Brav and Gompers (1997) provide seminal evidence showing that VC-backed IPOs outperform their non-VC counterparts shortly after listing but tend to revert to average or below-average returns over longer horizons. This pattern highlights the certification role of VC as a market signal during the IPO process, which reduces information asymmetry and investor uncertainty (Megginson & Weiss, 1991; Puri & Zarutskie, 2012). However, the persistence of superior performance by VC-backed firms varies across industries and time horizons (Gompers & Lerner, 2004). For example, more recent evidence indicates that outcomes are heterogeneous across sectors, with biotech and digital health IPOs often displaying different risk–return dynamics compared to technology IPOs (Ljungqvist & Richardson, 2003; Cumming & Dai, 2010; Lee & Wahal, 2004). This suggests that the benefits of VC certification may be more pronounced in knowledge-intensive, research-driven industries.

However, alongside these short-run benefits, the literature also highlights potential risks and limitations of VC involvement. Moreover, agency conflicts between venture capitalists and management, as well as pressures to scale rapidly, may erode long-term value creation (Jensen & Meckling, 1976; Ljungqvist & Wilhelm, 2003). Recent studies also suggest that VC-backed health-related IPOs face unique challenges due to high R&D intensity, long product development cycles, and regulatory uncertainty, which can weaken sustained market performance despite initial certification effects (Hall, 1993; Chan, Lakonishok, & Sougiannis, 2001). These challenges emphasise the importance of studying VC impacts within specific sectors, especially emerging ones like FemTech, which combine the uncertainty of health innovation with persistent funding gaps linked to gender bias (The Guardian, 2024; West Health & Persis Health, 2025).

The academic research on IPO performance mainly relies on Cumulative Abnormal Returns (CAR) and Buy-and-Hold Abnormal Returns (BHAR) to evaluate market reactions and long-term value, respectively (Ritter, 1991; Barber & Lyon, 1997). CAR measures the total difference between actual and expected returns over a short period, indicating immediate market sentiment and information flow (Brown & Warner, 1980). BHAR assesses the compounded return difference over more extended periods, capturing investor wealth effects but also facing concerns of skewness and selection bias (Barber & Lyon, 1997; Loughran & Ritter, 1995).

Several studies have found that IPO firms tend to underperform in the long run compared to benchmarks, as indicated by negative BHARs 3 to 5 years after listing (Ritter, 1991; Loughran & Ritter, 2004). Nevertheless, VC-backed companies sometimes demonstrate better BHAR performance, possibly due to improved governance and access to resources (Gompers & Lerner, 2004). However, the evidence is mixed and appears to depend on firm characteristics, industry sectors, and macroeconomic conditions (Fama, 1998; Teoh, Welch, & Wong, 1998).

More recent contributions have enhanced abnormal return models to increase the accuracy of event studies, particularly when working with small or sector-specific samples (Müller, 2023). In particular, research on health and biotechnology IPOs reveals that long R&D cycles and regulatory uncertainty often exacerbate post-IPO underperformance, underscoring the importance of adopting robust measures, such as CAR and BHAR, to capture these dynamics (Ljungqvist & Wilhelm, 2003; Cumming & Dai, 2010). Since FemTech firms share many features with health tech and biotech ventures, such as high innovation intensity, uncertain revenue models, and sensitivity to investor sentiment, using both CAR and BHAR is particularly valuable for evaluating their post-IPO outcomes.

Within the broader VC literature, a significant gender funding gap has been identified, with female-founded startups receiving a disproportionately smaller share of investments (Gompers et al., 2021; Brush et al., 2018). This disparity is often linked to investor homophily, implicit biases, and the underrepresentation of women in decision-making positions within VC firms (Brooks et al., 2014). These structural barriers create an uneven playing field for female entrepreneurs, affecting not only their ability to secure funding but also the valuation and long-term trajectory of their ventures.
Such challenges are especially pronounced in FemTech, a sector dedicated to women's health and well-being that has historically been underfunded and overlooked in mainstream biomedical research. Recent market reports confirm that although FemTech is growing rapidly, it still accounts for only a small fraction of overall health tech investment. For example, FemTech received just 2% of global health technology VC funding in 2023, despite women representing half of the world's population and driving significant healthcare demand (Deloitte, 2024; The Guardian, 2024). This underinvestment is closely tied to gender imbalances in VC decision-making, with women making up only 12% of partners at VC funds (Forbes, 2022; McKinsey Health Institute, 2024). The consequences of these disparities are twofold. First, underfunding limits the ability of FemTech startups to scale, delaying product development and reducing competitiveness relative to better-funded sectors (Gonzalez-Uribe & Leatherbee, 2018). Second, because VC backing often serves as a critical external validation mechanism, the scarcity of funding amplifies investor scepticism toward FemTech IPOs. Recent scholarship also underscores the "gender politics of digital health innovation," showing how structural inequities in finance intersect with the framing of women's health technologies (Santoro, 2025). Together, these findings highlight the necessity of analysing how VC support influences FemTech IPO performance within the broader context of gendered innovation and persistent capital market inequalities.

Furthermore, the COVID-19 pandemic caused unprecedented disruptions in global financial markets, amplifying uncertainty and risk aversion among investors (Baker et al., 2020). IPO activity declined sharply in 2020 as firms delayed offerings or faced discounted valuations due to heightened volatility and reduced investor confidence. While some recovery followed in late

2020 and 2021, the overall environment remained unstable, with markets rewarding firms that could credibly demonstrate resilience and adaptability.

Research suggests that VC-backed companies may have been better positioned to navigate this period. VC involvement could reduce scepticism by signalling quality and providing managerial support during crisis conditions, thereby facilitating IPO completion and stabilising aftermarket performance. However, operational challenges such as supply chain disruptions and shifting consumer demand often counteract these advantages, producing heterogeneous post-IPO outcomes. Health-related sectors were particularly affected. Biotech and digital health IPOs gained visibility during the pandemic as investor attention shifted toward healthcare solutions, but these firms also faced uncertain regulatory pathways, rapidly changing demand, and increased scrutiny of their business models (Cumming & Dai, 2010; Deloitte, 2024). This suggests that certification effects may have been amplified in some cases but weakened in others, depending on sectoral dynamics and investor sentiment.

For FemTech, the pandemic created both opportunities and risks. On one hand, COVID-19 exposed longstanding gaps in women's healthcare access, accelerating demand for digital solutions in fertility, pregnancy monitoring, and reproductive health (McKinsey Health Institute, 2024). On the other hand, FemTech firms often struggled with limited funding access and investor unfamiliarity, which may have exacerbated post-IPO volatility. Under such conditions, VC backing could play a vital role as a signal of legitimacy and stability, making the COVID-19 context a critical lens for evaluating FemTech IPO performance.

2.2.1 Hypotheses Development

The existing literature on VC and IPO performance provides a broad yet mixed foundation for analysing FemTech firms' post-IPO outcomes. Previous studies establish that VC backing generally acts as a certification mechanism, reducing information asymmetry and enhancing short-term market performance around the IPO event. However, long-term benefits are far less specific, with evidence pointing to the erosion of performance advantages over time due to operational difficulties, pressures to scale, and agency conflicts between VCs and entrepreneurs. These findings suggest that while VC involvement provides clear initial advantages, its effects may diminish over time, making sector-specific analysis crucial.

FemTech ventures are characterised by innovation in digital health, reproductive technologies, and diagnostics, often relying on untested business models and lengthy R&D cycles. Investors may have difficulty valuing such companies at the IPO stage due to a lack of comparable benchmarks and uncertainty around market adoption. These informational frictions increase the likelihood that FemTech firms will experience negative post-IPO performance, even if short-term sentiment is positive. This context strengthens the expectation that FemTech IPOs will follow the broader trend of long-run underperformance.

H1: *FemTech firms experience negative abnormal returns in the post-IPO period, consistent with the documented long-run underperformance of IPOs in broader markets.*

Despite these challenges, VC involvement remains a crucial differentiator in shaping IPO outcomes. The certification hypothesis suggests that VC backing provides credibility, signalling to investors that the firm has undergone rigorous screening and monitoring. VC participation also facilitates better governance, reduces information asymmetries, and provides access to valuable networks. In traditional technology and biotech sectors, these advantages often translate into higher IPO valuations and stronger initial aftermarket performance.

The importance of VC certification is amplified in FemTech due to persistent gender disparities in venture financing. Female-founded firms, which represent the majority of FemTech ventures, receive disproportionately less funding than male-led firms. This underfunding both limits growth and increases investor scepticism at the IPO stage. In such contexts, VC backing functions not only as a financial resource but also as a critical legitimacy signal that can offset biases and improve investor confidence. Recent research has highlighted how gendered dynamics in venture capital exacerbate capital allocation inefficiencies, making VC certification even more central to FemTech IPOs than to traditional sectors. By providing external validation, VC backing may reduce the discounting effects associated with FemTech's novelty and gendered funding challenges. VC involvement is also likely to enhance post-IPO governance, enabling firms to navigate the transition to public ownership and maintain investor trust. Accordingly, VC-backed FemTech IPOs are expected to demonstrate stronger relative performance compared to non-VC-backed counterparts.

H2: *VC-backed FemTech firms show significantly higher post-IPO performance compared to non-VC-backed FemTech firms, reflecting the certification and governance benefits of VC involvement.*

The COVID-19 pandemic created an exceptional environment for IPO markets, characterised by heightened uncertainty, delayed listings, and volatile investor sentiment. Under such conditions, investors relied more heavily on credible signals of quality, increasing the importance of VC certification. Evidence from health-related IPOs suggests that while some firms benefitted from increased demand for healthcare solutions, others struggled with operational disruptions and unpredictable regulatory pathways.

Similarly, for FemTech firms, the pandemic was a double-edged sword. On one hand, it amplified awareness of women's health gaps and accelerated demand for digital health innovations such as telemedicine, fertility apps, and pregnancy monitoring tools. On the other hand, investor scepticism persisted due to the sector's novelty and gendered funding disparities, resulting in uneven capital access. In this environment, VC backing could have served as a critical credibility enhancer, signalling resilience and helping FemTech ventures secure favourable IPO valuations despite market turbulence.

Suppose VC certification becomes more salient during crises. In that case, FemTech firms that went public during the COVID-19 period should display stronger relative performance advantages from VC involvement compared to those listing in more stable times. This aligns with signalling theory, which predicts that costly signals become more valuable under conditions of heightened uncertainty.

H3: *The positive effect of VC backing on post-IPO performance is stronger for IPOs that occurred during the COVID-19 crisis, due to increased investor reliance on certification signals under heightened uncertainty.*

3. Dataset

This study examines a sample of 45 IPOs executed in the US between January 1995 and March 2023. The initial dataset comprised 828 companies operating within the broader healthcare sector and listed on major US exchanges, specifically the *NYSE* and *NASDAQ* stock exchanges. The dataset was refined to solely companies from the US, as it is more representative: it is the most advanced geography in terms of VC funding and FemTech market development. Companies whose stocks were traded on over-the-counter (OTC) markets such as the *US Pink*

Sheets were excluded to ensure data reliability and regulatory consistency. Starting from this broad healthcare dataset allowed for comprehensive coverage of firms potentially involved in FemTech-related activities while ensuring data availability and market relevance.

Refinement involved a systematic review of each company's business description, applying an extensive list of FemTech-specific keywords. These included terms related to women's health and reproductive technologies, such as *women, female, maternal, fertility, infertility, pregnancy, menstruation, endometriosis, ovarian, uterus, menopause, hormonal, gynaecology, contraceptive, birth control, in vitro fertilisation (IVF), lactation, breastfeeding, obstetrics, and pelvic health*. Keyword identification was conducted through a combination of automated text analysis and manual validation to ensure accurate sector classification. Companies whose primary operations or product offerings corresponded with these terms were retained, while ambiguous cases underwent further review.

In accordance with data availability and quality considerations, monthly stock return data following each IPO were extracted from the CRSP database, denominated in US Dollars. The dataset includes returns covering various event windows post-IPO (3, 6, 12 months), enabling analysis of both short- and long-term market performance. Data cleaning procedures included adjustments for corporate actions and filtering of extreme outliers to maintain sample integrity.

3.1 Event window

The event date (t = 0) for each firm is defined as the IPO listing day, which represents the point at which previously private information becomes fully disseminated to the market. This date is crucial for assessing investor reaction and subsequent stock price evolution. In alignment with prior IPO literature (Ritter, 1991; Brav and Gompers, 1997), the analysis of post-IPO performance employs event windows that extend beyond the immediate aftermath of the listing to account for potential delayed market reactions, investor sentiment shifts, and long-run underperformance phenomena.

To capture the persistence of post-IPO returns, this paper examines three event windows: 3, 6, and 12 months after the IPO date. These horizons are consistent with methodologies adopted in long-run IPO performance studies (Loughran and Ritter, 1995), allowing for a comprehensive assessment of whether VC-backed FemTech firms exhibit superior or inferior performance relative to their non-VC-backed peers. Data constraints also guided the choice of these specific horizons; extending the observation period to 24 or 36 months would have significantly reduced the sample size due to the relatively recent emergence and limited number of publicly listed FemTech firms. At this stage, an analysis of the previous ownerships of the companies was done through Crunchbase to assess whether they had received VC funding or not.

Additionally, while the majority of firms in the sample went public through traditional IPO processes, a few entered public markets through alternative mechanisms, including uplistings or reverse mergers. In such cases, the firm's first appearance on a regulated exchange covered by CRSP was treated as the effective listing date. Although not a conventional IPO, this transition marked the firm's first meaningful access to public capital markets and full exposure to disclosure standards and market scrutiny. This approach is consistent with empirical precedent, which treats such events as functionally equivalent to study post-listing performance (Gompers and Lerner, 2004; Ritter, 2020).

3.2 Description of the Dependent Variables

The following section covers the calculation of the dependent variables used in the events study. In total, three event windows were tested. For each event window, the Cumulative Abnormal Returns (CAR) and the Cumulative Average Abnormal Returns (CAAR) of the issuer firm were calculated. Thus, the CAR in the periods of 3 months (3m), 6 months (6m) and 12 months (12m) after the IPO were used in the subsequent regressions. To calculate CAR, we first calculated abnormal returns (AR_{it}). For the simplicity of the project and according to Brown and Warner (1980), different methodologies applied to calculate AR_{it} will not lead to significant differences in results. For this reason, the market-adjusted model (Müller, 2023) was used as the assumption to calculate abnormal returns through the following formula:

$$AR_{it} = R_{it} - NR_{it}$$

The variable R_{it} represents the monthly stock returns for company *i* at time *t* within the event window established, while NR_{it} represent the monthly returns from the benchmark used, which is the MSCI United States Price Index USD. By calculating AR_{it}, we were able to analyse the stock's performance and fluctuations on an unbiased basis over a short time frame. Once the $AR_{i,t}$ was computed, the CAR_i and CAAR were computed by using the following formulas:

$$CAR_i = \sum_{t1}^{t2} AR_{i,t} \qquad\qquad CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$$

By calculating the CAR, we got an overview of the impact that the IPOs had on the performance of the stock prices: positive values suggest a positive effect on the firm's performance, whereas negative values indicate the contrary. And finally, the value was used as the dependent variable for the subsequent regressions. Additionally, for each event window, the Buy-and-Hold Returns (BHAR) were calculated with the same data and methodology. After computing the $AR_{i,t}$, the $BHAR_{i,t}$ was calculated with the following formula:

$$BHAR_{i,t} = \prod_{(t=1)}^{(T)} (1 + R_{i,t}) - \prod_{(t=1)}^{(T)} (1 + R_{m,t})$$

Where $R_{i,t}$ denotes the return of firm *i* at time *t*, and $R_{m,t}$ the return of the market index at the same time. The formula represents the cumulative difference in compounded returns between the firm and the market over the event window *T*. By calculating the BHAR, we were able to assess the long-term performance of each stock relative to the market, capturing the cumulative effect of the IPO over time. Positive BHAR values indicate that the firm outperformed the market during the event window, while negative values suggest underperformance.

3.3 Description of the Independent Variables

In total, six independent variables were used for the regression analysis.

1. *Venture Capital Funding:* This is a dummy variable indicating whether the company received VC funding prior to its IPO. It takes the value of 1 if the firm was VC-backed, and 0 otherwise. This variable allows us to distinguish between the post-IPO performance of VC-backed and non-VC-backed FemTech firms (Megginson & Weiss, 1991; Brav & Gompers, 1997).

2. *Firm's Size:* The Market Capitalisation serves as a proxy for firm size and was calculated as the product of the number of shares outstanding and the stock price during the year of the IPO. This approach ensures consistency across firms regardless of listing date within the year and reflects their market value at the time of going public. To address the wide dispersion in firm sizes and to reduce the influence of extreme values, the natural logarithm of market capitalisation was used in the

analysis. The log transformation also accounts for the diminishing marginal impact of firm size on post-IPO performance, making the variable more suitable for regression analysis. This methodology aligns with prior empirical studies on IPO performance (Ritter, 1991; Loughran & Ritter, 1995).

3. *Profitability:* This variable is measured using the EBITDA margin, defined as $\frac{EBITDA}{Total\ Revenues}$, and serves as an indicator of the firm's operating efficiency at the time of the IPO. The EBITDA margin is particularly relevant for early-stage or growth-oriented companies like those in the FemTech sector, where traditional net income figures may be less informative due to high initial R&D or scaling costs. For companies where EBITDA margin could not be calculated due to missing or incomplete financial data, the subindustry median was used as a proxy. This imputation approach ensures that the variable remains comparable across the sample while minimising bias introduced by data gaps. The use of EBITDA margin as a profitability proxy is consistent with prior studies focusing on IPO performance and private equity-backed firms (e.g., Kaplan & Schoar, 2005; Cao & Lerner, 2009).

4. *R&D Intensity:* This variable is defined as $\frac{R\&D\ Expenses}{Total\ Revenues}$. This variable serves as a proxy for the firm's commitment to innovation relative to its operational scale, a particularly relevant factor for FemTech companies, which often rely on product development and technological differentiation (Chan, Lakonishok, & Sougiannis, 2001; Hall, 1993). Due to the unavailability of firm-level R&D data for several companies in the sample, the industry median R&D intensity was used as a proxy based on the firm's subindustry classification, following standard practice in empirical research (Kothari, Laguerre, & Leone, 2002). This substitution approach allowed for the retention of these observations in the analysis without introducing significant bias, while ensuring consistency across the dataset.

5. *Firm's Age:* This variable is defined as the number of years between the company's founding date and its IPO. For firms that entered public markets through non-traditional channels, such as reverse mergers or uplistings, the listing year on a regulated exchange was taken as the effective IPO date, in line with established literature treating these transitions as functionally equivalent to conventional IPOs. This approach ensures consistency in measuring firm maturity at the time of public listing, which may influence post-IPO performance and investor perception (Ritter, 2020; Gompers & Lerner, 2004).

6. *COVID-19:* This is a dummy variable used to control for the potential market-wide impact of the COVID-19 pandemic. It takes the value of 1 for IPOs that occurred after March 2020, corresponding to the period following the World Health Organisation's declaration of COVID-19 as a global

pandemic and the onset of widespread market disruption (World Health Organisation, 2020; Baker et al., 2020). IPOs dated before this threshold are assigned a value of 0. This variable is included to account for the unique economic and financial conditions that may have influenced investor sentiment, firm valuations, and performance dynamics during and after the onset of the pandemic.

3.4 Descriptive Statistics

Table 1 displays the results of the event study analysis, including CAR, CAAR, and BHAR across the 3, 6, and 12-month post-IPO windows, as well as descriptive statistics of the independent variables. The CAR for VC-backed FemTech firms generally shows a positive trend over the 3, 6, and 12 months post-IPO periods, although there is notable variability among individual companies. At 3 months, CAR values range widely from -128.570% to +113.520%, reflecting substantial heterogeneity in early market reactions. Despite this dispersion, the mean CAR is positive at 10.730%, indicating a modestly favourable average outcome. By 6 months, the mean CAR increases to 22.430%, with values spanning from -78.470% to +147.670%, suggesting strengthened investor confidence for several firms. At 12 months, the mean CAR reaches 39.440%, though the range remains large (-269.750% to +163.550%), highlighting that while many VC-backed firms sustain positive abnormal returns, others experience pronounced declines.

In contrast, non-VC-backed FemTech firms exhibit weaker performance and greater downside risk. Their 3-month CARs range from -108.550% to +111.250%, with a negative mean of -5.340%, suggesting more cautious investor sentiment. At 6 months, the group's mean CAR is only marginally positive (1.140%), with outcomes varying from -102.510% to +127.970%. By 12 months, non-VC-backed firms display significant underperformance on average, with a mean CAR of -29.110% and a broad range (-208.870% to +164.650%).

The analysis of CAAR further reinforces these differences: VC-backed firms demonstrate positive mean CAARs that increase steadily over time (10.730% at 3 months, 22.430% at 6 months, and 39.440% at 12 months), whereas non-VC-backed firms exhibit negative or marginal CAARs (-5.340%, 1.140%, and -29.110% for the respective windows). These results suggest that VC backing is associated with stronger and more consistent positive abnormal returns following IPO, highlighting its potential certification effect in enhancing market performance within the FemTech sector.

The BHAR results, however, indicate long-term challenges. VC-backed FemTech firms generally underperform compared with the market, with most firms showing negative BHAR values across the 3, 6, and 12 months post-IPO periods. While a few positive outliers exist, the prevailing trend is a decline in cumulative returns over time, suggesting difficulties in sustaining shareholder value beyond the initial market enthusiasm. In contrast, non-VC-backed firms display more varied BHAR outcomes. At 12 months, some firms achieve exceptionally strong positive long-term returns (up to +323.400%), while others face substantial negative returns. This dispersion indicates that although VC backing is associated with more consistent short-term performance, it does not guarantee long-term success, and firm-specific factors remain decisive in determining post-IPO value creation.

In addition to performance measures, Table 1 summarises the descriptive statistics of the independent variables used in the regression analysis. Several patterns emerge. First, VC-backed FemTech firms tend to be smaller in size at the time of listing, as reflected in their lower average market capitalisation (mean log market cap of 4.75 versus 6.30 for non-VC-backed firms). This suggests that VC investors may be more willing to support earlier-stage ventures with limited scale, while non-VC-backed firms reaching IPO tend to be relatively larger and more established.

Firm age also reveals meaningful differences. VC-backed FemTech companies are, on average, slightly younger (8.5 years) than their non-VC-backed counterparts (9.3 years), consistent with the idea that VC involvement accelerates the path to IPO. Both groups, however, show wide variation in age, ranging from just 2 years to nearly 30 years, reflecting heterogeneity in development cycles across the sector.

Regarding innovation intensity, VC-backed firms display significantly higher R&D expenditure ratios, with an average R&D intensity of nearly 29.440% compared to around 16.290% for non-VC-backed firms. This finding aligns with the expectation that VC capital is directed toward high-risk, innovation-driven ventures requiring ongoing research investment. Finally, profitability, as measured by EBITDA margin, shows extreme variation, including negative outliers, which highlights the financial volatility typical of early-stage health technology ventures. The differences between VC-backed and non-VC-backed firms emphasise the importance of controlling for firm size, age, and R&D intensity when evaluating post-IPO performance outcomes.

[Insert Table 1 here]

3.5 Description of the Regression Models

To examine the relationship between VC backing and post-IPO performance, a series of ordinary least squares (OLS) regressions were estimated using the Cumulative Abnormal Return (CAR) as the dependent variable across the three event windows (3 months post-IPO, 6 months post-IPO and 12 months post-IPO). The baseline model regresses CAR on a dummy variable for VC-backing, progressively controlling for the other five independent variables across seven total models.

Model 1: $CAR_i = \beta_0 + \beta_1 \, VC_i + \varepsilon_i$

Model 2: $CAR_i = \beta_0 + \beta_1 \, VC_i + \beta_2 \, \ln(Market\ Capitalization)_i + \varepsilon_i$

Model 3: $CAR_i = \beta_0 + \beta_1 \, VC_i + \beta_2 \, \ln(Market\ Capitalization)_i + \beta_3 \, Age_i + \varepsilon_i$

Model 4: $CAR_i = \beta_0 + \beta_1 \, VC_i + \beta_2 \, \ln(Market\ Capitalization)_i + \beta_3 \, Age_i + \beta_4 \, Profitability_i + \varepsilon_i$

Model 5: $CAR_i = \beta_0 + \beta_1 \, VC_i + \beta_2 \, \ln(Market\ Capitalization)_i + \beta_3 \, Age_i + \beta_4 \, Profitability_i + \beta_5 \, R\&D\ Intensity_i + \varepsilon_i$

Model 6: $CAR_i = \beta_0 + \beta_1 \, VC_i + \beta_2 \, \ln(Market\ Capitalization)_i + \beta_3 \, Age_i + \beta_4 \, Profitability_i + \beta_5 \, R\&D\ Intensity_i + \beta_6 \, COVID - 19_i + \varepsilon_i$

The reason a build-up method was employed is to allow for a clearer interpretation of how the explanatory power of the model evolves with the inclusion of each variable. This stepwise approach helps assess whether the effect of VC-backing remains robust after controlling for additional firm-specific factors. Moreover, the build-up structure facilitates the detection of potential omitted variable bias and enhances transparency regarding the individual contribution of each variable to the explanation of cross-sectional variation in cumulative abnormal returns.

4. Empirical Results

4.1 T-Test Results (CAR and BHAR)

To assess whether VC backing influences post-IPO performance, a series of two-sample t-tests assuming unequal variances were performed using firm-level CARs. These tests compare the mean CARs of VC-backed and non-VC-backed FemTech firms over 3, 6, and 12-month post-IPO periods. Due to the limited sample size and exploratory nature of the study, a 90% confidence level ($\alpha = 0.10$) was adopted. This threshold strikes a balance between statistical stringency and the ability to detect economically meaningful effects that might not reach conventional significance levels. While the t-statistic remains unaffected by the confidence level, using a 90% interval increases the likelihood of identifying relevant relationships while maintaining the risk of Type I error within acceptable bounds.

At the 3-month mark, VC-backed firms achieved a mean CAR of 10.73%, compared to -5.34% for non-VC-backed firms, representing an economically significant difference of over 16 percentage points. However, the t-statistic of 0.934 did not exceed the critical value of 1.3138, and the p-value of 0.179 indicated the result was not statistically significant.

Similarly, at the 6-month horizon, VC-backed firms recorded an average CAR of 22.43%, versus 1.14% for their non-VC-backed counterparts, a spread of 21.3 percentage points. Yet, the t-statistic (1.144) once again fell short of the critical value (1.3065), with a one-tailed p-value of 0.130. These results suggest a trend towards better short- and medium-term performance for VC-backed firms, though not statistically conclusive.

At the 12-month interval, the difference in performance became both economically and statistically significant. VC-backed firms recorded an average CAR of 39.44%, while non-VC-backed firms experienced a negative average of -29.11%, resulting in a considerable gap of nearly 70 percentage points. The t-statistic of 2.3108 exceeded the critical value (1.3114), and the corresponding one-tailed p-value of 0.014 confirms significance at the 90% confidence level. This suggests evidence that VC backing is positively associated with superior long-term market performance in FemTech IPOs.

[Insert Table 2 here]

A comparable analysis was conducted utilising BHAR, applying the same two-sample t-test methodology across 3, 6, and 12-month periods. In contrast to the CAR results, BHAR analysis revealed consistent underperformance by VC-backed firms.

At 3 months, VC-backed firms had a mean BHAR of -5.01%, while non-VC-backed firms achieved +11.33%. The 6-month gap widened further: VC-backed firms averaged a loss of -18.97% compared to a gain of +3.86% for non-VC-backed peers. At 12 months, the divergence peaked, with VC-backed firms at -34.65% and non-VC-backed firms at +25.80%. Although the differences at 3 and 6 months were not statistically significant at the 90% level, the 12-month t-test yielded a statistically significant result: a t-statistic of –2.18 and a p-value of 0.046, confirming the underperformance of VC-backed firms in the long term. These BHAR results stand in contrast to the CAR analysis, where VC backing appeared beneficial at the 12-month horizon. This divergence underscores the importance of examining both measures when evaluating post-IPO performance.

[Insert Table 3 here]

To further investigate long-term dynamics, BHAR was calculated over a 24-month window for firms with sufficient post-IPO trading history. However, extending the window resulted in a smaller sample due to the recent listing dates of many firms. Notably, the subset of VC-backed firms remaining in the 24-month sample continued to exhibit notable underperformance, consistent with earlier trends. Due to the limited sample size and possible selection bias, these extended results were not formally tested statistically, but reinforce the conclusion that VC backing does not consistently translate into superior long-term performance in the public market context for FemTech firms.

4.2 Regression Models

To complement the t-test analysis and account for potential confounding factors, a series of multivariate regressions were conducted to examine whether VC backing influences post-IPO performance, measured through CARs over 3, 6, and 12-month windows. A build-up (stepwise) modelling strategy was employed to systematically assess the robustness of the VC effect as additional firm-specific controls were introduced. Each model began with a simple regression of CAR on a VC-backing dummy and incrementally added variables such as the natural logarithm of market capitalisation (proxy for firm size), firm age, EBITDA margin (profitability), R&D intensity (innovation effort), and a COVID-19 dummy to control for pandemic-related market effects.

3-Month CAR Regressions: Across all six specifications, the coefficient on VC-backing remained positive (ranging from approximately 0.09 to 0.14), suggesting a potential premium associated with VC involvement in the immediate post-IPO period. However, none of these coefficients reached conventional significance thresholds ($p > 0.1$), meaning the positive effect is not statistically robust. Similarly, none of the control variables showed statistically significant effects. The explanatory power of the models remained low, with adjusted R^2 values peaking at just 6.6%. This suggests that most of the variation in short-term CARs remains unexplained, indicating the influence of omitted variables or idiosyncratic market factors. The inclusion of the COVID-19 dummy in the final model did not improve fit or alter the VC coefficient, further suggesting the limited short-term explanatory value of pandemic-related effects.

[Insert Table 4 here]

6-Month CAR Regressions: The medium-term models produced similar results. VC-backing coefficients remained positive (around 0.15 to 0.19 across specifications), but again failed to reach statistical significance. Control variables also showed little explanatory power, with p-values consistently above 0.1. Neither firm size nor age proved to be meaningful predictors of CARs in this window, and both R&D intensity and the COVID-19 dummy had minimal impact on model fit or significance. Adjusted R^2 values stayed low, ranging from 3% to 7.2%, indicating that the models only explain a small part of the cross-sectional variation in 6-month abnormal returns. Despite the consistent direction of coefficients, the evidence does not support a statistically significant link between VC-backing and medium-term performance.

[Insert Table 5 here]

12-Month CAR Regressions: In the long-term models, the coefficient on VC-backing consistently remained positive (around 0.14 to 0.17), but, as with earlier results, it never achieved statistical significance (p-values > 0.1). This indicates that, although there may be a directional trend showing improved performance among VC-backed FemTech firms, the effect is too weak to be distinguished from random variation in the data. Once again, none of the control variables were statistically significant. The adjusted R^2 values across different specifications stayed modest, ranging from roughly 4% to 7.5%, emphasising the limited explanatory power of the models even when including multiple firm-level predictors.

[Insert Table 6 here]

To conclude, across all three time horizons (3, 6, and 12 months), the regression analysis does not provide statistically significant evidence that VC backing influences post-IPO CARs for FemTech firms. Although the VC dummy remains consistently positive, suggesting a potential favourable effect, the absence of statistical significance and low R^2 values indicate that other unobserved or sector-specific factors are likely more influential.

4.3 Robustness Test

To assess the robustness of the initial regression findings, two additional models were developed. These robustness checks aim to evaluate whether the observed relationship between VC backing and post-IPO performance holds under different model specifications and performance measures. First, to explore whether the COVID-19 pandemic influenced the VC-performance relationship, an interaction term between VC status and a COVID-period dummy was introduced (Model 7), with results evaluated over 6 and 12-month CAR windows. This helps determine whether VC backing provided differential resilience during a period of heightened market uncertainty. Second, to verify whether the findings are consistent when using an alternative performance metric, Model 8 was estimated using the 12-month BHAR as the dependent variable. While CAR measures short-term market reactions, BHAR reflects longer-term investor experience, allowing a more comprehensive assessment of performance persistence. In conclusion, the analysis applies winsorization at the 10th and 90th percentiles. This adjustment mitigates the influence of extreme outliers, which is particularly important given the relatively small sample size of FemTech IPOs, where individual firms can disproportionately affect results. After winsorization, t-tests and the baseline regressions (Models 6 and 8) were recalculated to verify consistency. Together, these robustness checks help validate the strength and generalizability of the baseline results.

4.3.1 COVID-19 Regressions

To investigate whether the COVID-19 pandemic affected the relationship between VC backing and post-IPO performance, a new regression model was introduced, Model 7, which includes an interaction term between the VC dummy and the COVID period dummy.

$$\text{Model 7: } CAR_i = \beta_0 + \beta_1 VC_i + \beta_2 COVID_i + \beta_3 (VC_i \times COVID_i) + \varepsilon_i$$

This model is tested using cumulative abnormal returns over two alternative event windows: 6 months and 12 months, providing robustness checks across different post-IPO performance periods. From the empirical results, the most pronounced differences in post-IPO performance between VC-backed and non-VC-backed firms were observed at the 6 and 12 months marks, particularly in relation to the COVID-19 period and VC interaction. The 3-month CAR, by contrast, did not display substantial variation across groups and was therefore excluded to focus the analysis on timeframes where the interaction effect is more interpretable. Theoretically, the 3-month CAR tends to reflect short-term market noise driven by IPO underpricing and investor sentiment, while 6 and 12-month CARs are more likely to capture strategic responses to macroeconomic shocks such as COVID-19. Restricting the model to these longer windows also helps mitigate overfitting risks in light of the limited sample size.

The regression on the 6 months CAR yields an overall weakly significant model (F-test p = 0.0997), with the COVID dummy positively associated with the 6 months CAR at the 10% significance level (coefficient = 0.394, p = 0.10). The VC dummy and the interaction term, however, are not statistically significant, indicating no evidence of a differential VC effect during the pandemic in the short- to medium-term.

[Insert Table 7 here]

Model 7 estimated on the 12 months CAR explains approximately 22.6% of the variation in long-term abnormal returns (F-test p = 0.014), indicating a statistically significant overall fit. While the coefficients for VC backing and the COVID dummy are positive but not individually significant, the interaction term suggests a positive moderating effect of VC backing during the COVID period (coefficient = 0.761). However, this effect does not reach statistical significance (p = 0.19). Thus, the data do not provide strong evidence that the pandemic context materially alters the relationship between VC backing and long-term post-IPO performance.

Overall, while the model suggests some variation in post-IPO performance linked to the COVID period, particularly over longer windows, there is limited statistical evidence that VC backing significantly moderates this effect.

4.3.2 BHAR Regression

As a second robustness check, the analysis was re-estimated using BHAR over 12 months as the dependent variable, instead of the 12-month CAR. While CAR captures short-term abnormal returns around the event window, BHAR offers a longer-term perspective, reflecting the performance of a buy-and-hold investor over the 12 months following the IPO. This allows for validation of the main findings using an alternative and widely used measure of post-IPO performance.

Model 8 replicates the specification of Model 6, with the only change being the dependent variable. The results confirm the earlier trend: VC backing is associated with significantly lower long-term returns, with the coefficient on the VC dummy remaining negative and statistically significant (coefficient = -0.629, p = 0.024). Other control variables, including firm size, age, profitability, R&D intensity, and the COVID-19 period dummy, remain statistically insignificant. These findings suggest that the negative effect of VC backing on post-IPO performance is not limited to short-term market reactions but also persists over a longer horizon.

Model 8: $$BHAR_i = \beta_0 + \beta_1\, VC_i + \beta_2\, \ln(Market\ Capitalization)_i + \beta_3\, Age_i + \beta_4\, Profitability_i + \beta_5\, R\&D\ Intensity_i + \beta_6\, COVID-19_i + \varepsilon_i$$

Overall, the robustness checks support the main results. The COVID interaction model shows no strong VC effect, though longer-term differences are more visible. The BHAR model confirms the negative impact of VC backing over 12 months, supporting the interpretation of the findings.

[Insert Table 8 here]

4.3.3 Adjustments for Outliers

Given the small sample size of FemTech IPOs, extreme values could disproportionately affect the results. To address this, winsorization was applied as a third robustness check.

The analysis applies winsorization at the 10th and 90th percentiles to mitigate the influence of extreme observations, which is particularly important given the relatively small sample size of FemTech IPOs. After winsorization, both t-tests and regressions were re-estimated to evaluate whether outliers drove the main results. The t-test results for CAR indicate that VC-backed firms exhibit higher cumulative abnormal returns than their non-VC-backed peers, with the differences becoming statistically significant at 12 months ($p = 0.037$) and marginally significant at 6 months ($p = 0.098$). In contrast, the t-tests for BHAR indicate that VC-backed firms exhibit consistently lower long-run returns, with the underperformance becoming significant at 12 months ($p = 0.016$).

[Insert Tables 9 and 10 here]

Regression results reinforce this pattern: winsorized CAR regressions confirm a positive and significant effect of VC backing. In contrast, winsorized BHAR regressions reveal a negative and significant coefficient on the VC dummy. Together, these findings highlight that the positive short-term impact of VC backing on IPO performance remains robust after controlling for outliers. Still, the effect does not translate into sustained long-term value creation.

[Insert Table 11 and 12 here]

In addition to two-sided winsorization at the 10th/90th percentiles, we repeat the analysis at 5th/95th and at 1st/99th percentiles. All substantive inferences are unchanged.

4.4 Implications and Discussion

This study finds that VC-backed FemTech firms show higher CARs in the short to medium term, with a statistically significant advantage at 12 months. In contrast, BHAR results demonstrate consistent and significant long-term underperformance of VC-backed firms. Regression models confirm that CAR coefficients for VC are positive but insignificant, while BHAR regressions highlight a negative and significant effect. COVID-19 interaction models show no meaningful moderating influence. Overall, VC backing provides short-term certification benefits but fails to guarantee sustainable long-term value creation.

4.4.1 Interpretation of Results

The empirical findings of this study present a complex and nuanced picture of the role VC-backing plays in the post-IPO performance of FemTech firms, shedding light on the hypotheses developed based on prior academic literature and sector-specific characteristics.

Hypothesis 1 posited that FemTech companies typically see negative abnormal returns after their IPOs, in line with the well-known trend of long-term underperformance among newly listed firms (Ritter, 1991; Loughran & Ritter, 2004). The findings offer partial support for this idea. Specifically, the BHAR, which measures long-term investor wealth growth, shows a consistent pattern of underperformance across all examined timeframes for the entire sample. This aligns with broader IPO research, suggesting that, despite initial market excitement, corrections, operational hurdles, and the risks associated with going public tend to erode value over time. However, the short- to medium-term CAR reveal more varied results, with some firms, especially venture-backed ones, showing positive returns in the early months after the IPO. This difference between CAR and BHAR highlights the importance of considering various performance periods when evaluating IPO success and understanding the market- and firm-specific factors that influence these outcomes.

With Hypothesis 2, it was proposed that FemTech firms supported by VC would outperform their counterparts without VC backing after going public, due to the benefits of certification and governance that VC involvement provides (Megginson & Weiss, 1991; Brav & Gompers, 1997). Evidence from two-sample t-tests on CAR supports this idea in the short to medium term: VC-backed firms tend to have higher average CARs at 3, 6, and especially 12 months post-IPO, with the 12-month difference being statistically significant. This indicates that investors respond positively to the active monitoring, strategic advice, and reputation of venture capitalists during the early public phase, which boosts credibility and investor confidence. However, this advantage diminishes over the long term, as shown by the BHAR, where VC-backed firms experience statistically significant underperformance. This surprising result may be due to complex factors such as agency conflicts between VCs and management (Jensen & Meckling, 1976), pressures to grow quickly at the expense of operational discipline (Hsu, 2004), or market corrections after potential IPO overvaluation (Ritter, 1991). Regression analyses that include firm controls yield positive but statistically insignificant coefficients for VC backing across different CAR periods, suggesting that the impact of VC support is influenced by other unobserved factors or specific sector conditions not accounted for in the model. Overall, these findings suggest that while VC backing offers early certification advantages, it does not ensure sustainable long-term value, emphasising the complex role of VC in emerging and risky sectors like FemTech.

Finally, through Hypothesis 3, it was expected that the COVID-19 pandemic would lessen the influence of VC backing on IPO performance, emphasising the importance of VC certification signals amid increased market uncertainty (Baker et al., 2020). However, interaction models using a COVID-19 dummy variable and its interaction with VC backing show no significant moderating effects on CAR or BHAR measures. Although the COVID-19 dummy alone has a slight positive link with medium-term CAR, neither VC backing nor the interaction term is statistically significant. This suggests that, despite the pandemic leading to increased volatility and risk aversion, these market conditions did not significantly alter investor reliance on VC signals in the FemTech IPO sector. Several reasons could explain this. FemTech's role as a healthcare-related industry might have provided resilience or even boosted investor interest during the crisis, reducing negative impacts. Alternatively, the small sample size and the brief period since COVID-19 began might have limited the ability to detect meaningful interaction effects. Future studies with larger datasets and longer post-pandemic periods could offer more definitive insights.

The divergence between CAR and BHAR results highlights key differences in what these metrics measure. CAR captures cumulative abnormal returns during specific event windows, mainly reflecting immediate market reactions and shifts in investor sentiment after the IPO. It is sensitive to the signalling effects of VC backing, which can boost investor confidence and demand in the short term. Conversely, BHAR sums up compounded buy-and-hold returns over longer periods, representing actual shareholder wealth that considers ongoing firm performance, operational management, and market adjustments. The negative BHAR findings for VC-backed firms suggest that initial investor enthusiasm may decline as firms face challenges in maintaining growth, controlling costs, and competing in a sector characterised by high innovation.

Additionally, the low adjusted R^2 of the regression models indicates that other factors- such as firm-specific details, sector influences, or macroeconomic conditions- beyond VC backing and the controls used are essential in determining post-IPO returns. This underscores the complexity of IPO performance in niche sectors and the necessity for further multifaceted research.

4.4.2 Implications for Investors and FemTech Startups

This study's findings have important practical implications for investors and entrepreneurs in the FemTech sector.

For investors, the positive short- and medium-term CARs linked to VC-backed Femtech companies suggest promising early market opportunities and validate VC involvement as a mark of quality, boosting IPO appeal and initial trading performance. However, the notably negative long-term BHAR outcomes advise caution, suggesting that early successes may not translate into lasting shareholder value. Investors should therefore supplement traditional metrics with thorough evaluations of business models, competitive positioning, and management quality when assessing Femtech IPOs. Awareness of potential agency issues and scaling risks associated with VC-backed firms is crucial for making balanced investment decisions.

For FemTech startups, these results highlight the dual nature of VC support. While VC funding offers vital resources, strategic guidance, and external validation necessary for growth and going public, the long-term underperformance suggests VC involvement might also introduce pressures that harm operational discipline or encourage overly ambitious scaling. Entrepreneurs must carefully balance rapid growth with sustainable value creation, focusing on operational excellence, governance, and innovation that can withstand public market scrutiny. The lack of significant pandemic-related effects indicates that FemTech startups may benefit from the sector's inherent resilience, which should be factored into strategic planning.

The absence of a pandemic moderation effect suggests that, despite global crises potentially disrupting capital markets, VC certification remains a consistent indicator of quality whose effectiveness does not significantly change in extreme conditions. This offers reassurance to both investors and founders about the reliability of VC signals across market environments.

4.4.3 Alignment with Prior Literature

This study’s findings support and provide detailed insights into existing research on VC-backed IPO performance, situating them within the growing FemTech sector.

The observed positive but statistically insignificant effects of VC backing on CAR echo earlier research, which shows venture capitalists as certifiers that boost investor confidence and enhance short-term IPO reception (Megginson & Weiss, 1991; Brav & Gompers, 1997). Conversely, the notable long-term underperformance of VC-backed firms in terms of BHAR aligns with studies that point to agency conflicts, governance challenges, and scaling pressures, which may hinder long-term value creation after an IPO (Jensen & Meckling, 1976; Ljungqvist & Wilhelm, 2003; Chemmanur et al., 2011).

The absence of a significant COVID-19 interaction effect contrasts with findings in some sectors where external shocks have amplified or shifted VC effects on IPO results, which might indicate sector resilience or limited data maturity in FemTech. These outcomes emphasise the importance of sector-specific and event-sensitive analyses to fully understand VC-backed IPO performance.

Overall, this research enhances academic discussions by using multiple performance metrics, rigorous firm-level regression models, and addressing dynamics during crises. It underscores the complex, context-dependent role of VC certification in FemTech IPOs and calls for further studies to explore the underlying mechanisms.

5. Conclusions and Limitations

5.1 Key Findings and Contributions

This thesis thoroughly investigates how VC support influences the post-IPO performance of FemTech companies, with special focus on the COVID-19 pandemic's moderating effects. Its main contributions show a complex relationship: VC-backed firms tend to generate notable positive abnormal returns in the short- to medium-term, based on CAR, although these are often not statistically significant. In contrast, BHAR analyses indicate that VC-backed firms underperform over the long term, highlighting a disconnect between initial market excitement and long-term shareholder value.

Testing the pandemic's moderating role through interaction models revealed no strong evidence that COVID-19 significantly changed the link between VC involvement and IPO results. These findings contribute to the relatively sparse research on FemTech IPOs and emphasise the intricate dynamics in niche, innovation-focused sectors that are affected by external shocks.

Methodologically, the study enhances existing literature by using multiple performance metrics, stepwise regression with firm controls, and crisis period analysis. The insights are valuable for investors, entrepreneurs, and policymakers aiming to promote sustainable growth in FemTech.

5.2 Study Limitations

This study provides valuable insights into the post-IPO performance of FemTech companies and the impact of VC funding; however, several limitations should be noted. Firstly, although SDC Platinum is a popular and comprehensive database for IPO and private equity research, it was not used here because it has a limited ability to identify and categorise FemTech firms accurately. The broad industry classifications in SDC, combined with the small and unrepresentative sample resulting from keyword filtering in business descriptions, necessitated an alternative data collection method. Consequently, data were gathered from Refinitiv Eikon and supplemented with manual screening based on FemTech-specific criteria, yielding a final sample of 45 firms listed on regulated US markets between 1995 and 2023.

Although this sample is moderate and somewhat uneven, comprising 30 VC-backed and 15 non-VC-backed firms, it is still adequate for valid statistical inference and cross-sectional analysis, especially considering the niche focus of FemTech. Nonetheless, the small sample size limits statistical power, restricts detailed subgroup analyses, and affects the broader applicability of the findings.

Second, including TherapeuticsMD (TXMD), which listed publicly through uplisting rather than a traditional IPO, reflects pragmatic decisions to maximise the sample size and coverage. This approach aligns with established empirical practices (Ritter, 2020; Gompers & Lerner, 2004), acknowledging uplistings as functionally similar to IPOs in terms of market transparency and capital access.

Third, particular firm-specific variables such as EBITDA margin were estimated using industry median values when data was missing, to preserve sample consistency. For R&D intensity, external industry benchmarks were used (Damodaran, 2025). These imputations, while necessary, could introduce measurement errors and weaken the estimated effects.

Fourth, the study uses the MSCI USA Price Index as the market benchmark for return calculations. Although MSCI provides a transparent and stable proxy, it does not account for dividend reinvestments, which may bias BHAR downward. Additionally, because MSCI USA covers broad sectors, it may not fully reflect the risk profile of typically small-cap, healthcare- or biotech-focused FemTech firms. Future research could consider alternative benchmarks, such as the CRSP value-weighted index or portfolios matched by size and industry (Ritter, 1991; Barber & Lyon, 1997), for more precise comparisons.

Finally, two methodological constraints should be noted. First, the study's event windows are limited to 3, 6, and 12 months (with exploratory 24-month results). Longer horizons commonly used in IPO research (three to five years) could not be assessed due to the recency of FemTech IPOs and the small sample, restricting conclusions about very long-term performance. Second, while CAR and BHAR are established measures in IPO research, both approaches have recognised weaknesses. CARs may be overly sensitive to event-window choice, while BHARs are prone to skewness and survivorship bias (Fama, 1998; Barber & Lyon, 1997). Alternative approaches, such as calendar-time portfolio regressions, may provide additional robustness in future studies.

5.3 Future Research Directions

Building on the current findings and limitations, several directions for future research are suggested. Increasing the dataset with more FemTech firms going public will enhance statistical power and enable more detailed analyses, such as comparisons across subindustries and studies spanning multiple economic cycles. Additional data, including firm-level governance metrics, VC investor details, and sentiment indices, is essential to understand better how VC support impacts IPO success. Using alternative market benchmarks that better match FemTech firms' risk and size could enhance measurement accuracy. Methodologically, future research could combine BHAR-based multivariate regressions with substantial adjustments for survivor bias and model specification to complement the CAR approach used here. Exploring other performance aspects, such as operating metrics, innovation results, or post-IPO financing, may provide deeper insights.

Since the moderating effect of the COVID-19 pandemic remains unclear, longer post-pandemic observation periods are needed to detect any delayed influences. Researchers may also study other external shocks or regulatory changes that affect FemTech and related sectors. Finally, qualitative methods, such as case studies or interviews with entrepreneurs and investors, can provide valuable insights into strategic choices, governance, and market dynamics that influence FemTech IPO success, complementing purely quantitative data.

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Appendices

Table 1 - Descriptive Statistics for Dependent and Independent Variables

Variable	Group	Mean	Std. Dev	Median	Max	Min	N
CAR_3m	VC Backed	10.73%	52.41%	15.55%	115.82%	-128.57%	30
	NON-VC Backed	-5.34%	55.37%	1.99%	123.76%	-108.56%	15
CAR_6m	VC Backed	22.43%	66.72%	29.99%	137.25%	-145.81%	30
	NON-VC Backed	1.14%	54.44%	-0.07%	142.07%	-77.98%	15
CAR_12m	VC Backed	39.44%	94.94%	27.02%	227.51%	-148.02%	30
	NON-VC Backed	-29.11%	93.25%	-36.47%	143.61%	-270.83%	15
BHAR_3m	VC Backed	-5.01%	50.05%	-15.90%	166.58%	-74.79%	30
	NON-VC Backed	11.33%	59.54%	-2.29%	147.18%	-84.91%	15
BHAR_6m	VC Backed	-18.98%	50.82%	-33.56%	125.77%	-77.57%	30
	NON-VC Backed	-3.86%	44.89%	-7.37%	64.28%	-97.97%	15
BHAR_12m	VC Backed	-34.67%	51.92%	-45.76%	119.81%	-109.23%	30
	NON-VC Backed	25.80%	103.20%	15.57%	323.40%	-121.39%	15
LN (Market Cap)	VC Backed	4.75	2.45	4.83	7.79	-3.91	30
	NON-VC Backed	6.30	1.96	5.77	10.47	3.49	15
Firm Age	VC Backed	8.50	6.85	6.00	29.00	2.00	30
	NON-VC Backed	9.33	9.30	5.00	29.00	2.00	15
EBITDA Margin	VC Backed	-1621.50%	4814.02%	-117.00%	20.00%	-25191.00%	30
	NON-VC Backed	-123.07%	342.54%	11.00%	38.00%	-1266.00%	15
R&D Intensity	VC Backed	29.47%	20.19%	37.50%	48.00%	0.26%	30
	NON-VC Backed	15.93%	16.82%	7.00%	48.00%	0.26%	15

This table reports descriptive statistics for the sample of 45 FemTech IPOs (30 VC-backed and 15 non-VC-backed). Reported values include mean, standard deviation, median, maximum, minimum, and sample size for cumulative abnormal returns (CAR), buy-and-hold abnormal returns (BHAR), and firm-level control variables. VC-backed firms display higher average CARs but also greater variability, while BHARs indicate consistent underperformance relative to non-VC-backed peers.

Table 2 - T-test results for CAR over 3, 6, and 12 months

Window	*VC-Backed Mean*	*Non VC-Backed Mean*	*T-stat*	*P-value*
3 months	10.73%	-5.34%	0.934	0.359
6 months	22.43%	1.14%	1.144	0.260
12 months	39.44%	-29.11%	2.311**	0.028

Table 2 reports mean CARs for VC-backed and non-VC-backed FemTech firms over 3-, 6-, and 12-month post-IPO. The results show that differences are not statistically significant at 3 and 6 months, although VC-backed firms exhibit higher average CARs. At 12 months, the difference becomes significant at the 5% level (**), indicating superior long-term abnormal returns for VC-backed firms.

Table 3 - T-test results for BHAR over 3, 6, and 12 months

Window	*VC-Backed Mean*	*Non VC-Backed Mean*	*T-stat*	*P-value*
3 months	-5.01%	11.33%	-0.914	0.370
6 months	-18.98%	-3.86%	-1.018	0.317
12 months	-34.67%	25.80%	-2.138**	0.046

Table 3 presents mean BHARs for VC-backed and non-VC-backed FemTech firms. The results show consistent underperformance of VC-backed firms across all horizons. The gap becomes statistically significant at the 5% level (**) after 12 months, highlighting weaker long-term investor wealth creation for VC-backed firms.

Table 4 - Regression results for CAR over 3 months

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
VC Dummy	0.161	0.166	0.163	0.150	0.191	0.228
	(0.169)	(0.180)	(0.182)	(0.186)	(0.194)	(0.193)
LN Market Cap		0.003	0.003	0.004	0.001	0.005
		(-0.036)	(0.036)	(0.037)	(0.037)	(0.037)
Firm's Age			-0.003	-0.003	-0.004	0.007
			(0.011)	(0.011)	(0.011)	(0.014)
EBITDA Margin				-0.001	-0.001	-0.002
				(0.002)	(0.002)	(0.002)
R&D Intensity					-0.361	-0.433
					(0.450)	(0.448)
COVID-19 Dummy						0.298
						(0.216)
N	45	45	45	45	45	45
R^2	0.021	0.021	0.022	0.027	0.043	0.089
Adjusted R^2	-0.002	-0.026	-0.049	-0.070	-0.080	-0.055

This table reports OLS regression estimates of cumulative abnormal returns (CAR) over the 3-month post-IPO window. The coefficient on the VC dummy is consistently positive across all six specifications (ranging from 0.15 to 0.23) but not statistically significant. None of the control variables are significant, and the explanatory power of the models remains low, with adjusted R^2 values close to zero.

Table 5 - Regression results for CAR over 6 months

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
VC Dummy	0.2129	0.203	0.183	0.177	0.260	0.320
	(0.1992)	(0.212)	(0.209)	(0.214)	(0.219)	(0.213)
LN Market Cap		-0.006	-0.009	-0.009	-0.016	-0.009
		(0.042)	(0.042)	(0.042)	(0.042)	(0.041)
Firm's Age			-0.019	-0.019	-0.022	-0.003
			(0.012)	(0.013)	(0.013)	(0.015)
EBITDA Margin				0.000	-0.001	-0.002
				(0.002)	(0.002)	(0.002)
R&D Intensity					-0.750	-0.861
					(0.509)	(0.494)
COVID-19 Dummy						0.472
						(0.238)
N	45	45	45	45	45	45
R^2	0.026	0.02636	0.0780	0.0788	0.1275	0.2093
Adjusted R^2	0.003	-0.02000	0.0105	-0.0133	0.0156	0.0844

This table presents OLS regression results for cumulative abnormal returns (CAR) over the 6-month post-IPO window. The VC dummy remains positive across all specifications (0.18–0.32) but is not statistically significant. None of the control variables show significant effects, and the explanatory power is limited, with adjusted R^2 values ranging from near zero to 8%.

Table 6 - Regression results for CAR over 12 months

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
VC Dummy	0.686**	-0.008	0.646**	0.664**	0.776**	0.854***
	(0.298)	(0.063)	(0.316)	(0.323)	(0.331)	(0.327)
LN Market Cap		0.672**	-0.012	-0.014	-0.024	-0.014
		(0.318)	(0.063)	(0.064)	(0.064)	(0.062)
Firm's Age			-0.024	-0.024	-0.028	-0.004
			(0.019)	(0.019)	(0.019)	(0.023)
EBITDA Margin				0.001	0.001	0.000
				(0.004)	(0.004)	(0.004)
R&D Intensity					-1.004	-1.149
					(0.771)	(0.759)
COVID-19 Dummy						0.612
						(0.366)
N	45	45	45	45	45	45
R^2	0.109	0.110	0.145	0.148	0.183	0.239
Adjusted R^2	0.089	0.067	0.082	0.063	0.079	0.119

This table shows OLS regression results for cumulative abnormal returns (CAR) over the 12-month post-IPO window. The VC dummy is consistently positive and statistically significant in several specifications at 5% (**) and 1% levels (***), suggesting superior long-term performance for VC-backed firms. Other control variables, including firm size, age, profitability, R&D intensity, and the COVID-19 dummy, are not significant. The explanatory power improves slightly compared to shorter windows, with adjusted R^2 values reaching around 12%.

Table 7 - Regression results for CAR over 6 and 12 months

Variable	CAR_6m	CAR_12m
VC Dummy	0.223	0.386
	(0.258)	(0.383)
COVID-19 Dummy	0.399	0.073
	(0.314)	(0.466)
Interaction Dummy	0.042	0.761
	(0.387)	(0.575)
N	45	45
R^2	0.140	0.226
Adjusted R^2	0.077	0.170

This table presents regression results for CAR over 6- and 12-month post-IPO windows, including an interaction between VC backing and the COVID-19 period. While coefficients on the VC dummy and the interaction term are positive, they are not statistically significant. The COVID-19 dummy shows a weak positive association at 6 months but remains insignificant at 12 months. Overall, the model explains more variation at 12 months (adjusted R^2 = 17%) compared to 6 months.

Table 8 - Regression results for BHAR over 12 months

Variable	BHAR 12 Months
VC Dummy	-0.633**
	(0.268)
LN Market Cap	0.030
	(0.051)
Firm's Age	0.002
	(0.019)
EBITDA Margin	0.000
	(0.003)
R&D Intensity	0.500
	(0.621)
COVID-19 Dummy	-0.173
	(0.299)
N	45
R^2	0.170
Adjusted R^2	0.038

This table reports OLS regression results for buy-and-hold abnormal returns (BHAR) over the 12-month post-IPO window. The coefficient on the VC dummy is negative and statistically significant at the 5% level (**), indicating long-term underperformance of VC-backed firms relative to non-VC-backed peers. All control variables are statistically insignificant, and the model's explanatory power remains modest, with an adjusted R^2 of 3.8%.

Table 9 - T-test results for Winsorized CAR over 3, 6, and 12 months

Window	*VC-Backed Mean*	*Non VC-Backed Mean*	*T-stat*	*P-value*
3 months	10.212%	-3.261%	1.174	0.249
6 months	24.365%	-0.587%	1.709*	0.098
12 months	32.153%	-16.737%	2.180**	0.037

The table presents t-test results for winsorized CAR over 3, 6, and 12 months post-IPO. VC-backed firms consistently show higher mean CARs than non-VC-backed peers, with differences becoming statistically significant at 12 months ($p = 0.037$). These results confirm that the positive VC effect persists after controlling for outliers.

Table 10 - T-test results for Winsorized BHAR over 3, 6, and 12 months

Window	*VC-Backed Mean*	*Non VC-Backed Mean*	*T-stat*	*P-value*
3 months	-8.711%	1.811%	-0.929	0.361
6 months	-21.928%	-2.302%	-1.579	0.125
12 months	-35.195%	-2.302%	-2.560**	0.016

This table reports t-test results for winsorized BHAR over 3, 6, and 12 months. VC-backed firms show consistently lower mean BHARs than non-VC-backed peers, with the difference becoming statistically significant at 12 months (p = 0.016). This indicates long-run underperformance of VC-backed FemTech IPOs relative to non-VC-backed firms.

Table 11 - Regression results for Winsorized CAR over 12 months

Variable	CAR_w 12-Months
VC Dummy	0.640**
	(0.237)
LN Market Cap	-0.031
	(0.045)
Firm's Age	-0.006
	(0.017)
EBITDA Margin	0.000
	(0.003)
R&D Intensity	-1.015
	(0.550)
COVID-19 Dummy	0.548
	(0.265)
N	45
R^2	0.307
Adjusted R^2	0.198

The table presents regression results for winsorized CAR over 12 months. The VC dummy is positive and significant at the 5% level, indicating that VC-backed FemTech firms outperform non-VC-backed peers in cumulative abnormal returns. Other controls are insignificant, and the model shows modest explanatory power (Adj. R^2 = 0.198).

Table 12 - Regression results for Winsorized BHAR over 12 months

Variable	BHAR_w 12-months
VC Dummy	-0.463**
	(0.160)
LN Market Cap	0.026
	(0.030)
Firm's Age	-0.002
	(0.012)
EBITDA Margin	0.000
	(0.002)
R&D Intensity	0.562
	(0.371)
COVID-19 Dummy	-0.251
	(0.179)
N	45
R^2	0.258
Adjusted R^2	0.141

The table presents regression results for winsorized BHAR over 12 months. The VC dummy is negative and significant at the 5% level, indicating that VC-backed FemTech firms underperform non-VC-backed peers in long-run buy-and-hold abnormal returns. All other variables are insignificant, and the model exhibits modest explanatory power (Adj. R^2 = 0.141).