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RESEARCH ARTICLE

The role of decentralized and traditional entrepreneurial finance in startups financing: an analysis of ICO-funded startups

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Abstract The rise of Decentralized Finance (DeFi) has introduced new fundraising mechanisms for startups. This study examines the interplay between Initial Coin Offerings (ICOs) and traditional entrepreneurial finance investors. Our findings document that while ICO funding amounts do not predict future funding success, prior business angel investment significantly increases the likelihood of securing follow-on funding. Co-investment by crypto funds during the ICO enhances follow-on funding opportunities, particularly for firms backed by hedge-style crypto investors. This research contributes to the entrepreneurial finance literature by examining how blockchain-based financing mechanisms integrate into the broader venture funding ecosystem.

Plain English Summary The work examines the interplay between Initial Coin Offerings (ICOs), traditional finance investors, and specialized crypto funds. Results show that, despite a successful ICO, ventures seeking further funding must rely on specialized traditional investors as a certification signal. Specifically, with their due diligence and sophisticated analysis of the blockchain sector, crypto funds reduce information asymmetry and represent a stamp of approval for subsequent funding rounds. Also, the investment style adopted by crypto funds matters: hedge-style funds have a higher significant impact than venture capital style funds, pushing the venture through new financing rounds. Results have implications for the venture financing cycle and contribute to the entrepreneurial finance literature by examining the integration of blockchain-based financing mechanisms into the venture funding ecosystem. Although ICOs disintermediate traditional corporate finance mechanisms, institutional investors specialized in the crypto domain are central to the company's financing cycle.

Keywords ICO · Blockchain · Tokens · Startups · Entrepreneurial finance

JEL Classification G23 · G24 · L26

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1 Introduction

Most successful startups have traditionally followed a sequential financing cycle, beginning with

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capital from 'friends, family, and fools,' followed by investments from business angels (BAs), venture capitalists (VCs), banks, and ultimately public capital markets through initial public offerings (IPOs). However, this conventional model has been increasingly challenged by the emergence of alternative financing sources characterized by disintermediation, democratization, and digitalization (the '3Ds'). Among these, crowdfunding has gained prominence by bypassing financial intermediaries, operating entirely in a digital environment, and granting retail investors access to early-stage funding opportunities. More recently, Decentralized Finance (DeFi) has further disrupted entrepreneurial finance by adding a fourth "D"—decentralization. As Cumming et al. (2025b) note, "cryptocurrencies and the idea of issuing financial instruments within a decentralized ecosystem emerged from growing dissatisfaction with the perceived partiality of traditional financial markets." Among these instruments, initial coin offerings (ICOs) enable direct peer-to-peer fundraising, allowing startups to raise capital in exchange for tradable cryptographic tokens (Chen & Bellavitis, 2020; Chod & Lyandres, 2021; Fisch, 2019; Fisch et al., 2022; Fuchs & Momtaz, 2024; Kher et al., 2021; Lyandres et al., 2022; Mansuri & Momtaz, 2022; Momtaz, 2024). Unlike typical crowdfunding platforms, ICOs can be developed without intermediaries and connect entrepreneurs with a wide range of investors or potential new users for their products or services. These DLT-based instruments, available at different stages of a startup's growth, provide entrepreneurs with greater flexibility in structuring their fundraising strategies while introducing new challenges, particularly in balancing the benefits and risks of DeFi-based methods alongside traditional financing channels.

For early-stage ventures, securing funding throughout their life cycle is critical for survival and growth (e.g., Baum and Silverman, 2004; Bellavitis et al., 2017). While much of the research on ICOs has focused on identifying the determinants of offering success (Fisch & Momtaz, 2020; Howell et al., 2020; Meoli & Vismara, 2022; Momtaz, 2020; Momtaz, 2021a; Thewissen et al., 2022), a successful token sale represents only the first step in a startup's financing journey. ICOs typically occur early in high-tech ventures, where they may provide a certification signal for future fundraising rounds, or at later stages when tokens are listed for trading.

Research in entrepreneurial finance has demonstrated that investments from traditional investors—such as BAs, VCs, and private equity—help mitigate information asymmetries and attract additional capital by certifying a startup's quality (Colombo et al., 2022; Kleinert et al., 2020). Also, in the case of crowdfunding, previous studies show that it represents a certification signal for attracting subsequent investment rounds (Butticè et al., 2020; Signori & Vismara, 2018; Walthoff-Borm et al., 2018). The certification role of previous investment rounds should be particularly valuable in high-uncertainty environments, such as the decentralized finance (DeFi) ecosystem, which remains characterized by fraudulent behavior and low regulatory oversight (Camelo & Duarte, 2024). However, it remains unclear whether DeFi mechanisms, particularly ICOs, can function as credible certification signals to facilitate follow-on funding from traditional investors. Existing studies have primarily examined the interaction between DeFi and traditional finance at the moment of the initial token sale (Camelo & Duarte, 2024; Cumming et al., 2025a; Drobetz et al., 2025), leaving a gap in understanding how different funding sources support ICO-funded startups across their full financing cycle. Given the growing volume of DeFi instruments and increasing institutional interest in blockchain-based financing (Cumming et al., 2025a), it is timely to explore the relationship between DeFi and traditional finance (TradFin) subjects. This paper investigates the follow-on funding performance of ICO-funded startups, focusing on how DeFi and TradFin investors interact and whether DeFi can serve as a credible certification signal for follow-on investment rounds. Indeed, given their specificities, ICO-funded startups call for a re-conceptualization of the traditional 'Berger and Udell funding cycle' (Bellavitis et al., 2017).

Using a comprehensive sample of 744 ICOs issued in the USA and Europe between 2015 and 2021, we find that a successful ICO does not significantly increase the likelihood of obtaining follow-on funding. Similarly, prior investment rounds from traditional financial (TradFin) investors before the offering do not affect follow-on financing, although they play an important role in firm survival. By contrast, the presence of crypto funds co-investing during the ICO significantly raises the probability of securing subsequent financing, serving as a certification

signal. Moreover, investment style matters: hedge-style crypto funds exert a stronger effect than VC-style funds. These findings suggest that institutional investors specialized in the crypto domain play a pivotal role in enhancing ICO-backed ventures' ability to raise additional funding in the long term.

Our study contributes to the literature on token offerings and, more generally, DeFi instruments as new sources of entrepreneurial finance. We focus on the post-offering scenario of ICO-funded startups and their abilities to attract new sources of funds (Block et al., 2018). The study provides insights into the relationship between the token market and more traditional entrepreneurial finance investors by looking at the venture financing cycle in terms of the likelihood of obtaining other equity financing rounds. Unlike equity crowdfunding offerings, which exhibit a positive influence on subsequent investments (Coakley & Lazos, 2021; Rossi et al., 2021; Signori & Vismara, 2018), the ICO success, or the amount raised in ICOs, has a limited impact on the attractiveness of subsequent investors. Our results further highlight the role played by institutional investors and their certification role in post-offering performance (e.g., Cumming et al., 2025a; Fisch & Momtaz, 2020). Finally, our study contributes to previous literature in the entrepreneurial finance domain about the determinants of follow-on funds and the relationships between new digital financing instruments and traditional entrepreneurial finance investors (e.g., Signori & Vismara, 2018) with a focus on the seed ventures research field, which is largely underexplored (Cumming & Vismara, 2017). The remainder of the paper is structured as follows: Section 2 provides the institutional and literature background, along with the development of our hypotheses. Section 3 presents the sample and methodology, while Section 4 reports the empirical findings. Section 5 offers the discussion and concludes the paper.

2 Institutional and literature background

2.1 Institutional background

DeFi encompasses alternative financial markets, products, and systems that utilize crypto-assets and smart contracts based on distributed ledger technology or similar innovations (Bongini et al., 2025). These technological advancements may have significant implications for financing startups and emerging high-tech ventures (Fisch, 2019), offering a new avenue for addressing funding needs. ICOs have emerged as a novel means of funding among DeFi, facilitating direct financial support from individual and institutional investors for entrepreneurial endeavours, thereby democratizing access to online investment markets (Fisch et al., 2022). A primary objective of blockchain-based financing mechanisms is to circumvent traditional intermediaries such as banks, VCs, and private equity firms, thereby reducing associated costs related to marketing, distribution, and transactions (Huang et al., 2020). This approach aims to expand the supply side by increasing the pool of investors in digital finance markets and the demand side by offering entrepreneurs additional avenues for securing funding (Fisch et al., 2021). Given that the average funding per ICO typically falls within the range of $10 to $20 million (Bellavitis et al., 2021; Howell et al., 2020), ICOs have the potential to compete with rounds of funding from VCs and private equity or even directly with IPOs.

Despite the similarities in nomenclature, ICOs and IPOs differ in significant ways. Notably, token offerings tend to involve much younger and smaller firms, typically in the nascent stages of their life cycles, and they do not engage underwriters to establish token valuation or attract buyers (Benedetti & Kostovetsky, 2021). In general, for startups, ICOs offer greater accessibility compared to IPOs, enabling startups to raise substantial capital in shorter durations, even relative to crowdfunding initiatives (Block et al., 2021). Furthermore, by leveraging blockchain technology, tokens can readily connect entrepreneurs with diverse investors or users for their products or services, thereby enhancing engagement with the project.

Compared with crowdfunding, which involves disintermediation but not decentralization, tokens can be traded publicly and immediately, thereby addressing the liquidity concerns inherent in equity crowdfunding models where secondary markets are absent (Block et al., 2021). This feature is particularly advantageous for investors, as tokens are fungible and fractionalized, allowing trading at arbitrarily low unit prices, inter-investor exchanges, or conversion into other cryptocurrencies or fiat currencies on cryptocurrency exchanges (Cumming et al., 2025a). Moreover, token offerings generally raise larger amounts of

capital than crowdfunding campaigns, often comparable to VC rounds (Block et al., 2021), making them suitable across all stages of the funding life cycle, although seed ventures remain the majority of firms raising capital through ICOs (Momtaz, 2020). Finally, while crowdfunding backers typically receive products or equity-like instruments, ICOs issue a variety of tokenized assets—such as security tokens, utility tokens, governance tokens, or hybrids thereof.

2.2 Literature background

Existing literature has predominantly focused on examining the determinants of success in token offerings (e.g., Adhami et al., 2018; Belitski & Boreiko, 2022; Bongini et al., 2022; Davydiuk et al., 2023; Thewissen et al., 2022). Within this discourse, scholarly inquiries have identified various factors influencing fundraising success, including the institutional environment and market sentiment (Bellavitis et al., 2021; Drobetz et al., 2019; Xia et al., 2024), token governance (Fuchs & Momtaz, 2024) as well as founder and human capital characteristics (Colombo et al., 2022; Momtaz, 2021b, c, d), and the information provided in token offering documents, such as white papers (Adhami et al., 2018; Bongini et al., 2022; Florysiak & Schandlbauer, 2022; Thewissen et al., 2022).

Other studies have shifted their focus to examining post-token offering outcomes. Some investigations explore the financial performance of ventures after ICOs by analyzing market trading dynamics in both short and long terms (e.g., Benedetti & Kostovetsky, 2021; Benedetti & Nikbakht, 2021; Drobetz et al., 2019; Fisch & Momtaz, 2020; Lyandres and Rabetti, 2023 Amiram et al., 2024). The findings predominantly indicate a higher average underpricing in token offerings compared to IPOs, along with increased liquidity and trading volume of exchange-traded tokens when issuers provide more comprehensive information during the offering. Howell et al. (2020) present evidence suggesting that ICO characteristics also predict issuers' operational success, with discernible effects on future employment rates, as measured by the number of employees on LinkedIn or the company website.

ICO-funded startups are blockchain-based ventures that, like any startup, face the issue of surviving the 'death valley'. To do so, they may be able to raise further external capital from institutional investors such as BAs and VCs. On the other hand, a common expectation is that only a small number of ICO-funded startups will survive (Bellavitis et al., 2022). They might fail soon after the offering for several reasons, such as the risky nature of their technology or the confidence of their proponents (Huang et al., 2022), or looking for funds and continuing their financing cycle. Assessing the financing profiles of ICO-funded startups is critical for the future of these markets, their token issuers, and investors' interests. Specific analyses have yet to be done on the role of ICOs in the start-up financing cycle and their relationship with TradFin funding.

Only a few studies have investigated the relationship between ICO and traditional entrepreneurial finance investors. Drobetz et al. (2025) examine post-offering outcomes, revealing a positive impact of crypto funds co-investing with the crowd on post-ICO evaluation and risk-adjusted token price performance. Subsequently, Cumming et al. (2025a) explore the disparities between crowdfunded and crypto-fund-backed token issuers concerning both operational and financial performance. Ventures backed by institutional investors exhibit lower survival probabilities and inferior operational performance compared to crowdfunded ventures. In terms of financial performance, the presence of institutional investors leads to increased firm valuation and abnormal returns only in the short term. However, the factors that explain post-offering outcomes for start-ups that experienced successful online fundraising cannot be generalized. This implies that token offerings may represent, for the startup, a means of seed financing and/or later-stage business growth. As financing is crucial for start-ups in the seed and later stages to support their survival, development, and expansion, current research has made significant progress in understanding the subsequent evolution of ventures that adopt digital online financing channels. In particular, the effects of successful or unsuccessful equity crowdfunding on follow-on fundraising (Signori & Vismara, 2018; Walthoff-Borm et al., 2018; Rossi et al., 2023) or start-up performance and survival (Coakley & Lazos, 2021; Coakley et al., 2022; Cumming et al., 2019). Since crowdfunding and token offering have many aspects in common (Block et al., 2021), our hypotheses are grounded on the literature in the crowdfunding domain that has explored which factors affect the

likelihood of obtaining post-offering funds by crowd-backed startups.

2.3 Theory and hypotheses development

The inherent characteristics of token offerings create severe information asymmetry between entrepreneurs and investors during initial offerings and subsequent funding rounds (Momtaz, 2024; Xia et al., 2024), increasing investment risk. First, typical issuers in token offerings are high-tech start-ups or blockchain-based start-ups. Ventures often conduct token offerings at very early development stages when market and technological risks peak; entrepreneurs are typically young, and many are in the pre-R&D stage (Chod & Lyandres, 2021). These ventures offer investors potentially high returns but entail high risk due to grappling with highly complex technological problems associated with legal and environmental challenges (Bongini et al., 2022). Second, information processing for non-expert investors can be challenging, and the understanding of the technological background of the token distribution mechanism is especially hard to interpret. Blockchain technology remains novel and continually evolving, making it difficult for investors to assess the project's viability. Third, especially at the beginning of the market, ICOs often operated outside traditional regulatory frameworks, leading to fewer mandatory disclosures and thus a high potential for fraud. Unlike traditional investments, where strict regulations govern information dissemination, the quality and accuracy of information available about ICOs can vary widely. Finally, unlike traditional financial instruments, the value of ICO tokens often depends on the future utility and popularity of the underlying network or application, making valuation challenging.

To address the information asymmetries typical of the seed and start-up stage, ICO-funded startups seeking capital often utilize high-quality signals to communicate their value to the market. Previous literature has shown that investment rounds serve as certification signals that communicate firm quality and viability to potential follow-on investors, with the signal's strength varying based on investor background, financing context, and temporal proximity (Kleinert et al., 2020). Also, using disintermediated finance instruments, such as crowdfunding, serves as a certification signal to reduce professional investors' information asymmetries and facilitates the attraction of subsequent financing (Butticè et al., 2020; Signori & Vismara, 2018).

Following an initially successful token offering, high-tech ventures typically continue to seek additional capital and other resources to scale their projects. For several reasons, we argue that an ICO can serve as a positive signal of firm quality for subsequent investors. First, conducting an ICO demonstrates the founding team's technical capabilities and the venture's technological intensity. Second, ICO success often improves operational outcomes, accelerating product development and enhancing profitability (Cumming et al., 2025a). Third, a successful ICO increases venture external validation and visibility, attracting attention from potential users, strategic partners, and talent. Thus, we hypothesize:

HP1: *The success of an ICO increases the probability of follow-on funding after the ICO.*

Prior financing from institutional investors in seed-stage companies is associated with a certification mechanism that conveys firm quality to other investors, boosts investor confidence, and thus reduces information asymmetries (Colombo et al., 2022), thanks to implied screening activity assumed to support the financing decision. Previous studies report that financing from reputable angels or venture capitalists increases the likelihood of follow-on funding (Kleinert et al., 2020). This also holds for crowdfunded startups, where the number of VCs supporting the firm before the crowdfunding offering positively impacts the likelihood of obtaining post-offering financing.

Building upon previous research concerning the role of institutional investors as certification signals of venture quality for other investors, we posit the following hypothesis:

HP2: *The prior funding from TradFin investors increases the probability of follow-on funding after the ICO.*

However, firms with more dispersed ownership are found to be less likely to issue further equity (Signori & Vismara, 2018). A dispersed ownership structure may result in conflicting interests among investors, potentially limiting venture growth opportunities. Notably, literature evidences differences between institutional i.e. VCs and non-institutional, i.e., BAs,

incubators, or accelerators, investment strategies, approaches, and due diligence. Institutional investors are primarily financially motivated and adopt ex-ante stringent contractual provisions to reduce market risks, whereas non-institutional investors, in contrast, present informal and personal involvement with the entrepreneurs, placing greater emphasis on ex-post investment involvement as a means of reducing risk. These divergent perspectives and approaches may lead to potential conflicts regarding investment strategies and interests between institutional, non-institutional investors, and DeFi financing instruments, negatively affecting the likelihood of the startup raising further investment rounds.

In token markets, Howell et al. (2020) and Belitski and Boreiko (2022) provide evidence that obtaining pre-ICO, VCs, or BAs rounds increases offering success. Regarding post-offering performance, startups that received a previous VC round experience lower failure rates and/or higher future employment (Howell et al., 2020). Nevertheless, no systematic analysis exists on the moderating role of ICO success and prior funding from TradFin investors on the likelihood of obtaining new funding rounds. Given the benefit of ICO in terms of venture visibility and validation from the crowd, we hypothesize that:

HP3: *The success of an ICO positively moderates the relationship between prior funding from TradFin investors and the probability of follow-on funding after the ICO.*

In particular, in light of new actors that enter the entrepreneurial finance ecosystem (Block et al., 2018), recent studies have investigated financing schemes involving heterogeneous investors (Bonnet et al., 2022). Token markets attract institutional investors with a high-risk-return profile, known as crypto-funds (e.g., Fisch et al., 2021; Howell et al., 2020). Crypto funds are a new form of institutional investor specialized in the financing of crypto ventures, and compared to traditional venture capital, they are much more involved in the operating development and implementation of blockchain businesses (Momtaz, 2024). Studies provide evidence of a co-investment strategy between the crowd and crypto funds during the token offering with a positive effect on company evaluation and market performance (Drobetz et al., 2025; Fish and Momtaz, 2020). We leverage this work, adding a corporate finance perspective and investigating additional effects derived from the presence of crypto funds in the token offering. Through their deep knowledge of the sector and their high due diligence activity, crypto funds assume the role of certifier of the company for subsequent funding rounds, thus positively affecting the likelihood of obtaining additional investments. Based on these arguments, we hypothesize that:

HP4: *The presence of crypto funds in the token offerings increases the probability of follow-on funding after the ICO.*

Literature has already demonstrated that different investment styles exist not only among traditional institutional investors (Brav et al., 2008; Klein & Zur, 2009) but also among these new players active in the crypto domain (Cumming et al., 2025a; Drobetz et al., 2025). In particular, two styles emerged: venture capital (VC) and hedge fund styles. The former is focused on a long-term investment strategy, providing strategic management support to the company. At the same time, the latter adopts a shorter-term investment horizon with a higher focus on market performance. Cumming et al. (2025a) show that venture-style strategies of crypto funds drive the positive operating performance of the tokenized startup, while hedge fund-style strategies are correlated with a positive post-funding token financial performance. Despite differences in their investment styles and impact on the venture, their presence helps reduce information asymmetry and serves as a certification for future investors. Thus, we hypothesize:

HP5A: *The presence of VC-style crypto funds in the token offerings increases the probability of follow-on funding after the ICO.*
HP5B: *The presence of hedge-style crypto funds in the token offerings increases the probability of follow-on funding after the ICO.*

3 Data and methodology

3.1 Dataset

The dataset is built starting from the Token Offerings Research Database (TORD). The TORD database is manually curated and integrates information from leading ICO research platforms such as

ICOBench, ICOMarks, and related sources (e.g., Benedetti & Kostovetsky, 2021; Howell et al., 2020; Lyandres et al., 2022; Xia et al., 2022). We select token offerings issued in the US and Europe from 2015 and update the list until December 2021 across multiple well-known aggregators: Coinitelligence.com, Tokenmarket.net, Blockdata, STOscope.com, STOrating.com, STOwise.com, STOcheck.com, STOAnalytics, and ICObench.com. The United States and Europe are the two leading areas of the token offering market, where the USA had a large share of the market, comprising 30% of token offerings, at the onset of this industry, while Europe has increased its relevance steadily over time (Bellavitis et al., 2021; 2022). Moreover, in both areas, regulators extend existing securities laws to cryptocurrency exchanges and token offerings, requiring KYC and CFT to be mandatory. These are relevant for our study since they contribute to reducing non-comparability issues. In total, we start from 3,052 token offerings. As in Bongini et al. (2022), we do not consider stablecoins (279 in total) and startups for whom the white paper is not available (388). The white paper is the main document published during the token offering, which investors refer to for investment decisions (Bongini et al., 2022; Thewissen et al., 2022).

Starting from a base of 2,385 projects, we identified company names using two data sources: Crunchbase and Orbis. Because project and company names do not always match, we cross-checked token offerings across multiple online sources (token platforms, Google, and specialized blockchain news websites such as Coindesk, Cointelegraph, and Ledger Insights). We then tracked the startups in our sample through Crunchbase from the closing date of the token offering until the end of 2022 to collect information on funders, including the number and timing of funding rounds. This process allowed us to identify 1,409 entities. Crunchbase, which covers global funding rounds, is a widely used and validated data source in entrepreneurial finance research (e.g., Cumming et al., 2019; Rossi et al., 2023; Signori & Vismara, 2018). From Orbis, we retrieved information on startup characteristics, including foundation year, current status, and sector description. However, due to missing values—which is a common challenge in ICO research (Bongini et al., 2022; Fisch, 2019; Fisch & Momtaz, 2020; Momtaz, 2020)—the final sample comprises 744 uniquely identified startups that issued token offerings between December 2016 and December 2021. Among these, 87 are security token offerings and 657 are utility token offerings.

3.2 Dependent variables

In our sample, 70% (520) of the sample closed successfully the offering, i.e., collected the target amount. [1] Following Signori and Vismara (2018), we categorize our sample of token offerings into different post-offering scenarios: active companies (664, 89% of the sample), those that are categorized in Orbis as 'active' until the end of 2022; failed companies, those that are categorized *Failure in Orbis* and are either 'dissolved' or 'in liquidation' (80, 11% of the sample), Among active companies, in total, 181 ICOs (27% of active companies) successfully secured follow-on funding. Among these, the types of financing observed include: equity funding (159 cases), M&A transactions (12), additional ICOs (6), IPOs (3), and debt financing (1). The probability of failure and the probability of follow-on funding after the ICO are our main dependent variables.

3.3 Independent variables

To explore the determinants of post-offering financing rounds, we rely on variables describing the issuers, the offering, and the startup's funding history. Table 1 presents the descriptive statistics of our

[1] ICOs operate similarly to 'all-or-nothing' crowdfunding campaigns, where a funding threshold must be met for the project to proceed. The soft cap represents the minimum amount of funds needed; however, what happens if it is not reached depends on the ICO's specific terms, as outlined in its white-paper or smart contract. The tokens issued during ICOs are typically managed through smart contracts—self-executing contracts with the terms directly written into code. The technological foundation provided by these smart contracts facilitates the refund process. If the funding goal is not achieved, the smart contract can automatically trigger the return of collected funds to contributors, ensuring a transparent and efficient restitution process. However, unlike traditional 'all-or-nothing' crowdfunding campaigns, a key distinction in ICOs is the pre-sale phase, which functions as a private offering. During this phase, entrepreneurs must understand the value of their entrepreneurial idea, identify the required amount for the official token sale, and secure early support.

Table 1 Descriptive statistics

	Obs	Mean	Std. dev	Min	Max
Panel A: startup and offering characteristics					
Success	744	0,70	0,45	0	1
ln_amount_raised	744	10.89	7.34	0	20.17
Age	744	2.49	3,92	0	34
N_Founders	744	1.73	1.24	0	8.00
Patents	744	0.07	0.24	0	1
STO	744	0.11	0.31	0	1
Pre-sale	744	0.38	0.48	0	1
Team size	744	10.51	6.12	1	38
Word count	744	6177.45	4198.88	233	28764
Panel B: Financing round characteristics					
Round_before	744	0.42	0.49	0	1
BAAC_before	744	0.17	0.37	0	1
PEVC_before	744	0.26	0.49	0	1
Crypto Fund	744	0.17	0.38	0	1
Crypto VC style (n.)	744	0.39	1.30	0	10
Crypto VC style (d)	744	0.15	0.36	0	1
Crypto Hedge style (n.)	744	0.15	0.69	0	9
Crypto Hedge style (d)	744	0.07	0.26	0	1

sample. Tables A1 and A2 in the Appendix display the variable description and correlation matrix.

Since token offerings vary in size, ranging from micro-cap ($0.1 million or less) to mega-cap (several billion), following Bellavitis et al. (2021) and Momtaz (2020), we use a dummy variable equal to 1 in case of offering success and 0 otherwise, which is the explanatory variable for our HP1. As a robustness check, we use the logarithm of the amount raised at the end of the token offering (*Ln_Amount_raised*) as an alternative measure of success. A startup's *Age* is the length of time the startup has been active (from the founding until the offering time). On average, the startups in our sample are 2.5 years old and founded by 2 entrepreneurs (*N_founders*). Each information is available on CrunchBase. Following Signori and Vismara (2018), we retrieve information from the white paper about the startup's innovation level through the dummy variable '*Patents*' that takes the value 1 if the startup holds at least one patent. Only 7% of cases held at least one patent. Regarding the offering characteristics, we rely on previous studies about the success of token offerings to identify a list of independent variables (Bongini et al., 2022; Cumming et al., 2025a). We collected information at the time of the offering about the token type issued, security or utility token (on average, 11% of the startup issued a security token—*STO*), and the publication of a '*Pre-sale*' offering before the offering (on average, 38% of the issuers). The sample presents, on average, 13 million euros raised. This volume aligns with the mean funding between $10 and $20 million, evidenced by previous studies on the ICO market (Bellavitis et al., 2021; Howell et al., 2020; Momtaz, 2021b). We also control the offering year; most token offerings occurred in 2017 and 2018 (71% of our sample). On average, the white paper has a length of 6,177 words, and the team size is composed of about 10 people, in line with previous studies (Momtaz, 2020; Thewissen et al., 2022).

Finally, we collected information regarding the characteristics of funding rounds before and during the token offering. In our sample, 42% of firms had a '*Round before*' the token offering. On average, ICO-funded startups experience one previous investment (with a maximum of 13) and one '*Follow-on*' round (with a maximum of 12). Regarding the TradFin investors that inject money before the token offerings, following Kleinert et al. (2020), we distinguish between institutional investors (VCs and PE) and non-institutional investors (BAs and accelerators). In detail, 17% of the sample received support from at least one BA or accelerator before the token offerings, while 26% received support from at least one VC or PE. Following previous studies (e.g., Cumming et al., 2025a; Fisch & Momtaz, 2020), we map ICO-funded startups on the CryptoFund Research database (www.cryptofundresearch.com) and CrunchBase to identify whether, during the token offerings, the start-up has received investment from Crypto Fund alongside individuals. The list in July 2023 includes more than 800 institutional investors and the names of the token offerings in which they invested. To identify those entered during the token offerings, we manually compared the investors' names from CrunchBase with those entered before and during the token offerings. 17% of token offerings in the sample see the presence of crypto funds, where, on average, there is one crypto fund and a maximum of 5 operators. The CryptoFund Research

database identifies the two investment strategies: *Crypto VC style* and *Crypto Hedge style*. Among crypto funds in the sample, 15% present at least one VC-style (with a maximum of 10 investors in an offering), and 7% at least one hedge fund-style (with a maximum of 9 crypto funds in an offering).

3.4 Method

Our study investigates the determinants of post-offering financing rounds for successful ICOs and their relationship with TradFin investors. We adopt a competing risks proportional hazard duration model (Fine and Gray, 1999) fitted using the maximum likelihood approach as in Signori and Vismara (2018) and Rossi et al. (2023). The model enables us to calculate the hazard rate for a specific scenario of interest (follow-on funding) while considering other potential competing scenarios (failure or no further rounds). In this competing risk setting, startups are observed from study entry to the occurrence of the event of interest ('*Follow-on*') or a competing event or censoring. In our setting, we consider a new funding round as the event of interest, with failure being the competing event, to investigate the determinants of both scenarios. The time to the occurrence of the event is measured in days from the closing date of the token offering. For failed ventures, the event date is the failure date reported on the Orbis database. For the subsequent funding round, we use the date of the first round after the offering, as reported on Crunchbase. We consider the first successful round if a startup obtains multiple financing rounds. Active companies without further rounds correspond to the right-censored observations.

The competing-risks regression is expressed by the hazard function, denoted by h(t). The model is semi-iparametric in that the baseline sub-hazard $h_{1,0}(t)$ (that for covariates set to zero) is left unspecified. In contrast, the effect of covariates x is assumed to be proportional:

$$h_1(t|x) = h_{1,0}(t) \times \exp\left(\delta_i + \sum_{k=1}^{K} \alpha_k X_{kij-1} + \sum_{k=1}^{K} \alpha_k S_{ki} + \sum_{k=1}^{K} \alpha_k Z_{kj} + J_i + W_i + \varepsilon_i\right) \quad (1)$$

where t represents the time to the first financing round; h(t) is the hazard function determined by a set of k covariates (included in vectors X_k, S_k, Z_k), and the coefficients (α_k) that measure the impact of covariates on time of the event of interest; *i* represents each firm; and *j* is the time variable. In our analysis, the covariates can be divided into three main groups of variables: a) the vector that includes the firms' characteristics (X_k): number of funders, presence of patents, and age b) the vector that includes the token's characteristics (S_k): the type of token (security or utility), the presence of a pre-sale, the logarithm of the amount raised, the white paper length, the team size and c) the vector that considers the previous round financing characteristics (Z_k): the presence of at least one BAs and private equity and VC before the offerings and the presence and the type of crypto funds investment styles during the token offering. Then, we add industry (J_i) and country (W_i) controls.

4 Results

Tables 2 and 3 show the results of the models used to test our hypotheses. In all models, we investigate the determinants of follow-on funding through competing risk regression on the post-offering scenarios where we consider a new investment round (*Follow-on*) as the event of interest and failure as the competing event, or '*Failure*' as the event of interest and '*Follow-on'* funding as the competing event. In Models 1 and 2, we introduce the explanatory variable '*Success'* and the control variables to test HP1. From Model 3 to 10 in Table 2, we add variables referring to the type of prior investors, at least one BA, and accelerator (*BAAC_before*), or private equity and venture capital (*PEVC_before*) separately, and with the interaction term with the ICO success variable to test *HP2,* and *HP3*. In Table 3, Models 1 to 6 consider the presence of crypto funds during the offering and their investment style, differentiating between those with a VC-style and those with a hedge-style to test *HP4* and *HP5*. In the results, we report coefficients instead of sub-hazard ratios.

In all Models of Tables 2 and 3, the offering success (*Success*) does not increase the likelihood of a follow-on round. Thus, our *HP1* is not supported. As for control variables, in Table 2, Model 1 shows that

Table 2 TradFin investors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Success	0,06	−0.103	0.063	−0.018	−0.005	−0.018	0.069	−0.081	−0.037	0.212
	(0.162)	(0.358)	(0.162)	(0.351)	(0.174)	(0.351)	(0.162)	(0.360)	(0.171)	(0.392)
Age	−0.054**	−0.100	−0.053**	−0.045	−0.051**	−0.045	−0.053**	−0.079	−0.051**	−0.077
	(0.027)	(0.143)	(0.026)	(0.098)	(0.025)	(0.098)	(0.026)	(0.136)	(0.025)	(0.148)
N_Founders	0.095*	−0.394**	0.092*	−0.345**	0.107*	−0.345**	0.101*	−0.386**	0.116**	−0.402***
	(0.054)	(0.163)	(0.055)	(0.160)	(0.055)	(0.160)	(0.052)	(0.157)	(0.052)	(0.156)
Patent (d)	0.731***	−1.232	0.701***	−1.107	0.737***	−1.107	0.731***	−1.203	0.758***	−1.144
	(0.217)	(1.034)	(0.222)	(1.034)	(0.224)	(1.034)	(0.217)	(1.042)	(0.218)	(1.047)
STO (d)	0.119	−1.244	0.168	−1.412	0.169	−1.412	0.150	−1.319	0.144	−1.250
	(0.168)	(1.012)	(0.169)	(1.015)	(0.170)	(1.015)	(0.166)	(1.027)	(0.167)	(1.028)
Pre-Sale	−0.193	0.610*	−0.173	0.571	−0.174	0.571	−0.183	0.549	−0.178	0.551
	(0.163)	(0.347)	(0.164)	(0.353)	(0.164)	(0.353)	(0.163)	(0.349)	(0.162)	(0.354)
Round_before	0.108	−0.256	-	-	-	-	-	-	-	-
	(0.156)	(0.367)	-	-	-	-	-	-	-	-
Team size	0.003	−0.003	0.004	−0.011	0.003	−0.011	0.004	−0.007	0.004	−0.005
	(0.011)	(0.034)	(0.011)	(0.036)	(0.011)	(0.036)	(0.011)	(0.035)	(0.011)	(0.036)
Word count	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BAAC_before	-	-	0.057	−15.167***	−0.144	−15.395***	-	-	-	-
	-	-	(0.085)	(0.323)	(0.201)	(0.575)	-	-	-	-
Success* BAAC_before	-	-	-		0.218	0.252	-	-	-	-
	-	-	-		(0.205)	(0.631)	-	-	-	-
PEVC_before	-	-	-	-	-	-	0.024	−0.344	−0.143	0.428
	-	-	-	-	-	-	(0.055)	(0.290)	(0.150)	(0.470)
Success* PEVC_before	-	-	-	-	-	-	-	-	0.189	−1.288**
	-	-	-	-	-	-	-	-	(0.154)	(0.621)
Log-likelihood	−1044,12	−203,49	−1044,12	−196,41	−1043,65	−196,41	−1044,27	−202,91	−1043,55	−200,87
Observations	744	744	744	744	744	744	744	744	744	744

The table reports the results of the competing risk regression with 744 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

Table 3 Crypto funds presence

	(1)	(2)	(3)	(4)	(5)	(6)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Success	−0.004	0.016	0.067	0.015	0.094	−0.019
	(0.168)	(0.348)	(0.168)	(0.350)	(0.163)	(0.355)
Age	−0.077***	−0.141	−0.057**	−0.131	−0.044*	−0.148
	(0.029)	(0.139)	(0.027)	(0.138)	(0.024)	(0.140)
N_Founders	0.067	−0.344**	0.073	−0.363**	0.064	−0.368**
	(0.056)	(0.167)	(0.054)	(0.163)	(0.055)	(0.154)
Patent (d)	0.781***	−1.260	0.700***	−1.253	0.850***	−1.204
	(0.218)	(1.031)	(0.216)	(1.026)	(0.210)	(1.017)
STO (d)	0.226	−1.502	0.234	−1.494	0.211	−1.437
	(0.163)	(1.011)	(0.165)	(1.011)	(0.160)	(1.005)
Pre-Sale	−0.073	0.389	−0.121	0.413	−0.127	0.488
	(0.157)	(0.342)	(0.160)	(0.342)	(0.165)	(0.348)
Team size	0.009	−0.012	0.005	−0.011	0.004	−0.006
	(0.011)	(0.033)	(0.011)	(0.033)	(0.011)	(0.033)
Word count	−0.000	0.000	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Crypto fund (d)	0.787***	−2.457**	-	-	-	-
	(0.149)	(1.008)	-	-	-	-
Crypto VC Style	-	-	0.180***	−1.690**	-	-
	-	-	(0.035)	(0.831)	-	-
Crypto Hedge style	-	-	-	-	0.332***	−13.762***
	-	-	-	-	(0.060)	(0.419)
Log-likelihood	−1034,07	−197,58	−1035,65	−197,84	−1034,55	−199,61
Observations	744	744	744	744	744	744

The table reports the results of the competing risk regression with 744 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

the probability of obtaining a follow-on round after the token offerings is enhanced for younger startups (an increase of one year diminishes the likelihood of follow-on funding by about 5%) that hold patents (the presence of at least one patent increases by 73% the likelihood of receiving subsequent funds) and increases for ventures with a large number of funders (one more funder increases the likelihood of follow on funding by about 10%). These results confirm previous literature about signaling for ventures in the seed stage. The startup team members and patents positively increase token offering success, and their significance is also confirmed when the likelihood of follow-on funding is considered. In particular, human capital and patents are strong signals in the seed stage (Rossi et al., 2021). The token type issued does not affect the follow-up fund probability.

In Models 3 to 10 of Table 2, we test whether the probability of follow-on funding depends on previous investors in the ICO startup (*HP2*) and whether a successful token offering moderates this relationship (*HP3*). We found that obtaining financing before the ICO, independently of the type of investors, BAs, accelerators, or PE and VCs, does not increase the probability of follow-on financing, even in the case of ICO success. Hence, both our HPs about TradFin investors are not supported. However, Model 4 shows that ventures backed by at least one BA significantly reduce the likelihood of failure.

In Table 3, Models 1 to 6 explore the impact of investments by crypto funds during the ICO. We find a significant effect of crypto funds as co-investors during the token offering. Their presence increases the survival profile of ICO-funded startups in all models and the probability of follow-on funding by 78% ($p < 0.05$, Model 1). This supports *HP4*. Differentiating crypto funds between VC and hedge-style, we find that both investment styles positively affect raising new funding rounds (confirming HP5A and 5B, $p < 0.01$, Models 3 and 5),

Table 4 Robustness tests on sub-sample period and market characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Success	0.016	0.048	−0.011	0.270	−0.040	0.017	−0.091	0.253	−0.021	0.035	−0.052	0.260
	(0.172)	(0.353)	(0.169)	(0.392)	(0.177)	(0.343)	(0.172)	(0.380)	(0.176)	(0.341)	(0.171)	(0.369)
Age	−0.051*	−0.033	−0.050*	−0.072	−0.041*	−0.068	−0.044*	−0.091	−0.053**	−0.039	−0.053**	−0.063
	(0.026)	(0.096)	(0.026)	(0.149)	(0.022)	(0.109)	(0.023)	(0.154)	(0.024)	(0.098)	(0.024)	(0.138)
N_founders	0.120*	−0.367**	0.128**	−0.419**	0.118**	−0.347**	0.129**	−0.400***	0.111**	−0.385**	0.119**	−0.452***
	(0.062)	(0.167)	(0.059)	(0.167)	(0.057)	(0.160)	(0.053)	(0.153)	(0.055)	(0.170)	(0.051)	(0.168)
Patent (d)	0.704***	−1.141	0.718***	−1.163	0.724***	−1.133	0.740***	−1.115	0.756***	−1.304	0.774***	−1.185
	(0.225)	(1.027)	(0.220)	(1.040)	(0.225)	(1.034)	(0.220)	(1.044)	(0.232)	(1.076)	(0.225)	(1.049)
STO (d)	0.124	−1.465	0.103	−1.286	0.332*	−1.619	0.332*	−1.412	0.209	−1.588	0.188	−1.443
	(0.169)	(1.020)	(0.166)	(1.028)	(0.181)	(1.025)	(0.183)	(1.043)	(0.170)	(1.011)	(0.167)	(1.038)
Pre-sale	−0.166	0.501	−0.171	0.492	−0.123	0.512	−0.114	0.461	−0.148	0.360	−0.149	0.306
	(0.165)	(0.356)	(0.162)	(0.358)	(0.165)	(0.351)	(0.161)	(0.362)	(0.166)	(0.379)	(0.164)	(0.385)
Team size	0.002	−0.010	0.003	−0.005	0.002	−0.016	0.003	−0.009	0.005	−0.017	0.005	−0.008
	(0.011)	(0.036)	(0.011)	(0.036)	(0.011)	(0.036)	(0.011)	(0.036)	(0.011)	(0.034)	(0.011)	(0.036)
Word count	−0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BAAC_before	−0.163	−15.228***	-	-	−0.102	−15.493***	-	-	−0.150	−15.825***	-	-
	(0.202)	(0.579)	-	-	(0.204)	(0.591)	-	-	(0.203)	(0.570)	-	-
Success* BAAC_before	0.223	0.018	-	-	0.183	0.313	-	-	0.215	0.609	-	-
	(0.206)	(0.641)	-	-	(0.206)	(0.647)	-	-	(0.207)	(0.635)	-	-
PEVC_before	-	-	−0.151	0.426	-	-	−0.109	0.349	-	-	−0.142	0.330
	-	-	(0.150)	(0.468)	-	-	(0.157)	(0.493)	-	-	(0.153)	(0.493)
Success* PEVC_before	-	-	0.185	−1.310**	-	-	0.193	−1.256**	-	-	0.183	−1.191*
	-	-	(0.153)	(0.626)	-	-	(0.157)	(0.633)	-	-	(0.156)	(0.645)
Bull market	-	-	-	-	0.353**	−0.458	0.392**	−0.427	-	-	-	-
	-	-	-	-	(0.151)	(0.338)	(0.156)	(0.357)	-	-	-	-
Bear market	-	-	-	-	-	-	-	-	−0.173	0.769**	−0.176	0.809**
	-	-	-	-	-	-	-	-	(0.166)	(0.359)	(0.167)	(0.373)
Log-Likelihood	−1005,65	−195,23	−1005,56	−199,77	−1040,92	−195,49	−1040,35	−200,11	−1043,06	−193,84	−1042,94	−198,12
Observations	695	695	695	695	744	744	744	744	744	744	744	744

The table reports results from competing-risks regressions. Models 1–4 are estimated on 695 token offerings after excluding the year 2021; Models 5–12 are estimated on 744 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

Table 5 Robustness tests for amount raised and TradFin investors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Amoun raised (ln)	0.008	−0.007	0.008	−0.003	0.003	−0.003	0.008	−0.006	−0.000	0.018
	(0.010)	(0.022)	(0.010)	(0.021)	(0.011)	(0.021)	(0.010)	(0.022)	(0.011)	(0.024)
Age	−0.054*	−0.100	−0.052**	−0.045	−0.050**	−0.045	−0.053*	−0.078	−0.049*	−0.076
	(0.028)	(0.143)	(0.027)	(0.098)	(0.025)	(0.098)	(0.027)	(0.136)	(0.026)	(0.145)
N Founders	0.099*	−0.395**	0.096*	−0.344**	0.111**	−0.344**	0.104**	−0.386**	0.124**	−0.414***
	(0.054)	(0.162)	(0.056)	(0.160)	(0.056)	(0.160)	(0.052)	(0.157)	(0.053)	(0.156)
Patent (d)	0.725***	−1.230	0.698***	−1.100	0.747***	−1.100	0.725***	−1.201	0.767***	−1.113
	(0.217)	(1.033)	(0.222)	(1.033)	(0.226)	(1.033)	(0.217)	(1.041)	(0.220)	(1.043)
STO (d)	0.138	−1.250	0.187	−1.412	0.174	−1.412	0.171	−1.323	0.170	−1.270
	(0.164)	(1.009)	(0.163)	(1.018)	(0.166)	(1.018)	(0.160)	(1.028)	(0.158)	(1.014)
Pre-sale	−0.188	0.607*	−0.167	0.572	−0.173	0.572	−0.176	0.547	−0.175	0.562
	(0.164)	(0.349)	(0.164)	(0.355)	(0.165)	(0.355)	(0.163)	(0.351)	(0.162)	(0.359)
Round_before	0.105	−0.256	-	-	-	-	-	-	-	-
	(0.156)	(0.368)	-	-	-	-	-	-	-	-
Team size	0.004	−0.003	0.004	−0.011	0.003	−0.011	0.005	−0.007	0.004	−0.004
	(0.011)	(0.034)	(0.011)	(0.035)	(0.011)	(0.035)	(0.011)	(0.034)	(0.011)	(0.037)
Word count	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BAAC_before	-	-	0.055	−15.167***	−0.191	−15.455***	-	-	-	-
	-	-	(0.085)	(0.322)	(0.192)	(0.565)	-	-	-	-
Success* BAAC_before	-	-	-	-	0.017	0.022	-	-	-	-
	-	-	-	-	(0.012)	(0.039)	-	-	-	-
PEVC_before	-	-	-	-	-	-	0.025	−0.344	−0.182	0.523
	-	-	-	-	-	-	(0.055)	(0.290)	(0.145)	(0.407)
Success* PEVC_before	-	-	-	-	-	-	-	-	0.014*	−0.110**
	-	-	-	-	-	-	-	-	(0.009)	(0.046)
Log-Likelihood	−1043.88	−203.48	−1043.89	−196.4	−1043.21	−196.4	−1044.02	−202.91	−1042.88	−199.5
Observations	744	744	744	744	744	744	744	744	744	744

The table reports the results of the competing risk regression with 744 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

but with different magnitudes. In the former case, an additional VC-style crypto fund increases by 18% the probability of follow-on funding. Regarding hedge-style crypto funds, the magnitude is even greater: an additional hedge-style crypto fund increases the likelihood of follow-on rounds by 33%. Hedge-style investments significantly drive exponential growth in the subsequent likelihood of funding. This result aligns with Cumming et al.'s (2025a) findings that emphasize the greater impact of hedge-fund-style investments compared to VC-style investments on the financial post-performance of ICO-funded startups.

4.1 Robustness checks and additional analyses

We develop several tests to check the robustness of our evidence. First, in Table 4, as in Signori and Vismara (2018), we do not consider the last year of offerings (2021, 49 token offering) to reduce potential censoring concerns (Models 1 to 4). Our main results about the negligible role of TradFin investors remain supported. Second, we add control over the market characteristics. Following Drobetz et al. (2025) and Cumming et al. (2025a), we distinguish between periods of bull and bear markets. The bull market extends from 2015 to January 2018, while the bear market spans between February 2018 and January 2019. Again, our main results hold. Additionally, a bull market is considered a favourable market condition during the initial offering and is seen as a positive signal for the firm's future success in securing follow-on funding ($p < 0.01$; Models 5 and 7). Conversely, a bear market negatively affects the probability of raising additional funds for active companies ($p < 0.01$; Models 9 and 11). Further, we consider the amount raised as a measure of success instead of using the dummy variable

Table 6 Robustness tests for amount raised and Crypto Funds presence

	(1)	(2)	(3)	(4)	(5)	(6)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Amoun raised (ln)	0.004	0.001	0.007	0.002	0.009	−0.001
	(0.010)	(0.022)	(0.010)	(0.022)	(0.010)	(0.023)
Age	−0.076***	−0.141	−0.056**	−0.131	−0.043*	−0.148
	(0.029)	(0.140)	(0.027)	(0.138)	(0.024)	(0.141)
N Founders	0.070	−0.344**	0.077	−0.363**	0.067	−0.368**
	(0.055)	(0.167)	(0.054)	(0.163)	(0.055)	(0.154)
patent (d)	0.777***	−1.261	0.696***	−1.255	0.844***	−1.205
	(0.217)	(1.030)	(0.216)	(1.026)	(0.211)	(1.017)
STO (d)	0.231	−1.500	0.251	−1.493	0.234	−1.438
	(0.161)	(1.012)	(0.161)	(1.013)	(0.154)	(1.008)
Pre-sale	−0.074	0.389	−0.117	0.413	−0.120	0.487
	(0.158)	(0.345)	(0.160)	(0.345)	(0.165)	(0.350)
Round_before						
Team size	0.009	−0.012	0.005	−0.011	0.005	−0.006
	(0.011)	(0.032)	(0.011)	(0.033)	(0.011)	(0.032)
Word count	−0.000	0.000	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Crypto fund (d)	0.779***	−2.458**	-	-	-	-
	(0.149)	(1.008)	-	-	-	-
Crypto VC style	-	-	0.179***	−1.691**	-	-
	-	-	(0.035)	(0.831)	-	-
Crypto Hedge style	-	-	-	-	0.333***	−13.760***
	-	-	-	-	(0.060)	(0.419)
Log-Likelihood	−1034.01	−197.58	−1035.49	−197.84	−1034.34	−199.61
Observations	744	744	744	744	744	744

The table reports the results of the competing risk regression with 744 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

Table 7 Competing risk model on a matched sample with TradFin investors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Success (d)	−0.223	0.613	−0.309	0.911	−0.344	0.911	−0.293	0.444	−0.533*	2.740**
	(0.286)	(1.065)	(0.272)	(0.871)	(0.303)	(0.871)	(0.277)	(0.899)	(0.294)	(1.266)
Age	−0.015	−0.025	−0.042	0.129	−0.043	0.129	−0.042	0.039	−0.021	0.004
	(0.046)	(0.259)	(0.048)	(0.227)	(0.048)	(0.227)	(0.047)	(0.207)	(0.041)	(0.166)
N_Founders	0.045	−0.321	0.014	0.133	0.013	0.133	0.018	−0.309	0.059	−0.421
	(0.113)	(0.414)	(0.117)	(0.553)	(0.117)	(0.553)	(0.116)	(0.440)	(0.110)	(0.529)
Patents (d)	0.866**	−0.937	0.822*	−0.976	0.815*	−0.976	0.872**	−0.965	0.789*	−0.347
	(0.406)	(1.674)	(0.426)	(1.616)	(0.428)	(1.616)	(0.414)	(1.633)	(0.425)	(1.336)
STO (d)	0.064	−1.613	0.007	−1.302	0.018	−1.302	−0.028	−1.401	0.003	−0.855
	(0.254)	(1.860)	(0.276)	(1.822)	(0.280)	(1.822)	(0.255)	(1.888)	(0.261)	(1.762)
Pre-sale	−0.126	1.047	−0.158	1.156*	−0.154	1.156*	−0.176	1.113*	−0.181	1.438
	(0.308)	(0.787)	(0.297)	(0.643)	(0.298)	(0.643)	(0.304)	(0.668)	(0.304)	(0.998)
Round_before	−0.464	0.952	-	-	-	-	-	-	-	-
	(0.285)	(0.685)	-	-	-	-	-	-	-	-
Team size	0.044	−0.110	0.043	−0.107	0.043	−0.107	0.042	−0.115	0.047*	−0.052
	(0.028)	(0.124)	(0.027)	(0.115)	(0.027)	(0.115)	(0.027)	(0.126)	(0.027)	(0.119)
Word count	−0.000**	0.000*	−0.000**	0.000*	−0.000**	0.000*	−0.000**	0.000*	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BAAC_before	-	-	0.077	−17.696***	−0.097	−14.837***	-	-	-	-
	-	-	(0.151)	(1.873)	(0.447)	(1.574)	-	-	-	-
succ_d_BAAC_before	-	-	-	-	0.179	−2.694	-	-	-	-
	-	-	-	-	(0.457)	(2.433)	-	-	-	-
PEVC_before	-	-	-	-	-	-	0.030	−0.013	−0.370	2.326
	-	-	-	-	-	-	(0.111)	(0.335)	(0.395)	(1.507)
succ_d_PEVC_before	-	-	-	-	-	-	-	-	0.434	−2.642*
	-	-	-	-	-	-	-	-	(0.418)	(1.390)
Log-likelihood	−243.51	−28.82	−244.28	−25.89	−244.25	−25.89	−244.42	−29.3	−243.75	−27.01
Observations	218	218	218	218	218	218	218	218	218	218

The table reports the results of the competing risk regression on a matched sample of 218 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

Table 8 Competing risk model on a matched sample with Crypto Funds presence

	(1)	(2)	(3)	(4)	(5)	(6)
	Follow-on	Failure	Follow-on	Failure	Follow-on	Failure
Success (d)	−0.367	0.269	−0.277	0.267	−0.261	0.388
	(0.277)	(0.826)	(0.279)	(0.828)	(0.283)	(0.894)
Age	−0.075*	0.009	−0.038	0.009	−0.037	0.034
	(0.046)	(0.259)	(0.043)	(0.259)	(0.044)	(0.202)
N_Founders	−0.029	−0.340	0.005	−0.342	−0.003	−0.313
	(0.116)	(0.393)	(0.117)	(0.387)	(0.121)	(0.421)
Patents (d)	1.086***	−0.268	0.940**	−0.266	0.924**	−0.988
	(0.415)	(1.563)	(0.401)	(1.564)	(0.406)	(1.759)
STO (d)	0.007	−1.275	0.049	−1.281	0.031	−1.359
	(0.255)	(1.963)	(0.247)	(1.952)	(0.247)	(1.871)
Pre-sale	−0.017	0.739	−0.127	0.742	−0.149	0.999
	(0.297)	(0.786)	(0.303)	(0.783)	(0.312)	(0.786)
Team size	0.049*	−0.140	0.041	−0.141	0.040	−0.117
	(0.028)	(0.157)	(0.027)	(0.156)	(0.027)	(0.133)
Word count	−0.000**	0.000	−0.000*	0.000	−0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Crypto funds (d)	1.047***	−15.520***	-	-	-	-
	(0.293)	(1.123)	-	-	-	-
Crypto VC style	-	-	0.131**	−16.077***	-	-
	-	-	(0.062)	(1.435)	-	-
Crypto Hedge style	-	-	-	-	0.161	−14.101***
	-	-	-	-	(0.141)	(1.056)
Log-likelihood	−239.85	−27.3	−242.88	−27.3	−243.81	−28.8
Observations	218	218	218	218	218	218

The table reports the results of the competing risk regression on a matched sample of 218 token offerings. Geographical and industry-fixed effects are included. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively; standard errors are in parentheses. Table A1 presents the definition of the variables

success. All our results are confirmed and reported in Tables 5 and 6.

Finally, we run the propensity score matching procedure as an additional robustness test to control for selection bias in the type of token issued (utility *vs* security). A propensity score has been calculated and defined as the probability of being treated (namely, the issue of a security token) given the following startup characteristics: age, country, and the year in which the token has been issued.

We applied a propensity score matching with the k-nearest neighbour algorithm. This estimator selects n comparison units, where propensity scores are nearest to the treated unit to be analyzed. We applied a 2-nearest-neighbor matching. Individuals with similar estimated propensity scores will have, on average, similar chances of receiving that treatment and, overall, a similar covariate distribution. We check the propensity score distribution before and after the matching procedure (Fig. 1 in the Appendix). Tables 7 and 8 report the competing risk model developed on the matched sample, and our results support our main findings.

5 Conclusions

This study investigates the factors influencing follow-on funding for ICOs and the role of both traditional financial (TradFin) and crypto fund investors. Specifically, we examine: the effect of the amount raised during token offerings (HP1); the moderating role of ICO

success in relation to prior TradFin investors (HP2 and HP3); and the influence of crypto fund investment during the offering, with attention to investment style (HP4 and HP5). Our analysis draws on 744 token offerings launched in Europe and the USA between 2015 and 2021. The results show that ICO success has only a negligible certification effect on subsequent funding rounds, contrary to HP1. While token offerings positively influence startups' operational performance—supporting product development, service delivery, and initial profitability—they do not significantly affect the probability of follow-on funding. Similarly, prior investments from institutional or non-institutional investors do not increase the likelihood of securing additional funds, even in the case of a successful ICO (HP2 and HP3 are not supported). By contrast, crypto fund participation during the offering significantly enhances the probability of follow-on financing, supporting HP4. Moreover, the likelihood of obtaining subsequent funding increases with the number of participating crypto funds, particularly when hedge-style funds are involved, consistent with HP5.

These results suggest that subsequent investors do not interpret a successful ICO as a certification signal. Instead, when token offerings are viewed as a parallel and specialized financial market, a distinct class of institutional investors emerges—crypto funds. While both seed-stage investors and crypto funds enhance venture survivorship, only specialized crypto funds significantly increase the probability of obtaining follow-on funding. This effect arises from the certification role played by crypto funds, which act as signals that reduce search frictions in a highly asymmetric market through careful due diligence, information verification, and the use of sophisticated pricing and forecasting models (Camelo & Duarte, 2024; Momtaz, 2024). In this sense, crypto funds provide a "stamp of approval" and a quality signal that is difficult to imitate.

Moreover, investment styles produce heterogeneous effects. Hedge-style crypto funds exert a stronger impact than VC-style funds on the likelihood of securing additional financing rounds. Consistent with Cumming et al. (2025a), we find that VC-style funds primarily drive operating performance, whereas hedge-style funds drive financial performance. Extending this research, our results show that both investment styles enhance the probability of follow-on funding through a certification effect, but hedge-style funds exert the stronger influence by pushing ventures more effectively into new financing rounds. Unlike VC-style investors, hedge-style funds are more motivated by short-term financial gains and thus more inclined to exploit the certification effect by prioritizing exit strategies through trading and sales (Drobetz et al., 2025).

Our findings align with recent literature that examines the role of new institutional investors, i.e., crypto funds, in the token market (Cumming et al., 2025a; Drobetz et al., 2025; Fisch & Momtaz, 2020) and emphasize the need for a more thorough exploration of the actions and coexistence of TradFin investors in DeFi (Fisch et al., 2021). As demonstrated by Fisch and Momtaz (2020), the presence of crypto funds backing is associated with enhanced post-ICO performance owing to their superior screening (selection effect) and coaching abilities (treatment effect). However, limited knowledge exists regarding the relationship between TradFin investors and ICO-funded startups and whether DeFi can serve as a credible certification signal. Our findings address these gaps.

Additionally, our findings contribute to the literature on certification signals in the entrepreneurial finance domain (e.g., Vismara, 2018). Notably, patents significantly influence the likelihood of a successful token offering and subsequent funding rounds. Given that technological components are strategic assets for blockchain-based startups, the presence of a patent is considered a credible, costly, and non-imitable signal of the startup's technological and innovative capabilities. Rajan (2012) provides evidence that the signaling value of patents is greater in earlier financing rounds, particularly in the early stages of a startup's development. Additionally, the number of founders is a signal that enhances token success and attracts additional funds.

Given the limited research on this topic, this study inevitably maintains an exploratory focus. Future research could expand the analyzed sample over the observed period, incorporating additional information about accounting, financial data, and the prosecution of their financing cycle. Moreover, other long-term prospects of ICOs could be explored across different dimensions, such as product development and economic performance. Further investigation into the type of token issued (security *vs* utility), the characteristics of institutional investors (e.g., their ownership structure), the type of subsequent funding round (debt, equity, or other DeFi instruments), and their investment

Appendix

Table 9 Variable definition

Ln_Amount_raised (€)	The logarithm of the amount raised in the token offerings
Age	The startup's age at the time of the token offering
N_founders	The number of startup's founders
Patents	Dummy equals 1 if the startup holds at least one patent
STO	Dummy equals 1 for security token offerings
Pre-sale	Dummy equals 1 if the offering provides for a pre-sale
Team Size	The number of members in the team
Word Count	The white paper's word count
Short_offering	Dummy equals 1 if the offering timing is lower than 45 days
Round_before	Dummy equals 1 if the startup obtains investments before the token offering
BAAC_before	Dummy equals 1 if the startup obtains previous investment from at least one business angel or accelerator
PEVC_before	Dummy equals 1 if the startup obtains previous investment from at least one private equity or venture capital
Crypto Fund	Dummy equals 1 if the startup has secured crypto fund backing during the token offerings
Crypto VC style	The number of crypto funds with venture-style capital investment strategies that backed the startup during the token offerings
Crypto Hedge style	The number of crypto funds with hedge fund-style investment strategies that backed the startup during the token offerings

Table 10 Pairwise correlations matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Success	1.000													
(2) Age	-0.005	1.000												
(3) N_Founders	0.123	-0.031	1.000											
(4) Patent	0.078	0.063	0.082	1.000										
(5) STO	0.041	0.090	0.033	0.028	1.000									
(6) Pre-Sale	-0.078	-0.036	-0.066	-0.041	-0.037	1.000								
(7) Round_before	0.104	0.065	0.258	0.143	0.034	-0.073	1.000							
(8) BAAC_before	0.076	0.055	0.221	0.187	-0.047	-0.095	0.340	1.000						
(9) PEVC_before	0.102	0.097	0.233	0.172	-0.023	-0.130	0.536	0.555	1.000					
(10) Crypto fund	0.173	0.004	0.157	0.122	-0.048	-0.147	0.193	0.213	0.318	1.000				
(11) Crypto VC style	0.121	-0.003	0.106	0.114	-0.058	-0.141	0.186	0.269	0.374	0.664	1.000			
(12) Crypto Hedge style	0.051	-0.033	0.117	0.035	-0.054	-0.119	0.117	0.165	0.201	0.486	0.694	1.000		
(13) Team size	0.028	-0.051	-0.029	-0.074	-0.014	0.179	-0.079	-0.111	-0.125	-0.044	-0.045	-0.039	1.000	
(14) Word count	-0.004	-0.013	0.001	0.020	-0.093	0.151	0.021	-0.078	-0.049	0.010	0.053	-0.022	0.293	1.000

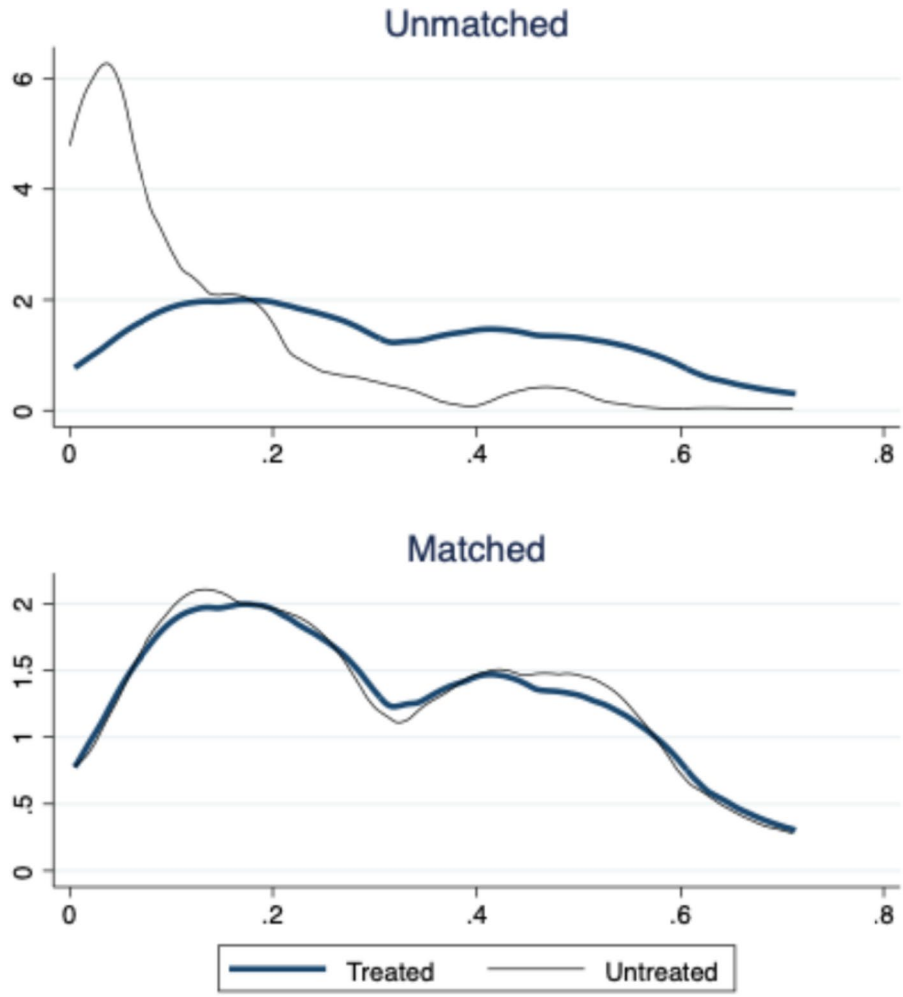

Fig. 1 Distribution of propensity score before and after the matching procedure

patterns in ICO-funded startups would also be valuable. Other exploration would be in the exit strategy of crypto funds and the characteristics of their investment activity. We leave these avenues open for future research.

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