



C-level managers and born-digitals' scaling: The case of Initial Coin Offerings (ICOs)

Johannes Gartner^{a,*}, Andrea Moro^b

^a Lund Universit t, Sten K. Johnson Centre for Entrepreneurship, Sweden

^b Cranfield University, School of Management, United Kingdom

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ABSTRACT

This research contributes to the Management of Technology (MOT) literature by scrutinizing the interrelation between education, experience, and the scaling aptitudes of high-tech companies. The study hinges on a comprehensive analysis of data collected from 1987 C-level executives and 3644 born-digital firms that pursued funding via blockchain-based Initial Coin Offerings (ICOs). Employing structural equation modeling, we systematically tested our hypotheses, contrasting the scaling trajectories of companies that successfully procured funding against those that fell short. Our findings reveal that amongst the diverse managerial competencies, only the leadership acumen of CEOs plays an important role in fostering the scaling of tech-companies across the spectrum, leaving the proficiencies of CFOs and CTOs with negligible impact. More crucially, the competencies of a CEO magnify in importance in relation to a tech-company's scaling potential post the securing of funds. The insights gained from this study not only enrich the existing body of knowledge on scaling and ICOs within the MOT literature but also hold considerable practical value for crafting effective scaling strategies in the high-tech industry.

1. Introduction

Investigating the scalability of tech ventures, this study casts a spotlight on the pivotal role of management teams, with an accent on C-level executives, in leveraging Initial Coin Offerings (ICOs) as a distinctive fundraising mechanism. Situated within the ambit of the technology management literature, it explores the intersect of the scaling process of born-digital firms with managerial expertise, elucidating how effectively management can navigate through the complex tapestry of expansive growth. Born-digital firms are defined as enterprises which, from their inception, harness digital tools to swiftly, cost-effectively, and globally distribute their offerings (Birkinshaw, 2022; Autio and Zander, 2016; Monaghan et al., 2020).

Scaling, articulated as the meticulous replication of core attributes that catalyze a firm's value, propels expansive growth (Tippmann et al., 2023) and underpins the application of an entrenched business model across diversified and/or novel geographies (Winter and Szulanski, 2001), spanning into foreign markets (Chliova and Ringov, 2017; Szulanski and Jensen, 2008). Within this context, the management team not only emerges as a catalyst but also as a navigator, steering the venture through the multifaceted journey of scaling.

The linchpin role of the management team in orchestrating the scalability and success of tech ventures is not newfound; it has been underscored consistently across academic research (MacMillan and Day, 1987; Singer, 1995; Mullins, 1996; Thompson et al., 1996; Almus and Nerlinger, 1999; Sapsed et al., 2002; Prahalad and Hamel, 2003; Brinckmann et al., 2005; Teece, 2007; Brinckmann et al., 2011; Cetindamar and Pala, 2011; Ortu et al., 2017; Siepel et al., 2017; Deligianni et al., 2019; Iyer et al., 2020). This pivotal role is conspicuously prevalent in 'born-digital' firms because they harness digital tools to swiftly, cost-effectively, and globally distribute their offerings right from the start (Birkinshaw, 2022; Autio and Zander, 2016; Monaghan et al., 2020).

Navigating through the intricate landscape of alternative funding mechanisms for high-tech startups—often interwoven with substantial risks (Ang, 1992; Berger and Udell, 1998, 2006; Winborg and Landstr m, 2001)—has spurred explorations into innovative financial instruments. Amongst these are reward crowdfunding, equity crowdfunding, and peer-to-peer lending (Ahlers et al., 2015; Belleflamme et al., 2014; Wei Shi, 2018). Notably, Initial Coin Offerings (ICOs), a relatively recent emergence, have carved out a distinct niche in this domain. As blockchain-based fundraising tools, ICOs issue and sell tokens, bestowing investors with either a venture share or access to

* Corresponding author.

E-mail addresses: johannes.gartner@fek.lu.se (J. Gartner), andrea.moro@cranfield.ac.uk (A. Moro).

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services (Adhami et al., 2018; Bellavitis et al., 2021; Fisch, 2019).

While extant research has journeyed through various determinants influencing a firm's capacity to secure ICO funds—encompassing factors such as code availability on GitHub, token presale organization, specific service accessibility, ICO jurisdiction (Adhami et al., 2018), presence of a hard cap during presale (Amsden and Schweizer, 2018), existence and content of a white paper (Adhami et al., 2018; Fisch, 2019; Bongini et al., 2022), sentiments on social media platforms (Domingo et al., 2020), understanding and trust in cryptocurrencies (Steinmetz et al., 2021), founders' attributes (An et al., 2019; Ante et al., 2018; Burns and Moro, 2018), leadership teams (Howell et al., 2020; Momtaz, 2021), as well as their educational and professional backgrounds (An et al., 2019)—there subsists a noticeable gap. The nuanced understanding of how the expertise of the management team perennially influences an organization's potential for scaling, particularly post-ICO, warrants deeper scrutiny.

Addressing this gap, this manuscript poses the specific research question: How do the skills, primarily education and experience, of C-level management impact the scalability of born-digital companies that use ICOs as a fundraising mechanism?

To explore this inquiry, our investigation probes into the influence of C-level management expertise, on company scalability, particularly through the lens of employee growth (Walsh and Linton, 2011; Berg et al., 2015; Linton, 2015; Gulati and DeSantola, 2016; Schulte-Althoff et al., 2021). The concept of scalability is deeply intertwined with technological skills (Cetindamar and Pala, 2011), and is further scaffolded by high-tech endeavors and digital ecosystems (Linton and Walsh, 2003; Linton and Walsh, 2013; Kang et al., 2019; Elia et al., 2020; Marinakis et al., 2021). Furthermore, the emergence of strategic congruence as a crucial determinant in both technological and business diversification lends momentum to growth dynamics (Gulati and DeSantola, 2016; Zhu, 2020; Schulte-Althoff et al., 2021; Tan and Xia, 2022; Lee, 2023).

Thus, we posit the hypothesis that companies embodying higher skill echelons within all C-level roles would manifest enhanced scaling capabilities, and consequently, an expanded employee base (Siepel et al., 2017; Deligianni et al., 2019). Additionally, we anticipate the skills harbored by CTOs and CFOs to unveil particular merits following the securement of funding through ICOs. Mindful to sidestep survival bias (Gudmundsson and Lechner, 2013) and retrospective bias (Cassar and Craig, 2009), our hypotheses are applied across both victorious and unsuccessful ICO campaigns, subjected to testing through the aggregated data from 3644 tech companies, and further scrutinized through 1987 LinkedIn profiles of their respective CEOs, CFOs, and CTOs.

Embarking on an intricate exploration through the structural equation modeling approach, this research meticulously dissects the intricate interplay amongst various pivotal variables, uncovering that exclusively the skills possessed by a CEO exert a positive influence on company scaling, while those of CFOs and CTOs lack significant impact. Moreover, the CEO's skills ascend to greater indispensability in enhancing a firm's scaling capacity, especially upon the securement of funding. This unforeseen finding is potentially tethered to the vast uncertainties and simultaneous multifaceted challenges—spanning technological, financial, market, and human resource dimensions—customarily encountered by tech start-ups. Within such complex landscapes, while the specialized expertise of the CTO and CFO may ostensibly diminish in criticality, it is the strategic direction and visionary capacity proffered by the CEO that predominantly emerges as a quintessential catalyst for company growth.

This investigation carves out a significant contribution to the Management of Technology (MOT) literature, by delving into the pivotal role of C-level competencies within a context steeped in innovation and uncertainty (Gulati and DeSantola, 2016; Schulte-Althoff et al., 2021), and furthermore, by expanding the lens to envelop the scaling of “digital-born” companies. This includes a pivotal dive into the crucial and contemporary realm of ICO-funded firms, crucially incorporating firms

that have not successfully met their funding objectives into our purview. From a practical standpoint, our findings elucidate the paramount relevance of CEO skills, especially upon reaching funding thresholds, offering pivotal insights for managers and investors alike.

The ensuing structure of our research unfurls as follows: Section 2 unveils the underlying theory and posits our hypotheses. Section 3 illuminates the data, methodology, variables, and controls utilized. Section 4 divulges the results, which are subsequently discussed in Section 5, culminating in a conclusion in Section 6.

2. Theory and hypotheses

2.1. Scaling

The nexus between a company's scaling and its multifaceted impact – benefiting not only the firm and its investors but also reverberating positively through societal channels via job and wealth creation – has been robustly underscored in literature (Teece, 2007; Duruflé et al., 2018; Isenberg and Lawton, 2014). Despite the inherent challenges faced by public policies in pinpointing and fostering high-growth firms with precision (Hözl and Janger, 2013), the phenomenon of scaling, which is succinctly defined as the rate of growth of a firm, has piqued and sustained the intrigue of both scholars and industry practitioners alike (Autio, 2016; European Commission, 2016; Scale up Europe, 2016).

In delving deeper, scholarly explorations have probed into the phenomenon of scaling across a myriad of contexts, including but not limited to high-growth ventures (Duruflé et al., 2016; Rasmussen et al., 2018), scale-ups (Coviello, 2020; DeSantola and Gulati, 2017), the ripple effects of rapid growth precipitated by first or early mover advantages (Coad, 2018), and the swift internationalization trajectories traced by lean entrepreneurial firms (Autio and Zander, 2016).

With a more contemporary lens, scaling research has burgeoned to encompass an expansive array of topics, capturing the global scaling endeavors (Reuber et al., 2021), the peculiar scaling dynamics of social or hybrid enterprises especially within the challenging terrains of Sub-Saharan Africa and bottom-of-the-pyramid contexts (Busch and Barkema, 2021; Chliova and Ringov, 2017), and the scaling of innovative initiatives germinating within organizations as vast and complex as the United Nations (Ambos and Tatarinov, 2022; Tatarinov and Ambos, 2022). Furthermore, explorations have extended into the realm of multinational enterprises, decoding their unique scaling puzzles (Szulanski et al., 2016).

Recently, the pivotal role and scaling trajectories of high-tech companies have attracted a spotlight, necessitating a scrutinization of their unique challenges and strategies in scaling (Financial Times, 2021; Sullivan, 2016; Mihailova, 2023; Stallkamp et al., 2022; Tippmann et al., 2022).

2.2. Scaling in born-digital enterprises

The entwining of technological capabilities, digitalization, and thriving digital ecosystems fundamentally impacts the scalability of firms, beckoning significant scholarly exploration and deliberation (Linton and Walsh, 2003; Linton and Walsh, 2013; Kang et al., 2019; Elia et al., 2020; Marinakis et al., 2021). Scholars within international business and entrepreneurship realms have strived to demystify the specific objectives, mechanisms, and tribulations, alongside organizational contexts, that characterize the process of international scaling through technologies (Huang et al., 2017; Piaskowska et al., 2021; Giustiziero et al., 2021; Tippmann et al., 2023). For instance, Gartner et al. (2022b) singled out digitalization as a pivotal determinant in scaling, elucidating that firms heavily skewed towards digital technologies frequently present market offerings that eclipse conventional technologies in terms of economic efficiency and consumer advantages (Goldfarb and Tucker, 2019; Teece and Linden, 2017).

Unlike conventional industries where scaling often emanates from standardization (Chandler, 1962), the agility offered by digital technology provides a potent avenue to propel rapid expansion (Kallinikos et al., 2013; Svahn et al., 2017; Yoo et al., 2012). Achieving scalability through digitalization demands a strategic balance between replicating proven strategies and nurturing innovative entrepreneurship, both vital to sustain swift growth and maintain a competitive edge through perpetual innovation (Tippmann et al., 2022).

Explicitly apparent in born-digital firms—enterprises that have fundamentally relied on digital tools from their inception—is a pervasive ‘global by default’ mentality, which catalyzes rapid, economically savvy global expansion (Birkinshaw, 2022; Autio and Zander, 2016; Monaghan et al., 2020). These entities leverage digital platforms and markets for immediate global scaling, utilize data-driven operations to expediently augment the value of their offerings (Huang et al., 2017; Elia et al., 2020), and revel in the advantages of minimized incremental user costs (Shaheer, 2020) while maintaining high connectivity and adaptability (Adner et al., 2019; Nambisan, 2017).

Within born-digital entities, a notably fascinating subgroup encompasses those highly digital firms that integrate digital technologies, such as Blockchain, for financing operations. The technological impetus driving innovations in financial business models extends beyond merely altering financial service delivery; it also instigates shifts in markets, regulations, industrial networks, dominant entities, and culture (Sánchez, 2022). Yet, this sphere, despite its pertinence, remains tantalizingly underexplored (Sahut et al., 2021).

2.3. Initial Coin Offering (ICO)

Blockchain technology, characterized by its decentralized, cryptographically secure, and peer-to-peer attributes, presents a compelling alternative to centralized processing authorities (Narayanan et al., 2016; Pilkington, 2015). It ensures consistent data integrity across a global network of computers or nodes—each employing hash functions for communication—without a centralized control entity, while also demonstrating resilience against data loss even when nodes are compromised (Nakamoto, 2008; Narayanan et al., 2016). The intricate process of transaction recording, block validation through distributed algorithms, and synchronized communication across nodes, perpetuates decentralized consensus, thereby fortifying the reliability and application of blockchain across diverse transaction types, such as payments and contracts (Adhami et al., 2018; Chen, 2018; Narayanan et al., 2016).

ICOs leverage blockchain to issue tokens—either as a representation of venture ownership (security token) or as access enablers to venture services (utility token)—facilitating startups to circumvent traditional financial intermediaries and regulatory boundaries, thereby raising funds efficiently and inclusively (Adhami et al., 2018; Chen, 2018; Mollick, 2014; Nakamoto, 2008). Typically characterized by a global outlook and cross-border operations from inception, ICO projects aim for large-scale, globally disruptive innovations applicable across varied technological frameworks (Reuber et al., 2021; Rawhouser et al., 2022). In 2017, ICOs peaked with a staggering \$5.3 billion in global fundraising, predominantly fueled by their unregulated nature, which enables startups to access international investors without geographical or legal hindrances (Fisch, 2019; Howell et al., 2020; Murphy, 2018). Such a mechanism not only amplifies fundraising capacities of startups by accommodating micro-contributions but also allows investors early-stage entry into innovative ventures, mutually benefitting both parties (Adhami et al., 2018; Howell et al., 2020; Huang et al., 2020).

Despite drawing parallels with crowdfunding—by attracting numerous minor investors—and IPOs—through token similarities with shares and tradability on secondary markets—ICOs incorporate distinctive risk factors due to the absence of intermediaries who conduct screening and post-investment monitoring, which is common in IPOs (Corbet et al., 2019; Fisch, 2019; Jackson, 2018; Kajtazi and Moro, 2019; Moro and Wang, 2019). These elevated risks, which also echo

those encountered in angel and venture capital funding, coupled with potential technological uncertainties and even fraud, engender an environment where only a slim percentage of ICOs are projected to find success (Bellavitis et al., 2021; Coffie and Zhao, 2021; Hornuf et al., 2022).

In the pursuit of informed investment decisions within ICOs, investors predominantly depend on available information, either voluntarily disseminated by the firm's management, like social media data (Perez et al., 2020), or inadvertently disclosed details such as the educational and experiential background of the management team (Moro et al., 2023; Ante et al., 2018; Amsden and Schweizer, 2018; Moro and Wang, 2019; Ofir and Sadeh, 2020; Yadav, 2017). Thus, the multifaceted dimensions of ICOs, from their decentralized attributes to the unique investment landscape they foster, necessitate further rigorous scrutiny, theorizing, and empirical exploration, especially within the context of their viability as a sustainable financing model in the global digital economy.

2.4. The role of management skills

Scaling, particularly within firms navigating digital business models and encountering nominal entry barriers, invokes a series of multifaceted challenges. These encompass proficient management at an escalated scale (DeSantola and Gulati, 2017; Sirmon et al., 2011), internal discord and navigating through organizational chaos (Gulati and DeSantola, 2016), seizing growth opportunities while harnessing economies of scale (Reuber et al., 2021), and strategically balancing conflicting demands amid scaling strategy deployment (Tippmann et al., 2022). A specialized skill set is imperative for navigating these challenges, and absent these, numerous global scaling endeavors have foundered (Kutcher et al., 2014; Scale up Europe, 2016).

Leadership teams' human capital emerges as a pivotal variable in navigating a company through effective scaling (Teece, 2007). Previous studies underscore founders' characteristics and experiences as influential determinants shaping both the cultural and behavioral paradigms within rapid-growth firms (Barringer et al., 2005; Mullins, 1996; Mac-Millan and Day, 1987). Managerial attributes, particularly education and experience, serve as proxies for capabilities and exert a positive influence on new venture performance (Zhu, 2020), with diverse evidence corroborating the significance of various entrepreneurial and technical capabilities across different contexts (e.g., Sapienza and Grimm, 1997; Tan and Xia, 2022; Cetindamar and Pala, 2011; Linton and Walsh, 2003; Elia et al., 2020; Marinakis et al., 2021; Gartner et al., 2022a, 2022b).

At the collective team level, the emphasis on fostering interconnections and collaborative synergy emerges as paramount (Shepherd and Patzelt, 2022). Collaborative innovations mediate the impact of dynamic capabilities on performance, especially in born-digital SMEs (Pundziene and Geryba, 2023), and technological proficiency and entrepreneurial competencies significantly influence resource orchestration and innovation efficiency (Deligianni et al., 2019). Notably, firms with successful growth trajectories often distinguish themselves through the early acquisition of complementary managerial skills, while others navigating growth followed by an exit may grapple with a paucity of specialized skills (Siepel et al., 2017).

Empirical observations reveal a robust correlation between specific management factors, particularly in innovative, technology-based firms, and the company's growth trajectory, as well as net employment (Almus and Nerlinger, 1999). Effective scaling is also associated with the strategic hiring of functional experts and establishing adept management structures to support expanded personnel (Gulati and DeSantola, 2016). Even within high-tech ventures, a consistent revenue-employee growth pattern mirrors that observed within traditional service startups (Schulte-Althoff et al., 2021).

In this milieu, we pivot our attention towards the competencies, particularly educational and experiential, of the ICO's CEO, CFO, and

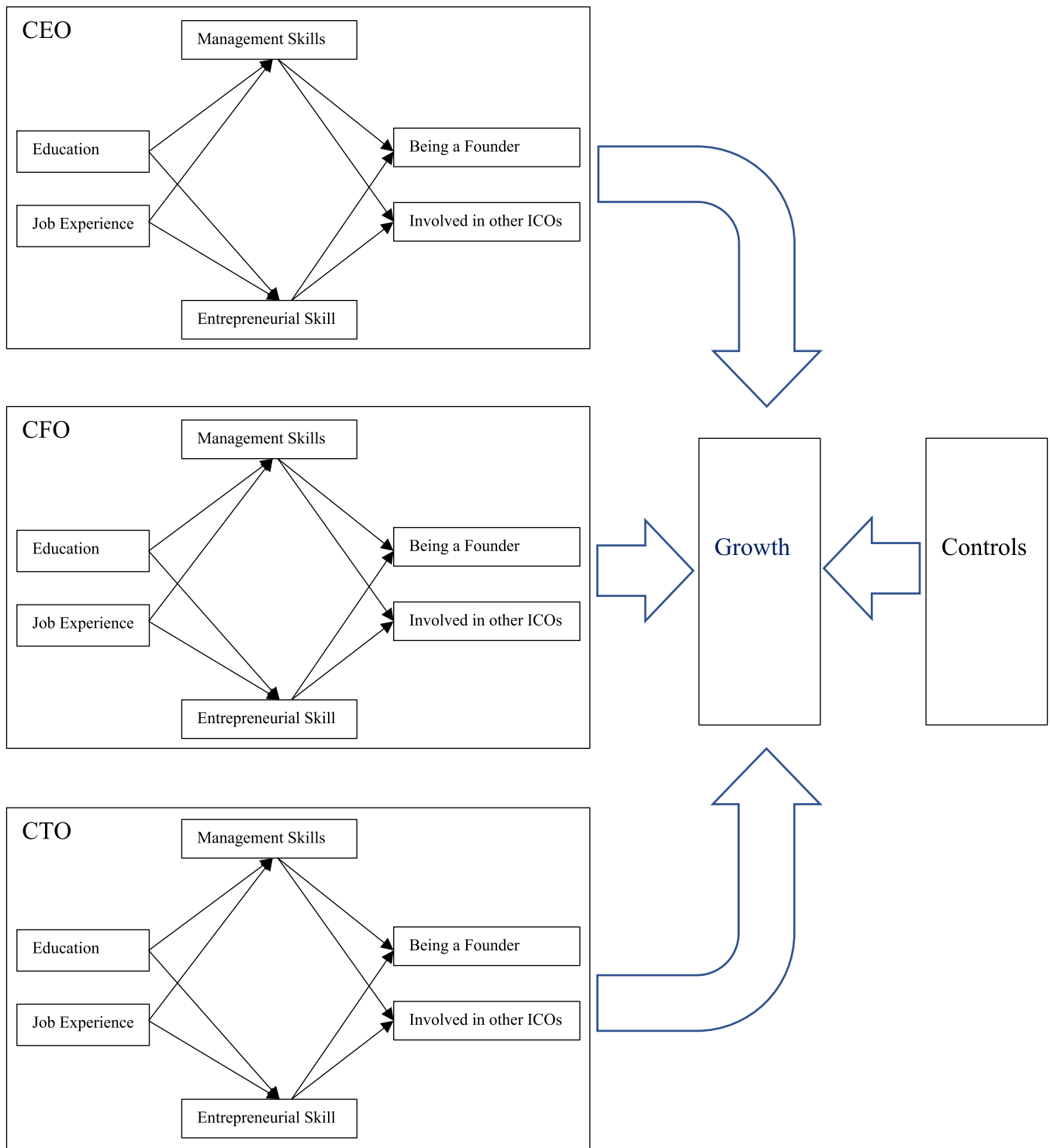


Fig. 1. Structure of the tested model.

CTO as independent variables, operationalizing the employee count, adjusted for the age of the ICO company, as a dependent variable indicative of scaling.

- H1. CEOs possessing enhanced skills correlate positively with company scaling, mirrored through an increasing number of employees.
- H2. CFOs possessing enhanced skills correlate positively with company scaling, mirrored through an increasing number of employees.
- H3. CTOs possessing enhanced skills correlate positively with

company scaling, mirrored through an increasing number of employees.

Mindful of survival bias (Gudmundsson and Lechner, 2013) and hindsight/retrospective bias (Cassar and Craig, 2009), our evaluation framework will scrutinize these hypotheses across companies that have both successfully and unsuccessfully met their ICO funding benchmarks.

3. Data and methodology

3.1. Data

The empirical scrutiny of new venture creation is often hampered by survival bias (Gudmundsson and Lechner, 2013) and hindsight/retrospective bias (Cassar and Craig, 2009). The latter arises due to the inherent limitations in public records, which predominantly encompass information on successful startups (Aldrich, 1999), and the predisposition of unsuccessful business founders to inaccurately recall and report the factors leading to their failure (Dimov, 2007). Given the restrictive accessibility of census data for research endeavors, a comprehensive analysis of new venture creation becomes a daunting task for researchers. To mitigate these limitations, adopting a judicious approach in sample selection and deploying statistical methods to minimize selection bias is imperative (Winship and Mare, 1992). The acquisition of near-census data is viable under specific circumstances, such as when dealing with a relatively small sampling frame and ensuring comprehensive observation of a phenomenon (Flint et al., 2002). This is applicable in the context of Initial Coin Offerings (ICOs), which are typically finite in number and leave distinguishable digital footprints, even in failure or short-lived scenarios, thereby allowing for meticulous data collection and analysis.

This study, aligning with the insights from Geissinger et al. (2023) regarding the crucial role of social media research in scrutinizing technological and societal innovations, and inspired by the methodology of Bogusz et al. (2020) who utilized social media data for ICO research, intends to accumulate near-census data. It employs an adapted four-stage systematic literature review approach articulated by Tranfield et al. (2003). Defined by Fink (2005) as a method characterized by its systematic, explicit, and reproducible design for identifying, evaluating, and interpreting documented information, this methodology, while commonly utilized in systematic literature reviews, is here applied to data sources to scrupulously analyze the ICO paradigm.

Data collection was executed from January to September 2021 and initiated with a systematic literature analysis encompassing all publications available in the ProQuest.com academic database. Employing a search criteria that encapsulated any article containing the term “initial coin offering” in the title, abstract, or keywords—without restrictions on publication date, peer-review status, or language—319 results were procured. This culminated in 254 unique and full-text accessible publications. Through the use of text analysis software, web links within these articles were extracted, manually sorted, and categorized, identifying 134 distinct ICOs, 34 online platforms, and additional resources. Supplementary searches, using keywords like “ICO list,” “ICO database,” and “ICO ratings” on platforms including Google, web forums, and social media, identified an additional 69 resources. Utilizing the “similarweb.com” database yielded 18 more links, accumulating a total of 121 web domains. From these, 55 online resources were substantively utilized after excluding 23 off-topic or non-relevant domains and 43 that were no longer active online. From the viable 55 resources, ICO entries were manually extracted, even from eight that were no longer updated post-ICO hype period (2017–2020). Data was also extracted from 16 offline websites through web archives or extant social media content, ensuring a comprehensive inclusion of short-lived and failed ICO projects. The meticulous consolidation and cleansing of data led to the identification of 16,541 individual ICO projects spanning 2013 to 2021.

An Excel script facilitated the merging of all data derived from various platforms, alongside LinkedIn profile links, with manual input and corrections enacted as necessary, utilizing original ICO websites, social media accounts, and whitepapers as data sources. To procure team data, an analogous methodology was employed. A total of 4853 whitepapers were downloaded and imported into text analysis software to extract embedded LinkedIn links, facilitating the collection of LinkedIn profile links from official ICO websites and their utilization as data sources for information on work experience, education, and

endorsements. This approach assures a comprehensive and rigorous analysis, establishing a robust foundation upon which empirical findings can be solidly built.

3.2. Methodology

In engaging with variables that inherently influence one another, we crafted a structural equation model, wherein the paramount outcome is delineated as the average growth in the team members engaged in a project from its Initial Coin Offering (ICO) until July 2021. Adhering to a Gaussian distribution, due to our dependent variable conforming to a normal distribution, we modeled the relationships amongst diverse variables and the ultimate outcome using an identity link function.

The model encompasses a foundational regression that integrates all control variables, in addition to considering the skills (quantified as the logarithm of endorsements) of the Chief Financial Officer (CFO), Chief Technology Officer (CTO), and Chief Executive Officer (CEO), work experience (expressed as the logarithm of years), education (measured in years of university education), a specification of whether they are founding ICO members (denoted by a dummy variable), and whether they participate in other ICOs at the C-level (indicated by a dummy variable).

Nonetheless, acknowledging that the logarithm of skills is a derivative of both education and experience, we constructed three supplementary regressions. In these, the dependent variables are the logarithms of the skills of the CFO, CTO, and CEO, while the independent variables encompass years of university education and job experience (logarithm of years). In this context, the logarithm of skills also adheres to a normal distribution; hence, the identity link function is employed once more. Furthermore, the decision to initiate participation in an ICO as a founder and to engage in other startups is modulated by the experience, quantified both through years of experience and education. Consequently, three additional regressions were introduced, modeling the propensity to be a founder and involvement in other startups, dictated by education and experience, wherein the dependent variable, resulting from a Bernoulli process, is modeled using a logit link function. The visual representation of this model is encapsulated in Fig. 1.

To dissect the influence of the CEO, CFO, and CTO roles on an ICO project's success, our analysis was bifurcated: initially employing our comprehensive firm sample, incorporating all three aforementioned roles, and subsequently recalculating the model using two discrete firm subsets - those successfully reaching their soft cap and those falling short yet continuing with their project. This facilitated a comparison regarding the predictive significance of each role concerning success for firms, considering scenarios both inclusive and exclusive of funding.

Subsequently, we re-executed the analysis for each subset, probing the singular contributions of the CEO, CFO, and CTO. While comprehensive coefficients and levels of significance of the control variables are eschewed here for brevity, we do render commentary on noticeable shifts in sign and level of significance between the controls in the complete sample and subsets. All regressions were computed utilizing Stata17, ensuring a robust and reliable analytical process.

This methodology, ensuring the meticulous and comprehensive analysis of the variables under scrutiny, furnishes a potent foundation for examining the factors contributing to the success or failure of ICO projects and the nuanced roles that individual C-level executives play therein.

3.3. Outcome variable, independent variables and controls

Our analytical focus zeroes in on the average annual growth rate of the number of team members engaging in the Initial Coin Offering (ICO) project, quantified utilizing natural logarithms. This methodological choice enables us to accommodate the diminishing marginal impact of additional team members, especially in smaller firms, and ensures that

Table 1
Descriptive statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
Average Growth	3644	0.71434	0.68151	-2.1972	2.9444
ICO with Whitelist	3644	0.26784	0.44289	0	1
ICO implementing Know Your Customer	3644	0.44347	0.49686	0	1
ICO implementing Minimum Viable Product	3644	0.22283	0.41620	0	1
Pre ICO sale	3644	0.37541	0.48430	0	1
ICO offering bonus	3644	0.33809	0.47312	0	1
Logarithm of total funds raised	3644	5.47263	7.23469	0	22.1427
Crypto	3644	0.22475	0.41748	0	1
Fintech	3644	0.17481	0.37985	0	1
Consulting	3644	0.17536	0.38032	0	1
Entertaining	3644	0.10977	0.31265	0	1
Health Social	3644	0.04693	0.21151	0	1
European Union	3644	0.20856	0.40634	0	1
Non-European Union	3644	0.14709	0.35425	0	1
North America	3644	0.10757	0.30988	0	1
Central America and Caribbean	3644	0.05241	0.22289	0	1
South America	3644	0.00988	0.09892	0	1
Pacific Basin	3644	0.03568	0.18550	0	1
Asia	3644	0.04802	0.21385	0	1
Google searches on ICO	3644	16.92476	10.40031	6	54
Ether accepted	3644	0.65971	0.47387	0	1
Bitcoin accepted	3644	0.34605	0.47577	0	1
Common currencies accepted	3644	0.10895	0.31161	0	1
USD accepted	3644	0.04940	0.21672	0	1
EUR accepted	3644	0.00796	0.08887	0	1
Number of years in university education (CEO)	3644	1.83096	2.44578	0	9
Number of years in university education (CFO)	3644	0.43496	1.40580	0	9
Number of years in university education (CTO)	3644	1.29748	2.22601	0	9
Logarithm of the days of experience of the CEO	3644	5.89606	3.42303	0	10.4368
Logarithm of the days of experience of the CFO	3644	3.80728	3.86111	0	9.8259
Logarithm of the days of experience of the CTO	3644	1.22107	2.84406	0	9.8615
CEO management skills (log)	3644	1.35299	1.82652	0	6.3279
CEO entrepreneurial skills (log)	3644	0.54652	1.34366	0	5.2933
CFO management skills (log)	3644	0.25717	0.91019	0	5.6021
CFO Finance skills (log)	3644	0.18611	0.81362	0	6.0521
CTO management skills (log)	3644	0.61542	1.31290	0	6.1527
CTO technology skills (log)	3644	1.13522	1.76143	0	6.2066
CFO participating in multiple ICOs	3644	0.05708	0.23203	0	1
CTO participating in multiple ICOs	3644	0.18469	0.38810	0	1
CEO participating in multiple ICOs	3644	0.27799	0.44807	0	1
CEO is a founder member	3644	0.38419	0.48647	0	1
CFO is a founder member	3644	0.03019	0.17112	0	1
CTO is a founder member	3644	0.12651	0.33247	0	1

the team's growth adheres to a normal distribution—thus aligning appropriately with our selected estimation method.

The principal variables under our microscope are the skills, education, and experience of the key C-level executives: the CEO, CFO, and CTO. These variables are pivotal, allowing us to scrutinize their direct influence on firm growth and to explore their potential to impact other variables, which might, in turn, exert an indirect influence on the firm's growth trajectory. Acknowledging the skewed distribution of skills and experience, these variables are transformed into natural logarithms to furnish a more precise portrayal of their relationship with firm growth.

Expanding our analytical spectrum, our suite of control variables amalgamates metrics indicative of social media activity. This includes the natural logarithm of follower counts across various platforms, namely Twitter, Telegram, and LinkedIn. Additionally, we account for the multi-faceted involvement of the CEO, CFO, and CTO by ascertaining whether they are engaged with other firms and establishing if they form part of the founding team. Augmenting our analytical depth, we also embed industry- and venture-specific controls. This involves the incorporation of dummy variables to categorize the industry in which the ICO is operational, and ascertain whether the venture activates Know Your Customer (KYC) processes or Minimum Viable Products (MVP), offers pre-ICO sales or bonuses, maintains a whitelist, and imposes restrictions on its ICO sales—all variables anticipated to wield a positive influence on firm growth. Furthermore, we include the type of currency accepted by the ICO.

To round off our array of control variables, we control for context-driven factors such as the Google trend index for the term “ICO” during the time of the offering and the geographical location of the ICO. These variables are prognosticated to amplify both the popularity and growth of the venture, thereby providing a comprehensive and nuanced lens through which the multifaceted dynamics of ICO project growth can be assiduously examined.

In utilizing this methodological approach, we aim to illuminate the complex interplay between the leadership variables, social media influence, and specific control variables that collectively shape the growth trajectory of ICO projects, paving the way for enriched insights and informed discussions in the subsequent findings and discussion chapters.

4. Results

The descriptive statistics are reported in Table 1.

Delving into our sample data, all firms showcased a discernible growth in the average yearly change in staff size, oscillating between 0.11 % (natural logarithm: -2.1972) and 19 % (natural logarithm: 2.9944). A noteworthy observation is that in 27.8 % of instances, CEOs were concurrently engaged in other ICO projects, suggesting a palpable prevalence of cross-project collaboration.

When exploring the educational journey of C-level team members, we observed that they have accumulated between 0 and 9 years of university education. More precisely, CEOs, on average, spent 1.83 years in university education, whereas CTOs and CFOs have spent marginally less, averaging 1.29 years and 0.43 years respectively. The spectrum of skills across the CEO, CFO, and CTO roles is vastly divergent, spanning from a nadir of 0 to a zenith exceeding 500. Nevertheless, the average skill level lingered on the lower end of the spectrum, thus revealing a skewed distribution. A finer lens on skill distribution illuminated that CFOs average 1.20 in finance skills, whereas CEOs exhibit an average of 3.86 in management skills.

Segmenting our sample into two distinctive cohorts - firms that successfully attained their soft cap and those that, despite failing, perpetuated their project endeavors - a chasm was observed in the average growth rate between the two clusters. Successful firms registered an average growth rate of 0.7988, contrasted against the 0.6411 of their unsuccessful counterparts, a divergence that is statistically significant ($p < 0.01$). Intriguingly, no substantive variation was discerned in the skills of the CEO, CFO, and CTO across these two clusters, with a

Table 2
All the ICOs.

Variables	1 CEO Man	2 CEO Ent	3 CEO part	4 CEO Founder	5 CFO Man	6 CFO Fin	7 CFO part	8 CFO founder	9 CTO Man	10 CTO Tech	11 CTO part	12 CTO founder	13 Growth
CEO management skills (log)			0.1238*** (0.0217)	0.1832*** (0.0205)									0.0276* (0.0141)
CEO entrepreneurial skills (log)			0.0522* (0.0287)	0.0690** (0.0276)									0.0016 (0.0173)
CFO management skills (log)							0.7208*** (0.0545)	0.7054*** (0.0635)					0.0272 (0.0303)
CFO Finance skills (log)							0.1445** (0.0629)	-0.1419 (0.0872)					-0.0368 (0.0316)
CTO management skills (log)											0.1603*** (0.0314)	0.1831*** (0.0344)	0.0174 (0.0179)
CT technology skills (log)											0.3516*** (0.0245)	0.3062*** (0.0278)	0.0075 (0.0156)
Logarithm of the days of experience of the CEO	0.1912*** (0.0087)	0.0790*** (0.0069)											-0.0038 (0.0086)
Number of years in university education (CEO)	0.0979*** (0.0122)	0.0473*** (0.0097)											0.0100 (0.0097)
CEO participating in multiple ICOs													0.0578 (0.0514)
CEO is a founder member													-0.0351 (0.0516)
Logarithm of the days of experience of the CTO					0.1802*** (0.0057)	0.1002*** (0.0055)							0.0097 (0.0130)
Number of years in university education (CFO)					0.0750*** (0.0115)	0.1444*** (0.0112)							0.0302 (0.0203)
CFO participating in multiple ICOs													0.0350 (0.1025)
CFO is a founder member													0.0241 (0.1188)
Logarithm of the days of experience of the CTO									0.1372*** (0.0061)	0.2671*** (0.0071)			0.0135 (0.0088)
CTO participating in multiple ICOs													-0.0377 (0.0602)
CTO is a founder member													-0.0596 (0.0673)
Number of years in university education (CTO)									0.0574*** (0.0106)	0.0675*** (0.0124)			-0.0036 (0.0113)
ICO with Whitelist													0.0857* (0.0491)
ICO implementing Know Your Customer													0.2530*** (0.0558)
ICO implementing Minimum Viable Product													0.0570 (0.0525)
Pre ICO sale													0.0182 (0.0453)
ICO offering bonus													0.0511 (0.0469)
Logarithm of total funds raised													0.0098*** (0.0029)
Crypto													-0.1548* (0.0865)
Fintech													-0.1774*

(continued on next page)

Table 2 (continued)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
	CEO Man	CEO Ent	CEO part	CEO Founder	CFO Man	CFO Fin	CFO part	CFO founder	CTO Man	CTO Tech	CTO part	CTO founder	Growth
													(0.0911)
Consulting													−0.0463
Entertaining													(0.0922)
Health Social Services													−0.0894
European Union													(0.0977)
Non-European Union													−0.1191
North America													(0.1183)
Central America and Caribbean													0.0819
South America													(0.0577)
Pacific Basin													0.1252**
Asia													(0.0639)
Google ICO													−0.0975
Ether accepted													(0.0792)
Bitcoin accepted													0.1984**
Common currencies accepted													(0.0861)
USD accepted													−0.0151
EUR accepted													(0.2230)
Constant	0.0466	−0.0059	−1.1651***	−0.7699***	0.0045	0.0010	−3.3702***	−3.9082***	0.0184	0.0305	−2.1465***	−2.5726***	0.2416**
Observations	(0.0545)	(0.0429)	(0.0482)	(0.0442)	(0.0125)	(0.0122)	(0.0945)	(0.1225)	(0.0270)	(0.0315)	(0.0634)	(0.0750)	(0.1064)
	3644	3644	3644	3644	3644	3644	3644	3644	3644	3644	3644	3644	3644

Standard errors in parentheses.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Table 3
ICO reaching the soft cap.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
	CEO Man	CEO Ent	CEO part	CEO Founder	CFO Man	CFO Fin	CFO part	CFO founder	CTO Man	CTO Tech	CTO part	CTO founder	Growth
CEO management skills (log)			0.0922*** (0.0350)	0.1995*** (0.0335)									0.0394** (0.0180)
CEO entrepreneurial skills (log)			0.1187*** (0.0450)	0.0421 (0.0444)									-0.0203 (0.0223)
CFO management skills (log)							0.7935*** (0.0904)	0.7215*** (0.1008)					0.0116 (0.0415)
CFO Finance skills (log)							0.1223* (0.1040)	-0.0510 (0.1246)					-0.0493 (0.0397)
CTO management skills (log)											0.2022*** (0.0479)	0.1136** (0.0543)	0.0179 (0.0223)
CT technology skills (log)											0.3150*** (0.0375)	0.2633*** (0.0430)	-0.0019 (0.0196)
Logarithm of the days of experience of the CEO	0.2188*** (0.0143)	0.0835*** (0.0115)											0.0037 (0.0111)
Number of years in university education (CEO)	0.0445** (0.0196)	0.0414*** (0.0159)											0.0113 (0.0119)
CEO participating in multiple ICOs													0.0523 (0.0634)
CEO is a founder member													-0.0810 (0.0647)
Logarithm of the days of experience of the CTO					0.1878*** (0.0093)	0.1064*** (0.0093)							0.0166 (0.0180)
Number of years in university education (CFO)					0.0769*** (0.0181)	0.1630*** (0.0181)							0.0360 (0.0260)
CFO participating in multiple ICOs													0.0848 (0.1458)
CFO is a founder member													-0.0062 (0.1484)
Logarithm of the days of experience of the CTO									0.1404*** (0.0103)	0.2651*** (0.0122)			0.0092 (0.0113)
CTO participating in multiple ICOs													-0.0391 (0.0760)
CTO is a founder member													-0.0451 (0.0832)
Number of years in university education (CTO)									0.0360** (0.0172)	0.0671*** (0.0202)			-0.0022 (0.0137)
Controls													included
Constant	0.0250 (0.0874)	-0.0094 (0.0707)	-1.0683*** (0.0777)	-0.7736*** (0.0732)	0.0036 (0.0202)	-0.0014 (0.0201)	-3.4761*** (0.1624)	-3.8360*** (0.1934)	0.0303 (0.0492)	0.0517 (0.0580)	-1.9284*** (0.0978)	-2.3130*** (0.1136)	-0.1551 (0.2391)
Observations	1358	1358	1358	1358	1358	1358	1358	1358	1358	1358	1358	1358	1358

Standard errors in parentheses.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Table 4
ICO not reaching the soft cap.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
	CEO Man	CEO Ent	CEO part	CEO Founder	CFO Man	CFO Fin	CFO part	CFO founder	CTO Man	CTO Tech	CTO part	CTO founder	Growth
CEO management skills (log)			0.1434*** (0.0276)	0.1733*** (0.0259)									0.0227 (0.0219)
CEO entrepreneurial skills (log)			0.0070 (0.0376)	0.0860** (0.0353)									0.0254 (0.0267)
CFO management skills (log)							0.6786*** (0.0687)	0.6983*** (0.0821)					0.0236 (0.0450)
CFO Finance skills (log)							0.1574** (0.0795)	-0.2338* (0.1265)					-0.0309 (0.0505)
CTO management skills (log)											0.1275*** (0.0421)	0.2323*** (0.0445)	0.0012 (0.0281)
CT technology skills (log)											0.3737*** (0.0324)	0.3349*** (0.0364)	0.0282 (0.0251)
Logarithm of the days of experience of the CEO	0.1758*** (0.0111)	0.0765*** (0.0086)											-0.0126 (0.0131)
Number of years in university education (CEO)	0.1299*** (0.0157)	0.0505*** (0.0122)											0.0053 (0.0155)
CEO participating in multiple ICOs													0.0896 (0.0825)
CEO is a founder member													0.0489 (0.0812)
Logarithm of the days of experience of the CTO					0.1762*** (0.0072)	0.0975*** (0.0069)							0.0011 (0.0189)
Number of years in university education (CFO)					0.0728*** (0.0148)	0.1309*** (0.0143)							0.0444 (0.0325)
CFO participating in multiple ICOs													-0.0473 (0.1559)
CFO is a founder member													-0.1348 (0.2039)
Logarithm of the days of experience of the CTO									0.1345*** (0.0076)	0.2680*** (0.0088)			0.0155 (0.0139)
CTO participating in multiple ICOs													0.0353 (0.0993)
CTO is a founder member													-0.0571 (0.1079)
Number of years in university education (CTO)									0.0731*** (0.0135)	0.0678*** (0.0156)			-0.0024 (0.0194)
Controls													included
Constant	0.0593 (0.0694)	-0.0037 (0.0541)	-1.2231*** (0.0615)	-0.7684*** (0.0555)	0.0051 (0.0159)	0.0023 (0.0153)	-3.3120*** (0.1162)	-3.9537*** (0.1583)	0.0125 (0.0320)	0.0198 (0.0371)	-2.2852*** (0.0836)	-2.7472*** (0.1002)	0.6445*** (0.1477)
Observations	2286	2286	2286	2286	2286	2286	2286	2286	2286	2286	2286	2286	2286

Standard errors in parentheses.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Table 5
CEO only.

Variables	Overall																
	Reaching Softcap				Not Reaching Softcap				Growth								
	1	2	3	4	1	2	3	4	1	2	3	4					
	CEO Man	CEO Ent	CEO part	CEO Founder	CEO Man	CEO Ent	CEO part	CEO Founder	CEO Man	CEO Ent	CEO part	CEO Founder	CEO Man	CEO Ent	CEO part	CEO Founder	
CEO management skills (log)	0.1238*** (0.0217)	0.1832*** (0.0205)	0.0522* (0.0287)	0.1832*** (0.0205)	0.0256* (0.0141)	0.0922*** (0.0350)	0.1995*** (0.0335)	0.1995*** (0.0335)	0.0360** (0.0179)	0.1434*** (0.0276)	0.1434*** (0.0276)	0.1733*** (0.0259)	0.1733*** (0.0259)	0.0203 (0.0219)	0.0203 (0.0219)	0.0203 (0.0219)	0.0203 (0.0219)
CEO entrepreneurial skills (log)	0.0522* (0.0287)	0.0690** (0.0276)	0.0287 (0.0287)	0.0690** (0.0276)	0.0061 (0.0173)	0.1187*** (0.0450)	0.0421 (0.0444)	0.0421 (0.0444)	-0.0140 (0.0220)	0.0070 (0.0376)	0.0070 (0.0376)	0.0860** (0.0353)	0.0860** (0.0353)	0.0246 (0.0266)	0.0246 (0.0266)	0.0246 (0.0266)	0.0246 (0.0266)
Logarithm of the days of experience of the CEO	0.1912*** (0.0087)	0.0790*** (0.0069)	0.0790*** (0.0069)	0.1912*** (0.0087)	-0.0095 (0.0084)	0.2188*** (0.0143)	0.0835*** (0.0115)	0.0835*** (0.0115)	0.0006 (0.0106)	0.1758*** (0.0111)	0.1758*** (0.0111)	0.0765*** (0.0086)	0.0765*** (0.0086)	-0.0173 (0.0129)	-0.0173 (0.0129)	-0.0173 (0.0129)	-0.0173 (0.0129)
Number of years in university education (CEO)	0.0979*** (0.0122)	0.0473*** (0.0097)	0.0473*** (0.0097)	0.0979*** (0.0122)	0.0053 (0.0097)	0.0445** (0.0196)	0.0414*** (0.0159)	0.0414*** (0.0159)	0.0059 (0.0118)	0.1299*** (0.0157)	0.1299*** (0.0157)	0.0505*** (0.0122)	0.0505*** (0.0122)	0.0025 (0.0155)	0.0025 (0.0155)	0.0025 (0.0155)	0.0025 (0.0155)
Controls					included				included					included	included	included	included
Constant	0.0466 (0.0545)	-0.0059 (0.0429)	-1.1651*** (0.0482)	-0.7699*** (0.0442)	0.3673*** (0.0984)	0.0250 (0.0874)	-0.0094 (0.0707)	-1.0683*** (0.0777)	-0.0782 (0.2361)	0.0593 (0.0694)	-0.0037 (0.0541)	-1.2231*** (0.0615)	-1.2231*** (0.0615)	0.7726*** (0.1335)	0.7726*** (0.1335)	0.7726*** (0.1335)	0.7726*** (0.1335)
Observations	3644	3644	3644	3644	3644	1358	1358	1358	1358	2286	2286	2286	2286	2286	2286	2286	2286

Standard errors in parentheses.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

singular exception residing in the CTO's technological skills, which showcased a statistically significant variation at the 0.01 level (1.2683 for successful firms versus 1.0561 for unsuccessful ones).

Collectively, these revelations hint at a fascinating inference: the procurement of funds and subsequent fiscal success appears to be largely decoupled from the metric of the C-level team's skill quality. This propels the discourse towards a more nuanced exploration of the myriad factors influencing the financial trajectory of ICO projects, a theme that we shall dissect further in the ensuing discussion chapter.

Table 2 presents the SEM as described in the Methodology section.

The proposed model demonstrates commendable performance, achieving apex values in both the Bayes Information Criterion and the Akaike Information Criterion relative to alternative models with a pruned set of controls. Moreover, the simplification achieved by such alternative models does not vitiate the significance of the pivotal variables, underpinning our assertion that our model epitomizes the most judicious and efficacious analytical framework.

The maiden two columns of our Structural Equation Model (SEM) scrutinize variables influencing CEO management and entrepreneurial skills. Both regressions unambiguously illustrate that education and experience exert a significant impact on these skills. Columns three and four pivot to explore determinants of CEO involvement in other ICOs and their propensity to be founding members. This relational structure, modeled as a Bernoulli process, incorporates the logit function as the link function. Herein, managerial skills emerge as highly significant, while entrepreneurial skills exhibit significance at the 0.1 and 0.05 levels, correspondingly.

Regressions 5 through 8 navigate through determinants influencing CFO skills, their involvement in other ICOs, and their founding member status. Here, both education and experience surface as salient in sculpting managerial and financial skills. Additionally, these skills significantly shape the CFO's involvement in other ICOs, albeit only managerial skills wield influence over their status as founding members. Notably, regressions 7 and 8 employ the Bernoulli process to model the dependent variable.

Extending the analysis to CTOs via regressions 9 through 12, we examine the ramifications of experience and education on skills and the ensuing impact on participation in other ICOs and founding member status. Here, findings closely parallel those encountered for CEOs and CFOs.

Regression 13 amalgamates these elements to probe the determinants of firm growth. Intriguingly, industry and geographic location did not exhibit a substantial linkage to growth, with exceptions noted for the Crypto and Fintech industries and firms located in Central America or non-EU European regions, which demonstrated significance at the 0.05 level. In contrast, the type of currency accepted during the ICO, adherence to a KYC policy, and the maintenance of a whitelist were all positively correlative with growth. Furthermore, the fund quantum raised surfaced as significantly conjoined with growth, as a larger financial corpus facilitates investment in growth trajectories.

Focusing on the core variables, it was discerned that only the CEO's managerial skills exerted a positive, significant impact on growth at the 0.05 level. The remainder of the variables related to the CEO, CFO, and CTO were rendered non-significant. Thus, we extrapolate that ICO growth is directly and positively influenced by the CEO's managerial skills and, indirectly, by their educational and experiential journey.

Table 3 presents the SEM, limited to firms that are successful in securing funds during the ICO.

The elucidated results spanning columns 1 through 12 unveil that the determinants dictating skills, engagements in additional ICOs, and ICO founding memberships portray consistency across CEOs, CFOs, and CTOs, albeit with nuanced discrepancies. Specifically, in the context of the CFO, financial skills do not wield significant influence over participation in alternate ICOs or founding member status. Concurrently, for CEOs, entrepreneurial skills ascend to high significance concerning involvement in other ICOs, yet do not bear significant weight in

Table 6
CFO only.

Variables	Overall						Reaching Soft cap						Not Reaching Soft cap					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	CEO Man	CEO Ent	Growth	CEO part	CEO Founder	CEO Ent	CEO Man	CEO Ent	Growth	CEO part	CEO Founder	CEO Ent	CEO Man	CEO Ent	Growth	CEO part	CEO Founder	Growth
CFO management skills (log)	0.1802*** (0.0057)	0.1002*** (0.0055)	0.0267 (0.0303)	0.7208** (0.0545)	0.7054*** (0.0635)	0.0267 (0.0303)	0.0036 (0.0202)	0.1878*** (0.0093)	0.0103 (0.0130)	0.7935*** (0.0904)	0.7215*** (0.1008)	0.0165 (0.0413)	0.0051 (0.0159)	0.1762*** (0.0072)	0.0975*** (0.0069)	0.6786*** (0.0687)	0.6983*** (0.0821)	0.0292 (0.0446)
CFO Finance skills (log)	0.0750*** (0.0115)	0.1444*** (0.0112)	-0.0309 (0.0318)	0.1445** (0.0629)	-0.1419 (0.0872)	-0.0309 (0.0318)	0.0222 (0.0203)	0.0769*** (0.0181)	0.1630*** (0.0181)	0.1223 (0.1040)	-0.0510 (0.1246)	-0.0528 (0.0400)	0.0313 (0.0258)	0.0728*** (0.0148)	0.1309*** (0.0143)	0.1574** (0.0795)	-0.2338* (0.1265)	-0.0094 (0.0502)
Logarithm of the days of experience of the CFO	0.0045 (0.0125)	0.0010 (0.0122)	0.3235*** (0.0961)	-3.3702*** (0.0945)	-3.9082*** (0.1225)	0.3235*** (0.0961)	0.0036 (0.0202)	0.0036 (0.0202)	0.0036 (0.0202)	-3.4761*** (0.1624)	-3.8360*** (0.1934)	-0.1126 (0.2335)	0.0051 (0.0159)	0.0023 (0.0153)	-3.3120*** (0.1162)	-3.9537*** (0.1583)	-0.0000 (0.1323)	0.7342*** (0.1323)
Control	3644	3644	3644	3644	3644	3644	1358	1358	1358	1358	1358	1358	2286	2286	2286	2286	2286	2286

Standard errors in parentheses.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

determining ICO founding membership.

In Regression 13, which integrates various control variables (omitted here due to spatial limitations), we discern subtle fluctuations in the significance of specific variables: the geographic demarcation of Central America forfeits its significance; Bitcoin (BTC) transitions to non-significance; Ethereum (ETH) secures augmented significance; and within the industrial segments, only consulting sustains its significance. Pivotaly, the core variables reveal a positive correlation between CEO managerial skills and growth, achieving significance at the 0.028 level. However, variables pertinent to the CEO, CTO, and CFO otherwise do not exhibit statistical significance. Cumulatively, the outcome for firms adept at acquiring funds via an ICO accentuates the cardinal influence of CEO managerial skills in spearheading growth trajectories.

Table 4 introduces the SEM limited to firms that are unsuccessful in securing funds during the ICO, specifically those that did not reach the soft cap.

The findings elucidated from columns 1 through 12 reiterate that the determinants, namely skills, involvement in alternative ICOs, and ICO founding membership, maintain shared characteristics across the CEO, CFO, and CTO roles, albeit with minor divergences, especially in the significance of skills for CEOs and CFOs, compared to the holistic dataset.

Regression 13 encompasses several control variables, which, due to spatial limitations, are not detailed herein. Subtle shifts in significance materialize: the non-European Union geographic region relinquishes its statistical weight, Bitcoin (BTC) loses its significance, the employment of common currencies attains newfound significance, and both the fintech and consulting sectors emerge as significant. Intriguingly, none of the core variables manifest significance within this particular context, marking a departure from antecedent findings. In aggregate, for firms that do not meet their soft cap, the diminished growth rate appears impervious to the attributes of the executive ensemble.

4.1. Further analysis

To further scrutinize the impact of CEOs, CFOs, and CTOs on ICO growth, we fine-tuned our initial structural equation model (SEM) to separately integrate each role. The results derived from the SEM that singularly focuses on the CEO's role are detailed in Table 5. Although control variables are incorporated in the estimation, they are omitted from this discussion due to spatial considerations.

The findings are consistent with those procured from SEMs that jointly included all three executive roles. CEO managerial skills persist in being significant across all firms and gain augmented significance when analyzing firms that successfully procure funds through an ICO. In contrast, CEO skills do not assume a significant role in firms that, despite failing to secure funds, persist in their original project. The fact that managerial skills are influenced by education and experience suggests that these factors do not directly drive a firm's growth but indirectly contribute to its expansion by bolstering the CEO's managerial skills.

Table 6 delineates the results pertinent to the CFO.

The outcomes corroborate those obtained from SEMs that simultaneously considered all three executive roles. CFO skills—alongside education, experience, involvement in other ICOs, and founding member status—fail to attain statistical significance. This non-significance prevails when evaluating both successful and unsuccessful subsamples regarding their capability to secure funds.

Lastly, Table 7 outlines the results pertinent to the CTO.

The insights here concur with those extracted from SEMs that amalgamated all three executive roles. The CTO's skills, education, experience, participation in other ICOs, or status as a founding member do not achieve statistical significance in any of the samples. Our analysis robustly underscores the concept that only the CEO significantly influences a firm's growth. Subsequently, we recalculated a markedly simplified version of the CEO model, excising all pathways that do not exhibit significance. These results are presented in Table 8.

Table 7
CTO only.

Variables	Overall						Reaching Soft cap						Not Reaching Soft cap					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO	CTO
CTO management skills (log)	0.1603*** (0.0314)	0.1831*** (0.0344)	0.0173* (0.0178)	0.1603*** (0.0314)	0.1831*** (0.0344)	0.0173* (0.0178)	0.1404*** (0.0103)	0.2651*** (0.0122)	0.1136*** (0.0543)	0.2022*** (0.0479)	0.1136*** (0.0543)	0.0166 (0.0222)	0.1345*** (0.0076)	0.2680*** (0.0088)	0.1275*** (0.0421)	0.2323*** (0.0445)	0.0001 (0.0281)	
CTO technology skills (log)	0.3516*** (0.0245)	0.3062*** (0.0278)	0.0115 (0.0156)	0.3516*** (0.0245)	0.3062*** (0.0278)	0.0115 (0.0156)	0.1404*** (0.0103)	0.2651*** (0.0122)	0.2633*** (0.0430)	0.3150*** (0.0375)	0.2633*** (0.0430)	0.0033 (0.0197)	0.1345*** (0.0076)	0.2680*** (0.0088)	0.3737*** (0.0324)	0.3349*** (0.0364)	0.0325 (0.0249)	
Logarithm of the days of experience of the CTO	0.1372*** (0.0061)	0.2671*** (0.0071)	0.0087 (0.0086)	0.1372*** (0.0061)	0.2671*** (0.0071)	0.0087 (0.0086)	0.1404*** (0.0103)	0.2651*** (0.0122)	0.0430 (0.0110)	0.0375 (0.0076)	0.0430 (0.0110)	0.0015 (0.0076)	0.1345*** (0.0076)	0.2680*** (0.0088)	0.0324 (0.0134)	0.0364 (0.0134)	0.0102 (0.0134)	
Number of years in university education (CTO)	0.0574*** (0.0106)	0.0675*** (0.0124)	-0.0012 (0.0114)	0.0574*** (0.0106)	0.0675*** (0.0124)	-0.0012 (0.0114)	0.0360*** (0.0172)	0.0671*** (0.0202)	0.0678*** (0.02379)	0.0731*** (0.0320)	0.0678*** (0.02379)	-0.0000 (0.0138)	0.0731*** (0.0135)	0.0678*** (0.0156)	0.0678*** (0.0190)	0.0678*** (0.0190)	-0.0016 (0.0190)	
Controls			included			included						included					included	
Constant	0.0184 (0.0270)	0.0305 (0.0315)	-0.3189*** (0.0992)	0.0184 (0.0270)	0.0305 (0.0315)	-0.3189*** (0.0992)	0.0303 (0.0492)	0.0517 (0.0580)	-2.3130*** (0.1136)	-1.9284*** (0.0978)	-2.3130*** (0.1136)	-0.0849 (0.2379)	0.0125 (0.0320)	0.0198 (0.0371)	-2.2852*** (0.0836)	-2.7472*** (0.1002)	0.6877*** (0.1367)	
Observations	3644	3644	3644	3644	3644	3644	1358	1358	1358	1358	1358	1358	2286	2286	2286	2286	2286	

Standard errors in parentheses.
 *** p < 0.01.
 ** p < 0.05.
 * p < 0.1.

The refined model reinforces our preliminary findings related to the impact of CEO managerial skills. Notably, in this context, the status of being a founding member achieves significance, implying that a CEO's entrepreneurial trait—evident through founding member status—can also catalyze firm growth. Given that being a founding member is impacted by CEO skills, it can be inferred from the simplified model that CEO skills promote growth both directly and indirectly, with the latter occurring through the vector of founding member status. However, when the dataset is bifurcated, the variable of being a founding member reverts to a state of non-significance.

A sequence of additional tests was conducted to fortify our findings. Initially, we integrated controls for pivotal events, such as the Covid-19 pandemic and the transition in the US administration from Trump to Biden. Earlier occurrences, such as the transition from the Obama to Trump administration and the Brexit referendum, were deemed too premature to exert influence on the firms in our dataset. Remarkably, our results steadfastly maintained their qualitative similarity, resisting alterations from these adjustments.

Following this, acknowledging that all firms possess a CEO, we revisited our model utilizing net data. Once again, the findings echoed the original outcomes. Furthermore, we reevaluated our model, omitting the top-tier roles, and as anticipated, these results mirrored those procured when these roles were incorporated.

Conclusively, one might suggest that the dynamic trajectory of growth might exert more influence than sheer growth. To probe this hypothesis, we constrained our analysis to firms established post-01/01/2018. This permitted a detailed examination of growth dynamics, especially in relation to personnel, amongst the most nascent firms within our sample (a total of 648 firms). Intriguingly, the outcomes remained harmonious with the original dataset, suggesting marginal variances in growth determinants between fledgling firms and their more established counterparts.

5. Discussion

Delving into the rich, multifaceted sphere of high-tech ventures' scalability, managerial proficiency at the C-level (Singer, 1995; Thompson et al., 1996; Sapsed et al., 2002; Brinckmann et al., 2011; Ortu et al., 2017; MacMillan and Day, 1987; Mullins, 1996; Sapienza and Grimm, 1997; Almus and Nerlinger, 1999; Barringer et al., 2005), and the tactical employment of Initial Coin Offerings (ICOs) as a financial strategy, our comprehensive study illuminates critical, and at times paradoxical, insights into the propellants and impediments of scaling within born-digital firms, providing a nexus between intricate managerial skills and organizational growth trajectories through the growth in the number of employees (Gulati and DeSantola, 2016; Schulte-Althoff et al., 2021). Utilizing a robust dataset of 1978 C-level profiles from 3644 tech companies, this exploration resonates with numerous scholarly dialogues emphasizing the quintessential necessity for a nuanced understanding of scaling, especially through digital technologies and financial machinations (Huang et al., 2017; Piaskowska et al., 2021; Giustiziero et al., 2021; Reuber et al., 2021).

Our empirical inquiry, which aligns and occasionally deviates from existing literary frameworks, underscores the prominent role of CEO managerial skills in directly influencing and ostensibly amplifying the scaling capacity of born-digital firms that strategically leverage ICOs as a pivotal fundraising mechanism (Gulati and DeSantola, 2016; Schulte-Althoff et al., 2021). Particularly, CEOs emerge not merely as administrative entities but as crucial catalysts, potentially converging their strategic foresight and leadership proficiency to adeptly maneuver through the dynamic challenges intrinsic to the tech industry and particularly, scaling ventures.

This study unravels a surprisingly diminished influence of CTOs and CFOs on scalability post-ICO, an observation that diverges from the commonly perceived imperative nature of technological and financial leadership in navigating a tech venture's scaling journey (Cetindamar

Table 8
CEO - parsimonious.

Variables	(1)	(3)	(2)	(5)	(7)	(6)	(9)	(11)	(10)
	Man Skills	Founder	Growth	Man Skills	Founder	Growth	Man Skills	Founder	Growth
CEO management skills (log)		0.1832*** (0.0205)	0.0248** (0.0122)		0.1995*** (0.0335)	0.0325** (0.0153)		0.1733*** (0.0259)	0.0202 (0.0192)
ICO with Whitelist			0.0718 (0.0501)			0.1452** (0.0647)			-0.0172 (0.0756)
ICO implementing Know Your Customer			0.3290*** (0.0556)			0.3020*** (0.0725)			0.3624*** (0.0825)
ICO implementing Minimum Viable Product			0.0348 (0.0520)			0.0825 (0.0674)			-0.0097 (0.0778)
Pre ICO sale			0.0607 (0.0451)			-0.0162 (0.0583)			0.1299* (0.0677)
ICO offering bonus			0.0093*** (0.0030)			0.0062 (0.0131)			(0.0698)
Logarithm of total funds raised			0.0006 (0.0024)			0.0072*** (0.0027)			-0.0175*** (0.0048)
Google searches on ICO			-0.0867* (0.0449)			-0.0764 (0.0556)			-0.0718 (0.0705)
CEO is a founder member				0.2188*** (0.0143)			0.1758*** (0.0111)		
Logarithm of the days of experience of the CEO	0.1912*** (0.0087)			0.0445** (0.0196)			0.1299*** (0.0157)		
Number of years in university education (CEO)	0.0979*** (0.0122)	0.0690** (0.0276)			0.0421 (0.0444)			0.0860** (0.0353)	
CEO entrepreneurial skills (log)	0.0466 (0.0545)	-0.7699*** (0.0442)	0.4002*** (0.0605)	0.0250 (0.0874)	-0.7736*** (0.0732)	0.2464 (0.2036)	0.0593 (0.0694)	-0.7684*** (0.0555)	0.7247*** (0.0940)
Constant									
Observations	3644	3644	3644	1358	1358	1358	2286	2286	2286

Standard errors in parentheses.

- *** p < 0.01.
- ** p < 0.05.
- * p < 0.1.

and Pala, 2011; Deligianni et al., 2019; Zhu, 2020; Pundziene and Geryba, 2023), especially subsequent to funding (Mullins, 1996; MacMillan and Day, 1987). Hypotheses 2 and 3, which postulated a direct correlation between elevated CTO and CFO skills and company scaling, respectively, found no substantial backing in our findings for both company categories, suggesting a conspicuous departure from expectation and thus seeding avenues for further intricate exploration.

The nuanced complexity of this leadership dynamic (Siepel et al., 2017) becomes particularly pertinent in the context of ICOs, given their interweaving with blockchain technology, market fluctuations, investor psychology, regulatory frameworks, and the global economic environment. While previous research has explored various dimensions of scaling and ICOs independently, addressing aspects such as global scaling, social enterprise scaling in specific geographies, and the influence of digital technologies (Birkinshaw, 2022; Autio and Zander, 2016; Monaghan et al., 2020), an integrative exploration specifically scrutinizing scaling post-ICO, as endeavored in our study, introduces novel narratives into our understanding of organizational dynamics.

Notwithstanding their seemingly muted impact on scalability, it's pivotal to note that the potential influences of CFOs and CTOs might permeate realms beyond overt scalability, thereby contributing towards other facets like operational efficiency, technological innovation, financial risk mitigation, and regulatory adherence. This possibility, albeit with less direct visibility, might play a critical role in stabilizing and subtly steering the firm's scaling trajectory, hinting at a complex, multi-layered interplay of C-level roles in navigating the intricate path of organizational growth and stability.

Our findings pave the way for burgeoning research opportunities, such as exploring the potential overshadowing or compensatory dynamics between CEO roles and other C-level positions in contexts of scalability and growth post-ICO. This opens up a kaleidoscopic perspective towards understanding the multifaceted and dynamically evolving patterns of organizational dynamics and leadership interplay in

the scaling journey of high-tech ventures, particularly in light of the ICO as a substantial financial fulcrum.

In retrospect, the CEO's enhanced role in bolstering a firm's scaling capacity, particularly post-funding, could serve as a pivotal inquiry point for understanding why certain digital-born firms either flounder or conspicuously succeed in their scaling endeavors, forging a pathway for future investigations and practical implications in technology management and entrepreneurial leadership. The dichotomy between CEO skill levels and the triumph or tribulation of digital-born firms in their scalability sojourn might hence offer a fertile ground for ensuing scholarly dialogues and empirical investigations (Kutcher et al., 2014; Scale up Europe, 2016; Birkinshaw, 2022; Stallkamp et al., 2022; Gulati and DeSantola, 2016).

6. Conclusion

In the contemporary era, where technological advances perpetually reconfigure organizational landscapes, particularly in the digital-born firm sector, the present study meticulously investigates the pivotal interplay between managerial expertise and organizational growth, anchoring its exploration in an empirical foundation of 1987 C-level profiles across 3644 technology companies. Bridging seminal works from the realm of technology management and scaling literature (Singer, 1995; Thompson et al., 1996; MacMillan and Day, 1987, etc.) with a novel focus on Initial Coin Offerings (ICOs) as a fundraising avenue, this research transcends typical investigations, meticulously addressing biases by examining both successful and unsuccessful ICO campaigns.

Contrary to prevalent assumptions in extant literature, our findings, illuminated through the nuanced application of structural equation modeling, suggest a notably nuanced role of Chief Technical Officers (CTOs) and Chief Financial Officers (CFOs) in steering the scalability of firms post-ICO, an insight that intriguingly diverges from dominant

scholarly and industry narratives. Notably, Chief Executive Officers (CEOs) emerge, not merely as managerial figureheads but as crucial architects deftly piloting the scalability ventures of digital-born firms, especially in the aftermath of ICO funding, their strategic foresight and leadership prowess being identified as paramount catalysts in maneuvering through the intricacies of technological innovation and financial strategy.

This notable centrality of CEO competencies, particularly in post-ICO contexts, illuminates a multi-faceted conundrum, spotlighting why their strategic and visionary prowess is ostensibly augmented in such a unique fundraising milieu, while the technical and financial aptitude traditionally associated with CTOs and CFOs doesn't permeate with equivalent impact on scalability trajectories. Herein lies a multitude of avenues for future scholarly exploration and theory expansion, probing into other organizational facets subtly navigated by CTOs and CFOs, such as operational efficiency, technological innovation, or financial and regulatory compliance, which might not directly catalyze visible scaling but contribute indispensably to the firm's sustainability and evolutionary journey.

Simultaneously, the study opens a Pandora's box of implications for practitioners, especially investors and C-suite managers, who navigate the turbulent waters of technological firm scalability post-ICO. The proffered insights suggest that the capabilities and proficiency of CEOs, especially their visionary and strategic acumen, should be of paramount consideration in investment decisions and managerial strategies, particularly within the high-risk ICO environment.

However, the light cast by this study, while illuminating, does not claim to thoroughly elucidate the entirety of the complexities intertwined in managerial expertise and organizational scaling. It gestures towards a horizon teeming with unanswered questions and untapped potential for further exploration, which could dissect specific attributes of CEO skills that are vital in post-ICO scaling or understanding how the roles and influence of CTOs and CFOs may shift through various scaling phases. Furthermore, the study acknowledges its limitations, including the potential for additional analysis on a larger or alternative dataset, restricted generalizability due to the specific high-tech context, and a dearth of control variables related to financial performance and other scaling indicators owing to data constraints.

In essence, this exploration constructs a foundational stone, a platform upon which future scholarly and practical endeavors can be erected, pursuing the continuous unravelling of the multifaceted relationship between managerial expertise and organizational scaling within the vibrant realm of technology ventures, thereby contributing to the ever-expanding tapestry of knowledge in this pulsating domain.

CRedit authorship contribution statement

We equally contributed to all parts of the paper.

Data availability

The authors do not have permission to share data.

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Johannes Gartner is a post-doctoral researcher at Lund University, Sweden. Johannes holds a PhD in Social and Economics Science from the Johannes Kepler University Linz, a

Diploma in Computer Science from UAS Mittweida, Germany, a Master of Business Administration from WU Vienna University and a Master in Arts and Business in Information Security Management from University of Applied Sciences Upper Austria (Campus Hagenberg). His research was published in Journals such as *Journal of Business Ethics*, *Technological Forecasting and Social Change*, *Journal of Business Research* and *Journal of Small Business Management*.

Andrea Moro worked for fifteen years as senior financial advisor for SMEs in a consulting firm completely owned by a group of Italian small local banks. In that role, he advised small and medium sized firms on financial topic during the start-up stage, major investments as well as during turnaround. The role implied the analysis of the financial soundness of projects, the setting up of budgets, the support to firms' management during negotiations with investors and banks. He moved to the academia in 2008 firstly joining The Open University Business School where he taught finance modules in the MBA and in 2010 University of Leicester School of Management. In 2014, he joined Cranfield University where he currently teaches Finance to the Full Time MBA students and Entrepreneurial Finance to the MSc Finance students. He is currently non-executive member of the board of directors of two real estate development firms in Italy and member of governing body of two schools in Milton Keynes. In addition, he advises a leading Italian insurance company about CSR and Corporate social responsibility reporting. Andrea Moro's research interests are mainly on firms – bank lending relationship. He investigates issues firms face accessing credit, what can reduce the information asymmetry between firms and banks and the role of soft factors such as trust in the lending relationships. In addition, he is interested in small firms' capital structure and its optimisation as well as small business financial planning.