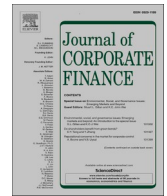




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Is equity crowdfunding always good? Deal structure and the attraction of venture capital investors

Vincenzo Buttice^{a,*}, Francesca Di Pietro^b, Francesca Tenca^a

^a School of Management, Politecnico di Milano, Via Lambruschini 4/b, Milano 20156, Italy

^b Trinity Business School, Trinity College Dublin, the University of Dublin, Dublin, Ireland

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ABSTRACT

This paper provides evidence that equity crowdfunding has implications for firms long after the capital raised through the campaign is injected. Using a unique dataset of 290 firms that successfully fundraised via the two most prominent UK equity crowdfunding portals, we examine how different shareholder structures, namely the nominee vs. the direct shareholder structure, affect the attraction of venture capital financing. From the comparison with a control group of twin firms that did not receive any external seed financing, we find that a successful equity crowdfunding campaign facilitates the attraction of VC financing. This association is stronger for equity crowdfunding campaigns with a nominee shareholder structure, while it results weaker when the direct shareholder structure is chosen. Compared to a different control sample of angel-backed firms, receiving equity crowdfunding through a nominee structure facilitates the attraction of VC financing.

1. Introduction

In the last ten years, equity crowdfunding has become an established source of funding (Hornuf and Schwiendbacher, 2018) for entrepreneurial firms (Cumming et al., 2016). Hand in hand with its growing role for early-stage financing, equity crowdfunding has also gained momentum in the academic community. The seminal articles on this topic have mainly focused on the factors associated with the success of crowdfunding campaigns (see e.g., Vismara, 2016b; Ahlers et al., 2015; Piva and Rossi-Lamastra, 2018; Lukkarinen et al., 2016; Mahmood et al., 2019; Ralcheva and Roosenboom, 2016; Bapna, 2017; and Mochkabadi and Volkmann, 2018 for a review). Only recently, several studies have started to investigate the aftermath of launching an equity crowdfunding campaign for entrepreneurial firms (see for a review Vanacker et al., 2019; Ahlstrom et al., 2018). Within this debate a few studies focus on crowd investors' post-campaign contribution. Di Pietro et al. (2018) showed that crowd investors provide entrepreneurs with two main types of input: knowledge (product, strategy, and market-related), and network ties with industry players and other relevant stakeholders. Related to this study, Walthoff-Borm et al. (2018a) moves from the idea that, through crowdfunding, entrepreneurs can access *extra-financial resources*, such as feedback and direct involvement (i.e., ties) by crowd investors. Contrary to expectation, they show that equity crowdfunded firms exhibit lower financial performances and have significantly higher failure rates. Hornuf et al. (2018) find a similar result, they report that German equity crowdfunded firms have a higher likelihood of failure. They further demonstrate that the hazard of failure increases with the valuation of the firm, while decreases with the amount raised during the crowdfunding campaign.

* Corresponding author.

E-mail addresses: vincenzo.buttice@polimi.it (V. Buttice), francesca.dipietro@tcd.ie (F. Di Pietro), francesca.tenca@polimi.it (F. Tenca).

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Within the research stream on firms' performance after an equity crowdfunding campaign, only a few studies have investigated the relation between crowdfunding and follow-on financing. Moreover, this literature is far from being conclusive, actually, the results are often diverging. Signori and Vismara (2018) find that 34.9% of the companies that obtained equity crowdfunding raised additional funding, either in the form of private equity injection (9%) or follow-on offering on a crowdfunding platform (25%). Hornuf et al. (2018) show that firms that received equity crowdfunding register a higher chance of obtaining follow-on financing by business angels or venture capitalists. Drover et al. (2017) show that VC have a higher willingness to conduct due diligence on firms that raised reward-based crowdfunding,¹ but they do not find any association for firms raising equity crowdfunding. Also, a recent study by Cumming et al. (2019) contributes to this debate, by looking at the ownership structure of firms seeking equity crowdfunding. They found that a higher separation between ownership and control rights lowers the likelihood of attracting professional investors.

Besides some contrasting results, none of these studies have examined directly how different shareholder structures (Walthoff-Borm et al., 2018a) affect firms' capacity to obtain follow-on investments from professional investors and, in particular, venture capitalists, after an equity crowdfunding campaign. We believe this omission has significant implications. Equity crowdfunding may represent a valuable signal that reduces professional investors' information asymmetries. However, crowd investors' involvement after an equity crowdfunding campaign may also generate governance issues (Cumming et al., 2019) and agency conflicts with potential follow-on investors. We argue that the relevance of coordination problems and agency conflicts varies depending on the shareholder structure chosen for the equity crowdfunding offering. We expect high agency conflicts vis-a-vis follow-on professional investors for firms that received equity crowdfunding through a direct shareholder structure, wherein crowd investors become direct shareholders. These conflicts may off-set the signaling value of having received equity crowdfunding. On the contrary, we argue that potential agency conflicts with follow-on professional investors are lower for firms that chose a nominee structure,² wherein the equity crowdfunding platform holds and manages firm's shares on behalf of the crowd investors. Thus, in this case, the signaling value of crowdfunding holds.

This paper adds to the literature on follow-on financing by venture capitalists (VCs) after an equity crowdfunding campaign by investigating how the functioning of different shareholder structures affects the investment patterns following the campaign. Particularly, we aim at answering the following research questions: *i) How does having received equity crowdfunding affect the attraction of VC financing? ii) How does the shareholder structure of the crowdfunding campaign affect the attraction of VC financing?*

We investigate these research questions using a comprehensive dataset of firms that raised financing from the two largest equity crowdfunding platforms in UK: Seedrs and Crowdcube, between 2011 and 2018. Through a Cox survival model (Cox, 1972), we analyze whether and how equity crowdfunding facilitate the reception of follow-on VC financing. We compared equity crowdfunded firms with two different control groups. The first control group consists of firms from the same industry and age that did not receive any external seed financing, but were similar in terms of size, geographical location, and debt structure. Secondly, we compared equity crowdfunded firms against those that received seed financing from business angels.

The empirical analysis delivers key results, which can be summarized as follows. First, from the comparison with the control group of firms that did not received any seed financing, we found a positive association between equity crowdfunding and the reception of follow-on VC financing. We found that this association is stronger for equity crowdfunding campaigns with a nominee shareholder structure, while it is weaker when the direct shareholder structure is chosen. Second, compared to angel-backed firms, receiving equity crowdfunding through a nominee shareholder structure positively affects the attraction of follow-on VC financing.

This paper unfolds as follow: in Section 2, we describe the research setting and the direct vs. nominee shareholder structure. In Section 3, we formulate hypotheses on the association between shareholder structure and the attraction of VCs follow-on investment. In Section 4, we describe the material and methods, and Section 5 describes the empirical results. Finally, section 6 concludes the paper.

2. The research setting

2.1. Equity crowdfunding in the United Kingdom

The United Kingdom (hereafter UK) is, by far, the largest and fastest growing equity crowdfunding market in Europe, both in term of number of campaigns and capital raised (Cambridge Centre for Alternative Finance, 2018). This market accounted for nearly 40% of the global equity crowdfunding market in 2016 (Walthoff-Borm et al., 2018a) and represented 73% of the European market in 2017 (Cambridge Centre for Alternative Finance, 2019). Using data from the UK entails a number of advantages for researchers. First, being the largest market in the world, it provides enough firms that successfully raised equity crowdfunding. Also, other countries (e.g. France and Italy) have specific regulation allowing equity crowdfunding, however, in those countries the funding volume is significantly lower both in terms of number of campaigns and capital raised (Vismara, 2016b). Hence, using data from those countries would result in limited samples for conducting econometric analysis. Second, the UK regulatory framework allows equity crowdfunding platforms to operate through both a direct and a nominee shareholder structure. While this is possible also in other countries (e.g.

¹ The positive association between crowdfunding and follow-on financing finds confirmation in the context of reward-based crowdfunding in a study by Roma et al. (2017), who highlight that firms that collected a large amount of funding from reward-based crowdfunding have increased chances of receiving subsequent funding by venture capital when this information is complemented by the presence of patents or a large network of social ties. Still in the reward-based crowdfunding context, Colombo and Shafi (2019), find that the amount of extra financing received during the campaign affect the odds of receiving external equity in the aftermath of the campaign.

² Occasionally, direct and nominee structure have been referred as individual and pooled voting rights (Rossi et al., 2019).

Germany, see [Hornuf and Schwienbacher, 2018](#)), again the low number of campaigns launched in these countries would not allow to test our research questions. Third, the focus on the UK provides sufficient accounting data on small, privately held firms ([Walthoff-Borm et al., 2018a](#)). This information is crucial for our purposes, both to characterize the firms in our sample and to create a proper control group. Fourth, by focusing on a single country, we are able to rule out confounding effects at the country-level, such as differences in the regulatory and institutional framework ([Di Pietro and Buttice, 2020](#)). For instance, start-ups' investors in the UK benefit from a substantial tax incentive via the Seed Enterprise Investment Scheme (SEIS) and the Enterprise Investment Scheme (EIS). Both schemes offer a generous tax relief on equity investments in UK-based start-ups, providing a unique financing opportunity for entrepreneurs and investors to support the local entrepreneurial ecosystem. Finally, the UK setting has been used by many prior studies (e.g. [Signori and Vismara, 2018](#); [Vismara, 2016b](#); [Walthoff-Borm et al., 2018a](#); [Cumming et al., 2019](#)), thus it facilitates the comparison of our results with prior research.

Among the reasons of the development of the equity crowdfunding market in the UK, scholars identify the regulatory framework adopted by the government ([Steinhoff, 2015](#)). This body of rules, which is currently defined by the FCA's Policy Statement PS14/4 ([Cumming et al., 2019](#)), together with the 2006 Companies Act, gives shareholders particular rights. For instance, any shareholder who owns at least 5% of the total voting rights can call a general meeting³ ([Walthoff-Borm et al., 2018a](#)). Shareholders representing at least 5% of total voting rights can also ask the firm to produce a written document providing details on specific matters. Moreover, shareholders owning more than 10% of company shares have the right to prevent a general meeting from being held and they can force the firm to have its financial accounts audited. However, this set of measures, which is meant to increase transparency towards minority shareholders and, ultimately, to facilitate control, requires shareholders to hold a sufficiently large stake and does not always apply to crowd investors, but they may become relevant when shareholders are organized through the nominee shareholding structure (see next paragraph 2.1).

2.2. Equity crowdfunding shareholder structure

In the evolving equity crowdfunding market, platforms mostly offer two alternative shareholder structures to firms that successfully manage to raise funding ([Cumming and Wright, 2017](#); [Hornuf and Schwienbacher, 2018](#)). These are the direct and the nominee shareholder structure.

The direct shareholder structure allows crowd investors to become direct shareholders of the firm. With the direct shareholder structure, crowd investors receive shares with voting and preemptive rights when they invest equal to or beyond a predetermined threshold set by the entrepreneur, while they receive shares without voting and preemptive rights when they invest below such threshold ([Cumming and Wright, 2017](#)). Prior literature has shown that the large majority of crowd investors (75%) indeed hold voting and preemptive rights ([Signori and Vismara, 2018](#)).

The alternative to the direct shareholder structure is the nominee shareholder structure, wherein the crowd is represented by one legal shareholder (i.e., the nominee) that holds the shares on behalf of the crowd investors. With the nominee shareholder structure, crowd-funded firms sign a contract with the platform, which takes votes and issues consent on behalf of each individual investor. This means that the platform is the only legal shareholder declared in the shareholders' register of the firm.

The nominee is authorized to take decisions on a variety of matters at general meetings, such as company liquidation, issue of ordinary and preference shares, transfer of company assets, loans application, managerial salary increase above an agreed level, etc. ([Cumming et al., 2019](#)). On the one hand, with the nominee structure, shareholders benefit from a coordinated effort to monitor and enforce their rights. In terms of economic benefits, investors maintain the right to participate to dividend distribution and keep fiscal advantages (e.g., tax reliefs) related to the investment. On the other hand, under this structure, firms do not need to coordinate the management of their crowd investors on their own, such as organizing large corporate events, or worry about the attendance quorum at general meetings. The nominee is also granted special rights, i.e. preemptive rights, drag along and tag along rights. For instance, the nominee has the power to waive crowd-investors' preemptive rights if it is in the best interest of the company, such as a decision concerning a new investment round at a significantly higher valuation under time pressure. Typically, shares offered during the campaign are overall above 10%, thus granting the nominee the power to exert control (e.g. financial auditing) on the invested firm. Instead, one major pitfall of the nominee shareholder structure is the reduced possibility for entrepreneurs to reach out to their investors for advice, networking and mentoring ([Dharwadkar et al., 2000](#)).

One well known platform that offers direct shareholder structure is Crowdcube ([Walthoff-Borm et al., 2018b](#)). However, since Fall 2016, the platform introduced also the possibility for firms to opt for the nominee shareholder structure. Therefore, nowadays both options – direct and nominee structure – are available for firms fundraising via Crowdcube. Seeds is the largest UK equity-based platform that adopts the nominee shareholder structure. Both platforms do not charge any management fee for acting as nominee.

3. Hypotheses

3.1. Equity crowdfunding as a signal of venture quality

In making investment decisions, VCs face substantial information asymmetries associated with the discerning of firm quality.

³ In United Kingdom, under the 2006 Companies Act, privately held firms are not required to hold an annual general meeting.

Young entrepreneurial ventures have usually limited track record, high intangible assets (especially high-tech ventures), lack internal funds and have low debt capacity (Carpenter and Petersen, 2002), which makes it challenging for traditional investors to apply proper and effective screening. Indeed, the level of information asymmetry is very high as well as the risk of moral hazard behavior of the entrepreneur (Ahlers et al., 2015; Vismara, 2016a), who might not provide the appropriate level of effort in the venture and/or not pursue the project maximizing return for investors (Amit et al., 1998; Bergemann and Hege, 1998; Strausz, 2017).

Nevertheless, information asymmetries could be reduced by signals that allow potential investors to infer the quality of the firm (Spence, 1973; Dewally and Ederington, 2006; Connelly et al., 2011). VCs are known to rely on signals to differentiate between high- and low-quality firms during their selection process (Baum and Silverman, 2004; Bertoni et al., 2015; Puri and Zarutskie, 2012). For instance, patents (Hsu and Ziedonis, 2013), entrepreneur's education (Davidsson and Honig, 2003), top management team characteristics (Baum and Silverman, 2004; Hsu, 2007), board governance (Sanders and Boivie, 2004), and venture's affiliations (Plummer et al., 2016) are used as signals by VCs.

Signaling theory has been applied also in the context of crowdfunding. Prior studies have demonstrated the importance of signals sent by entrepreneurs to small investors for the success of the crowdfunding campaign (Bapna, 2017; Ahlers et al., 2015; Kim and Viswanathan, 2018; Bernstein et al., 2017; Allison et al., 2015; Courtney et al., 2017; Steigenberger and Wilhelm, 2018). A couple of studies have also showed that crowdfunding may work as a signal for other investors. Vismara (2016b) find that early-bird investors in an equity crowdfunding campaign attract a large number of late crowd investors, while Drover et al. (2017) find, in an experimental setting, that crowdfunding performance influences VCs' screening decisions and willingness to conduct due diligence.

We propose that equity crowdfunding, aside being a channel to raise funds to kickstart early-stage firms (Walthoff-Borm et al., 2018a), represents a signal of firm quality for subsequent potential investors for a number of reasons. First, with a successful crowdfunding campaign, the firm has reached a first investment milestone, the entrepreneur has demonstrated her ability to design and manage the campaign (i.e., she was able to set a proper target capital and equity stake offered). Moreover, crowdfunding performance represents also a validation for future market demand. Considering that, on average, successful equity crowdfunding campaigns attract between 150 and 500 investors per offering (Di Pietro et al., 2018; Vismara, 2016a), a successful campaign establishes a tangible estimate of the business potential market (Vismara, 2016a). If this is the case, compared to ventures receiving no seed external capital support, we expect that a successful equity crowdfunding round will act as a positive signal for VCs. Thus, we posit:

H1a. Having successfully raised funds via equity crowdfunding facilitates obtaining follow-on VC financing compared to not having received external seed equity financing.

We have argued that equity crowdfunding enables to reduce information asymmetries surrounding venture quality concerning both the entrepreneur's ability and business market appeal. However, we should consider that crowd investors evaluate investment opportunities often based on personal knowledge, passion and personal interests, geographical proximity, and peer influence (Agrawal et al., 2015; Lee and Lee, 2012; Zhang and Liu, 2012; Croce et al., 2018; Tenca et al., 2018) and do not rely on a formal and structured evaluation process based on firm's potential financial returns (Cholakova and Clarysse, 2015; Fisher et al., 2017). On the contrary, other early stage investors, such as business angels, are more likely to make investment decisions in a similar way as VCs (Fisher et al., 2017). Indeed, they look at financials to evaluate business opportunities (Croce et al., 2017) and they invest with the aim of obtaining a personal economic return (Van Osnabrugge, 2000). Because of their different decision-making process, we argue that business angels and crowdfunding are very different signals for VCs. We explain this more in depth in the following paragraphs.

Angels are high-net worth individuals, often former successful entrepreneurs, who invest their own money in exchange for minority stakes of young ventures (Wetzel Jr, 1981). The angel investment process is well articulated and takes time (Van Osnabrugge, 2000; Hsu et al., 2014). During this process, angels often have the possibility to access additional information about the firm. Indeed, before a deal is completed, they obtain information from their personal network of contacts, have frequent meetings with founders, analyze the financials in depth, examine the business plan and conduct due diligence (Maxwell et al., 2011; Croce et al., 2017). Moreover, angel investors have both significant investment and industry experience (Mittens et al., 2012), and, by actively getting involved in the company, have the possibility to monitor the development of the project reducing the risk of adverse selection for follow-on investors. For these reasons business angels are capable to reduce the information asymmetries surrounding the venture.

On the other hand, crowdfunding investors have limited information and limited time to assess the business (online campaigns last 60 days on average), entrepreneurs are often reluctant to disclose sensitive information online due to confidentiality, and crowdfunding investors rarely have the opportunity to meet the firm's founders (Di Pietro et al., 2018). Moreover, the small amount invested during the campaign does not justify an extensive due diligence, which implies high fixed costs (Ahlers et al., 2015).

Thus, we argue that angel investment is considered by VCs as a superior signal that can be used to reduce information asymmetries, and we posit that:

H1b. Having successfully raised funds via equity crowdfunding hinders obtaining follow-on VC financing compared to having received angel financing.

3.2. Direct and nominee shareholder structure and the attraction of VC financing

As described in Section 2.1, crowd investors may be managed through two different shareholder structure, i.e., the direct and the nominee shareholder structure.

In the direct shareholder structure, firms deliver individual voting rights to each investor based on the number of shares acquired,

whereas in the nominee structure the crowd is represented by one legal shareholder (i.e., the nominee), who gives the consent to major decisions on behalf of all individual shareholders.

Platforms operating through a direct shareholder structure do not intermediate the relationship between the entrepreneurs and crowd investors. This may become onerous for the entrepreneurs, who need to directly coordinate with them. On average, a crowdfunding campaign has 333 crowd investors, of which 205 are entitled to vote, i.e. 75% of the crowd base (Signori and Vismara, 2018). Hence, crucial corporate events, such as follow-on rounds of financing, director election, recapitalization, sale of significant assets, or managerial salary increase that require shareholders' approval, are more complex to implement under the direct shareholder structure. Similarly, closing a follow-on round of financing would need each crowd investor to sign and return a document to the firm. Some shareholders may be quite inactive (i.e. they are not interested in participating to corporate events) and therefore may have to be contacted repeatedly to get their approval. In addition to increased coordination problems, it is more difficult for entrepreneurs to reach an agreement with many shareholders – having potentially misaligned interests – and close the financing deal.

Considering more closely the VC side, the direct shareholder structure may cause agency conflicts between the VC and crowd investors each time the interests of VC shareholders are not aligned with those of crowd investors (Fisher et al., 2017). This may happen in decisions related to the reception of a new follow-on investments and exit. Indeed, compared to a VC, the lower expertise (Ahlers et al., 2015) and the potentially diverging goals of crowd investors (Fisher et al., 2017), may make the latter less equipped to assess the potential and long-term benefits of such strategic decisions and may induce the firm to make suboptimal choices. Under these conditions, the VC may anticipate these agency costs, and thus avoid to finance the start-ups that selected the direct shareholder structure.

In contrast, the nominee shareholder structure avoids the drawbacks associated with having a dispersed ownership. First, the nominee shareholder structure lowers coordination costs: entrepreneurs only need to interact with the platform, instead of their entire investor-base (Walthoff-Borm et al., 2018a; Cumming et al., 2019). Obtaining shareholders' approval becomes faster and cheaper for firms, because the process is managed directly by the platform, by mean of a purpose-built software, which centralizes the investors' polling process for all crowd-funded firms. By reducing coordination costs between the firm and the crowd investors, we argue that the nominee shareholder structure will result more appealing for a VC interested in investing in the firm. Since it streamlines the decision-making process on many crucial corporate events, including the reception of a follow-on investment, the nominee shareholder structure helps a VC interested in investing in the firm after the equity crowdfunding campaign to close the deal faster. This reduction of frictions, of course, also facilitates the investments by other professional investors at later stages. Thus, under the nominee shareholder structure, VCs will be less concerned about the firm's ability to obtain the additional financial resources needed to scale-up and they will be more inclined to invest.

Moreover, the nominee shareholder structure reduces agency problems among VCs and crowd investors, which may arise when the interests of VC investors are not aligned with those of crowd investors (Fisher et al., 2017).⁴ It is widely accepted in corporate governance literature that concentrated ownership – associated with a nominee structure – reduces agency costs and, as such, results in improved firm performance (e.g. Barry et al., 1990; Jensen and Meckling, 1976; Shleifer and Vishny, 1997). The CEO of Seedrs confirms this argument in a few public interviews.⁵ The nominee has the power to by-pass the crowd, for instance waiving crowd investors' preemptive rights in case of a potentially advantageous follow-on investment by a professional investor or an exit opportunity. A similar argument is reported on Crowdcube official webpage.⁶

All considerations presented above suggest that the nominee shareholder structure implies a reduction of both coordination costs and agency costs between the crowd investors and the VC, compared to the direct shareholder structure. Since, in making an investment decision the VC may ponder the positive signal of raising equity crowdfunding with its coordination and agency costs, we can expect a preference towards the nominee shareholder structure. Accordingly, we posit that:

H2a. Compared to firms that did not receive external seed equity financing, the positive association between raising equity crowdfunding and follow-on VC financing is stronger for firms that use a nominee shareholder structure than for firms that use the direct shareholder structure.

H2b. Compared to angel-backed firms, the negative association between raising equity crowdfunding and follow-on VC financing is weaker for firms that use a nominee shareholder structure than for firms that use the direct shareholder structure.

4. Material and methods

4.1. Data sources and sample

We combined data from multiple sources. First, we used Crowdcube and Seedrs websites to identify and collect data on companies that successfully raised funds via these two equity crowdfunding platforms, between 2011 and March 2018. Crowdcube and Seedrs are

⁴ To confirm our assumptions, we have conducted six interviews with professional investors (3 VCs, 1 BA and 2 CF platform manager), which confirmed their preference towards startups that have selected the nominee shareholder structure. Investors have motivated their preferences due to the lower coordination/agency problems, they will potentially incur, with crowd investors.

⁵ See the Seedrs's CEO interview with the Financial Times available at <https://www.ft.com/content/e9d998c2-ee93-11e4-88e3-00144feab7de>; and on Seedrs website at <https://www.seedrs.com/learn/blog/entrepreneurs/tips-tricks/nominee-structure-equity-crowdfunding>

⁶ See crowdcube webpage <https://www.crowdcube.com/explore/raising/nominee> (last accessed on Feb, 27, 2020)

the two largest equity crowdfunding platforms in the UK for volume raised and for number of transactions (Cambridge Centre for Alternative Finance, 2018, 2019). Both platforms are located in London and have been among the first to operate in the UK equity crowdfunding market. Together, they are seen as the most active equity crowdfunding platforms in Europe. Walthoff-Borm et al. (2018a), report that in 2016, Crowdcube and Seedrs accounted for over 85% of the whole equity crowdfunding market in the UK. Both platforms adopt the traditional “all-or-nothing” funding approach (Belleflamme et al., 2014), which allows entrepreneurs to receive funding only if the campaign raises 100% of the target (i.e. if the campaign is successful). If the target amount is not met, investors receive their money back. On the contrary, in case the capital raised met the target amount before the end of the campaign, both platforms provide an overfunding option, which grants firms the right to issue further shares to raise additional financing.

As noted by prior research, platforms do not archive all previous successful equity crowdfunding campaigns on their websites (Walthoff-Borm et al., 2018b). To ensure the maximum coverage, we used multiple online resources, including Wayback machine (<https://web.archive.org/>) and Crunchbase, to retrieve information about campaigns that received equity crowdfunding but, for some reasons, were not accessible on platform websites anymore. This activity resulted in a total sample of 603 campaigns launched by 451 different firms. For these firms, we sought financial information from Orbis Bureau Van Dijk and we tracked the entire investment pattern from Crunchbase, an online database on start-ups managed by TechCrunch. Data from Crunchbase have been used by a number of studies in entrepreneurial finance (e.g. Cumming et al., 2016; Cumming et al., 2019; Hellmann and Thiele, 2015). We collected information on the equity offerings carried out by each firm, including the type of transaction and the identity of the investors. Since we were interested in the reception of funding from professional investors, we restricted the sample to firms less than 10 years-old at the time of the first equity crowdfunding investment. As noted by prior literature, indeed, obtaining the first financing round from professional investors after ten years of incorporation is very unlikely (Bertoni et al., 2011). To reduce cross-country heterogeneity, we also excluded companies outside UK. Finally, we removed firms that did not file financial statements.

To test our hypotheses, we created two control samples. One includes firms that did not receive any external seed financing (Control Sample 1), while the other includes angel-backed firms (Control Sample 2). Control Sample 1 has been built from the Orbis Bureau Van Dijk database. To this aim, we selected i) all active companies in UK, ii) incorporated between 2008 and 2018, iii) operating in the same industrial sector of firms that launched an equity crowdfunding campaign (according to the NACE Rev. 2 main section), iv) and that filed at least once their financial statement in that period. This resulted in a list of 1,020,888 companies that met our criteria. We extracted 50,000 companies randomly and for these we collected longitudinal accounting information from 2010 to 2017. We used this database to create Control Sample 1. Specifically, we based our matching on propensity score (Heckman et al., 1997), and selected for each firm that received equity crowdfunding the nearest neighbor (1,1 matching). Conditional on operating in the same industry and having the same age, firms have been matched on size (i.e. total assets), debt ratio (loans to total assets), and geographical location (London vs. outside London) in the year of the first equity crowdfunding campaign. Prior literature indicated that these variables are associated with the success of the equity crowdfunding campaign (Walthoff-Borm et al., 2018b; Hartmann et al., 2019). Matching has been performed with replacement to reduce the incidence of possible biases (Abadie and Imbens, 2012). To avoid poor matches, we define a Caliper equal to 0.1 and removed from our sample all firms that did not find a match (91 equity crowdfunded firms). The final sample consists of 290 unique firms that raised equity crowdfunding. Once identified the firms in Control Sample 1, we collected from Crunchbase information about their entire investment pattern. In this phase, we ensured that each matched firm had not received any crowdfunding.

Table 1 reports *t*-test for the independent variables used in the propensity score matching before and after the match. As we can see, after the matching there are no statistically significant differences between the distribution of total assets and debt ratio (taken in the year of the first equity crowdfunding investment), and the dummy for location in London between the two samples of firms.

To create Control Sample 2, we extracted from Crunchbase the list of UK firms that received angel financing between 2011 and 2018. We also matched these firms with information from the Orbis database to retrieve accounting data. Overall, this control sample included 448 firms with available accounting information. Since the number of firms was limited, we did not perform any matching.

Table 1
Matching variables statistics before and after matching.

Before matching	N	Mean	N	Mean	t-test
Tot. Assets (ln)	211,686	4.03	238	4.73	-0.71***
Debt Ratio (ln)	198,988	0.03	216	0.05	-0.02**
London	350,000	0.16	289	0.46	-0.30***
Age	349,881	1.96	289	2.53	-0.57***
After matching	N	Mean	N	Mean	t-test
Tot. Assets (ln)	199	5.06	199	5.00	0.06
Debt Ratio (ln)	199	0.03	199	0.04	-0.01
London	199	0.43	199	0.45	-0.02
Age ^a	199	2.11	199	2.11	0.00

^a The propensity score matching is conditional on firms having the same age and operating in the same industry.

4.2. Variables

Our main independent variable is a dummy *ECF*, which takes value one if the firm successfully raised equity crowdfunding, while 0 if the firm belongs to the control sample. This variable has been used to test hypotheses 1a and 1b. To test hypotheses 2a and 2b, we replaced the dummy *ECF* with two binary variables *Nominee* and *Direct*, which take value 1 if the crowdfunding campaign used the nominee or the direct shareholder structure, respectively.

We included a number of firm-specific controls that fell outside the purview of our theorizing yet might affect our estimates. We controlled for firm's size by including the variable *Total Assets*, computed as the mean of total assets in the 3 years before the focal investment (i.e. $\frac{1}{3} \sum_{i=1}^3 Total\ Assets_{t-i}$). To control for firm's capitalization, we included the *Equity Ratio* computed as the mean of the ratio between capital owned by the firm's shareholders and total assets 3 years before the focal investment (i.e. $\frac{1}{3} \sum_{i=1}^3 \frac{Equity_{t-i}}{Total\ Assets_{t-i}}$). Moreover, we included the *Debt Ratio*, computed as the mean of the ratio between financial loans and total assets 3 years before the focal investment (i.e. $\frac{1}{3} \sum_{i=1}^3 \frac{Loans_{t-i}}{Total\ Assets_{t-i}}$), to control for firm's leverage. We also included the *Current Ratio*, calculated as the mean of the ratio between current assets and current liabilities 3 years before the focal investment (i.e. $\frac{1}{3} \sum_{i=1}^3 \frac{Current\ Assets_{t-i}}{Current\ Liabilities_{t-i}}$), to take into account firm's liquidity. We also controlled for firm's *Age* since incorporation. Moreover, we included a dummy variable *London*, equal to 1 if the firm was located in London, to control whether the firm was located in the largest VC hub in Europe (Bertoni et al., 2015). We included two additional dummy variables, *VC pre*, equal to 1 if the focal firm had raised VC before equity crowdfunding, and *Seedrs*, which takes value 1 if the focal firm successfully raised an equity crowdfunding round on Seedrs, to account for any other platform level effect apart from the shareholder structure. We also controlled for firm's industry, by including a set of dummy variables based on NACE Rev. 2 main section. Finally, we included year dummies in our estimates. All variables used in our estimates are described in Table 2.

4.3. Endogenous variables

The procedure used to construct Control Sample 1 ensures that the variables used for the matching (i.e. Total Assets; Debt Ratio; Geography, Industry, Age), are unlikely to explain our results. However, the matching does not ensure that other *unobservable* firm-level characteristics may guide our estimates, thus raising endogeneity concerns. Particularly, it may be that the unobserved quality or other firm characteristics may guide both the success during the equity crowdfunding campaign and the reception of VC financing, introducing a selection bias. To take this concern into account, we implemented a Heckman approach Heckman (1979). Thus, we first estimate a selection equation for the probability of a firm to raise ECF successfully, we estimate the Inverse Mills Ratio and we finally included it in our main regression equations in the second stage.

To ensure the identification condition, we included in the selection equation a set of variables, i.e. the total value of the UK equity crowdfunding market six months before the focal investment date and a set of dummy variables indicating the day of the week when the focal campaign was launched. These variables are correlated to the probability of success of the equity crowdfunding campaign (Vismara, 2016b), but not necessarily with the attraction of the follow-on investment from professional investors. The selection equation follows (Eq. (1)):

Table 2
Variable description.

Variable	Description
Time to VC follow-on	For ECF sample = Time (days) between the first equity crowdfunding round and the first following VC round, or time until the end of the observation period (March 31, 2019) (natural logarithm). For Control Sample 1 = Time (days) between the corresponding investment date of the twin equity-crowdfunded firm and the first following VC round, or time until the end of the observation period (March 31, 2019) (natural logarithm). For Control Sample 2 = Time (days) between the first BA investment and the first following VC round, or time until the end of the observation period (March 31, 2019) (natural logarithm).
ECF success	Dummy equal to 1 if the focal firm successfully raised an equity crowdfunding round, 0 otherwise.
VC pre	Dummy equal to 1 if the focal firm has raised VC before equity crowdfunding.
Nominee	Dummy equal to 1 if the focal firm has chosen the Nominee shareholder structure for the equity crowdfunding offering, 0 otherwise.
Direct	Dummy equal to 1 if the focal firm has chosen the Direct shareholder structure for the equity crowdfunding offering, 0 otherwise.
Age	Firm's age at focal investment year (natural logarithm).
Total assets	Mean of total assets 3 years before the focal investment year (natural logarithm).
Equity ratio	Mean of the ratio between equity (capital) and total assets 3 years before the focal investment year (natural logarithm).
Debt ratio	Mean of the ratio between financial loans and total assets 3 years before the focal investment year (natural logarithm).
Current ratio	Mean of the ratio between current assets and current liabilities 3 years before the focal investment year (natural logarithm).
London	Dummy equal to 1 if the firm is located in London, 0 otherwise.
Seedrs	Dummy equal to 1 if the focal firm successfully raised an equity crowdfunding round on Seedrs platform, 0 otherwise.
Tot ECF volume	Total amount raised by equity crowdfunding in UK six months before the focal investment date (natural logarithm).
Tot ECF volume Nominee	Total amount raised by equity crowdfunding campaigns with a Nominee shareholder structure six months before the focal investment date (natural logarithm).
Day of week dummies	Dummies equal to 1 for the day of the week of the focal investment.
Industry dummies	Dummies equal to 1 for the focal firm's industry based on NACE Rev. 2 main section.
Year dummies	Dummies equal to 1 for the year of the focal investment.

$$ECF\ success = \alpha + \beta_1\ Tot\ ECF\ volume + \bar{\gamma}\ Day\ of\ weeks + \bar{\delta}\ controls + \varepsilon \quad (1)$$

In the models including information on the shareholder structure, a second selection process should be considered. In addition to a potential selection bias due to equity crowdfunding success, firms may select into nominee vs. direct shareholder structure. Since the two processes are unlikely to be independent (i.e. the determinants of using a nominee shareholder structure can also guide the success of the crowdfunding campaign and the reception of VC financing), we used the methodology suggested by Tunali (1986). Accordingly, we run a bi-variate Probit regression on the likelihood of posting an offering through nominee vs. direct shareholder structure (Eq. (2)), and on the probability of success of the crowdfunding campaign (Eq. (3)). To ensure the identification condition we included in Eq. (2) the total amount raised through equity crowdfunding through the nominee shareholder structure six months before the focal campaign date and the day of the week when the focal campaign was launched. Eq. (3) is analogous to Eq. (1) previously described.

$$Nominee = \alpha + \beta_1\ Tot\ ECF\ volume\ Nominee + \bar{\gamma}\ Day\ of\ weeks + \bar{\delta}\ controls + \varepsilon \quad (2)$$

$$ECF\ success = \alpha + \beta_1\ Tot\ ECF\ volume + \bar{\gamma}\ Day\ of\ weeks + \bar{\delta}\ controls + \varepsilon \quad (3)$$

Eq. (2) and Eq. (3) have been used to create the two Inverse Mills ratios to include in the second stage regressions. In the context of crowdfunding studies, a similar methodology has been recently adopted by Cumming et al. (2019).

4.4. Models

In our models we estimate the hazard rate of receiving a round of VC financing for firms that received equity crowdfunding and firms in Control Sample 1 and Control Sample 2. To this aim, we resorted to a semi-parametric Cox (1972), frequently used to investigate venture performance (for a similar approach see Hellmann and Puri, 2002; Cumming and Johan, 2010; Nahata et al., 2014; Colombo and Shafi, 2019; Kang, 2019). The literature has argued that the Cox models are superior to other specifications (e.g. Weibull model), since they do not require a priori assumption about the shape of the underlying hazard rate function. The hazard model uses the timing of an event (in this study, the number of days taken from the first equity crowdfunding investment until the first VC investment round) to analyze the venture's subsequent VC financing.

Our specification to test hypotheses 1a and 1b follows:

$$\ln h^{\text{follow-on investment}}(t) = \rho ECF + \bar{\delta}\ controls + \mu IMR_{\text{success}} + \varepsilon \quad (4)$$

In this specification, $h^{\text{follow-on investment}}(t)$ is the hazard function, which gives for, any t , the probability of receiving financing from a VC investor at time t conditional to having not received financing up to time t .

Since the observation period ends on March 31st, 2019, the minimum time window to receive VC financing is one year (for a firm invested on March 31st, 2018). For Control Sample 1, we measured the time to follow-on VC, beginning from the same investment date of the matched firm. ECF is our main independent variable indicating whether the firms received equity crowdfunding, while ρ is its estimated coefficient. A positive (negative) ρ implies a higher (lower) hazard rate for the variable ECF . $\bar{\delta}$ is the vector of coefficients of our control variables, $controls$; while IMR_{success} is the Inverse Mills Ratio constructed from Eq. (1), with its coefficient μ . The residuals are indicated by ε .

To test hypotheses 2a and 2b, we used a similar specification. In this case, we added the two inverse Mills Ratio estimated from Eq. (2) and Eq. (3) to consider the double selection process. Accordingly, our specification follows:

$$\ln h^{\text{follow-on investment}}(t) = \rho ECF + \bar{\delta}\ controls + \mu IMR_{\text{success}} + \sigma IMR_{\text{nominee}} + \varepsilon \quad (5)$$

4.5. Descriptive statistics

Table 3 reports descriptive statistics for the sample of firms that have received equity crowdfunding. We distinguish between Seedrs (48 firms) and Crowdcube (242 firms). We did not detect any statistically significant difference between the two sample of firms, apart from the age, and the number of firms that have received VC before crowdfunding, which are both slightly higher for the Crowdcube sample. With no surprise, all the firms that launched an equity crowdfunding campaign on Seedrs used the nominee shareholder structure. On the contrary on Crowdcube, 11 firms used the nominee structure, while 231 used the direct shareholder structure. This result could be in part attributed to the time frame considered (up to March, 2018), in fact only about 30% of Crowdcube firms in our sample have launched the equity crowdfunding campaign after the platform have introduced the nominee shareholder structure. Of these, none except one, have received a VC investment before the equity crowdfunded campaign. Thus, if, in principle, pre-existent VCs may have a role in pushing companies to choose the nominee shareholding structure over the direct, it does not emerge from our data sample.

To assess whether there are any differences between firms that chose the nominee structure on Crowdcube or Seedrs and firms that chose the direct shareholder structure on Crowdcube, we compare the two groups in Table 4. Indeed, we find relevant differences between the two samples. Firms that chose the nominee shareholder structure are on average younger, with significantly higher *Total Assets*, and more of these firms are located in the city of London. Related to firm's capitalization (*Equity ratio*) we do not find any significant difference between the two groups.

In Table 5, we report the comparison between the full sample of firms that received equity crowdfunding and our two control samples. On average firms that raised funding through equity crowdfunding were 2.5 years old. Specifically, 16.5% of crowdfunded

Table 3
Descriptive statistics by Crowdcube and Seedrs.

	Crowdcube = 242 firms						Seedrs = 48 firms		
	Nominee = 11 firms		Direct = 231 firms		Total Crowdcube		Nominee = 48 firms		t-test ^a
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	
VC pre	0.182	0.000	0.074	0.000	0.079	0.000	0.021	0.000	0.058*
Age	1.059	1.099	1.083	1.099	1.082	1.099	0.938	0.693	0.144*
Total assets	5.282	5.531	4.027	4.249	4.080	4.287	4.423	4.285	-0.343
Equity ratio	0.098	0.010	0.190	0.013	0.186	0.012	0.159	0.002	0.027
Debt ratio	0.008	0.000	0.030	0.000	0.029	0.000	0.040	0.000	-0.010
Current ratio	1.445	1.045	1.045	0.845	1.064	0.857	1.051	0.774	0.013
London	0.446	0.000	0.636	1.000	0.455	0.000	0.521	1.000	-0.066

^a Difference between means of total sample of Crowdcube firms (col. 5) and total sample of Seedrs firms (col. 7).

Table 4
Descriptive statistics by Direct and Nominee shareholder structure.

	Direct = 231 firms		Nominee = 59 firms		t-test ^a	Full sample = 290 firms	
	Mean	Median	Mean	Median		Mean	Median
VC pre	0.074	0.000	0.051	0.000	0.023	0.069	0.000
Age	1.083	1.099	0.961	0.693	0.122**	1.058	1.099
Total assets	4.027	4.249	4.572	4.534	-0.545**	4.137	4.285
Equity ratio	0.190	0.013	0.148	0.005	0.042	0.184	0.011
Debt ratio	0.030	0.000	0.034	0.000	-0.004	0.031	0.000
Current ratio	1.045	0.845	1.121	0.889	-0.076	1.062	0.848
London	0.446	0.000	0.542	1.000	-0.097**	0.466	0.000
Seedrs	0.000	0.000	0.814	1.000	-0.814***	0.166	0.000

^a Difference between means of total sample Direct (col. 1) and total sample Nominee (col. 3).

firms were less than one-year-old, 60% were between one and three years-old and only 24.5% were more than four years-old. Firms that received equity crowdfunding report on average 4.14 in *Total Assets* (i.e., about 63,000 €), their *Equity Ratio* is equal to 18.4%, their *Debt Ratio* is equal to 3.1%, while the *Current Ratio* equals 1.06. 135 firms (47%) in this sample are located in London. We do not detect any statistically significant difference between the sample of firms that received equity crowdfunding and Control Sample 1 for *Age*, *Total Assets*, *Debt Ratio* and the location (i.e., *London* dummy), thanks to the matching procedure. Instead, firms that received equity crowdfunding show a better capitalization (i.e., higher *Equity Ratio*) and liquidity (i.e., higher *Current Ratio*). On the contrary, compared with Control Sample 2, firms that received equity crowdfunding are on average slightly older, with higher debts and a smaller portion of them is located in London (47% vs. 74%).

Finally, concerning the industry distribution equity crowd-funded firms belong mainly to the Manufacturing (21%), the Information and Communication (18%), the Wholesale and Retail sector (15%), and the Research and Development industry (10%). Firms of Control Sample 1 belong exactly to the same industries of equity crowd-funded firms, according to our matching procedure. While angel-backed firms of Control Sample 2 have a higher incidence of firms belonging to the Information and Communication industry (around 54%) in respect to the other industrial sectors.

5. Results

Tables 6 shows the estimates of hypothesis 1 computed for our two control samples. Models 1–3 are computed against Control Sample 1 comprising firms that have not received any external equity finance before VC, while models 4–6 are estimated for Control Sample 2 of angel-invested firms. All estimates are semi-parametric Cox models,⁷ computed with robust standard errors clustered by firm (since each venture may have undergone more than one round of financing before receiving the first follow-on VC investment, i.e. equity crowdfunding or business angel). To establish whether multicollinearity was a concern in our study, we computed the variance inflation factor (VIF) and tolerance values. In all our models, the average VIF score was below 2.59, and individual item scored higher than 6.10, (lower than the conventional threshold of 10), which suggests multicollinearity was not an issue (Kutner et al., 2004; Hair et al., 2006; McDonald and Moffitt, 1980).

Columns 1 and 4 report the hazard rate of baseline semi-parametric cox estimates for receiving VC financing at time t conditional to having not received VC financing up to time t . These two models are reported for comparison purposes with our two main two-stages cox models, shown in column 2 and 5, where the two-step approach explained in Section 4.3 and 4.4 is applied to account for the endogenous variables *ECF* and *Nominee*. The first step Eq. (1) (Section 4.3) is reported in columns 3 and 6, respectively for the two different control samples.

⁷ As robustness, we run the same estimates with the panel logit estimator obtaining consistent results, which are available upon authors' request.

Table 5
Descriptive statistics by ECF sample, Control Sample 1 and Control Sample 2.

	ECF sample = 290 firms		Control Sample 1 = 199 firms			Control Sample 2 = 448 firms		
	Mean	Median	Mean	Median	t-test ^a	Mean	Median	t-test ^b
VC pre	0.069	0.000	0.020	0.000	0.049**	0.000	0.000	0.069***
Age	1.058	1.099	0.966	1.099	0.092	0.819	0.693	0.239***
Total assets	4.137	4.285	4.813	4.784	-0.676	3.932	4.236	0.205
Equity ratio	0.184	0.011	0.039	0.000	0.145***	0.172	0.005	0.012
Debt ratio	0.031	0.000	0.023	0.000	0.008	0.019	0.000	0.012**
Current ratio	1.062	0.848	0.774	0.684	0.288***	1.343	0.973	-0.281
London	0.466	0.000	0.434	0.000	0.031	0.740	1.000	-0.275***
Seedrs	0.166	0.000	0.000	0.000	0.166***	0.000	0.000	0.166***

^a Difference between means of total sample ECF (col. 1) and total control sample 1 (col. 3)

^b Difference between means of total sample ECF (col. 1) and total control sample 2 (col. 6).

Table 6
Estimates result Hypothesis 1.

	Control Group 1: not invested			Control Group 2: angel-invested		
	(1)	(2)	(3)	(4)	(5)	(6)
ECF success	2.823** (1.461)	3.009** (1.592)		0.557* (0.175)	0.556* (0.177)	
VC pre	5.714*** (3.542)	10.159*** (6.469)		2.111 (1.293)	2.129 (1.369)	
Age	1.192 (0.459)	1.295 (0.516)	1.581*** (0.211)	0.842 (0.179)	0.843 (0.183)	1.178 (0.147)
Total assets	0.980 (0.107)	0.943 (0.125)	0.881*** (0.040)	1.196** (0.094)	1.196** (0.095)	1.105** (0.048)
Equity ratio	0.020 (0.057)	0.021 (0.062)	0.646 (0.457)	0.209 (0.288)	0.208 (0.288)	2.117 (1.055)
Debt ratio	2.620 (1.600)	2.524 (2.202)	6.482*** (3.333)	1.813* (0.625)	1.811* (0.626)	1.493* (0.319)
Current ratio	1.121 (0.308)	0.968 (0.343)	1.662*** (0.225)	0.838 (0.128)	0.838 (0.129)	0.840** (0.059)
London	0.854 (0.327)	0.804 (0.318)	1.204 (0.194)	0.741 (0.194)	0.740 (0.195)	0.503*** (0.071)
Seedr	1.756 (0.893)	2.041 (1.111)		1.767 (0.830)	1.770 (0.829)	
IMR (first step)		4.403 (4.398)			0.949 (0.615)	
Tot ECF volume			35.241*** (32.056)			1.832** (0.525)
Days of week dummies			yes			yes
Industry dummies	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Log-Likelihood	-165.79	-120.10	-189.15	-466.26	-466.26	-363.56
Pseudo R-square	12.59%	15.52%	33.31%	3.38%	3.38%	27.87%
N obs	474	410	410	729	729	730

Models 1, 2, 4, 5 are hazard cox survival models, hazard ratios displayed. The dependent variable is the time between the ECF investment date and the VC investment date for VC-backed firms or end of the observation period (March, 312,019) for not VC-backed firms. Models 3 and 6 are first step probit regression, odd ratios displayed. The dependent variable is the probability of successfully raising equity crowdfunding (ECF). All independent continuous variables are in logarithmic form. Standard errors in brackets. Significance levels *10%, **5%, ***1%.

Looking at Control Sample 1, in the selection step (col. 3) we see that the Tot ECF volume is positively and significantly correlated with *ECF success* ($p < 0.01$) as well as the dummies representing the days of the week in which the campaign was launched (that are not reported for brevity). Firm's *Age* ($p < 0.01$), *Debt Ratio* ($p < 0.01$, this effect is quite common in equity crowdfunding) and *Current Ratio* ($p < 0.01$) are also strongly positively associated with *ECF success*, as indicated by the above 1 and significant odd ratios. Smaller firms, moreover, seem more likely to achieve equity crowdfunded success (*Total Assets* below 1, $p < 0.01$) Looking at the second stage cox model in column 2, we find an above one and statistically significant hazard rate of *ECF success* ($hr = 3.009$, $p < 0.05$). The result suggests a positive association between receipt of equity crowdfunding and VC follow-on financing in comparison to not receiving any seed financing, providing support to our hypotheses 1a. The magnitude of this effect seems quite sizable as equity crowdfunded firms have three times higher hazard (risk) of receiving follow-on VC than non-invested firms. As expected, we also find a strong positive impact on getting additional VC funds after the equity crowdfunding campaign for firms that have been financed by a VC before ($hr = 10.159$, $p < 0.01$).

Resorting to Control Sample 2, the selection step (Eq. (1)) is reported in column 6. Both the dummies representing the days of the

week ($p < 0.01$) and the variable *Tot ECF volume* ($p < 0.05$) continue to remain statistically significant. Firm's *Total assets* ($p < 0.05$) and *Debt Ratio* ($p < 0.10$) are positively associated with *ECF success*, even if they show a weaker significance, while firms' *Current Ratio* ($p < 0.05$) and the dummy variable *London* ($p < 0.01$) are negatively associated with *ECF success*. Firm's *Age* is, instead, not significant at conventional levels. Looking at the result of the second stage cox model in column 5, we find that having received an equity crowdfunding round has a hazard rate below 1, indicating a lower likelihood of receiving follow-on VC financing at time t , having not received it yet ($hr = 0.556$, $p < 0.10$). The ratio is only significant at the 10% level, thus we find only a weak support for our hypothesis 1b, predicting a negative association between equity crowdfunding in comparison to angel financing and the reception of follow-on VC financing. Having received VC financing before the equity crowdfunding campaign (*VC pre*) does not seem to have an impact on subsequent VC investments for the sample of angel-backed firms.

Tables 7 shows the estimates of hypothesis 2, computed separately for our two control samples (Control Sample 1 shown in col. 1–4, Control Sample 2 shown in col. 5–8).

To assess the impact of the shareholder structure chosen during the crowdfunding campaign, we add the two dependent variables *Nominee* and *Direct* shareholder structure. The baseline cox models computed without the two-stage approach are reported for comparison in columns 1 (for Control Sample 1) and 5 (for Control Sample 2). As both the nominee (or the direct) structure chosen and the probability of raising equity crowdfunding successfully are likely to be endogenously and simultaneously determined, we resort to a bivariate probit model for the first step Eqs. (2) and (3), as illustrated in Section 4.4.

The bivariate probit results are shown in Table 7, columns 3 (Eq. (2), dependent variable = *ECF success*) and 4 (Eq. (3), dependent variable = *Nominee*), and 7 (Eq. (2), dependent variable = *ECF success*) and 8 (Eq. (3), dependent variable = *Nominee*), for Control Sample 1 and Control Sample 2 respectively. The rho calculated for both bivariate probit models is significantly different from zero, indicating that the residuals of the two probit models are indeed correlated and, therefore, is preferable to estimate them together, using the bivariate probit specification.

Considering Control Sample 1, both variables, *Tot ECF volume* and *Tot ECF volume Nominee*, are positively and significantly correlated with *ECF success* ($p < 0.01$) and *Nominee* shareholder structure ($p < 0.01$) respectively, as well as the days of the week dummies. As before, *ECF success* is also positively associated with firm's *Age* ($p < 0.01$), *Debt Ratio* ($p < 0.01$) and *Current Ratio* ($p < 0.01$), and negatively with *Total assets* ($p < 0.10$).

Looking at the second stage cox model in column 2 we find that the hazard rate of the *Nominee* ($hr = 37.154$, $p < 0.01$) is strongly significant and above one, while the hazard rate of the *Direct* ($hr = 2.806$, $p < 0.05$), despite still positive is less significant. The difference between the hazard ratios of the *Nominee* and the *Direct* dummies is positive and statistically significant ($p < 0.01$). Thus, we find support for hypothesis 2a, predicting a stronger positive association between crowdfunding and follow-on VC financing for firms choosing the nominee shareholder structure than for firms choosing the direct shareholder structure. Again, the variable *VC pre* ($p < 0.01$) increases the likelihood to receive additional VC financing. The effect is again quite strong in its magnitude.

Considering, instead, Control Sample 2, only *Tot ECF volume* ($p < 0.01$) seems to have a positive effect on *ECF success* (col. 7), while the effect of *Tot ECF volume Nominee* on the probability of choosing the *Nominee* structure is non-significant (col. 8). Concerning the other control variables, we have similar effects as before, with *Total assets* ($p < 0.01$) and *Debt Ratio* ($p < 0.05$) positively associated with *ECF success*, *Current Ratio* ($p < 0.05$) and the dummy *London* ($p < 0.01$) negatively associated with *ECF success*, while firm's *Age* is not significant at conventional levels. Firm's *Age* ($p < 0.1$), and *Debt Ratio* ($p < 0.01$) are positively associated with the selection of the *Nominee* shareholder structure. The second stage cox model is shown in column 6, we find that the nominee shareholder structure facilitates receiving additional VC funds. In fact, we find a hazard rate above 1 for *Nominee* ($hr = 14.579$, $p < 0.01$), while the direct shareholder structure does not seem to have any effect on raising follow-on VC investment. One possible explanation for this result is related to the fact that angel investors typically acquire a larger equity stake compared to the crowd.⁸ The lower equity stake owned by the nominee also allows the VC to invest, ceteris paribus, in discounted firms. The difference between the hazard ratios of the *Nominee* and the *Direct* dummies is positive and statistically significant ($p < 0.01$). Thus, we find partial support for hypothesis 2b, predicting a weaker negative association between crowdfunding and follow-on VC financing for firms using the nominee shareholder structure than for firms using the direct shareholder structure. Moreover, we find that launching the campaign on Seedrs ($p < 0.05$) increases the probability of receiving follow-on VC financing for other reasons than solely the shareholder structure.

6. Discussion and conclusion

In this paper, we conducted a quantitative analysis to investigate whether and how having received equity crowdfunding affect the attraction of VC financing after the campaign.

From an analysis of firms that obtained crowdfunding through the two largest UK equity crowdfunding platforms, we find that, in comparison to a control group of firms that did not receive any seed equity financing, a successful equity crowdfunding campaign facilitates the attraction of subsequent VC financing. For these firms, the association between equity crowdfunding and follow-on VC investment is stronger if the firm has adopted a nominee shareholder structure, while it is only weakly significant when the direct shareholder structure is chosen. From the comparison with a control group of angel-backed firms, we find that obtaining equity crowdfunding through the nominee shareholder structure, facilitates the attraction of follow-on VC financing. On the contrary, we do not detect any statistical difference between firms that received equity crowdfunding through a direct shareholder structure and angel-

⁸ Angel investors typically look for a return on investment between 20% and 30% (Capizzi, 2015; Morrissette, 2007), which is on average higher than the expected return for crowd investors (Signori and Vismara, 2018).

Table 7
Estimates result Hypothesis 2.

	Control Group 1: not invested				Control Group 2: angel-invested			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nominee	10.985*** (9.102)	37.154*** (34.862)			3.154* (2.060)	14.579*** (13.107)		
Direct	2.440* (1.250)	2.806** (1.287)			0.494** (0.157)	0.560 (0.209)		
VC pre	5.043** (3.228)	4.780*** (2.609)			1.784 (1.042)	1.615 (1.043)		
Age	1.244 (0.465)	1.130 (0.416)	1.584*** (0.228)	0.964 (0.195)	0.843 (0.175)	0.814 (0.212)	0.998 (0.113)	0.672** (0.104)
Total assets	0.959 (0.113)	0.986 (0.121)	0.919* (0.044)	1.029 (0.066)	1.198** (0.097)	1.193* (0.114)	1.106*** (0.042)	1.079 (0.052)
Equity ratio	0.027 (0.074)	0.050 (0.156)	0.555 (0.344)	0.256* (0.197)	0.248 (0.330)	0.019* (0.044)	1.800 (0.853)	1.070 (0.578)
Debt ratio	2.666 (1.637)	2.843* (1.578)	9.191*** (5.450)	2.161 (1.069)	1.843* (0.633)	1.908* (0.735)	1.457** (0.264)	2.052*** (0.417)
Current ratio	1.170 (0.323)	1.118 (0.347)	1.566*** (0.230)	1.086 (0.138)	0.832 (0.129)	0.817 (0.158)	0.852** (0.054)	0.891 (0.074)
London	0.807 (0.329)	0.680 (0.273)	1.087 (0.180)	1.375 (0.340)	0.713 (0.188)	0.785 (0.259)	0.433*** (0.055)	0.786 (0.124)
Seedr	0.500 (0.402)	0.376 (0.332)			0.336 (0.239)	0.232** (0.165)		
IMR (first step), pmarg1		0.093* (0.118)				0.058** (0.078)		
IMR (first step), pmarg2		4.436* (3.657)				0.589 (0.465)		
Tot ECF volume			11.487*** (4.509)				2.288*** (0.721)	
Tot ECF volume Nominee				1.612*** (0.112)				0.950 (0.083)
Days of week dummies			yes	yes			yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Log-Likelihood	-164.11	-148.13	-268.45	-268.45	-463.59	-334.03	-268.45	-400.75
Pseudo R-square	13.48%	13.63%			13.93%	4.72%		
N obs	474	413	413	413	729	566	413	566

backed firms.

We argue that receiving equity crowdfunding signals entrepreneurs' quality and firms' market appeal (Drover et al., 2017). Thus, it lowers information asymmetries and favors the attraction of VC investors. However, receiving equity crowdfunding also generates coordination costs, agency conflicts and governance issues (Cumming et al., 2019) with potential follow-on investors, which are higher for the direct shareholder structure, and partly off-set the signaling value of having received equity crowdfunding.

Our findings advance the discussion in entrepreneurship and signaling theory by recognizing crowdfunding and angel investors as a mechanism through which new ventures can signal their value by whom has invested in the firm (Bruton et al., 2009). Also, we highlight the importance of the shareholder structure as a screening mechanism for VC investors, contributing to the literature about corporate governance and VCs' investment decisions (Walthoff-Borm et al., 2018a). Moving from these results, this paper indicates a number of interesting research directions. A worthy follow-up research question relates to the entrepreneurial, firm-level and institutional characteristics that reduce potential agency conflicts arising due to the direct shareholder structure (Cumming et al., 2019). Another interesting direction for future research refers to the type of professional investors attracted (e.g., IVC vs. CVC). The literature has shown that VC investors differ in the strategic objectives they pursue, their governance, and their investment capabilities (see e.g., Gompers and Lerner, 2000; Hellmann, 2002). Such differences may make potential professional investors more or less exposed to the agency conflicts related to the direct shareholder structure selected during the equity crowdfunding campaign. A third possible advancement of our paper roots in the application of quasi-experimental approaches to assess causality and to confirm our theoretical interpretations (e.g., a regression discontinuity design, natural experiments). Fourth, subsequent studies may investigate whether other motivations (e.g., marketing, talent attraction, etc.) besides pure financial ones, play a role in the choice of a particular shareholder structure. For instance, a firm with a solid capitalization may prefer the direct shareholder structure and, potentially, delay raising follow-on VC funds. Although, this issue does not appear to happen in our sample, a firm "liquidity runway" hypothesis could be explored in other settings. Finally, our analysis focuses on 290 start-ups that received equity crowdfunding and then provided at least one year of financial records, which is consistent with our research question. However, future studies can investigate the dynamics that lead start-ups to fail immediately after the reception of equity crowdfunding.

Our paper provides important implications for entrepreneurs. We show that the shareholder structure may heavily bear down on

securing additional funding required for growth and expansion. Our study urges entrepreneurs, who see crowdfunding as a valuable alternative to access early stage financing (Cumming et al., 2016), but then aim to attract investments by professional investors, to carefully consider the shareholder structure when launching an equity crowdfunding campaign. For the same reason, we advise equity crowdfunding platforms to carefully reconsider the decision of providing entrepreneurs the possibility to use only a direct shareholder structure. In the long run, a reduced number of start-ups able to obtain follow-on investments from professional investors may have an impact on the revenues of the platform, which is not easily predictable. On the one hand, a reduced number of firms receiving follow-on finance from professional investors may imply an increasing pool of firms returning to the platform to launch a follow-on crowdfunding offering (Signori and Vismara, 2018 show that 25% of the firms that receives equity crowdfunding launch a subsequent equity crowdfunding campaign). On the other hand, the low number of firms capable of raising additional financing from professional investors may discourage other entrepreneurs to launch an equity crowdfunding campaign on the platform. Establishing partnership with professional investors or providing exit mechanisms for crowd investors may represent complementary measures to assure the attraction of professional investors and to make platforms with a direct shareholder structure more appealing. Finally, our paper has clear implications for policymakers. Equity crowdfunding has been discussed in policy circles as an important lever to support job creation, economic growth and competitiveness.⁹ Our study warns against considering equity crowdfunding as a homogenous market. New policy interventions should take into consideration that different shareholder structures may hamper or enhance the attraction of professional investors and, ultimately, firms' growth.

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⁹ See e.g. the Report on Crowdfunding in the EU Capital Markets Union, https://ec.europa.eu/info/system/files/crowdfunding-report-03052016_en.pdf.

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