Equity retention and Social Network Theory in Equity Crowdfunding

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Keywords Crowdfunding, Signaling, Network theory, National Systems of Entrepreneurship, Entrepreneurial finance

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Abstract This paper makes two contributions to research on the new entrepreneurial finance context of equity crowdfunding. First, we compare its regulation around the world and discuss how this impacts the development of markets. Second, we investigate the signaling role played toward external investors by equity retention and social capital. Using a sample of 271 projects listed on the UK platforms Crowdcube and Seedrs in the period 2011–2014, we find that campaigns launched by entrepreneurs (1) who sold smaller fraction of their companies at listing and (2) had more social capital had higher probabilities of success. Our results combine findings in classical entrepreneurial finance settings, like venture capital and IPOs, with evidence from other, non-equity crowdfunding markets.

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JEL Classification: G18; G38.

1 Introduction

Technological advances are changing the way in which entrepreneurial finance is provided. The diffusion of social networks and the development of online platforms have created new opportunities for entrepreneurs to raise seed capital and for non-professional investors to disintermediate their investments. By easing the manner in which demand for capital meets supply, recent financial innovations are expected to improve the efficiency of financial markets (Agrawal et al. 2013). Among these innovations, crowdfunding is emerging as the most widely adopted financial alternative, whereby individuals supply funds directly to entrepreneurs without the costly interposition of intermediaries (Bruton et al. 2015). In this setting, in which the impact of the development of local financial institutions is less central, national policy differences play a key role (Colombo et al., 2015b). Whereas equity crowdfunding markets are already a reality in some countries, legal issues have restricted their development in others. These differences affect the ways in which these markets evolve and will ultimately determine the shape of entrepreneurial finance systems.

In contrast to most entrepreneurial settings, in which institutions are largely silent, National Systems of Entrepreneurship (NSEs) are driven by individuals, with institutions regulating who acts and the outcomes of individual actions (Acs et al. 2014). As in any systemic approach, NSE components interact to deliver performance. This implies that system performance can be held back by poorly performing components, i.e., "bottleneck" factors. As noted by Acs and colleagues (2014, p. 491), some pillars "operate more readily as bottlenecks than other - finance being a good example." In the entrepreneurial finance realm, speeding and scaling opportunities that internet platforms deliver to early-stage financing can be exploited fully only within regulatory frameworks that balance the need for capital formation with that for investor protection. In this paper, we thoroughly discuss the evolution of the regulatory framework and the development of equity crowdfunding markets around the world.

The United Kingdom has the most developed pure equity crowdfunding market. On a European level, this is not surprising. The Depth of Capital Markets Index, developed by Groh et al. (2012) and used by Acs et al. (2014) to measure the Risk Capital Pillar in NSEs, ranks the UK fourth worldwide, the only European country among the top five. The predominance of British equity markets involves public and private markets, as

exemplified by the size of the London Stock Exchange or the development of the venture capital (VC) industry (Paleari et al. 2008). London's Alternative Investment Market (AIM) is the most successful European second-tier market and has served as a model for other stock markets in continental Europe (Vismara et al. 2012). Similar to the need for functional initial public offering (IPO) markets in order to achieve VC industry development (Black and Gilson 1998), equity crowdfunding benefits from a vibrant IPO market. To give an example, in December 2014, Mill Residential went public with a "combined IPO" targeting institutional investors on the AIM and retail investors via crowdfunding. Taking another approach, the listed company Chapel Down raised £2.9 million in just 10 days in September 2014 on the equity crowdfunding platform Seedrs.

Our study delivers an international comparison on the regulation and development of equity crowdfunding markets around the world. In addition to structural financial factors, indeed, regulatory reasons underlie the development of the equity crowdfunding market in the UK. In contrast to that of the United States, where long-standing restrictions on public solicitation for stocks prohibit equity crowdfunding, the regulatory setting in the UK is defined by the Financial Conduct Authority (FCA). The empirical setting of this study focuses on the UK, in particular on the two globally leading equity crowdfunding platforms that allow crowdfunders to buy ordinary shares, which are Crowdcube and Seedrs. The dataset is composed of 271 projects posted in the period 2011–2014 on these two platforms, making this the largest empirical study of equity crowdfunding to date.

When valuing to take an equity position in start-ups, VCs and business angels rely heavily on due diligence predicated on face-to-face interactions and personal relationships (Cumming et al 2015a). In the IPOs, underwriters are in charge of the pricing and allocation of shares (Paleari et al. 2014; Vismara et al 2015). In the equity crowdfunding setting, entrepreneurs disclose information online and have limited opportunities to interact with potential investors. Convincing them is therefore even more challenging than in traditional entrepreneurial finance. At the same time, crowdfunders are less equipped to overcome information asymmetry problems. They typically lack the experience and capability to evaluate different investment opportunities (Ahlers et al. 2015) and, due to fixed costs, have limited opportunity to

perform due diligence (Agrawal et al. 2013). This situation leads to classic collective-action problems. Furthermore, in contrast to investors in other public equity markets, crowdfunding investors cannot even rely on the reputations of intermediaries, such as investment banks (e.g., IPO underwriters) and financial analysts. Still, equity crowdfunding platforms are spreading around the world (World Bank 2013).

As in every market laden with information asymmetries, the ability to signal quality to potential investors is a critical factor in gaining finance. Signaling theory is the main research framework under which entrepreneurial finance has been investigated, in particular with regard to public equity. Signals include ownership structure and corporate governance characteristics (Audretsch and Lehmann 2013; Bertoni et al. 2014; Judge et al. 2014; Zattoni and Judge 2012), and affiliation with prestigious underwriters (Carter and Manaster 1990; Carter et al 1998; Migliorati and Vismara 2014), VCs (Megginson and Weiss 1991, Nakata 2008), and universities (Bonardo et al. 2010; Bonardo et al. 2011; Meoli et al. 2013). Our study extends signaling theory to the microfinance literature, where Ahlers et al. (2015) is the only paper available to date that applies signaling theory to equity crowdfunding.

Information asymmetries matter when one party is not fully aware of the quality and behavioral intentions of the other party. Although insiders' intentions are not observable, potential investors can deduce them from the characteristics of an offer. Retained equity, or overhang, is typically interpreted as a signal of entrepreneurial intentions, and is strongly associated with the probability of success of an initial or follow-on offer in stock markets (Leland and Pyle 1977). Consistent with the corporate finance literature, if growth is the primary goal of crowdfunders committed to long-term goals, then they should be expected to retain control of a firm after an offering. As confirmation of the importance of this information, the percentage of equity offered is reported clearly on the home page of each project posted on an equity crowdfunding platform. Using regression analysis, we show that previous results from different financial settings hold in equity crowdfunding. We demonstrate that a larger percentage of equity offered by founders reduces the probability of equity crowdfunding campaign success.

Crowdfunders are typically first-time entrepreneurs. Unlike investors in other entrepreneurial finance settings, they cannot count on investment banks to stimulate

demand. Perhaps not surprisingly, therefore, fundraisers on UK crowdfunding platforms believe that the most important route to successful funder sourcing is through their existing social networks (Nesta 2014). In this paper, we extend social network theory to explain the role of entrepreneurs' professional connections in the success of crowdfunding campaigns. Consistent with Leyden et al. (2014), we document the importance of social networks in promoting innovation and reducing uncertainty. The social aspect of entrepreneurship increases the probability of entrepreneurial success by increasing the likelihood of raising funds in crowdfunding campaigns.

The paper is organized as follows. Section 2 presents a comparison of the regulation and development of equity crowdfunding in various countries. Section 3 provides the research hypotheses. Section 4 describes the data, variables, and methodology used in the study. Econometric results are reported in section 5, and conclusions are provided in section 6.

2 Regulation and crowdfunding markets around the world

Internet has long presented the promise of entrepreneurial finance democratization. Initially, online auction IPOs were viewed as alternatives to the traditional book-building method of IPO underwriting. Despite being considered an efficient market mechanism to lower the costs of going public (Ritter, 2013), the expectations of online auction IPOs were never realized. Only one investment bank, W.R. Hambrecht, has developed a platform for online public offerings, and only 20 companies in the US, most notably Google, have gone public with online auctions. With the burst of the internet bubble, investor confidence decreased while demand for more stringent regulation led to the 2002 Sarbanes-Oxley Act in the US and similar changes elsewhere (Akyol et al. 2014). The related increase in fixed costs of compliance with new regulation deterred many small firms from going public (Gao et al. 2013; Ritter et al. 2013). In 2012, the Jumpstart Our Business Startups Act alleviated the burden for those firms in many ways (Audretsch et al. 2015). In particular, Title III, the Capital Raising Online While Deterring Fraud and Unethical Non-Disclosure Act, enabled firms to sell limited amounts of equity to large numbers of investors *via* internet platforms. Nevertheless, as of November 2015, the Securities and Exchange Commission has yet to promulgate these regulations.

While equity crowdfunding remains unlawful in the US, regulatory changes aiming to facilitate its establishment are occurring throughout the world. Such efforts began in Australia, where the Australian Small Scale Offerings Board (ASSOB) was founded in 2007, making crowdfunding available to sophisticated investors. Since its inception, 176 companies have been successfully funded, raising more than US$150 million, through the ASSOB. Using data from this platform, Ahlers et al. (2015) found that financial roadmaps and risk factors, as well as internal governance, are determinants of crowdfunding campaign success. External certification, by contrast, has no impact.

Equity crowdfunding is most developed in the UK. Its regulation is defined in the FCA's Policy Statement PS14/4, which came into force in April 2014 after having been published and open for comments since October 2013. To invest in UK equity crowdfunding platforms, investors who are neither "sophisticated" nor "high net worth" must certify that they are not committing more than one-tenth of their net assets in a year. Investors must register as platform members, which requires them to certify that they are informed regarding investment's opportunities and risks or have received independent advice. After years of active reward-based crowdfunding in the UK, Seedrs was the first equity crowdfunding platform to be authorized by the FCA. Established in 2011, Crowdcube is, as of November 2015, the world's largest platform, with £115 million raised successfully from more than 225,000 investors. Other UK-based equity crowdfunding platforms include SyndicateRoom, ShareIn, VentureFounders, Funding Tree, Volpit, and Crowd For Angels.

Although other OECD countries allow the sale of equity shares to small investors through crowdfunding platforms, the amount of capital raised successfully to date is considerably lower than in the UK. In 2013, Italy was the first country in Europe to implement complete regulation of equity crowdfunding (*Decreto Legge* no. 179/2012 – *Decreto Crescita Bis*), creating a national registry for crowdfunding operators. Since 2014, a similar regulation has been applied to French portals, with the *Autorité des Marchés Financiers* requiring registration of crowdfunding investment advisers (*Conseiller en Investissements Participatifs*). A high number ofMany equity crowdfunding platforms are active in these countries, but only few projects have been financed successfully. As of November 2015, Italy had 14 active platforms, but only a handful of successfully financed projects. Similarly, the Netherlands and Sweden had

more than 10 platforms each (the largest are Symbid and FundedByMe, respectively), but very few equity campaigns.

In countries where equity crowdfunding is not yet legal, most legislative frameworks allow for certain profit-sharing arrangements. This is the case in Germany, which has Europe's largest economy, where the sale of shares carrying voting rights through crowdfunding platforms is not permitted. German platforms rely on the use of "*Partiarisches Darlehen*", a specific form of profit-participating loan. These bond-like securities do not carry voting rights. In Canada, equity crowdfunding is being approached on a provincial level. The first provinces to legalize it were Ontario and Saskatchewan in 2013. In the same year, legal guidelines were established in New Zealand.

Finally, cross-country crowdfunding investment can also occur. For instance, investors in UK platforms must be in countries where they may legally receive financial promotions, such as one of the EU member states. European platforms do not advertise investment opportunities to people in the US, Canada, or Japan, where investors cannot register or view pitches. Because securities regulations vary among countries, strategies aimed at expanding platforms across countries are not implemented easily. Nevertheless, given that crowdfunding has the natural ability to cross borders due to the prevalence of internet access, international platforms, such as isePankur and TrustBuddy, are being created. A few cross-border acquisitions have also taken place on existing platforms. For instance, Seedrs acquired the California-based Junction in November 2014 with the "hope to be in prime position to take advantage of the massive U.S. market opportunity"[1] when US regulation is eventually defined. Wisdom, an equity crowdfunding aggregator, was launched in 2014 to centralize equity campaigns, allowing investors to search for opportunities on numerous platforms in accordance with their criteria. Based on the ease with which the internet facilitates cross-jurisdictional investment, Cumming and Johan (2013) expect that investor demand will give rise to a "race to the top" in the regulation of crowdfunding.

3 Hypotheses

[1] See "Seedrs Advances to the US" (www.thefundingcentre.com).

Due to the novelty of the phenomenon, signaling mechanisms have been studied less thoroughly in the setting of crowdfunding than in traditional entrepreneurial finance (for a review, see Moritz and Block, 2015). Researchers have recently focused on the signals sent by projects' proponents to investors in non-equity crowdfunding platforms, suggesting that entrepreneurs' preparedness, i.e., the degree to which campaigns conform to the standards for successful pitches (Mollick 2014), and social capital (Colombo et al. 2015) are associated positively with campaign success. To date, only Ahlers et al. (2015) have examined signaling in equity crowdfunding. Using a sample of 104 projects on the Australian platform ASSOB, they identified characteristics of firms' TMTs (e.g., amount or level of education) and offers (e.g., intention to seek an exit by IPO or trade sale) that affect the probability of proposal success. While we control for these factors, we focus our attention on founders' behavior at the time of the offer and their social capital.

3.1 Equity retention

In a seminal paper, Leland and Pyle (1977) argued that entrepreneurs' willingness to invest in their own projects signals project quality. As firm owners know more than external investors about their projects, investors can look at owners' financial commitments to obtain information about unknown firm value. Entrepreneurs who are optimistic about the potential of a venture retain as much equity as possible. Those who are not as confident that the firm can generate positive cash flows in the future tend to raise money by selling higher proportions of equity to investors. The amount of equity retained by a company's founders is traditionally considered a positive signal to external investors, in the IPO context and in VC funding (Busenitz et al. 2005). We extend this research by arguing that this signal also plays a key role in the setting of equity crowdfunding.

The potential returns for successful business ideas are extremely high for crowdfunders, and entrepreneurs who are optimistic about the future prospects of their companies try to retain large amounts of equity shares to benefit from future appreciation. This process generates a separating equilibrium due to penalty costs. Although signal costs do not differ between high- and low-quality firms, owners of low-quality firms who retain high proportions of equity incur penalty costs generated by the

loss of wealth in the future. We thus argue that founders can signal their commitment through high ownership retention. Potential investors will perceive this behavior as a quality signal, which will increase their willingness to subscribe to the offer. These arguments lead to Hypothesis 1.

Hypothesis 1: A larger percentage of equity offered by founders will reduce the probability of equity crowdfunding campaign success.

3.2 Social networks

The role of entrepreneurs' social capital is important in entrepreneurial finance because network ties between entrepreneurs and potential investors influence the selection of ventures to fund, overcoming information asymmetries (Shane and Cable 2002). Recent publications have shown that the relationship between proponents' social capital and project outcome is positive in reward- and donation-based crowdfunding platforms. Using a sample of reward-based projects posted on Kickstarter, Mollick (2014) showed that the number of a founder's social network connections is associated positively with the capital raised from a project. Examining the same platform, Colombo et al. (2015a) found that the founder's social capital plays a crucial role in attracting backers in the early days of a campaign, which, in turn, mediates the success of the offer. The role of social capital in donation-based crowdfunding has also been confirmed (Ordanini et al. 2011). However, research on the role of entrepreneurs' social capital in the equity crowdfunding context is lacking.

A survey conducted by Nesta in 2014 showed that two-thirds of UK fundraisers considered their existing social network connections to be important for the success of their campaigns. In many cases, investors' connections with fundraisers predate crowdfunding campaigns. Most backers give funds to those they know at least by reputation, with only 28% backing someone unknown to them personally or through social networks. Entrepreneurs' social capital is therefore expected to play a key role in attracting early investments in equity crowdfunding campaigns.

The campaign of a proponent with a larger number of social network connections is expected to have a greater probability of success due to the greater likelihood of direct bids from those with whom s/he is connected. Additionally, as noted by Colombo et al. (2015a), social connections help to spread information and generate word-of-mouth

familiarity with projects (Arndt 1967). When posting projects on equity crowdfunding platforms, proponents often link their social network profiles to the platform accounts. Potential investors can thereby connect directly to founders *via* LinkedIn, Twitter, and Facebook, which is necessary to request additional information about projects before investing.[2] To this extent, social networks can help to reduce information asymmetry.

We argue that a greater number of an entrepreneur's social connections increases the probability of receiving outside financing, as stated in hypothesis 2.

Hypothesis 2. A larger number of founders' social connections will increase the probability of equity crowdfunding campaign success.

4 Research design

4.1 Sample and variables

We examine 271 equity crowdfunding campaigns posted on Crowdcube and Seedrs, two UK-based platforms. We collected information about 187 pitches posted on Crowdcube from its launch in February 2011 through August 2014, and 84 projects posted on Seedrs since 2012. Individual commitments are aggregated *via* the platform until funding targets are reached, with the crowdfunding scheme working in the traditional "all-or-nothing" fashion. Thus, campaigns are successful only when target amounts are reached, and pledges are then transferred within 6 weeks from the escrow accounts to the project proponents' accounts. Investors thus become direct shareholders in the companies. When targets are not reached, all pledges are voided.

Campaign success is measured as a dependent variable using the number of investors and funding amount at the end of each campaign. In line with previous studies (e.g., Colombo et al. 2015a; Vismara 2015), the *Funding_Amount* variable is measured as the percentage of target capital collected. This variable is a fine-tuned measure of campaign success that indicates how much capital has been raised (when ≥ 1) or how close the pitch was to reaching the target. The *No_Investors* variable, measured at the end of each campaign, is an important measure of success, as crowdfunders aim to accumulate a large number of backers. This goal is in line with the literature on public

[2] Related to network theory, investigation not only of proponents' social networks, but also the role of early investors in campaigns would be of interest. Unlike in other public equity markets, such as IPOs, the behavior of individual investors is transparent in crowdfunding platforms. Vismara (2015) found that information cascades play a crucial role in the success of equity crowdfunding campaigns.

offers, where, everything else equal, existing shareholders value the entry of a dispersed set of shareholders more than they value blockholders (Megginson 2005). Because this variable is measured in absolute terms, we include offer size (*Target_Capital*) among the control variables in regression analyses. We use a negative binomial regression for the number of investors and OLS for the percentage of capital raised. Given that successful pitches can be closed before the end of the campaign period, and campaign duration can be extended at the platform's discretion when the target amount has not been reached, we control for these ex-post changes in campaign duration by introducing a control variable (*Duration*) in regression analyses.

The explanatory variables are the percentage of equity offered to investors (*Equity_Offered*), as reported on the main page of each pitch, and *Social_Capital*, measured using the proponents' LinkedIn accounts. As in Colombo et al. (2015a), the number of founders' LinkedIn connections proxies for proponents' existing professional social contacts prior to the start of campaigns.[3]

We control for a series of project and proponent variables. First, we include among our regressors TMT size (*TMT_Size*) by counting the number of members in entrepreneurial ventures, as reported on the "Team" page of each pitch. As in Ahlers et al. (2015), we control for the target amount (*Target_Capital*) as a measure of project size. *Tax_Incentives* dummy identifies which projects qualifies under the UK Enterprise Investment Scheme, which was designed to encourage seed investments in early-stage companies of up to £1 million in capital raised. At listing, proponents declare their intentions with regard to exit and pay-out policies.[4] Similar to Ahlers et al. (2015), we use dummy variables equal to 1 when an exit through IPO was planned (*Exit_IPO*) and when exit was planned 5 years after the offer (*Late_Exit*). We also use a dummy variable to control for firms' intention to distribute *Dividends*. Finally, we control for offers launched on *Seedrs* (baseline = Crowdcube), those made by firms based in

[3] Six projects in our sample have two proponents, and two projects have three proponents. For these projects, *Social_Capital* is measured as the average number of proponents' LinkedIn connections.

[4] Proponents who list projects on Seedrs are not required to disclose their exit intentions. *Exit_IPO* and *Late_Exit* are equal to 0 in these cases.

London, and those founded by women (*Female_Founder*).[5] Year and industry fixed effects are included in all regression analyses.

Variable definitions and descriptive statistics are reported in Table 1, and the correlation matrix is shown in Table 2.

<INSERT TABLES 1 AND 2 ABOUT HERE>

4.2 Descriptive statistics

The average project in our sample raises 101.7% of the target capital from 92 investors (Table 1). Some projects attracted more than 900 investors and raised more than three times their targets. Typically, unsuccessful crowdfunding campaigns raised ≤25% of target capital; this was true for about one-third of projects in the sample. Predictably, given the incentives of an all-or-nothing framework, only 10% of projects remained unsuccessful after raising >50% capital. Conversely, a sizeable proportion of projects (28%) received pledges for 100–125% of the target capital and another 12% received pledges covering 125–150%. Figure 1 shows the average number of investors by funding amount. Projects that raised <25% of the target amount have an average of 18.7 investors. This number increases monotonically across funding amount classes, reaching an average of 185 investors for campaigns more than 1.5 times oversubscribed (*Funding_Amount* > 150).

The average entrepreneur in our sample has 330 LinkedIn connections, a much larger number than the 49 connections for Kickstarter entrepreneurs reported by Colombo et al. (2015a). Although this difference is due partly to Colombo et al.'s assignment of a 0 value for social capital when proponents were companies (only individuals can list equity crowdfunding projects), the social connections seem to be even more relevant in our sample. The average equity offered at listing is 13.6% and the average target capital is £143,700, resulting in an average crowdfunding offer of about £20,000, much larger than in reward-based crowdfunding (Colombo et al. 2015a; Mollick 2014).

[5] In the case of multiple proponents, the gender of the CEO determines the *Female_Founder* variable.

The number of TMT members (*TMT_Size*) ranges from 1 to 15, with an average of 3.3, similar to the 3.6 figure reported for ASSOB projects (Ahlers et al. 2015). Most projects (62.7%) are eligible for tax incentives under the Enterprise Investment Scheme (EIS). Although the average duration of campaigns in our sample is 57 days, only 14.8% of projects planned an exit 5 years after the crowdfunding pitch. About half (47.6%) of proponents are based in London and 11.1% are women. Seedrs accounts for 31% of the projects. Multicollinearity is not a major concern because no variance inflation factor exceeded 4, which is below the critical cut-off value of 10.

5 Results

Table 3 shows the results of regression analysis with dependent variables measuring crowdfunding campaign success. The evidence supports our hypotheses. First, a larger percentage of equity offered is associated with a smaller number of investors (model 1) and a smaller amount of capital raised (model 2, coefficient = –0.882, significant at 5%). As in other public equity offerings, entrepreneurs who retained high proportions of equity conveyed positive signals of commitment to investors. Second, the projects of founders with more connections have a greater probability of success in both model specifications (model 1, coefficient = 0.064; model 2, coefficient = 0.104; both significant at 5%). These results confirm our second hypothesis and support the relevance of social network theory in the equity crowdfunding context.

Among control variables, the number of TMT members is related positively to campaign outcome, reflecting this variable's perception by outside investors as a positive signal of a firm's ability to cope with market uncertainty. The target capital amount does not affect campaigns' relative capacity to raise funds, but it is related to the number of investors as a size effect (more investors are needed to raise more capital). These findings on TMT size and target capital are in line with those of Ahlers et al. (2015). Contrary to Ahlers et al. (2015), instead, proponents' stated intention to have an IPO exit does not significantly affect campaign outcome in our sample. Projects with a declared exit intention after more than 5 years attract fewer investors, but are equally likely to raise funds. Female founders do not differ in terms of ability to attract investors, but they raised less money. This new evidence warrants further investigation. Longer pitch duration is associated with reduced probability of success. Indeed,

proponents exercise the option to shorten pitch duration only when projects raise funds early. Finally, projects on Seedrs attracted more investors and funds than did those on Crowdcube, due to the greater overall success of this platform during the sampling period.

<INSERT TABLE 3 ABOUT HERE>

5.1 Robustness checks

We conducted a set of robustness checks. First, we performed the regression analysis using a dichotomous measure of campaign success, equal to 1 for campaigns reaching or exceeding their target capital, as in Ahlers at et al. (2015) and Colombo et al. (2015a). The results were in line with those obtained using the funding amount as the dependent variable. Second, we increased or changed the control variables. We introduced a dummy variable for pitches that offered rewards to investors. We confirm the results of Cholakova and Clarysse (2015) that the provision of reward does not impact the probability of success of equity crowdfunding campaigns, where investors look for financial return. Third, in addition to controlling for incentives obtained under the Enterprise Investment Scheme using the Tax_Incentives variable, we conducted regression analyses including pitches that qualified for Seed Enterprise Investment Scheme tax relief (80% of the sample). Finally, we examined exit options other than IPO, such as trade sales (72% of the sample) and management buyouts or share buy backs (11%). The significance levels of our explanatory variables in these analyses did not differ from those of the primary analyses.

Projects listed on Seedrs (about one-third of the sample; Table 1) are to some extent different from those posted on Crowdcube, as shown by the large number of variables correlated significantly with the Seedrs dummy variable (Table 2). We thus conducted regression analyses including only projects listed on Crowdcube. The results did not change, but statistical significance was reduced, arguably due to the smaller size of the sample. Although larger samples enabling more robust results will surely be available in a few years, we believe that pooling of data from the two platforms yielded sound results at this point.

Finally, we conclude this section with some remarks to compare our empirical setting with that of Ahlers et al. (2015). While the set of dependent and independent variables is similar, they also included *Share_Price* among their control variables. However, share prices are not visible on Seedrs or Crowdcube. Visitors to these platforms can see only the target amounts and percentages of equity offered. Of course, investors can derive company valuations (e.g., a campaign aiming to raise £100,000 by offering 10% of shares is valued at £1 million) and make decisions accordingly (although this signal is not immediate). Our regression analyses included *Equity_Offered* and *Target_Capital* as independent variables. Ahlers et al. (2015) examined ASSOB, a crowdfunding platform where bond-like securities are offered to a smaller set of investors (average, seven investors per campaign); in contrast, an average of 92.4 investors subscribed to campaigns in our sample. Moreover, whereas ASSOB requires reporting of the average parcel size (31,304 AUD [minimum 5,000 AUD], as reported by Ahlers et al. 2015), crowdfunders in the UK can invest as little as £10. The platforms make this information highly visible to attract amateur investors.

6 Discussion and conclusions

Advancements in information and communication technology have simplified interaction between those who want to invest money and those who need it. Accordingly, equity crowdfunding platforms are being established throughout the world to allow entrepreneurs to raise funds from diversified sets of investors. They face the challenge of signaling the quality of their project, among a plethora of investment options. Our paper contributes to the nascent crowdfunding literature, and in particular to the limited research on the determinants of the success of pure equity crowdfunding campaigns.

IPOs are the natural parallelism of equity public offerings *via* crowdfunding. As traditional stock markets target institutional and retail investors, equity crowdfunding platforms allows to both sophisticated and amateur investors to become shareholders of listing firms. Although a comparison of screening and selection activities between crowdfunding platforms and traditional stock markets is a matter for future research, in this paper we have described the current development of global equity crowdfunding markets and discussed the legal *status quo* of equity crowdfunding regulation in various

countries. Despite the increasing popularity of crowdfunding in the setting of entrepreneurial finance, academic research is still emergent, arguably because very few platforms have a sufficient number of projects for quantitative analysis. We conducted a comprehensive analysis of two British equity crowdfunding platforms (Crowdcube and Seedrs) to identify factors that increase the probability of campaign success. The UK is currently the only country with large pure equity crowdfunding platforms, where amateur investors have bought shares in hundreds of companies. This form of startup financing is indeed currently forbidden by regulation in the US. Other European countries either lack a specific regulation (e.g., Germany) or have more crowdfunding platforms than successfully funded campaigns (e.g., France and Italy).

Our study shows that, as in traditional corporate finance (Leland and Pyle, 1977), equity retention is perceived as a signal of quality. Founders who sell larger portions of their companies at listing are less likely to attract the interest of potential investors. Founders' behavior at listing is thus important to increase the probability of their ventures' success. Second, entrepreneurs' social connections help investors to reduce information asymmetries and have been demonstrated to influence venture finance decisions (e.g., Shane and Cable, 2002). Our study provides empirical evidence of the importance of these connections in equity crowdfunding, as they help to increase pitch popularity and thereby attract more investors and capital. In a struggle for visibility, proponents with larger social networks have greater chances of success. Consistent with Leyden et al. (2014), we observed that social network theory applies to entrepreneurial finance, as social networks help to reduce uncertainty and attract attention.

The limitations of this study offer avenues for further research. First, focusing on crowdfunders, future studies will benefit from larger samples to shed light on the possible role of investors' (in addition to proponents') reputations. Investigation of the behavior of business angels, who operate on equity crowdfunding platforms (Enterprise Research Centre 2014), could also provide insight on the complementarity or substitute roles of angel investors and crowdfunding. Second, focusing on proponents, the signals provided TMT members served only as control variables in this study. More in-depth examination of these aspects could reveal that they have more important roles. For instance, we measured entrepreneurs' social capital using the absolute number of

LinkedIn connections, but we did not qualify the socioeconomic importance of each contact.

As empirical analyses of equity crowdfunding are to date limited, several control factors used in this study warrant further investigation. For instance, we find that projects with declared exit intentions after more than 5 years attract fewer investors, but are equally likely to raise funds. On the contrary, female founders show the same ability to attract investors as their male counterparts, but raise less money. These findings are novel and warrant further research. Most importantly, whereas general crowdfunding platforms allow investors to deliver money to companies in exchange for products, rewards, or bond-like instruments, pure equity crowdfunding platforms allow investors to become shareholders of startups. Similar to IPOs, equity crowdfunding offerings are prime arenas for the examination of corporate governance. In the first study of corporate governance in firms raising equity capital through crowdfunding, Cumming et al. (2015b) focused on the roles of corporate governance mechanisms (e.g., non-executive board members) and voting rights. Further studies on these topics have the potential to generate new insight on the governance of entrepreneurial firms.

We believe that the results of our study have interesting implications for entrepreneurs and managers of crowdfunding platforms. We confirm that equity retention is a predictor of crowdfunding campaign success, as with IPOs. Entrepreneurs should thus consider this signaling effect when determining the amount of equity and voting rights to be offered at listing. For instance, they might consider a staged financing plan, in which crowdfunding serves as part of a sequential strategy. As preliminary evidence (not discussed in this paper), we find that a few firms had raised funds repeatedly on the same platform. This approach might be helpful in reducing information asymmetry in subsequent offerings. Last, our study remarks that project proponents can effectively rely on their personal connections in the initial stages of campaigns to attract larger numbers of contributions. Accordingly, platform managers should facilitate connections with social networks to increase the popularity of pitches and attract more investors.

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Table 1 Variables and descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max	Variable description
Pitch outcomes						
No_Investors (No.)	271	92.4	102.2	1	909	Number of investors that funded the project at the end of the campaign
Funding_Amount (%)	271	101.7	62.0	0	374	Total amount raised at the end of the campaign divided by the target capital
Explanatory variables						
Social_Capital (No.)	271	3.3	2.0	0	5	Number of proponent's LinkedIn connections/100
Equity_Offered (%)	271	13.6	8.2	0	45	Percentage of equity offered
Control variables						
TMT_Size (No.)	271	3.3	2.1	1	15	Number of firm's TMT members
Target_Capital (£1,000)	271	143.7	172.8	4	1150	Target capital to be raised
Tax_Incentives (%)	271	62.7	48.4	0	100	Dummy=1 if the Enterprise Investment Scheme (EIS) tax relief is available for investors; 0 otherwise
Exit_IPO (%)	271	8.5	27.9	0	100	Dummy=1 if the most-likely planned exit is an IPO; 0 otherwise
Late_Exit (%)	271	14.8	35.5	0	100	Dummy=1 if the exit is planned after 5 years; 0 otherwise
Dividends (%)	271	9.2	29.0	0	100	Dummy=1 if there is the intention to distribute dividends; 0 otherwise
Seedrs (%)	271	31.0	46.3	0	100	Dummy=1 for project published on Seedrs; 0 otherwise
London_Based (%)	271	47.6	50.0	0	100	Dummy=1 if the start-up location is London; 0 otherwise
Female_Founder (%)	271	11.1	31.4	0	100	Dummy=1 if the founder is a woman; 0 otherwise
Duration (days)	271	56.8	24.9	1	137	Duration of the campaign measured at the end of the pitch

Table 2 Correlation matrix

		1	2	3	4	5	6	7	8	9	10	11
1	Social_Capital	1										
2	Equity_Offered	-0.224*	1									
3	TMT_Size	0.002	-0.198*	1								
4	Ln_Target_Capital	0.066	0.209*	0.254*	1							
5	Tax_Incentives	-0.024	0.072	-0.222*	-0.331*	1						
6	Exit_IPO	-0.106	0.011	0.095	0.177*	0.003	1					
7	Late_Exit	-0.112	0.050	0.090	0.150*	0.007	0.097	1				
8	Dividends	-0.063	0.240*	-0.062	0.086	-0.125*	0.040	0.047	1			
9	Seedrs	0.182*	-0.156*	-0.237*	-0.412*	0.281*	-0.204*	-0.279*	-0.214*	1		
10	London_Based	0.235*	-0.020	-0.064	0.194	-0.087	-0.025	0.020	-0.074	0.032	1	
11	Female_Founder	0.010	0.043	0.055	-0.041	0.035	-0.107	-0.014	0.009	0.043	0.182*	1
12	Duration	-0.067	0.003	-0.047	-0.167	-0.010	-0.300	0.030	-0.112	0.175*	0.012	0.040

Significant correlations (99% confidence level) are identified with *.

Table 3 Determinants of campaign success

	Model (1) No. Investors	Model (2) Funding_Amount
Social_Capital	0.064**	0.104**
	(0.031)	(0.042)
Equity_Offered	-1.644**	-0.882**
	(0.680)	(0.413)
TMT_Size	0.098***	0.080***
	(0.024)	(0.020)
Ln_Target_Capital	0.382***	-0.046
	(0.065)	(0.057)
Tax_Incentives	0.033	-0.003
	(0.145)	(0.112)
Exit_IPO	-0.098	0.044
	(0.171)	(0.153)
Late_Exit	-0.287**	-0.098
	(0.146)	0.111)
Dividends	0.335*	0.114
	(0.189)	(0.138)
Seedrs	1.254***	0.710***
	(0.149)	(0.130)
London_Based	0.048	0.021
	(0.107)	(0.082)
Female_Founder	-0.155	-0.202**
	(0.163)	(0.096)
Duration	-0.003*	-0.004**
	(0.002)	(0.002)
Industry_Fixed_Effects	YES	YES
Year_Fixed_Effects	YES	YES
Constant	2.270***	1.237***
	(0.455)	(0.375)
Obs.	271	271
Lnalpha	-0.698***	
	(0.091)	
(Pseudo) R^2	0.0556	0.291

Significance level at 1% (***), 5% (**), and 10% (*).

Fig. 1 Average number of investors by funding amount (% relative to terget)