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Determinants of campaign success: Empirical evidence from equity crowdfunding in Japan*

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Abstract

This study investigates campaign success in equity crowdfunding, using campaigns listed on a leading Japanese equity crowdfunding platform. We examine how success depends on campaign- and firm-specific characteristics, including the campaign target amount. We provide evidence that campaigns launched by venture capital-backed firms are more likely to succeed than others. We also find that patenting has a positive effect on campaign success, as well as on the campaign target amount. Moreover, campaigns that have already provided services or products have a lower probability of success, although not always, and tend to set a lower target amount. Furthermore, campaigns launched by firms eligible for the Angel Tax System, introduced in Japan as a tax incentive for investment in young and small firms, have a higher tendency to succeed in equity crowdfunding.

Keywords: Angel Tax System; Campaign success; Equity crowdfunding; Patent; Target amount; Venture capital

JEL classification: G23; G24; M13

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1. Introduction

Equity crowdfunding attracts a substantial number of investors and funds in many countries and regions. Numerous scholars have addressed equity crowdfunding, following an increase its recognition since the 2010s.¹ Indeed, many studies have identified the factors that affect equity crowdfunding participation, measured by the number of investors and the funding amount (Ahlers et al., 2015; Block et al., 2018; Lukkarinen et al., 2016). Several scholars have extensively examined the probability of campaign success (Cumming et al., 2020, 2021; Hornuf et al., 2021; Nitani et al., 2019; Shafi, 2021; Vismara, 2019; Vulkan et al., 2016). In the literature, campaign success is defined as a case in which the amount pledged exceeds 100% or more of the campaign target amount (Colombo et al., 2015; Piva and Rossi-Lamastra, 2018). These studies provide ample evidence on the determinants of campaign success, given that the amount pledged in equity crowdfunding depends on campaign-, entrepreneur-, and firm-specific characteristics.

Campaign success is pivotal for entrepreneurs and crowd investors (crowd funders), especially in the case of an “all-or-nothing” rule, which means that campaigns are funded only if the amount pledged reaches a publicly declared threshold (i.e., target amount). This is because entrepreneurs do not obtain any funds pledged and crowd investors do not obtain any rewards in equity crowdfunding unless the amount pledged exceeds 100% or more of the campaign target amount. Meanwhile, the definition of campaign success indicates that the probability of campaign success depends not only on the amount pledged but also on the campaign target amount. Indeed, some scholars have found that the campaign target amount has a negative effect on campaign success (Cumming et al., 2021; Piva and Rossi-Lamastra, 2018; Ralcheva and Roosenboom, 2020; Vulkan et al., 2016). In this respect, it is conceivable that the campaign target amount is endogenously determined by the probability of campaign success. Moreover, firms may have an incentive to lower their target amount to ensure campaign success (Nitani et al., 2019). Nevertheless, little attention has been paid to how the campaign target amount is determined.

Presumably, the target amount varies across campaigns or firms, and it is assumed that the target amount is associated with campaign-specific characteristics. For instance, some firms seek a small amount of equity financing, while others devoted to research and development (R&D) may require large funds for R&D investment. However, even when these firms propose technology-based campaigns, they do not necessarily have a higher probability of campaign success, partly because of the large target amount for their R&D. Moreover, other firms may set

¹ For instance, special issues on crowdfunding appear in *Entrepreneurship Theory and Practice* (Bruton et al., 2015; Short et al., 2017) and *Journal of Technology Transfer* (Vismara, 2021). For a literature review on equity crowdfunding, see Mochkabadi and Volkmann (2020).

a lower target amount if they are willing to prioritize the advertisement of their developing services and products on equity crowdfunding platform rather than the funding campaign amount. In this respect, scholars should pay more attention to the setting of the target amount in equity crowdfunding. Furthermore, attractive projects tend to achieve the target amount faster than others. In other words, campaign duration may be associated with the target amount, but only a few studies have examined the time to campaign success (Nitani et al., 2019). Further investigation would help identify the determinants of campaign success on equity crowdfunding platforms.

This study investigates campaign success in equity crowdfunding, using campaigns listed on a leading Japanese equity crowdfunding platform, FUNDINNO, based on the all-or-nothing rule.² As previously mentioned, campaign success is pivotal for entrepreneurs and crowd investors in the case of the all-or-nothing rule. We examine how success depends on campaign- and firm-specific characteristics, including the campaign target amount. We provide evidence that campaigns launched by venture capital (VC)-backed firms are more likely to succeed. We also find that patenting has a positive effect on campaign success, as well as on the campaign target amount. Moreover, campaigns that have already provided services or products have a lower probability of success. However, this relationship is not always significant, and such campaigns tend to set a lower target amount, suggesting that firms aim to investigate the market and advertise their services/products rather than raise funds on equity crowdfunding platforms. Furthermore, campaigns launched by firms eligible for the Angel Tax System, introduced in 1997 in Japan as a tax incentive for investment in young and small firms, have a higher tendency to succeed in equity crowdfunding.

This study provides valuable evidence on equity crowdfunding. First, we shed light on differences in the time to the target amount—that is, the time to campaign success, which represents the level of attractiveness of campaigns. Our results indicate that some types of campaigns on equity crowdfunding platform; for example, firms that engage in R&D activities, are more likely to raise funds faster than others, suggesting that equity crowdfunding has potential to help the financing of R&D activities. Second, we identify the factors that affect the campaign target amount, while considering the endogeneity of the campaign target amount. We find that patenting has a positive effect not only on campaign success but also on the campaign target

² In some equity crowdfunding platforms, entrepreneurs can choose the keep-it-all rule, which means that campaigns are funded for the amount pledged without being dependent on campaign success. Some scholars have examined campaign success, including the choice between the all-or-nothing and keep-it-all rules (Bollaert et al., 2020). However, entrepreneurs cannot choose the keep-it-all rule in the equity crowdfunding platform used in this study.

amount, suggesting that such technology-based campaigns are more likely to achieve campaign success, even if entrepreneurs require huge funds. Third, by identifying the factors that negatively affect the campaign target amount, we provide novel insights into the advertising effect of campaigns on equity crowdfunding platforms. Specifically, the campaign target amount, in addition to the probability of campaign success, is lower when services/products are already developed. This suggests that some campaigns aim to investigate the market and advertise their services/products rather than raise funds on equity crowdfunding platforms. Such a distorted purpose may stem from equity crowdfunding restrictions imposed by regulations due to strong investor protection.

The remaining of this study is organized as follows. The next section introduces research background, including the hypothesis development. The third section presents the analytical framework of the study. The fourth section introduces the data used in this study. The fifth section presents our estimation results. Finally, the last section provides concluding remarks.

2. Research background

2.1. Equity crowdfunding

Start-up firms, especially high-tech start-ups, often face difficulties in financing because they have highly uncertain prospects, lack tangible assets that can be used as collateral, and face severe information problems (Bernstein et al., 2017; Hall and Lerner, 2010). Equity crowdfunding is expected to play a supporting role in reducing the early-stage funding gap (Brüntje and Gaijda, 2016; Mochkabadi and Volkmann, 2020). It involves benefits from fast access to a large pool of crowd investors and feedback from the equity crowdfunding market (Blaseg et al., 2021). In practice, the large financial flows to entrepreneurs in the UK via equity crowdfunding have been largely incremental to the traditional sources of early-stage entrepreneurial finance (Estrin et al., 2018).

Studies on equity crowdfunding often take five perspectives: (i) capital markets, (ii) entrepreneurs, (iii) institutions, (iv) investors, and (v) platforms (Mochkabadi and Volkmann, 2020).³ Among them, the entrepreneurial perspective has recently become more relevant worldwide. Empirical studies from an entrepreneurial perspective have provided ample evidence of equity crowdfunding in countries, such as Australia (Ahlers et al., 2015), France (Cumming et al., 2020), Germany (Blaseg et al., 2021; Block et al., 2018; Hornuf and Schvienbacher, 2018), the UK (Coakley et al., 2022; Cumming et al., 2021; Kleinert et al., 2020; Ralcheva and

³ Several studies have examined post-campaign outcomes after a successful crowdfunding campaign (Eldridge et al., 2021; Hornuf et al., 2018, 2021; Signori and Vismara, 2018). These studies are included in entrepreneurial perspective.

Roosenboom, 2020; Shafi, 2021; Vismara, 2016, 2018a, 2019; Vulkan et al., 2016), and the US (Borchers and Dunham, 2022; Cummings et al., 2020; Mamonov and Malaga, 2019).⁴ While several studies have examined equity crowdfunding in European countries (Nitani et al., 2019), there is a paucity of research on equity crowdfunding in other countries and regions, including Japan.

There are four types of crowdfunding business models: (i) donation-based, (ii) reward-based, (iii) lending, and (iv) equity crowdfunding (Cumming and Hornuf, 2018; Vulkan et al., 2016).⁵ Among them, equity crowdfunding has established itself as a financing alternative to traditional funding sources, including VC firms and angel investors (business angels) (Ralcheva and Roosenboom, 2020). Equity financing is often argued to have advantages over debt financing for R&D investment (Carpenter and Petersen, 2002; Hall, 2002). In particular, high-tech start-ups, including entrepreneurial inventors, often require equity financing rather than debt financing (Colombo and Grilli, 2007; Hall, 2010; Honjo, 2021a, 2021b). This is due to the business characteristics associated with high uncertainty and information asymmetry with external suppliers of capital. Young and small firms may also rely on equity crowdfunding because of the lack of credit history and track records. Hence, equity crowdfunding is expected to become a popular financing choice for such firms (Ralcheva and Roosenboom, 2020).

Table 1 summarizes the literature on campaign success in equity crowdfunding. Several studies have examined the probability of campaign using data from equity crowdfunding platforms in developed economies. As discussed, campaign success is pivotal for entrepreneurs and crowd investors in equity crowdfunding platforms based on the all-or-nothing rule. Even if the amount pledged in the campaign is high, entrepreneurs cannot obtain funds without campaign success. Moreover, crowd investors seek to make investment decisions, considering the probability of campaign success. Therefore, the determinants of campaign success are valuable for entrepreneurs, in addition to crowd investors and crowdfunding platform firms, to effectively raise funds on equity crowdfunding platforms. Furthermore, only a few studies have focused on the time to campaign success (Nitani et al., 2019). Examining the time to campaign success in equity crowdfunding platforms would be useful not only for the urgent financing of firms but also for a better understanding of what types of campaigns attract crowd investors.

⁴ Meoli et al. (2022) also examined the survival of security-based crowdfunding platforms, including equity crowdfunding ones, across OECD countries.

⁵ Reward-based crowdfunding can play a role in financing—specifically trade credit, such as notes and accounts payable—because crowd investors pay fees before the development of services/products. In reward-based crowdfunding, crowd investors have more informational advantages over bankers, as they can a priori choose services/products based on their own interests.

2.2. Determinants of campaign success

Crowd investors are willing to choose high-quality projects, as they can secure their returns on investments by participating in successful campaigns. However, crowd investors do not necessarily have sufficient information about project quality; that is, information asymmetries exist between entrepreneurs and crowd investors. Generally, crowd investors have imperfect information when evaluating project quality, partly because entrepreneurs usually provide fragmented information through their project descriptions (Kleiner et al., 2020). Unlike professional investors, such as VC firms, crowd investors lack the experience and capability to evaluate investment opportunities (Ahlers et al., 2015). Rather, equity crowdfunding could be built on the wisdom of the crowd (Schwienbacher and Larralde, 2012). While professional investors seek detailed due diligence in selecting firms, crowd investors in equity crowdfunding platforms have less incentive to devote substantial resources to the due diligence process (Vismara, 2019). Owing to little experience in selecting investments, crowd investors' decisions are susceptible to professional investors' decisions to invest in campaigns.

Presumably, information asymmetries in equity crowdfunding are more severe in entrepreneurial finance markets (Vismara, 2018b). This may be caused by a lack of experience and capability of crowd investors to evaluate investment opportunities (Ahlers et al., 2015). For entrepreneurs, there are potential costs associated with equity crowdfunding: the early public disclosure of entrepreneurial activities, communication costs with a large pool of crowd investors, and equity dilution associated with the discouragement of future investors (Blaseg et al., 2021). Under information asymmetries, crowd investors also face adverse selection (Walthoff-Borm et al. 2018a, 2018b). With adverse selection, entrepreneurs with high-quality projects facing challenges in signaling their quality could find it difficult to obtain high valuations (Meoli et al., 2022). Moreover, such entrepreneurs are less likely to seek equity financing because of loss of ownership and opportunity costs (Blaseg et al., 2021). The dispersed ownership of early-stage shareholders enables entrepreneurs to manage a substantial number of shareholders, which results in more effort and costs during follow-on funding. In this context, equity crowdfunding may attract entrepreneurs with low-quality projects than those with high-quality projects (Blaseg et al., 2021).

Presumably, campaign success in equity crowdfunding depends on how campaigns attract crowd investors and promote investment decisions. Under information asymmetries, some scholars have addressed the signaling effect of equity crowdfunding (Ahlers et al., 2015; Bapna, 2019; Block et al., 2018; Piva and Rossi-Lamastra; 2018). It is conceivable that the signaling associated with project quality significantly influences campaign success. To raise the necessary funding for business development, start-up firms voluntarily disclose business information, such

as qualitative business descriptions of business models, to crowd investors through online platforms or portals (Johan and Zhang, 2021). If entrepreneurs provide valuable information that attracts crowd investors, such campaigns increase the probability of success in equity crowdfunding. Under information asymmetries between entrepreneurs and crowd investors, credible signaling plays a significant role in raising funds. Indeed, signaling theory has already been applied in the literature on equity crowdfunding (Ahlers et al., 2015; Block et al., 2018; Vismara, 2016).

The presence of professional investors, such as VC firms, may signal project quality to crowd investors, which affects campaign success. In line with this argument, a firm's financial capital is associated with the probability of campaign success. In addition to the firm's financial capital, the entrepreneur's human capital also plays a vital role in campaign success (Piva and Rossi-Lamastra, 2018). Indeed, in the entrepreneurship literature, human capital is known to impact business success positively (Unger et al., 2011). The three dimensions for assessing the quality of campaigns—human capital, social capital, and intellectual capital—have been addressed extensively in the literature (Ahlers et al., 2015). Therefore, under the information asymmetry between entrepreneurs and crowd investors, information on the human capital of entrepreneurs and project members may have a significant impact on campaign success.

Furthermore, other studies have examined policy support for investment through equity crowdfunding. Tax incentives are more beneficial for investors. In practice, previous studies have examined the impact of policy support on campaign success using tax incentives in the UK, specifically, the Seed Enterprise Investment Scheme, designed to encourage seed investments in early-stage firms (Vismara, 2016, 2018a, 2019). However, the results did not reveal a significant effect of tax incentives on the probability of campaign success. Further investigations are required to evaluate public policies for the promotion of seed investments.

2.3. Campaign target amount and purpose of equity crowdfunding

The campaign target amount indicates entrepreneurs' demand for financing on equity crowdfunding platforms, while the total amount raised in equity crowdfunding represents the supply of financing from crowd investors. Some scholars have examined the impact of the campaign target amount on the total amount raised (Cumming et al., 2021; Vismara, 2016). Moreover, the campaign target amount, as well as the campaign duration, is controllable by entrepreneurs and firms, while the total amount raised is uncontrollable. Therefore, the campaign target amount is more likely to reflect firm strategy in equity crowdfunding platforms.

All else being equal, entrepreneurs should set a lower target amount to increase the probability

of campaign success. As discussed, some scholars have found that the target amount has a negative effect on campaign success (Cumming et al., 2021; Piva and Rossi-Lamastra, 2018; Ralcheva and Roosenboom, 2020; Vulkan et al., 2016).⁶ Their findings suggest that entrepreneurs have an incentive to set a lower target amount to increase the probability of campaign success. Particularly in the case of the all-or-nothing rule, this incentive becomes stronger because entrepreneurs do not obtain any of the funds pledged without campaign success. If the target amount varies according to campaign- and firm-specific characteristics, it is considered that the target amount is endogenously determined. However, to the best of our knowledge, no studies have estimated the determinants of the target amount or considered its endogeneity. Such investigation of the campaign target amount, including campaign duration, could provide a comprehensive understanding of equity crowdfunding success.

Furthermore, firms and project teams may seek to convey business value and advertise funding campaigns to potential investors (Johan and Zhang, 2020). Although equity crowdfunding differs from purchase-based crowdfunding, firms can identify advertising opportunities on equity crowdfunding platforms. In particular, start-up firms that use equity crowdfunding tend to lack a reputation in the financial, labor, and product markets; therefore, they have an incentive to advertise their services and products, including the firms themselves, on equity crowdfunding platforms. Crowd investors may provide other non-financial benefits, such as feedback and market validation (Walthoff-Borm et al., 2018b). They may provide valuable feedback and become brand ambassadors for the firm and its products (Schwienbacher and Larralde, 2012). Especially with equity crowdfunding limited to the upper amount of funding, entrepreneurs may seek advertisements for their services/products, including test marketing, rather than raise funding. Such advertising effects in equity crowdfunding may be associated with the setting of the campaign target amount.

2.4. The Japanese context

New financial alternatives to seeding entrepreneurship, including crowdfunding, are being developed in many countries (Bruton et al., 2015). This is partly because bank financing has become less available since the global financial crisis of the late 2000s (Clayton et al., 2018; Harrison, 2013). However, bank debt financing still plays a central role in some countries, such as Japan, which has a bank-centered financial system (Pinkowitz and Williamson, 2001; Sasaki and Suzuki, 2019; Weinstein and Yafeh, 1998).

⁶ Using the case of Kickstarter in the US for reward-based crowdfunding, some scholars found that the probability of campaign success is negatively associated with campaign success (Colombo et al., 2015; Mollick, 2014).

Indeed, various programs facilitate the flow of funds for small and medium enterprise (SME) lending in Japan. Regional banks, *shinkin* banks (credit associations), and credit cooperatives have been established to provide funds to local businesses. With regard to business start-ups, the Japan Financial Corporation (JFC), a government-affiliated financial institution, has loan programs to promote these activities by providing a stable supply of long-term loans. In particular, public policies have been implemented to enhance debt financing for SMEs, including start-up firms, whenever the Japanese economy is stagnant.⁷

However, private equity capital is less common in Japan (Honjo and Nagaoka, 2018). According to the Global Entrepreneurship Monitor data, Japan has the lowest level of investment by individuals in new businesses among developed economies (Honjo, 2015; Honjo and Nakamura, 2020). Moreover, VC investment is not high in Japan, compared to other developed economies, such as the UK and the US.⁸ In Japan, therefore, equity crowdfunding is expected to provide equity funds to SMEs, including high-tech start-ups, as a growing financial means. It can be manifested whether equity crowdfunding is required for entrepreneurial inventors, by focusing on bank-centered financial systems, such as Japan, rather than market-based financial systems.

In Japan, five equity crowdfunding platform firms (FUNDINNO, CAMPFIRE Startups, Unicorn, Angel Navi, and Ecrowd), which are registered as type-I small-amount electronic public offering service providers and the members of the Japan Securities Dealers Association (JSDA), has operated equity crowdfunding platforms as of December 2021. Because of the indirect network effects of crowdfunding, it is often dominated by a single platform (Agrawal et al., 2014). As of August 2021, approximately 78% of equity crowdfunding campaigns in Japan were listed on FUNDINNO, a leading equity crowdfunding platform in Japan.⁹ Figure 1 displays the number of campaigns and total amount on equity crowdfunding platforms in Japan. In recent years, equity crowdfunding has been developing in Japan, as shown in Fig. 1.

It is important to note that equity crowdfunding in Japan is strictly regulated. Specifically,

⁷ The total amount of loans to start-ups (consisting of those that have yet to start and those that are within one year of start-up) was 161.5 billion JPY in fiscal year (FY) 2019 and 247.7 billion JPY in FY 2020. Moreover, the JFC also provides the COVID-19 Hybrid Subordinated Loan Program to firms for reinforcing financial foundations under an economic environment greatly affected by the coronavirus pandemic. As of March 31, 2021, the JFC made loan decisions for 2,373 businesses worth 397.0 billion JPY. For more details on the JFC's activities, see the JFC website. https://www.jfc.go.jp/n/english/pdf/jfc2021e_0.pdf [accessed on January 10, 2022]

⁸ For more details on VC investment, see the OECD Statistics website. https://stats.oecd.org/Index.aspx?DataSetCode=VC_INVEST [accessed on January 20, 2022]

⁹ For more details on equity crowdfunding platform firms in Japan, see the JSDA website. <https://market.jsda.or.jp/shijyo/kabucrowdfunding/index.html> [accessed on January 6, 2022].

investors are permitted to invest no more than 500 thousand JPY per firm each year, and firms are only allowed to raise less than 100 million JPY following the Financial Instrument and Exchange Act. In the US, investors were only permitted to invest no more than 1.07 million USD yearly, similar to Japan's upper limit. However, funding regulations in the US were partially amended in March 2021, and firms were recently allowed to raise up to 5 million USD. Moreover, the upper limit is not available for firms and most investors in the UK. In these respects, we realize that Japan's equity crowdfunding regulations are much more stringent.¹⁰

Furthermore, in April 2020, the Angel Tax System in Japan was applied to equity crowdfunding platforms operated by type-I small-amount electronic public offering service providers. The Angel Tax System consists of two types of tax benefits. (i) Type A, which can be applied for investment into firms less than three years old (five years old after the tax reform in April 2020), is a deduction from gross income (deduction calculated by the amount of investment in target firms minus 2 thousand JPY) for the year. (ii) Type B, which can be applied for investment into firms less than 10 years old, is a deduction from capital gains (deduction of the amount invested in target firms from other capital gains) for the year (Small and Medium Enterprise Agency, 2017). After April 2020, equity crowdfunding platform firms certified by the Ministry of Economy, Trade and Industry, Japan can issue whether an equity crowdfunding campaign is eligible for the Angel Tax System.¹¹ Such tax benefits enable crowd investors to invest in equity crowdfunding campaigns.

3. Hypotheses development

In equity crowdfunding platforms, information asymmetries regarding project quality exist

¹⁰ For more details on regulations in equity crowdfunding platforms in Japan, see the JSDA website.

<https://market.jsda.or.jp/shijyo/kabucrowdfunding/seido/gaiyou/index.html> [accessed on January 6, 2022].

For more details on equity crowdfunding in the US, see "Regulation Crowdfunding: A Small Entity Compliance Guide for Issuers" and "SEC Harmonizes and Improves "Patchwork" Exempt Offering Framework" on the US Securities and Exchange Commission (SEC) website.

<https://www.sec.gov/info/smallbus/secg/rccomplianceguide-051316.htm> [accessed on January 6, 2022].

<https://www.sec.gov/news/press-release/2020-273> [accessed on January 6, 2022].

For more details on equity crowdfunding in the UK, see "PS14/4: The FCA's regulatory approach to crowdfunding over the internet, and the promotion of non-readily realizable securities by other media" on the Financial Conduct Authority website.

<https://www.fca.org.uk/publications/policy-statements/ps14-4-fca%E2%80%99s-regulatory-approach-crowdfunding-over-internet-and> [accessed on January 6, 2022].

¹¹ Originally, equity crowdfunding campaigns were issued by prefectural governments; therefore, equity crowdfunding campaigns eligible for the Angel Tax System before April 2020 are available in the data set.

between entrepreneurs and crowd investors. Under these conditions, signaling may play a significant role in raising funds and determining campaign success in equity crowdfunding. According to signaling theory, third parties can certify project quality to outside investors and prior financing positively affects campaign success (Kleinert et al., 2020).¹² Several scholars have found that successful campaigns in equity crowdfunding attract professional investors, such as VC firms (Butticè et al., 2020; Hornuf et al., 2018). By contrast, investors with a public profile increase the appeal of the offer among early investors, who, in turn, attract late investors (Vismara, 2018a). Several firms raise funds through angel investors, VC firms, crowdfunding, and grants before equity crowdfunding campaigns. The types of investors participating in equity crowdfunding campaigns—in other words, current financial capital—may influence campaign success.

The presence of professional investors, such as VC firms, may give crowd investors a sense of security for monetary returns, presumably because professional investors invest in equity crowdfunding to realize monetary returns (Vismara, 2019). VC firms typically use the most selective and reliable screening processes (Kleinert et al., 2020; Mason and Harrison, 2002; Van Osnabrugge, 2000). In addition, affiliations with VC firms are expected to better firm performance, so they may increase the chances of obtaining follow-on financing (Kleinert et al., 2020). In this respect, it is plausible that VC financing prior to equity crowdfunding significantly impact the probability of campaign success. However, it is unclear whether the presence of professional investors, such as VC firms, attracts crowd investors, partly because VC participation in the early stages prevents crowd investors from obtaining control rights. Therefore, some crowd investors may be unwilling to participate in equity crowdfunding campaigns controlled by professional investors. To examine whether the presence of professional investors, such as VC firms, attracts crowd investors in equity crowdfunding platforms, we test the following hypothesis:

H1: Campaigns launched by professional investor-backed firms are more likely to succeed in equity crowdfunding than others.

As previously mentioned, equity financing has advantages over debt financing for R&D investment (Carpenter and Petersen, 2002; Hall, 2002). As a new financial alternative, equity crowdfunding is expected to become a popular financing choice for young and innovative firms

¹² Walthoff-Born et al. (2018a) examined the types of firms that search for equity crowdfunding, based on the pecking order theory, and found that firms listed on equity crowdfunding platforms are less profitable, have excessive debt levels more often, and have more intangible assets than others.

(Ralcheva and Roosenboom, 2020). Indeed, some studies have found that firms that use equity crowdfunding have a higher rate of patent applications (Walthoff-Borm et al., 2018a, 2018b). In addition, intellectual property, such as patents, can be viewed as a credible signal that conveys information to crowd investors about a firm's innovation capabilities (Ralcheva and Roosenboom, 2020). Crowd investors expect patent-related campaigns to exhibit a higher level of skills and technologies. From the signaling theory perspective, patents signal project quality to outside investors (Walthoff-Borm et al., 2018a). Moreover, if crowd investors have an incentive to support technological development through equity crowdfunding, research campaigns, including academic activities, are more likely to succeed. Therefore, campaigns proposed by entrepreneurs who pursue technological development may attract more crowd investors. Hence, we test the following hypothesis:

H2: Campaigns launched by firms with patent applications and registrations are more likely to succeed in equity crowdfunding than others.

Moreover, entrepreneurs may expect financial and non-financial benefits through equity crowdfunding, unlike those who obtain only financing, such as bank loans. Some firms, especially those already providing their services/products, may expect non-financial benefits, such as feedback and market validation, on equity crowdfunding platforms (Walthoff-Borm et al., 2018b). More interestingly, Bollaert et al. (2020) emphasized the “narcissists hypotheses” in equity crowdfunding, which indicates that narcissistic entrepreneurs are more likely to set a lower target amount, choose the keep-it-all rule and set a longer campaign duration. They concluded that the campaigns of narcissistic entrepreneurs are less successful. Therefore, among campaigns, some entrepreneurs may pursue advertising—mainly to show off their campaigns—but such campaigns do not necessarily succeed in equity crowdfunding. This is partly because entrepreneurs do not expect significant financing due to funding regulations on the total amount that can be raised in equity crowdfunding. Thus, we examine whether the development of services/products is associated with campaign success.

H3: Campaigns associated with the development of services/products are less likely to succeed in equity crowdfunding than others.

Furthermore, we examine whether policies introduced into equity crowdfunding in Japan effectively increase the probability of campaign success. As discussed, few studies have examined

policy support, such as tax incentives, for investment via equity crowdfunding (Vismara, 2016, 2018a, 2019). While tax incentives are expected to encourage investment in start-up firms, whether such a policy helps provide equity capital on equity crowdfunding platforms for new businesses remains an open question. Therefore, we test the following hypothesis:

H4: Campaigns launched by firms eligible for the Angel Tax System are more likely to succeed in equity crowdfunding than others.

4. Data

4.1. Data source

We construct a sample of equity crowdfunding campaigns listed on FUNDINNO, owned by FUNDINNO, Inc. (formerly, Japan Cloud Capital, Inc.), an equity crowdfunding platform service initially founded in Japan. As already mentioned, FUNDINNO is a leading equity crowdfunding platform, and approximately 78% of equity crowdfunding campaigns in Japan were listed on FUNDINNO as of August 2021.

FUNDINNO follows the all-or-nothing rule. In this platform, equity crowdfunding campaigns involve 10 types of information: (i) VC backing, (ii) corporate venture capital (CVC) backing, (iii) angel investor-backing, (iv) past funding experience in FUNDINNO, (v) profitability in the preceding accounting year, (vi) existence of developed services/products, (vii) patent applications/registrations, (viii) common shares or stock options, (ix) eligibility for the Angel Tax System, and (x) shareholders' benefits. All this information would be useful to crowd investors when they make investment decisions.¹³

4.2. Sample

The sample consisted of 242 campaigns conducted from November 2017 to August 2021.¹⁴ In the sample, 77% of the 242 campaigns were successful. As shown in Table 1, we find that this average success, specifically the mean probability of campaign success, is much higher than that in other economies, except in the case of German equity crowdfunding (Ralcheva and Roosenboom, 2020). This is partially due to the limitation of the upper bound of equity

¹³ We do not use information of (vii) common shares or stock options, because campaigns are eligible for the Angel Tax system when shares are issued, but not when stock options are granted. In fact, a dummy variable for stock options is negatively correlated with that for the Angel Tax System.

¹⁴ Among equity crowdfunding campaigns listed on FUNDINNO, three campaigns were a priori excluded because they were suspended before being launched. In addition, 18 campaigns were a priori excluded because these campaigns had an extraordinary long duration (over 30 days).

crowdfunding to less than 100 million JPY and the rigorous screening process by equity crowdfunding platforms.

Figure 2 shows the distributions of the ratio of the amount pledged in the sample. The ratio is less than one if the campaign fails and not less than one if the campaign succeeds. Many successful campaigns receive twice the target amount, and some receive approximately four times or more of the target amount. However, many unsuccessful campaigns failed by a wide margin. These findings indicate that the amount pledged on the equity crowdfunding platform is highly skewed, consistent with Agrawal et al. (2014).

4.3. Method

We use a binary response model—specifically, a probit model—to identify the factors affecting the probability of campaign success. Most empirical studies have estimated the determinants of campaign success using a binary response model, such as logit and probit models (Piva and Rossi-Lamastra, 2018; Ralcheva and Roosenboom, 2020). Moreover, we employ a survival analysis approach to consider the differences in the time to campaign success between campaigns. In this study, the proportion of successful campaigns accounts for approximately 77% of the sample. Some campaigns succeeded soon after the firms launched them. By doing so, we provide evidence of how fast campaigns succeed in equity crowdfunding.

We employ non-parametric and semi-parametric techniques, specifically the survival estimator proposed by Kaplan and Meier (1958) and the proportional hazards model proposed by Cox (1972), following prior literature (Felipe et al., 2022).¹⁵ In this study, we use the Kaplan-Meier (K-M) survival estimator to measure the fraction of campaigns that have not yet achieved the target amount at time t . In addition, we use the proportional hazards model to identify the factors affecting the time to campaign success.

4.4. Covariates

Whether a campaign succeeds is measured by a binary variable (*Success*) in this study.¹⁶ This variable takes the value of one if the (cumulative) amount pledged in equity crowdfunding is not less than the campaign target amount during the campaign period. We calculate the cumulative

¹⁵ Felipe et al. (2022) targeted reward-based crowdfunding, Catarse in Brazil, but only a few studies targeting equity crowdfunding have examined the time to campaign success in the literature (Nitani et al., 2019).

¹⁶ We do not examine the number of investors in this study. The upper amount of individual investment is limited to no more than 500 thousand JPY, and most crowd investors tend to invest a similar amount following the upper limit. Thus, examining the number of investors does not provide additional findings.

amount pledged by the campaign to determine campaign success.¹⁷ We also define the target amount ($\ln Target$) as the logarithm of the campaign target amount (million JPY). It is important to note that the firm that launches the campaign and the platform firm (FUNDINNO, Inc.) decide the campaign target amount in advance.

Regarding the variables for hypothesis testing, VC backing (VC) is measured by a dummy variable that takes the value of one if the firm is backed by VC prior to equity crowdfunding. In addition to VC backing, CVC backing (CVC) is measured by a dummy variable that takes the value of one if the firm is backed by a non-financial firm or CVC. We also use a dummy variable for angel investors (*Angel investors*), which takes the value of one if the firm is backed by angel investors. Following Ahlers et al. (2015) and Vismara (2018a), we capture patents (*Patent*) using a dummy variable that takes the value of one if the firm gains or applies for a patent. We use a dummy variable for services/products (*Services/products*), which takes the value of one if the firm has already provided services/products before launching the campaign. The Angel Tax System (*Angel Tax System*) is measured by a dummy variable that takes the value of one if the firm's campaign is eligible for the Angel Tax System, including both Types A and B.

As controls, we include capital size ($\ln Capital$) when the campaign is launched to control for differences in firm size between campaigns. We also use team size ($\ln Team$) to control for differences between campaigns, such as networks, according to the number of team members. Moreover, the firm's funding experience in FUNDINNO before the campaign's launch (*Experience*) is measured by a dummy. Furthermore, we measure firm age ($\ln Age$) and the campaign start year (year dummies).¹⁸ Table A1 in the Appendix provides the definitions of the variables used in this study.

Table 2 presents descriptive statistics of the variables used in the regression equations. The mean amount pledged is approximately 28 million JPY, and the maximum amount pledged is 99 million JPY due to the upper limit of equity crowdfunding, 100 million JPY. The mean age of firms on the equity crowdfunding platform is approximately 5 years, and the mean target amount of campaigns is approximately 16 million JPY.

Table 3 presents the means of the variables used, according to the success or failure of the campaigns. While the mean amount pledged in the successful campaign group is larger than that

¹⁷ If a crowd investor cancels the investment or does not pay the amount pledged within the period of payment, we do not include it in the cumulative amount pledged by the campaign.

¹⁸ To control changes in the equity crowdfunding platform over time, instead of year dummies, we use the logarithm of the number of crowd investors registered in the equity crowdfunding platform at the launch of the campaign. Consequently, we obtain similar results when using the logarithm of the number of crowd investors.

in the unsuccessful campaign group, the mean target amount in the successful campaign group is smaller than that in the unsuccessful campaign group. Campaigns that seek to raise more funds from crowd investors do not always succeed in equity crowdfunding. In addition, the VC and Angel Tax System dummies differ between successful and unsuccessful campaigns, indicating that campaigns launched by VC-backed firms and those launched by firms eligible for the Angel Tax System are more likely to succeed in equity crowdfunding. However, the CVC, angel investors, patent, and services/products dummies do not significantly differ between successful and unsuccessful campaigns.

5. Results

5.1. Probability of campaign success: probit model

Table 4 presents the estimation results for campaign success when the probit model is used, and a positive coefficient indicates that the factor increases the probability of campaign success. Column (i) in Table 4 reports the estimation results for the probability of campaign success when the above covariates (*VC*, *CVC*, *Angel investors*, *Patent*, *Services/products*, *Angel Tax System*, *lnCapital*, *lnTeam*, *Experience*, *lnAge*, *lnTarget*, and year dummies) are included in the regression equation. However, the target amount (*lnTarget*) may depend on campaign-specific characteristics; thus, it may be endogenously determined. In addition, the Angel Tax System dummy (*Angel Tax System*) may be correlated with firm age (*lnAge*), along with the crowdfunding experience dummy (*Experience*), because firms under 10 years of age are eligible for the Angel Tax System. For these reasons, the target amount is excluded in columns (ii) and (iv), and firm age and the crowdfunding experience dummy are excluded in columns (iii) and (iv) to avoid multicollinearity. Moreover, we present the estimation results for the probability of campaign success in Tables A3 and A4 in the Appendix when the endogeneity of the target amount (*lnTarget*) is taken into account.

As Table 4 shows, the VC dummy (*VC*) has a positive and significant effect on the probability of campaign success. The results indicate that campaigns launched by VC-backed firms are more likely to succeed in equity crowdfunding than others. Therefore, we provide support for H1. However, we find no significant relationships for the CVC and angel investors dummies. In other words, campaigns launched by firms backed by CVC, including non-financial firms, and those backed by angel investors do not necessarily have a higher probability of campaign success in equity crowdfunding. These findings suggest that VC, compared to CVC, including non-financial firms, and angel investors, attracts more crowd investors, partly because of VC's experience in selecting investments with due diligence. This also suggests that the impact of professional

investors on the probability of campaign success varies according to the type of investor.

In Table 4, we find that the patent dummy (*Patent*) has a positive and significant effect on the probability of campaign success. The results indicate that campaigns launched by firms with patent applications and registrations are more likely to succeed in equity crowdfunding than others, which supports H2. However, the coefficients of patents are insignificant in columns (ii) and (iv) when the target amount is excluded. As shown in Table A3 in the Appendix, the patent dummy is positively associated with the target amount, presumably because firms with intellectual capital require more funding for R&D. Thus, by controlling the target amount, we find that the probability of campaign success is higher for firms with patent applications and registrations. While R&D-intensive firms set a higher target amount, such firms are more likely to attract crowd investors because of campaigns with innovative potential. The findings also suggest that patenting has a positive effect on campaign success as a signal of campaign quality.

Although the services/products dummy (*Services/products*) has a negative effect on the probability of campaign success, it is insignificant in columns (i), (ii), and (iv). While the estimated coefficients indicate that campaigns associated with the development of services/products have a lower probability of campaign success, our results do not fully support H3. Table A3 in the Appendix shows that the services/products dummy is negatively associated with the target amount, indicating that such campaigns are more likely to set a lower target amount. Previous studies argue that equity crowdfunding is used for marketing purposes (Mollick, 2014). Therefore, several firms aim to investigate the market and advertise their services/products rather than raise equity capital. If a firm's reputation increases with campaign success, it has an incentive to set a lower target amount to increase the probability of campaign success. However, despite a lower target amount, campaigns associated with the development of services and products do not exhibit a higher probability of campaign success.

The Angel Tax System dummy (*Angel Tax System*) has a positive and significant effect on the probability of campaign success in Table 4. The results indicate that campaigns launched by firms eligible for the Angel Tax System are more likely to succeed in equity crowdfunding than others, supporting H4. The Angel Tax System attracts crowd investors; thus, the Angel Tax System effectively promotes campaign success in equity crowdfunding.

As for controls, the coefficients of the number of team members (*lnTeam*) are positive and significant for campaign success in Table 4. The results indicate that campaigns launched by large teams are more likely to succeed in equity crowdfunding, suggesting that such campaigns have advantages for investors' networks. Furthermore, the campaign target amount (*lnTarget*) has a negative and significant effect on the probability of campaign success. The results indicate that

campaigns set to a lower target amount have a higher probability of campaign success, which is consistent with previous studies (Cumming et al., 2021; Piva and Rossi-Lamastra, 2018; Ralcheva and Roosenboom, 2020; Vulkan et al., 2016)

5.2. Time to campaign success: survival analysis approach

We calculate the K-M survival estimates according to private equity participation prior to equity crowdfunding. Figure 3 displays the K-M survival estimates when the sample is divided according to the following dummies: (a) *VC*, (b) *CVC*, and (c) *Angel investors*. Figure 4 also displays the K-M survival estimates when the sample is divided according to the following dummies: (d) *Patent*, (e) *Services/products*, and (f) *Angel Tax System*.

In Fig. 3, we find significant differences in the K-M survival estimates between VC participation and others, while there are no differences between CVC participation and others and between angel investors participation and others. These findings on the impact of VC participation on campaign success are consistent with those in Table 4. In Fig. 4, we find a significant difference in the K-M survival estimates for patents and the Angel Tax System, whereas there is no difference for the development of services/products. Therefore, the findings using K-M survival estimates support H2 and H4.

Table 5 presents the estimation results for the time to campaign success when the proportional hazards model is used, and a positive coefficient indicates that the factor accelerates the time to campaign success. The covariates used in each column of Table 5 are consistent with those of Table 4.

The VC dummy has a positive effect on the time to campaign success at the 1% level in Table 5, indicating that campaigns launched by VC-backed firms are more likely to succeed in equity crowdfunding earlier than others. As shown in Tables 4 and 5, the results reveal that VC participation prior to equity crowdfunding has a positive effect on campaign success. Similarly, we find no evidence of the impact of CVC participation, in addition to angel investors participation, on the time to campaign success.

In addition, the patent dummy has a positive and significant effect on the time to campaign success. Therefore, we find that patenting is positively associated with the time to campaign success, as well as the probability of campaign success, although its coefficients are not significant in columns (ii) and (iv) of Table 4. The results indicate that campaigns launched by firms with patent applications and registrations are more likely to succeed in equity crowdfunding earlier than others.

However, although the services/products dummy has a negative effect on the time to

campaign success, its effect is not significant in Table 5. We do not find any evidence of the impact of the development of services/products on the time to campaign success. Even though campaigns that develop services/products tend to maintain a certain level of campaign success by setting a lower target amount, they do not achieve the target amount faster in equity crowdfunding.

Furthermore, the Angel Tax System dummy has a positive effect on the time to campaign success at the 1% level. The findings of the time to campaign success are consistent with those of the probability of campaign success. The results reveal that firms eligible for the Angel Tax System are more likely to succeed in equity crowdfunding earlier than others, suggesting that campaigns eligible for the Angel Tax System effectively attract crowd investors.

6. Conclusions

This study investigated campaign success in equity crowdfunding, using campaigns listed on a leading Japanese equity crowdfunding platform. We examined how success depends on campaign- and firm-specific characteristics, including the campaign target amount. We provided evidence that campaigns launched by VC-backed firms are more likely to succeed than others. We also found that patenting has a positive effect on campaign success, as well as the campaign target amount. The results indicate that firms that engage in R&D activities are more likely to raise funds, suggesting that equity crowdfunding has potential to help the financing of R&D activities. Moreover, campaigns that have already provided services or products have a lower probability of success, although this relationship is not always significant. Such campaigns tend to set a lower target amount, suggesting that firms aim to investigate the market and advertise their services/products rather than raise funds on the equity crowdfunding platform. Furthermore, campaigns launched by firms eligible for the Angel Tax System have a higher tendency to succeed in equity crowdfunding.

As already argued, numerous scholars have addressed equity crowdfunding since the 2010s and the majority of samples used in the literature on crowdfunding tend to be primarily focused on European countries and the US. Only a few studies have included data from other nations including Australia, Brazil, Canada, China, India, New Zealand, Singapore, and Taiwan (Mochkabadi and Volkmann, 2020). To the best of our knowledge, there have been no academic studies on crowdfunding, including equity crowdfunding, in Japan, where private equity capital, including informal investors, has not yet been developed (Honjo and Nakamura, 2020). Under equity crowdfunding with a limited amount of funding, we provide new findings on the behavior of entrepreneurs and crowd investors. As this study focuses on campaigns launched by firms in Japan, its results may stem from Japan's economic conditions. However, the findings would be

useful in gaining insights into policies that can develop financial alternatives to promote entrepreneurial innovation in other economies that depend on bank financing. Although we do not directly provide evidence on policy changes to private equity capital, the findings of this study would lead to an understanding of the importance of equity crowdfunding in these economies.

This study has some limitations. First, we did not examine post-campaign outcomes because of a lack of data on firm performance, although some studies have examined them (Eldridge et al., 2021; Hornuf et al., 2018, 2021; Signori and Vismara, 2018). Therefore, it is unclear whether firms improve performance by raising funds on equity crowdfunding platforms. Second, we did not consider alternative financing instruments, such as subsidies and public loan programs. Further research is needed to evaluate the role of equity crowdfunding in nurturing start-up firms with growth potential.

Despite these limitations, we provide new evidence on the factors that affect campaign success in equity crowdfunding, specifically, the impact of VC participation and patenting on campaign success. More importantly, we provide novel insights into the mechanisms that increase campaign success by including the campaign target amount. In practice, even if firms that have developed their services/products tend to set a lower target amount, our findings suggest that their campaigns do not succeed in equity crowdfunding, implying that they seek to promote their services/products rather than raise funds on equity crowdfunding platforms. Such promotion with equity crowdfunding may be caused by limitations in funding—specifically, 100 million JPY per year on Japanese equity crowdfunding platforms. This distorted purpose may also stem from strict regulations arising from strong investor protection in equity crowdfunding. For policymakers and crowdfunding platform firms, investor protection against adverse selection is essential in ensuring the sustainability of equity crowdfunding markets (Walthoff-Borm et al., 2018b). As is often argued, unsophisticated investors require more protection through regulations (Goethner et al., 2021). However, overly strong investor protection, particularly relevant in equity crowdfunding in Japan, may harm small firms, including entrepreneurial initiatives, although this contrasts with the traditional law and finance view that stronger investor protection is better (Hornuf and Schwiendacher, 2017). Our findings could be useful in considering regulations for effective equity crowdfunding platforms.

Appendix

Table A1 summarizes the definitions of variables used in this study. Table A2 presents the correlation matrix for the variables.

Although we estimated the probit model in Table 4, the target amount varies between

campaigns; thus, it is conceivable that campaign-specific characteristics determine the campaign target amount. Although the literature has paid less attention to the relationship between the campaign target amount and campaign success, it may help us identify whether the factors are associated with the campaign target amount rather than the pledged amount, which may be able to manage the probability of campaign success. Hence, the campaign target amount may be endogenously determined in the regression model.

Table A3 presents the estimation results for campaign success, corresponding to Table 4, when the probit model with a continuous endogenous covariate is used. While column (i) in Table A3 reports the estimation results for the target amount in the first stage, column (ii) reports the results for the campaign success, assuming that the target amount (*lnTarget*) is a continuous endogenous covariate in the second stage. To identify the target amount in column (i), we use the following instruments: campaign period (*lnDuration*), funding experience in FUNDINNO (*Experience*), firm age (*lnAge*), and the number of crowd investors (*lnInvestors*). However, as firm age (*lnAge*) is correlated to the number of crowd investors (*lnInvestors*), firm age (*lnAge*) is excluded from the regression equation in column (iii), and column (iv) reports the estimation results for the campaign success.

Table A4 presents the estimation results for campaign success based on the duration data. In Table A4, a discrete-time duration model is used because a continuous endogenous covariate cannot be included in the proportional hazards model (i.e., the continuous-time duration model). To estimate the discrete-time duration model, we defined a binary variable (*Success_P*), which equals one at time *t* when *Success* = 1 for the campaign. To consider campaign-specific effects, we used the cluster variance of the campaign as the cross-section identifier. Furthermore, to specify the time-specific term, we included the logarithm of hours from the campaign launch (*lnHours*).

As shown in Table A3, the coefficients of services/products are negative and significant for campaign success. In Table A4, the coefficients of the Angel Tax System are positive and significant. However, the Wald test of the exogeneity of the instrumented variables in Table A3 does not reject the null hypothesis of no endogeneity; thus, the probit model, as shown in Table 5, is preferable. Likewise, the Wald test in Table A4 does not reject this either. Consequently, the findings presented in Tables A3 and A4 are consistent with those in Tables 4 and 5, and the results are robust, irrespective of the endogeneity of the target amount.

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Table 1. Literature on campaign success in equity crowdfunding

Literature	Economy	Platform	Period	<i>N</i>	Ave. success
Ahlers et al. (2015)	Australia	ASSOB	10/2006–10/2011	139 camp.	7%
Borchers and Dunham (2022)	US	(Various platforms)	5/2016–6/2019	580 camp.	57%
Coakley et al. (2022)	UK	Crowdcube Seedrs SyndicateRoom	2013–2018	1291 camp.	59%
Cumming et al. (2020)	France	WiSEED	2009–9/2016	64 camp.	28%
Cumming et al. (2021)	UK	Crowdcube	2013–2016	167 camp.	49%
Hornuf and Schwienbacher (2018)	Germany	Companisto Innvestment Seedmatch United Equity	11/2011–8/2014	89 camp.	81%
Kleinert et al. (2020)	UK	Crowdcube	4/2017–4/2018	221 camp.	56%
Nitani et al. (2019)	Germany UK Finland Sweden	Companisto Crowdcube Invesdor FundedByMe	7/2014–2/2015	319 camp.	67%
Piva and Rossi-Lamastra (2018)	Italy	SiamoSoci	Mid/2011– 12/2013	284 entre. (129 camp.)	13%
Ralcheva and Roosenboom (2020)	UK	Crowdcube Seedrs	2012–2017	1303 camp. 868 camp.	43% 46%
Shafi (2021)	UK	Crowdcube	9/2015–8/2016	207 camp.	54%
Vismara (2019)	UK	Crowdcube	1/2014–12/2015	345 camp.	51%
Vulkan et al. (2016)	UK	Seedrs	7/2012–9/2015	636 camp.	34%

Note: *N* indicates the number of campaigns (camp.) or entrepreneurs (entre.). Ave. success indicates the percentage of successful campaigns (or successful entrepreneurs).

Table 2. Descriptive statistics of variables

Variables	<i>N</i>	Mean	SD	Min	Median	Max
<i>Success</i>	242	0.77	-----	-----	-----	-----
<i>Amount pledged</i>	242	28.40	19.82	1.89	24.96	99.00
<i>Target</i>	242	15.67	9.04	5.00	14.90	80.00
<i>lnTarget</i>	242	2.64	0.45	1.61	2.70	4.38
<i>VC</i>	242	0.28	-----	-----	-----	-----
<i>CVC</i>	242	0.44	-----	-----	-----	-----
<i>Angel investors</i>	242	0.68	-----	-----	-----	-----
<i>Patent</i>	242	0.36	-----	-----	-----	-----
<i>Services/products</i>	242	0.77	-----	-----	-----	-----
<i>Angel Tax System</i>	242	0.38	-----	-----	-----	-----
<i>lnCapital</i>	242	2.70	1.29	-0.92	2.97	6.20
<i>lnTeam</i>	242	1.31	0.45	0.00	1.39	2.30
<i>Experience</i>	242	0.19	-----	-----	-----	-----
<i>lnAge</i>	242	3.58	1.07	0.00	3.68	6.25
<i>lnDuration</i>	242	0.96	0.58	0.15	0.95	3.38
<i>lnInvestors</i>	242	9.65	0.58	8.06	9.70	10.40

Note: SD indicates standard deviation. *N* indicates the number of observations.

Table 3. Mean differences between successful and unsuccessful campaigns

Variables	Success Mean (a)	Non-success Mean (b)	Difference (a) – (b)
<i>Amount pledged</i>	34.50	8.14	26.36***
<i>Target</i>	14.96	18.03	-3.07**
<i>lnTarget</i>	2.61	2.73	-0.12*
<i>VC</i>	0.32	0.13	0.20***
<i>CVC</i>	0.45	0.41	0.04
<i>Angel investors</i>	0.68	0.70	-0.02
<i>Patent</i>	0.38	0.27	0.11
<i>Services/products</i>	0.76	0.80	-0.05
<i>Angel Tax System</i>	0.42	0.27	0.15**
<i>lnCapital</i>	2.76	2.48	0.28
<i>lnTeam</i>	1.35	1.18	0.17**
<i>Experience</i>	0.20	0.16	0.04
<i>lnAge</i>	3.56	3.64	-0.07
<i>lnDuration</i>	0.96	0.98	-0.02
<i>lnInvestors</i>	9.66	9.63	0.04
Number of campaigns	186	56	242

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Estimation results for the probability of campaign success: Probit model (coefficients)

Covariates	(i)	(ii)	(iii)	(iv)
<i>VC</i>	0.743*** (0.272)	0.685** (0.279)	0.746*** (0.272)	0.683** (0.281)
<i>CVC</i>	0.0905 (0.226)	0.0399 (0.219)	0.0722 (0.223)	0.0476 (0.218)
<i>Angel investors</i>	-0.116 (0.218)	-0.116 (0.212)	-0.108 (0.216)	-0.102 (0.210)
<i>Patent</i>	0.584** (0.227)	0.324 (0.210)	0.551** (0.221)	0.311 (0.210)
<i>Services/products</i>	-0.416 (0.259)	-0.123 (0.244)	-0.466* (0.253)	-0.163 (0.241)
<i>Angel Tax System</i>	0.399* (0.219)	0.468** (0.212)	0.388* (0.207)	0.489** (0.201)
<i>lnCapital</i>	0.0634 (0.101)	0.0464 (0.108)	0.0401 (0.0937)	0.0101 (0.101)
<i>lnTeam</i>	0.749*** (0.240)	0.610*** (0.229)	0.703*** (0.232)	0.591*** (0.227)
<i>Experience</i>	-0.204 (0.259)	-0.128 (0.257)		
<i>lnAge</i>	-0.0459 (0.105)	-0.0813 (0.104)		
<i>lnTarget</i>	-0.981*** (0.264)		-0.945*** (0.262)	
Year dummies	Yes	Yes	Yes	Yes
Constant term	Yes	Yes	Yes	Yes
Number of campaigns	242	242	242	242
Log pseud-likelihood	-109	-115	-110	-116
Wald test: zero coefficients	42.2***	28.9***	39.6***	28.2***

Note: The dependent variable is *Success*. The figures in parentheses are robust estimates of standard errors. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5. Estimation results for the time to campaign success: Proportional hazards model (coefficients)

Covariates	(i)	(ii)	(iii)	(iv)
<i>VC</i>	0.428*** (0.137)	0.363*** (0.139)	0.426*** (0.137)	0.361*** (0.139)
<i>CVC</i>	0.0953 (0.134)	0.0791 (0.134)	0.0877 (0.133)	0.0772 (0.133)
<i>Angel investors</i>	-0.0889 (0.124)	-0.0800 (0.133)	-0.0834 (0.124)	-0.0754 (0.132)
<i>Patent</i>	0.405*** (0.130)	0.259** (0.131)	0.391*** (0.127)	0.248* (0.129)
<i>Services/products</i>	-0.0976 (0.132)	0.00969 (0.147)	-0.138 (0.122)	-0.0281 (0.139)
<i>Angel Tax System</i>	0.347*** (0.127)	0.372*** (0.127)	0.325*** (0.120)	0.365*** (0.119)
<i>lnCapital</i>	0.0212 (0.0610)	0.0277 (0.0650)	0.00254 (0.0560)	0.00831 (0.0606)
<i>lnTeam</i>	0.491*** (0.154)	0.383** (0.154)	0.477*** (0.151)	0.372** (0.152)
<i>Experience</i>	-0.154 (0.162)	-0.111 (0.163)		
<i>lnAge</i>	-0.0300 (0.0657)	-0.0405 (0.0680)		
<i>lnTarget</i>	-0.733*** (0.146)		-0.727*** (0.145)	
Year dummies	Yes	Yes	Yes	Yes
Number of campaigns	242	242	242	242
Log pseudo-likelihood	-916	-923	-917	-923
Wald test: zero coefficients	77.5***	50.0***	76.4***	49.1***

Note: The figures in parentheses are robust estimates of standard errors. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1. Definitions of variable used in this study.

Variable	Definition
<i>Success</i>	(=1) if the cumulative amount pledged by the campaign on the equity crowdfunding platform is no less than the campaign target amount in the campaign period (i.e., successful campaign), and (=0) otherwise (i.e., unsuccessful campaign).
<i>Success_P</i>	(=1) if <i>Success</i> = 1 at time <i>t</i> , and (=0) otherwise.
<i>Amount pledged</i>	Cumulative amount pledged (million JPY) by the campaign.
<i>Target amount</i>	Campaign target amount (million JPY).
<i>lnTarget</i>	Logarithm of the campaign target amount (million JPY).
<i>VC</i>	(=1) if the firm is backed by VC before the launch of the campaign, and (=0) otherwise.
<i>CVC</i>	(=1) if the firm is backed by a non-financial firm or CVC before the launch of the campaign, and (=0) otherwise.
<i>Angel investor</i>	(=1) if the firm is backed by angel investors (individual investors other than founders and family) before the launch of the campaign, and (=0) otherwise.
<i>Patent</i>	(=1) if the firm gained or applied for a patent, and (=0) otherwise.
<i>Services/products</i>	(=1) if the campaign already provides services/products before the launch of the campaign, and (=0) otherwise.
<i>Angel Tax System</i>	(=1) if the firm is eligible for the Angel Tax System, and (=0) otherwise.
<i>lnCapital</i>	Logarithm of capital stock (million JPY) of the firm when the campaign is launched.
<i>lnTeam</i>	Logarithm of the number of team members for the campaign.
<i>Experience</i>	(=1) if the firm has funding experience in FUNDINNO before the launch of the campaign, and (=0) otherwise.
<i>lnAge</i>	Logarithm of firm age at the launch of the campaign.
(Year dummies)	(=1) if the campaign launches in the year (2019, 2020 or 2021), and (=0) otherwise.
<i>lnHours</i>	Logarithm of hours from the launch of the campaign.
<i>lnDuration</i>	Logarithm of the number of days set for the campaign.
<i>lnInvestors</i>	Logarithm of the number of crowd investors registered in FUNDINNO at the launch of the campaign.

Note: Reference category for year dummies is 2017 and 2018.

Table A2. Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) <i>Success</i>	1															
(2) <i>Amount pledged</i>	0.58	1														
(3) <i>Target amount</i>	-0.13	0.28	1													
(4) <i>lnTarget</i>	-0.10	0.37	0.91	1												
(5) <i>VC</i>	0.20	0.26	0.13	0.19	1											
(6) <i>CVC</i>	0.05	0.09	-0.11	-0.08	0.05	1										
(7) <i>Angel investor</i>	0.01	0.08	-0.03	0.04	0.10	0.25	1									
(8) <i>Patent</i>	0.12	0.31	0.10	0.13	0.03	0.02	0.03	1								
(9) <i>Services/products</i>	-0.04	-0.10	-0.37	-0.34	-0.02	0.18	0.10	0.01	1							
(10) <i>Angel Tax System</i>	0.12	0.07	-0.11	-0.15	-0.05	0.00	0.04	0.03	0.05	1						
(11) <i>lnCapital</i>	0.09	0.24	-0.02	0.09	0.37	0.33	0.25	0.17	0.17	0.00	1					
(12) <i>lnTeam</i>	0.17	0.11	-0.02	-0.02	0.07	0.21	0.15	0.02	0.08	0.06	0.16	1				
(13) <i>Experience</i>	0.02	0.12	-0.09	-0.08	0.08	0.12	0.09	0.06	0.15	0.23	0.26	0.08	1			
(14) <i>lnAge</i>	-0.05	0.05	-0.03	0.06	0.11	0.13	0.01	0.14	0.24	-0.21	0.42	0.08	0.13	1		
(15) <i>lnDuration</i>	-0.05	-0.02	0.10	0.14	0.00	-0.19	-0.16	-0.11	-0.15	-0.10	-0.16	-0.08	-0.05	0.00	1	
(16) <i>lnInvestors</i>	0.02	-0.03	-0.28	-0.35	-0.19	0.29	0.03	0.20	0.37	0.14	0.03	0.20	0.11	0.05	-0.50	1

Note. The number of campaigns is 242.

Table A3. Estimation results for the probability of campaign success: Probit model with a continuous endogenous covariate

Covariates	(i)	(ii)	(iii)	(iv)
	<i>lnTarget</i>	<i>Success</i>	<i>lnTarget</i>	<i>Success</i>
<i>VC</i>	0.0530 (0.0584)	0.688** (0.289)	0.0496 (0.0585)	0.698** (0.298)
<i>CVC</i>	0.00514 (0.0533)	0.0904 (0.207)	0.00539 (0.0534)	0.0964 (0.210)
<i>Angel investors</i>	0.0654 (0.0543)	-0.0193 (0.244)	0.0595 (0.0542)	-0.0260 (0.258)
<i>Patent</i>	0.176*** (0.0512)	0.750*** (0.229)	0.182*** (0.0510)	0.747*** (0.252)
<i>Services/products</i>	-0.205*** (0.0648)	-0.625** (0.298)	-0.190*** (0.0638)	-0.611* (0.321)
<i>Angel Tax System</i>	-0.0840 (0.0521)	0.200 (0.311)	-0.0990* (0.0506)	0.221 (0.346)
<i>lnCapital</i>	0.0175 (0.0236)	0.0608 (0.0869)	0.0271 (0.0225)	0.0587 (0.0894)
<i>lnTeam</i>	0.0652 (0.0557)	0.727*** (0.250)	0.0694 (0.0558)	0.739*** (0.251)
<i>Experience</i>	-0.0355 (0.0662)		-0.0324 (0.0692)	
<i>lnAge</i>	0.0294 (0.0244)			
<i>lnDuration</i>	0.0611 (0.0442)		0.0613 (0.0450)	
<i>lnInvestors</i>	0.335** (0.165)		0.328** (0.165)	
<i>lnTarget</i>		-2.212** (1.064)		-2.120 (1.346)
Year dummies	Yes	Yes	Yes	Yes
Constant term	Yes	Yes	Yes	Yes
Number of campaigns		242		242
Log likelihood		-206		-207
Wald test: zero coefficients		57.2***		51.1***
Wald test: exogeneity		0.73		0.43

Note: The dependent variable is *Success*. The figures in parentheses are standard errors. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *lnTarget* is an endogenous variable. *lnDuration*, *Experience*, *lnAge*, and *lnInvestors* are used as instruments for *lnTarget*.

Table A4. Estimation results for the time to campaign success: Probit model with a continuous endogenous covariate (discrete-time duration model)

Covariates	(i)	(ii)	(iii)	(iv)
	<i>lnTarget</i>	<i>Success</i>	<i>lnTarget</i>	<i>Success</i>
<i>VC</i>	0.170* (0.0899)	0.979 (0.708)	0.169* (0.0930)	0.904 (0.808)
<i>CVC</i>	0.0512 (0.0959)	0.0533 (0.268)	0.0404 (0.0926)	0.0551 (0.263)
<i>Angel investors</i>	-0.173* (0.0919)	-0.272 (0.373)	-0.171* (0.0963)	-0.295 (0.366)
<i>Patent</i>	0.282*** (0.0922)	0.793** (0.364)	0.286*** (0.0890)	0.810** (0.324)
<i>Services/products</i>	-0.214 (0.135)	-1.158* (0.691)	-0.213 (0.136)	-1.088 (0.749)
<i>Angel Tax System</i>	0.0460 (0.0846)	0.122 (0.309)	0.0379 (0.0856)	0.114 (0.301)
<i>lnCapital</i>	-0.0390 (0.0413)	-0.150 (0.134)	-0.0359 (0.0444)	-0.148 (0.140)
<i>lnTeam</i>	0.401*** (0.0927)	1.633** (0.651)	0.404*** (0.0959)	1.578** (0.763)
<i>lnHours</i>	0.0540 (0.0412)		0.0490 (0.0585)	
<i>Experience</i>	-0.107 (0.160)		-0.0856 (0.170)	
<i>lnAge</i>	0.0170 (0.0389)			
<i>lnDuration</i>	-0.0296 (0.0900)		-0.0402 (0.0544)	
<i>lnInvestors</i>	0.191 (0.772)		0.118 (0.726)	
<i>lnTarget</i>		-2.871*** (0.627)		-2.923*** (0.475)
Year dummies	Yes	Yes	Yes	Yes
Constant term	Yes	Yes	Yes	Yes
Number of campaigns		6,212		6,212
Log pseudo-likelihood		-4784		-4793
Wald test: zero coefficients		174***		204***

Wald test: exogeneity

0.79

0.67

Note: The dependent variable is *Success_P*. The figures in parentheses are cluster-robust standard errors at the campaign level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *lnTarget* is an endogenous variable. *lnDuration*, *Experience*, *lnAge*, and *lnInvestors* are used as instruments for *lnTarget*.

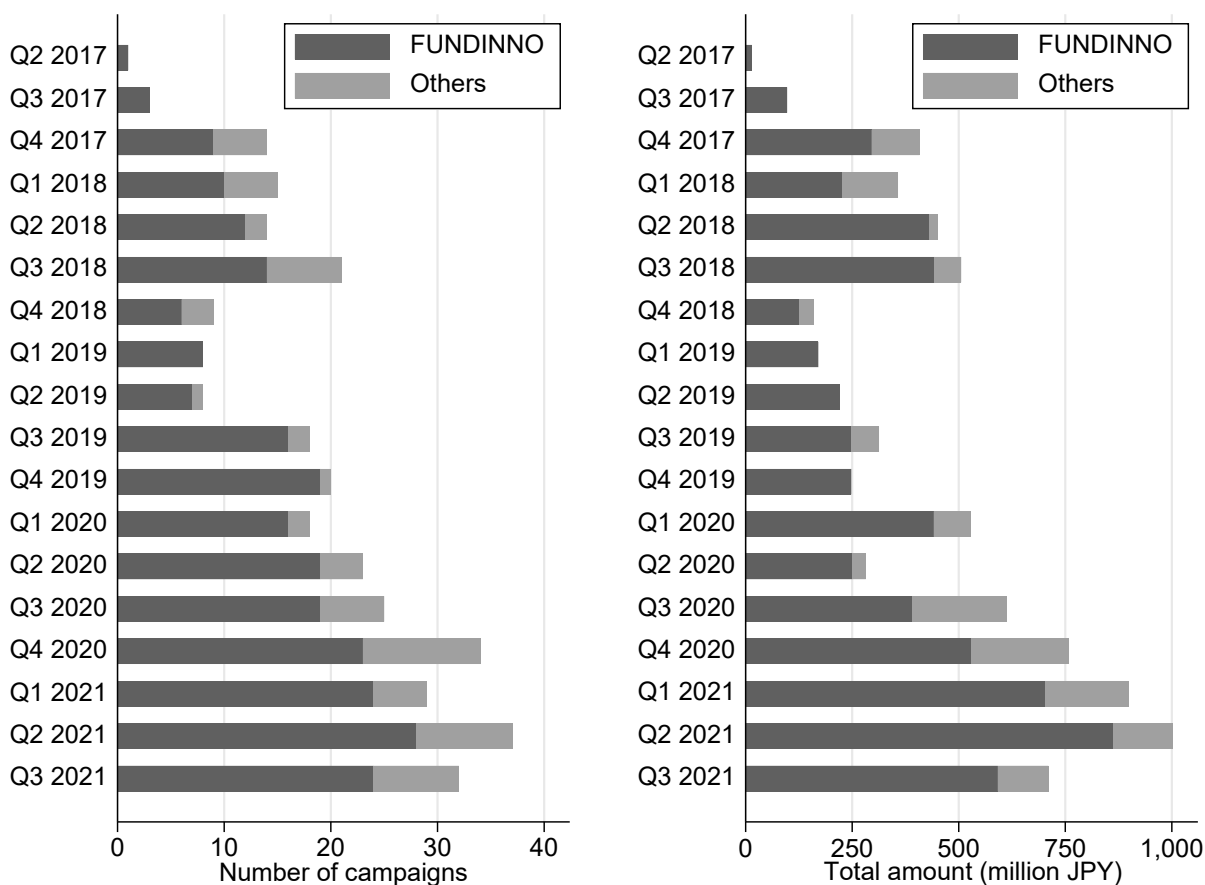


Fig. 1. Number of campaigns and total amount pledged on equity crowdfunding platforms in Japan

Source: JSDA website

https://www.jsda.or.jp/shiryoshitsu/toukei/kabucrowdfunding/index.html?_ga=2.144795764.1107716731.1647926998-1350480052.1647926998 [accessed on March 22, 2022]

Note: The number of campaigns indicates the number of issued stocks and granted stock options on FUNDINNO and the other equity crowdfunding platforms in Japan, regardless of campaign success. The total amount indicates the total amount (million JPY) pledged through issued stocks and stock options on FUNDINNO and the other equity crowdfunding platforms in Japan.

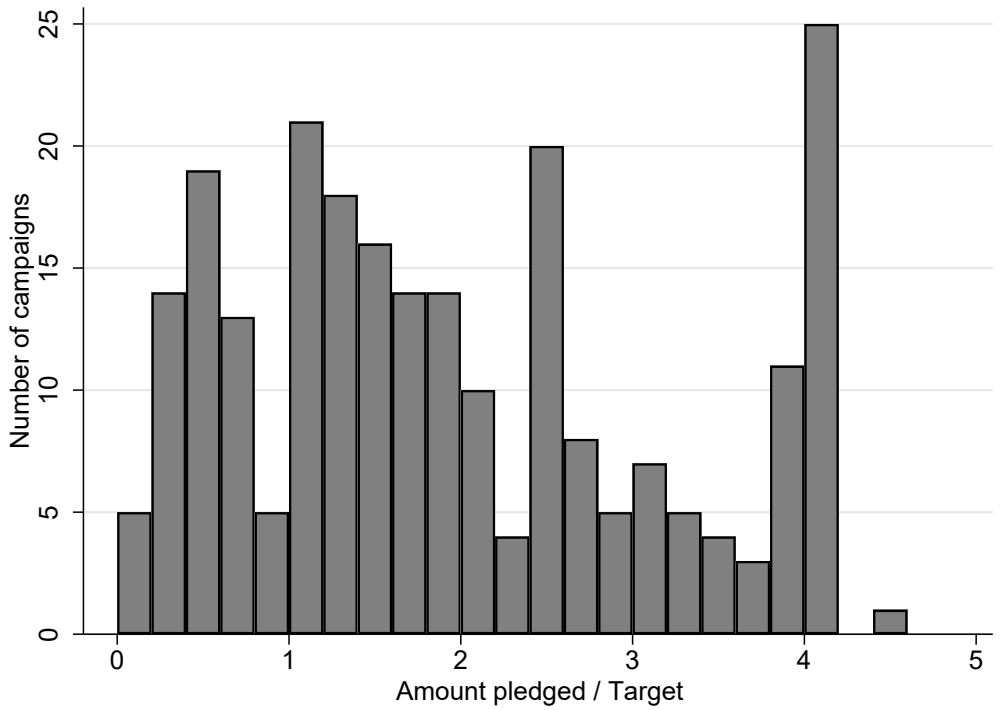


Fig. 2. Distribution of the ratio of the amount pledged to the campaign target amount.

Note: The total number of campaigns is 242. Amount pledged / Target indicates the ratio of the amount pledged to the campaign target amount. When a campaign fails, this ratio is less than one.

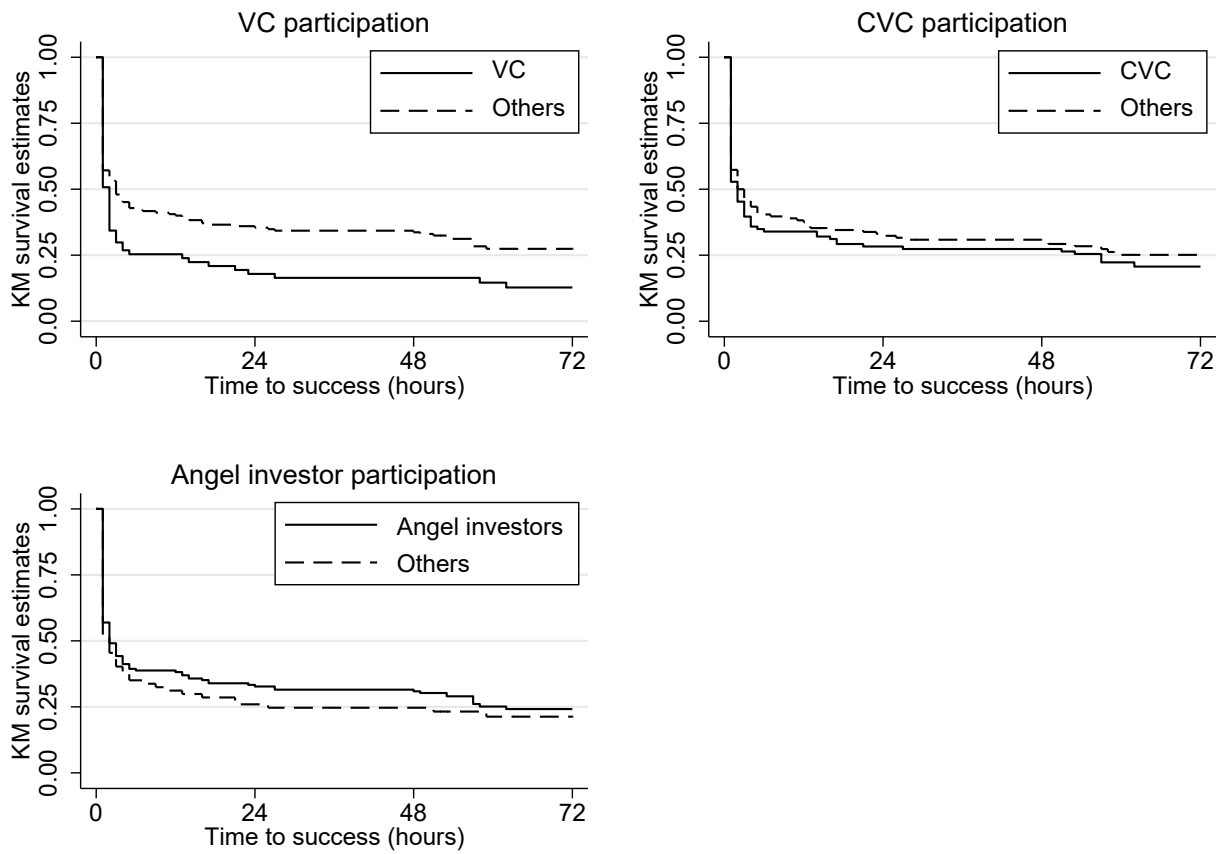


Fig. 3. Kaplan-Meier survival estimates: VC, CVC, and angel investors

Note: The figures illustrate the Kaplan-Meier survival estimates (KM survival estimates) of campaign success between the two groups. The total number of observations is 242. Chi-square log-rank test statistics are 7.62 ($p < 0.01$), 0.77 ($p > 0.1$), and 0.22 ($p > 0.1$) for VC, CVC, and angel investor participation, respectively.

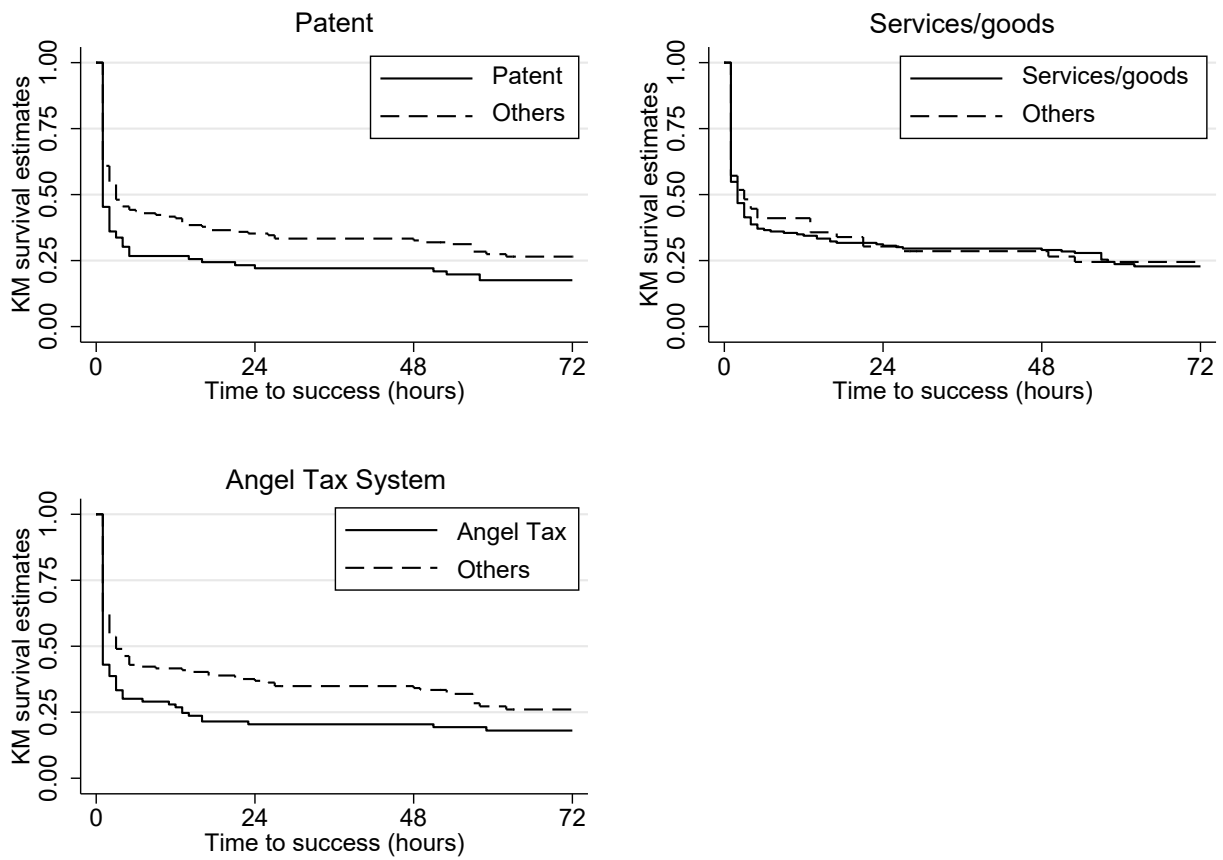


Fig. 4. Kaplan-Meier survival estimates: Patent, services/products, and the Angel Tax System.

Note: The figures illustrate the Kaplan-Meier survival estimates (KM survival estimates) of campaign success between the two groups. The total number of observations is 242. Chi-square log-rank test statistics are 4.40 ($p < 0.05$), 0.01 ($p > 0.1$), and 6.20 ($p < 0.05$) for patent, services/products, and the Angel Tax System, respectively.