

## **Financial Literacy and Security-based Crowdfunding**

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Security-based crowdfunding has recently emerged as a novel market that allows small investors to engage directly in financing entrepreneurial ventures. However, a certain level of financial literacy is required to understand and manage these digital finance tools. A better understanding of the impact of financial literacy is therefore central to the development of these markets and the achievement of their inclusive potential. Using data on the population of 432 investment crowdfunding platforms in 37 OECD countries between 2007 and 2019, we find higher platforms' survival profiles where the level of financial literacy is higher. Financial literacy, however, needs to combine with specific platform characteristics to take full effect, as it matters more for those platforms that deliver voting rights and for those that provide poorer value-added services to crowdfunding investors.

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## INTRODUCTION

Security-based crowdfunding has recently emerged as a popular funding method. This success is partly due to its inclusionary nature. Crowdfunding provides ordinary investors with the opportunity, for the first time, “to go online and invest in entrepreneurs that they believe in.”<sup>1</sup> While early-stage finance is traditionally limited to sophisticated investors, such as venture capitalists and business angels, security-based crowdfunding is associated with a large pool of small investors (Block, Groh, Hornuf, Vanacker, et al., 2020). The disintermediation provided by crowdfunding platforms enables individuals to directly invest in promising entrepreneurial ventures or seek capital to finance their businesses. Thus, security-based crowdfunding is expected to democratize and improve the efficiency of financial markets (Cumming, Meoli, & Vismara, 2019a).

Through disintermediation, equity crowdfunding encourages direct valuation and investment, thereby delivering unprecedented investment opportunities to small investors. While the role as gatekeepers of crowdfunding platforms is certainly relevant (Cumming, Johan, & Zhang, 2019), the final decision on which venture to finance is left to the investors. Nevertheless, small investors are likely to have neither the ability nor the incentives to research and evaluate entrepreneurial ventures extensively. Coherently, there are concerns about the potential risk for small investors in security-based crowdfunding (Schwienbacher, 2018). The lack of financial literacy on the supply side (i.e., investors seeking investment opportunities) might pair with adverse selection problems on the demand side (i.e., entrepreneurs seeking finance). Walthoff-Borm, Schwienbacher, & Vanacker (2018) find that entrepreneurs searching for external finance often consider security-based crowdfunding as a last resort when they lack alternatives such as internal funds or debt financing. Blaseg, Cumming, & Koetter (2020) show that security-based crowdfunding attracts entrepreneurial ventures tied to distressed banks, proxying low quality. Accordingly, the analysis of the comments submitted by stakeholders to the Securities and Exchange Commission (SEC) in response to US equity crowdfunding regulations reveals that one of the major concerns for the development of the market is that low-quality entrepreneurs seek financing through crowdfunding to take advantage of unsophisticated small investors (Cummings, Rawhouser, Vismara, & Hamilton, 2019). Crowdfunding might thus empower entrepreneurs to exploit inexperienced and uncoordinated investors with behavioral and herding biases.

Although the inclusive potential of digital finance is high, using these tools and managing the associated risk requires a certain level of financial literacy.<sup>2</sup> Prior studies indicate that investors

with higher financial literacy have a higher capacity to assess investment opportunities (OECD, 2005; Lusardi, Mitchell, & Curto, 2010), and a higher degree of financial literacy increases financial inclusion at a country level (Grohmann, Klühs, & Menkhoff, 2018). However, people with low financial literacy are less likely to accumulate wealth and manage wealth effectively (Hilgert, 2003; Stango & Zinman, 2009). They are less likely to participate in stock markets (van Rooij, Lusardi, & Alessie, 2011), and are more frequently harmed in digital financial markets (Tomilova & Dashi, 2019). Therefore, we argue that financial literacy is central to the development of digital finance markets and their potential to achieve inclusive objectives. Accordingly, in this paper, we study, for the first time, the relationship between financial literacy and security-based crowdfunding.

Although security-based crowdfunding is a recent phenomenon, valuable research on the topic is already available. Most extant studies, take uniquely either the perspective of the demand of capital by focusing on the characteristics of ventures (e.g., Ahlers, Cumming, Günther, & Schweizer, 2015; Block, Colombo, Cumming, & Vismara, 2018; Hornuf & Schwienbacher, 2017; Vismara, 2016) or of the supply of capital by focusing on investors (e.g., Hervé, Manthé, Sannajust, & Schwienbacher, 2019; Hornuf & Schwienbacher, 2018; Vismara, 2018). Crowdfunding platforms have been the focus for only few studies. Among them, Dushnitsky, Guerini, Piva, & Rossi-Lamastra (2016) studied country-level factors influencing platform creation in 15 European countries and documented variations across crowdfunding models. Rau (2019) investigates how country characteristics affect the volumes of crowdfunding and found that the quality of the regulation, financial development, and ease of access to the Internet are the main determinants of the development of crowdfunding. Cumming, Johan, & Zhang (2019) studied Canadian crowdfunding platforms and found that those that followed higher standards of due diligence were more likely to list successful offerings and raise higher amounts of capital. Rossi & Vismara (2018) focused on the array of services provided by platforms, distinguishing between pre-launch, ongoing, and post-offering services. They show that higher post-campaign services increased the number of successful offerings.

All the studies mentioned take a static perspective and perform cross-section analyses on the different aspects of the functioning of crowdfunding platforms. Security-based crowdfunding platforms, however, often do not survive long. We observe that the number of active platforms has not substantially increased over the last five years because of an increasing number of failures of crowdfunding platforms despite the establishment of new platforms each year. Therefore, it is meaningful to study their survival profiles. We track security-based crowdfunding platforms over time and argue that financial literacy is a necessary condition for

the development and survival of these markets. Financial literacy has been recognized as a significant element of stability and financial growth (OECD, 2013). Therefore, we expect this to hold for security-based crowdfunding markets.

While crowdfunding is about including small investors, their involvement in the governance of the ventures they finance varies across platforms: some platforms deliver voting rights while others do not. This is a significant difference, if we consider that corporate finance studies show that firm value decreases when voting rights of controlling shareholders exceed cash-flow rights (e.g., La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 2002; Claessens, Djankov, Fan, & Lang, 2002). Consistent with this literature, Cumming, Meoli, & Vismara (2019b) study dual-class shares in security-based crowdfunding and find that a higher separation between ownership and control lowers the likelihood of a successful offering and the post-offering performance of funded ventures. As corporate governance mechanisms affect investment decisions, the delivery of voting rights should impact the development of these platforms, and possibly moderate the relationship between the level of financial literacy and the survival profile of security-based crowdfunding platforms.

Security-based platforms are responsible for the quality of the information exchanged between entrepreneurs and investors. The value-added services offered are crucial to alleviate the information asymmetries and enhance the functioning of the market. Some platforms offer a rich combination of pre-launch, ongoing, and post-campaign services to small investors and project proponents. However, other platforms are passive and do not offer any of these services (Cumming, Johan, & Zhang, 2019). Financial literacy should matter more for those cases that do not provide (much) value-added services, as these platforms expose small investors to higher hazards. Accordingly, the market mechanisms of some platforms require the co-investment of accredited investors to launch a campaign on their portal and make available the offering to small investors (Rossi, Vismara, & Meoli, 2019). This is the case of the Australian Small Scale Offerings Board (ASSOB) and the UK-based platform SyndicateRoom. The co-investment requirement is likely to reduce uncertainty for small investors as accredited investors have a higher capacity and incentive to perform due diligence. The certification role of accredited investors might alleviate informational concerns and moderate the relationship between financial literacy and the survival profile of security-based crowdfunding platforms. The empirical analysis in this study is based on the universe of 432 security-based crowdfunding platforms in the 37 Organisation for Economic Co-Operation and Development (OECD) countries, observed between 2007 and 2019. We document evidence of a positive relationship between the level of financial literacy and the survival profile of security-based

platforms. The success of investment-based crowdfunding platforms is related to financial literacy, confirming that the potential of digital finance is attainable if investors in a country have the tools to manage the risks appropriately. While there is no evidence supporting the relationship between financial literacy and platform survival in the univariate analysis, a significant effect is found in most of our regression models, when we control for contextual effects and identify the role of moderating variables. The relationship between financial literacy and the development of security-based crowdfunding platforms is stronger for platforms delivering voting rights to investors, consistent with the view that voting rights are a more complicated form of crowdfunding. Besides, financial literacy enables a better understanding of the complexities of that type of crowdfunding. The role of financial literacy is weaker for platforms that provide more value-added services, as they better fill an informational void. Accordingly, we find limited support of the hypothesis that the co-investment requirement enhances the survival profile of crowdfunding platforms. This weak statistical evidence is consistent with the certification and information production role of accredited investors, on which small investor can free ride. We conclude that financial literacy is necessary but needs to combine with specific platform characteristics to be effective.

The remainder of the paper unfolds as follows. In section 2, we discuss the development of the theoretical framework and testable hypotheses, while in section 3, we describe the methodology adopted in this study. In section 4, we report the results of our analyses. Section 5 presents the conclusion.

## **THEORY AND HYPOTHESES**

Security-based crowdfunding, like in every entrepreneurial finance market, is plagued by information asymmetries between investors and entrepreneurs. These challenges relate to both hidden information, which leads to adverse selections, and hidden action, which leads to moral hazards (Amit, Brander, & Zott, 1998). Ex-ante selection and ex-post incentive and control problems are particularly severe in this digital context (Cumming, Meoli, & Vismara, 2019b). While venture capitalists and business angels rely on face-to-face due diligence and actively monitor their portfolio of entrepreneurs, crowdfunding investors can only rely on the information and opportunities of interaction provided by the platforms. Differently from what happens in venture capital or other types of private equity, investors make direct investment decisions. Relative to traditional public equity markets, overcoming information asymmetries is challenging in security-based crowdfunding because of the structural absence of specialized

intermediaries. Financial analysts do not help investors with information production, and there is no third-party certification, like those provided by investment banks as underwriters in initial public offerings. Moreover, while the cost of monitoring the business is fixed, the incentive to monitor the business varies and increases with the size of the investment. As crowdfunding investors bid small amounts of capital, the potential benefit from the investment is not enough to compensate for the cost of performing individual monitoring.

Furthermore, crowdfunding investors typically lack the experience and capability to evaluate investment opportunities (Ahlers, Cumming, Günther, & Schweizer, 2015). A recent study by Johan & Zhang (2020) document that while sophisticated investors are skeptical of entrepreneurs' costless signals, small investors are attracted to promotional language and associate it with the ability of entrepreneurs. In traditional stock markets, small investors often lack basic economic fundamentals (Lusardi & Mitchell 2007; van Rooij, Lusardi, & Alessie, 2011). The presence of financially illiterate small investors, who do not have appropriate tools to evaluate investment opportunities, are likely to affect crowdfunding markets, where free-riding problems might exacerbate the problems leaving investors reluctant to engage in information production and active monitoring (Welch, 1992; Bikhchandani, Hirshleifer, & Welch, 1998). This might lead to market failure, meaning high-quality entrepreneurial ventures cannot be distinguished from low-quality projects available on security-based crowdfunding platforms.

Financial economics models assume that, as entrepreneurs possess more information about the quality of their ventures, high-quality ventures are less likely to seek external financing due to the loss of ownership share and the greater opportunity costs of giving up ownership (Stiglitz & Weiss, 1981). This adverse selection problem might threaten the survival of crowdfunding markets. Entrepreneurs with high-quality projects, facing challenges in signaling their quality, could find it difficult to obtain high valuations. Eventually, they might decide to leave the market, reducing the average quality of projects. Consequently, the willingness to invest decreases, and investors only buy securities if compensated by a discount. Ultimately, this could lead to an Akerlof type of market failure (Akerlof, 1970), resulting in vanishing markets as the equilibrium price would be zero.

Previous research has established that people's actions and decisions, especially in situations that involve uncertainty, are influenced by information gained by observing others (Bikhchandani, Hirshleifer, & Welch, 1998). Information-asymmetry might be mitigated by observational learning and the 'wisdom of the crowd.' The wisdom-of-the-crowd principle suggests that, under certain conditions, a pool of individuals leads to better decision making

than any individual, even when the individual is an expert. In crowdfunding, potential external investors evaluate entrepreneurial ventures based on the same set of information disclosed online. As such information is elaborated differently by each investor, some investors overestimate the venture quality, while others underestimate it. If the errors made by investors are independent, then they tend to average to zero, and the evaluation by the crowd is more accurate than any individual evaluation. However, the wisdom-of-the-crowd principle only works when potential investors do not influence each other, and their errors are unrelated. This is not the case in security-based crowdfunding, where later investors can observe the decisions of early investors and be tempted epistemically to free ride on the efforts of others, thereby violating the condition of mutual independence. Vismara (2018) documents the influential position of sophisticated investors throughout the bidding process in one of the world's largest equity crowdfunding platform, showing that unsophisticated investors base their decision on the bids by sophisticated investors.

As with any investment, there are risks associated with security-based crowdfunding investments. The ability of crowdfunding investors to assess such risks is, therefore, central to the development of these markets. Accordingly, the level of financial literacy of investors is expected to impact the survival profiles of these platforms. Small investors with higher financial literacy hold realistic expectations concerning the risks involved with security-based crowdfunding. Financially literate investors have a better understanding of risk diversification and are likely to build a portfolio that limits the exposure to the risk. Thus, investors characterized by higher financial literacy are more likely to expect the value of security-based crowdfunding as a small fraction in a broader diversified portfolio. Consequently, security-based crowdfunding platforms are more attractive in contexts of higher financial literacy, as investors limit the risk through portfolio diversification. However, the lower capabilities in mixing various investments within a portfolio reduce the propensity of financially illiterate investors to invest in security-based crowdfunding. Hence, security-based crowdfunding platforms will find it difficult to flourish under conditions of lower financial literacy. Therefore, we formulate Hypothesis 1 as follows:

*Hypothesis 1: Investors' financial literacy is positively related to the survival profile of security-based crowdfunding platforms.*

Security-based crowdfunding platforms are not homogeneous as they offer different typologies of governance mechanisms to listing ventures. While some platforms assign voting rights to crowd investors, others do not deliver voting rights (Cumming, Vanacker, & Zahra, 2019). Extant studies have found that this governance decision is necessary for the success of crowdfunding offerings. Cumming, Meoli, & Vismara (2019b) studied the decisions of crowdfunding investors where both voting and non-voting shares are offered, allowing prospective shareholders to enroll in different classes. They found that investors were willing to pay a premium to obtain voting rights. Walthoff-Born, Vanacker, & Collewaert (2018) found that firms in which the security-based crowdfunding platform held and managed the shares for investors outperformed those that opted for a direct shareholding structure. In a cross-country study, Rossi, Vismara, & Meoli (2019) found evidence that the delivery of individual voting rights is associated with lower chances of success of the platforms.

Managers of firms with dispersed shareholders are considerably discerned regarding the actions they take, as small investors find it difficult to coordinate and share monitoring costs (Jensen & Meckling, 1976). In case investors do not receive voting rights, managers could easily use the insulation granted by the absence of external voting power to enjoy the perquisites of control. Bebchuk & Zingales (2000), for instance, documented that dual class share structures exacerbate the distortions associated with excessive use of controlling shareholder structure. The risk of expropriation causes investors to hesitate before investing in no voting shares. Alternatively, moral hazard problems should be mitigated by offering voting rights.

We posit that investors with higher financial literacy are more likely to be aware of moral hazard problems occurring after the offering. Hence, as the delivery of voting rights reduces the risk of moral hazard problems, small investors with higher financial literacy should be more attracted to such platforms than those with lower financial literacy. Consequently, the positive relationship between the level of financial literacy and the survival of the platform is expected to be stronger when voting rights are delivered. Thus, we formulate Hypothesis 2 as follows:

*Hypothesis 2: The delivery of voting rights positively moderates the relationship between investors' financial literacy and the survival profile of security-based crowdfunding platforms.*



Security-based platforms differ in the types of value-added services they deliver. While some platforms grant a combination of pre-launch, ongoing, and post-campaign services, other platforms do not offer any of these services. Previous studies show that the provision of value-added services is associated with an increased level of development of crowdfunding platforms. Basing on a sample of 93 Canadian crowdfunding platforms, Cumming, Johan, & Zhang (2019) document that platform due diligence, comprising background checks, site visits, credit checks, cross-checks, account monitoring, third-party proof of funding project, and value-added services like strategic fundraising guidance, have a positive impact on both the percentage of fully funded projects and the total amount of capital raised. Using a sample of 127 platforms in four European countries, Rossi & Vismara (2018) document that a higher number of post-campaign services increases the annual number of successful offerings on the platform.

Value-added services include pre-evaluation before listing on the platform, strategic fundraising guidance, business or financial planning, crowdfunding contract design facilitation, and marketing or promotional services (Cumming, Johan, & Zhang, 2019). Pre-money evaluation refers to the platform supporting entrepreneurs in implementing evaluation techniques before the listing of the venture. Strategic fundraising guidance means different ways a platform helps in implementing strategies aimed to make a project more attractive to potential investors. Facilitation in crowdfunding contract design involves supporting the entrepreneur in legal assistance. Business or financial planning and marketing and promotional services refer to the platform helping entrepreneurs prepare a long-term business plan and design marketing campaigns, respectively.

The availability of value-added services might mitigate information asymmetry between investors and project proponents, reducing the level of uncertainty faced by small investors. Additionally, platforms could play a role in the professionalization of entrepreneurial ventures by providing support to formalize contracts. Investors with lower levels of financial literacy are likely to benefit from the information generated by the platform and from increased professionalization. Accordingly, we expect financial literacy to matter most for the survival of the platforms that provide fewer value-adds. Therefore, the positive relationship between the level of financial literacy and the survival of the platform is expected to be weaker when more value-added services are provided. We formulate our Hypothesis 3 as follows:

*Hypothesis 3: The availability of value-adds negatively moderates the relationship between investors' financial literacy and the survival profile of security-based crowdfunding platforms.*

Although it is always possible for an accredited investor<sup>3</sup> to invest in an offering during the fundraising phase, some platforms require their presence as a condition to open the campaign to small investors (Rossi, Vismara, & Meoli, 2019). We identify this requirement as a co-investment condition, ensuring that all offerings posted on the platform have at least one accredited investor who has committed to invest before the launch of the offering. This is likely to generate a difference across platforms as their presence is a strong predictor of a firm's ability to survive after the offering (Signori & Vismara, 2018).

The cost of performing due diligence is fixed; it does not depend on the amount invested. As accredited investors invest more money (Cumming, Meoli, & Vismara, 2019b), their incentives to perform due diligence are higher. Simultaneously, their costs to access and process information are lower in absolute terms (because of their higher capacities and expertise) and in relative terms (because of the higher amount of capital that they invest). This increases the information production at the platform-level. Although such information is not produced through the platform rather from external parties (i.e., accredited investors), small investors can free ride, thereby facing lower levels of uncertainty. Accordingly, financial literacy should matter most for a platform's survival in the absence of co-investment conditions. The positive relationship between the level of financial literacy and the survival of the platform is therefore expected to be negatively moderated by the co-investment condition, as we posit in Hypothesis 4.

*Hypothesis 4: The requirement of co-investment by accredited investors negatively moderates the relationship between investors' financial literacy and the survival profile of security-based crowdfunding platforms.*

## RESEARCH DESIGN

### Sample and sources of information

The sample of the present study includes information on the universe of 432 security-based crowdfunding platforms launched between 2007 and 2019 in the 37 OECD countries. While generally characterized by developed institutions, OECD countries still present a large degree of diversity regarding financial literacy levels (Atkinson & Messy, 2012), allowing for an effective assessment of the impact of this indicator on the development of entrepreneurial markets. Security-based crowdfunding platforms either allow individuals to purchase securities from companies in the form of equity or debt, including equity-based crowdfunding, real estate, profit sharing, debt-based securities, and mini-bonds<sup>4</sup>. Security-based crowdfunding platforms in our sample work under an all-or-nothing fundraising policy, such that an entrepreneurial venture sets a fundraising goal and keeps nothing unless the goal is achieved (Cumming, Leboeuf, & Schwienbacher, 2020). As we study security-based platforms operating in different countries, our sample is also built using different sources. The sample construction proceeded as follows. First, we identified security-based platforms from crowdfunding national registries. Second, we examined all national crowdfunding-related associations and listed their members. Third, we reviewed reports focused on crowdfunding in one or more of the 37 OECD countries. Every platform's website was analyzed to include only security-based crowdfunding platforms in our sample. In Table 1, we describe the different sources of information in detail.

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### Platform survival

Not all platforms survive over time. We identify a platform failure according to the following three scenarios. First, the platform website becomes inaccessible for at least six months. For example, the US-based platform Custvestor, whose website has not been accessible since November 2018. The platform was effectively suspended from the Financial Industry Regulatory Authority, Inc (FINRA) registry on March 8, 2019. Second, the platform declares its failure on the website or ceases to operate in the crowdfunding business, like the Danish platform CrowdInvest, which exited crowdfunding in April 2018. Finally, a platform is acquired by another platform and ceases to exist independently. For instance, the Austrian platform Finnest was acquired by the Finnish platform Invesdor in June 2019.

Simple graphs offer a readable way to represent the evolution of the industry. Figure 1 documents the number of active security-based crowdfunding platforms between 2007 and 2019. A security-based crowdfunding platform is active in the period between the platform launch and its failure, or to 2019 if still operating as of December 31, 2019. Platform launch is the incorporation date available on the platform website. Platform failure is the time at which the platform experiences one of the failure scenarios described. Figure 2 reports the number of security-based crowdfunding platforms launched, defined using their incorporation dates, and the number of those that failed. The latter is identified as the year in which the platform experiences one of the failure scenarios described. We observe that the number of active platforms has recently been stable because of an increasing number of failures of crowdfunding platforms.

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Insert Figure 1 and Figure 2 here  
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## **Variables**

The main explanatory variable employed in the analysis is the level of financial sophistication of crowdfunding investors. The degree of financial literacy is a country-level variable based on the information provided by the Standard & Poor's Global Financial Literacy Survey. The information on financial literacy is based on questions from the Gallup World Poll survey, for which approximately 150,000 national representatives and randomly selected adults were interviewed in 2014 from 143 different countries. The questions of the survey assess basic knowledge in financial decision-making, interest rates, interest compounding, inflation, and risk diversification. Based on this information, and following Klapper, Lusardi, & van Oudheusden (2015), we measured the degree of financial literacy as the percentage of adults who are financially literate in one country (individuals are defined as financially literate when they correctly answer at least three out of the four financial concepts described).

Defining and appropriately measuring financial literacy is essential to understand variation in financial outcomes and the barriers to effective financial choices (Huston, 2010). There are three primary reasons for the selection of the Standard & Poor's Global Financial Literacy Survey for measuring financial literacy. First, the questions of the survey refer to the definitions of the three fundamental concepts based on investment decisions. These include (1) numeracy and capacity to calculate interest rates, (2) understanding of inflation, and (3) understanding of risk diversification, defined by Lusardi & Mitchell (2014). These concepts have been translated

into metrics, and a standard set of questions have already been implemented in numerous surveys in the US and abroad (Lusardi & Mitchell, 2008, 2011). Second, the survey is not limited to specific audiences (i.e., students, investors, or workers). However, it targets an adult audience, which controls the greatest share of financial resources. Last, the survey was conducted in 143 countries, allowing us to study the whole set of 37 OECD countries.

We include in all our models a set of platform-level variables. Platform-level data are based on information available on the official websites of the platforms (both current and past pages accessed using the Wayback Machine internet archive<sup>5</sup>). If the information is missing, the platform's social network profiles and crowdfunding studies are consulted to find the information needed. We use three platform-level variables as moderators in the relationship between financial literacy and the platform survival profile. They are *voting rights delivery*, *value-adds*, and *co-investment condition*. *Voting rights delivery* is a dummy variable discriminating between platforms selling securities with voting rights from platforms that do not. The variable *value-adds* measures the number of user services provided by the platform. Service types identified are similar to those in the study by Cumming, Johan, & Zhang (2019) and include pre-evaluation, strategic fundraising guidance, business or financial planning, crowdfunding contract design facilitation, and marketing or promotional services. *Co-investment condition* identifies platforms which require the involvement of at least one accredited investor to open the offering to the community of crowdfunding investors.

There are other platform-level measures used in our study as control variables. Most importantly, we consider that security-based platforms do not survive over time without investors. We thus include a variable to control for *Market participation*, which is measured as the total number of investors in each year as in Cumming, Johan, & Zhang (2019): Level 1: fewer than 100; Level 2: 101–500; Level 3: 501–1000; Level 4: 1001–2500; Level 5: 2501–5000; Level 6: 5001–10,000; Level 7: 10,001–20,000; Level 8: 20,001–50,000; Level 9: more than 50,000. The number of yearly investors is taken from the information provided by the platform, either directly from the official website or by consulting the annual reports and infographics. Security-based crowdfunding involves both equity and debt securities. Equity crowdfunding is when individuals purchase equity securities and become shareholders. In debt crowdfunding, individuals invest in bond-like securities at a fixed interest rate. While there are platforms that only allow entrepreneurial ventures to raise capital through equity crowdfunding, other platforms also trade in debt securities. *Debt* is a dummy variable equal to one if the platform lists equity and debt securities and zero otherwise. The *Hybrid platform* dummy identifies the platforms that, in addition to security-based crowdfunding, offer further

typologies of crowdfunding, like donation, and reward-based, or peer-to-peer lending. The *Industry specialized* dummy is equal to one for all platforms active in specific industries (e.g., real estate, healthcare, green projects) and zero in other cases. We also include a variable that considers competition each year. The variable *Competing platforms at launch* counts the number of active platforms in the same country of one platform each year.

In our regressions, we also include several country-level variables obtained from the World Bank World Development Indicators. All variables are measured annually, in each year of platform activity. The *GDP per capita* variable is used as a measure of the size of the country's economy at the time of platform launch, while *population* measures the size of the country in terms of the number of inhabitants. Following La Porta, Lopez-De-Silanes, Shleifer, & Vishny (1998), the *common law country* dummy classifies platforms according to the legal system under which they operate, distinguishing between platforms operating in common law countries (e.g., Australia, Canada, New Zealand, the UK, and the US) and the ones operating in civil law countries (e.g., Austria, France, Germany, and Italy). *Equity market index*, calculated as the market capitalization of listed domestic companies, over the gross domestic product (GDP), at the year of platform launch, is a measure of the development of a financial system in a country.

### **Descriptive statistics**

Panels A and B of Table 2 report descriptive statistics of the explanatory and control variables employed in our main analysis. The mean value of financial literacy is 56.92, ranging from 24 (Turkey) to 71 (Sweden). Concerning moderating variables, 54.2% of the platforms in the sample deliver voting rights. The mean value of value-added services is 0.98, while the median is equal to zero. Our data, combined with evidence from previous studies (Cumming, Johan, & Zhang, 2019; Rossi & Vismara, 2018), show that most crowdfunding platforms do not provide any value-added services. Almost one-third of the platforms require the co-investment of accredited investors. The mean value of market participation is 2.7, meaning that the average number of investors is between the range of 101 and 500 investors per year. Approximately half (47.7%) of the platforms offer debt securities, while only about 8.6% list crowdfunding offerings different from security-based crowdfunding. The average level of financial literacy is 56.9, with large variations across countries. The degree of financial literacy in our sample ranges from 24 (Turkey) to 71 (Sweden). Table 3 reports correlation coefficients among the independent variables employed in our main analysis, also including the Variance Inflation

Factors (VIFs), obtained after estimating an ordinary least square (OLS) regression of *financial literacy* against all variables. Panel C of Table 2 is dedicated to explanatory and control variables employed in the robustness tests.

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Insert Table 2 and Table 3 here  
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## Model

We estimate a platform's likelihood of failure considering the time elapsed since its launch. This is modeled by estimating proportional hazards, i.e., the probability that a given scenario occurs at a given time, provided that it has not occurred before that time. We do so by employing a shared-frailty Weibull proportional hazard model fitted using maximum likelihood. In our setting, platforms that survive beyond January 2020 correspond to the right-censored observations. For failed platforms, the event year is the failure year, if the platform experiences one of the failure scenarios described. The time to occurrence of a failure event is measured starting from the year of the platform launch, as reported on the platform official website.

The shared-frailty model is a generalization of the proportional hazard model and includes a random effect term representing the heterogeneity of frailty or proneness to failure (Clayton, 1978; Clayton & Cuzick, 1985). Shared-frailty modeling is used with multivariate survival data where observations are independent, conditional to a group-specific unobserved quantity. The common value of this unobserved quantity creates a dependence between the group members (Hougaard, 1986). Frailties are therefore common (or shared) among groups and generate dependency between the survival times of the observations, which are conditionally independent given the frailty (Sahu, Dey, Aslanidou, & Sinha, 1997). By absorbing unobserved heterogeneity at a group-level, any remaining biases are minimized. We use shared-frailty modeling to account for unobserved heterogeneity, that is, an omitted common factor which varies only across platforms. Observations within platform  $i$  share the same random effect term  $f_i$ , such that platforms with random effect  $f_i < 1$  ( $f_i > 1$ ) are 'less prone to failure' ('more prone to failure') and have a decreased (increased) hazard rates.  $f_i$  is gamma distributed with mean one and variance  $\theta$ . The gamma distribution is chosen for mathematical convenience. Gamma random effects can be integrated out from the conditional survival likelihood function, leading to a marginal log-likelihood function that contains only parameters of interest and can easily be estimated using maximum likelihood.

Our model is specified as follows:

$$h_{ij}(t) = f_i \exp \left( \beta_1 \text{Financial Literacy}_{ij} + \beta_2 \text{Voting Rights Delivery}_{i,j} + \beta_3 \text{Financial Literacy}_{ij} \times \text{Voting Rights Delivery}_{i,j} + \beta_4 \text{Value Added}_{i,j} + \beta_5 \text{Financial Literacy}_{ij} \times \text{Value Added}_{i,j} + \beta_6 \text{Coinvestment condition}_{i,j} + \beta_7 \text{Financial Literacy}_{ij} \times \text{Coinvestment condition}_{i,j} + \overline{\gamma_1} \overline{\text{Platform level Controls}}_{ij} + \overline{\gamma_2} \overline{\text{Country level Controls}}_{ij} \right) pt^{p-1},$$

where,  $h_{ij}(t)$  is the estimated proportional hazard for platform  $i$  in year  $j$ ,  $f_i$  is the frailty shared by each platform  $i$ , and  $p$  is the estimated shape parameter. We investigate *Financial Literacy*<sub>ij</sub>, the main explanatory variable, whose effect is estimated by  $\beta_1$ . *Voting Rights Delivery*<sub>i,j</sub>, *Value Added*<sub>ij</sub>, and *Coinvestment condition*<sub>i,j</sub> are moderating variables, with direct effects estimated by  $\beta_2$ ,  $\beta_4$ , and  $\beta_6$ , respectively, and moderating effects estimated by  $\beta_3$ ,  $\beta_5$ , and  $\beta_7$ , respectively. Vectors  $\overline{\gamma_1}$  and  $\overline{\gamma_2}$  are the coefficients estimated with respect to the variables included in  $\overline{\text{Platform level Controls}}_{ij}$  and  $\overline{\text{Country level Controls}}_{ij}$ , respectively.

In the model, a lower hazard corresponds to a higher survival profile. For ease of interpretation, we change signs and report coefficients instead of hazard ratios in the results. A positive coefficient indicates that an increase in each variable makes the survival profile higher (and a platform failure is less likely). Conversely, a negative coefficient indicates that an increase in the explanatory variable makes the survival profile lower (and a platform failure more likely). To test the moderating effect of corporate governance on the relationship between financial literacy and the likelihood of a platform survival, we included interaction terms between *financial literacy* and the moderating variables (*voting rights delivery*, *value-adds*, and *co-investment condition*). In each case, if the interaction term is significant, then the governance variable is moderating the relationship between financial literacy and platform failure.

## RESULTS

As the first step in our analysis, we plot in Figure 3, the Kaplan-Meier curves for the survival profile of security-based platforms. To investigate the impact of financial literacy on the survival profile, we divide the sample into two groups, i.e., platforms based in countries with



financial literacy below the median value and platforms based in countries with a financial literacy equal or above the median (financial literacy=57)<sup>6</sup>. We compute equal precision confidence bands at a 95% confidence level (Nair, 1984) for each group and find that the two bands follow a similar path. While the two bands almost overlap until the sixth year, they start to diverge from the seventh year onwards. This evidence suggests a positive relationship between the level of financial literacy and the survival profile of security-based platforms. However, the difference is not statistically significant, such that this graph does not fully support hypothesis 1.

The weakness of the univariate effect might be due to several reasons. First, there might be a truncation bias, as some platforms in the sample may fail after the period considered in our study. Second, we might have included platforms that offer security-based crowdfunding, although their core business is about offering different typologies of financial services. These platforms are, therefore, able to survive over time even if they manage very few security-based crowdfunding deals. Last, there might have been platforms that we missed to include in our sample as they intended to start but never launched any offerings online. Platforms often rely on a pre-offering phase during which ventures raise contributions privately (Lukkarinen, Teich, Wallenius, & Wallenius, 2016). If a venture cannot attract enough capital through personal contacts, it is unlikely to do so through the crowd. Here, there is no incentive for the platform to launch a crowdfunding offering, which is likely to be unsuccessful. Therefore, it might be possible that the number of unsuccessful platforms is underestimated in our sample, making the result on financial literacy weaker than it should be observed in practice.

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Insert Figure 3 here  
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The univariate analysis does not control for systematic differences across security-based platforms and contextual determinants. Table 4 reports our results on how our covariates affect the likelihood of a security-based crowdfunding platform's survival<sup>7</sup>. First, we investigate the influence of the level of financial literacy on the likelihood of a platform's survival (Model 1). Then, we test the moderating effects of three moderating variables by adding interaction terms with financial literacy. We test whether the delivery of voting rights moderates the relationship between the level of financial literacy and the platform survival profile (Model 2). We test the moderating effect of value-added services on the relationship between the level of financial literacy and the platform survival profile (Model 3). We test whether the co-investment

requirement moderates the relationship between the level of financial literacy and the platform survival profile (Model 4). Last, we run the full model with all interactions (Model 5).

The relationship between the level of financial literacy and the likelihood of a platform survival is positive, although it is only significant at the 10% level, as reported in Model 1. The coefficient is 0.33 and implies that, for one standard deviation change in financial literacy, there would be an increase in the platform's likelihood to survive in a period by 28%. Under different model specifications, the coefficient is confirmed to be positive at different levels of significance ( $p < 0.01$  with  $\beta = 1.10$  in Model 2,  $p < 0.05$  with  $\beta = 0.40$  in Model 3,  $p < 0.01$  with  $\beta = 0.90$  in Model 5). Therefore, we find some evidence on the direct positive effect of financial literacy and the survival profile of security-based platforms, as stated in our Hypothesis 1. When testing the interaction between *financial literacy* and *voting rights*, we find that the delivery of voting rights contributes to moderating the relationship between the level of financial literacy in a country and the dependent variable. As the interaction term *financial literacy X voting rights* is positive and significant at less than 1% ( $\beta = 0.78$ ), we find support for Hypothesis 2. This coefficient is confirmed to be positive at a slightly lower significance ( $p < 0.05$  with  $\beta = 0.58$ ) in Model 5. Platforms based in countries with high financial literacy are more likely to survive if they deliver voting rights. Concerning economic impact, when the mean value of voting rights is decreased (increased) by one standard deviation, a 67% (85%) increase in a platform's likelihood to survive in a period is associated with a one standard deviation change in financial literacy. Model 3 shows that the interaction between *financial literacy* and *value-adds* is negatively related to the likelihood of platform survival at less than a 5% level ( $\beta = -0.25$ ). Confirming Hypothesis 3, we find evidence of a negative moderating effect of the availability of value-added services in the relationship between financial literacy and the dependent variable. As reported in Model 5, the coefficient of the interaction is confirmed to be negative and significant at less than 1% ( $\beta = -0.29$ ). When the mean value of value-added services increases (decreases) by one standard deviation, an 18% decrease (38% increase) in a platform's likelihood to survive in a period is associated with a one standard deviation change in financial literacy. According to Hypothesis 4, platforms that offer more value-added services are more likely to survive when financial literacy is lower. The coefficient for the interaction term *financial literacy X co-investment condition* is negative and not significant in Model 4, although it shows a significance at less than 10% in Model 5 ( $\beta = -0.44$ ). Therefore, we find limited support for this hypothesis.

Market participation is positively related to platform survival ( $p < 0.01$  in all the models). As expected, a larger number of funders is positively associated with the dependent variable.

Platforms offering debt securities are positively related to platform survival ( $p < 0.01$  in Model 2 and Model 5,  $p < 0.10$  in Model 3 and Model 4). This was expected, as it is relatively easier to value debt compared to equity. The *hybrid platform* is positively related to platform survival ( $p < 0.05$  in Model 1, Model 3, and Model 4,  $p < 0.10$  in Model 5). Platforms entirely dedicated to security-based crowdfunding target a smaller pool of potential funders than those offering different typologies of crowdfunding, including donation- and reward-crowdfunding, leading to a higher likelihood of platform failure. *Competing platform at launch* is negatively related to platform survival profile ( $p < 0.01$  in Model 1 and Model 3,  $p < 0.05$  in Model 2 and Model 5,  $p < 0.10$  in Model 4). Competition among platforms at a country level at the time of launch affects the likelihood to survive over time.

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Insert Table 4 here  
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#### **ROBUSTNESS TEST**

We run four sets of robustness tests. First, we address endogeneity problems of financial literacy and assess the robustness of statistical inference to various sources of bias. Second, we test our hypotheses with different moderators, obtained by disentangling the distinct types of voting rights and value-added services. Third, we test our results allowing for different measures of country-level control variables and additional country-control variables. Last, we re-estimate the survival analysis for different estimation techniques.

Results reported in Table 5 provide empirical support for the robustness of the survival analysis, testing the results concerning different measures of financial literacy.<sup>8</sup> A potential endogeneity problem exists because country characteristics might increase the likelihood that platforms based in countries characterized by higher financial literacy survive over time. The effect of financial literacy on the survival profile of platforms might be dependent on some country characteristics. Given that correlation analysis shows moderate collinearity between financial literacy and GDP per capita ( $r = 0.546$ , see Table 3), following Pollock, Chen, Jackson, & Hambrick (2010) and Colombo, Meoli, & Vismara (2019), we regressed, in an OLS setting, financial literacy against GDP per capita, and included the residuals from these regressions in our models (Models 1), as a measure of financial literacy corrected for the level of a country's GDP per capita. Further, financial literacy is regressed against the country's population ( $r = 0.186$ ), the legal system ( $r = -0.349$ ), and the equity index level ( $r = 0.255$ ), and residuals from each regression are included in our following models (Model 2, Model 3, and Model 4,

respectively). Results concerning our hypotheses are similar across the different measures of financial literacy, with few exceptions (e.g., a slightly lower significance of *financial literacy X voting rights* and a slightly higher significance of *financial literacy X co-investment condition* in Model 3).

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Insert Table 5 here  
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Statistical inference on the effect of financial literacy might be invalidated due to various sources of bias. Following Frank, Maroulis, Duong, & Kelcey (2013) and based on Rubin's causal model (Rubin, 1974), we calculate the level of bias in an estimate to invalidate the effect of financial literacy on the dependent variable. We find that 42.85% of cases (851) would have to be replaced (e.g., with cases for which the effect is equal to zero) to invalidate the effect of financial literacy<sup>9</sup>.

In Table 6, we assess the robustness of our results when using different moderators in the relationship between the level of financial literacy and the platform survival profile. In Models 1 and 2, we test the robustness of our Hypothesis 2 by considering platforms operating two different voting rights delivery structures (e.g., Rossi, Vismara, & Meoli, 2019; Walthoff-Born, Vanacker, & Collewaert, 2018). In Model 1, rather than using *Voting rights delivery* as a moderator, we use the dummy variable *Direct*, identifying platforms that allow delivering voting rights to crowdfunding investors under a direct ownership structure. However, in Model 2, we use the dummy variable *Nominee*, identifying platforms that operate a nominee. Contrary to direct ownership structure, platforms operate a nominee pool with voting rights in the hands of a trustee. We find a positive and significant moderating effect of voting rights delivered under a direct ownership structure on the relationship between financial literacy and the platform's survival profile ( $p < 0.01$ ), confirming our results. The moderating effect of voting rights delivered through a nominee structure is not significant. Our results show that the moderating effect of voting rights on the relationship between the level of financial literacy and the survival platform profile is only observed where the disintermediation between investors and entrepreneurs is severe.

In Models 3 to 7, we test the robustness of our results concerning Hypothesis 3 by disentangling the different value-added services across five different typologies, i.e., strategic fundraising guidance, business or financial planning, facilitation in crowdfunding contract design, pre-evaluation before listing on the platform, and marketing or promotional services. Rather than using *Value-adds services* as a moderator, we use each dummy variable identifying platforms

providing a specific typology of service. In Model 3, we use *Strategic guidance*; in Model 4, we use *Business planning*; in Model 5, we use *Contract design*; in Model 6, we use *Pre-evaluation*; and in Model 7, we use *Marketing*. While *Strategic guidance*, *Contract design*, and *Pre-evaluation* have a statistically significant impact on the relationship between financial literacy and platform survival at less than 10%, we find no moderating effect of *Business planning* and *Marketing*. The main results concerning Hypothesis 2 are not confirmed when restricting the measure to a specific type of service. Our analysis shows that no service, taken individually, is enough to moderate the relationship between financial literacy and the platform's survival. In contrast, a platform should make available a combination of more services to increase the likelihood of survival when financial literacy is low.

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Insert Table 6 here  
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Table 7 shows the results of robustness tests on our analysis with alternative country-level control variables and additional country-level control variables. Each control is substituted with an alternative measure to check whether our results depend on our choice of specific county-level controls. In Model 1, *GDP per capita growth* replaces *GDP per capita*; in Model 2, *GDP* replaces *Population*; in Model 3, *Strength of legal rights index* replaces *Common Law country*; and in Model 4, *Listed firms/population* replaces *Equity market index*. The main results concerning our hypotheses are confirmed, with few exceptions concerning Model 4, where the coefficient of *financial literacy X voting rights delivery* is more significant ( $p < 0.01$ ). In contrast, the coefficient of *financial literacy X co-investment condition* is not significant. Last, we include some additional country-level controls. In Model 5, we add the country-level control variable *tertiary education* as a measure of human capital, and *Ease of doing business* as a measure of the entrepreneurship level in Model 6. While *tertiary education* does not impact the survival profile of the investment platform, we find weak evidence on the positive effect of *ease of doing business* ( $p < 0.10$  in Model 6). Results concerning our hypotheses are robust for both measures of human capital and entrepreneurship within a country.

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Insert Table 7 here  
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Table 8 reports the tests on the robustness of the survival analysis for different estimation techniques. In Model 1, we implement a Cox proportional hazard survival-time model with robust standard errors, in which the survival distribution is left unspecified (Cox, 1972). Model

2 and Model 3 are shared-frailty proportional hazard survival-time models, where the parametric survival distribution is an exponential and a Gompertz distribution, respectively. The main results concerning our hypotheses are all confirmed. The positive effect of financial literacy, and the moderating effects of voting rights and value-added services, are robust for the different estimation techniques employed in the robustness test. *Financial literacy X co-investment condition*, slightly significant in the main analysis, does not show any significant effect when changing estimation techniques.

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Insert Table 8 here

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## CONCLUSIONS

This paper investigates the role of financial literacy in security-based crowdfunding. While the univariate analysis does not provide sufficient empirical evidence to support a positive relationship between the level of financial literacy and the survival of crowdfunding platforms, when considering differences across platforms and contextual determinants through multivariate analysis, most of our regression models provide significant results of higher survival profiles of platforms where financial literacy is high. Our strong result is that the level of financial literacy needs to combine with specific platform characteristics to take full effect. We find that financial literacy matters most for the platform's survival when voting rights are delivered, while its effect is weaker when more value-added services are provided. This result highlights the role of information production and governance mechanisms on the development of crowdfunding platforms, which adds to previous literature (Cumming, Johan, & Zhang, 2019). While we find a strong effect of value-added services in moderating the relationship between financial literacy and platform survival, the effect of co-investment by accredited investors is negative but statistically weaker.

Our results contribute to the literature on financial literacy, documenting specific transmission mechanisms to financial development, and the corporate governance literature, by revealing the role of governance mechanisms at the platform level in crowdfunding markets (Ahlstrom, Cumming, & Vismara, 2018). While previous literature already identified a positive effect of voting-rights distribution on the probability of success of the offerings (Cumming, Meoli, & Vismara, 2019b), our study extends previous research to the platform level and better our understanding of when voting-rights distribution creates the condition for the development of the market. Accordingly, the role played by crowdfunding platforms and the services that they

provide highlight their relevance in the matching between demand and supply or risk capital. With few exceptions (e.g., Rossi & Vismara, 2018; Cumming, Johan, & Zhang, 2019; Rau, 2019), previous studies have overlooked their function.

The introduction of new digital financing channels has disintermediated and democratized access to external equity finance by offering security-based crowdfunding and blockchain-based finance. Financial literacy is increasingly relevant for policymakers, governments, and platforms extending opportunities to ordinary citizens to invest in young companies. By taking a dynamic perspective, we provide the first evidence on the frequency of failure of security-based crowdfunding platforms. Despite the growing popularity of the phenomenon, we know little about the evolution of crowdfunding markets over time. We study 432 security-based crowdfunding platforms active across the 37 OECD countries from 2007 to 2019 and document that one out of three (30%) platforms have closed. The high frequency of failure of security-based crowdfunding platforms calls for the attention of policymakers and scholars. Regulation supporting information production at the platform level is likely to impact the development of crowdfunding markets, especially in those countries where financial literacy is low, and the need to guide small investors is high. The ever-evolving scenario of entrepreneurial finance, where new instruments are constantly created, and new investors continuously appear on the scene, provide rich opportunities to inform policymakers interested in nurturing the entrepreneurial ecosystem. The role of crowdfunding platforms and the rapid changes in the industry are components of a growing impact on the connection between innovation, entrepreneurship, and public policy.

This is consistent with our arguments about the importance of shifting the unit of observation of crowdfunding research to crowdfunding platforms, as platforms differ in several aspects. A better understanding of the heterogeneity across platforms not only contributes to the under-investigated stream of literature on crowdfunding platforms but also could provide valuable insights to crowdfunding under different perspectives. For instance, offering-level cross-platforms studies often treat platforms as homogeneous, with the limitation of omitting the potential effect of platform-level differences affecting offering-level outcomes. Furthermore, as the security-based crowdfunding market grows, and the industry starts to consolidate, it is relevant to investigate the dynamics that will lead to a market concentration with a few leading platforms surviving the competitive environment.

Some limitations of this study open opportunities for future research. Although our paper finds evidence of a correlation between financial literacy and the survival profile of security-based crowdfunding platforms, there is insufficient evidence to support a robust causal relationship.

There might be biases due to nonrandom selection of a sample and uncontrolled confounding variables. Financial literacy could be endogenous. If there are unobserved country characteristics correlated to both the development of crowdfunding platforms and the level of financial literacy, then the estimates of our model could be biased. In our study, we addressed endogeneity problems by using different measures of financial literacy corrected for each country-level variable. Future research could explore alternative research designs to improve the robustness of causal inference in terms of correlations associated with unobserved variables and selection bias.

Our evidence on a positive correlation between financial literacy and the survival of security-based crowdfunding platforms has been investigated exclusively from the investors' perspective. However, besides delivering unique investment opportunities to small investors, crowdfunding provides access to funding to underrepresented groups of potential entrepreneurs (Mollick & Robb, 2016). Cumming, Meoli, & Vismara (2019a) find that younger and remotely located entrepreneurs are more likely to launch equity offerings than initial public offerings and have higher chances of success. Therefore, fundraising via crowdfunding might be easier for financially illiterate entrepreneurs as well. The research question of whether, and to what extent, the presence of financially illiterate entrepreneurs impacts the survival profile of crowdfunding platforms deserves consideration.

Last, differences in regulation across countries might also play a role. Depending on a country's regulation, crowdfunding investors are subject to different investment limits according to their income or net worth. Thus, most of the supply of equity capital comes from a specific category of individuals characterized by financial sophistication, which might differ from the level of financial literacy, based on a representative sample of a country's population. This problem is less severe, where all the investors are subject to the same investment limits. Variances in investment limits across countries might be the focus of future research.



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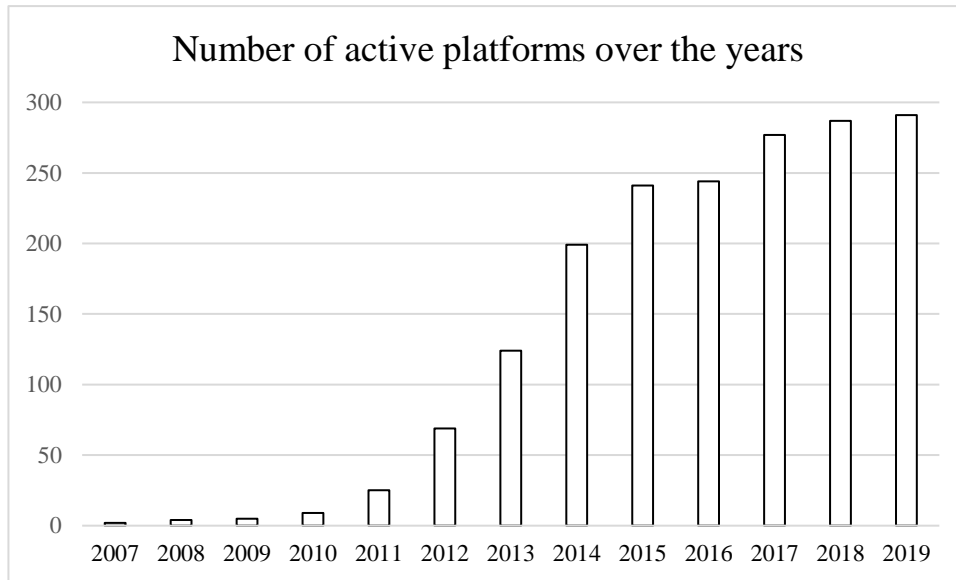
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## Tables and Figures

**FIGURE 1**

### Number of active platforms over the years

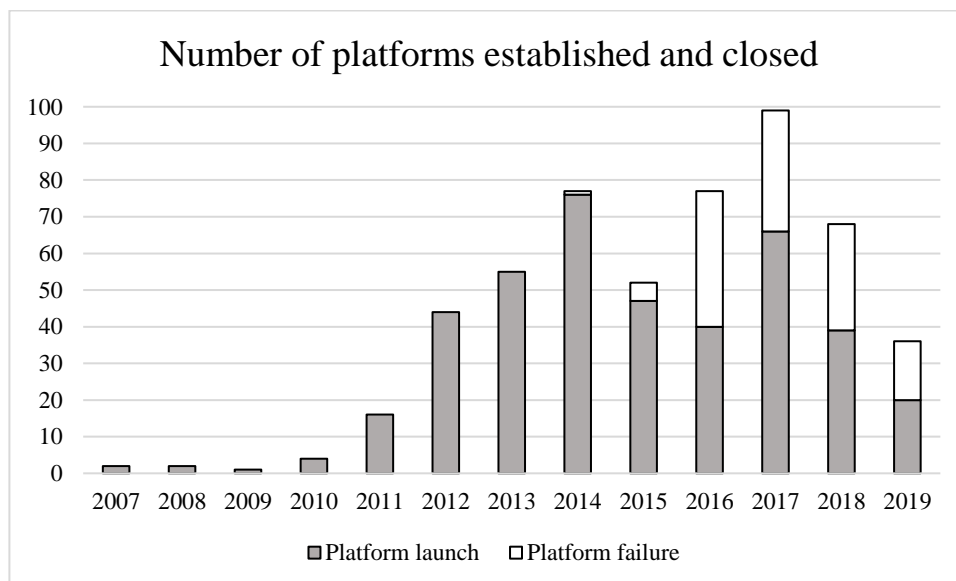
The population of 432 security-based crowdfunding platforms active within the period 2007-2019 in the 37 OECD countries.



**FIGURE 2**

### Number of platforms established and closed over the years

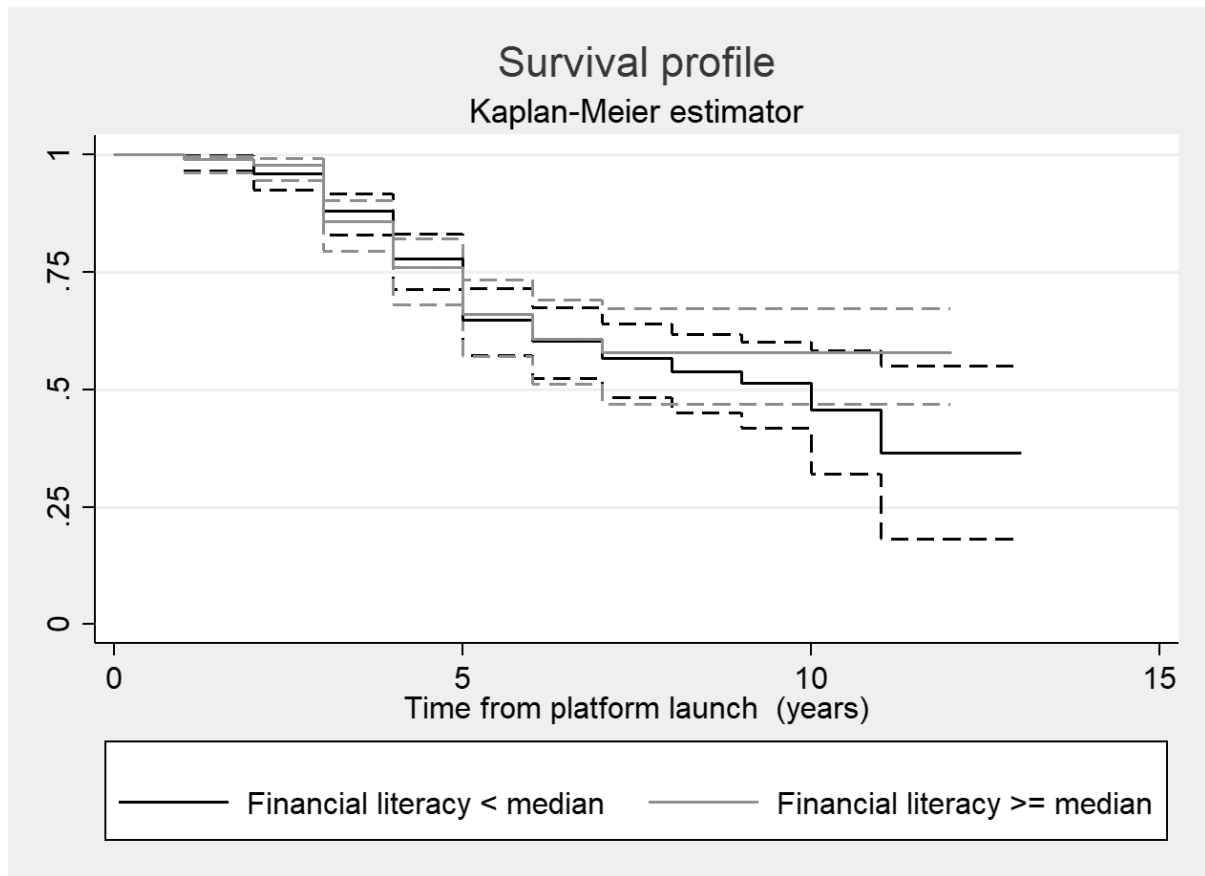
Platform launch is the incorporation date of a platform, while platform failure is the year in which the platform is closed down or in which its website becomes not accessible.



**FIGURE 3**

**Survival profile of platforms**

This figure graphs the Kaplan-Meier estimator of the survival profile of security-based platforms (solid lines). Equal precision confidence bands at 95% confidence level (Nair, 1984) are computed and displayed in the graph (dotted lines). Security-based platforms are divided between platforms based in countries with financial literacy below the median value of financial literacy (N=820) and platforms based in countries with financial literacy equal or above the median (N=1,167), with median value of financial literature equal to 57.





**TABLE 1****Sources of information by country**

The table reports the sources adopted to build the sample of security-based crowdfunding platforms. As registries and lists might include all the typologies of crowdfunding and fintech investments, platforms were double-checked using their website to identify only security-based platforms.

Country	Sources
Belgium	National registry of alternative funding platforms supervised by the Financial Services and Markets Authority, established in 2016.
Australia	List of Australian Financial Services Licence (AFSL) holders, available on the Crowd Funding Institute of Australia website. AFSL is a license required for businesses providing financial services in Australia.
Austria	List from Dorfleitner, Hornuf, Schmitt, and Weber (2017), updated with newly launch platforms listed on Crowdfunding.de, reporting on crowdfunding in Austria since 2011.
Canada	Canadian Online Funding and Investing Directory periodically updated by the National Crowdfunding and Fintech Association. The directory includes different kinds of active online financial technology platforms and service providers. We have extracted only the entities classified as “platform” from this directory.
Chile	List of FinteChile members, available on the FinteChile.org website. FinteChile is an association whose members are involved in Chile’s FinTech industry.
Estonia	List of Finance Estonia members, available on the financeestonia.eu website. Finance Estonia is a financial sector representative organization whose members are active local fintech companies.
France	National registry supervised by the <i>Organisme pour le registre unique des intermédiaires en assurance, banque et finance</i> , established in 2014. Crowdfunding platforms are registered as <i>Conseiller en Investissements Participatifs</i> .
Germany	List from Dorfleitner et al. (2017), updated with new-born platforms listed on the website Crowdfunding.de, reporting on crowdfunding in Germany since 2011.
Italy	National registry of crowdfunding platforms supervised by the <i>Commissione Nazionale per le Società e la Borsa</i> , established in 2012. Italy was the first country in Europe to create a national registry.
Lithuania	National registry of operators of crowdfunding platforms supervised by <i>Lietuvos Bankas</i> , established in 2016.
Mexico	List of FinTech Mexico members, available on fintechmexico.org website. FinTech Mexico is an association whose members are fintech companies active in Mexico.
Netherlands	National registry of crowdfunding platforms supervised by the Dutch Authority for the Financial Markets, established in 2017. We double-checked the list of platforms on the national registry with the list available on fundwijzer.nl and

	crowdfundmarkt.nl. As we realized that some platforms have been active in the Netherlands before the creation of the national registry, we added these platforms to the sample.
New Zealand	National registry of crowdfunding platforms supervised by the Financial Market Authority, established in 2014.
Norway	List of Norsk Crowdfunding Forening (NCF) members, available on norskcrowdfunding.no. NCF is an association whose members are crowdfunding platforms active in Norway.
Portugal	National registry of crowdfunding platforms supervised by the <i>Comissão do Mercado De Valores Mobiliários</i> , established in 2018.
Spain	National registry of crowdfunding platforms supervised by the <i>Comisión Nacional del Mercado de Valores</i> , established in 2015. We double-checked the list of platforms on the national registry with the list available on universocrowdfunding.com. As we realized that some platforms have been active in Spain before the creation of the national registry, we added these platforms to the sample.
Switzerland	Crowdfunding.de, which reports information on crowdfunding in Switzerland since 2011. We integrated with the list of platforms listed on the Swiss Crowdfunding Association website.
United Kingdom	List of crowdfunding platforms from the CCAF’s “The Global Alternative Finance Market Benchmarking” report. This list is updated with new-born platforms by relying on the website of the UK Crowdfunding Association (UKCFA), which collects data on security-based crowdfunding platforms in the UK.
United States	National registry of crowdfunding intermediaries supervised by the Financial Industry Regulatory Authority, established in 2014.
Colombia, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Israel, Japan, Korea, Latvia, Lithuania, Luxembourg, Poland, Slovak Republic, Slovenia, Sweden, and Turkey	The samples of security-based crowdfunding platforms were built using different sources. First, we referred to the “2013CF Crowdfunding Industry Report” and “2015CF Crowdfunding Industry Report”, including a list of crowdfunding platforms worldwide. Second, we used the report “Identifying market and regulatory obstacles to cross-border development of crowdfunding in the EU,” published in November 2017 and funded by the European Commission. Third, we used CCAF’s “The Global Alternative Finance Market Benchmarking” report.
All countries	We checked the list of finance providers available on the European Crowdfunding Network (ECN), Nordic Crowdfunding Alliance, and altfinator.eu website. ECN is an independent network promoting the activity of crowdfunding platforms in Europe, active from 2013. Nordic Crowdfunding Alliance is a partnership of crowdfunding platforms active in Denmark, Finland, Iceland, and Norway, established in 2014. ALTFInator provides materials and resources on alternative financing providers, including security-based crowdfunding platforms, with the main aim to map and analyze the alternative finance ecosystems in Europe.

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**TABLE 2**

**Variables definition and descriptive statistics**

This table defines variables employed in the survival analysis. Descriptive statistics refer to the whole data set of 1,987 platform-year observations. WB WDI 2019: World Bank World Development Indicators updated on 2019/12/20.

Variable	Definition	Mean	Median	St. Dev.	Min	Max
<b>Panel A. Explanatory variables</b>						
Financial literacy	Level of financial sophistication of crowdfunding investors, measured using the Financial Literacy Index (100=best, 0=lowest). Standardized in regression analyses. Source: Standard & poor's Global Financial Literacy Survey.	56.92	57	10.69	24	71
Voting rights	Dummy variable equal to 1 if the platform delivers voting rights to crowdfunding investors at the time of launch, 0 otherwise.	0.54	1	0.50	0	1
Value adds	Number of types of crowdfunding services offered to users at the time of launch. Services types include pre-evaluation before listing on the platform, strategic fundraising guidance, business or financial planning, facilitation in crowdfunding contract design, and marketing or promotional services.	0.98	0	1.30	0	5
Co-investment condition	Dummy variable equal to 1 if the investment of at least one accredited investor is required in order to post the offering on the crowdfunding platform at the time of launch, 0 otherwise. The definition of accredited investors is provided by the regulation of each country.	0.32	0	0.47	0	1
<b>Panel B. Control variables</b>						
Market participation	The total number of registered investors in each platform, measured annually as in Cumming, Johan, & Zhang (2019).	2.70	1	2.91	1	6
Debt	Dummy variable equal to 1 if the platform also lists debt securities at the time of launch, 0 otherwise.	0.48	0	0.50	0	1
Hybrid platform	Dummy variable equal to 1 if the platform offers different typologies of crowdfunding, like donation, reward-based, or peer-to-peer lending, in addition to security-based crowdfunding, at the time of launch, 0 if it offers security-based crowdfunding only.	0.09	0	0.29	0	1

Industry specialized	Dummy variable equal to 1 if only ventures active in specific industries (i.e. real estate, healthcare, green energy, food) are admitted at the time of launch, 0 otherwise.	0.30	0	0.46	0	1
Competing platforms	The number of platforms active in the same country, measured annually.	29.77	29	20.79	0	68
GDP per capita	GDP per capita PPP, thousand, current international dollar, measured annually. Natural logarithms in regression analyses. Source: WB WDI 2019 (International Comparison Program database).	45.76	28.65	9.32	14.25	111.1
Population	Country population, million, measured annually. Natural logarithms in regression analyses. Source: WB WDI 2019 (United Nations Population Division).	17.78	18.01	1.13	13.31	19.61
Common law country	Dummy variable equal to 1 if the platform is based in a common law country (i.e., Australia, Canada, New Zealand, the UK, and the US), 0 otherwise; defined as in La Porta, Lopez-de-Silanes, Shleifer, & Vishny (1998).	0.307	0	0.47	0	1
Equity market index	The market capitalization of listed domestic companies, as a percentage of GDP, measured annually. Source: WB WDI 2019 (World Federation of Exchanges database).	72.31	63.92	39.53	4.87	248.03

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Panel C. Explanatory/Control variables employed in robustness tests

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Direct	Dummy variable equal to 1 if the platform allows delivering voting rights to crowdfunding investors under a direct ownership structure, 0 otherwise.	0.44	0	0.50	0	1
Nominee	Dummy variable equal to 1 if the platform allows delivering voting rights to crowdfunding investors under a nominee ownership structure, 0 otherwise.	0.10	0	0.30	0	1
Strategic guidance	Dummy variable equal to 1 if the platform helps in implementing strategies aimed to make a project more attractive to potential investors, 0 otherwise.	0.15	0	0.36	0	1
Business planning	Dummy variable equal to 1 if the platform helps entrepreneurs preparing a long-term business plan, 0 otherwise.	0.13	0	0.34	0	1
Contract design	Dummy variable equal to 1 if the platform supports entrepreneurs in legal assistance, 0 otherwise.	0.15	0	0.36	0	1
Pre-evaluation	Dummy variable equal to 1 if the platform supports entrepreneurs in implementing evaluation techniques, 0 otherwise.	0.23	0	0.42	0	1
Marketing	Dummy variable equal to 1 if the platform helps designing marketing campaigns, 0 otherwise.	0.30	0	0.46	0	1
GDP per capita growth	Annual percentage growth rate of GDP per capita, current international dollar. Source: WB WDI 2019 (International Comparison Program database).	1.40	1.45	1.07	-5.46	5.87

GDP	GDP, trillion, current international dollar. Source: WB WDI 2019 (International Comparison Program database).	4.47	2.77	5.72	0.04	20.51
Strength of legal rights index	Measure of the degree to which laws protect rights of borrowers and lenders (0=weak, 12=strong). Source: WB WDI 2019 (Doing Business project).	6.22	6	2.78	2	12
Listed firms/population	Number of listed domestic companies per million inhabitants. Source: WB WDI 2019 (World Federation of Exchanges database).	22.29	8.27	26.63	1.11	118.00
Tertiary education	Gross enrolment calculated as the ratio of total enrolment in tertiary education (ISCED5 or higher), regardless of age, as a percentage of the population in the age group officially correspondent to the level of education. Source: WB WDI 2019 (UNESCO Institute for Statistics).	72.22	67.74	13.74	19.15	136.60
Ease of doing business	Measure of the distance to frontier score, which represents the best performance observed on each Doing Business topic across all economies (0=lowest, 100=best). Source: WB WDI 2019 (Doing Business project). WB WDI 2019: World Bank World Development Indicators updated on 2019/12/20.	78.97	79.50	3.79	66.92	87.17

**TABLE 3****Correlation matrix**

Correlation matrix applies to the whole data set of 1,987 platform-year observations. Variance inflation factors (VIFs) are obtained after estimating an OLS regression of financial literacy against all variables. See Table 2 for variables definition. \* indicates significance at the 1 percent level.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	VIF
(1) Financial literacy	1.00													
(2) Voting rights	-0.17*	1.00												1.69
(3) Value adds	-0.10*	0.01	1.00											1.07
(4) Co-investment condition	-0.39*	0.30*	0.15*	1.00										1.67
(5) Market participation	0.08*	0.33*	0.03	0.08*	1.00									1.20
(6) Debt	0.26*	-0.41*	-0.04	-0.33*	0.00	1.00								1.41
(7) Hybrid platform	0.02	0.06*	0.04	-0.12*	-0.01	0.06*	1.00							1.05
(8) Industry specialized	0.14*	-0.09*	-0.06	-0.33*	0.12*	0.28*	0.01	1.00						1.24
(9) Competing plat.	0.22*	-0.37*	0.02	-0.39*	-0.20*	0.19*	0.04	0.18*	1.00					2.79
(10) GDP per capita	0.55*	-0.07*	-0.00	-0.35*	-0.02	0.21*	0.04	0.12*	0.42*	1.00				1.71
(11) Population	0.19*	-0.23*	0.08*	-0.31*	-0.18*	0.16*	0.10*	0.04	0.61*	0.32*	1.00			2.47
(12) Common Law	-0.35*	-0.18*	-0.02	0.24*	-0.01	-0.07*	-0.13*	0.06*	0.13*	-0.29*	-0.33*	1.00		2.02
(13) Market cap.	0.23*	0.08*	-0.07*	-0.26*	-0.01	0.12*	0.10*	-0.02	0.10*	0.47*	0.43*	-0.57*	1.00	1.97
Mean VIF														1.69

**TABLE 4****Survival analysis**

The table reports the results of shared-frailty Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Financial literacy	0.33*	1.10***	0.40**	0.08	0.90***
	(0.17)	(0.22)	(0.16)	(0.27)	(0.26)
Voting rights	-	2.23***	-	-	2.30***
	-	(0.41)	-	-	(0.37)
Financial literacy X Voting rights	-	0.78***	-	-	0.58**
	-	(0.27)	-	-	(0.27)
Value adds	-	-	0.26***	-	0.26***
	-	-	(0.09)	-	(0.09)
Financial literacy X Value added	-	-	-0.25**	-	-0.29***
	-	-	(0.11)	-	(0.10)
Co-investment condition	-	-	-	0.39	-0.28
	-	-	-	(0.37)	(0.33)
Financial literacy X Co-investment condition	-	-	-	-0.29	-0.44*
	-	-	-	(0.31)	(0.25)
Market participation	2.21***	1.91***	2.02***	2.18***	1.77***
	(0.51)	(0.49)	(0.48)	(0.50)	(0.46)
Debt	0.33	0.97***	0.35*	0.45*	1.13***
	(0.24)	(0.22)	(0.21)	(0.23)	(0.22)
Hybrid platform	1.16**	0.68	1.08**	1.17**	0.74*
	(0.54)	(0.48)	(0.47)	(0.52)	(0.45)
Industry specialized	0.47	0.26	0.32	0.46*	0.07
	(0.29)	(0.25)	(0.26)	(0.28)	(0.25)
Competing platforms	-0.04***	-0.02**	-0.03***	-0.02*	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ln(GDP per capita)	1.36	0.64	1.25	0.86	0.08
	(0.88)	(0.89)	(0.79)	(0.82)	(0.89)
Ln(Population)	0.16	0.25	0.07	0.00	0.14
	(0.21)	(0.19)	(0.19)	(0.20)	(0.18)
Common Law country	0.08	0.29	-0.00	-0.27	0.40
	(0.50)	(0.49)	(0.46)	(0.47)	(0.47)
Equity market index	0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Constant	11.14	3.94	9.18	3.28	-3.53
	(9.56)	(9.29)	(8.77)	(9.38)	(9.60)
Observations	1,987	1,987	1,987	1,987	1,987
Number of platforms	432	432	432	432	432
Log likelihood	-142.8	-121.0	-136.5	-141.2	-109.4

## TABLE 5

### Robustness test on different measures of financial literacy

This table reports the results of share-frailty Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. The measure of financial literacy is corrected by the level of each of the country-level control variables. In Model 1, following Pollock, Chen, Jackson, & Hambrick (2010) and Colombo, Meoli, & Vismara (2019), financial literacy is created by regressing in an OLS setting the financial literacy index against GDP per capita, and the residuals from this regression are included in the model. In Models 2 to 4, financial literacy is corrected by the size of a country's population, the country's legal system and the level of equity index of a country, respectively. Only the full model is reported (corresponding to Model 5 in Table 4). Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.



	(1)	(2)	(3)	(4)
Financial literacy	0.976*** (0.303)	0.905*** (0.261)	0.737*** (0.281)	0.939*** (0.290)
Voting rights	2.286*** (0.393)	2.305*** (0.374)	2.141*** (0.365)	2.332*** (0.379)
Financial literacy X Voting rights delivery	0.864** (0.376)	0.606** (0.275)	0.490* (0.289)	0.677** (0.296)
Value adds	0.216*** (0.083)	0.258*** (0.090)	0.249*** (0.086)	0.257*** (0.088)
Financial literacy X Value added	-0.229** (0.105)	-0.290*** (0.100)	-0.183** (0.087)	-0.242*** (0.090)
Co-investment condition	-0.201 (0.328)	-0.282 (0.331)	-0.259 (0.325)	-0.298 (0.332)
Financial literacy X Co-inv. cond.	-0.613* (0.320)	-0.453* (0.249)	-0.551** (0.272)	-0.459* (0.266)
Market participation	1.756*** (0.456)	1.771*** (0.460)	1.770*** (0.458)	1.787*** (0.461)
Debt	1.068*** (0.216)	1.127*** (0.218)	1.079*** (0.217)	1.122*** (0.218)
Hybrid platform	0.727 (0.445)	0.745* (0.445)	0.793* (0.442)	0.737* (0.447)
Industry specialized	0.122 (0.249)	0.077 (0.250)	0.096 (0.249)	0.089 (0.249)
Competing platforms	-0.027** (0.012)	-0.025** (0.012)	-0.027** (0.012)	-0.025** (0.012)
Ln(GDP per capita)	1.675** (0.802)	0.090 (0.885)	-0.082 (0.855)	0.157 (0.875)
Ln(Population)	0.171 (0.186)	0.164 (0.185)	0.169 (0.177)	0.150 (0.182)
Common Law country	0.487 (0.465)	0.397 (0.467)	0.048 (0.403)	0.436 (0.462)
Equity market index	0.006 (0.005)	0.004 (0.005)	0.007 (0.005)	0.008 (0.006)
Constant	14.938 (9.185)	-2.200 (9.538)	-3.820 (9.230)	-1.453 (9.424)
Observations	1,987	1,987	1,987	1,987
Number of platforms	432	432	432	432
Log likelihood	-113.4	-109.5	-114.2	-110.8

## TABLE 6

### Robustness test on different moderators

This table reports the results of share-frailty Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. We use different moderator variables, relative to the results reported in Table 4. In Model 1 and Model 2, *Voting rights delivery* is replaced by *Direct* and *Nominee*, respectively. In Models 3 to 7, *Value-adds* is replaced by *Strategic guidance*, *Business planning*, *Contract design*, *Pre-evaluation*, and *Marketing*, respectively. Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial Literacy	1.22*** (0.26)	0.11 (0.46)	0.30* (0.16)	0.31* (0.17)	0.35** (0.16)	0.29* (0.16)	0.80*** (0.17)	0.30* (0.17)
Direct	2.54*** (0.51)	- -	- -	- -	- -	- -	- -	2.40*** (0.48)
Financial Literacy X Direct	0.82*** (0.30)	- -	- -	- -	- -	- -	- -	0.63** (0.29)
Nominee	- -	-0.38 (0.37)	- -	- -	- -	- -	- -	0.31 (0.33)
Financial Literacy X Nominee	- -	-0.17 (0.46)	- -	- -	- -	- -	- -	-0.46 (0.42)
Strategic guidance	- -	- -	1.29*** (0.43)	- -	- -	- -	- -	0.23 (0.47)
Financial Literacy X Strategic guidance	- -	- -	-0.95* (0.51)	- -	- -	- -	- -	-0.34 (0.64)
Business/financial planning	- -	- -	- -	-0.65* (0.35)	- -	- -	- -	-0.43 (0.33)
Financial Literacy X Business planning	- -	- -	- -	-0.49 (0.34)	- -	- -	- -	-0.41 (0.34)
Contract design	- -	- -	- -	- -	0.19 (0.31)	- -	- -	0.08 (0.36)
Financial Literacy X Contract design	- -	- -	- -	- -	-0.55* (0.29)	- -	- -	-0.29 (0.39)
Pre-evaluation	- -	- -	- -	- -	- -	2.41** (0.94)	- -	2.03** (0.95)
Financial Literacy X Pre- evaluation	- -	- -	- -	- -	- -	-2.10* (1.12)	- -	-1.63 (1.17)
Marketing	- -	- -	- -	- -	- -	- -	-0.36 (0.27)	0.21 (0.34)
Financial Literacy X Marketing	- -	- -	- -	- -	- -	- -	0.45 (0.28)	0.22 (0.35)
Market participation	2.03*** (0.48)	2.18*** (0.50)	2.14*** (0.50)	2.21*** (0.51)	2.24*** (0.52)	2.11*** (0.50)	2.14*** (0.50)	1.84*** (0.44)
Debt	0.84*** (0.23)	0.23 (0.24)	0.42* (0.23)	0.36 (0.24)	0.33 (0.23)	0.43* (0.23)	0.31 (0.22)	0.94*** (0.23)
Hybrid platform	0.57 (0.50)	1.11** (0.51)	1.16** (0.53)	1.15** (0.54)	1.17** (0.54)	1.18** (0.54)	1.13** (0.51)	0.67 (0.48)
Industry specialized	0.28 (0.26)	0.36 (0.28)	0.39 (0.29)	0.43 (0.29)	0.42 (0.29)	0.43 (0.29)	0.41 (0.28)	0.16 (0.26)
Competing platforms	-0.02** (0.01)	-0.03** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03** (0.01)
Ln(GDP per capita)	0.48 (0.93)	1.24 (0.83)	1.13 (0.87)	1.40 (0.88)	1.22 (0.88)	0.96 (0.88)	1.35 (0.83)	0.17 (0.86)
Ln(Population)	0.22 (0.19)	0.08 (0.20)	0.14 (0.20)	0.17 (0.21)	0.11 (0.21)	0.06 (0.20)	0.12 (0.19)	0.14 (0.18)
Common Law country	0.57 (0.51)	-0.09 (0.48)	0.10 (0.49)	-0.04 (0.50)	0.03 (0.50)	0.18 (0.50)	0.01 (0.47)	0.49 (0.48)
Equity market index	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)
Constant	1.92 (9.78)	9.43 (9.03)	7.19 (9.46)	12.16 (9.56)	8.83 (9.58)	2.95 (9.70)	10.27 (9.02)	-5.32 (9.23)
Observations	1,987	1,987	1,987	1,987	1,987	1,987	1,987	1,987
Number of platforms	432	432	432	432	432	432	432	432
Log likelihood	-124.3	-142.7	-135	-139.9	-140.6	-129.3	-140.7	-105.8

## TABLE 7

### Robustness test on different and additional controls variables

This table reports the results of shared-frailties Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. We use different and additional country-level control variables, relative to the results reported in Table 4. Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. In Model 1, *GDP per capita growth* replaces *GDP per capita*; in Model 2, *GDP* replaces *Population*; in Model 3, *Strength of legal rights index* replaces *Common Law country*; and in Model 4, *Listed firms/population* replaces *Equity market index*. In Model 5 and Model 6, we add *Tertiary education*, as a measure of human capital and *Ease of doing business*, as a measure of the level of entrepreneurship, respectively. Only the full model is reported (corresponding to Model 5 in Table 4). See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Financial literacy	0.94*** (0.26)	0.90*** (0.26)	0.89*** (0.28)	0.98*** (0.27)	0.92*** (0.27)	0.75*** (0.28)
Voting rights	2.37*** (0.38)	2.30*** (0.37)	2.26*** (0.37)	2.20*** (0.38)	2.27*** (0.37)	2.41*** (0.39)
Financial literacy X Voting rights delivery	0.57** (0.25)	0.58** (0.27)	0.65** (0.28)	0.71*** (0.24)	0.61** (0.28)	0.56** (0.27)
Value adds	0.28*** (0.09)	0.26*** (0.09)	0.26*** (0.09)	0.26*** (0.09)	0.25*** (0.09)	0.27*** (0.09)
Financial literacy X Value added	-0.30*** (0.10)	-0.29*** (0.10)	-0.29*** (0.10)	-0.30*** (0.10)	-0.29*** (0.10)	-0.29*** (0.10)
Co-investment condition	-0.34 (0.33)	-0.28 (0.33)	-0.26 (0.34)	-0.23 (0.36)	-0.19 (0.34)	-0.21 (0.33)
Financial literacy X Co-inv. cond.	-0.46* (0.24)	-0.44* (0.25)	-0.43* (0.25)	-0.36 (0.24)	-0.45* (0.25)	-0.61** (0.27)
Market participation	1.79*** (0.46)	1.77*** (0.46)	1.81*** (0.46)	1.78*** (0.46)	1.77*** (0.46)	1.82*** (0.47)
Debt	1.14*** (0.21)	1.13*** (0.22)	1.14*** (0.22)	1.08*** (0.22)	1.14*** (0.22)	1.14*** (0.22)
Hybrid platform	0.78* (0.45)	0.74* (0.45)	0.71 (0.45)	0.73* (0.44)	0.68 (0.45)	0.76* (0.45)
Industry specialized	0.10 (0.25)	0.07 (0.25)	0.07 (0.25)	0.10 (0.25)	0.02 (0.25)	0.09 (0.26)
Competing platforms	-0.03** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.03** (0.01)	-0.03** (0.01)	-0.03** (0.01)
Ln(GDP per capita)	- (0.13)	-0.06 (0.91)	0.06 (0.88)	0.48 (0.81)	0.22 (0.89)	-0.63 (0.97)
GDP per capita growth	0.13 (0.13)	- (0.13)	- (0.13)	- (0.13)	- (0.13)	- (0.13)
Ln(Population)	0.21 (0.20)	- (0.20)	0.09 (0.18)	0.17 (0.19)	0.12 (0.19)	0.26 (0.21)
Ln(GDP)	- (0.18)	0.14 (0.18)	- (0.18)	- (0.18)	- (0.18)	- (0.18)
Common Law country	0.40 (0.46)	0.41 (0.47)	- (0.47)	0.22 (0.40)	0.49 (0.48)	1.11* (0.62)
Strength of legal rights index	- (0.07)	- (0.07)	-0.02 (0.07)	- (0.07)	- (0.07)	- (0.07)
Equity market index	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	- (0.01)	0.01 (0.01)	0.01 (0.01)
Listed firms/population	- (0.01)	- (0.01)	- (0.01)	-0.00 (0.01)	- (0.01)	- (0.01)
Tertiary education	- (0.01)	- (0.01)	- (0.01)	- (0.01)	-0.01 (0.01)	-0.01 (0.01)
Ease of doing business	- (0.06)	- (0.06)	- (0.06)	- (0.06)	- (0.06)	0.10* (0.06)
Constant	-3.14 (3.52)	-3.50 (9.61)	-4.79 (9.37)	0.84 (8.81)	-3.03 (9.57)	-0.96 (9.35)
Observations	1,987	1,987	1,987	1,987	1,987	1,987
Number of groups	432	432	432	432	432	432
Log likelihood	-108.9	-109.4	-109.7	-109.6	-108.8	-107.5

## TABLE 8

### **Robustness test on different estimation techniques**

This table reports the results of regression models with the likelihood of a platform to survive over time as dependent variable. We use different estimation techniques. Model 1 refers to a Cox proportional hazard survival-time model with robust standard errors; Model 2 to a shared-frailty exponential proportional hazard survival-time model; Model 3 to a shared-frailty Gompertz proportional hazard survival-time model. Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level in shared-frailty models. Only the full model is reported (corresponding to Model 5 in Table 4). See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)
Financial literacy	0.84*** (0.30)	1.05*** (0.27)	1.30*** (0.33)
Voting rights	1.99*** (0.33)	1.78*** (0.37)	2.67*** (0.48)
Financial literacy X Voting rights delivery	0.47** (0.21)	0.56** (0.27)	0.72** (0.31)
Value adds	0.22*** (0.08)	0.19** (0.09)	0.24** (0.12)
Financial literacy X Value added	-0.27*** (0.08)	-0.31*** (0.10)	-0.34*** (0.12)
Co-investment condition	-0.24 (0.27)	-0.17 (0.29)	-0.14 (0.38)
Financial literacy X Co-inv. cond.	-0.38 (0.25)	-0.13 (0.23)	-0.29 (0.29)
Market participation	1.59** (0.77)	1.42*** (0.41)	2.15*** (0.57)
Debt	0.84*** (0.17)	0.49** (0.20)	1.15*** (0.26)
Hybrid platform	0.47 (0.35)	0.14 (0.43)	1.13** (0.57)
Industry specialized	0.07 (0.21)	0.13 (0.24)	0.15 (0.30)
Competing platforms	-0.03*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)
Ln(GDP per capita)	-0.38 (0.77)	-1.19 (0.77)	-0.22 (0.97)
Ln(Population)	0.15 (0.16)	0.37** (0.15)	0.32 (0.21)
Common Law country	0.60 (0.39)	1.05** (0.44)	0.24 (0.54)
Equity market index	0.01 (0.01)	0.01* (0.01)	0.00 (0.01)
Constant	- -	-8.26 (8.59)	-2.04 (10.49)
Observations	1,987	1,987	1,987
Number of platforms	432	432	432
Log likelihood	-584.3	-185.4	-125.9

## Appendix

**TABLE A1**

**Survival analysis excluding platforms operating in more than one country**

The table reports the results of shared-frailty Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. We exclude 11 platforms that operate in more than one country from our population (70 observations). Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Financial Literacy	0.32* (0.17)	1.04*** (0.23)	0.33** (0.15)	-0.14 (0.32)	0.74*** (0.28)
Voting rights	-	2.12*** (0.41)	-	-	2.18*** (0.37)
Financial literacy X Voting rights	-	0.71** (0.28)	-	-	0.52* (0.27)
Value adds	-	-	0.29*** (0.09)	-	0.27*** (0.09)
Financial literacy X Value added	-	-	-0.21** (0.10)	-	-0.29*** (0.10)
Co-investment condition	-	-	-	0.10 (0.44)	-0.43 (0.35)
Financial literacy X Co-investment condition	-	-	-	-0.53 (0.37)	-0.57** (0.26)
Market participation	2.17*** (0.50)	1.90*** (0.49)	1.96*** (0.47)	2.16*** (0.50)	1.75*** (0.46)
Debt	0.42* (0.23)	0.99*** (0.23)	0.46** (0.20)	0.56** (0.24)	1.16*** (0.22)
Hybrid platform	0.71 (0.53)	0.54 (0.48)	0.47 (0.47)	0.73 (0.51)	0.51 (0.44)
Industry specialized	0.44 (0.28)	0.24 (0.25)	0.29 (0.25)	0.41 (0.28)	0.04 (0.25)
Competing platforms	-0.03*** (0.01)	-0.02** (0.01)	-0.03*** (0.01)	-0.02* (0.01)	-0.03** (0.01)
Ln(GDP per capita)	1.52* (0.86)	0.64 (0.89)	1.53** (0.76)	0.98 (0.83)	0.11 (0.89)
Ln(Population)	0.13 (0.20)	0.25 (0.19)	0.08 (0.17)	-0.04 (0.20)	0.13 (0.18)
Common Law country	0.12 (0.49)	0.27 (0.50)	0.13 (0.45)	-0.14 (0.49)	0.52 (0.49)
Equity market index	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.01 (0.00)	0.01 (0.01)
Constant	12.98 (9.35)	4.14 (9.37)	13.02 (8.57)	4.54 (9.53)	-2.74 (9.66)
Observations	1,917	1,917	1,917	1,917	1,917
Number of platforms	421	421	421	421	421
Log likelihood	-138.9	-119.6	-131.6	-136.7	-107.1



**TABLE A2****Survival analysis with a different definition of platform failure**

The table reports the results of shared-frailty Weibull survival-time models with the likelihood of a platform to survive over time as dependent variable. Platform failure is identified according to the following two scenarios (1) the platform website becomes inaccessible for at least 6 months, and (2) the platform declares failure on the website or ceases to operate in the crowdfunding business. Random effects terms (shared frailties) are included to account of unobserved heterogeneity at the platform level. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Financial Literacy	0.29* (0.17)	1.16*** (0.24)	0.44** (0.18)	0.04 (0.29)	0.87*** (0.27)
Voting rights	-	2.38*** (0.44)	-	-	2.35*** (0.39)
Financial literacy X Voting rights	-	0.75** (0.29)	-	-	0.60** (0.27)
Value adds	-	-	0.23** (0.10)	-	0.25*** (0.09)
Financial literacy X Value added	-	-	-0.27** (0.11)	-	-0.29*** (0.10)
Co-investment condition	-	-	-	0.27 (0.41)	-0.31 (0.33)
Financial literacy X Co-investment condition	-	-	-	-0.37 (0.33)	-0.47* (0.25)
Market participation	2.22*** (0.51)	1.99*** (0.51)	2.09*** (0.49)	2.21*** (0.51)	1.78*** (0.46)
Debt	0.26 (0.24)	0.93*** (0.24)	0.30 (0.22)	0.38 (0.24)	1.09*** (0.22)
Hybrid platform	1.37** (0.58)	0.95* (0.55)	1.31** (0.55)	1.43** (0.58)	0.89* (0.48)
Industry specialized	0.44 (0.29)	0.26 (0.27)	0.33 (0.28)	0.45 (0.29)	0.04 (0.25)
Competing platforms	-0.03*** (0.01)	-0.03** (0.01)	-0.03*** (0.01)	-0.02* (0.01)	-0.02** (0.01)
Ln(GDP per capita)	1.37 (0.88)	0.60 (0.93)	1.18 (0.85)	0.85 (0.88)	0.08 (0.89)
Ln(Population)	0.14 (0.21)	0.30 (0.20)	0.09 (0.20)	0.03 (0.21)	0.14 (0.18)
Common Law country	-0.05 (0.50)	0.25 (0.51)	-0.04 (0.49)	-0.25 (0.50)	0.30 (0.47)
Equity market index	0.00 (0.00)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)
Constant	10.85 (9.62)	3.59 (9.78)	8.12 (9.35)	3.40 (10.01)	-3.77 (9.61)
Observations	1,987	1,987	1,987	1,987	1,987
Number of platforms	432	432	432	432	432
Log likelihood	-141.1	-119.1	-125	-138.9	-108.7

### **Table A3**

#### **Survival analysis with competing scenarios**

The table reports the results of a competing risks regression on platform's outcomes, according to the method of Fine & Grey (1999). In Failed models, the hazard rate of platform failure is the latent dependent variable, and the event of an acquisition is the competing event. In Acquired models, the hazard rate of a platform acquisition is the latent dependent variable, and failure is the competing event. See Table 2 for variables definition. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent levels, respectively.

	Failed	Acquired	Failed	Acquired	Failed	Acquired	Failed	Acquired	Failed	Acquired
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financial Literacy	-0.22*	-0.50	-0.31	-0.37	-0.34***	-0.63	-0.36***	-0.67	-0.67***	-0.46
	(0.12)	(0.41)	(0.20)	(1.05)	(0.13)	(0.47)	(0.12)	(0.47)	(0.20)	(1.18)
Voting rights	-	-	-1.90***	-0.09	-	-	-	-	-1.94***	-0.02
	-	-	(0.35)	(0.74)	-	-	-	-	(0.34)	(0.77)
Financial literacy X Voting rights	-	-	-0.61***	-0.19	-	-	-	-	-0.46**	-0.44
	-	-	(0.22)	(1.19)	-	-	-	-	(0.22)	(1.21)
Value adds	-	-	-	-	-0.17**	-0.61*	-	-	-0.17**	-0.62*
	-	-	-	-	(0.08)	(0.36)	-	-	(0.08)	(0.35)
Financial literacy X Value added	-	-	-	-	0.22***	0.18	-	-	0.25***	0.16
	-	-	-	-	(0.08)	(0.43)	-	-	(0.08)	(0.47)
Co-investment condition	-	-	-	-	-	-	-0.21	-0.53	0.23	-0.42
	-	-	-	-	-	-	(0.31)	(0.82)	(0.28)	(0.93)
Financial literacy X Co-investment condition	-	-	-	-	-	-	0.34	0.23	0.40	0.27
	-	-	-	-	-	-	(0.25)	(0.70)	(0.26)	(0.78)
Market participation	-1.77**	0.09	-1.66**	0.11	-1.72**	0.13	-1.77**	0.08	-1.63**	0.14
	(0.76)	(0.16)	(0.79)	(0.15)	(0.76)	(0.16)	(0.76)	(0.16)	(0.82)	(0.15)
Debt	-0.11	-0.42	-0.57***	-0.45	-0.15	-0.43	-0.20	-0.50	-0.71***	-0.51
	(0.16)	(0.67)	(0.16)	(0.78)	(0.16)	(0.69)	(0.16)	(0.69)	(0.17)	(0.78)
Hybrid platform	-0.89**	0.02	-0.57*	0.04	-0.90**	0.14	-0.96**	-0.06	-0.61*	0.11
	(0.39)	(1.22)	(0.33)	(1.16)	(0.40)	(1.21)	(0.41)	(1.17)	(0.34)	(1.14)
Industry specialized	-0.30	0.57	-0.17	0.59	-0.22	0.49	-0.30	0.48	-0.04	0.47
	(0.21)	(0.69)	(0.20)	(0.69)	(0.20)	(0.70)	(0.21)	(0.68)	(0.21)	(0.68)
Competing platforms	0.03***	-0.01	0.02**	-0.01	0.03***	-0.01	0.02**	-0.02	0.02**	-0.02
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.02)	(0.01)	(0.02)
Ln(GDP per capita)	-0.90	6.34***	-0.18	6.28***	-0.78	6.62***	-0.48	6.43***	0.31	6.68***
	(0.72)	(2.31)	(0.85)	(2.33)	(0.63)	(2.42)	(0.66)	(2.30)	(0.77)	(2.53)
Ln(Population)	-0.12	0.18	-0.25*	0.14	-0.08	0.25	-0.03	0.22	-0.14	0.23
	(0.15)	(0.53)	(0.15)	(0.53)	(0.15)	(0.53)	(0.14)	(0.52)	(0.16)	(0.57)
Common Law country	0.11	-0.30	0.28	-0.25	0.09	-0.21	0.00	-0.45	0.29	-0.23
	(0.37)	(1.46)	(0.39)	(1.56)	(0.38)	(1.63)	(0.37)	(1.53)	(0.40)	(1.75)
Equity market index	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01	-0.00	-0.01	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Observations	1,987	1,987	1,987	1,987	1,987	1,987	1,987	1,987	1,987	1,987
Number of platforms	432	432	432	432	432	432	432	432	432	432
Log likelihood	-595.8	-53.85	-578.9	-53.84	-590.7	-51.89	-53.64	-593.6	-570.9	-51.68

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<sup>1</sup> The quotation is reported from the White House Press Release, accessed at <https://www.whitehouse.gov/the-press-office/2012/04/05/remarks-president-jobs-act-bill-signing>. The Jumpstart Our Business Startups (JOBS) Act, enacted in April 2012, includes the Capital Raising Online While Deterring Fraud and Unethical Non-Disclosures Act (CROWDFUND Act), which authorizes equity crowdfunding. Consistent with the definition provided by the US Securities and Exchange Commission (SEC), accessed at <https://www.sec.gov/smallbusiness/exemptofferings/regcrowdfunding>, security-based crowdfunding refers to a financing method in which firms raise capital by offering securities through soliciting relatively small individual investments or contributions from multitudes people. Securities include equity securities, which represent ownership of a company, and debt (or fixed income) securities.

<sup>2</sup> Financial literacy can be defined as “a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing” (Atkinson & Messy, 2012).

<sup>3</sup> The definition of accredited investors varies across jurisdictions. In the US, accredited investors, include both investors who have over \$1 m in net worth or earn more than \$200 k per year, \$300 k with spouse, in each of the past 2 years, as well as institutions like banks and venture capitalists (Rule 501(a) of Regulation D). In Canada, accredited investors have net worth higher than CA\$5 m or financial assets higher than CA\$1 m or income higher than CA\$200 k or joint spouse income higher than CA\$300 k in the last 2 years, corporations, limited partnerships, trusts and estates having net assets of at least CA\$5 m (section 2.3 of Regulation 45-106). In the UK, accredited investors include professional investors, self-certified sophisticated investors, high net worth investors (net worth higher than £250k or annual income higher than £100 k) and advised investors, i.e. investors who receive regulated investment advice or management services from a professional adviser authorised by the Financial Conduct Authority (COBS 3.5 of FCA Handbook - COBS 4.12.6 R & COBS 4.12.7 R).

<sup>4</sup> Crowdfunding categories are taken from “The Global Alternative Finance Market Benchmarking”, published in April 2020 by the Cambridge Center of Alternative Finance (CCAF).

<sup>5</sup> The Wayback Machine is a digital archive of the World Wide Web, founded by the Internet Archive, a nonprofit organization based in San Francisco. It allows the user to go “back in time” and see what websites looked like in the past. It is available online at: [web.archive.org](http://web.archive.org).

<sup>6</sup> We plot Kaplan-Meier curves of the two groups (i) by excluding the platforms based in countries with financial literacy equal to the median and (ii) by using the 1<sup>st</sup> and 3<sup>rd</sup> quantiles.

<sup>7</sup> In our analysis we make two assumptions. First, we assume that cross-border investment on a platform are relatively small, such that our measure of financial literacy is representative of the financial sophistication level of most investors on the platform. Relaxing our assumption and excluding 11 platforms that localized their websites in terms of currency and language for different countries, our results are confirmed at a similar level of significance (See Table A1 in the Appendix). Second, we assume that the acquisition scenario should be related to a failure. We perform our main analysis using a stricter definition of platform failure which excludes the acquisition outcome (See Table A2 in the Appendix). Additionally, we perform a competing risks proportional-hazard duration model where we estimate the platform’s likelihood to fail at a given time, conditional on the fact that it has not been acquired before that time (see Table A3 in the Appendix). Again, our main results do not significantly change.

<sup>8</sup> Although robustness tests have been performed for all the different model specifications, in the tables of robustness tests, we only report the model with all variables and interactions, corresponding to Model 5 in Table 4 of the main analysis.

<sup>9</sup> To assess how much bias there must be in estimate to invalidate the inference of the effect of financial literacy on the survival profile of security-based crowdfunding platforms, we apply the *konfound* Stata command with a nonlinear model option (Xu, Maroulis & Rosenberg, 2019).