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Equity Crowdfunding and Treatment Effect on Professionalization of Innovative Start-ups

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Abstract

The purpose of this paper is to study the dynamics of the Italian equity crowdfunding market for all the three phases that characterize this innovative financing instrument: the launch of a campaign, the achievement of a successful outcome and the consequences generated by the capital collected. Three typologies of descriptive statistics are performed, one for each of the phases, together with econometric models to test the presence of a selection effect on the access to equity crowdfunding and of a treatment effect on the level of professionalization of the backed start-up generated by the successful campaign.

Results demonstrate the existence of a relation between the structure and dimension of the firm and the instrument of equity crowdfunding along all its three phases. Indeed, start-ups that launch a campaign result to be more developed than the ones that prefer traditional funding sources in terms of assets and employees and managers appointed. As further analysis on this topic, econometric models on the selection effect highlight a strong association between venture's innovativeness, social vocation and maturity, as well as the wealth of its geographical location, with the access to equity crowdfunding. Moreover, innovative start-ups that complete a successful funding project are managed by more executives than the ones that instead fail, report on their balance sheet a significantly higher value of IPRs and launch a campaign that lasts for half of the months of the unsuccessful ones. Additionally, the collection of risk capital through equity crowdfunding is correlated with a growth of the employees and investments in R&D. To further study the consequences of a successful equity crowdfunding project on venture's professionalization as standing point with the existent literature, econometric models on the treatment effect demonstrate a significant association between the outcome of the campaign and the growth of the managerial profiles appointed.

Key Words

Equity crowdfunding, Access, Success, Post-campaign, Professionalization

Sommario

L'obiettivo di questo studio è analizzare le dinamiche del mercato italiano dell'equity crowdfunding per tutte e tre le fasi che caratterizzano questo innovativo strumento di finanziamento: il lancio della campagna, il raggiungimento di un risultato positivo e le conseguenze generate dal capitale raccolto. Tre tipologie di statistiche descrittive sono condotte, una per ogni fase, insieme a dei modelli econometrici per testare la presenza di un effetto di selezione sull'accesso all'equity crowdfunding e di un effetto di trattamento sul livello di professionalizzazione della start-up finanziata generato dalla campagna di successo.

I risultati dimostrano l'esistenza di una relazione tra la struttura e dimensione dell'azienda e l'equity crowdfunding lungo tutte e tre le sue fasi. Infatti, le start-up che lanciano una campagna risultano essere più sviluppate di quelle che preferiscono forme di finanziamento più tradizionali in termini di assets, impiegati e managers incaricati. Come ulteriore analisi su questo tema, i modelli econometrici sull'effetto di selezione evidenziano una forte associazione tra l'innovatività, la vocazione sociale e la maturità dell'azienda, così come il benessere della regione geografica di origine, con l'accesso all'equity crowdfunding. Inoltre, le start-up che completano con successo la campagna sono gestite da più dirigenti di quelle per cui fallisce, riportano nel loro bilancio un valore di IPRs molto più significativo e promuovono campagne che durano la metà di quelle che ottengono un risultato negativo. Ancora, l'ottenimento di capitale di rischio tramite equity crowdfunding è correlato a una crescita degli impiegati e degli investimenti in R&D. Per studiare più a fondo le conseguenze di una campagna di successo sul livello di professionalizzazione della start-up finanziata come punto di innovazione rispetto alla letteratura esistente, i modelli econometrici sull'effetto di trattamento dimostrano una significativa associazione tra il risultato della campagna e la crescita delle figure manageriali nominate.

Parole chiave

Equity crowdfunding, Accesso, Successo, Post-campagna, Professionalizzazione

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Extended Summary

The topic of this paper is represented by the equity crowdfunding. This is a relatively new financing instruments through which companies have the possibility to collect equity capital, besides the more traditional sources of funding as business angels, venture capitalists and bank loans. Public awareness on this phenomenon peaked in fact after the 5th of April 2012, when President Obama signed the Jumpstart Our Business Startups (JOBS) Act, a law that legalized the collection of funds for start-ups in change of equity by relaxing some restrictions concerning the sale of securities. From that moment, the equity crowdfunding instrument spread all over the other most developed countries, becoming a valuable and reliable source of funds for new ventures. As a matter of fact, start-ups at the beginning of their lifecycle face significant difficulties in collecting funds from traditional sources of financing in order to foster their business development. Literature in fact demonstrates that business angles and venture capitalists have increased, during the last years, their minimum investment in innovative entrepreneurial projects, resulting then in a greater difficulty for early-stage ventures in being founded by these actors. Moreover, also bank loans result to be scarcely available for new firms, because of the absence of collaterals and sufficient cash flows to repay interests. Equity crowdfunding becomes then an interesting source of risk capital, because of its ability of tapping a vast crowd of potential investors, who have the possibility to foster the entrepreneurial project by providing small amount of capital. In conclusion, equity crowdfunding represents a new interesting topic in the field of entrepreneurial finance that deserves to be further analysed.

The financing instrument studied in this paper is characterised by a precise and rigorous process that could be split in three main phases. The first one is represented by the access to this funding source. As a matter of fact, early-stage ventures need to ask the permission to the equity crowdfunding platform in order to publish their crowdfunding campaign on the website. On the other side, the portal performs some level of due diligence to evaluate the quality of the

entrepreneurial project and, at the end, avoid the promotion of low quality ventures on their website. The dynamics related to this access phase to the instrument of equity crowdfunding represent then a first interesting aspect to be considered in the study of this phenomenon.

The second phase is instead related to the drivers that guide success or failure for the campaign promoted on the platform. The regulation, in fact, states that the funding project is successful only in the case all the target capital set at the beginning of the campaign is raised from crowdfunders. The market, however, allows also another mechanism in order to determine the outcome of the crowdfunding project. More precisely, campaigns defined by the Italian regulation as *offerte scindibili* are always successful, meaning that the capital collected on the platform is always released to the start-up, independently of the achievement of the target capital. Besides these issues related to the regulation, the main topic of this second phase is given by the ability of the early-stage venture in transmitting the quality of its entrepreneurial project and, on the other side, the experience of potential investors on the equity crowdfunding platform in receiving these signals. This aspect is considered by the literature as one of the more relevant in regard of equity crowdfunding, because of the information asymmetries that typically affect this financing instrument, that could generate a market failure in the case not sufficient countermeasures in terms of market design, rules and regulations are taken. It is interesting then to verify if the signalling effects identified by the literature, as well as additional venture's and campaign's characteristics, are experienced also in the Italian equity crowdfunding market.

The last phase related to the phenomenon of equity crowdfunding is given by the post-campaign consequences. More precisely, the collection of risk capital after the completion of a successful campaign could determine some relevant changes in the profile of the early-stage venture backed. The consequences of being fund from traditional sources of funding, like business angels, venture capitalist and banks, are well documented by the literature on entrepreneurial finance. The novelty of equity crowdfunding, instead, is the cause of a scarce research from academics in relation to

the consequences of this financing instrument. A deeper analysis on the evolution of the funded start-up after the conclusion of a successful campaign represents then an extremely relevant and cutting-edge topic if compared to the existing literature on equity crowdfunding. More precisely, the main research topic of this paper is related to the effects of a successful crowdfunding project on the level of professionalization of the funded firm. Literature in fact demonstrates that collecting risk capital from business angels or venture capitalists generates an increase of the number of managers appointed by the start-up, because of the necessity of these financing sources in monitoring the evolution of the backed firm. The hypothesis formulated in this paper states, therefore, that the conclusion of a successful equity crowdfunding campaign increases the level of professionalization of the backed venture. Reasons behind this potential association are represented, first of all, by the greater financial availabilities of the firm in appointing new managers, because of the collection of fresh capital. Secondly, the positive externalities generated by a successful campaign in terms of reputation and perceived quality could stimulate skilled and experienced managers in joining the start-up. The verification of the existence of this correlation represents then the main topic of the paper.

In order to analyse all the three phases of equity crowdfunding, three typologies of descriptive statistics are performed, together with eight econometric models specifically created to test the presence of a potential selection effect on the access to equity crowdfunding and a potential treatment effect on the level of professionalization of the funded early-stage venture generated by the successful campaign. Descriptive statistics 1 aims then at comparing the innovative start-ups that launched a crowdfunding project with the ones that instead preferred more traditional sources of funding, in order to highlight the main differences between them. Moreover, to further develop this analysis, four econometric models are performed in relation to a potential selection effect, so to depict the main associations between firm's characteristics and access to equity crowdfunding. As a matter of fact, this effect could be determined by two different phenomena. The first one is

a potential self-selection operated by the early-stage venture, which can prefer more traditional sources of funding because of the perception of not being suitable for the dynamics of equity crowdfunding. Secondly, the selection operated by the platform while evaluating the quality of the entrepreneurial project and deciding which ones to promote on its website.

Descriptive statistics 2 has as a purpose, instead, the testing for the Italian equity crowdfunding market of the signals of quality identified by the literature. More precisely, the idea is to test if the factors that are perceived as indicators of entrepreneurial quality and that, at the end, are associated to campaign's success are considered as relevant also for crowdinvestors on Italian equity crowdfunding platforms.

The objective of Descriptive statistics 3 is the analysis of the third and last phase of the process of equity crowdfunding, namely the study of the consequences of a successful equity crowdfunding campaign on the characteristics of the backed venture. As further and innovative development of this issue, four additional econometric models are performed in order to test the hypothesis formulated in this paper in relation to the consequences of a crowdfunding project with positive outcome on the level of professionalization of the funded firm. These models aim then at verifying the presence of a potential treatment effect that associates the completion of a successful campaign to the growth of the number of managers appointed by the backed venture.

The sample of companies considered for all the analyses performed in the paper is given by the early-stage ventures that are defined as *start-up innovative* according to the Italian legislation. This choice is motivated by the fact that, in Italy, just two typologies of companies have to possibility to collect funds through equity crowdfunding: *start-up innovative* and *PMI innovative*. To be registered in these two special sections of *Registro Imprese*, firms need to satisfy precise requirements set by the authority that regulates the Italian equity crowdfunding market, namely the CONSOB. However, the authorization to exploit this innovative funding source was given to *PMI innovative* just few months before the publication of this paper, therefore the number of

innovative SMEs that launched an equity crowdfunding project is extremely limited. As a consequence, just *start-up innovative* are considered in the sample for the analyses computed.
The typologies of data required for the descriptive statistics and the econometric models are mainly three. First of all, information reported in the balance sheet, income statement and cash flow statement of the early-stage ventures are needed, so to gather their financial profile. Moreover, also more "soft" data are required to complete the insight about start-ups with a 360° approach. Some examples are related to the sector, the geographical location, the composition of its human resources and managerial team or the level of innovation of the entrepreneurial project. Finally, data about the equity crowdfunding campaign performed are needed, especially to evaluate potential associations between the characteristics of the funding project and its consequent outcome.

In order to collect all these information, three main sources of data are consulted, namely Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance" of the School of Management of Politecnico di Milano. This first source of data is used to gather all the information contained in the income statement, cash flow statement and balance sheet of the companies in the sample. It is a database developed by Bureau Van Dijk, a Moody's Analytics Company, which contains comprehensive data on companies in Italy, with up to ten years of history. *Registro Imprese* is a database created and updated by *Ministero dello Sviluppo Economico*, the ministry responsible in Italy for industrial politics, international business, communication and energy. In particular, this authority has created a special section of *Registro Imprese* dedicated to the innovative start-ups that reports all the "soft" information previously described. Finally, the research group "Entrepreneurship & Finance" of the School of Management of Politecnico di Milano, whose aim is to study all the phenomena related to entrepreneurship and corporate finance, focusing especially on the effects on innovation, firm's competitiveness and the economic system. This

last source provides a dataset comprehensive of all the equity crowdfunding campaigns performed in Italy, together with their related characteristics.

Other typologies of data sources, exploited specifically for the analysis of the potential treatment effect related to the hypothesis formulated, are the website of the start-up and the equity crowdfunding platform on which the campaign was promoted, the LinkedIn page of the firm and, in some cases, the press. All these sources are fundamental for the information regarding the evolution of the managerial team of the ventures in the sample along the different phases of equity crowdfunding. These data were in fact collected manually, combining information from the different sources, because of the absence of an existent aggregated database.

All the collected data are integrated through the tax code of the innovative start-up, so to create a final database comprehensive of all the three typologies of information required. In particular, a specific dataset is created for each of the analysis performed in the paper, diversified according to the firms to be considered and the years to which the variables selected refer. As a matter of fact, the dataset for Descriptive statistics 1 includes all the innovative start-ups present in Italy, and the year considered is the last available for firms that did not access equity crowdfunding, the one before the conclusion of the campaign for early-stage ventures that launched an equity crowdfunding project. Descriptive statistics 2 and econometric models for the treatment effect, instead, consider the same year of Descriptive statistics 1, selecting however just the companies that promoted a campaign. The dataset for Descriptive statistics 3 focuses just on the companies that concluded a successful equity crowdfunding campaign, reporting the same year of the conclusion of the funding project and the one before. Finally, the dataset for the econometric models of the selection effect is the same of the one created for Descriptive statistics 1, however the years considered are 2015 and 2016.

The estimation techniques adopted differ in relation to the analysis considered. More precisely, for all the three descriptive statistics a comparison between the average indicators of the two

groups of companies is provided, together with a test-T able to compute differences with statistical significance. In particular, the two groups of companies compared are represented by the start-ups that accessed equity crowdfunding and the ones that did not for Descriptive statistics 1, by the ones that concluded the campaign with positive outcome and the ones that instead failed for the Descriptive statistics 2, by the pre-campaign and post-campaign of the ventures that promoted a successful crowdfunding project for descriptive statistics 3.

For what concerns instead the econometric models, the ones related to the selection effect use a probit regression model, because of the binary nature of the dependent variable. The models referred to the treatment effect rely, instead, on a simple regression model, namely OLS.

The clear trend that emerges from the results of the first descriptive statistics is that, on average, the innovative start-ups that decide to launch an equity crowdfunding campaign are more structured and developed than the ones that prefer more traditional sources of funding. As a matter of fact, it is experienced a consistently greater expansion of the companies that exploit this innovative financing instrument in terms of assets and human resources employed. The level of tangibles, financials and intangibles reported in their balance sheet is in fact much greater, with particular reference to IPRs and investments in R&D. Moreover, these firms are characterised by a consistently higher number of employees, executives and external advisors appointed. Another relevant element of difference is represented by the capital structure, more exposed towards third party sources of capital for the start-ups that did not access equity crowdfunding. For what concerns profitability and liquidity, no disparities were discovered between the two groups of firms.

The most relevant and interesting trend emerging from the second descriptive statistics is that, also for this phase of the financing instrument, the innovative start-ups that complete with success an equity crowdfunding campaign are, on average, more structured and characterised by a greater dimension in terms of human resources than the ones for which the financing instrument fails.

More precisely, these companies tend to appoint more directors, managers and advisors before the launch of the equity crowdfunding project. The other main elements of difference between these two groups of firms are represented by the intellectual property rights owned and the duration set for the campaign. As a matter of fact, innovative start-ups that complete the funding project with positive result report on their balance sheet a significantly higher value of IPRs and launch a campaign that, on average, lasts for half of the months of the unsuccessful ones.

The main trend that emerges from the third descriptive statistics is related, also in this case, to the dimension of the innovative start-up, as also observed for the two analyses previously presented. As a matter of fact, completing an equity crowdfunding campaign with positive result allows the firm to reinforce its structure both in terms of human resources and assets. After completing the successful funding project, in fact, the number of employees working for the start-up tends to growth by almost 70%. Moreover, a significant part of the capital collected is invested in research and development, in order to foster the competitive advantage with competitors. One last relevant consequence of a successful equity crowdfunding campaign is a clear reduction of firm's exposure towards third party sources of capital.

As further development of the analysis performed through the first descriptive statistics, the econometric models created and computed in relation to the potential selection effect on the access to equity crowdfunding demonstrate the existence of a strong and statistically significant positive association between the level of innovativeness of the early-stage venture, the potential social vocation of the entrepreneurial project and the geographical location, expressed in terms of GDP, with the probability of launching an equity crowdfunding campaign. Moreover, results highlight the relevance of the age of the start-up as significantly negatively correlated with the probability of asking risk capital to crowdfunders on the platform.

With the purpose of further studying the trend identified by the three descriptive statistics about the relation between the structure and dimension of the start-up and the equity crowdfunding, the econometric models related to the potential treatment effect of a positive campaign on the level of professionalization of the backed early-stage venture represent a clear standing point with the existent literature on the topic. Results seem to support the hypothesis formulated in the chapter Typologies of Analysis and Hypothesis, according to which the conclusion of a successful equity crowdfunding campaign stimulates the growth of the level of professionalization of the innovative start-up that collected risk capital from crowdinvestors. Econometric models, in fact, demonstrate that success is strongly and positively correlated to the growth of the number of managers appointed by the firm. This result is verified also in the case the outcome of the crowdfunding project is described by the ratio between the risk capital effectively collected and the target set at the beginning of the campaign.

For what concerns the limitations of the study presented in this paper, a first relevant issue is given by the limited dimension of the sample for what concerns the Descriptive statistics 2 and 3 and the econometric models related to the treatment effect on firm's level of professionalization. Given that equity crowdfunding is a quite recent phenomenon in Italy, the first campaign launched is dated 2014 and the total number of crowdfunding projects performed at the date of this paper is equal to 117. As a consequence of that, the conclusions presented are based on a limited sample and, therefore, are able to describe the Italian equity crowdfunding market with moderate significance.

A second limitation is related to the estimation technique of analyses computed for the descriptive statistics. As a matter of fact, the use of the test-T allows to depict statistical differences among two groups of firms, however does not permit to state conclusions related to cause-effect relations. All the results presented for the descriptive statistics must be then considered as simple statistical associations with the different phases of equity crowdfunding and not as precise causal links.

The study presented in the paper generates several inputs for further research on the topic of equity crowdfunding. A first possibility, directly generated by the first limitation presented, in given by the necessity of repeating the analyses performed with a greater sample of companies that exploited equity crowdfunding. In few years, in fact, the number of campaigns launched on Italian equity crowdfunding platforms will be wide enough to provide conclusions with much greater statistical relevance than the ones presented in this paper.

A second relevant topic not covered by the study of this paper and, therefore, potentially object of further research on the dynamics of equity crowdfunding is represented by the understanding of the precise reasons that determine the treatment effect explored in the paper. To be more precise, the positive association between a successful equity crowdfunding campaign and the growth of the managerial team of the funded venture could be motivated by two phenomena. The first one is given by the greater financial availabilities of the firm as consequence of the conclusion of the funding project with positive outcome. The collection of fresh capital could, in fact, stimulate the early-stage venture in appointing new skilled and experienced managers so to improve its level of professionalization. A second indirect phenomenon to be considered is represented by the positive externalities on public awareness generated by a successful equity crowdfunding campaign. As a matter of fact, the effective collection of risk capital through this innovative financing instrument could improve the reputation and quality of the start-up perceived by professional managers, who can be in turn stimulated in joining the early-stage venture and fostering its business development. To conclude, further research should focus on this topic, in order to understand if the treatment effect on firm's professionalization discovered in this paper is generated by the greater financial availabilities of the backed venture, the positive externalities of the financing instrument on perceived quality and reputation, or both of them.

Introduction

The introduction of equity crowdfunding among the instruments of entrepreneurial finance available for early-stage ventures to collect capital for their business development is quite recent. As a matter of fact, the public awareness about this financing source started to growth with a significant rate just after President Obama signed the JOBS Act in 2012, a regulation that reduced the limitations related to the sale of securities and, therefore, favoured the development of equity crowdfunding. This innovative funding source represents an extremely relevant topic in the field of entrepreneurial finance, because of the advantages it is able to provide to early-stage ventures if compared to the more traditional sources of funding. As a matter of fact, new start-ups seeking for additional capital face significant difficulties in collecting funds from business angels and venture capitalists. These players have, in fact, increased during the last years their minimum investment in innovative entrepreneurial projects, because of the relevant cost they have to sustain while performing the due diligence necessary to evaluate the quality of the venture. Moreover, also bank loans result to be scarce for innovative start-ups, mainly because of the lack of collaterals and sufficient cash flows to repay interests on debt. As a consequence of these constraints on the funding process for new firms, equity crowdfunding becomes then a valuable source of risk capital to finance the first steps of the lifecycle of innovative start-ups. More precisely, the relevance of this topic within the field of entrepreneurial finance is given, first of all, by the potential capability of equity crowdfunding in closing the typical funding gap that affects early-stage ventures. Indeed, at the beginning of the lifecycle, start-ups tend to rely on family and friend as sources of small amounts of capital, while, when the company is already somehow developed and significant funds are needed, they involve in the entrepreneurial project professional investors like venture capitalists or even banks. The gap, in term of dimension of the funding, experienced between these two sources of capital is critical for early-stage ventures, because of the difficulty in raising a “medium” amount of capital. Equity crowdfunding becomes

then a relevant player in this sense, being able to provide funds of this dimension and, therefore, solve this significant financing problem.

Moreover, the relevance of equity crowdfunding in the field of entrepreneurial finance is also motivated by its possibility to fund early-stage ventures with a different profile that the ones backed by traditional professional investors. As a matter of fact, business angels and venture capitalists focus on high-risk and high-return ventures, meaning the ones for which the probability of failure is extremely high, but that, in the case of success, generate extraordinary returns. Equity crowdfunding becomes then relevant also in this sense, having the possibility to provide risk capital also to those medium-risk, medium-return start-ups, otherwise excluded by traditional entrepreneurial financing instruments.

Figure 0.1 Italian Equity Crowdfunding market, from Osservatori "Entrepreneurship & Finance"

The phenomenon of equity crowdfunding is quite recent in Italy, with the first campaign promoted during the year 2014. The figure above (Figure 0.1) report the main information about the Italian equity crowdfunding market at the date of publication of this paper, provided by the observatory of "Entrepreneurship & Finance" of the School of Management of Politecnico di Milano. As clearly highlighted by the figure, the equity crowdfunding portals authorized by CONSOB are 21,

while the total number of campaigns launched is equal to 141, as prove of the novelty of this financing instrument on the Italian field. Moreover, among the companies that promoted an equity crowdfunding project, 122 are defined as *start-up innovative*, while just 10 are *PMI innovative*. This record support then the decision of focusing just on *start-up innovative*, given the scarce dimension of the sample for the other typology of firm. One last interesting information related to the Italian equity crowdfunding market is given by the total risk capital released to early-stage ventures until the date of writing of this paper, namely mid-2017. This value is equal to approximately 17 million €, which is a quite significant amount considered that this financing source was introduced in Italy in 2014. A more interesting data is, however, related to the distribution of this value on the different years from 2014 until 2017 (Figure 0.2). Indeed, the capital collected in 2014 was 1.31 M€, in 2015 1.77 M€, in 2016 4.36 M€, while in 2017 9.93 M€. It is then experienced a significantly positive trend related to the use of this innovative financing instrument from Italian early-stage ventures, highlighting one more time the relevance of this topic within the field of entrepreneurial finance.

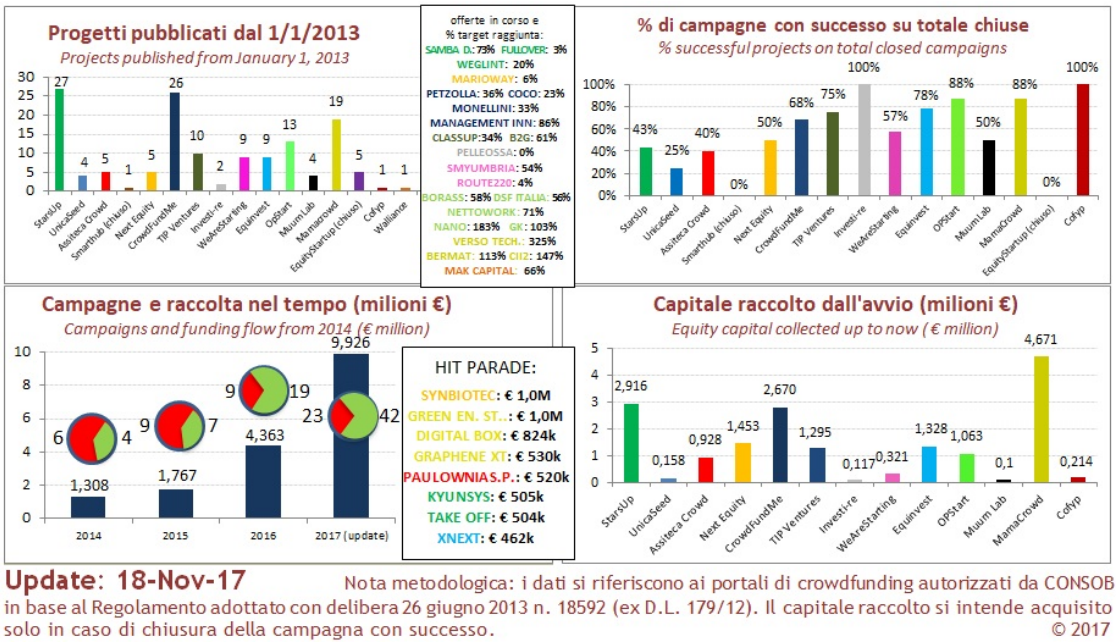

Figure 0.2 Evolution of the Italian Equity Crowdfunding market, from Osservatori "Entrepreneurship & Finance"

Analysing the rigorous process followed by equity crowdfunding projects, three main phases could be depicted. A first one is related to the access to this financing instrument, meaning the choice of the start-up in collecting funds from equity crowdfunding and the availability of the platform in promoting the campaign on its website. A second phase is represented by the achievement of a successful crowdfunding project, which is strictly related to the ability of the firm in transmitting the quality of its entrepreneurial activity to potential investors on the platform. Finally, the consequences of a successful equity crowdfunding campaign on the characteristics of the backed venture. The scarce availability of research in the existent literature in relation to some of the phases previously cited gives space for cutting-edge studies presented in this paper. More precisely, the drivers that guide the decision of a start-up in performing an equity crowdfunding campaign have been merely studied by the literature, providing then some input for new interesting research projects. The most promising aspect, however, is the one represented by the consequences of a successful campaign on firm characteristics. Existing literature, in fact, has mainly focused on the effects on returns for crowdfunders, neglecting however to analyse the evolution of the backed early-stage venture after the collection of the risk capital. Moreover, literature has deeply studied the consequences of the collection of capital from business angels and venture capitalists on the level of firm's professionalization, but lacks in research for this topic related to equity crowdfunding.

In conclusion, equity crowdfunding represents a valuable and interesting financing alternative in the field of entrepreneurial finance for early stage ventures. Additionally, the scarce availability of the literature for what concerns the access to equity crowdfunding and the consequences of a successful campaign makes this topic even more interesting for new research projects.

1. Literature review

The topic of this paper is represented by the equity crowdfunding. This is a relatively new financing instruments through which companies have the possibility to collect equity capital, besides the more traditional sources of funding as business angels, venture capitalists and bank loans. Public awareness on this phenomenon peaked in fact after the 5th of April 2012, when President Obama signed the Jumpstart Our Business Startups (JOBS) Act, a law that legalized the collection of funds for start-ups in change of equity by relaxing some restrictions concerning the sale of securities. From that moment, the equity crowdfunding instrument spread all over the other most developed countries, becoming a valuable and reliable source of funds for new ventures. This phenomenon, however, must be led back to a wider trend that has strongly influenced the entrepreneurial finance during the last decade, which is named, more in general, crowdfunding. Before analysing equity crowdfunding, is then necessary to present an overview of the general trend to which it belongs, in order to have a clear understanding of its positioning and characteristics if compared to the other sources of financing available on the market. The first part of this literature review is then focused on the phenomenon of crowdfunding with a broad perspective (Crowdfunding), trying to highlight the milestones of its development (From Crowdsourcing to Crowdfunding) and its inherent advantages (Advantages of Crowdfunding) and differences with the more traditional funding instruments (Crowdfunding and Traditional sources of funding). Successively, a presentation and definition of the different forms of crowdfunding is provided, with the purpose of clarifying the points of parity and points of difference between them (Forms of Crowdfunding). After this short introduction about the trend considered as paternal to equity crowdfunding, the review of the literature focuses specifically on this new financing instrument, collecting all the relevant research papers related to this topic (Equity Crowdfunding). The aim is then to provide the widest and most comprehensive understanding of the phenomenon of equity crowdfunding and of the dynamics according to which it behaves. By providing a

complete insight of the topic, it would be then possible to further develop the knowledge about this new and partially understood financing instrument.

1.1. Crowdfunding

One of the main problems for an entrepreneur launching its own venture is the collection of the capital required to promote and develop the business. In the initial phases of the firm lifecycle, when the funds required are relatively limited, the founder usually relies on its own personal network as source of capital, more precisely family and friends. In some cases, founders exploit also some forms of bootstrapping, through which it is possible to reduce the financial needs by boosting the profits of the firm in the short-term (Winborg and Landstrom, 2001; Ebben and Johnson, 2006). Successively, if the entrepreneurial activity survives and goes ahead along the lifecycle, more significant amounts of capital are required. Collecting money from professional investors like business angels, venture capitalists and banks, however, could be challenging for a start-up in its initial phases of life, because of the limited cash flows, profitability and collaterals, together with the presence of significant information asymmetries with potential investors (Cosh et al., 2009).

From the beginning of the new millennium, however, some entrepreneurs started to use the Internet as a mean to seek financings directly from the general public, the "crowd", instead of approaching professional investors. Thanks to this new financial instrument, called "crowdfunding", a significant number of project-specific investments or entrepreneurial ventures, that otherwise would not had been able to collect money, had the possibility to gather the funds required.

1.1.1. Definition of Crowdfunding

A simple and clear definition of crowdfunding is then the financing of new entrepreneurial activities or specific projects promoted by established firms by a group of individuals instead of

professional investors, like business angels, venture capitalists and banks. The main characteristic is then the fact that companies have the possibility to directly "tap the crowd" to seek additional funding, usually through the instruments provided by the Internet.

The definition provided by Schwienbacher and Larralde (2010) defines crowdfunding as *"an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes"*. Mollick (2014) argues however on the broadness of this definition that, in his opinion, does not include some financing instruments still defined by academics as forms of crowdfunding, like internet-based peer-to-peer landing. According to the author, *"crowdfunding refers to the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit - to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries"*. In his opinion, this definition refers to all the possible forms through which crowdfunding can be exploited, including also the possible future scenarios of this phenomenon.

1.1.2. From Crowdsourcing to Crowdfunding

From an historical point of view, the birth of crowdfunding is deeply-rooted in the macro-trend called as "crowdsourcing", a term that was first used by Jeff Howe and Mark Robinson in 2006 on *Wired Magazine*. A clear and complete definition of this phenomenon is provided by Kleemann et al. (2008), who states that *"Crowdsourcing takes place when a profit oriented firm outsources specific tasks essential for the making or sale of its product to the general public (the crowd) in the form of an open call over the Internet, with the intention of animating individuals to make a (voluntary) contribution to the firm's production process for free or for significantly less than that contribution is worth to the firm"*. Basically, for-profit organizations rely on consumers as volunteers and, almost, free taskforce in order to directly perform activities along the firm's internal processes. Kleemann defines these "working consumer" with three main

characteristics: they are directly involved in the production process and therefore create value; their skills and competences can be considered by the firm as valuable assets; they are integrated into corporate structures and monitored as employees. The table below (Table 1.1) presents the different typologies of crowdsourcing identified by the author.

Type of Crowdsourcing	**Description**
Participation of consumers in product development and configuration	Companies ask for comments and suggestions on current and future products
Product design	Companies ask to develop a whole new product from A to Z
Competitive bids on specifically defined tasks or problems	Companies ask to give a solution to unsolved problems
Permanent open calls	Companies ask for any new information or documentation
Community reporting	Same as before apart that the work is done by a known community instead
Product rating by consumers and consumer profiling	Companies ask for product reviews and opinions for other users to see
Customer-to-customer support	Companies ask customers to help other customers and use it for consumer knowledge and product design

Table 1.1 Different sources of crowdsourcing, as characterised by Kleemann et al. (2008)

From the chart (Table 1.1) clearly emerges the fact that the phenomenon of crowdsourcing could be related to different kind of activities performed by the consumer, from the simple ones to the more complex. As a matter of fact, the "working consumer" could be asked to simply express an opinion about a product to completely develop from A to Z a new one. According to this classification, Schwienbacher and Larralde (2010) state that crowdfunding can be considered as part of the consumers' support if considered in a broader sense, linking then its origins to the phenomenon of crowdsourcing.

Several authors in the literature report the importance of the birth of Web 2.0 for the development of crowdsourcing (Brabham, 2008; Kleemann et al., 2008). More precisely, they state that without this technological innovation firms would have not been able to reach a similar pool of consumers that easily. Listed below there are the three main characteristics of Web 2.0 identified by Lee et al. (2008). First of all, collaboration allows to merge together each other's knowledge and

resources. Secondly, openness permits to people to freely contribute to different projects. Third and last point, participation is improved thanks to the ease of access to computers and Internet. The combination of these three factors has then favoured the development and success of the different forms of crowdsourcing. The advantages provided by this technological innovation, however, represent a critical topic also for the more specific phenomenon of crowdfunding. Agrawal et al. (2014), in fact, define the reason behind the development of crowdfunding according to the economic theory. More precisely, they try to understand why this instrument was not considered as a valuable method to finance early-stage ventures and projects before the commercialization of the Internet. As stated in the paper, the first relevant reason is related to the fact that matching funders with creators is now much more efficient and effective due to the lower search costs online, a clear advantage generated by the birth of Web 2.0. As a second reason, the reduction of the risk because of the economic feasibility of funding in small increments online. Finally, a low-cost communication allows geographically dispersed funders to better collect information and control the progresses of the funded project. In conclusion, the literature demonstrates the critical role played by Web 2.0 in the development of crowdsourcing and crowdfunding, principally because of the possibility to create a direct and efficient communication channel between creators and funders located even hundreds of miles away.

If the technological feasibility was made available by the birth of Web 2.0, the general awareness of the public towards the existence of this new financing instrument came just few years later. As a matter of fact, from the introduction of the JOBS Act in 2012 from President Obama, the notoriety of crowdfunding experienced a drastic growth. The graph reported below (Figure 1.1) clearly support this thesis.

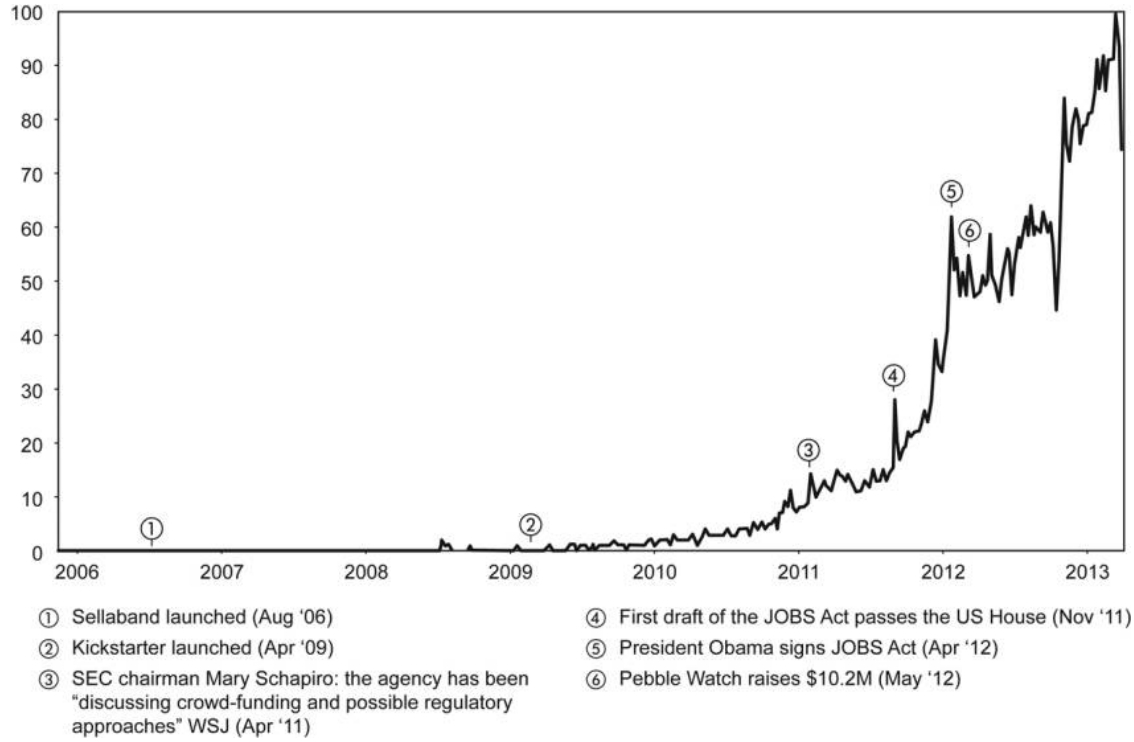

Figure 1.1 Google search volume for "crowdfunding" (100 represents peak search volume), from Agrawal et al. (2014)

Historically, crowdfunding developed primarily in the arts and creativity-based industries, like recorded music, film, video games. The more frequent typologies of financing were donation-based and reward-based crowdfunding, meaning that the funders were people that just wanted to be part of the development of a specific project, like philanthropists, or receive in return of the investment the product promoted, like early birds. At the beginning the crowdfunding market was dominated by one single platform, because of the logics that regulate this phenomenon. Indeed, crowdfunding can be considered as a two-sided market (Hagiu and Wright, 2015), in which both the parties involved need the presence of the other one. In fact, creators of entrepreneurial ventures or projects need the presence of a consistent number of potential funders on the platform, on the other side the interest of funders is strictly determined by the number of creators available on the same platform.

The first crowdfunding portal ever launched is Sellaband, it was founded in 2006 in Amsterdam and was specialised in music-only projects. Further on, in 2009, Sellaband was replaced by

Kickstarter, a broader creative-projects platform based in New York. A chart reporting the evolution over time of the success of Kickstarter is reported below (Figure 1.2).

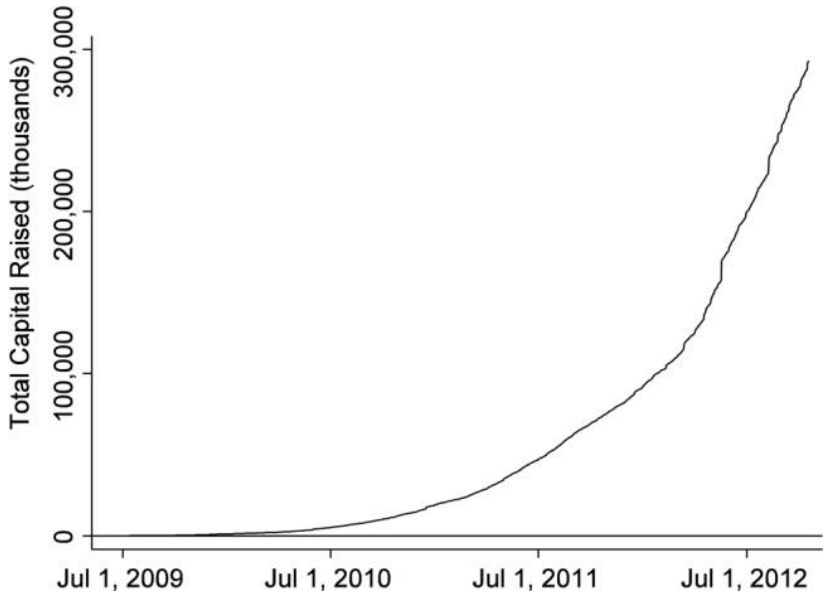

Figure 1.2 Total capital raised (thousands) on Kickstarter by successful projects between June 2009 and October 2012, from Agrawal et al. 2014

From the foundation of Kickstarter until now, crowdfunding has experienced a drastic growth, both in terms of platforms launched and geographical dispersion. A large number of countries in fact currently promote the use of crowdfunding techniques, not only non-equity but also equity-based, making then this instrument a valuable source of financing for new ventures and entrepreneurial projects.

1.1.3. Crowdfunding and Traditional sources of funding

From the point of view of entrepreneurial finance, crowdfunding is collocated in a segment already occupied, in some way, by other forms of financing. As a matter of fact, the more traditional ways through which new ventures collect money from external sources are business angels, venture capitalists and banks. The dynamics of crowdfunding, however, are able to generate some advantages for both the creators and the funders that are not experienced for the other forms of funding.

As reported by Schwienbacher and Larralde (2010), the different sources of financing available for a company can be divided in two main categories: equity and debt. In the first case, by providing equity capital, the funder becomes a shareholder of the firm and, as a consequence, claims some control over the company, benefits from the profit generated but, at the same time, bears the risk for the invested capital. On the other hand, investors providing finance for debt remain external parties, but are strictly linked with the firm by a detailed contractual agreement. Moreover, the risk faced by this typology of investors is lower, thanks to the provision of collaterals and the seniority of their claims over equity. This second category of financing, however, is usually scarcely available for early-stage ventures, because of their lack of collaterals and cash flows not sufficient to guarantee the payment of interests (Berger and Udell, 1998).
A classification of the different sources of financing belonging to each of the two categories is provided by Schwienbacher and Larralde and reported in the table below (Table 1.2).

	Investor	**Description**
Equity	*Entrepreneur and team members*	The entrepreneur invests his own money in the company, or money he obtained through a personal loan
	Friends and family	The entrepreneurs' friends and family
	Business angels	Wealthy individuals willing to invest in small projects
	Venture capitalists	Specialized investors gathering money from non specialists and placing it into bigger projects for a period of 5-7 years
	Other companies/strategic investors	Other companies can decide to invest in projects they believe have strategic importance to them
	Stock markets	Members of the public invest in the company through a public offering
Debt	*Banks*	Loans
	Leasing companies	Provide equipments and office space to entrepreneurs against lease payments
	Government agencies	Subsidy for particular projects
	Customers/suppliers	e.g., trade credit
	Bootstrapping	Use of trade credit, credit card and other methods, including working capital management

Table 1.2 Different types of entrepreneurial finance investors, grouped by debt and equity claims, from Schwienbacher and Larralde (2010)

For what concerns specifically crowdfunding, one form belongs to the equity category, while the others to the debt one. A detailed description of the different forms through which this financing instrument has developed during the last decade is provided in the following chapter (Forms of Crowdfunding). A comparison between crowdfunding and the more relevant forms of funding for a new venture is then required.

First of all, the authors of this financing classification identify some similarities and differences between crowdfunding and bootstrapping. More precisely, the latter tries to collect money from a variety of sources as wide as possible, as also entrepreneurs aim at attracting the highest number of crowdfunders on the platform. Basically, for both the methods the founders rely on creative ways to collect the required capital, avoiding the involvement of traditional investors, like business angels, VCs and banks. At the same time, crowdfunding and bootstrapping differ for several other reasons. Among them, the more significant regards the fact that founders that exploit crowdfunding seek the financial help of external investors, namely the crowdfunders. Bootstrappers, instead, rely just on resources internally available to the firm and active cash management techniques.

In the literature, there is also track of a comparison between crowdfunding and the other traditional sources of funding available for a new venture, like business angels, venture capitalists and banks. The main topics are listed below.

Information asymmetries

The first aspect considered by Schwienbacher and Larralde (2010) is represented by the information asymmetries, one of the main issues related to entrepreneurial financing activities. More precisely, this phenomenon happens when the two parties involved in a funding process have access to different levels of information (Myers and Majluf, 1984; Narayanan, 1998). Business angels and venture capitalists suffer the existence of this problem, even if in a much

more limited way than crowdfunding. As a matter of fact, traditional investors are, first of all, professional investors, meaning that they have the required knowledge and competences to correctly evaluate the potential profitability of an investment. Secondly, business angels and venture capitalists establish a direct face-to-face relation with the entrepreneur, having then the possibility to collect much more information and perform a proper due diligence. On the other side, investors on crowdfunding platforms are non-professional investors, therefore tend to evaluate ventures and projects through subjective and qualitative observations rather than objective and quantitative ones. Moreover, the information made available by founders on the platform are limited, especially because of possible problems related to idea stealing and intellectual property rights. In conclusion, information asymmetry represents one of the more relevant issues for all the crowdfunding instruments developed.

Moral hazard

The second main topic of the comparison between crowdfunding and traditional sources of funding, according to the literature, is given by the moral hazard. As a matter of fact, equity investors, as business angels and VCs, usually deals with this risk by staging their investments in several rounds. Doing that, they have the possibility to decide if to provide or not additional funds to the firm, based on the achievement of specific milestones and the gathering of updated information regarding the technological and market risk of the project (Bergemann and Hege, 1998). On the other side, as highlighted by Mollick (2014), in crowdfunding the money is raised upfront and, in the specific case of reward-based crowdfunding, without any clear legal obligation from the entrepreneur to deliver their promised reward. In this scenario, the opportunities for fraud from the founder are then vast.

Even if the entrepreneur is not dishonest, the capability of effectively delivering on their obligations could be damaged by the significant level of foreknowledge required to define the target capital and schedule the project. Budgets used are in fact usually computed very early in

the venture process and, therefore, are very likely to become underestimated once the project goes ahead. Mollick then states that crowdfunding projects are at risk of delays, or even failure, as initial resources endowments may prove to be inadequate. Moreover, the achievement of a remarkable success for the crowdfunding instrument could even worsen these problems. The predefined planning could be in fact not adequate to the new and increased expectations following an unexpected success. The table reported below (Figure 1.3) clearly highlights the existence of this issue over a sample of 471 successful Kickstarter projects in the categories of Design and Technology.

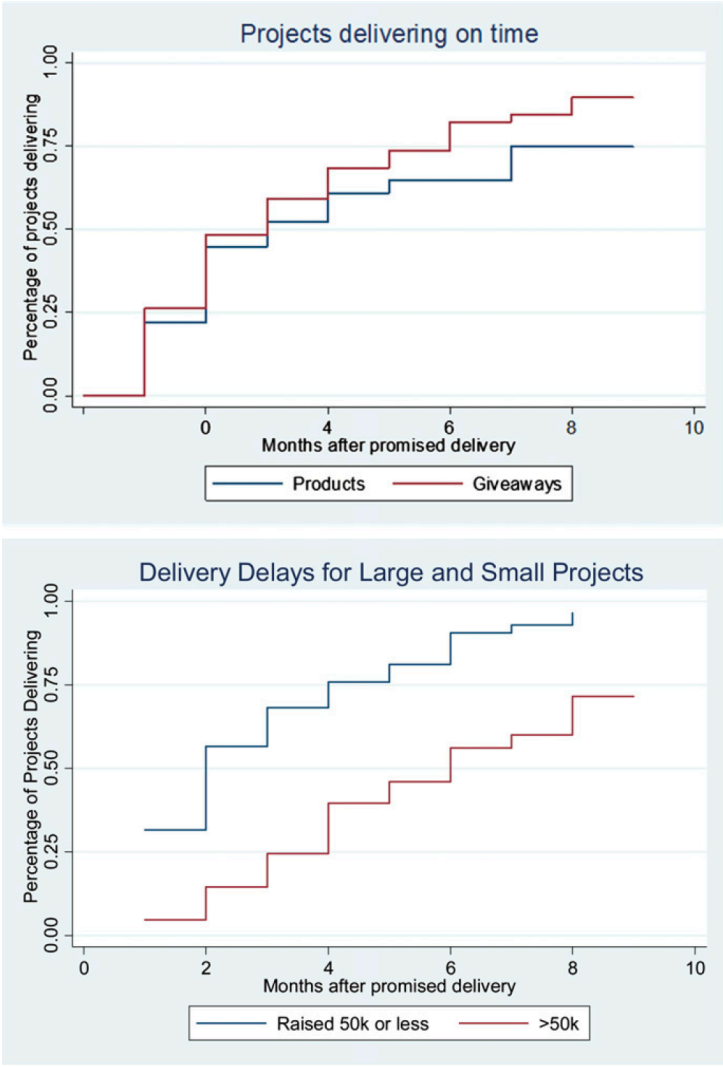

Figure 1.3 Kaplan-Meier failure curve for project delivery, from Mollick (2014)

Geographical dispersion

As stated by Agrawal et al. (2011), probably the most striking characteristics of crowdfunding is the geographical dispersion of investors. As a matter of fact, traditional investors, like business angels and venture capitalists, are usually geographically localised relatively close to the entrepreneurial venture or project funded. This is because of the necessary face-to-face interaction with the founder, in order to collect all the required information to correctly evaluate the potentiality of an investment and perform a due diligence able to mitigate the risk, the uncertainty and the information asymmetries of the funding process (Agrawal et al., 2014). Conversely, crowdfunding is able to mitigate this geographical constraint, allowing creators to raise money from investors dispersed all over the world. As reported by Agrawal et al., when Sellaband offered royalty sharing to investors, more than 86% of the funds came from individuals who were more than 60 miles away from the founder, while the average distance between investors and creators was around 3000 miles. This study demonstrates the capability of crowdfunding to seek financial help form an almost infinite base of potential investors. On the other side, it is clear that the geographical distance, even if mitigated by the efficiency of the communications provided by the Internet, reduces the possibility to gather sufficient information and, therefore, emphasizes the problem of information asymmetries.

Funding agglomerations

Besides the geographical dispersion of investors, the author notes that crowdfunding still follows the existing agglomerations of financing. As in fact demonstrated by the literature, traditional sources of funding, principally business angels and venture capitalists, tend to concentrate in some regions because of the high proactiveness of the entrepreneurial system. This happens because of the spillovers among successful start-ups, the need of investors to monitor their investment and the industrial clustering (Feldman, 2001; Kenney and Burg, 1999; Owen-Smith and Powel, 2004). Probably the most famous example is represented by the Silicon Valley. In the same way, despite

the decoupling of funding and location, capitals from crowdfunding disproportionally flow to the same regions as traditional sources of funding (Agrawal et al., 2013). The motivations are probably related to the location of human capital, complementary assets and access to capital for follow-on financing (Agrawal et al., 2014). This phenomenon is clearly represented by the image below (Figure 1.4).

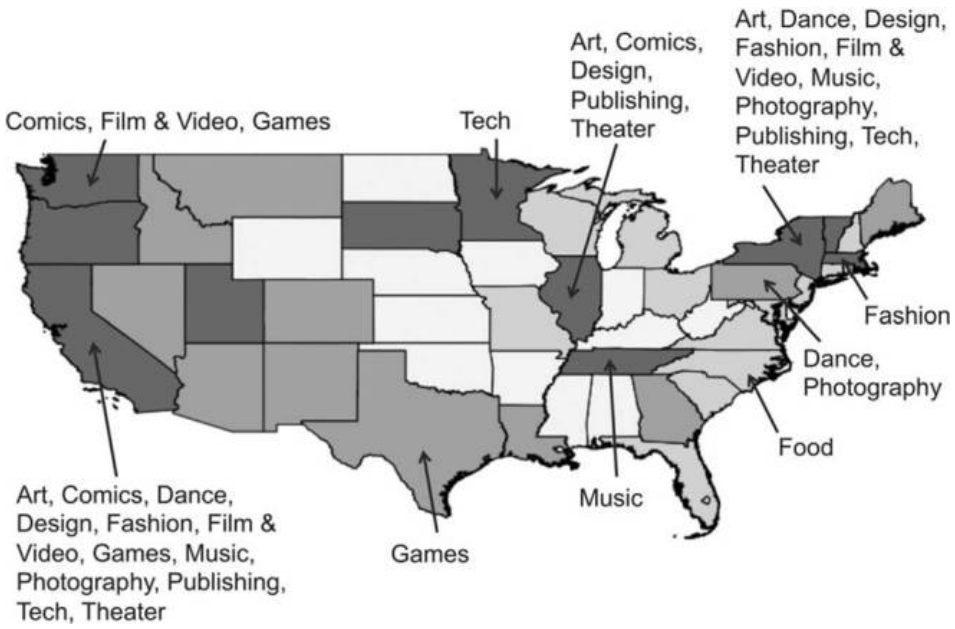

Figure 1.4 Kickstarter projects by state (darker colors have more financing), from Agrawal et al. (2014)

As shown by the map relatively to projects funded on Kickstarter, the distribution of crowdfunding is significantly concentrated in some specific states of the U.S. Moreover, the typology of the projects is strictly correlated to the characteristics of the entrepreneurial system of the region. As a matter of fact, California is more subject to crowdfunding projects regarding films, games and tech, while New York focuses more on the fashion industry. This is clearly related to the positive externalities generated by the entrepreneurial activities and human capital located in those regions.

Family and Friends

One last interesting consideration highlighted by the literature is the role played by family and friends (F&F) in the funding process of a crowdfunding project. More specifically, Agrawal et al. (2011) discovered that local investors, principally represented by family and friends, tends to invest in the initial phases of the financing process, namely before the entrepreneur has raised $10000. Moreover, the authors state that their role is particularly relevant in regard of the success of the funding, given that investors' propensity to invest in a specific project is directly and positively correlated to the amount of capital collected by the founder on the platform. In conclusion, even if investors are geographically dispersed, the role played by local investors, principally F&F, is of extreme importance for the outcome of the crowdfunding project.

1.1.4. Advantages of Crowdfunding

The reasons for which crowdfunding has experienced such a growth during the last decades are principally related to three advantages of this instrument, typical of the reward-based form, identified by the literature and listed below, if compared to the more traditional sources of funding.

Funds

The first advantage provided by crowdfunding to entrepreneurs is obviously the funds received by investors on the platform. As reported by Mollick (2014), many founders seek for a limited amount of capital, usually under $1000, in order to launch a one-time project, as, for example, an event. Increasingly, however, crowdfunding results to be a valuable source of seed capital for new ventures (Schwienbacher and Larralde, 2010), allowing entrepreneurs to collect the required capital to develop their business idea (Evans and Leighton, 1989). Traditional sources of early-stage financing, however, provides additional services and resources of significant value for a new venture. As a matter of fact, beside the financing capital, business angels and venture capitalists help the entrepreneur in developing its business through their knowledge and

experience in the industry, facilitate the management of governance issues and finally increase the prestige and reputation of the firm (Ferrary and Granovetter, 2009; Gompers and Lerner, 2004). It is then clear that crowdfunding is not able to provide these typologies of insights to the founder, given the absence of face-to-face relationships and limited experience of investors in the field.

"Wisdom of the Crowd"

The second main advantage, which is strictly related to the dynamics of crowdfunding, is represented by the "wisdom of the crowd". Even if investors on the platform have much less experience than professional ones, the crowd can at times be more efficient than individuals in defining the market potential of the product promoted. This means that entrepreneurs, by promoting their venture or project on the crowdfunding platform, have the possibility to gather information about the possible market demand of the product directly from the crowd. This is something that instead business angels and venture capitalists are not able to provide in such an efficient and effective way (Schwienbacher and Larralde, 2010).

Marketing and Reputation

The last significant advantage provided by crowdfunding in comparison to traditional sources of funding is given by the marketing consequences of a financing project. As stated by Mollick, crowdfunding has the power to create interest and improve the reputation of a new venture, first of all because of the presence on the platform, secondly because investors could become future customers and advertise the product within their network of acquaintances. This phenomenon is significantly important especially in the markets in which the creation of an ecosystem of complementary products is fundamental. The reputation generated by crowdfunding could in fact stimulate an early commercialization of complementors, in order to immediately create a competitive advantage with competitors even before the product is released. Moreover,

crowdfunding campaigns are usually followed by press attention, something that could be extremely helpful for entrepreneurs from a marketing perspective.

1.1.5. Forms of Crowdfunding

At the beginning of this phenomenon, crowdfunding was strictly related to two main typologies of financing, more precisely donation-based crowdfunding and reward-based crowdfunding. Successively, however, due to the success experienced for this innovative financing instrument, new forms of crowdfunding entered the market. To be more precise, the typologies of crowdfunding introduced can be classified, according to Hornuf and Schwienbacher (2016), under the common name of "Crowdinvesting". As reported in the paper, this term denotes all the Internet-based investments in start-up companies made by the crowd with the intention to obtain some residual claim on future cash flows of the firm. While crowd*funding* is primarily but not exclusively focused on projects in the field of art, music and creativity as well as social activities, crowd*investing* has as a purpose the financing of corporate growth and innovation (Bradford, 2012; Klohn and Hornuf, 2012). In conclusion, as stated by Hornuf and Schwienbacher, crowdfunding covers a broader activity, as it comprehends also donations, pre-purchase and reward-based forms of financing by the crowd. Crowdinvesting is then a sub-category of crowdfunding, in which firms issue securities to investors and then grant returns in the form of interests, dividends or parts of the earnings of the business, in order to satisfy their financial needs. The funds collected are directly used to develop the business of the venture and are not necessarily related to a particular product or project. The image below (Figure 1.5) clearly represents the mechanism of crowdinvesting transactions.

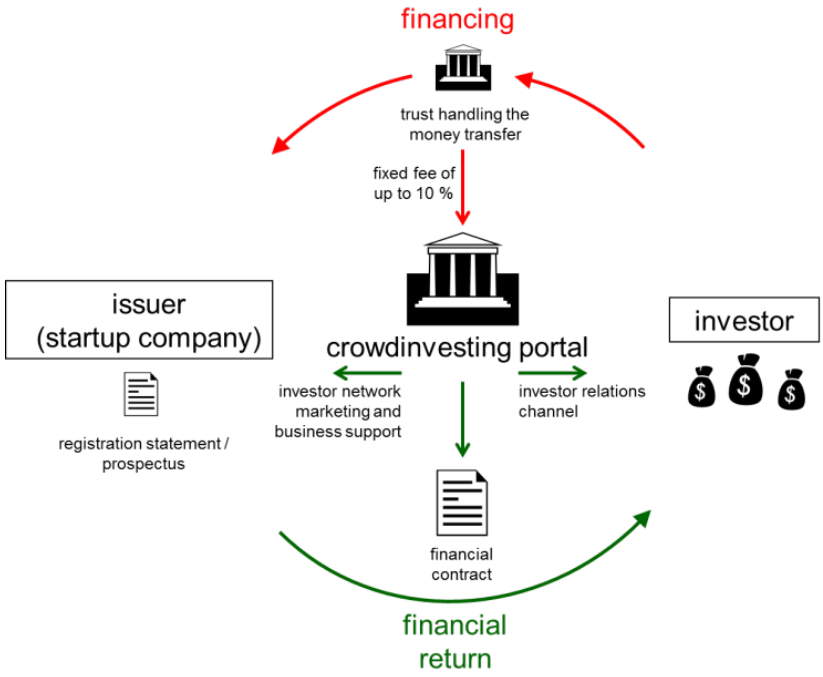

Figure 1.5 Structure of Crowdinvesting transactions, from Hornuf and Schwienbacher (2016)

Three are the forms through which crowdinvesting has developed, namely "equity crowdfunding", "lending crowdfunding" and "invoice trading". Below is reported a short description of all the five typologies of crowdfunding available on the market.

Donation-based Crowdfunding

As defined by the *Financial Times*, donation-based crowdfunding "*enables individuals to directly share their money with causes and projects that they feel strongly about and thereby empower others to create impact"*. This typology of crowdfunding involves then investors who donate varying sums of money to support a specific cause or project. In change of this funding, investors usually receive gratitude from the backed firm, a special mention or even physical items like a postcard. Essentially, however, the pledge is a donation from the consumer to the company. This is the case, for example, of philanthropists who fund charity projects or activities to be directly involved for the social cause.

Reward-based Crowdfunding

As stated by Mollick, reward-based crowdfunding is the most developed and exploited form of crowdfunding. According to its simple dynamics, investors receive a reward from the firm for backing its project on the platform. The typology of reward usually differs in relation to the characteristics of the project promoted. It could include a credit in a movie, the possibility to provide inputs about product development, or the opportunity to personally meet the creators of the venture/project. In other cases, instead, investors are treated as early-customers, to whom the product funded is then sold at an early date and at a lower price. This pre-selling strategy is often used by those ventures whose product is represented by a new software, hardware or consumer good (Mollick, 2014). As stated by Belleflamme et al. (2011), this pre-ordering schemes gives the possibility to the entrepreneur to price discriminate between two groups of customers, namely the "crowdfunders" who pre-purchase the product, and the "regular" consumers who instead wait its commercialization on the market. The final purpose of this price discrimination is clearly the maximization of firm's profits. Belleflamme et al. however warns about the possible negative consequences of a distortion of this discrimination mechanisms. As a matter of fact, in order to involve more investors and therefore collect more capital, founders can alter the pricing scheme from the optimal configuration and, as a consequence, significantly damage the profitability of reward-based crowdfunding.

Equity Crowdfunding

Equity crowdfunding is defined as the offering of securities by a privately held business to the general public through the intermediation of an online platform. This financing instrument allows anyone to buy some shares of a firm by giving the possibility to the entrepreneurs to offer a portion of the equity in change of the capital they require to develop their business or specific project (Collins and Pierrakis, 2012). Investors can then, through the equity crowdfunding platform on which the funding is promoted, buy small parts of this equity stake.

This form of financing is one of the more recent among the ones belonging to the phenomenon of crowdfunding. Indeed, as of mid-2013, equity crowdfunding was generally not permitted in the United States and still rare worldwide, representing less than the 5% of all crowdfunding investments (Massolution, 2015). After the approval of the JOBS Act and few successful funding campaigns, however, the phenomenon quickly developed and the number of platforms significantly grew over the most developed countries. According to the same source however, Equity crowdfunding still remains limited if compared to peer-to-peer lending, accounting worldwide for nearly $2.5 billion in 2015.

A complete review of the literature regarding this topic is provided in the following chapter (Equity Crowdfunding).

Lending Crowdfunding

Lending crowdfunding, also known as peer-to-peer lending, is the practice of matching borrowers and lenders through an online platform. Borrowers are often able to gain access to funds quickly and typically at lower interest rates than banks, making it an attractive loan alternative to banks. The loans issued are often comprised of many different investors, ranging from individuals to institutional ones. Both typologies of investors benefit by being able to lend money at a range of interest rates based on proprietary credit scores assigned by each platform. Since investors typically fund just a portion of a loan and spread the amount lent across many buyers, they can potentially receive steady and attractive returns while spreading the risk across multiple borrowers. Given these advantages, lending crowdfunding has experiences a rapid growth during the last years, becoming an interesting and valuable alternative to banks.

An interesting study performed by Burtch et al. (2013) highlights the importance of factors like the geographical distance and the cultural differences in the choice of lenders about which borrower to support. Analysing a dataset of country-to-country lending volumes composed of

more than three million individual lending transactions between 2005 and 2010, the authors demonstrate that lenders do prefer culturally similar and geographically proximate borrowers.

Invoice Trading

Invoice trading is a fast and easy way through which small and medium sized enterprises (SMEs) can raise short-term debt by pre-financing their outstanding invoices through individual or institutional investors. Often SMEs find difficulties in collecting financing, then, besides the traditional factoring market, bank loans and overdraft facilities, online invoice trading represent a valuable source to raise working capital. Generally, these web-based platforms are hosted by FinTechs. In the recent years, the invoice trading has experienced a significant development. As a matter of fact, in the UK, the most active state in Europe for what concerns alternative finance (Wardrop et al., 2015), the market volume of this financing instrument more than tripled between 2013 and 2015 (Zhang et al., 2016). If, in fact, in 2013 the volume was around £97 million, in 2015 this value peaked to nearly £325 million. Moreover, also from a global perspective invoice trading is expected to significantly growth over the next years.

One of the more relevant paper regarding this topic is the one provided by Dorfleitner et al. (2017), in which it is empirically analysed whether the risk of payment difficulties is appropriately reflected in the prices of online invoice trading platform. Interestingly, they discovered that the interest rate, the duration and the percentage of the invoice funded are related to the default probability. Moreover, Dorfleitner et al. compared the two different market mechanisms to set the prices of the invoices, more precisely auctions and fixed-price. The result is that default probability is lower under the fixed-price mechanism, while the gross yield and the return for the investor are greater within the auction regime.

After this complete and necessary introduction about the origins of equity crowdfunding, it is possible to focus on the specific topic of this paper.

1.2. Equity Crowdfunding

1.2.1. Definition of Equity Crowdfunding

The first rough definition of equity crowdfunding is given by Bradford (2012). In his paper, the author defines this financing instrument as *"a model in which funders receive an interest in the form of equity or equity-like arrangements (e.g., profit sharing) in the ventures they fund"*. Belleflamme et al. (2012) state that the central difference between equity crowdfunding and the traditional sources of capital is represented by the funding process itself: entrepreneurs make an open call for funding on the crowdfunding platform and investors decide which ventures to fund on the base of the information provided. Moreover, the platform facilitates the financing transaction by providing a standardized investment contract and settling the payments. Another relevant characteristic noted by the authors about this phenomenon is that individual equity crowdfunding investments are significantly lower than the ones made by business angels and venture capitalists. The combination of these two considerations allow to generate a final and complete definition of equity crowdfunding. As stated by Ahlers and Cumming (2012), *"Equity crowdfunding is a method of financing whereby an entrepreneur sells equity or equity-like shares in a company to a group of (small) investors through an open call for funding on Internet-based platforms"*.

After this definition of equity crowdfunding, the review of the literature focuses on the different steps involved in the funding process (Dynamics of Equity Crowdfunding), highlighting all their main dynamics, and provides a comparison with the traditional sources of capital for early-stage ventures (Equity Crowdfunding and Traditional Financing). Successively, the attention is given to the actors involved in this financing instrument, with related incentives and disincentives (Actors Incentives; Actors Disincentives), and to the pillar on which equity crowdfunding is based, namely the "wisdom of the crowd" (The "Wisdom of the Crowd"). Furthermore, the principal threat of this funding source, information asymmetries, is presented (Information

Asymmetries), together with an explanation of the possible consequent market failures, first of all the "market of lemons" (A "Market of Lemons"). Finally, a review of the solutions to these problems is provided, starting from the "signalling effects" (The Role of Signals), passing through syndicated forms of equity crowdfunding (Syndicated Equity Crowdfunding), to the role covered by platforms' rules (Platform Rules) and regulations by policymakers (Regulations). To conclude the overview of this phenomenon, some considerations on the consequences of equity crowdfunding are presented (Consequences of Equity Crowdfunding), even though the literature is quite scarce about this topic.

1.2.2. Dynamics of Equity Crowdfunding

The purpose of this chapter is to describe all the different phases that are part of an equity crowdfunding project, trying to highlight the main characteristics and related issues.

The stages of equity crowdfunding

The financing instrument topic of this paper involves the participation of three typologies of actors: the entrepreneurs promoting the funding campaign, the investors and the equity crowdfunding platform. Each of these actors play a crucial role in a specific phase of the crowdfunding process. The image below (Figure 1.6) clearly shows all the steps required to perform an equity crowdfunding campaign.

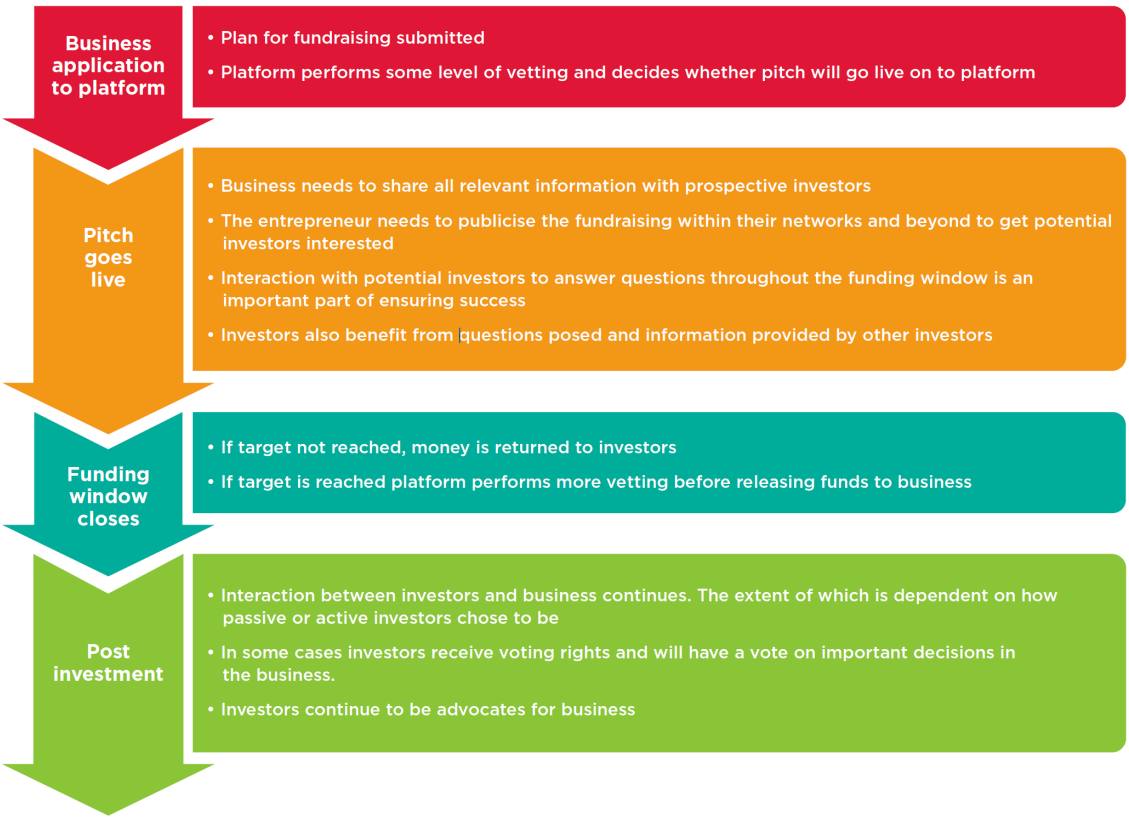

Figure 1.6 The stages of Equity Crowdfunding, from Collins and Pierrakis (2012)

The first step of the crowdfunding process consists in the venture submitting its funding proposal to the equity crowdfunding platform. At this point, the latter evaluates in some way the characteristics of the start-up asking for financing. More precisely, the platform performs some level of vetting of the business, looking at factors such as the likelihood the venture could be fraudulent, the business's suitability to crowdfunding and the reputation of the entrepreneurs. Based on these analyses, the platform at the end decides if the pitch received can go live on the site or not. The time horizon in which the analysis of the venture is performed can vary from platform to platform. As matter of fact, some of them, like Exeter-based Crowdcube, perform the majority of their vetting beforehand, having as a result a rejection rate approximately equal to 75% (Collins and Pierrakis, 2012). Some other platforms like the Dutch one called Symbid, instead, run their due diligence only after the target capital is achieved but before releasing the amount collected to the venture.

Once the funding proposal is accepted, the pitch goes live on the website of the platform and is then viewable to everyone. Usually these pitches are in the form of a video or text description and must provide all the information required by potential investors on the platform to evaluate the profitability of an investment in the firm. More precisely, entrepreneurs have to explain their business model, present themselves through their education and professional experiences, define the amount of capital they require and explain for what purpose. The Italian regulation formalized by the CONSOB is quite strict and clear about the typology of information founders must provide, as more precisely explained in one of the following chapters (Data Sources). One last important disclosure is how much equity the firm is offering, with each investor getting a *pro rata* share depending on the proportion of the target amount they commit.

While the equity crowdfunding campaign is promoted, the role played by the entrepreneur from a marketing point of view is of extreme relevance. As a matter of fact, besides the investors who usually brows on the platform in search of interesting opportunities, the founder has to spread to his network and further the message to market the pitch as wide as possible outside the platform. Indeed, the literature has demonstrated the importance of family and friends (F&F) investments (Agrawal et al., 2011) and the crucial role played by early-stage investors on the success of the funding project (Vismara 2015). They have then to promote in the more effective way their crowdfunding campaign to all their acquaintances and through all the technological means available, in order to make people interested in the business and in becoming investors.
Moreover, as the campaign goes beyond, it is important that the founder maintains the relationship with the investor in order to answer potential questions related to the business and provide updates about the funding progress.

The time horizon during which the pitch is promoted on the equity crowdfunding platform is another setting that is defined at the beginning of the funding process. Some platforms set a

standard “funding window”, some others fix a maximum limit for the duration. Once the time available for the promotion of the equity crowdfunding campaign is terminated, the outcome of the funding instrument is determined by the comparison between the capital collected and the target capital set by the founders. More precisely, if all the capital required is raised, then the campaign is successful and the funds are released to the firm. In the other case, the outcome is negative and all the capital is returned to the investors. This mechanism is the one more spread across equity crowdfunding platforms, and it is called the “all-or-nothing” model. In the market, however, exists also another form of campaign, according to which the venture collects all the capital raised independently of the achievement of the target capital. Clearly in this case the risk faced by investors is higher, given that the collection of an amount significantly lower than the one required could create difficulties in the development of the entrepreneurial project.

The facilitation of the actual money transfer usually involves an escrow account, independent of both the investor and the founder, where the investment is held until the total target is reached, or, failing that, returned to the investor.

After the conclusion of the investment, the investor has still the possibility to take an active role towards the decisions taken by the venture. More precisely, the extent to which the investor can have decisional power depends on platform characteristics and the eventual decision of founders to provide voting rights. As a matter of fact, some equity crowdfunding platforms operates a nominee and management system able to represent the interest of investors with the business. In some other cases, instead, the entrepreneur is allowed to manage his own interests, while the investor has the possibility to choose between being passive or involved in the business. Moreover, in the case the venture provides voting rights, the investors have then the option to exercise decisional power over the further strategic choices of the company.

Setting valuations

One of the main problem for the entrepreneur while launching the equity crowdfunding campaign on the platform is represented by the choice of the percentage of equity to offer to investors in change of the target capital set. The definition of the stake of equity offered is in fact directly related to the valuation of the venture made by the founders. It is clear that an incorrect estimation of the value of the firm could generate negative consequences on the outcome of the funding campaign. Valuating an early-stage venture, however, is not an easy task (Zacharakis and Meyer, 2000), principally because of the prevalence of intangible assets and the fact that valuations are largely based on risky predictions of future market size, competition, revenue and other variables.

The most common practice adopted by equity crowdfunding platforms is to allow entrepreneurs to set their own valuation of the venture, based on what they perceive the business is worth. In some other cases, however, the platform allows upward flexibility by giving the possibility to increase the percentage of equity offered to investors once the campaign has already started. In this way, a fair valuation of the firm is guaranteed. Indeed, if the founder notices that the rate of investment is not sufficient to reach the target capital, he can eventually increase the equity offered to stimulate investors on the platform. In some other cases, this increase can be determined by feedbacks claiming a too high valuation of the venture. In any case, any increase of the equity offered applies also to the investors that funded the campaign before the change, with their equity stake increasing too.

An alternative method to set valuation is a represented by a market-driven approach. More precisely, the entrepreneur set the amount of equity and the number of shares he is offering on the platform. At this point, investors bid for the shares with the ones that are willing to pay the most for the equity available. The auction theory literature, however, has demonstrated that the ones who win under this mechanism pay more than the larger pool of bidders believe the business is worth and thus may be overpaying (Thaler 1988).

One last alternative available to reduce the problem of incorrect valuations is given by the possibility of the equity crowdfunding platforms to offer coaching to entrepreneurs about valuations methods, especially through the support of investment-bankers, fund managers and venture capitalists. Moreover, the platform can also allow founder to benchmark their venture with other ones promoting a campaign on the same portal, in order to determine a fair valuation.

In conclusion, as stated by Collins and Pierrakis (2012), guaranteeing upward flexibility in ventures' valuation is of extreme importance to achieve fairness and therefore facilitate the success of the equity crowdfunding campaign. On the other side, the entrepreneur has to be aware of the potential negative effects of a too high percentage of equity offered, as a negative signal about the commitment of the entrepreneurial team to investors or further difficulties in obtaining follow-on financing.

Fraud detection and Selection of businesses

Probably the most relevant issue highlighted by the ones arguing against the ease of the regulation and the promotion of equity crowdfunding is represented by the risk of fraud behaviours. More precisely, the capital collected through the crowdfunding platform from the investors may be released erroneously to entrepreneurs who have no intention of creating a profitable business. Some safeguards have been however identified by the literature, circumscribing then the risk represented by this moral hazard.

The first protection against the risk presented is given by the vetting performed by equity crowdfunding platforms while evaluating the funding proposals received. In particular, the platform has to perform some form of due diligence in order to depict the quality of the entrepreneurial project and, at the end, select just the ones with greater potentialities. The capability of the crowdfunding portal of understanding the quality of a venture and identify

potential frauds becomes a critical source of competitive advantage with competitors, given the increasing number of equity crowdfunding platforms operating in the market.

Another protection against frauds is represented by the mechanism "all-or-nothing", according to which the campaign achieves a positive outcome only if all the target capital set is reached. Given that to collect the amount required a significant number of small investors operating on the crowdfunding platform is required, the probability that some of them detect a fraudulent entrepreneurial project is greater than in the case in which the target capital is raised from few big investors. In conclusion, in an "all-or-nothing" regime, entrepreneurs need to collect money from a significant number of investors, which in turn increases the probability of fraud detection. Obviously, this protection mechanism is valuable only if the investor does not completely rely on the vetting performed by the crowdfunding platform and the latter provides forum discussions where one can alert others to issues they come across when assessing the quality and validity of a given proposal.

A third possible solution to avoid the problem of moral hazard is given by the introduction of a staggered release of funds linked to milestones. According to this method, the platform provides the capital collected from investors in different stages, only if the venture respects the scheduling set for the development of the entrepreneurial project. This solution, however, faces some difficulties. First of all, from a regulatory perspective, the platform may be required to hold investors' funds for a longer period. Secondly, from an administrative perspective, the platform would be in charge of the check of the different milestones along the project.

One last innovative but at the same time extremely valuable solution for fraud detection and selection of quality businesses is represented by social media. Given the incredible amount of information available on these sources, for investors becomes easier to evaluate the social creditworthiness and trustworthiness of entrepreneurs promoting a funding project on the equity

crowdfunding platform. Moreover, social media also allow the potential investor to easily assess the competences and experience of founders, so to determine whether or not they will be able to develop the entrepreneurial project topic of the campaign. This last resource represents a valuable constraint against fraudulent intentions, given the exponential diffusion of social media and the consequent ease of access to precious and complete information about entrepreneurs.

1.2.3. Equity Crowdfunding and Traditional Financing

From the point of view of entrepreneurial finance, equity crowdfunding represents an interesting source of capital which, in some cases, could be considered as an alternative to traditional debt financing, namely banks, and, more interestingly, risk financing, namely business angels and venture capitalists. In order to provide a complete overview of equity crowdfunding, it is then necessary to compare this phenomenon with the traditional funding instruments. Below are reported the main terms of comparison highlighted by the literature.

The "equity-gap"

The two typologies of capital available for early-stage ventures are risk/equity and debt funds. The availability of the latter form, however, is quite scarce for young start-ups, mainly because of their incapacity of generating sufficient cash flows to pay interests on bank loans and of providing enough collaterals (Wilson and Silva, 2013). As a consequence, new ventures tend to rely first of all on equity capital. The initial funds are in fact usually collected from family and friends (F&F) of the entrepreneur, however these financings are quite limited and sufficient just for an initial phase of the development of the business. Moreover, Jeff Lynn, founder of the crowdfunding platform Seedrs, claims that there is a risk of class bias related to this source of funding. Indeed, he states that only entrepreneurs with wealthy F&F are able to raise initial funds through this mean and, therefore, begin the development of the entrepreneurial project.

As previously highlighted, even if founders are able to collect funds from F&F, the amount of this financing is usually constraint, therefore for most of the cases larger source of equity capital

are required. The problem is that also business angels and venture capitalists are now scarcely available, principally because they moved upward in term of minimum investment in young ventures (BVCA, 2011; BIS, 2009). As a matter of fact, the majority of rounds closed by business angels in 2009/2010 were greater than £100000 (BIS, 2010). For what concerns instead venture capitalists, they largely left the seed stage space, principally because the ratio of transaction costs to investment size for small deals became less suited for their business model. More precisely, the increase of this ratio, especially in the sectors such as software and Internet-based start-ups, was determined by the decreasing cost of starting a business thanks to innovations such as cloud computing and greater processing power (Miller and Bound, 2011).

The effects of these phenomena on the investment size of traditional sources of risk capital are clearly presented in the image below (Figure 1.7).

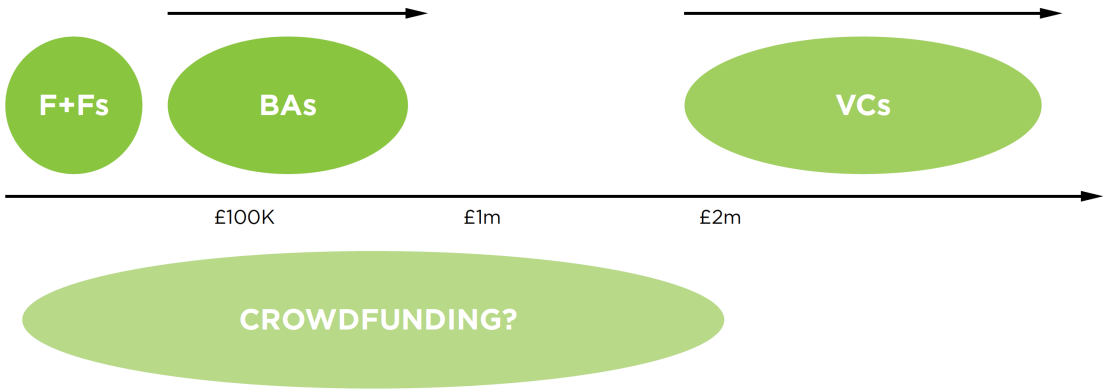

Figure 1.7 The equity gap, from Collins and Pierrakis (2012)

As stated by Collins and Pierrakis (2012) this situation has created two possible markets for equity crowdfunding. The first one is represented by initial seed money to start a business, when family and friends' capital is not available or not sufficient and, at the same time, the funds needed are too limited for business angels to get involved. The second market in which equity crowdfunding can play a significant role is given by the gap above the level where business angels are usually active, but where the capital required is too small to make venture capitalists interest in funding

the venture. The majority of equity crowdfunding campaigns so far have been related to the lower gap, however potentialities to tap also the higher one through this innovative financing instrument are reported in the literature. As in fact stated by Hornuf and Schwienbacher (2016), equity crowdfunding allows syndicated investments in which a professional investor, like a business angels or a venture capital, selects a business and a pool of non-professional investors, relying on its due diligence and experience, invest on it. As a consequence, equity crowdfunding is also able, through this mechanism, to provide greater amount of capital and, at the same time, reduce the possible negative consequences of information asymmetries. Moreover, syndicates represent a form of proximity between equity crowdfunding and traditional risk financings because of the intermediation provided by a professional investor.

Risk – Reward opportunity

As stated by Collins and Pierrakis (2012), equity crowdfunding has the possibility to tap a category of early-stage ventures that is usually neglect by traditional providers of debt and equity capital. The image below (Figure 1.8) clearly highlight this statement.

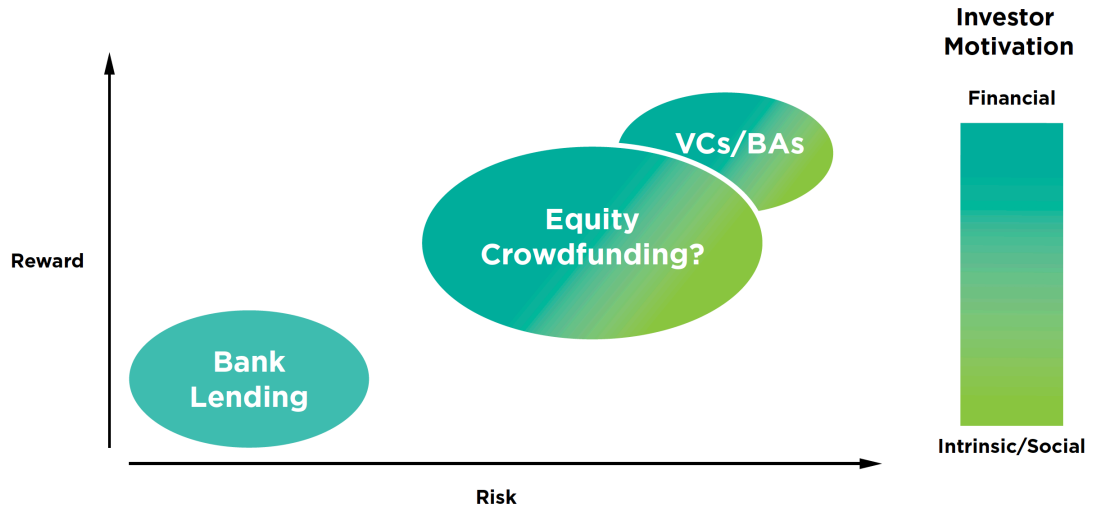

Figure 1.8 Business risk-reward profile where crowdfunding may fit

As demonstrated by the financing market, business angels and venture capitalists tend to prefer start-ups that are characterised by high level of risk, but that are potentially able, in the near future, to generate exceptional returns. On the other side, traditional sources of debt capital, banks, are more interested in low-risk firms, from which they gather low levels of return. In the middle, a category of early-stage ventures characterised by a medium level of risk that are potentially able to guarantee a satisficing profitability, however not sufficient to attract the attention of traditional equity investors. This category represents the most interesting opportunity for equity crowdfunding, especially because investors on the crowdfunding platform are willing to accept more risk or less return than business angels and venture capitalists given the presence of non-financial benefits. As a matter of fact, if traditional investors are mainly interested in financial gains, for crowdfunders it is also valuable the feeling of support and participation in the development of new products and companies (Jeppesen and Frederiksen, 2006; Gerber et al., 2012).

The financing market has experienced some initiatives in order to favour the collection of funds also for this category of start-ups. As an example, the UK government has intervened in order to increase the flow of seed and early-stage capital with instruments such as publicly-backed venture capital funds focused on early-stage businesses, co-investments funds and tax-breaks for investors. However, the effectiveness of this initiatives has been mixed (NESTA BVCA, 2009).
In conclusion, equity crowdfunding represents an interesting and valuable source of capital for those ventures characterized by medium levels of risk and return, also because even if investors on the crowdfunding platform are willing to accept lower returns or higher risks than traditional investors, they have the possibility to effectively spread their total risk by funding more ventures.

Access to follow-on financing

The possibility to raise additional capital after the conclusion of a funding project represents a relevant issue for a young start-up in order to further finance its development. This possibility is often provided by traditional sources of equity capital, namely business angels and venture capitalists. As a matter of fact, these typologies of investors tend to stage their investment in different rounds, in order to guarantee to the firm the necessary funds to develop its business but, at the same time, reduce the risk faced. The competitive advantage of traditional risk financings with the equity crowdfunding instrument is, in fact, the establishment of a relationship between the professional investor and the entrepreneur (Wilson and Testoni, 2014). The direct consequence of this personal relation is a clear facilitation of follow-on financings for the related start-up, as well as for other entrepreneurial projects promoted by the same founder. As a matter of fact, research has demonstrated that serial or repeat entrepreneurs tend to have far more success at growing new ventures, because of existing relationships with institutional investors as well as significant personal resources (Gompers et al., 2010).

For what concerns instead equity crowdfunding, the possibility to guarantee follow-on financings is limited, given that investors on the platform are "small" and non-professional ones. This criticality, however, can be solved in some way. A first possible solution is represented by the consequences of a successful equity crowdfunding campaign. Indeed, a positive outcome demonstrates the existence of a market demand for the product offered by the start-up (Schwienbacher and Larralde, 2010). This effect is particularly relevant for business models and sectors in which the investor is also a potential customer, then for consumer-facing businesses. On the other side, it could be difficult to demonstrate the market potential through the crowd for business models based on complex IP or innovations in very high-tech and cutting-edge areas (Wilson and Testoni, 2014). Nonetheless, this demonstration of market demand can increase the

interest of business angels and venture capitalists in providing additional financings following the one received through equity crowdfunding.

Another solution to the problem of follow-on financings for equity crowdfunding is given by syndicated investments. More precisely, this mechanism consists in the direct involvement of a professional investor in the crowdfunding campaign, whose role is to evaluate the venture and perform a proper due diligence. The possible consequence is then the creation of the typical relationship with the entrepreneur that characterises traditional equity financings, facilitating then the fruition of additional funds.

Information disclosure and protection mechanisms

A critical aspect for innovative start-ups while seeking for capital is the disclosure of sensible information. As a matter of fact, in order to convince the potential investor, the entrepreneur has to present his business idea, business model or innovation topic of the funding project. Usually this necessity does not represent a risk while collecting capital from business angels and venture capitalists. Indeed, the entrepreneur has the possibility to make the professional investor to sign a non-disclosure agreement (NDA) in order to prevent him to steal the business idea. Moreover, a potential moral hazard from the investor could be detrimental for his reputation and, as a consequence, for its financing activity (Collins and Pierrakis, 2012).

While instead promoting an equity crowdfunding campaign, the entrepreneur has to disclose its business model and business idea on the crowdfunding platform, making then crucial information available to everyone. The direct risk faced by the founder is then represented by the possibility that crowdfunders steal its idea while do not provide funds to the campaign. This detrimental phenomenon was named by Cooter and Edlin (2013) the "Double trust dilemma of innovation", and a solution for this problem has not been found yet.

In conclusion, the collection of risk capital through equity crowdfunding could be extremely dangerous for ventures characterised by high technological or business-model innovation, if not adequately protected through intellectual property rights.

Post-investment support

A form of relation between the funder and the entrepreneur after the conclusion of the funding project is experienced for almost all of the financing instruments available on the market. The extent to which this link is valuable for the firm, however, strongly depends on the typology of financing exploited. Indeed, contributions of business angels and venture capitalists are not limited to the provision of finance. They are actively involved in monitoring the companies in which they invest and often provide critical resources such as industry expertise and a valuable network of contacts (Gorman and Sahlman, 1989; Baum and Silverman, 2004; Hsu, 2004).

Equity crowdfunding, instead, is generally not capable of providing these contributions to the venture. Crowdfunders, in fact, have the possibility to eventually monitor the development of the entrepreneurial project, however they are rarely directly involved in the decisions regarding the business. Moreover, their role in the post-investment stage can vary dramatically, given the great deal of variation among the approaches adopted by the different platforms (Collins and Pierrakis, 2012).

The literature is then quite unanimous in defining the post-investment support as one of the main competitive advantages of traditional sources of risk capital if compared to the equity crowdfunding instrument.

Social ventures

An interesting point of difference between equity crowdfunding and traditional equity investors is represented by the typology of start-ups funded. More precisely, the disparity is given by social ventures, for which the aim is to provide both social gains and profits. For these entrepreneurial activities, the main purpose is to create non-financial returns instead of the financial ones. For this

reason, traditional investors like business angels and venture capitalists are usually not interested in funding them. Equity crowdfunding becomes then a valuable source of risk capital for social ventures, where investors on the platform have the possibility to be active in the promotion of the entrepreneurial project and related campaign to address international social problems or local issues.

Financial contracting

The structure on which equity crowdfunding is based already suggests that financial contracting is performed in a different way if compared to traditional financings. More precisely, crowdfunding platforms provide standardized contracts, without the possibility of negotiations and amendments in the offer. On the other side, private ordering (Williamson, 2002) has been a keystone of angel investing and venture capital market (Gilson, 2003).

Not only the process through which the financial contracting takes place represents a clear point of difference, but also the substance of the securities offered. Indeed, business angels and venture capitals make use of various covenants in the contracts they sign with the venture. Some examples are anti-dilution provisions and liquidation preferences to secure higher priority in the distribution of value (Kaplan and Stromberg, 2000). Moreover, usually business angels and venture capitalists stage their investment in order to reduce the risk of capital loss due to fraudulent behaviours.

In the context of equity crowdfunding, instead, tailor-made contractual arrangements and staged financing are difficult to implement, as they require negotiations, as well as strong monitoring of the entrepreneurial venture, which are extremely difficult to accomplish with hundreds of investors.

Some differences are also related to the typology of shares provided. Often business angels refuse to buy common shares (Wong et al., 2009), as sometimes instead happens in equity crowdfunding. Even worse, usually crowdfunders buy shares without any voting rights that rank in the last

position in case of bankruptcy. By contrast, professional investors opt for convertible preferred shares that guarantee higher priority if the firm fails.

Statutory law, however, provides an alternative form of protection to investors on crowdfunding platforms that does not rely on tailor-made financial contracts and staged financing. As an example, some jurisdictions protect investors by creating gatekeepers, requiring annual disclosures from the entrepreneur and, eventually, banning the promotion of the funding project on equity crowdfunding platforms.

In conclusion, investors on crowdfunding platforms experience a limited capacity of protecting themselves through financial contracts if compared to business angels and venture capitalists, however receive a significant degree of protection under statutory securities laws (Hornuf and Schwienbacher, 2017)

Exit strategy

The literature has demonstrated that the existence of a well-developed stock market is of fundamental importance for venture capitalists, because of the possibility to exit the venture funded through an IPO (Black and Gilson, 1999; Da Rin et al, 2006). Moreover, according to Black and Gilson, an IPO represents an interesting opportunity for founders to reacquire the control of the firm from venture capitalists. These dynamics result to be valid also for business angels financing. For what concerns instead the early-stage ventures that are financed through equity crowdfunding, their dimension is usually too small to permit an IPO on the stock market (Carpentier and Suret, 2010). In conclusion, the literature demonstrates that, conversely to traditional equity sources, equity crowdfunding is not able to generate satisficing exit opportunities.

To summarize, the results of this comparison between equity crowdfunding and the traditional sources of funds are clearly and completely summed up by Hornuf and Schwienbacher (2016).

As in fact stated by the authors, *"Crowdinvestors are likely to complement rather than substitute business angels or venture capital funds either because they fill funding gaps or co-invest in the same round with professional investors"*.

1.2.4. Actors Incentives

In this chapter, the incentives given by the equity crowdfunding instrument for the three typologies of actors are presented. In particular, the literature, according to the economic theory, has identified some specific reasons for which entrepreneurs, funders and platforms should prefer this innovative financing instrument instead of the more traditional ones, like business angels, venture capitalists and banks. The analysis is split in three parts in order to separately analyse each actor's incentives.

1.2.4.1. Creator Incentives

Lower Cost of Capital

Literature states that, under some conditions, equity crowdfunding can guarantee to the entrepreneurs a cost of capital that is lower than the one provided by traditional sources of funding, increasing then the value of this innovative financing instruments for early-stage ventures. The reasons for which this phenomenon could take place are mainly three.

The first one is related to the possibility of having better matches between entrepreneur and funders. This means that through equity crowdfunding the start-up is backed by the investors with the highest willingness to pay for the equity of the venture. The difference between the equity typologies of financing about this "optimal matching" is given by the dimension of the pool of investors tapped. As a matter of fact, if business angles and venture capitalists typically operate at local level, crowdfunders are dispersed all over the world (Agrawal et al., 2011). As a consequence, equity crowdfunding is able to identify the investors that are most interested in investing in the firm and that, therefore, could provide capital at a lower cost.

The second reason for which equity crowdfunding can guarantee a lower cost of capital is represented by the "bundling" proposition of this instrument. More precisely, if traditional sources of equity guarantee to the investor just financial returns, equity crowdfunding is able to provide to crowdfunders also non-financial benefits. These include being part of a community and an entrepreneurial project, participate to the development of a product, provide feedbacks about the market demand, support social and charitable initiatives. Equity crowdfunding platform proposition to investors is then a sort of hybrid offering (Agrawal et al., 2014), composed of both financial and non-financial benefits. Entrepreneurs are then able to reduce the cost of capital by "selling" also nonpecuniary goods that are otherwise difficult to trade in traditional markets for early-stage capital.

The third cause for the lower cost of capital must be brought back to the information an equity crowdfunding campaign can provide to the entrepreneur. As also stated in the previous chapter (Advantages of Crowdfunding), the "wisdom of the crowd" generates valuable information about the market potential of the product promoted (Schwienbacher and Larralde, 2010). More precisely, the rate of adherence of investors to the campaign on the platform is a direct measure the potential market demand. As a consequence, a successful equity crowdfunding project is able to demonstrate the potential profitability of the entrepreneurial project and then increase the interest of traditional investors in backing the firm. On the other side, however, a negative outcome can damage the availability of business angels and venture capitalists. In conclusion, a successful equity crowdfunding can significantly reduce the cost of capital for follow-on financings.

One last possible reason for which this innovative financing instrument can provide equity at a lower cost is given by the competition in the funding market. As a matter of fact, the quite recent development of equity crowdfunding has increase the competition in the financing market for

early-stage venture. A direct consequence of this entrance is a decrease of the cost of capital provided by traditional sources of funds, in order to remain competitive on the market.

More information

As previously stated, the adherence of crowdinvestors to the equity crowdfunding campaign can provide valuable information to the entrepreneur about the potential market demand for the product. However, in the case investors on the platform obtain also early access to the product, crowdfunding serves as a particularly informative type of marketing research, which is often modelled as to reduce the variance of post-launch demand (Lauga and Ofek, 2009). More precisely, equity crowdfunding campaigns that include advanced selling provide incentive-compatible demand signals, therefore increasing the quality of the signal of the demand (Ding, 2007). In conclusion, crowdfunding has the potential to reduce the noise associated with assessing the demand before the launch of a new product. The direct consequence of this improvement in demand predictions is a higher number of entrepreneurial projects promoted and a greater rate of success among them (Lauga and Ofek, 2009).

Moreover, the participation of investors to the equity crowdfunding campaign can determine the gathering of valuable information about the product or the business model adopted by the entrepreneur. As a consequence, the founder has the possibility to correctly calibrate its value proposition according to the market requests. Additionally, investors feedback can also favour the development of complementors for the promoted product, in order to create an ecosystem able to increase the value for the customer and beat the competition. These advantages related to user-driven innovation are well documented by the literature (von Hippel, 1998; Baldwin et al., 2006; Chatterji and Fabrizio, 2011), however equity crowdfunding platforms allow the creator to engage potential investors in the definition and design of the product even before it has been produced.

1.2.4.2. Funder Incentives

Access to investment opportunity

The first significant benefit generated by equity crowdfunding to investors is the access to a wide variety of early-stage ventures. Before the birth of this financing instrument, the possibility to invest risk capital in young start-ups was quite scarce for non-professional investors with limited private resources. The only possibility was in fact the existence of a direct relation with the entrepreneur to whom provide equity capital, being then part of the funding source called family and friends (F&F). With the introduction of equity crowdfunding, instead, non-professional investors have the possibility to browse the platform, analyse hundreds of early-stage ventures and eventually invest limited amount of capital. In conclusion, as stated by Gubler (2013), equity crowdfunding is *"giving ordinary investors the opportunity to get in on the ground floor of the next big idea"*.

Early access to new products

The presence in the market of hybrid models of equity crowdfunding is by now consolidated. In particular, entrepreneurs operating under this mechanism provide both financial and non-financial returns to their investors. One of the non-pecuniary benefit is represented by the early access to the product developed. This means that crowdinvestors are given the possibility to pre-buy the product and receive it before it is launched on the market. These investors are also called early-birds customers, for which the advanced access to firm's offering is extremely valuable. Moreover, from the point of view of the entrepreneur, enabling product enthusiasts to be early shareholders could also align their incentives with their means to enhance the value of the venture (Agrawal et al., 2014).

Community participation

For many funders, investing on an equity crowdfunding platform is considered as an inherently social activity. For them, in fact, providing capital to early-stage ventures is a mean to establish a preferential relation with the entrepreneur, to receive updates and establish a direct communication. Moreover, benefits derive also from the feeling of being part of an entrepreneurial project (Schwienbacher and Larralde, 2010) and a community of early innovation-addicted adopters. In some cases, crowdfunders may fund the firm in order to receive recognition from the entrepreneur within the community.

Support for a product, service or idea

For donation-based and reward-based crowdfunding the role played by philanthropy is surprisingly significant. This phenomenon, however, characterises in some way also equity crowdfunding. As a matter of fact, some investors provide funds to the campaign not really for the financial returns, the eventual early-access to the product and the participation into a community, but mainly to support the development of an idea that for them is valuable. This is the case, for example, of social and charitable initiatives and projects promoted on equity crowdfunding platforms.

Formalization of contracts

As reported by Agrawal et. al (2011), the crowdfunders who tend to invest at the beginning of the campaign are usually the ones defined as family and friends, representing then the social network of the entrepreneur. The role played by the platform is then an intermediation between these two parties, allowing the formalization of what otherwise would be informal finance. As a consequence, they improve on the financial contracts between family and friends by balancing the benefits and costs of social relationship (Lee and Persson, 2012). As stated in the previous chapter (Equity Crowdfunding and Traditional Financing), however, the necessity of

standardization given by the significant number of investors and, therefore, the absence of tailor-made financial contracts reduces the protection guaranteed to crowdfunders.

1.2.4.3. Platform Incentives

The majority of equity crowdfunding platforms are for-profit businesses and the most common revenue model is based on a transaction fee for successful campaigns, usually 4-5% (Agrawal et al., 2014). The purpose of the platform is then to maximise both the number and the size of successful equity crowdfunding campaign. It becomes then fundamental the ability to scan the ventures asking for funding and perform a proper due diligence able to identify high-quality firms, eliminate frauds and facilitate efficient matching between ideas and capital. Moreover, equity crowdfunding platform should attract entrepreneurial projects that strongly attract media attention, so to expand the community of funders and gather the opportunity to access new categories (Kain, 2012).

1.2.5. Actors Disincentives

The purpose of this chapter is to present the possible disadvantages related to the use of equity crowdfunding for the actors involved in the financing process. More precisely, these negative shades related to the innovative funding instrument could determine, in some cases, a higher propensity of entrepreneurs and funders in relying on the traditional sources of capital. As for the previous chapter, the analysis is split in order to separately analyse each actor's disincentives.

1.2.5.1. Creator Disincentives

Disclosure of information

Probably the most relevant disincentive for entrepreneur is represented by the obligation of providing to crowdfunders on the platform all the information needed to completely evaluate the potential profitability in investing in the venture. The data regard the product to be developed as well as more sensible factors like the business model of the venture, its managerial team and

employees, its customers and so on. The risk of imitation in then extremely relevant, given that information are disclosed to the general public on the equity crowdfunding platform (Cooter and Edlin, 2013). For traditional sources of funds, instead, this risk is much more limited, given that the disclosure takes place within the relationship between the professional investor and the entrepreneur and, additionally, the sign of non-disclosure agreements could be adopted. To conclude, founders with significant technological or business model innovation face a high risk of imitation, therefore could prefer traditional financing instruments. This conclusion is also supported by the fact that disclosing to the public an innovation could prevent then the possibility to patent it.

Opportunity cost

Another issue related to equity crowdfunding for the entrepreneur is represented by the opportunity cost faced while choosing this financing instrument instead of the traditional ones. As a matter of fact, ventures that are backed by business angles and venture capitalists receive, beside the funds, post-investment support such as industry knowledge, contacts and status (Hsu, 2004). This extended role played by professional investors is extremely valuable for an early-stage venture in the development of its business. On the other side, investors on equity crowdfunding campaign are, first of all, non-professional, therefore they do not own the competences, knowledge and expertise of a business angel or venture capital. Moreover, even if they do, their likelihood in providing support to the firm is quite scarce, given the limited dimension of the investment, and therefore of the returns, made in the venture.

Moreover, the management of a large number of investors could become costly and timely expensive. As a matter of fact, founders have to provide updates about the evolution of the crowdfunding campaign, as well as answer to questions and feedbacks from investors. This activity clearly requires much more effort than managing a single face-to-face relationship with a traditional source of risk capital.

1.2.5.2. Funder Disincentives

Creator incompetence

At the beginning of this phenomenon, crowdinvestors were quite optimistic about entrepreneurs' ability in effectively delivering the product or the business in the time horizon set. After the failure of a significant share of successful equity crowdfunding projects, however, platforms have strengthened the level of information disclosure founders have to provide to investors. Nevertheless, some entrepreneurs have no experience related to product development, logistics and suppliers. The result is that or the venture fails and investors lose all the investment, or the promises are respected but with a significant delay on the plan. Moreover, even the equity crowdfunding campaigns that exceed their target capital by large amounts often deliver late because of founders' incapacity in modifying the plan to the new unexpected demand (Pepitone 2012).

Fraud

Probably the principal risk for crowdfunders on equity crowdfunding platforms is given by the possibility of funding frauds, facing then a high agency cost while investing in a start-up. This happens when entrepreneurs promote a campaign in order to collect money without the real intention of developing a business to generate profits. This risk is remarkable first of all for the information asymmetries that characterise the equity crowdfunding instrument, given the absence of a face-to-face relation between the investor and the entrepreneur as instead happens for traditional risk financing methods. Secondly, given the limited returns on the investment and the high cost of due diligences, crowdinvestors tend to reduce the detail of the analysis of the potential profitability of the venture, mainly free-riding on the investment decisions of others (Agrawal et al., 2014). The combination of these two phenomena generate a high risk of fraudulent behaviours by entrepreneurs.

Project risk

Projects and ventures promoted on equity crowdfunding campaigns are in their early-stage of definition, therefore are inherently risky. As a consequence, even if the crowdfunding campaign is not a fraud and founders have the competences and experience required to successfully develop a business, the risk of venture's failure is still significant. Moreover, information asymmetries between the entrepreneur and the funder may determine a relevant increase of the cost of the risk faced by the investor.

1.2.6. Information Asymmetries

According to the literature, information asymmetries represent the main criticality related to the phenomenon of equity crowdfunding and for which, as claimed by several authors, this innovative financing instrument will not become an interesting source of risk capital in the near future. Information asymmetries in the context of entrepreneurial finance occur when the two parties, namely the investor and the entrepreneur, own different levels of information about the venture. Clearly, the one with greater availability of information is the latter. As a matter of fact, founders have access to all the data related to their entrepreneurial project. On the other side, information available to crowdfunders are quite limited, reducing then the possibility to properly evaluate the quality of the venture. As a matter of fact, entrepreneurs disclose few characteristics of the product and business plan, but nothing is made available about relevant indicators of success like their competences and experiences, their professional network or the relationship within the entrepreneurial team. The direct consequence of these information asymmetries is a hesitancy of funders on the platform in providing funds, even to high potential start-ups, because of the scarce opportunity to perform complete and satisficing due diligences (Agrawal et al., 2015).

This criticality is experienced for all the forms of financing for early-stage ventures. Indeed, not only crowdfunders on equity platforms, but also business angles and venture capitalists face the problem of information asymmetries.

Traditional sources of risk capital, however, exploit some mechanisms through which they are able to reduce the information gap with founders. As a matter of fact, both business angels and venture capitalists prefer to act at "local" level in order to establish face-to-face relationship with the entrepreneur (Agrawal et al., 2011). By doing that, funders have the possibility to gather directly from the founder all the information needed to perform a proper due diligence and, at the end, evaluate the quality of the venture with a satisficing level of detail (Collins and Pierrakis, 2012).

Moreover, especially venture capitalists tend to rely on an additional form of protection represented by tailor-made contractual agreements. More precisely, they usually opt for staged financing and prefer to buy stocks with liquidation preferences (Ibrahim, 2015). In conclusion, this typology of investors drastically reduces the information asymmetries by establishing a direct relation with the entrepreneur and limits the negative consequences of the loss of some relevant information through personalised contracts.

Business angels, besides face-to-face interactions with founders, prefer to rely on other instruments to reduce information asymmetries. The first one is represented by their own experience and competence in the field. As a matter of fact, business angels tend to invest in ventures that operate in sectors/industries that are familiar to the investor. In this way, the funder has a sufficient level of experience and knowledge about the market to properly evaluate the potential quality of a start-up (Fisch, 1998).

Moreover, business angels usually rely on a network of professional advisors specialised in the selection of quality ventures. The combination of competences and experiences of different professional figures determines a drastic reduction of the information asymmetries between entrepreneur and investor, favouring then the funding of high-quality businesses (Ibrahim, 2015).

For what concerns instead equity crowdfunding, the information asymmetries experienced are much greater than for the other sources of equity capital previously described. Moreover, this

criticality is not solvable through the means exploited by venture capitalists and business angels (Dorff, 2013).

The reasons that determine such information asymmetries in equity crowdfunding according to the literature are mainly four. The first one is strictly related to the geographical dispersion of crowdfunders if compared to the position of the funded venture. As a matter of fact, one of the main differences between traditional equity investors and crowdfunders on equity platforms is given by the distance between funder and entrepreneur. For the latter, investors are spread all over the world, while business angels and venture capitalists tend to invest on local start-ups (Agrawal et al., 2011). The consequence of this geographical dispersion is the impossibility to establish a face-to-face relationship with the founder, limiting then the availability of valuable information. The only mean through which the funder collects data about the venture is the equity crowdfunding platform. However, as stated by Agrawal et al. (2015), the information able to predict the future success of an entrepreneurial project are mainly tacit, therefore available only through direct interactions with founders that, nevertheless, are not permitted to crowdfunders.

The second determinant of information asymmetries in the context of equity crowdfunding is given by the fact that funders on the platforms are mainly non-professional investors. This means that financing early-stage activities is not their main job, as instead is for venture capitalists and business angels. As a consequence, crowdfunders do not possess the level of knowledge, competence and experience to, first of all, identify the most relevant information to predict success and, secondly, to properly assess the quality of a young start-up (Catalini et al., 2016).

A third consideration is given by the reluctance of entrepreneurs in disclosing too many information about their business idea. This happens because making publicly available on the equity crowdfunding platform sensible information may significantly increase the risk of imitation faced by the entrepreneur. This phenomenon is even more accentuated for early-stage ventures whose business model is based on a drastic innovation that, however, is still not protected

by intellectual property rights. In conclusion, founders hesitate to provide too many information to funders on the platform because of the possible loss of their source of competitive advantage (Agrawal et al., 2014).

For what concerns this topic, academics in U.S. have conflictual points of view about the optimal level of disclosure that the regulation has to guarantee for equity crowdfunding campaigns. For some of them, the JOBS Act provides too little disclosure to protect crowdfunders, for some others, instead, it is too high to reduce imitation risk. However, all the academics agree on the fact that rules have to find the right balance between protecting investors from fraud and lowering investors' cost for fundraising (Dorff, 2013).

The fourth and last main factor highlighted by the literature as source of information asymmetries is represented by the scarce effort of investors on equity crowdfunding platforms in performing proper due diligences. This happens because the investment made in the venture is usually limited, therefore the cost of a complete analysis of the business could be too expensive. As a matter of fact, according to the JOBS Act, an American family composed of four people with an average income of approximately $70 thousand is allowed to invest through equity crowdfunding just $2 thousand. In conclusion, even if enough information are made available by the entrepreneur on the platform and sufficient knowledge and competences are owned by the crowdfunder, the cost of performing a proper due diligence to identify the real quality of the venture may exceed the potential profits of the investment.

To conclude, because of the significant information asymmetries experienced in equity crowdfunding, *"funders may discount the value of ventures on the platform"* and their willingness to pay because *"it is particularly difficult for them to assess the true ability of the creator or the underlying quality of the project or venture"* (Agrawal et al., 2014).

1.2.7. The "Wisdom of the Crowd"

In 2004 James Surowiecki published a book titled *The Wisdom of Crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies and nations*. In this publication, the author theorized for the first time the concept of "wisdom of the crowd". According to Surowiecki, collective decisions taken by a pool of independent individuals are often better than the ones that could have been made by any single member of the group. This theory is based on the assumption that each person of the pool has different competences, knowledge and experiences, therefore the aggregation of the information available determines a better decision-making than the one performed by individuals, also in the case they are experts in the field. Moreover, the author states that this phenomenon is experienced in a wide variety of contexts, ranging from business and economy to society issues.

In the context of equity crowdfunding, the wisdom of the crowd becomes the main pillar to solve the problem given by the significant information asymmetries. As a matter of fact, as also previously stated, crowdfunders on platforms do not have the possibility to reduce the information gap between entrepreneur and investors through the means usually adopted by business angels and venture capitalists (Dorff, 2013). The only solution to this criticality is then to rely on the crowd of investors and on its collective wisdom. Joan Heminway (2014) defines this hypothetical crowd as an *"ill-defined group of potential and actual investors in securities offered and sold through crowdfunding"*. She also states that, generally speaking, crowds can be irrational, foolish and even stupid, or rational, sensible and intelligent. Instead, specifically referring to the phenomenon of equity crowdfunding, Haminway concludes that *"preliminary indications are that the equity crowdfunding crowd has the potential for wisdom"*, even if empirical research is still needed to confirm this statement.

In conclusion, the principal solution to the problem of information asymmetries in equity crowdfunding is represented by the wisdom of the crowd. According to this assumption, the

crowd of investors on the platform, despite the relevant information gap, is able to identify through its collective wisdom the ventures with the highest quality and invest on them, rejecting the low-quality ones and frauds (Li, 2016). For some authors (Hurt, 2015; Dorff, 2013), however, the phenomenon of the wisdom of the crowd does not take place in the context of equity crowdfunding, because of a too scarce disclosure of information and lack of competences from crowdinvestors, with the information asymmetries generating at the end a market failure (Agrawal et al., 2014).

1.2.8. A "Market of Lemons"

The "market of lemons" is a particular typology of market failure determined by information asymmetries and that the literature strongly associate to equity crowdfunding as a possible risk. This concept was first theorised by economist George Akerlof, who won the Nobel Prize for his study on the market of used cars. More precisely, he notices that in a market were both good and bad cars are sold, significant information asymmetries are experienced between car owners and potential buyers. As a matter of fact, owners of good cars face difficulties in disclosing the high quality of their car to potential buyers, given the high cost of signals and the imitation performed by owners of bad ones. The consequence of these information asymmetries is that potential buyers are not able to distinguish between a good and a bad car and, therefore, are not willing to pay the price of a good car even for the ones that are actually good, because of their incapacity in recognising them. In conclusion, given that high quality is not identified, owners of good cars will exit the market, leaving then just bad cars, namely the "lemons". This is a clear example of "adverse selection", which is *"the process by which the price and quantity of goods and services in a given market is altered due to one party having information that the other party cannot have at a reasonable cost"* (Catalini et al., 2016). The final result is then an inefficient market, able to trade just low-quality goods because of its incapacity in solving information asymmetries (Goshen and Parchomovsky, 2005).

As stated by part of the literature, the equity crowdfunding market could become a market of lemons. The verification of this phenomenon is directly related to the ability of the crowd in spotting high-quality ventures. The role played then by the wisdom of the crowd is of particular importance, given that is the principal mechanism to avoid the occurrence of adverse selection. To be more precise, if crowdinvestors can effectively spot, through the collective wisdom, the start-ups with greater potentialities, invest on them and reach their target capital while rejecting low-quality ones and frauds, then high-quality ventures will be interested in accessing the equity crowdfunding market because of the capacity of the crowd in understanding the entrepreneurial quality and potentiality and therefore achieve a proper valuation, namely a successful campaign. If instead the crowd is not able to do so, then *"high-quality ventures will avoid raising capital on equity crowdfunding platforms because they cannot achieve a fair price for their equity in that forum"* (Agrawal et al., 2014). As a consequence, equity crowdfunding platforms will be mainly used by low-quality ventures, the "lemons", to collect risk capital, shifting then the market to a "sub-optimal equilibrium", in which crowdfunders are left just with not promising investment opportunities.

Academics and critics have two conflictual points of view in relation to the effectiveness of the wisdom of the crowd and, therefore, the possible transformation of the equity crowdfunding market in a market of lemons.

Some authors have confidence in the ability of the crowd in spotting high-quality early-stage ventures and then avoid adverse selection. As in fact demonstrated by Li (2016), *"The wisdom of the crowd effect of a well-designed profit-sharing contract speaks to optimal corporate governance structures, guides security design for some new financing practices such as equity crowdfunding, and sheds new light on the nature of the firm: firms endogenously emerge to complete the market under dispersed private information"*. According to Catalini et al. (2016), equity crowdfunding is not likely to become a market for the "next great idea", however it could

provide novel opportunities for investment and experimentation, opening new avenues of funding for small businesses, instruments to build a committed user base and vehicles for marketing and branding.

According to other academics, instead, equity crowdfunding is likely to become a market of lemons. Dorff (2013) claims that *"Investors will not find tomorrow's Google on crowdfunding portals because they will not be there; instead, start-ups with real potential will continue to use other programs"*. A similar point of view is shared by Hurt (2015), according to which the promotion of an equity crowdfunding campaign would become a signal of poor quality.

In conclusion, the wisdom of the crowd represents the main pillar of equity crowdfunding against information asymmetries and related market failure. The literature, however, has discordant views about the effectiveness of this instruments. Fortunately, additional mechanisms have been identified to reduce the information gap between investor and entrepreneur and the risk of a market of lemons, in the case the collective wisdom is not sufficient. In particular, from the following chapter, the literature review focuses on the role played by signals (The Role of Signals), syndicated investments (Syndicated Equity Crowdfunding) and market design, namely platform rules (Platform Rules) and regulations (Regulations), in regard of this issue.

1.2.9. The Role of Signals

One of the most powerful means available to entrepreneurs to reduce information asymmetries and increase the chances of success for their equity crowdfunding campaign is to provide signals of venture's quality to investors on the platform. More precisely, high-quality start-ups have the possibility to reduce information asymmetries and then communicate their market potentialities through specific signals that the literature has identified as relevant indicators of venture's quality for crowdinvestors and that are, as a consequence, statistically correlated to campaign success (Vismara, 2017; Ahlers et al., 2012).

The signals identified by academics are related to different aspects regarding the venture asking for funds and the process involved by the equity crowdfunding instrument. Reported below, all these signals are classified and described in the section to which they belong.

1.2.9.1. Venture's Characteristics

This section lists and describes all the signals identified by the literature regarding the characteristics of the firm asking for funds on the equity crowdfunding platform.

Location in a big city

It is demonstrated that early-stage ventures whose headquarter is located in a big city have greater probabilities of raising a total amount of funds equal or higher than the target capital they set for the equity crowdfunding campaign (Ralcheva and Roosenboom, 2016).

Stage of maturity

This indicator represents the number of years the venture has been operating in the market before launching the equity crowdfunding campaign. Regarding this topic, the literature is quite controversial. As a matter of fact, Ralcheva and Roosenboom (2016) state that age is negatively correlated to funding success. On the other side, Ahlers et al. (2012) conclude that there is no statistical correlation between the stage of maturity and the number of crowdfunders nor the total amount collected.

Technological content

The literature demonstrates that companies characterized by a high level of technological innovation experience greater chances of achieving success for the equity crowdfunding campaign performed (Ralcheva and Roosenboom, 2016). This is probably due to the fact that potential investors on the platform perceive the market potential of tech companies more relevant than the one of start-ups operating in other sectors.

External certifications

According to Ralcheva and Roosenboom (2016) the protection of core innovations through intellectual property rights as well as the collection of awards and grants are strongly and positively correlated to campaign success. Ahlers et al. (2012), instead, have a different opinion. According to the authors, in fact, awards, government grants and IPRs do not affect both the number of funders and the total capital raised through the campaign. The different levels of update of the samples however suggest that the first conclusion is the most reliable one.

First sale

Realizing a first sale means that the venture has already successfully tried to sell on the market its product, demonstrating then the existence of market demand. As a consequence, crowdfunders may be more interested in funding these ventures because of the lower perceived risk. As a matter of fact, literature reports that firms that perform a first sale experience grater chances of concluding the equity crowdfunding campaign with a positive outcome (Ralcheva and Roosenboom, 2016).

Capital market roadmap

Early-stage venture may decide to disclose to public their intentions in relation to an exit strategy or instead take this information private. Ahlers et al. (2012) state that companies which make available to crowdinvestors their exit strategy are more likely to achieve a successful campaign than the ones that do not. Moreover, an IPO intention has a stronger positive impact than a trade sale exit channel. Vismara (2015) instead claims that disclosing the intention of an IPO does not influence the result of the equity crowdfunding campaign.

1.2.9.2. Human Resources

In this section are presented and analysed all the signals related to the human resources employed by the early-stage venture. More precisely, the attention is given to the number of the different professional figures, as well as to their education and professional network.

Number of board members

Different authors tend to agree on the positive signalling effect generated by the number of board members. As a matter of fact, both Ahlers et al. (2012) and Vismara (2015) conclude that a greater number of board members determines increased probabilities is concluding an equity crowdfunding campaign with positive outcome.

Number of non-executive directors

Academics have different views about the effectiveness of the signalling effect generated by the number of non-executive directors. Ralcheva and Roosenboom (2016) conclude that appointing non-executive directors is statistically and positively correlated with funding success. Ahlers et al. (2012), instead, suggest that there is no correlation between the number of non-executive directors appointed by the venture and campaign outcome.

Number of advisors

Still according to Ralcheva and Roosenboom (2016), early-stage ventures that exploit the competences and knowledge on external advisors or appoint an advisory board face higher probabilities of performing a successful equity crowdfunding campaign than others.

Social capital

The social capital represents the dimension of the pool of personal contacts within the network of the entrepreneur asking for funds on the equity crowdfunding platform. Vismara (2015) states that social capital has not a direct effect on the result of the campaign performed, however is a predictive indicator of the number of early investors. This because the social capital of the founder

is mainly represented by family and friends who, according to Agrawal et al. (2011), are the ones that fund the venture at the beginning of the campaign. In a more recent publication, however, the same author concludes that the number of founder's connections is actually a driver for campaign success (Vismara, 2016)

Education of the board

The literature states that a higher level of education within the board determines a greater propensity of crowdfunders in investing in the venture. As in fact demonstrated by Ahlers et al. (2012), the higher the number of board members that attended an MBA, the higher the number of investors on the crowdfunding platform that actually fund the venture.

1.2.9.3. Campaign Settings

This section presents and describes all the signals identified by the literature that are directly set by the entrepreneur while launching the equity crowdfunding campaign.

Target capital

The academics tend to agree about the absence of a signalling role played by the target capital set by the founder for the equity crowdfunding campaign. More precisely, several papers claim that the number of investors as well as the total capital collected are not influenced by the target capital required by the entrepreneur (Ahlers et al., 2012; Vismara, 2015; Ralcheva and Roosenboom, 2016; Vismara, 2016). Vulkan et al. (2016), however, state that the target capital strongly influences investors' behaviour and, as a consequence, the outcome of the equity crowdfunding campaign. In particular, a too high capital requirement could increase the risk of not collecting it completely and, at the end, damper crowdfunders' interest in funding the venture.

Equity offered

While launching the equity crowdfunding campaign on the platform, the entrepreneur has to establish the percentage of equity to offer to crowdfunders in change of the target capital set. Even

if Ralcheva and Roosenboom (2016) conclude that the equity offered does not generate a signalling effect on the success of the campaign, several other authors state that a higher percentage of equity offered decreases both the number of investors on the platform who actually fund the venture and total capital collected (Ahlers et al., 2012; Vismara, 2015 and 2016).

Platform choice

The choice of the platform on which to promote the equity crowdfunding campaign could represent a signal the entrepreneur is giving to potential investors. More precisely, the regulations adopted by different platforms are considered as a sort of signals of venture's quality (Vismara, 2017). As an example, ventures promoting a campaign on equity crowdfunding portals that allow "keep-it-all" mechanisms may be perceived as less promising than the ones that instead choose the "all-or-nothing" regime.

Financial forecasts

Ahlers et al. (2012) highlight the signalling role played by the disclosure of financial forecasts on campaign success. As a matter of fact, the authors demonstrate that early-stage ventures that do not provide financial forecasts to their potential investors experience reduced chances of concluding the equity crowdfunding campaign with positive result.

The other main characteristics of the equity crowdfunding campaign set by the founder while launching the funding project do not result to generate signalling effects on the success of the financing. More precisely, literature has demonstrated that the typology of shares offered, the provision of dividends and rewards and the length of the campaign do not statistically affect the result of the campaign (Vismara, 2015 and 2017).

1.2.9.4. Campaign Fulfilment

This section focuses on the characteristics of the equity crowdfunding process in the time period in which the campaign is promoted on the platform. Indeed, some of these factors generate a strong signalling effect to crowdinvestors and, therefore, significantly affect the result of the financing instrument.

Early investors

Early investors are defined as the crowdfunders who provide capital to the equity crowdfunding campaign at the beginning of the funding project, namely within 5-10 days after the launch of the financing instrument. Literature has demonstrated that a high number of early-investors stimulates the demand for investing in the venture by late-investors and, as a consequence, increases the probability of success for the related campaign (Vismara, 2015; Vulkan et al., 2016). The reason behind this phenomenon is represented by the "information cascades". This topic has been widely studied by academics in the field of entrepreneurial finance, however a specific analysis of the application of this mechanism to equity crowdfunding was performed by Vismara (2015). In the paper, the author states that investors on platforms tend to rely on the due diligences and selection of businesses performed by other crowdfunders, mainly because of their lack of competence and time to do that by their own, investing at the end on the same ventures chosen by early-investors. It is then clear that start-ups that are backed by a high number of early-stage investors experience greater chances of success because of the amplification effect generated by information cascades.

Public profile investors

While providing funds to an equity crowdfunding campaign, the investor has the possibility to make his profile public on the platform, disclosing its name to the other crowdfunders and, eventually, linking his profile to social networks. Usually, these investors tend to fund equity crowdfunding start-ups more frequently than the others, and are characterised by a strong entrepreneurial and project-specific experience. Vismara (2015) claims that a greater percentage

of public profile investors among the funders of a campaign increases the chances of achieving a successful funding project. Also in this case, the mechanism in activated by the information cascades. As a matter of fact, public profile investors, who usually invest at the beginning of the campaign, stimulate the demand of other early-investors, because of their disclosed knowledge and experience about the topic. In conclusion, the presence of public profile funders stimulates the demand of late-investors and therefore favours the success of the equity crowdfunding campaign through the mediation effect provided by early-investors.

Large investments

Academics agree on the fact that few large pledges to the equity crowdfunding campaign favour the achievement of a successful outcome (Vulkan et al., 2016). This phenomenon takes place principally because of two reasons. The first one is that large investments significantly reduce the gap between the target capital and the funds currently collected. The second factor is given, also in this case, by the information cascades. Indeed, the provision of relevant amounts of capital from single investors improves the quality of the venture perceived by other crowdfunders on the platform and, therefore, increases the percentage of those who actually support the campaign. This mechanism is clearly supported by the two signals reported below.

Business angels

Ralcheva and Roosenboom (2016) demonstrated that early-stage ventures that are backed by business angles experience greater chances of success for the equity crowdfunding campaign promoted. This happens because the experience and competence of business angels in analysing and selecting the best ventures are strong signalling effects for other investors on the platform.

Venture capitalists

The same conclusions are provided by the literature in regard of the signalling effect of the support provided by venture capitalists to equity crowdfunding campaigns. As a matter of fact,

crowdfunding projects that are backed by venture capitalists are subject to an increased probability of positive outcome for the funding project launched (Ralcheva and Roosenboom, 2016).

Updates

According to Block et al. (2017), entrepreneurs who provides updates to crowdfunders during the promotion of the campaign have increased chances of closing a successful funding project. More precisely, the authors discovered that updates related to campaign developments, new funding, business developments and cooperation projects generate a greater number of investors and capital raised. On the contrary, news about the team, business model, products development and promotional campaigns do not result to influence the outcome of the financing instrument.

1.2.10. Syndicated Equity Crowdfunding

One of the main argument related to the design of the equity crowdfunding market highlighted by the literature as a solution to information asymmetries and market failure is represented by syndicated forms of investments. In particular, this mechanism is based on the intermediation on the financing transaction between crowdfunders and the venture provided by professional investors. More precisely, investors on the equity crowdfunding platform rely on the due diligences and selection of ventures operated by business angles and venture capitalists, investing then is start-ups with greater market potentialities and quality.

The procedure of syndicated investments is quite simple. As a matter of fact, professional investors, called “lead” investors, create a syndicate profile online, in which they disclose some information about themselves, like successful past investments performed, as well as their intentions in regard of how many syndicated funding to complete during the year and the typical investment size. At this point, crowdfunders on the platform, called “backers”, have the possibility to subscribe to the syndicate and fund the investments selected by the lead. In change of the

competence and experience of the professional investor in selecting high-quality ventures, backers pay a "carry" to the lead, which can range from 5% to 20% of the profits earned on the capital invested (Agrawal et al., 2015). This instrument is quite similar to an investment in a VC fund, however three main differences are experienced. First of all, the backer has the possibility to choose which investments selected by the lead to fund, and can at every time leave the syndicate. Secondly, the minimum investment size is much greater for VC funds, while, as last consideration, the percentage of capital provided by the lead is significantly greater than the one of general partners in VC funds.

The alignment of the incentives of lead investor, backers and entrepreneur is guaranteed by the fact that professional investors face reputational and financial benefits in case of selection of high-quality ventures, damages of the same typologies are instead experienced in case of frauds and low-quality firms. On the other side, if the entrepreneur does not respect the promises established during the promotion of the equity crowdfunding campaign, then he faces reputational costs within his professional network.

The advantages of syndicated investments are clearly highlighted by the statement provided by Agrawal et al. (2015), according to whom syndicates *"combine the global reach capability of the online world with the face-to-face diligence and monitoring abilities of the offline world"*. As a matter of fact, business angels and venture capitalists who lead the syndicate establish the direct face-to-face relationships with entrepreneur that characterise the traditional equity financing instruments. After collecting enough information and performing accurate due diligence, the backer has then the possibility to invest in high-quality ventures. The clear and enormous advantage is then the relevant reduction of information asymmetries that typically characterise equity crowdfunding. Indeed, crowdfunders invest on the choices made by the lead, favouring then a more efficient allocation of capital and preventing market failure.

What emerges from the literature is that the main pillar of syndicated equity crowdfunding is represented by the mechanism of "information cascades" (Vismara, 2015). As a matter of fact, crowdfunders rely on the due diligences performed by professional investors, because of their experience and knowledge in the sector and the success of previous investments performed. This phenomenon is in fact supported by the signalling effect generated by the "normal" participation of business angels and venture capitalist in non-syndicated equity crowdfunding campaigns, as stated by Ralcheva and Roosenboom (2016) and reported in the chapter above (Campaign Fulfilment).

Evidences from the market seem to demonstrate the effectiveness of syndicated forms of investments in the reduction of information asymmetries in equity crowdfunding. As in fact shown by Agrawal et al. (2015) about the funding transactions operated by AngelList, the presence of investors geographically distant from the venture funded increases both in terms of percentage and capital provided when the investment is syndicated by a professional investor. More precisely, the percentage out of total backers and share of capital provided by investors located in Silicon Valley investing in a firm not located in Silicon Valley is significantly greater for syndicated investments than for the non-syndicated ones (Figure 1.9). This result clearly demonstrates that syndicated equity crowdfunding is able to reduce information asymmetries and, therefore, favour the geographical dispersion of crowdfunders (Agrawal et al., 2011).

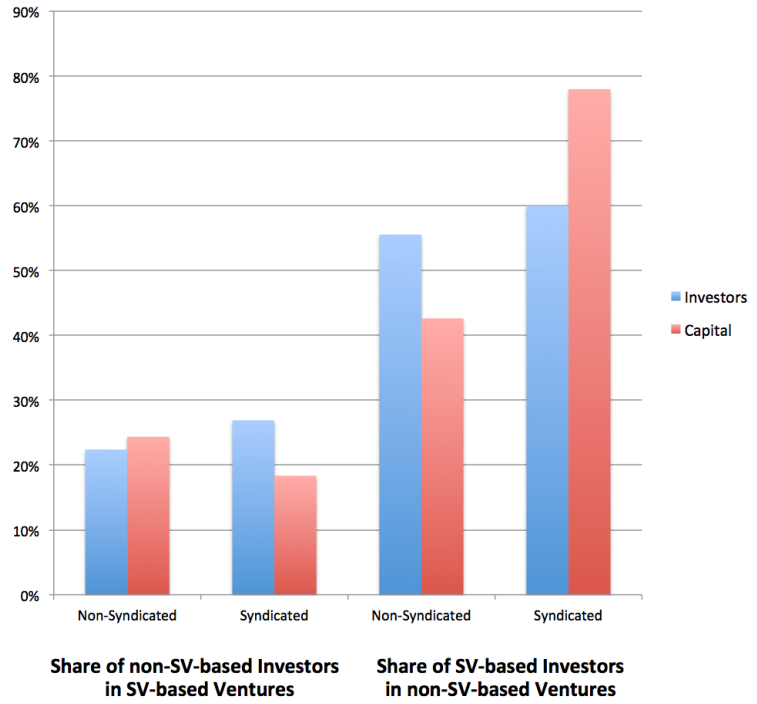

Figure 1.9 Geographical dispersion of backers for syndicated and non-syndicated equity crowdfunding investments on AngelList, from Agrawal et al. (2015)

The advantages provided by syndicates are also supported by evidences from the market regarding the diffusion of syndicated forms of equity crowdfunding investments during recent years.

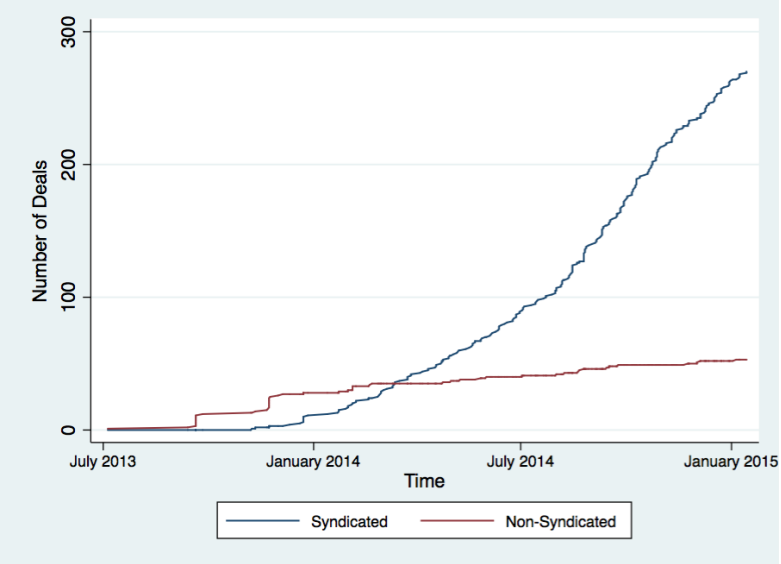

Figure 1.10 Cumulative number of successful syndicated and non-syndicated deals on AngelList, from Agrawal et al. (2015)

As in fact show by the graph (Figure 1.10) relatively to the portal AngelList, financings intermediated by professional investors on crowdfunding platforms have overtaken non-syndicated funding both in terms of number of transactions and total capital raised at the beginning of 2014.

One last interesting consideration reported by the literature about this phenomenon is represented by the typical characteristics of syndicated equity crowdfunding investments and its lead investors. As a matter of fact, funding intermediated by business angels and venture capitalists result to be highly skewed, with a median number of backers and individual investment equal, respectively, to 29 and $2,500, with maximum values peaking to 141 crowdfunders and $860,000. Moreover, lead investors tend to prefer internet-based early-stage ventures, given their ability to attract a larger pool of potential investors than the ones operating, as an example, in the medical or advanced materials sectors. Moreover, professional investors disclose their profile to public on equity crowdfunding platforms in order to make non-professional investors aware of their knowledge and experience and stimulate them to adhere to their syndicate.

In conclusion, academics agree on the potentialities given by the intermediation of a professional investor in the process of equity crowdfunding financing. More precisely, the reduction of information asymmetries allowed by the lead investor stimulates a more efficient allocation of capital from crowdfunders and, therefore, drastically reduces the risk of market failure.

1.2.11. Platform Rules

The role played by equity crowdfunding platforms in reducing information asymmetries is of fundamental importance to guarantee an efficient allocation of capital through this financing instrument. Some countermeasures have been already adopted by these portals, however, according to the literature, significant improvements from this point of view are still achievable and required to protect crowdfunders from frauds. The main solutions adopted to contrast

information asymmetries and possible further developments suggested by academics are reported below.

The first and most intuitive protection mechanism implemented by equity crowdfunding platforms is represented by the vetting performed by the platform itself. In most of the cases the due diligence is computed once the proposal of the funding project from the venture is received, but before launching the campaign on the website. In some other case, however, the platform evaluates the quality of the start-up at the conclusion of the campaign, just before releasing the capital collected to the venture. In both the cases the due diligence and consequent selection operated by the platform represent a fundamental screening of the quality of early-stage ventures and, therefore, a valuable protection instrument toward crowdinvestors. The ability of the platform to perform a proper vetting should be then fostered as principal source of competitive advantage.

Another possible solution highlighted by some researchers is the possibility to reduce the problem of information asymmetries by limiting the number of crowdinvestors to whom is allowed investing through equity crowdfunding. More precisely, the idea is to select the crowdinvestors who have more competences and experience in evaluating the quality of a start-up, in order to reduce, in the end, the risk of funding frauds and low-quality ventures. Some alternatives presented by the literature in regard of this topic suggest allowing equity crowdfunding just to accredited investors, or setting a high minimum-investment in order to stimulate a self-selection process among potential crowdfunders. These solutions, however, are criticised by part of the academics because of the lack of coherence with the main pillar of equity crowdfunding, namely the possibility for everyone to invest in early-stage ventures.

A critical setting defined by the equity crowdfunding portal in relation to information asymmetries is also represented by the revenue stream chosen. Most of the portals derive their profits through

a fee on the total capital invested in the venture after the completion of a successful campaign. Literature however claims that a better choice is represented by a fee on a potential exit of the firm funded through equity crowdfunding. As a matter of fact, the first form of revenue stream could lead to a conflict of interests between the platform and crowdinvestors (Wilson and Testoni, 2014). More precisely, if short-term monetary benefits are greater than long-term reputational ones, the platform could be less selective in the choice of the campaigns to be promoted and, therefore, decrease the average quality of the backed ventures. In conclusion, academics suggest the adoption of a revenue stream based on successful exists rather than successful campaigns, so to stimulate platforms in performing more accurate due diligences.

Other possible platforms' regulations highlighted by the literature are the introduction of a nominee and management system able to represents crowdfunders' interest after the completion of a successful campaign, solution already adopted by some portals. Moreover, the implementation of a feedback system to rate entrepreneurs' quality and trustworthiness could help investors in the selection process, however the scarce rate of repetitiveness of this funding instrument from the same founders limits the applicability of this method.

1.2.12. Regulations

As presented in the previous chapter (Platform Rules), the literature and the market provide best practices to equity crowdfunding platforms in order to limit the problem represented by information asymmetries. Nevertheless, Griffin (2012) claims that portals could deviate from these best-practices because of lack of long-term vision, incompetence or other hidden interests. Precise regulations from policymakers toward this issue are then required, given that leaving the financial market to self-regulate may be too costly.

The current legal framework aims at limiting the risk to which the investor on the platform is exposed. As a matter of fact, crowdinvestors are limited from the regulation in the capital they

could invest through equity crowdfunding by a maximum percentage of their annual income. To provide an example, a family in U.S. composed of four people with an average income of $70 thousands can invest on equity crowdfunding platforms a maximum of, approximately, $2 thousands (Dorff, 2013).

Nevertheless, the recent development of this financing instrument and the consequent significant volumes reached require stronger regulations in order to limit the risks faced by crowdinvestors (Wilson and Testoni, 2014).

According to the literature, regulations should impose the presence of an intermediary in the equity crowdfunding process, able to represent the interests of investors on the platform. Actors responsible of this role could be the platform itself or independent professional investors through the mechanism of syndicated funding. Moreover, supervision from the national authority should be guaranteed, in order to prevent the occurrence of conflicts of interests between the platform and crowdfunders. In this sense, the authority should monitor the quality of the due diligence performed by the equity crowdfunding platform in the case its revenues derive from the capital invested through the campaign, or, alternatively, impose the revenue stream based on a positive exit of the venture funded.

Researches also suggest that policymakers should increase the awareness of the public towards equity crowdfunding. More precisely, potential investors should be educated about the opportunities and, especially, the risks related to this innovative source of funding (Agrawal et al., 2014). Moreover, the platform should be obliged to verify that crowdfunders have not exceeded their yearly investment limits across all platform, so to be sure they are effectively able to face a potential loss of the capital provided to early-stage ventures.

Finally, as last suggestion provided by the literature to policymakers, the introduction of a limit over the total capital raised through the equity crowdfunding campaign. Thanks to this

mechanism, authorities are able to reduce the negative consequences of information asymmetries by limiting the number of crowdfunders exposed to potential frauds or low-quality investments.

1.2.13. Consequences of Equity Crowdfunding

The typical consequences of traditional equity financing instruments are well documented in the literature, however this topic has been quite scarcely developed by academics in relation to the phenomenon of equity crowdfunding. More precisely, researchers have mainly focused on the potential returns of an equity crowdfunding investment for the crowdfunder, neglecting an analysis of the potential consequences faced by the funded firm after a successful campaign.

Starting from the potential returns of an investment on an equity crowdfunding platform, as stated by Signori and Vismara (2016), the distribution of these expected returns on investment is likely to be similar to the one defined by IPO's returns. More precisely, profits for crowdfunders tend to be characterised by a significant level of skewness, having then the possibility to gain extraordinary rewards if able to spot high-quality ventures among the mass of firms promoting a campaign on the platform. As a matter of fact, Signori and Vismara report that crowdfunders have the possibility to gain a maximum return of 371% on the investment made, but, at the same time, they face a one out of ten probability of losing all the capital provided because of failure of the backed venture. The paper demonstrates that positive returns are correlated with the level of diversification, tax incentives and the appointment of non-executive directors. On the other side, failure is often predicted by lack of traction at listing, such as the absence of previous sales.

Another characteristic related to the returns for crowdfunders, highlighted by Collins and Pierrakis (2012), is that equity crowdfunding represents a long-term illiquid investment. As a matter of fact, if in reward-based crowdfunding returns are received quite quickly, for the equity-based model investors have to wait between five to ten years to monetise their funding. In this sense, a solution suggested by some equity crowdfunding platforms is the provision of a secondary market, independent or managed by the same portal, through which crowdinvestors

have the possibility to buy and sell shares of the backed firm after the conclusion of a successful campaign.

For what concerns the consequences of a successful equity crowdfunding campaign on the backed firm, the literature is quite scarce. Also in regard of this topic, Signori and Vismara (2016) provide some insights. More precisely, the authors focus on the effects of a campaign concluded with positive outcome on the survival rate of the backed venture. They in fact demonstrate that over a sample of 212 early-stage ventures funded on the UK equity crowdfunding platform Crowdcube, the 10% of them failed after the collection of the risk capital provided by crowdinvestors. Moreover, Signori and Vismara state that among the start-ups that concluded a successful equity crowdfunding campaign, approximately the 30% collected additional equity financings. In particular, the 22% subsequently raised risk capital from business angels or venture capitalists, the 10% through another campaign on the same equity crowdfunding platform, while the 1% as target of a merger or acquisition.

Literature however lacks studies related to the other consequences of a successful equity crowdfunding campaign on the profile of the backed venture. More precisely, no one has already studied how the human resources employed by the start-up evolve after the collection of risk capital from investors on the platform. In particular, the effects of this innovative financing instrument on the number of managers and, therefore, on the level of professionalization of the early-stage venture are still unknown. This gap in the literature gives then space to the study presented in this paper to further develop the theoretical knowledge about the phenomenon of equity crowdfunding.

2. Typologies of Analysis and Hypothesis

Given the characteristics of the Italian equity crowdfunding market, the purpose of this paper is to deeply analyse the Italian firms that participated to equity crowdfunding campaigns, in order to develop a clear profile of a company that decides to exploit this innovative source of financing. This company description is conceived to be as wide and comprehensive as possible, in order to identify every significant correlation between equity crowdfunding and the firm that performed a campaign. As a matter of fact, all the main voices from the income statement, balance sheet and cash flow statement are taken into account, together with more soft aspects like the geographical position of the firm, the industrial sector, the team composition or the innovativeness of the project.

As a second step, this paper aims at spotting and understanding which are the possible consequences of a successful equity crowdfunding campaign on the characteristics of the company. In other words, it is interesting to underline some possible common traits among the firms that received money through this innovative source of financing. Thanks to this analysis, an entrepreneur could be then aware of the possible consequences to be faced while performing an equity crowdfunding campaign, and therefore take the best decision in regard of which source of financing to rely on.

For what concerns the firms considered in the paper, the analysis is focused on just some typologies of the companies present in Italy. The Italian regulation, in fact, allows the participation to equity crowdfunding campaigns only to specific firms, which are the ones that are defined as *Start-up innovative* or *PMI innovative*. To be classified in one of these two categories, a company must satisfy some prerequisites that are defined by the Italian regulation, in particular from the CONSOB (*Commissione Nazionale per le Società e la Borsa*).

For what concerns the *Start-up innovative*, the characteristics that must be respected are the following:

- The company is not listed on regular markets or on other trading systems
- The company was constituted and has been working for no more than 48 months
- The headquarter is located in Italy
- The company is of small dimension (total annual value of production lower than 5 million €)
- The company doesn't distribute dividends
- The company dedicates most of its time in the development, production and commercialization of innovative products and services with high technological value, meaning that it operates in some specific sectors defined by the authorities (art. 2, comma 1 d.lgs. 24 marzo 2006, n. 155)

Moreover, this typology of company must satisfy at least one of the following prerequisites:

- Invest in research and development (at least 15% of the higher between the cost and the value of production)
- Have among its employees more than one third of PhDs, or MScs who are dedicated to research activities
- Own Intellectual Property Rights (at least one) related to industrial, electronical or biotechnological inventions

For what concerns instead the definition of *PMI innovative*, the requirements are the following:

- The company respects the definition of Small Medium Enterprises at European level (less than 250 employees, less than 50 million € of sales, less than 43 million € of total assets)
- The company has its headquarter in Italy, or in other EU country if the production site is located in Italy
- Certified balance sheet
- Not listed on a regular market (however it could be listed on a multilateral platform for trading)
- Not registered on the special section of *Start-up innovative*

Moreover, this typology of company must satisfy at least two of the following prerequisites:

- Invest in research and development (at least 3% of the higher between sales and cost of production)
- Have among its employees more than one fifth of PhDs, or more than one third of MScs
- Own at least one Intellectual Property Right or registered software

The Italian regulation allows both the typologies of companies to get access to equity crowdfunding, however the authorization to exploit this source of financing was given to *PMI innovative* just few months ago. As a consequence, at the date of this paper, there are only 8 companies belonging to this group of firms that performed an equity crowdfunding campaign. In conclusion, the empirical analysis of this paper focuses only on *Start-up innovative*, reaching then a satisfying trade-off between the dimension of the sample of companies that have the possibility to get access to equity crowdfunding in Italy and the reliability of results.

Once identified the set of actors on which the analysis is performed, the next step is to precisely understand what to study about this phenomenon. While considering the dynamics of this relatively new source of financing, three are the most interesting aspects to be analysed. A first one (Descriptive Statistics 1) is related to the drivers that guide a company to finance itself through equity crowdfunding, besides the more traditional instruments like bank loans, business angels and venture capitals. This is a quite relevant issue, given that, among all the companies allowed to exploit equity crowdfunding, just few of them opted for this financing strategy. In fact, if the total amount of *Start-up innovative* according to *Ministero dello Sviluppo Economico* is 7480 firms, the ones that performed at least one equity crowdfunding campaign are 120. It is therefore interesting to compare the characteristics of these companies, in order to understand the reasons and criteria behind the choice of leveraging or not on this innovative financing instrument.

The second relevant aspect (Descriptive Statistics 2) is strictly related to the success or failure of the campaign. The outcome of an equity crowdfunding campaign, in fact, is considered positive

only if some targets are achieved. In particular, the Italian regulation defined by the CONSOB allows a firm to perform two different typologies of campaign. In the first one, which is defined *tutto o niente*, the success is guaranteed only if all the required capital set by the firm while promoting the funding project on the equity crowdfunding platform is achieved. Moreover, at least 5% percent of this amount must be provided by professional investors. Instead, in the second typology, called *offerte scindibili*, campaigns are successful in all the cases, independently of the total capital reached. Obviously, in this second case, the risk to which the investor is exposed is much higher than in the first one, given that, if the company collects an amount far below the required capital, the possibility of successfully complete the entrepreneurial project object of the campaign could be significantly reduced.

The aim of this second analysis is then to study the characteristics of these companies that performed equity crowdfunding campaigns, in order to understand which are the drivers that guide success or failure.

One last interesting aspect to be considered (Descriptive Statistics 3) is how successful equity crowdfunding campaigns influence the indicators of the company, once all the capital collected is transferred to the firm. Given that equity crowdfunding aims at providing risk capital, for sure the immediate impact will be related to the characteristics of the shareholding and of the capital structure. Further implications, however, should be considered while evaluating the effects of this source of financing. For example, the availability of new capital could stimulate the firm to increase its investments in research and development or in its expansion. There could be some changes in the management of the firm, or some new employees could be hired. Finally, the new available capital could indirectly influence the profitability of the company and all the related indicators. In conclusion, it is interesting to study which are the effects for a company that successfully perform an equity crowdfunding campaign, in order to understand why a firm

seeking for additional capital should prefer this source of financing instead of the more traditional ones, like banks, VCs and BAs.

The second part of the paper (Econometric Model) aims at analysing in a deeper way some relations between innovative start-ups and equity crowdfunding identified through the descriptive statistics previously described (Descriptive Statistics). In particular, four initial econometric models are created in order to identify the presence of a potential selection effect on the access to equity crowdfunding and presented in the chapter Selection Effect on Access to Equity Crowdfunding. The purpose of this study is to further develop the analysis performed through the first descriptive statistics (Descriptive Statistics 1), so to obtain more reliable and statistically significant results about potential strong associations between the access to equity crowdfunding and specific firm's characteristics.

The relevance of this topic is justified by the dynamics of the financing instrument itself. As a matter of fact, a first generator of selection could be the equity crowdfunding platform. Its role in the evaluation and selection phase of the start-ups that ask to launch a funding campaign on their website is in fact of fundamental importance to eliminate low-quality entrepreneurial projects and frauds and, at the end, prevent market failure to take place. As a consequence, equity crowdfunding platforms could be then more inclined to allow the promotion of a campaign to those early-stage ventures with a specific profile and characteristics that are perceived as proxy of entrepreneurial quality. As second consideration, another relevant generator of a potential selection effect could be the start-up itself. The managerial team of the firm could in fact prefer to raise capital through more traditional sources of funding, like business angles, venture capitalists or banks, because they believe the profile of their firm as not suitable for the dynamics of the equity crowdfunding instrument, generating then a self-selection effect.

The second part of the chapter Econometric Models is instead fully dedicated to the analysis of a potential treatment effect generated by a successful equity crowdfunding campaign on the level of professionalization of the backed venture (Treatment Effect on Level of Professionalization). The idea of exploring this potential relation comes directly from the results of all the three descriptive statistics performed. As a matter of fact, the analysis computed as first part of the study presented in the paper highlights a significant trend characterising the companies that decide to fund themselves through this innovative source of funding. In particular, the results of the first descriptive statistics (**Errore. L'origine riferimento non è stata trovata.**) demonstrate that firms that decide to launch an equity crowdfunding campaign are, on average, more structured than the ones that instead prefer other sources of funding, both in terms of human resources and assets reported in the balance sheet. Moreover, what emerges from the results of the second descriptive statistics (**Errore. L'origine riferimento non è stata trovata.**) is that innovative start-ups that complete with success an equity crowdfunding campaign are also in this case more structured than the ones that fail, especially for what concerns the number of executives appointed before the beginning of the funding project and the value of intangible fixed assets registered in the financial statement. Furthermore, this strict relation between the dimension of the firm and equity crowdfunding is even reinforced by the results of the third descriptive statistics (**Errore. L'origine riferimento non è stata trovata.**), according to which the completion of a successful equity crowdfunding project allows the firm to become even more structured, especially in relation to the number of its employees and the investments devoted to research and development. In conclusion, it is clear the existence of a relation between the dimension of the firm and the equity crowdfunding instrument. It could be interesting then to further analyse this link, with particular attention given to the consequences of a successful campaign on the growth rate of the human resources employed by the start-up and its level of professionalization.

This topic has been already explored by the literature in relation to different typologies of financing sources, with the exception of equity crowdfunding. As a matter of fact, several are the papers that demonstrate a correlation between more traditional sources of funding and successive firm growth. In particular, the main effects presented by the literature are related to an increase of the growth rate in terms of survival, employment, sales, level of professionalization and probability of reaching further funding or an exit. Bertoni et al. (2011) focus on the consequences of collecting venture capital on the rate of growth for the number of employees and sales, analysing a 10-year longitudinal data set of 538 Italian new technology-based firms (NTBFs). The purpose of the paper (Bertoni et al., 2011) is to discriminate the causes that stimulate the growth of the firm after the conclusion of the financing instrument, differentiating between the "treatment effect" and the "selection effect". In particular, the first phenomenon is related to the ability of the venture capitalist in providing insights and advises to the executives of the firm, in order to further develop its structure and business. This effect is then strictly dependant on the experience and knowledge of the VC in generating an added value for the company. On the other side, the selection effect, according to which firms that get access to a specific source of funding are already pre-selected, meaning that their successive growth is not generated by the financing instrument used but is inherent to the characteristics of the firm. More precisely, the selection effect related to VC funding states that VCs are able to spot the companies with higher growth rate, therefore further developments are not caused by the financing source exploited but predetermined by the high potential of the firm. Bertoni et al. (2011) state that the treatment effect generated by VCs on the employment and sales growth has a significant and statistically positive evidence on the sample of Italian NTBFs considered. In particular, at the end of the year following the conclusion of the first financing round, the number of employees for VC-backed firms is 110% larger that for the ones that did not received venture capital. Moreover, from the second year after the first financing round, the number of employees continues to increase if compared to non-VC-backed firms, even if with decreasing rate.

This thesis is also supported by Colombo and Grilli (2010) that studied the effects on growth generated by the human capital of funders and the collection of venture capital, on a sample of 439 Italian NTBFs. The paper (Colombo and Grilli, 2010) demonstrates the existence of a strong treatment effect of VCs, especially for what concerns the employment rate. As a matter of fact, it is estimated a growth of the number of employees equal to 275% after the collection of capital through VCs.

Bertoni et al. (2011) do not identify the existence of a selection effect among the sample of Italian companies considered, meaning that further developments are not determined by the potentiality of the firm but strongly affected by the experience and advises provided by the VC. In conclusion, according to Bertoni et al. (2011), in Italy venture capitalists do not pick the "winners", but are able to create the "winners".

The consequences of the collection of venture capital on firm growth, with particular focus on the development of the human resources, are also the focus of the paper published by Hellmann and Puri (2002). In fact, the authors claim the existence of a strong influence operated by VCs on the human resource policies adopted. As a matter of fact, VCs tend to revise the recruitment process, favouring the use of business and professional contacts for the appointment of sales and marketing personnel, as well as for the administrative and managerial one. Moreover, firms that are fund by VCs are more than twice as likely to adopt a stock option plan and experience increased probabilities in appointing a vice president for marketing and sales. One last direct consequence of collecting venture capital is strictly related to the evolution of the top management of the firm. More precisely, companies that are backed by VCs are more likely to bring inside and external CEO. What emerges from the paper (Hellmann and Puri, 2002) is then a clear link between the collection of funds through VCs and the consequent development of the human resources, specifically for what concerns the level of professionalization of the firm.

Several are then the academics that have identified the existence of a treatment effect of VCs on the growth rate of the firm, with particular attention given to the further development of human resources. The literature, however, has studied this topic also in relation to other sources of financing. Lerner et al. (2015) studied the consequences of being backed by business angels across a heterogeneous set of 21 countries characterised by different entrepreneurship ecosystems. What he discovered is that collecting funds from business angels has a strong and statistically significant effect of the consequent growth of the firm, its successive performances and survival rate, independently of the country in which the company is located. Moreover, international business angles result to be more effective than the US ones for what concerns the probability of obtaining follow-on financing. On the other side, the paper (Lerner et al., 2015) identifies a phenomenon of self-selection characterising the less developed venture environments. More precisely, only more mature businesses apply to get financed by business angels, while early-stage start-ups do not because of the low perceived probability of receiving funds in less developed entrepreneurship ecosystems.

Other papers have also reported the existence of a treatment effect on human resources and level of professionalization generated by business angels funding. Kerr et al. (2011) states that the collection of capital through business angels directly generates higher rates of employment, as well as survival, exists, patenting, web traffic and financing. The role of these professional investors is also documented in the paper by Macht and Robinson (2009), according to which the presence of business angels allows to fill the knowledge/experience gaps through the provision of their own expertise and advises, provides a wide range of contacts and facilitates the access to further financing.

In the literature, however, there is track of different opinions in regards of the treatment effect operated by business angels. The paper from Levratto et al. (2018) analyses a dataset of 432 angel-backed French companies that are compared to two control groups, the first one randomly selected

and the second one composed of similar companies. Results demonstrate that being backed by business angels strongly improve the growth rate in terms of sales and employment if considering as control group the one randomly chosen. Instead, while performing the comparison with similar companies, the treatment effect operated by business angels on firm growth is limited. This means that, according to the results of the paper (Levratto et al., 2018), the selection effect is much more relevant than the treatment one. Moreover, Levratto et al. demonstrate that the effect of business angels on the employment growth rate depends on firm economic performances. More precisely, business angels are able to strengthen this growth rate for companies that are thriving, while the effect is null for the ones with decreasing employment.

In conclusion, the literature has already deeply analysed and identified the relation between the more traditional sources of financing and the consequences on human resources and level of professionalization. As previously described, the academics agree on the treatment effect generated by venture capitalists on the backed companies (Bertoni et al., 2011; Colombo and Grilli, 2010; Hellmann and Puri, 2002; Sorensen, 2007). The opinion of the literature is instead more variable for what concerns the role played by business angels. For some authors (Lerner et al., 2015; Ahmed and Cozzarin, 2009; Kerr et al., 2011; Macht and Robinson, 2009) a treatment effect exists also for this financing source, while, for some others (Levratto et al., 2018), there is a much stronger selection effect among the companies that decide to collect funds from business angels.

There is no reference however in the literature about the relation between the equity crowdfunding instrument and firm growth, especially for what concerns the development of human resources. At the moment, the consequences of a successful equity crowdfunding campaign on employment growth rate and level of professionalization of the company are unknown. It could be then interesting to understand if a positive outcome of this financing instrument stimulates or not the appointment of new managers. A potential correlation between these two phenomena is

hypothesized because of the advantages generated by an equity crowdfunding campaign with positive outcome. First of all, the availability of fresh capital, that could be used by the backed venture to select and appoint new skilled and experienced managers in order to increase its level of professionalization. Secondly, the positive reputational externalities generated by a successful campaign on public awareness. As a matter of fact, equity crowdfunding is able to spread the notoriety and trustworthiness of the early-stage backed venture among a network of professionals, stimulating then the interest of skilled managers in providing their competences and experience to foster the growth of the start-up.

The analysis aims then at defining which type of relation subsists between a successful equity crowdfunding campaign and the growth rate of the managerial team appointed by the firm. Therefore, the study is not oriented to depict the effects on human resources in general, but, more specifically, on the level of professionalization of the backed venture.
In conclusion, the hypothesis formulated in this paper is the following:

Hypothesis: *The completion of a successful equity crowdfunding campaign determines an increase of the growth rate of the managerial team appointed by the innovative start-up*

The purpose if this study is then to verify the existence of a treatment and/or selection effect performed by this innovative financing instrument on the pace of development of the managerial team appointed by the start-up.
The first possible scenario is the one in which the treatment effect is the only one identified, meaning that the higher growth rate experienced by the firm is directly and solely determined by the financing instrument exploited. As a matter of fact, both the equity capital collected and the improved reputation after a successful campaign could generate more financial availabilities for the firm to hire new skilled personnel and, on the other side, more interest from experienced professional managers in working for the backed company.

A second possible scenario is instead the one in which only the selection effect is depicted. This would mean that equity crowdfunding has no impact on further managerial developments of the firm. The only reason for which the start-ups that complete a campaign with positive outcome experience a higher rate of growth for their managerial team is represented by a phenomenon of selection, according to which firms that get access to equity crowdfunding are characterised by higher innate potentialities and growth rate. This could be also a realistic result, given that equity crowdfunding platforms cover a significant role in the screening and selection phase of the projects to be promoted on their portal.

One last possible scenario is the one in which both the treatment and the selection effects take place. According to this result, the companies that are selected by the equity crowdfunding platform for the promotion of their project are the ones that seems to be more promising, with higher growth rate of their managerial team. Successively, the completion of a successful equity crowdfunding campaign further improves the pace of development of the managerial profiles, thanks to the fresh capital collected and the reinforced firm reputation.

The verification of any of these scenarios would be of extreme interest from a research and academic point of view, because of the lack in the literature of references about this topic.

3. Methodology

3.1. Data Typologies

Given the typologies of the analysis to perform previously described, three types of data are required. A first one is related to the *Start-up innovative* present in Italy. A list of all the companies belonging to this section must be identified, together with all the possible indicators able to describe in the widest possible way the situation of the firm. In particular, the analysis strongly focuses on the performances included in the balance sheet, profit and loss account and cash flow statement. Studying these indicators, it is possible to perform all the analysis related to the assets and liabilities of the firm, as well as the ones regarding its profitability and liquidity.

However, also other indicators, which could be considered as more "soft", must be taken into account. Some possible examples are the sector in which the company established its core business, the geographical region in which it operates, the structure of the managerial team, the ratio between male and female employees or the percentage of foreigners working for the company. This information could be quite interesting while trying to understand the relation between a company and Equity Crowdfunding, especially for what concern the choice of exploiting this innovative source of financing and the probability to achieve success for the related campaign.

The third type of data required by the analysis regards specifically the campaigns performed by the companies which decided to rise capital through Equity Crowdfunding. In particular, it is important to understand which are the characteristics of the offer set by the company while promoting its project on the platform. Considering these aspects is quite crucial since they represent the only mean through which the potential investor could evaluate the potential profitability of investing in the firm. As a consequence of that, these settings have a strong impact on the final outcome of the campaign. Some examples of these relevant parameters are the Equity Crowdfunding platform on which the company decides to publish and promote its project, the

target capital required, the typology of shares offered to the investor or the total duration of the campaign in terms of months.

The analysis performed in this paper take then into account all these three types of data for all the Italian companies registered to the special section of *Start-up innovative*. The aim is then to provide the most comprehensive understanding of which are the logics behind the decision of rising capital through Equity Crowdfunding, the ability of achieving success for the campaign and the direct and indirect consequences of this financial source on the firm.

3.2. Data Sources

Given the variety of the analysis performed in this paper, multiple are the sources of data required in order to gather sufficient information for a comprehensive understanding of the dynamics of equity crowdfunding. As previously described, in fact, several are the typologies of data necessary, from the financial ones, to the softer ones more related to human capital and sector, to the ones strictly related to the campaign performed by the start-up. As a consequence of that, multiple sources of data are consulted, each one targeting a specific type of information among the ones just described.

The sources of data used in this paper are the following:

- *Analisi Informatizzata delle Aziende Italiane* (Aida)

  This first source of data is used to gather all the information contained in the income statement, cash flow statement and balance sheet of the companies in the sample, meaning the ones defined as *"Start-up innovative"*. Aida is a database developed by Bureau Van Dijk, a Moody's Analytics Company, which contains comprehensive data on companies in Italy, with up to ten years of history. The software helps to find and analyse company information quickly and easily, allowing to search by hundreds of criteria and perform many different research projects, including detailed financial analysis and credit risk assessment, corporate

finance, venture capital and M&A research, sales and marketing including feasibility assessment and generating data for campaigns plus academic study and teaching.

Moreover, Aida is composed of five modules able to provide additional information in regard of the Italian companies. A financial strength module that, thanks to ratings from various expert providers, allows to perform rating and credit risk analysis, to calculate company's probability of being sold, its financial strength and the environmental risk rate. A probability of default module, developed in collaboration with KFinance Economics, through which it is possible to analyse credit scores, rating classes and final PD. A BYO value module – Micro enterprises assessment, which is a decision-making tool integrated in Aida through which users can also use the information included in the Industry studies database to assess business performance of micro and small enterprises in Italy. An SPL module that enables the access to public service companies which therefore, linked to AIDA PA, is a unique tool to access the group of companies owned by local public authorities. Finally, a DFKA module, tool that helps to research firm's ratings and find the evaluative standard of the *Fondo di garanzia* for *PMI* (SME).

- *Registro Imprese* (*Ministero dello Sviluppo Economico*)

  Registro Imprese is a database created and updated by *Ministero dello Sviluppo Economico*, the ministry responsible in Italy for industrial politics, international business, communication and energy. Following the Italian legislation, the Italian companies, the foreign ones with headquarter in Italy and other institutions, like foundations and associations, that perform some business activity in the country, are obliged to be registered in this database. In particular, *Ministero dello Sviluppo Economico* created, together with the introduction of the new legislation, a special section of *Registro Imprese* dedicated to both *Start-up Innovative* and *PMI Innovative*. As a consequence of that, the ministry provides two samples of

companies which are the ones that satisfy the criteria necessary to be defined as a *Start-up innovativa* or a *PMI innovativa*.

For what concerns the type of data clustered in this database managed by the government, a significant difference is highlighted if compared to the one provided by Aida. In fact, if the latter focuses merely of information contained in the balance sheet, income statement and cash flow statement, the special section of *Registro Imprese* aims at disclosing information that could be considered as more "soft". As a matter of fact, the main voices of the database focus on the description of the business activity of the firm, of the sector in which it competes, of the team in terms of age, gender and ethnicity, of the geographical location, age and level of innovativeness of the company. Moreover, this special section provides additional information strictly related to the nature of the firms under investigation. In the database, in fact, it is possible to download also a pitch and the business model of the *Start-up innovativa* or *PMI innovativa*, in order to get an immediate and complete understanding of its business scope.

- *Osservatori* "Entrepreneurship & Finance" of the School of Management of Politecnico di Milano

  The research group "Entrepreneurship & Finance" is part of the School of Management of Politecnico di Milano and its aim is to study all the phenomena related to entrepreneurship and corporate finance, focusing especially on the effects on innovation, firm's competitiveness and the economic system. Currently the research group is promoting three different *Osservatori*. A first one is related to Mini-Bond, the aim of which is to analyse, also with European comparison, the Italian industry of bonds emitted by small and medium enterprises. In particular, it focuses on the dynamics of collection in relation to the context of the financial markets and the real economy, the characteristics of those firms and their emissions, the corporate choices in regard of the investments and development strategies

post-emission, the dynamic of the supply chain with its consultants and intermediaries, the profile of professional investors, in particular the funds of private debt.

A second *Osservatorio* is related to Crowd-investing. Its aim is to analyse the rising industry of capital collection by companies through direct investments from the internet users. Under this complex umbrella, three are the main phenomena investigated. Equity crowdfunding, which consists of subscriptions of equity capital, lending crowdfunding or P2P lending, a financing form that works as a loan, and invoice trading, which is the anticipated payment of firm's invoices by internet investors.

One last *Osservatorio* is related to specific themes like new Initial Public Offerings or the management of non-performing loans.

The entire research project described in this paper takes place inside the research group "Entrepreneurship & Finance", in particular as part of the study carried out by the *Osservatorio* on Crowd-investing. During the recent years the group has monitored and analysed the evolution of equity crowdfunding in Italy, constantly updating all the information related to this phenomenon. The result is a complete database with all the campaigns of equity crowdfunding performed in the country until December 2017. The type of data provided are strictly related to the characteristics of the campaign, in order to highlight the different choices of the companies in regard of the strategy adopted for this financing form. Some examples are the equity crowdfunding platform on which the project was promoted, the percentage of equity offered and the typology of the related shares, the total capital required or the duration of the campaign. In conclusion, this source is extremely useful to get a clear and complete insight of the equity crowdfunding industry in Italy and of its characteristics.

- Start-up websites

  This source is extremely useful for the research project described in this paper for what concerns the collection of information regarding the managerial team of the companies under investigation. As a matter of fact, the legislation obliges all the start-ups to provide and update at least every six months on their websites the following information:

  - Date and location of the foundation of the company, name and address of the notary
  - Headquarter and eventual peripheral offices
  - Corporate purpose
  - Short description of the business, including activities and investments in research and development
  - List of the business partners
  - List of the subsidiaries
  - Education and professional experiences of business partners and personnel that works in the start-up
  - Professional, cooperative or commercial relations with certified incubators, institutional and professional investors, universities and research centres
  - Balance sheet of the last year available (standard XBRL)
  - List of the intellectual property rights

  As a consequence of these strict requirements set by the Italian legislation, the websites of the start-ups represent a useful source to gather information especially regarding the human resources of the firm. In fact, all the data in terms of number, education and professional experience regarding the business partners and the managerial team have to be provided and updated frequently. In conclusion, the website of the start-ups is a valuable source of information in order to analyse the hypothesis investigated in this paper regarding the consequences of equity crowdfunding on the managerial team of the firm.

- Wayback Machine

  The Wayback Machine is a digital archive of the World Wide Web and other information on the Internet created by the Internet Archive, a non-profit organization, based in San Francisco, California, United States. The service enables users to see archived versions of the web pages across time, which the archive calls a "three-dimensional index". This capability is extremely useful for the purpose of this study if combined with the information provided by the website of each start-up investigated. In fact, searching on Wayback Machine the online page of a specific firm, it is possible to gather all the data available in different time periods of the history of the company. As a consequence of that, the combination of these two typologies of sources allows to collect the information regarding the managerial team of the start-up and, in turn, perform the analysis related to the hypothesis to be tested.

- Equity Crowdfunding Platforms

  An equity crowdfunding platform that is registered and then authorised by the CONSOB, must provide all the information necessary to allow the investor to take a conscious decision, being then able to consider all the characteristics and related risks. Platforms have the possibility to make this data available also through multimedia techniques, like videos or presentations. Moreover, the manager of the platform is obliged to ensure that the information provided are updated, accessible for at least twelve months after the completion of the campaign and available for at least five years to the ones who require them.

  For what concerns the typology of data given by the equity crowdfunding platform in relation to the specific campaign, there is a precise part of the regulation defined by the CONSOB that targets this topic. In particular, the platform has to publish a form containing all the following information related to the equity offering:

  - Information on the risks of the specific offer and start-up

- Information on the start-up and the financial instruments subject to the offer. In particular, the platform must provide the data related to the managerial team of the company and the *curriculum vitae* of the managers
- Information on the offer. This is a macro category that includes several requirements like the general conditions of the offer, the equity eventually already subscribed from professional investors, the indication of potential costs and commissions in charge of the investor, the terms and conditions of payment and assignment of the financial instruments subscribed
- Information on possible services offered by the manager of the equity crowdfunding platform in relation to the offer
- Information regarding the control authority
- Information on the actor in charge of the audit
- Information on legal and financial advisors and opinions of the experts

The direct consequence of this strict regulation defined by the government is a complete description of the offer published on the platform, allowing then the potential investor to have a clear understanding of the opportunities and risks in investing in a specific start-up. For the purpose of this study, the precise information regarding the managerial team permit to gather a more punctual definition of the management of the firm. In fact, in several cases the website of the company is not archived in Wayback Machine, therefore only the current profile of the management is available. In all these cases, the information provided by the platform allow to gather the number and names of the managers also when the campaign was launched on the portal, facilitating then the understanding of the evolution of the managerial team over time.

- LinkedIn

  LinkedIn is also a valuable source in order to collect information related to the managers of a start-up. In fact, by accessing to the LinkedIn page of the company it is possible to visualize all the employees that are currently working for the firm or worked for it in the past years. Selecting then among all the employees just the managers and accessing their personal page, among all the professional experiences it is possible to identify the one related to the start-up under investigation and therefore gather the date of beginning and eventually ending of the appointment. In conclusion, the combination of data provided by the website of the start-up, Wayback Machine and LinkedIn allows to precisely describe the evolution in time of the management team.

- Press

  This source is relatively relevant and is merely used in the cases in which there is lack of information provided by the other sources. Given that, especially in Italy, the equity crowdfunding is a relatively new phenomenon, when a start-up decides to launch a campaign the press tends to highlight this event publishing several articles on it. As a consequence of that, some information about the company and, in some cases, its managerial team could be gathered through the press, especially for what concerns the periods of the launch of the equity crowdfunding campaign and the end of it. However, this source is rarely used given the sufficient amount of data provided by the ones previously described.

- *Istituto Nazionale di Statistica* (Istat)

  This last source of information is used specifically to collect some precise data about the wealth of the ecosystem in which innovative start-ups are located, namely the gross domestic product per capita of all the regions in Italy for the years 2015 and 2016, in order to complete the dataset created for the selection effect (Dataset Description for Selection Effect). Istat is an Italian public authority for research, responsible for the census of population as well as of

industries like manufacturing, services and agriculture. Moreover, it performs surveys on families and numerous economic investigations. It was founded in 1926 and then reorganised in 1989 with the introduction of *Sistema Statistico Nazionale* (SISTAN), that modified its responsibilities and internal organization.

3.3. Operational Process

In this chapter is described the operational process performed to create all the datasets necessary for the descriptive statistics and econometric models investigated in the paper. The first part of this process consists in the collection of the data from the sources previously described, with all the related criteria followed in the download phase. Subsequently, a description of the datasets downloaded is performed, focusing principally on the variables selected, the years considered and the dimension of the sample available on the data sources. Progressively, the rules followed during the integration of the datasets are explained, with particular attention over the choice of the years selected.

Moreover, given that at operational level the creation of the datasets for the descriptive statistics and for the econometric models to be tested is significantly different, the explanation of these two operational processes is distinguished in this chapter.

3.3.1. Operational Process for Descriptive Statistics

In this part of the paper all the activities performed in order to obtain a satisficing database for the descriptive statistics are mentioned. Given the significant amount of information available on the data sources previously described, the selection and then the integration of all the voices represent critical steps for the goodness of the final result. As a consequence of that, all the steps performed are deeply described, trying to clearly transmit the path followed in the creation of the final datasets.

The sources used to gather the information needed for the descriptive statistics are three, more precisely Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance" of the School of

Management of Politecnico di Milano. Each one of them is able to provide a different type of data, that are the ones described in the previous section, creating as a final result a complete profile of the company.

The first source exploited is Aida, a database with all the information contained in the financial statement of every company that operates in Italy. Inside the database there is a specific section named "All innovative start-up companies", which groups together all the Italian firms that satisfy the prerequisites to be defined as a *Start-up innovativa* according to the legislation. This section of the database was completely downloaded, in order to consider the widest sample of companies authorized to perform an equity crowdfunding campaign. For what concerns the variables considered, a preselection was necessary, given that on Aida all the voices of the financial statement and even additional indicators are tracked. In particular, the main information of the balance sheet, income statement and cash flow statement were downloaded, including also some further variables related to the shareholding structure, the financial situation and the profitability of the firm. Moreover, since Aida collects the information for several years, all the selected data were downloaded for the last five years available, having then the possibility to successively select the most adequate record for the descriptive statistics. The dataset downloaded from Aida covers a sample of 7218 *start-up innovative*.

The second source considered is *Registro Imprese*. As previously mentioned, this database provides more "soft" information about the companies, like the business scope, the sector, the human resources or the level of innovation of the start-up. As stated in the chapter above, there is a special section of *Registro Imprese* dedicated to the *Start-up innovative* and *PMI innovative*. Among them, only the dataset related to start-up innovative was downloaded, excluding the one of *PMI innovative*. This choice is motivated by two reasons. The first one is the necessity of coherence with the sample of companies collected through Stata. The second is the fact that, since in Italy the authorization to exploit equity crowdfunding was given to *PMI innovative* quite recently, there are just few cases of innovative SME that performed an equity crowdfunding

campaign. Moreover, differently from Aida, *Registro Imprese* provides information only related to the last available year, therefore for each variable is available just the most recent record. The dataset downloaded from this second source covers a sample of 7480 *start-up innovative*.

The last source of data used to create a complete dataset for the descriptive statistics is *Osservatori* "Entrepreneurship & Finance" of the School of Management of Politecnico di Milano, in particular the research group that studies all the phenomena related to crowd-investing. The above-mentioned *osservatorio* has been studying the evolution of the equity crowdfunding market in Italy during the last years, constantly updating a database with all the main information related to this financing instrument. One of the results of this study is a file with all the companies that have ever exploited equity crowdfunding in Italy, together with some data describing the characteristics of the campaign performed. To mention few of them, the equity crowdfunding platform used, the target capital, the equity offered, the typology of shares and the duration of the campaign. The dataset provided by *Osservatori* "Entrepreneurship & Finance" covers a sample of 120 companies. It is relevant to notice that among the total number of companies, 112 are *start-up innovative*, while just 8 of them are *PMI innovative*.

Once collected all the available data from these three sources, the next step is to integrate all these information in one single dataset. In order to perform this operation, a key able to identify univocally each specific firm has to be identified. In this regard, the tax code of the company is the best solution. As a consequence of that, the three datasets previously described were integrated using as a unique key the tax code of each firm. The final result is a database comprehensive of almost all the *start-up innovative* present in Italy, described with a 360° approach through information related to their financial statement, their business, sector and human resources, and the characteristics of the equity crowdfunding campaign performed. As a matter of fact, while integrating the three datasets, just few companies were lost, meaning that were not present in both the databases of Aida and *Registro Imprese*.

The final sample of *start-up innovative* is, in fact, equal to 7246 companies, and among them the ones that performed an equity crowdfunding campaign are 117, therefore just 3 start-ups of the ones tracked in the file of *Osservatorio* "Entrepreneurship & Finance" were lost. These few cases of lack of information in one of the three sources considered as regards a specific firm is clearly determined by the different frequency of update of the databases. For instance, *Osservatorio* "Entrepreneurship & Finance" updates its file of equity crowdfunding campaigns almost weekly, while the frequency for Aida and *Registro Imprese* is half yearly or yearly. Nevertheless, the dimension of the final sample is sufficient to perform the descriptive statistics and test the hypothesis set with satisfying statistical significance.

As previously mentioned, the dataset downloaded from Aida tracks all the indicators for the last five years available, while the one collected from *Registro Imprese* is just related to the last year available. During this integration process, a selection of the years to be considered was performed, in order to keep just the years relevant for the descriptive statistics. In regard of that, for what concerns the innovative start-ups that have never launched an equity crowdfunding campaign, just the last year available was preserved, in order to have the most updated profile of these companies.

Speaking instead of the *start-up innovative* that fostered an equity crowdfunding campaign, the criteria behind the choice of the years to be considered are quite different and strictly related to the descriptive statistics to be performed. In fact, the three analyses, topic of the first part of the investigation of this paper and described in the chapter Descriptive Statistics, aim at discovering and highlighting the characteristics of the innovative start-ups that decide to promote an equity crowdfunding campaign, of the ones among them that indeed succeed and finally the consequences of the capital received on the company's profile. As a consequence of that, the first two descriptive statistics require information able to provide an overview of the firm just before the launch or during the promotion of the campaign. On the other side, the third descriptive statistic needs data immediately subsequent to the conclusion of the campaign on the platform, in

order to catch the immediate and direct effects of a potential success of this financing instrument. For what concerns then the first requirement, it was preserved the year preceding the conclusion of the campaign. This choice is motivated by the fact that on Aida the vast majority of the information is related to the 31st of December of each year and the average duration of an equity crowdfunding campaign is 4-5 months. Considering then the year preceding the conclusion of the campaign allows to keep the profile of the start-up which is closest to the period when the equity crowdfunding was launched. As regard the third descriptive statistic, instead, the same year of the conclusion of the campaign was preserved, so to have an insight of the firm on average some months after the reception of the financing.

In conclusion, the final result of this operational process is a unique dataset of 7246 *start-up innovative*, described by information collected from Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance". Among them, the 117 companies that exploited equity crowdfunding are characterised by data from the previous and same year of the conclusion of the campaign, while for the others just the last year available was preserved. In the following chapter (Dataset Description for Descriptive Statistics) this dataset will be decomposed in three final datasets, one for each of the three descriptive statistics to be performed.

3.3.2. Operational Process for Econometric Models

The purpose of this chapter is to describe the operational process followed in the creation of the final datasets for the econometric models performed as second part of the analysis of this paper. The majority of activities ran in relation to this topic are the same or similar to the ones regarding the operational process for descriptive statistics previously described (Operational Process for Descriptive Statistics), however they differ for some reasons. As a matter of fact, if some of the sources considered are the same, elements of difference in the process are represented by the years considered and the necessity of manually collecting data not available in an aggregate database. A more precise description of the operational processes is provided below, distinguished between

the selection (Operational Process for Selection Effect) and the treatment (Operational Process for Treatment Effect) effect.

3.3.2.1. Operational Process for Selection Effect

The operational process performed for the creation of the database for the selection effect is extremely similar to the one of the descriptive statistics. As a matter of fact, the main sources considered are the same, namely Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance". In this case, some information were collected also from an additional source of data, which is represented by Istat (*Istituto Nazionale di Statistica*). Moreover, the variables downloaded from the three sources cited are exactly the same of the ones for descriptive statistics previously mentioned in the chapter above.

The only difference in the process for creating the dataset to evaluate a potential selection effect on the access to equity crowdfunding is represented by the selection of the years to be considered in relation to the data. If, in fact, for the descriptive statistics the last year available was considered for the companies that did not launched an equity crowdfunding campaign, while for the ones that instead did both the previous and the one of the conclusion of the funding project were selected, in this case the years chosen are precisely 2015 and 2016, which are the last two available on Aida. This means that for all the innovative start-ups, both the ones that accessed equity crowdfunding and the ones that did not, all the variables that refer to a specific year were downloaded in relation to 2015 and 2016. This choice is motivated by the fact that a comparison between the two groups of companies based on the same year allows, at the end, to compute an econometric model able to consider also the ecosystem in which the firm is located as a potential driver for a selection effect.

In conclusion, the operational process followed for the creation of the dataset necessary to test the presence of a potential selection effect over the access to equity crowdfunding is extremely similar

to the one performed for descriptive statistics, besides the introduction of an additional source of information and the selection of two specific years for all the companies in the sample in relation to the variables referred to a precise date.

3.3.2.2. Operational Process for Treatment Effect

In this chapter is described the entire process through which the dataset for testing the hypothesis was created. In this case the collection of the information follows a totally different approach if compared to the one performed for the datasets of the descriptive statistics, given the complexity and dispersion of the required data.

While analysing the results of the descriptive statistics, an interesting trend was highlighted. In particular, it was noticed that, on average, the innovative start-ups that decide to launch an equity crowdfunding campaign and then achieve success are more structured in terms of assets and employees than the others. Moreover, the capital received thanks to a successful equity crowdfunding project increases the growth rate of the firm.

The aim of the paper is then to deeply analyse this phenomenon, focusing specifically on the evolution of the managerial team over time. In particular, the idea is to test if there is a statistically significant correlation between the growth rate of the managerial team and the success of the equity crowdfunding campaign. In order to verify this hypothesis, a complete dataset with all the information about the managerial team of the innovative start-ups considered needs to be created. The complexity of this task, if compared to the operational process performed for the descriptive statistics, is that there is not one single source where the whole evolution of the management over time is recorded, therefore a combination of multiple sources is needed in order to fill out the dataset. In particular, the ones exploited for this collection are the website of the start-up, Wayback Machine, the campaign page on the equity crowdfunding platform, LinkedIn and, in some cases, the press.

For what concerns the information required by the analysis, the total number of managers working for the firm, with related names, needs to be collected, specifically in relation to four time periods. The first one concurs to the first available date, which in most of the cases corresponds to the constitution of the start-up. The second period coincides to the closest one before the beginning of the campaign, substantially few months before. This information is useful in order to understand the managerial profile of the company while launching the equity crowdfunding project. The third date is the one just after the beginning of the campaign, also in this case few months after. This data allows to highlight a possible introduction of managerial profiles specifically for the promotion of the campaign. Finally, the fourth date is the most updated among the ones available, therefore it represents the current situation of the managerial team.

In order to collect the information mentioned above, the first source consulted is the website of the start-up investigated. As stated in the previous chapter (Data Sources), the firms that are defined as *start-up innovative* are obliged by the legislation to record on their website the names of the current managerial team and employees. This first source is then able to provide the data required for the fourth period of the dataset. Successively, searching the link of the aforementioned website on Wayback Machine, it is possible to find all the dates in which the managerial team of the firm was updated. As a consequence of that, the combination of these two sources provides the number and names of the managers for the other three required periods, that is at the constitution, just before and just after the beginning of the campaign.

In some cases, however, the information related to the managerial team is not available on the website of the start-up, even if required by the legislation. Moreover, for a significant number of companies in the sample, the link of the website is not recorded in the database of Wayback Machine. As a consequence of these two factors, for the majority of the cases the combination of these two sources is not enough to collect the information needed for the analysis.

For all the companies subject to this phenomenon, an additional source of data is required. The most used during the collection of information is LinkedIn. In particular, by searching the name of the start-up, it is possible to visualise all the employees working for the firm. This source allows then to identify which ones among them are appointed as managers, simply analysing their role in the company recorded in the professional experiences section. LinkedIn provides also the date in which the manager was appointed and, potentially, the date of resignation. Thanks to these information, the complete evolution over time of the managerial team can be mapped in detail.

There are few cases, however, in which both the link of the website on Wayback Machine and the firm page on LinkedIn are not available. For these companies then an additional source of data is required. The most adequate one corresponds to the page of the equity crowdfunding campaign on the platform chosen by the start-up. While promoting this type of financial instrument, in fact, the firm must disclose to the public the names of its employees and managers, together with their education and professional experiences. Exploring then the website of the platform it is possible to collect the information related to the managerial team for the second period, which is the one just before the beginning of the campaign. Searching then the names of these managers on LinkedIn allows to identify the period of their appointment in the firm and, therefore, complete the description of the evolution over time of the managerial team.

Moreover, for several cases, also documents provided by the press were consulted, in order to verify the data provided by the sources previously described. In particular, a significant number of articles are published when a start-up decides to launch an equity crowdfunding campaign. Therefore, by analysing these sources, it is possible to double check the number and names of the managers principally at the constitution of the firm and at the beginning of the campaign, periods that, in the database, correspond to the first and second period.

The final result of this complex operational process is a complete and detailed database able to describe the evolution of the managerial team of the start-up from its constitution to the current situation.

In order to provide also the information needed for the other explanatory variables to be included in the econometric models and described in the chapter Econometric Models for Treatment Effect, also the three data sources exploited for the descriptive statistics were used. More precisely, variables were downloaded from Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance" in relation to the year before the conclusion of the campaign for the start-ups that launched an equity crowdfunding project, the last one available instead for the firms that preferred more traditional sources of financing. A detailed description of the final dataset to test the presence of a potential treatment effect on the level of professionalization of the backed early-stage venture is provided in the chapter Dataset Description for Treatment Effect.

3.4. Dataset Description

In this chapter, the final steps performed to create the databases required by the descriptive statistics and econometric models are explained, together with a description of the specific information collected in each of them and the dimension of the related sample. Also in this case, the section is divided in two parts, one for the descriptive statistics and the other for the econometric models, because of the differences in terms of data provided.

3.4.1. Dataset Description for Descriptive Statistics

The final result of the operational process described in the previous chapter (Operational Process for Descriptive Statistics) is a unique dataset of 7246 *start-up innovative*, described by information collected from Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance". Among them, the 117 companies that exploited equity crowdfunding are characterised by data from the previous and same year of the conclusion of the campaign, while for the others

just the last year available was preserved. At this point the database created needs to be split in three sub-datasets, each specific for one of the three descriptive statistics to be performed. The decision to make this distinction is motivated by the differences in terms of purpose and then information required by the three aforementioned analyses.

3.4.1.1. Dataset Description for Descriptive Statistics 1

The aim of the first descriptive statistics is to create a profile with a 360° approach of the *start-up innovative* that decide to exploit the equity crowdfunding as source of capitals. The purpose is then to understand and highlight the characteristics of these companies in comparison to the ones that decide not to leverage on this innovative financial instrument, even if, by law, they could. The result is then a clear insight of the logics and dynamics that guide the access to equity crowdfunding.

In order to perform this analysis, the information available for all the innovative start-ups are required. Therefore, from the database result of the operational process, all the companies were preserved. Moreover, for the ones that performed an equity crowdfunding project, just the year before the conclusion of the campaign was considered, because of the necessity of understanding the profile of the company while approaching the equity crowdfunding instrument.

In conclusion, this first sub-dataset includes a sample of 7246 *start-up innovative*, among them 117 that launched an equity crowdfunding campaign and 7129 that did not. Moreover, for these 117 companies are available all the information related to the year before the ending of the campaign, while for the others the data are referred to the last year available. The dataset can be consulted at attachment Dataset Descriptive Statistics 1.

3.4.1.2. Dataset Description for Descriptive Statistics 2

This second type of analysis aims at understanding which are the characteristics of the companies that at the end achieve success for their equity crowdfunding campaign. Given that the only interaction between the start-up and the potential investor is mediated by the information

disclosed on the crowdfunding platform, the company has the possibility to send some so called "signals" to transmit, in some way, the quality of its entrepreneurial project. As stated in the literature review, there is a consistent base of academic research related to this topic. The purpose of this second descriptive statistics is then to verify the effect of the main signals described by the literature on the success of the Italian campaigns, and, at the same time, understand if even other factors affect the result of the equity crowdfunding project.

As a consequence of this goal, the innovative start-ups selected among the ones recorded in the database result of the operational process are just the ones that performed an equity crowdfunding campaign. Moreover, the year considered while selecting the information is the one before the ending of the crowdfunding project, because the signals perceived by potential investors are exactly the characteristics of the firm before and during the promotion of the campaign.

In conclusion, this second final dataset considers a sample of 105 *start-up innovative* that exploited equity crowdfunding, among them 60 achieved success while 45 did not. For the other 12 start-ups recorded by *Osservatori* "Entrepreneurship & Finance" that used this financial instrument, the campaign is still being promoted, therefore they cannot be considered for this analysis. Moreover, for all these 105 companies the information preserved are the ones available in relation to the year before the ending of the equity crowdfunding project. The dataset can be consulted at attachment Dataset Descriptive Statistics 2.

3.4.1.3. Dataset Description for Descriptive Statistics 3

If the first and second analyses focus on the situation pre-campaign, the third descriptive statistics instead looks at what happens in the post-campaign period. Its purpose is then to study the evolution of a start-up that successfully completed its equity crowdfunding project. The idea is to understand how the additional capital received through this financial instrument is invested by the firm, and, therefore, how the characteristics and indicators of the company are affected by a successful campaign. Clearly there are some immediate and direct effects as for the shareholding

and capital structure, since the firm is receiving equity funds. However, additional consequences need to be taken into account, like a potential expansion of the start-up in terms of employees or assets, or an increase of the investments in R&D. Moreover, also the effects on the profitability must be considered in this analysis. The aim of this third descriptive statistics is then to identify and highlight the consequences of a successful equity crowdfunding campaign on the profile of the company, in order to understand at the end why a start-up should prefer or, at least, give priority to this form of financing instead of the more traditional ones, like banks, VCs and BAs.

This third and last descriptive statistics requires then as sample of companies all the innovative start-ups that performed an equity crowdfunding campaign and completed it with a successful result. Moreover, the information to be preserved from the database result of the operational process are both the ones related to the year before the conclusion of the campaign and the ones referred to the same year. In this way is possible to compare the indicators before and after a successful campaign and, as a consequence, identify the main effects of a successful equity crowdfunding project.

In conclusion, this third final dataset, explicitly created for the third descriptive statistics, has a sample of 60 *start-up innovative* that performed a successful equity crowdfunding project, for each of which the data related to the previous and same year of the ending of the campaign are recorded. The dataset can be consulted at attachment Dataset Descriptive Statistics 3.

3.4.2. Dataset Description for Econometric Models

This chapter aims at describing the two datasets created and used in the computation of the econometric models for the testing of potential selection and treatment effects related to the phenomenon of equity crowdfunding. The final databases obtained are quite similar to the ones for the descriptive statistics, however they differ in terms of companies considered, years selected or additional sourced used. Below the two datasets are described, distinguishing between selection

(Dataset Description for Selection Effect) and treatment (Operational Process for Treatment Effect) effect.

3.4.2.1. Dataset Description for Selection Effect

The dataset created for testing a potential selection effect over the access to equity crowdfunding is quite similar to the one used for the Descriptive Statistics 1 and described in the previous chapter Dataset Description for Descriptive Statistics 1. As a matter of fact, both the datasets have as a sample the total number of innovative start-ups available from the different sources exploited. More precisely, both the early-stage ventures that decided to launch an equity crowdfunding campaign and the ones that, instead, preferred other sourced of financing were considered.
Another element of similarity is represented by the variables included in the final dataset. In both the cases, in fact, all the indicators downloaded from Aida, *Registro Imprese* and *Osservatori* "Entrepreneurship & Finance" were included. The file created for the selection effect, however, considers also an additional source of information that is Istat (*Istituto Nazionale di Statistica*), from which the data related to the GDP of the different regions of Italy were collected.

The main difference between these two datasets is, as previously stated (Operational Process for Selection Effect), the fact that the one for the selection effect considers the specific years 2015 and 2016 for all the start-ups in the sample. On the other side, the file created for the first descriptive statistics select the year before the conclusion of the campaign for the companies that accessed equity crowdfunding, the last available for the other in the sample. The strategy chosen for the econometric models allows to consider also the effect of the wealth of the ecosystem in which the firm is located as cause of a potential selection effect.

In conclusion, the dataset created for the evaluation of a potential selection effect on the access to equity crowdfunding has the same sample of companies of the one for Descriptive Statistics 1, meaning both the start-ups that launched an equity crowdfunding campaign and the ones that,

instead, preferred more traditional sources of funding. Moreover, the variables selected are the same ones downloaded from Aida, *Registro Imprese* and *Osservatori*, with the addition of an indicator from *Istat*. The years considered for the variables related to a specific date are, instead, 2015 and 2016. The dataset can be consulted at attachment Dataset Selection Effect.

3.4.2.2. Dataset Description for Treatment Effect

The purpose of the hypothesis of the paper is understanding if there is a statistically significant correlation between the growth rate of the managerial team of a start-up and the success of the equity crowdfunding campaign performed by the same company. In other words, the goal is to discover if the successful financing through this innovative instrument stimulates the appointment of additional managerial profiles in the firm.

In order to perform this analysis, a complete evolution over time of the managerial profile of each start-up needs to be documented. The process followed to collect all these complex and dispersed information is deeply described in the previous chapter (Operational Process for Treatment Effect).

The final dataset created specifically for testing the hypothesis is organized in four periods and, for each of them, the number and names of related managers are recorded. In particular, the periods to which the database refers are the ones previously mentioned (Operational Process for Treatment Effect). Period 1 is therefore the first date for which information about the managerial team are available on the sources considered, that is, in most of the cases, the date of constitution of the start-up. Period 2 corresponds to the time interval few months before the beginning of the campaign, while period 3 to the one just after it. Finally, period 4 represents the current situation of the managerial team.

Moreover, in some cases a specific date of the record is available. These cases are the ones for which the website of the start-up is tracked in the database of Wayback Machine or simply

correspond to the appointment or termination date provided by LinkedIn. For all the other cases in which a precise date is not available, the presence of a specific manager is guaranteed by the appointment and resignation dates just mentioned, or by the information provided by the equity crowdfunding platform about the campaign in relation to period 2. A list of all the data sources consulted during the operational process is available in the dataset specifically for each start-up investigated and consultable on the attachment Dataset Managers.

Besides the information regarding the evolution of the managerial team of the start-up, the dataset includes also other indicators considered then as control variables for the econometric models performed in relation to the potential treatment effect on the level of firm's professionalization. More precisely, also in this case the main variables from Aida, *Registro Imprese* and *Osservatori* were included in the dataset, selecting as year of interest the one before the conclusion of the equity crowdfunding campaign, as also done for the three descriptive statistics (Dataset Description for Descriptive Statistics) but differently from the file created for the selection effect (Dataset Description for Selection Effect).

For what concerns the sample of the dataset, all the companies that performed an equity crowdfunding campaign were considered, including both the ones that achieved success and the ones that did not. As last consideration, since this dataset was compiled few months after the three datasets for the descriptive statistics, some information contained in the file provided by *Osservatori* "Entrepreneurship & Finance" were updated. Precisely, during these few months some of the campaigns recorded ended, making then available the positive or negative result of the financial instrument. As a consequence of that, the sample of the final dataset for testing the hypothesis has 112 innovative start-ups, among them 66 performed a successful equity crowdfunding campaign, 46 did not. The dataset can be consulted at attachment Dataset Treatment Effect.

3.5. Empirical Method

This chapter aims a describing the empirical method followed in the analysis of the descriptive statistics. In particular, given the similarities in the analysis to be performed, for all the three descriptive statistics the method followed is the same. All the data collected from the different sources, described in the previous chapter (Data Sources), were organised and selected in order to create three final datasets on Excel (Dataset Description for Descriptive Statistics).

Given the simplicity of the analyses, all the three descriptive statistics are performed on the same software, Excel. More precisely, for all the indicators identified and described in the previous chapter (Descriptive Statistics), an average of the two groups of innovative start-ups considered in the specific descriptive statistic is computed. As mentioned before (Dataset Description), for the descriptive statistics 1 the firms in the sample are the ones that performed an equity crowdfunding campaign and the others that did not. The second descriptive statistics, instead, focuses on all the innovative start-ups that launched an equity crowdfunding project, distinguishing between the ones that achieved success and the others that failed. The third and last descriptive statistics is strictly related to the companies that performed a successful equity crowdfunding campaign, differentiating however the two periods before and after the launch of the financing instrument.

After computing the average of the two groups for all the indicators selected in the three descriptive statistics, an analysis to identify a possible difference among the two samples with statistical significance is performed. In particular, the typology of analysis selected is a Test-T, which is able to compute the level of statistical significance by which the averages of two samples differ between each other. Excel allows to perform three different typologies of Test-T, according to the characteristics of the two groups and the knowledge about their variance. The type one is dedicated to the analyses in which the two samples are composed by the same identical elements, considered, for instance, in two different time periods. The type two, defined as homoscedastic,

instead, has to be performed when the groups are made of different elements but with the same variance. Finally, type three, also known as heteroscedastic, is dedicated to the analyses in which the samples group together different elements with different variances.

In conclusion, for the descriptive statistic 1 it is always performed a Test-T of type 3, because the two groups of innovative start-ups, meaning the ones that performed an equity crowdfunding campaign and the ones that did not, are made of different firms. Moreover, it is not possible to assume that the two samples have the same variance for all the indicators selected, therefore the most comprehensive hypothesis has to be taken. Also for descriptive statistics 2 the Test-T performed is of type 3, because of the similarities of the characteristics of the two samples with the ones of descriptive statistics 1. To be more precise, also in this case the two groups of companies that completed successfully and unsuccessfully an equity crowdfunding campaign are clearly composed of different firms with different indicator's variances. For the last descriptive statistics, instead, it is always performed a Test-T of type 1, because the two samples are composed by the same innovative start-ups that closed an equity crowdfunding campaign with a positive result, however compared before and after the launch of the financing project.

One last consideration in relation to the settings of the Test-T has to be made. More precisely, this typology of analysis allows to consider two tails or one single tails. The first case has to be considered when the objective is to understand if the averages of two samples differ between each other or not. The second, instead, is more appropriate when the goal is to verify if one of the two averages is statistically significantly greater than the other. The latter is the case of the descriptive statistics debated in this paper, because of the hypothesis of behaviour made for all the indicators in the previous chapter. In conclusion, all the Tests-T described in the following chapter ore two-tailed tests.

3.6. Descriptive Statistics

The purpose of this chapter is to explain the descriptive statistics performed as first part of the analysis of the paper. More precisely, a first section is dedicated to the motivations behind the selection of the variables considered, together with the expected behaviour in relation to the equity crowdfunding phenomenon. A second section is instead dedicated to the analysis of the results, understanding if the expectations were verified or not and providing some possible explanations. The chapter is divided in three sub-chapters, each specific for one of the three descriptive statistics, because of the differences in terms of objectives and, therefore, criteria followed for the analysis.

3.6.1. Descriptive Statistics 1

The aim of the first descriptive statistics is to create a profile with a 360° approach of the *start-up innovative* that decide to exploit the equity crowdfunding as source of capitals. The purpose is then to understand and highlight the characteristics of these companies in comparison to the ones that decide not to leverage on this innovative financial instrument, even if, by law, they could. The result is then a clear insight of the logics and dynamics that guide the access to equity crowdfunding.

In order to provide then the widest characterisation possible of the start-up, several and different aspects need to be considered in the analysis. A first typology of variable aims at describing the firm from a demographical point of view, so to highlight possible geographical behaviours related to equity crowdfunding. Successively, an analysis of the assets and liabilities is required, in order to eventually identify some differences in the structure of the balance sheet between the innovative start-ups that launched an equity crowdfunding campaign and the ones that did not. Moreover, the balance between equity and debt capital represents an interesting topic, given that particular capital structure positions could reduce the possibility to receive money through traditional sources of funding and, in the end, favour this innovative financial instrument.

Furthermore, few variables able to describe the profitability and liquidity of the start-ups could unveil some unexpected differences among the two groups of companies. Finally, also a more "soft" characterisation of the companies is performed, focusing particularly on the profile of the board.

Below each of the topics just mentioned is specifically analysed, with a detailed description of the related variables selected and results obtained.

3.6.1.1. Demographic Variables

This first set of variables aims at describing with a demographical point of view the innovative start-ups recorded in the dataset of the first descriptive statistics, in order to identify potential trends specifically referred to the access to equity crowdfunding.

The results obtained and precisely discussed below show that the geographical location of the start-up does not represent a relevant driver for the choice of exploiting or not equity crowdfunding, even if, considering the distribution over the Italian area, a consistent part of the firms that opted for this typology of financing is located in the north-west of the country. As for the geographical location, also the sector to which the start-up belongs and its class of production do not result to be criteria of choice. On the other hand, a strong and statistically significant difference is highlighted for what concerns the number of employees and, therefore, the dimension of the two typologies of innovative start-ups considered in the sample.

A list of all the indicators selected with related description, graph and comment is reported below.

Region

The presence of traditional sources of funding like banks, but more specifically of business angles and venture capitalists, could differ from one region to another, making then the necessity of additional financial instruments like equity crowdfunding more relevant in some regions than others.

Region	Valle d'Aosta	Piemonte	Liguria	Lombardia	Trentino-Alto Adige	Veneto	Friuli-Venezia Giulia	Emilia-Romagna	Toscana	Marche
EC Startups	0	7	1	44	5	4	1	7	10	3
NO EC Startups	15	395	128	1613	207	628	166	789	326	336
Total	15	402	129	1657	212	632	167	796	336	339
% EC	0%	2%	1%	3%	2%	1%	1%	1%	3%	1%

Region	Umbria	Lazio	Abruzzo	Molise	Campania	Basilicata	Puglia	Calabria	Sicilia	Sardegna
EC Startups	1	12	1	2	1	1	7	1	2	7
NO EC Startups	121	686	173	32	520	53	273	167	355	146
Total	122	698	174	34	521	54	280	168	357	153
% EC	1%	2%	1%	6%	0%	2%	3%	1%	1%	5%

Table 3.1 Analysis of the access to equity crowdfunding at regional level in Italy

This first indicator describes the percentage of innovative start-ups that decided to launch an equity crowdfunding campaign in each region of Italy. More precisely, for each of them is reported the number of companies that exploited equity crowdfunding, the number of the ones that did not, the total number of innovative start-ups present in the region and, finally, the percentage of them that opted for this innovative financing instrument.

As clearly shown by the chart (Table 3.1), more or less all the regions have a rate of access to equity crowdfunding in between 1% and 3%. There are few cases, like Molise and Sardegna, where the percentage is greater, around 5-6%. These exceptions, however, have to be attributed to the small dimension of the sample and not to a specific trend related to equity crowdfunding. It is then possible to conclude that the region in which the start-up is registered does not represent a relevant driver for the choice of the financing strategy.

Geographic area

The same analysis could be performed with a more aggregated approach. In particular, start-ups could be classified in macro-regions of Italy, that are North-East, North-West, Centre, South and Islands. It is interesting to study this topic because different promotions of equity crowdfunding by local governments could influence the decision of start-ups while choosing the most adequate financing strategy.

Geographic area	North-East	North-West	Centre	South	Islands	Total
EC Starups	17	52	26	13	9	117
% EC	15%	44%	22%	11%	8%	
NO EC Startups	1790	2151	1469	1218	501	7129
% NO EC	25%	30%	21%	17%	7%	
Total	1807	2203	1495	1231	510	
% EC out of Total	1%	2%	2%	1%	2%	

Table 3.2 Analysis of the access to equity crowdfunding at macro-regional level in Italy

This variable focuses on the four main geographical areas of Italy, that are North- East, North-West, Centre, South and Islands. For each of them is reported the number of innovative start-ups that launched an equity crowdfunding campaign, the number of the ones that did not and the total. The results describe the distributions of the firms that exploited equity crowdfunding and the ones that opted for other financing instruments in the five macro-areas considered, as well as the percentage of access to equity crowdfunding for each of them.

As it is possible to deduct from the chart (Table 3.2), start-ups that decide to collect financing through equity crowdfunding are mostly located in the North-West, around 44%. The remaining 56%, instead, is almost equally distributed in the other four macro-areas, with a maximum of 22% in the Centre and a minimum of 8% in the Islands. The table (Table 3.2) also shows that the innovative start-ups that did not promote an equity crowdfunding campaign have a more flat distribution among the five macro-areas identified, with a maximum of 30% in the North-West and a minimum of 7% in the Islands. For what concerns the access to equity crowdfunding, the

percentage of innovative start-ups that exploited this financing instrument is almost the same in all the five macro-areas and equal to 1-2%.

In conclusion, also at a higher level the geographical location of the firm does not represent a parameter for the choice of access to equity crowdfunding.

Sector

As stated by the literature, the access to equity crowdfunding is more typical of companies operating in specific sectors rather than others. This phenomenon happens also for more traditional sources of financing like business angels and venture capitalists. The idea is then to verify if this natural selection takes place also for the Italian innovative start-ups.

Sector	Agriculture/Fishing	Commerce	Manufacturing/ Craftsmanship	Services - Software	Services - R&D	Tourism	Total
EC Startups	2	3	14	29	10	0	58
%EC	3%	5%	24%	50%	17%	0%	
NO EC Startups	42	307	1354	2178	989	65	4935
% NO EC	1%	6%	27%	44%	20%	1%	
Total	44	310	1368	2207	999	65	
% EC out of Total	5%	1%	1%	1%	1%	0%	

Table 3.3 Analysis of the access to equity crowdfunding at sectorial level in Italy

The analysis focuses on the six more relevant business sectors, that are Agriculture/Fishing, Commerce, Manufacturing/Craftsmanship, Services–Software, Services–R&D and Tourism. For each of them is reported the number of innovative start-ups that launched an equity crowdfunding campaign, the number of the ones that did not and the total. The results describe the distributions of the firms that exploited equity crowdfunding and the ones that opted for other financing instruments in the six sectors considered, as well as the percentage of access to equity crowdfunding for each of them.

As clearly shown by the chart (

Table 3.3), the two distributions computed assume the same behaviour. For both of them, in fact, the most relevant sector is by far Services-Software, with a percentage that peaks to 50% for equity crowdfunding start-ups and equal to 44% for the others. Moreover, for both the distributions the second and third most relevant sectors are, in order, Manufacturing/Craftsmanship and Services-R&D. Agriculture/Fishing, Commerce and Tourism cover instead a marginal role for both the samples of start-ups, with a maximum value of 5% for the companies that launched a campaign and 6% for the others.

Moreover, as highlighted by the last row (

Table 3.3), the rate of access to equity crowdfunding is almost the same for all the sectors and equal to approximately 1%. For Agriculture/Fishing is reported a 5% access rate that, however, have to be attributed to the small number of innovative start-ups working in this sector.

In conclusion, also the business sector does not appear to be a driver that guides of access to equity crowdfunding.

Employees

The dimension of the firm in term of human resources could differ between the companies that performed an equity crowdfunding campaign and the ones that did not. This because the financial instrument considered is usually exploited to solve the funding gap typical of the start-ups, therefore during an expansion interval in which the availability of business angels and venture capitals is quite limited (Collins and Pierrakis, 2012).

	Avg. EC Startups	Avg. NO EC Startups	P-value
Employees	3,14	1,07	0,053175194
# of observations	77	7111	

Table 3.4 Comparison of the number of employees for Descriptive Statistics 1

The table above (Table 3.4) reports the average number of employees for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not,

the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the chart (Table 3.4), the number of employees of the start-ups that launched an equity crowdfunding campaign is significantly greater than the one of the firms that did not, almost three times higher. Moreover, this difference is statistically significant because of a P-Value almost equal to 5%.

In conclusion, the number of employees working for the start-up and, therefore, its dimension seems to be a relevant criterion in the access to equity crowdfunding.

Production class

The fact that different financing instruments are usually related to different expansion periods could determine, as a consequence, some disparities in term of production class between the start-ups that exploited equity crowdfunding and the ones that opted for other solutions.

Production class	A	B	C	Total
EC Startups	41	11	2	54
% EC	76%	20%	4%	
NO EC Startups	2627	1023	169	3819
% NO EC	69%	27%	4%	
Total	2668	1034	171	
% EC out of Total	2%	1%	1%	

Table 3.5 Analysis of the access to equity crowdfunding for different production classes

This indicator identifies three different classes of production. Class A is related to a production value between 0€ and 100.000€, class B between 100.001€ and 500.000€ and class C between 500.001€ and 1.000.000€. For each of them is reported the number of innovative start-ups that launched an equity crowdfunding campaign, the number of the ones that did not and the total. The results describe the distributions of the firms that exploited equity crowdfunding and the ones that opted for other financing instruments in the three production classes considered, as well as the percentage of access to equity crowdfunding for each of them.

As it is possible to understand from the chart (Table 3.5), the two distributions assume the same behaviour, mostly concentrating in the first production class and constantly decreasing to the third one. This is quite expected given that both the groups are made of *start-up innovative*, a particular typology of firms for which the Italian legislation defines a maximum period of life after the registration to *Registro Imprese* of 4 years. They are then very likely to belong to the first production class, meaning the one with a production value between 0€ and 100.000€.

For what concerns the access rate to equity crowdfunding, the production class seems not to be a relevant driver, given that all the three classes experience 1-2% of innovative start-ups launching an equity crowdfunding campaign.

3.6.1.2. Assets and Liabilities

This second group of variables aims at studying the characteristics of the assets owned by the start-up, with related liabilities, in order to identify in the balance sheet structure potential drivers linked to the access to equity crowdfunding.

The results discussed in this chapter clearly show a consistent difference in terms of assets owned between the innovative start-ups that performed an equity crowdfunding campaign and the ones that instead did not. More precisely, the companies that opted for this innovative financing instrument report a significantly higher value of their assets, with a greater value of their tangibles, financials and intangibles. In particular, the main factor of difference is represented by the investments in R&D and the intellectual property rights. In conclusion, the profile of a start-up that launch an equity crowdfunding campaign emerging from this analysis represents a firm that is more structured, with a consistently higher value of tangible and intangible assets than the innovate start-ups that instead opted for other funding sources.

A list of all the indicators selected with related description, graph and comment is reported below.

Total tangible fixed assets

As mentioned before, different financing sources typically affect different expansion phases of the start-up. As a matter of fact, business angels usually target the first period of life of a company, while venture capitals focus more on successive rounds of financing when the profitability of the investment is less volatile. Moreover, the most traditional source of capitals, bank loans, is scarcely available until a certain level of expansion is reached by the start-up. It is then possible that this dynamic determines some differences in terms of tangible fixed assets owned by the firm.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Total tangible fixed assets [k€]	63,72	35,05	0,223348817
# of observations	80	4519	

Table 3.6 Comparison of the total tangible fixed assets for Descriptive Statistics 1

The table above (Table 3.6) reports the average value of the total tangible fixed assets for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the chart (Table 3.6), the average value of tangible fixed assets owned by the companies that performed an equity crowdfunding campaign is significantly greater than the one of the other companies. More precisely, this value is almost the double of the one reported by the innovative start-ups than did not exploit equity crowdfunding. This difference, however, is not strongly significant from a statistical point of view, because of a P-Value related to the Test-T relatively high. In fact, the probability that this difference is fortuitous and not strictly related to the characteristics of the two samples is equal to 22%.

It is then possible to conclude, with moderate certainty, that innovative start-ups accessing equity crowdfunding have, on average, a significantly greater value of tangible fixed assets than the other companies in the sample.

Total financial fixed assets

The same reasoning can be replicated in relation to the financial fixed assets. Probably the presence in the balance sheet of a significant value of this type of assets could reduce the risk perceived by professional investors while deciding if providing funds or not to a start-up. Conversely, this information is not available to non-professional investors approaching the equity crowdfunding platform. A possible consequence is then a correlation between a high value of financial fixed assets and the availability of more traditional sources of funding.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Total financial fixed assets [k€]	93,14	7,16	0,072199635
# of observations	80	4519	

Table 3.7 Comparison of the total financial fixed assets for Descriptive Statistics 1

The table above (Table 3.7) reports the average value of the total financial fixed assets for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.7) clearly shows that companies that performed an equity crowdfunding campaign report a significantly higher value of financial fixed assets than the one related to the firms that opted for other financing instruments. To be more precise, this value is approximately thirteen times higher than the one of the companies that did not exploit this innovative funding source. Moreover, this difference is statistically significant given a P-Value of the related Test-T equal to 7%.

In conclusion, the innovative start-ups that access equity crowdfunding report on their balance sheet a value of financial fixed assets that is consistently and statistically significantly greater than the one of the other companies.

Total intangible fixed assets

Intangible assets are, for most of the start-ups, one of the main voice reported in the balance sheet. As a matter of fact, this indicator includes all the patents that the firm has registered, its software or algorithms. These are critical resources for a start-up because represent the principal source of competitive advantage compared to its competitors.

According to the literature (Ralcheva and Roosenboom, 2016), this indicator generates a strong signalling effect among non-professional investors approaching equity crowdfunding. As a consequence of that, start-ups with a high level of intangible fixed assets could be stimulated in exploiting this innovative source of financing because of the greater probability of success of the equity campaign.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Total intangible fixed assets [k€]	210,14	61,11	0,00080124
# of observations	80	4519	

Table 3.8 Comparison of the total intangible fixed assets for Descriptive Statistics 1

The table above (Table 3.8) reports the average value of the total intangible fixed assets for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

What clearly emerges from the chart (Table 3.8) is that companies that access equity crowdfunding report a consistently greater value of intangible assets if compared to the one of the other companies. More precisely, this indicator is equal to 210,14 thousand €, that is approximately three and a half times higher than the average value registered for the firms that preferred other typologies of financing. Moreover, this difference is strongly statistically significant because of a P-Value equal to 0,08%.

It is then possible to conclude, with complete certainty, that the innovative start-ups that decide to access equity crowdfunding experience a consistently greater value of intangible assets than the other group of companies in the sample.

R&D expenses and Start-up and expansion costs

This indicator sums together the investments the firm is making in research and development, in order to sustain the level of innovation and therefore increase the competitive advantage with its competitors, and the costs required to expand itself in terms of assets, employees and business. Different levels of these types of investments could determine different choices in relation to the financing strategy to be selected. In fact, more traditional sources of funds like bank loans or venture capitalist are able to provide, on average, an amount of capital significantly higher than the one collectable through an equity crowdfunding campaign.

R&D expenses and Start-up and expansion costs	Avg. EC Startups	Avg. NO EC Startups	P-value
R&D [k€]	62,94	22,01	0,089330895
Expansion costs [k€]	3,06	4,7	0,103225621
# of observations	26	1781	

Table 3.9 Comparison of the R&D expenses and Start-up and expansion costs for Descriptive Statistics 1

The table above (Table 3.9) reports the average value of R&D expenses and Start-up and expansion costs for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As highlighted by the chart (Table 3.9), firms that access equity crowdfunding invest, on average, an amount of capital in R&D that is significantly greater than the one reported by the other companies. In particular, this value is almost three times higher. For what concerns instead the

start-up and expansion costs, no difference emerges from the results obtained. Moreover, both the analyses are statistically consistent because of a P-Value lower than 10%.

In conclusion, start-ups the launch an equity crowdfunding project invest in R&D an amount of capital that is statistically significantly higher than the one reported by firms that preferred other funding sources.

Patents, IPR, concessions, licenses, trademarks and similar rights

This indicator represents the most relevant resources among the intangible assets for a start-up. Moreover, the information related to this specific category of assets must be provided, according to the Italian legislation, in the document available on the equity crowdfunding platform on the page of the campaign. The literature states in fact that the presence of patents and intellectual property rights increase the quality of the project perceived by non-professional investors. As a consequence of that, start-ups with significant patents and IPRs, but also licenses, trademarks and similar rights, could be more interested in equity crowdfunding rather than other types of financing, because of the higher probability of success of the campaign.

Patents, IPR, concessions, licenses, trademarks and similar rights	Avg. EC Startups	Avg. NO EC Startups	P-value
Patents and IPR [k€]	70,71	7,9	0,109335573
Concessions, licenses, trademarks and similar rights [k€]	7,56	2,54	0,067540489
# of observations	26	1781	

Table 3.10 Comparison of the patents, IPRs, concessions, licenses, trademarks and similar rights for Descriptive Statistics 1

The table above (Table 3.10) reports the average value of patents, IPR, concessions, licenses, trademarks and similar rights for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

What emerges from the chart (Table 3.10) is a drastic difference in terms of patents and IPRs between the two groups of innovative start-ups. In particular, the companies that launched an equity crowdfunding campaign report, on average, a value related to patents and IPRs equal to 70,71 thousand €, almost ten times higher than the one of the other group. Moreover, this difference has a quite satisficing statistical significance, given a P-Value of approximately 10%. For what concerns instead concessions, licences, trademarks and similar rights, no disparities are depicted. In fact, both the groups of companies register a value that is lower than 10 thousand €. It is then possible to affirm, with a satisficing level of certainty, that the innovative start-ups that decide to access equity crowdfunding have a significantly higher value of patents and IPRs than the firms that opted for other funding instruments.

Total current assets

Companies that record in their balance sheet a high value of current assets have a significant availability of capital in the short term. This means that, on average, these start-ups are able to face by themselves some of the investments needed to expand their business. On the other side, companies with a low value of current assets might require additional capital provided by external financing sources as, among the possible alternatives, equity crowdfunding.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Total current assets [k€]	342,9	135,81	0,146977207
# of observations	80	4519	

Table 3.11 Comparison of the total current assets for Descriptive Statistics 1

The table above (Table 3.11) reports the average value of total current assets for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the chart (Table 3.11), innovative start-ups that access equity crowdfunding report an average value of current assets equal to 342,9 thousand €, which is approximately two and a half times higher than the one of the other companies. This indicator could suggest that firms that exploit this innovative source of financing run a more developed business. This conclusion, however, needs to be taken with the right level of consideration, given the low statistical significance of the analysis.

It is then possible to conclude, with moderated confidence, that innovative start-ups accessing equity crowdfunding are more structured not only in terms of fixed assets, but also from the point of view of the current ones.

Total payables

This variable represents the amount of capital the firm has to repay to third parties by the end of the current fiscal year. It is an indicator of the exposure of the company in the short-term and, in some way, of its liquidity, even if a more complete analysis about this topic has to consider also the current assets reported in the balance sheet. In conclusion, a significant level of payables could turn in favour to the access to equity crowdfunding, given that a relevant exposure of the firm to third parties could reduce the interest of banks in providing a loan.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Total payables [k€]	467,98	150	0,086956273
# of observations	80	4519	

Table 3.12 Comparison of the total payables for Descriptive Statistics 1

The table above (Table 3.12) reports the average value of total payables for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.12) clearly shows that the companies that promote an equity crowdfunding project register on their balance sheet a value of payables that is consistently greater than the one of the other group in the sample. In fact, if the level of payables peaks to almost half a million for equity crowdfunding start-ups, the same indicator is equal to just 150 thousand € for the firms that opted for other funding sources. Moreover, this difference is quite statistically significant, given a P-Value of 8,6%.

In conclusion, given the greater levels of current assets and payables of the innovative start-ups that performed an equity crowdfunding campaign, it is possible to state, with moderate statistical significance, that companies that exploit this financing instrument are more structured and run a more developed business that the innovative start-ups that preferred other funding sources.

3.6.1.3. Equity and Debt

This set of variables has as a purpose the identification of possible correlations between particular positions of the capital structure and the access to equity crowdfunding. In particular, a start-up that collected capital mostly of one of the two typologies, equity and debt, could find additional funds more easily from some specific financing sources instead of others. Moreover, the possible returns in investing in a start-up could increase the availability of some capital sources and reduce the one of others.

The results related to the analysis of the equity and debt situation of the start-ups in the sample explain that, on average, the companies that perform an equity crowdfunding campaign report an inferior return on equity if compared to the one of the other firms in the sample. Moreover, the capital structure of the two groups of innovative start-up is consistently different, with a clear exposure of the ones that decided to not exploit equity crowdfunding towards third party sources of capital. One last consideration is related to the cost of debit, that, as expected, results to be slightly higher for the firms that opted for this innovative founding source.

A list of all the indicators selected with related description, graph and comment is reported below.

Return on equity

This indicator is a direct measure of the profitability in investing in a firm. In fact, it represents, in relation to the total equity collected, the net profit generated at the end of the financial year available then for investments in company expansion and dividends to its shareholders. As a consequence, this is one of the main variable examined by professional investors while selecting the best start-ups. A low ROE could therefore reduce the availability of financing sources providing equity capital, as business angels, venture capitalists and equity crowdfunding, in favour of the more traditional bank loans and vice versa.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Return on equity (%)	-9,09	-2,03	0,05203949
# of observations	80	4519	

Table 3.13 Comparison of the return on equity for Descriptive Statistics 1

The table above (Table 3.13) reports the average value of the return on equity for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the chart (Table 3.13), firms that launch an equity crowdfunding campaign report an average value that is lower than the one of the other group of companies in the sample. As a matter of fact, innovative start-ups that opted for this new financing instrument have a return on equity equal to -9%, while the other companies experience a better performance from this point of view with -2%. This result is consistent with the hypothesis according to which firms promote an equity crowdfunding project also because of the possible scarce interest of traditional sources, like business angels and venture capitalists, in funding them. Moreover, the difference identified is statistically significant given a P-Value equal to 5%.

To conclude, innovative start-ups that decide to launch an equity crowdfunding campaign are able to guarantee, on average, a statistically significantly lower profitability to their shareholders, if compared to the one provided by the companies that instead opted for other sources of funding.

Debt to equity ratio

This indicator explains immediately to which extent the firm decided to focus on equity or debt capital. It is the clear representation of the capital structure of the start-up and, therefore, shows how much the company is exposed to third parties. Specific profiles, in particular the ones with a higher percentage of debt capital, are related to companies that preferred to fund their expenses mainly through bank loans, maybe neglecting the possible advantages of equity crowdfunding. On the other side, firms that opted for this innovative source of financing probably did not previously collect debt capital, because of the early life phase that equity crowdfunding usually targets.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Debt/Equity ratio (%)	0,97	0,9	0,470380982
# of observations	58	2896	

Table 3.14 Comparison of the debt to equity ratio for Descriptive Statistics 1

The table above (Table 3.14) reports the average value of the debt to equity ratio for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

What emerges from the chart (Table 3.14) is that the two groups of companies seem to have the same capital structure. The values obtained from the analysis are, in fact, almost the same. The result, however, must not be considered as reliable because of the scarce statistical significance and the small number of the observations for both the companies that promoted an equity

crowdfunding project and the ones that did not. A more precise and trustworthy comparison for what concerns this aspect is given by the following indicator.

Leverage

The leverage is another variable able to describe the capital structure of the firm. This indicator covers a significant role in the field of corporate finance, because of the direct effects on the return on equity and therefore the profitability for shareholders. In particular, by increasing to a certain extent the exposure to third party sources of funding, the firm has the possibility to increase its ROE, until the increase of bank interests nullifies this positive externality. The same reasoning presented for the debt to equity ratio in relation to the type of funding selected could be then proposed again for this indicator.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Leverage	5,55	9,44	0,023641819
# of observations	80	4519	

Table 3.15 Comparison of the leverage for Descriptive Statistics 1

The table above (Table 3.15) reports the average value of the leverage for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.15) clearly shows that companies that decide to exploit equity crowdfunding record a leverage that is consistently lower than the one of the other companies. In fact, for the first group of firms the leverage is equal to 5,55, that is approximately half of the value registered by the start-ups that opted for more traditional sources of funding. Moreover, this difference is strongly statistically significant because of a P-Value equal to 2%.

It is then possible to conclude with certainty that the innovative start-ups that decide to access equity crowdfunding are consistently less exposed to third party sources of capital than the ones that instead preferred more traditional financing instruments.

Cost of debit

This variable represents the average interest rate a company has to face as a consequence of the bank loans received. This type of cost is set directly by the bank after an examination of the firm requiring funds. In particular, if the risk faced by the financial institution related to a possible loss of the capital lent is particularly significant, then the interest rate will be set at a high level and vice versa. As a consequence, young start-ups still characterised by uncertainty of their business model could face a high cost of debit, and, therefore, prefer other sources of financing like equity crowdfunding.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Cost of debit (%)	4,48	3,71	0,146006001
# of observations	36	1097	

Table 3.16 Comparison of the cost of debit for Descriptive Statistics 1

The table above (Table 3.16) reports the average value of the cost of debit for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As expected, the chart (Table 3.16) shows that on average firms that choose equity crowdfunding experience a slightly higher cost of debit compared to the one of the other companies. It is in fact experienced a difference around 1% between the two values. This factor could be considered as one of the possible reasons for which some firms decide to exploit equity crowdfunding instead of more traditional sources of capital. The result, however, is not that statistically significant, given a P-Value equal to 14%.

The analysis allows then to conclude, with moderate statistical significance, that innovative start-ups that decide to launch an equity crowdfunding project report an average cost of debit that is slightly greater than the one of the companies that preferred other financing sources.

3.6.1.4. Profitability and Liquidity

The list of variables reported below aims at exploring the profitability and liquidity profile of the companies in the sample. The idea is then to understand if specific situations in terms of profits and cash available in the short-term favour or not the access to equity crowdfunding, instead of the other possible sources of funding.

The results of this analysis explain that there is no difference in term of profitability between the companies that decide to exploit equity crowdfunding and the ones that instead preferred some other sources of financing. In fact, the EBITDA, the operating margin, the net profit and the return on sales are almost equal between the two groups of firms, and, if some differences are identified, they are not supported by satisficing statistical significance.

A trend that instead emerges comparing the EBITDA e the operating margin is that the innovative start-ups that launch an equity crowdfunding campaign report a greater value of depreciation and amortisation if compared to the other companies in the sample. This consideration supports the thesis according to which firms that access equity crowdfunding are, on average, more structured and developed than the others.

On last consideration is related to the liquidity. In particular, both the groups of companies report a similar liquidity situation in the short and medium-long term.

A list of all the indicators selected with related description, graph and comment is reported below.

Profit

This indicator consists in the final voice of the income statement and represents firm's ability to internally sustain investments and remunerate its shareholders. This information is made available

only through a direct contact with the start-up, in fact it is not part of the set of data the firm has to provide while launching an equity crowdfunding project. As a consequence of that, this information cannot be considered by non-professional investors while evaluating the possibility of investing in an equity campaign. On the other side, profit is one of the most relevant indicator for professional investors, like business angels and venture capitalists, because it represents the capability of the company to remunerate their investment. A high profit could then increase the availability of traditional funding sources and therefore reduce the necessity of others like equity crowdfunding.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Profit (Loss) [k€]	-23,97	-18,66	0,364122674
# of observations	80	4519	

Table 3.17 Comparison of the profit for Descriptive Statistics 1

The table above (Table 3.17) reports the average value of the profit for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.17) shows that the average profits of the two groups of companies in the sample are almost the same. More precisely, the value registered by the innovative start-ups that preferred more traditional financings is greater by, approximately, 4 thousand €. Moreover, this irrelevant difference is not supported by the P-Value of the Test-T, which is equal to 36%.
In conclusion, the profit does not represent an element of difference between the companies that decide to access equity crowdfunding and the ones that opted for other funding sources.

EBITDA

This indicator is also extremely relevant for professional investors while evaluating the profitability of a start-up, probably even more than the net profit. This variable, in fact, explains

the ability of the firm in the creation of value through its core operating activities, without considering taxes and financial and extraordinary activities. A high level of EBITDA could then attract the interests of professional investors in funding the start-up, reducing in the end the necessity of other financing sources.

	Avg. EC Startups	Avg. NO EC Startups	P-value
EBITDA [k€]	26,09	-5,89	0,12830412
# of observations	80	4519	

Table 3.18 Comparison of the EBITDA for Descriptive Statistics 1

The table above (Table 3.18) reports the average value of the EBITDA for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the table (Table 3.18), also in this case the difference between the two values is not so relevant. Firms that access equity crowdfunding, in fact, report an average EBITDA that is greater than the one of the other companies by just 30 thousand €. Moreover, this difference is even not so statistically significant, because of a P-Value equal to 13%.

In conclusion, also the EBITDA does not represent an element of difference between the companies that decide to access equity crowdfunding and the ones that opted for other funding sources.

Operating margin

Operating margin conveys the same information of the EBITDA, considering however also the depreciation and amortisation. As a consequence, the same reasoning in relation to the access to equity crowdfunding performed for EBITDA could be reported here.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Operating margin [k€]	-6,73	-17,03	0,28080106
# of observations	80	4519	

Table 3.19 Comparison of the operating margin for Descriptive Statistics 1

The table above (Table 3.19) reports the average value of the operating margin for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The results shown in the table (Table 3.19) highlights that the operating margins of the two groups of companies are almost the same. As a matter of fact, the equity crowdfunding start-ups register an average value that is higher by just 10 thousand €. Moreover, this minimal difference is not supported by statistical significance, given a P-Value of 28%.

In conclusion, also the operating margin does not represent an element of difference between the companies that decide to access equity crowdfunding and the ones that opted for other funding sources.

Return on sales

This variable represents the impact of the operational costs on the revenues of the firm. It is then a strong indicator of the sustainability of the business model of the start-up and, therefore, extremely relevant while evaluating the profitability of a potential investment. Also in this case, this information is available only through a direct contact with the firm, therefore non-professional investors cannot collect this indicator on the equity crowdfunding platform. The same consideration in relation to the access to equity crowdfunding could be then replied here.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Return on sales (%)	0,23	1,94	0,282663263
# of observations	68	3615	

Table 3.20 Comparison of the return on sales for Descriptive Statistics 1

The table above (Table 3.20) reports the average value of the return on sales for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

Also in this case, the results presented in the chart (Table 3.20) explain that there is no difference in terms of return on sales between the two groups of firms. It is in fact experienced a variation of one single percentage point among the two values calculated. Moreover, this irrelevant difference is statistically insignificant, given a P-Value equal to 28%.
It is then possible to conclude that also the return on sales does not represent an element of difference between the companies that decide to access equity crowdfunding and the ones that opted for other funding sources.

Current ratio

This variable is calculated as the ratio between current assets and current liabilities. It represents then the extent to which the company is able to pay the expenses needed to sustain its business through the resources that will become cash during the fiscal year. This is a relevant indicator principally for banks while deciding if granting or not a loan to a start-up. As a matter of fact, part of the current liabilities is made of the interests the firm has to pay for the loans received from the bank. Low levels of current ratio could then reduce the availability of this traditional financing source and therefore favour more innovative ones.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Current ratio	1,87	1,87	0,498035155
# of observations	79	4399	

Table 3.21 Comparison of the current ratio for Descriptive Statistics 1

The table above (Table 3.21) reports the average value of the current ratio for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As clearly shown by the chart (Table 3.21), the two values computed for this indicator are almost equal. Moreover, given a P-Value equal to 49%, a potential difference among them would be completely fortuitous and not determined by the characteristics of the two groups of companies in the sample.

It is then possible to conclude that the liquidity in the short term does not represent an element of difference between the innovative start-ups that decide to launch an equity crowdfunding campaign and the ones that instead preferred other funding sources.

Liquidity ratio

The liquidity ratio provides a more precise information about the liquidity of a company if compared to the current ratio. In the formula, in fact, just the resources that are almost liquid are considered. Among all the voices classified as current assets, just cash, short-term investments and receivables are taken under consideration. Apart from the higher level of precision of this last indicator, the same reasoning performed for the current ratio could be reported here.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Liquidity ratio	1,76	1,77	0,471460394
# of observations	79	4399	

Table 3.22 Comparison of the liquidity ratio for Descriptive Statistics 1

The table above (Table 3.22) reports the average value of the liquidity ratio for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

Also in this case, the values reported in the chart (Table 3.22) are almost equal. Moreover, the negligible difference is not statistically relevant, given a P-Value of the related Test-T around 47%.

Therefore, also according to this more precise indicator, it is possible to conclude that the liquidity in the short term does not represent a factor of difference between the two groups of innovative start-ups.

Long-medium term liabilities/Total assets

This is an indicator of the liquidity of the company in the long term, since it represents the capability to repay the medium and long-term liabilities through the assets owned by the company. As also explained for the two variables related to the short-term liquidity, this indicator is strongly considered by financial institutions in the process of granting a loan. A low ratio between long-medium term liabilities and total assets could, in fact, increase the risk faced by the bank of losing the capital lent. As a consequence, different levels of this ratio could favour different types of financing.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Long-medium term liabilities/Total assets (%)	0,29	0,17	0,000752745
# of observations	79	4438	

Table 3.23 Comparison of long-medium term liabilities/total assets for Descriptive Statistics 1

The table above (Table 3.23) reports the average value of the ratio between the long-medium term liabilities and the total assets for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The results reported in the chart (Table 3.23) show that the values computed for the two groups are almost equal. It is in fact registered just a decimal of percentage point of difference for this indicator between companies that launched an equity crowdfunding campaign and the ones that preferred other financing instruments. The P-Value is equal to 0,08%, meaning that this difference, even if irrelevant, is statistically significant.

According to this analysis it is then possible to conclude that also the liquidity in the medium-long term does not represent an element of disparity between the two groups of innovative start-ups considered.

Net financial position

The net financial position explains the ability of the firm to immediately repay all its debts if it were asked to. It is in fact calculated as the difference between the cash and cash equivalents available to the company and its short and long-term debts. Companies that are particularly exposed to third party capital might report then a lower value of net financial position if compared to the ones that collected in percentage more equity funds. In conclusion, innovative start-ups that exploited equity crowdfunding as principal source of financing could have a greater value of this indicator than the ones that opted for more traditional funding instruments.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Net financial position [k€]	108,36	0,98	0,014480159
# of observations	68	2896	

Table 3.24 Comparison of the net financial position for Descriptive Statistics 1

The table above (Table 3.24) reports the average value of the net financial position for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The results presented by the table (Table 3.24) are extremely clear. It is experienced a consistent difference in relation to this indicator between the two groups of companies. In fact, the innovative start-ups that promoted an equity crowdfunding campaign register an average net financial position equal to 108,36 thousand €, while the firms that preferred more traditional sources of funding report a value around 0,98 thousand €. This result is consistent with the hypothesis made in relation to this analysis, because firms belonging to the second group collected a significant part of their capital most likely through bank loans. Moreover, the difference reported is statistically significant, given a P-Value equal to 1,4%.

Thanks to this analysis it is then possible to conclude that innovative start-ups that decide to exploit the advantages of equity crowdfunding are characterised by a consistently better financial position than the ones that collected capital through the more traditional financing instruments.

3.6.1.5. Board and Management

The set of variables selected and described below aims at studying the characteristics of the board managing the company. This aspect related to the human resources of the firm is particularly critical, especially for a start-up, because the competences and skills of the people working for the firm represent the principal source of competitive advantage with its competitors. The purpose is then to analyse the composition of the board and managerial team, in order to eventually identify some possible correlation with the access to equity crowdfunding or the other sources of financing.

The results obtained in relation to this analysis confirm the hypothesis presented about the human resources of the two groups of companies in the sample. As a matter of fact, the innovative start-ups that decide to launch an equity crowdfunding campaign register a consistently higher number of both directors, managers and contacts and external advisors. This result supports the trend emerging from the descriptive statistics according to which the companies that decide to exploit the advantages of this innovative source of funding are, on average, more structured not only in terms of assets but also in terms of dimension of the entrepreneurial team.

For what concerns instead the gender and percentage of directors, manager and contacts that are also shareholders, the results report a negligible difference between the innovative start-ups that promote an equity crowdfunding project and the ones that collect capital through more traditional sources of funding.

A list of all the indicators selected with related description, graph and comment is reported below.

Number of directors, managers and contacts

This variable sums up the number of the directors that compose the board, the managers of the start-up and the possible contacts with, as an example, research and development centres and incubators. This indicator is strictly related to the phase of expansion of the firm, in fact, the more the company is structured and established, the higher will be the number of its directors, managers and contacts. Given that different funding sources focus on different life phases of a start-up, the direct consequence could be a correlation between this variable and the financing instrument chosen by the firm.

	Avg. EC Startups	Avg. NO EC Startups	P-value
Number of directors/managers/contacts	2,87	1,97	3,26708E-06
# of observations	117	7129	

Table 3.25 Comparison of the number of directors, managers and contacts for Descriptive Statistics 1

The table above (Table 3.25) reports the average number of directors, managers and contacts for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The results obtained and displayed in the chart (Table 3.25) clearly highlight a significant difference in terms of number of directors, managers and contacts between the two groups of companies considered in the sample. In fact, if for the start-ups that promoted an equity crowdfunding project the value related to this indicator is equal to 2,87, for the other companies in the sample this number decreases to 1,97. This means that firms that decide to access equity crowdfunding have, on average, one director, manager or contact more than the ones that opted for other financing instruments. This consistent difference, equal to approximately 50% of the personnel working in the board and managerial team of the start-ups that did not access equity crowdfunding, is supported by a strong statistical significance. The P-Value related to the Test-T is in fact equal to 0,0003%.

It is then possible to conclude, with impeccable statistical significance, that the innovative start-ups that decide to launch an equity crowdfunding campaign are characterised by a number of directors, managers and contacts consistently greater than the one of the companies that instead preferred other funding sources.

Gender of directors, managers and contacts

This indicator calculates the percentage of females among the total number of directors, managers and contacts. The reason behind the selection of this variable is that maybe exists a relation between the gender mostly present in the board and managerial team and the financing strategy selected. In other words, the purpose is to understand if a specific gender is more compatible with the traditional sources of funding, like bank loans, business angels and venture capitalists, or with the innovative ones, like equity crowdfunding.

DMC Gender	EC Startups	NO EC Startups
Total M	333	14385
Total F	49	2592
Total M+F	382	16977
Average F (%)	13%	15%

Table 3.26 Comparison of the gender of directors, managers and contacts for Descriptive Statistics 1

The table above (Table 3.26) reports the average percentage of female directors, managers and contacts for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, with related number of observations for which the information is available.

As represented by the table (Table 3.26), for both the groups of companies the percentage of females covering executive roles is quite limited. Moreover, it is not experienced a significant difference between the start-ups that decide to launch an equity crowdfunding campaign and the ones that, instead, opted for other funding strategies. It is in fact registered a difference equal to 2 percentage points between the two groups.

In conclusion, the average gender of directors, mangers and contacts does not represent an element of difference between the firms that decide to access equity crowdfunding and the ones that do not.

Directors, managers and contacts also shareholders

This variable reports the number of directors, managers and contacts that are also shareholders of the company. This means that their remuneration is composed by both the salary coming from the director or managerial role and the dividends distributed by the company to its shareholders at the end of the fiscal year. As a consequence of that, they are clearly interested in enhancing the shareholder remuneration represented by the return of equity indicator. To achieve this goal, a possible solution could be the exploitation of the leverage theory, that allows to increase the

multiplication effect on the return of investment by collecting a higher percentage of debt capital. Having then a high number of directors, managers and contacts that are also shareholders of the start-up could eventually determine a greater probability of funding through bank loans.

DMC also shareholders	EC Startups	NO EC Startups
Total DMC	336	14058
DMC also shareholder	275	12809
Average DMC also shareholder	82%	91%

Table 3.27 Comparison of the percentage of directors, managers and contacts also shareholders for Descriptive Statistics 1

The table above (Table 3.27) reports the average percentage of directors, managers and contacts that are also shareholders for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, with related number of observations for which the information is available.

The chart Table 3.27 presents two similar values of this indicator for the two groups of firms. It is in fact registered a difference equal to approximately 10 percentage points. A higher rate of directors, managers and contacts that are also shareholders for the companies that did not exploit equity crowdfunding could be explained, as described by the hypothesis made in the previous chapter (Board and Management), by a greater interest of the executives in improving the return on equity by means of the leverage effect, favouring then the collection of capital through bank loans. This difference, however, is minimal and therefore negligible in the comparison.
The results allow then to conclude that the percentage of directors, managers and contacts that are also shareholders does not represent an element of difference between the innovative start-ups that decide to collect capital through equity crowdfunding and the ones that prefer other funding sources.

Number of advisors

This last indicator of the list represents the total number of advisors consulted by the firm. Also in this case, the same reasoning performed for the total number of directors, managers and contacts could be reported here. In fact, the more the company is ahead in its expansion process, the more it will be structured and then the more advisors it will contact. In conclusion, there could be a relation between the number of advisors and the typology of financing selected by intermediation of the start-up expansion phase in its lifecycle.

Number of advisors	EC Startups	NO EC Startups	P-value
# of advisors	206	7053	
# of observations	117	7129	
Average advisors per firm	1,760683761	0,989339318	0,02589286

Table 3.28 Comparison of the number of advisors for Descriptive Statistics 1

The table above (Table 3.28) reports the average number of advisors for both the groups of innovative start-ups that performed an equity crowdfunding campaign and the ones that did not, the related number of observations for which the information is available and the P-Value of the Test-T performed.

In this case, the chart (Table 3.28) highlights a consistent difference in terms of number of advisors between the two groups of firms. In fact, if for the start-ups that did not performed an equity crowdfunding campaign the value is around 1 advisor, for the companies that instead exploited this innovative financing instrument the indicator reports a number equal to 1,76. This means that, on average, the innovative start-ups that promote an equity crowdfunding project consult almost the double of the advisors contacted by the other companies in the sample. Moreover, this difference is strongly statistically significant because of a P-Value equal to 2,5%.

According to these results, it is then possible to conclude, with high level of certainty, that firms that access equity crowdfunding are, on average, more structured than the others also in terms of number of advisors contacted.

The clear trend that emerges from the results of this first descriptive statistics is that, on average, the innovative start-ups that decide to launch an equity crowdfunding campaign are more structured and developed than the ones that prefer more traditional sources of funding. As a matter of fact, it is experienced a consistently greater expansion of the companies that exploit this innovative financing instrument in terms of assets and human resources employed. The level of tangibles, financials and intangibles reported in their balance sheet is in fact much greater, with particular reference to IPRs and investments in R&D. Moreover, these firms are characterised by a consistently higher number of employees, executives and external advisors appointed.
One last relevant element of difference is represented by the capital structure, more exposed towards third party sources of capital for the start-ups that did not access equity crowdfunding. For what concerns profitability and liquidity, no disparities were discovered between the two groups of firms.

3.6.2. Descriptive Statistics 2

This second type of analysis aims at understanding which are the characteristics of the companies that at the end achieve success for their equity crowdfunding campaign. Given that the only interaction between the start-up and the potential investor is mediated by the information disclosed on the crowdfunding platform, the company has the possibility to send some so called "signals" to transmit, in some way, the quality of its entrepreneurial project. As stated in the literature review, there is a consistent base of academic research related to this topic. The purpose of this second descriptive statistics is then to verify the effect of the main signals described by the literature on the success of the Italian campaigns, and, at the same time, understand if even other factors affect the result of the equity crowdfunding project.

The variables selected for this second analysis can be classified according to the affinity to four main topics. The first one is related to a demographical description of the start-up, specifically focusing on its geographical location, its level of innovativeness and expansion phase. Literature in fact demonstrates that these factors are able to influence, in some way, the result of an equity crowdfunding campaign.

The second group of variables, instead, is strictly related to the characteristics of the project promoted on the equity crowdfunding platform. While launching a campaign, in fact, the start-up has to define the conditions according to which the financial instrument will work and, eventually, achieve success. Some of these indicators are the target capital required, the duration of the promotion on the platform, the percentage of equity offered and even the choice of the portal itself. These information, directly available to potential investors while evaluating the profitability of an investment, are extremely relevant in the selection among lots of campaigns and therefore critical for the success of the financing instrument.

Another aspect to be considered is the one regarding external certifications. Typically, intellectual property rights represent one of the main source of competitive advantage for start-ups. They have the power to communicate to potential investors the innovation capabilities of the firm, the ability to stake technological claims and the skills of the managerial team. In conclusion, external certifications can drastically reduce the information asymmetries between the start-up and potential investors about the quality of its project and, therefore, favour the success of the equity crowdfunding campaign.

One last topic to be examined is the relation between the characteristics of the start-up board and managerial team and the success of the equity crowdfunding campaign. The literature demonstrates in fact that the number of directors, managers and advisors appointed by the firm, as well as their level of education, has the ability to influence the result of the financing project.

Below each of the topics just mentioned is specifically analysed, with a detailed description of the related variables selected and results obtained.

3.6.2.1. Demographic Variables

This first set of variables aims at describing the start-ups in the sample created for the second descriptive statistics from a demographical point of view. The indicators describe the geographical location, the experience and technological innovation of the firm. The purpose is then to verify the signalling effect of these characteristics on the success of the equity crowdfunding campaign.

The results clearly explain that the signalling effect of the demographic variables on the result of the equity crowdfunding campaign are almost irrelevant. For what concerns the province in which the start-up is located, in fact, some differences in terms of success rate are reported, however the dimension of the sample is not sufficient to guarantee statistical significance of the result. Moreover, the level of technological innovation reached by the firm and the months in business until the launch of the campaign do not result to be critical elements for the outcome of the financing instrument.

A list of all the indicators selected with related description, graph and comment is reported below.

Province

Literature demonstrates that companies located in a big city experience increased chances of reaching their target (Ralcheva and Roosenboom, 2016). The idea is then to focus on the cities in Italy where the phenomenon of equity crowdfunding is more exploited and verify if this signalling effect subsists or not. In particular, the centres considered in the analysis are Milano, Torino, Brescia, Trento, Roma, Bergamo and Firenze.

Province	Milano	Torino	Brescia	Trento	Roma	Bergamo	Firenze	Total
Successful Campaigns	17	3	3	3	4	2	1	33
% Successful	52%	9%	9%	9%	12%	6%	3%	
Unsuccessful Campaigns	10	3	3	1	5	1	3	26
% Unsuccessful	38%	12%	12%	4%	19%	4%	12%	
Total	27	6	6	4	9	3	4	
% Successful out of total	63%	50%	50%	75%	44%	67%	25%	

Table 3.29 Analysis of the success rate of equity crowdfunding for different provinces in Italy

This variable focuses on the seven provinces of Italy in which the phenomenon of equity crowdfunding is more developed. More precisely, Milano, Torino, Brescia, Trento, Roma, Bergamo and Firenze. For each of them is reported the number of innovative start-ups that completed a successful equity crowdfunding campaign, the number of the ones that instead failed and the total. The results describe the distributions of the firms that achieved success and the ones that obtained a negative outcome for the campaign promoted in the seven provinces considered, as well as the percentage of success for each of them.

As represented by the table (Table 3.29), the province with the greatest rate of success is Trento, followed by Milano and Bergamo. The next positions are covered by Torino, Brescia and Roma, while the last in the rank is Firenze. The result suggests that the dimension of the city does not influence the outcome of an equity crowdfunding campaign, as instead stated by the literature. This conclusion, however, lacks statistical significance, given that, apart from Milan, the sample related to each province is too small.

It is then not possible to express a statement about the signalling effect of the dimension of the city in which the start-up is located, because of a not sufficient dimension of the sample available.

Technological innovation

This indicator represents the level of technological innovation performed by the start-up. Given that it does not exist a precise variable able to describe it, a good approximation is given by the

ratio between the intangible fixed assets and the total fixed assets. The motivation behind the selection of this variable is the fact that literature demonstrates that tech companies have greater changes of reaching the target of their equity campaign (Ralcheva and Roosenboom, 2016). Also in this case, the goal is then to verify if this effect takes place for the Italian start-ups.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns
Total intangible fixed assets/Total fixed assets	0,85	0,84
# of observations	42	29

Table 3.30 Comparison of the technological innovation for Descriptive Statistics 2

The table (Table 3.30) reports the average ratio between the intangible fixed assets and the total fixed assets for both the companies that performed a successful equity crowdfunding campaign and the ones that instead failed, together with the related number of observations for which the information is available.

As clearly shown by the chart (Table 3.30), the indicator reports almost the same value for both the groups of companies. It is then possible to conclude, differently from what stated by the literature, that the level of technological innovation does not represent in Italy a signalling effect for the outcome of an equity crowdfunding campaign.

Months in business

This indicator is able to describe the maturity of the start-up at the beginning of the equity crowdfunding campaign. It is in fact calculated as the difference between the date of publication of the project on the platform and the registration date in the special section of *Registro Imprese*. There is no reference in the academic research about a possible signalling effect of the start-up maturity on the success of the campaign, however a longer experience in the business could result in a reduced risk perceived by the potential investor while deciding if investing or not in the firm's equity crowdfunding project.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Months in business	12,18	11,19	0,355277893
# of observations	44	31	

Table 3.31 Comparison of the experience in business for Descriptive Statistics 2

The table above (Table 3.31) reports the average number of months in business for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the chart (Table 3.31), the difference related to this indicator between the two groups of companies is almost irrelevant, given that it is approximately equal to one single month. Moreover, this small discrepancy is not supported by statistical significance, because of a P-Value equal to 35%. This means that in the 35 percent of the cases the difference registered is fortuitous and not determined by the characteristics of the two groups of start-ups.
In conclusion, also the experience in business does not appear to be a signal for the result of an equity crowdfunding campaign.

3.6.2.2. Campaign Characteristics

This second set of variables identifies the main characteristics of the equity crowdfunding campaign launched by the innovative start-up. These settings are specifically and accurately chosen by the management of the firm and experience, according to the literature, a significant signalling effect on the success of the project. The purpose is then to verify if these direct consequences stand also for the Italian equity crowdfunding market.

Results show that the selection of the equity crowdfunding platform and the duration of the campaign set affect the outcome of the financing instrument topic of this paper. On the other side,

the target capital and the percentage of equity offered do not represent signalling effects for the Italian equity crowdfunding market.

A list of all the indicators selected with related description, graph and comment is reported below.

Equity crowdfunding platform

The first choice the start-up has to make while launching an equity crowdfunding project is related to the platform to be used. This selection is particularly relevant given that different platforms could have a different rate of success. In fact, the ability of the equity crowdfunding portal in promoting the campaign and attracting potential investors is crucial for the result of the financing instrument. Moreover, the network of the platform covers a significant role in this sense. As a matter of fact, the presence of professional investors, like business angels and venture capitalists, among the users of the equity crowdfunding portal could stimulate the occurrence of the so called "information cascades". According to this phenomenon, the decision of professional investors to fund a campaign reduces the information asymmetries about the quality of the project for non-professional investors and, as a consequence, increases the chances of success of the equity financing. The purpose is then to understand if the choice of the platform influences or not the result of the campaign.

Equity Crowdfunding Platform	Unica Seed	StarsUp	Assiteca Crowd	Next Equity	CrowdFundMe	TIP Ventures	Muum Lab
Successful Campaigns	1	10	2	2	13	4	1
% Successful	2%	17%	3%	3%	22%	7%	2%
Unsuccessful Campaigns	3	14	3	2	6	1	2
% Unsuccessful	7%	31%	7%	4%	13%	2%	4%
Total	4	24	5	4	19	5	3
% Successful out of total	25%	42%	40%	50%	68%	80%	33%

Equity Crowdfunding Platform	MamaCrowd	WeAreStarting	Equinvest	OPStart	Smarthub	EquityStartUp	Total
Successful Campaigns	11	4	7	5	0	0	60
% Successful	18%	7%	12%	8%	0%	0%	
Unsuccessful Campaigns	2	3	2	1	1	5	45
% Unsuccessful	4%	7%	4%	2%	2%	11%	
Total	13	7	9	6	1	5	
% Successful out of total	85%	57%	78%	83%	0%	0%	

Table 3.32 Analysis of the success rate for different equity crowdfunding platforms

This variable focuses on thirteen equity crowdfunding platforms operating in Italy and authorised by the legislation. For each of them is reported the number of innovative start-ups that completed a successful equity crowdfunding campaign, the number of the ones that instead failed and the total. The results describe the distributions of the firms that achieved success and the ones that obtained a negative outcome for the campaign promoted in the thirteen portals considered, as well as the percentage of success for each of them.

As represented by the chart (Table 3.32), the success rate of different equity crowdfunding platforms is extremely variable. However, given the small dimension of the sample that characterises most of the portals considered, the analysis should be focused just on the main ones, in order to maintain a satisficing level of statistical significance. In particular, the more relevant equity crowdfunding platforms in Italy are, in order, StarsUp, CrowdFundMe, MamaCrowd and Equinvest. Among them, the one with the highest rate of success is MamaCrowd, with 85% of

the campaigns concluded with positive result. In second position Eqwuinvest with 78%, then CrowdFundMe with 68% and, in the last position, StarsUp with 42%.

The success rate among the four main Italian equity crowdfunding portals is quite variable, therefore it is possible to conclude that the selection of the platform for the promotion of the project covers a significant role in relation to the final outcome of the financing instrument.

Target capital

This variable represents the amount of capital required by the start-up to complete its project and determines the final result of the campaign. According to the Italian legislation related to equity crowdfunding, there are two typologies of campaigns. A first one, defined as *tutto o niente*, in which the success is achieved only if all the target capital is collected. The second one, called *offerta scindibile*, instead guarantees the success of the financing instrument independently of the funds received. For both of the cases, however, a too high target capital could damper the interest of potential investors in financing the start-up. In fact, in the case of a campaign *tutto o niente*, the start-up can face difficulties in rising all the capital required to achieve success. In the case of a *offerta scindibile*, instead, collecting an amount that is lower than the target could increase the difficulties in implementing the project.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Target capital [€]	223467,57	261569,54	0,176554607
# of observations	60	45	

Table 3.33 Comparison of the target capital for Descriptive Statistics 2

The table above (Table 3.33) reports the average target capital for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.33) reports a minimum difference of this indicator between the two groups of firms considered in the analysis, which is equal to approximately 40 thousand €. Companies that conclude an equity crowdfunding campaign with a positive result, in fact, use to set a target capital that is, on average, slightly inferior to the one of the start-ups for which the project fails. This discrepancy, however, is not that statistically significant, given a P-Value equal to 18%.
In conclusion, the target capital set for the campaign seems to have a weak signalling effect in the Italian equity crowdfunding market.

Duration of the campaign

This indicator represents the duration of the equity crowdfunding campaign, which, on average, lasts for approximately 4-5 months. In the literature there is no mention about a possible signalling effect of this variable on the success of the financing instrument, however, some hypothesis could be made. In this type of equity funding projects, the first 5-10 days of the campaign are fundamental for a successful result. Therefore, a too high duration set by the start-up could reduce the quality of the project perceived by potential investors and, in conclusion, reduce the chances of success.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Duration [months]	3,2	5,62	0,000250277
# of observations	60	45	

Table 3.34 Comparison of the duration of the campaign for Descriptive Statistics 2

The table above (Table 3.34) reports the average duration of the campaign for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The table (Table 3.34) highlights a significant difference related to this indicator between the two groups of firms. As a matter of fact, innovative start-ups that conclude the equity crowdfunding campaign with success set, on average, a lower duration. As shown by the results, the campaign of these companies lasts for approximately three months, while for the others this value is around five and a half months. Moreover, given a P-Value of the Test-T performed equal to 0,003%, the difference depicted has strong statistical significance.

It is then possible to conclude, with high level of certainty, that the duration of the campaign set by the innovative start-up influences the result of the financing instrument. More precisely, the shorter the project, the greater the chances of success.

Equity offered

Literature demonstrates that the equity offered by the start-up in return for the capital received has a strong signalling effect on the success of the campaign (Ahlers et al., 2012; Vismara, 2015 and 2016). More precisely, the lower the equity offered to crowdfunding investors, the higher the commitment and ambition of the entrepreneurial team in the project, the higher the quality perceived by potential investors and, in conclusion, the greater the chances of success. The purpose is then to verify if the correlation between equity offered and a positive result of the related campaign stands also for the Italian equity crowdfunding market.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Equity offered [%]	16%	19%	0,133402417
# of observations	60	45	

Table 3.35 Comparison of the equity offered for Descriptive Statistics 2

The table above (Table 3.35) reports the average percentage of equity offered for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As clearly shown by the chart (Table 3.35), this indicator behaves almost in the same way for the two groups of companies. It is in fact registered an irrelevant difference, equal to three percentage points, that is not even supported by statistical significance.

In conclusion, differently from what stated by the literature, the percentage of equity offered by the firm to its potential investors does not represent a signal of quality and commitment for the Italian equity crowdfunding market.

3.6.2.3. External Certifications

This second set of variables focuses on the external certifications owned by the start-up and listed among the intangible assets in the balance sheet. According to the literature, these resources represents a strong signal the company can send to its potential investors on the equity crowdfunding platform, as a mean to reduce information asymmetries and, as a consequence, increase the chances of success of the campaign.

Results clearly show that innovative start-ups that complete an equity crowdfunding campaign with positive result report on their balance sheet, on average, a consistently greater value of patents and intellectual property rights if compared to the one of the companies for which instead the financing instrument failed. No discrepancies are instead discovered in relation to the value of concessions, licenses, trademarks and similar rights registered in the financial statement.

A list of all the indicators selected with related description, graph and comment is reported below.

Patents and intellectual property rights

Intellectual property rights represent a valuable source of information to potential investors on the equity crowdfunding platform. They have, in fact, the power to significantly reduce the information asymmetries between internet surfers and firm's characteristics (Ralcheva and Roosenboom, 2016). As a matter of fact, IPRs are able to clearly describe the innovation capabilities of the start-up, critical in the process of creation of a sustainable competitive

advantage. Moreover, a strong presence of this type of intangibles proves the ability of the firm in facing technological claims and is then representative of the skills and competences of the managerial team. In conclusion, the purpose of this indicator is to verify if the signalling effect of intellectual property rights covers a relevant role also for the Italian innovative start-ups that launched an equity crowdfunding project.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Ind. Patents and intellectual property rights [k€]	136,36	20,22	0,150778021
# of observations	12	10	

Table 3.36 Comparison of patents and intellectual property rights for Descriptive Statistics 2

The table above (Table 3.36) reports the average value of patents and intellectual property rights for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The table (Table 3.36) highlights a consistent difference in the values of this indicator for the two groups of firms. As a matter of fact, start-ups that promote a successful equity crowdfunding campaign report on their balance sheet an average value of patents and intellectual property rights equal to 136 thousand €. This measure is almost seven times greater than the one of the companies for which the financing instrument failed. The difference identified, however, is not supported by a strong statistical significance, given a P-Value of 15%.

It is then possible to conclude, coherently with the literature but without high statistical relevance, that IPRs play a signalling effect for the Italian equity crowdfunding market. More precisely, the higher the value of patents and IPRs, the greater the chances of success for the related campaign.

Concessions, licenses, trademarks and similar rights

Literature demonstrates that also trademarks, copyrights, licences and concessions can reduce information asymmetries by communicating relevant technological and market related information about the company to its potential investors (Ralcheva and Roosenboom, 2016). The consequence is then a direct impact of this typology of intangibles on the probability of success of the equity crowdfunding campaign. The objective of the analysis of this indicator is, therefore, the same of the one reported for the previous variable.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Concessions, licenses, trademarks and similar rights [k€]	4,9	3,3	0,323446367
# of observations	12	10	

Table 3.37 Comparison of concessions, licenses, trademarks and similar rights for Descriptive Statistics 2

The table above (Table 3.37) reports the average value of concessions, licenses, trademarks and similar rights for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The values of this indicator reported in the table (Table 3.37) are almost equal. Moreover, the minimal difference identified is not generated by the characteristics of the two groups of firms, but can be considered as fortuitous. The P-Value of the Test-T performed is in fact equal to 32%. In conclusion, the value of concession, licenses, trademarks and similar rights does not appear to be a signal of quality able to influence the result of an equity crowdfunding campaign in the Italian market.

3.6.2.4. Board and Management

This last set of variables for what concerns the second descriptive statistics aims at exploring a possible relation between the characteristics of the board and managerial team and the success of the equity crowdfunding campaign. The literature demonstrates, in fact, that some aspects related to the human resources working for the start-up can, in some way, influence the result of the financing instrument.

Results demonstrate that the average number of directors, managers and contacts and external advisors appointed by the innovative start-ups that complete with success an equity crowdfunding campaign are greater than the ones registered for the firms for which the financing instrument fails. On the other side, the average gender and educational level of the executives, as well as the number of non-executive directors, do not represent signalling effects for the Italian equity crowdfunding market.

A list of all the indicators selected with related description, graph and comment is reported below.

Number of directors, managers and contacts

The first indicator selected describes the number of directors, managers and possible contacts involved in the management of the start-up. This variable covers a significant signalling role and, therefore, has a relevant impact on the success of the campaign. According to the literature (Ahlers et al., 2012; Vismara, 2015), in fact, a greater dimension of the board increases both the expected number of investors and the total capital collected. There are probably two main reasons behind this dynamic. The first one is that potential investors, while evaluating an equity crowdfunding campaign, perceive a greater robustness and then a reduced risk in start-ups with a higher number of directors and managers. The second reason is strictly related to a network effect. Directors and managers, in fact, cover a crucial role in the promotion of an equity crowdfunding campaign, given their ability to directly involve in the project their professional network. This phenomenon

increases the number of investors, among which the presence of professional ones could stimulate information cascades and, in conclusion, increase the chances of success of the campaign.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Number of directors/managers/ contacts	3,08	2,64	0,143021624
# of observations	60	45	

Table 3.38 Comparison of the number of directors, managers and contacts for Descriptive Statistics 2

The table above (Table 3.38) reports the average number of directors, managers and contacts for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As shown by the results presented in the chart (Table 3.38), the number of executives of the companies that successfully complete the equity crowdfunding campaign is higher than the one reported for the firms for which the financing instrument fails. It is in fact experienced a difference of 0,44 for this indicator between the two groups of companies, which is almost equal to the 17% of the executives managing the start-ups that concluded the campaign with negative result. This result, however, is not strongly reliable because of a P-Value equal to 14%.
In conclusion, it is possible to state, even if with moderate statistical significance, that the innovative start-ups that perform a successful equity crowdfunding campaign are characterised by a number of directors, managers and contacts that is greater than the one of the companies for which the funding instrument failed.

Gender of directors, managers and contacts

There is no reference in the literature about a possible relation between the predominant gender in the board and managerial team and the success of the equity crowdfunding campaign. The

network effect considered for the previous indicator, however, could be more effective for one of the two genders. In conclusion, the purpose of this variable is to understand if the prevalence of one specific gender stimulates potential investors and, therefore, the chances of success of the campaign.

DMC gender	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Females [%]	14%	21%	0,18111432
# of observations	60	45	

Table 3.39 Comparison of the gender of directors, managers and contacts for Descriptive Statistics 2

The table above (Table 3.39) reports the average percentage of female directors, managers and contacts for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As displayed by the chart (Table 3.39), the average percentage of females among the executives of the start-up is almost the same for the two groups of companies considered. As a matter of fact, the difference computed is equal to seven percentage points. Moreover, it is not statistically significant, given a P-Value of 18%.

In conclusion, the average gender of the directors and managers seems to not cover a signalling role in relation to the outcome of an equity crowdfunding campaign for the Italian market.

Education

This variable describes the level of education of the team working for the firm. Literature demonstrates that a higher level of education of company's human resources improves the confidence of internet surfers in funding the start-up and, as a consequence, increases the number of final investors of the campaign (Ahlers et al., 2012). The idea is then to verify if this signalling effect stands also for the Italian equity crowdfunding market. In particular, the indicator

considered is conceived as a binary variable that assumes positive value if the team is composed for at least 2/3 by personnel with a MSc degree or for at least 1/3 by PhD or graduates with at least 3 years of experience in certified research activity.

2° qualification	Yes	No
Successful Campaigns	14	32
Unsuccessful Campaigns	8	25
Total	22	57
Successful out of total [%]	64%	56%

Table 3.40 Comparison of the educational level for Descriptive Statistics 2

The indicator considered is conceived as a binary variable that assumes positive value if the team is composed for at least 2/3 by personnel with a MSc degree or for at least 1/3 by PhD or graduates with at least 3 years of experience in certified research activity. The table above (Table 3.40) classifies both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed according to the positive or negative value of the indicator, with related number of observations for which the information is available.

As reported in the chart (Table 3.40), companies with a higher educational level experience a rate of success of their campaign equal to 64%, while for the others this percentage drops to 56%. It is then not observed a significant difference between the two levels of education.
In conclusion, differently from what stated by the literature, the educational level of the executives does not appear to be a relevant signal of quality for the Italian equity crowdfunding market.

Number of advisors

According to the literature (Ralcheva and Roosenboom, 2016), the presence of an Advisory Board and/or making use of professional advisors are consistently associated with funding success. This is probably related to the higher quality and reduced risk perceived by potential investors while evaluating an equity crowdfunding campaign on the platform. The purpose is then to understand

if also for the Italian Innovative start-ups appointing external advisors enhances the probability of success.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Number of advisors	2,17	1,29	0,00975543
# of observations	60	45	

Table 3.41 Comparison of the number of advisors for Descriptive Statistics 2

The table above (Table 3.41) reports the average number of advisors for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As clearly highlighted by the table (Table 3.41), the average number of advisors appointed by companies that completed the campaign with positive outcome is equal to 2,17 people, which is almost the 70% higher than the one reported by the other start-ups in the sample, for which the value is instead 1,29. Moreover, this significant difference is statistically relevant, since the P-Value of the Test-T performed is equal to 0,9%.

It is then possible to conclude, coherently to what stated by the literature and with statistical significance, that the number of advisors influences the result of an equity crowdfunding campaign. More precisely, the more the external advisors appointed, the greater the chances of success.

Number of non-executive directors

The reasoning behind the selection of this last indicator is similar to the one explained for the number of advisors. In fact, literature (Ahlers et al., 2012; Ralcheva and Roosenboom, 2016) demonstrates that appointing non-executive directors is consistently associated with the success of the equity crowdfunding campaign. The objective is then to verify the presence of this

signalling effect for the innovative start-ups reported in the sample of the second descriptive statistics.

	Avg. Successful Campaigns	Avg. Unsuccessful Campaigns	P-Value
Non-executive directors	0,49	0,42	0,214310914
# of observations	60	45	

Table 3.42 Comparison of the number of non-executive directors for Descriptive Statistics 2

The table above (Table 3.42) reports the average number of non-executive directors for both the groups of innovative start-ups that performed a successful equity crowdfunding campaign and the ones that instead failed, the related number of observations for which the information is available and the P-Value of the Test-T performed.

The chart (Table 3.42) reports a negligible discrepancy in the values of the two groups of companies, equal to seven percentage points. Moreover, this difference is not relevant from a statistical point of view, because of a P-Value around 21%.
Therefore, conversely to what affirmed by the literature, the number of non-executive directors does not appear to have a signalling effect on the outcome of an equity crowdfunding campaign in the Italian market.

In conclusion, the most relevant and interesting trend emerging from this second descriptive statistics is that the innovative start-ups that complete with success an equity crowdfunding campaign are, on average, more structured and characterised by a greater dimension in terms of human resources than the ones for which the financing instrument fails. More precisely, these companies tend to appoint more directors, managers and advisors before the launch of the equity crowdfunding project.
The other main elements of difference between these two groups of firms are represented by the intellectual property rights owned and the duration set for the campaign. As a matter of fact,

innovative start-ups that complete the funding project with positive result report on their balance sheet a significantly higher value of IPRs and launch a campaign that, on average, lasts for half of the months of the unsuccessful ones.

3.6.3. Descriptive Statistics 3

If the first and second analyses focus on the situation pre-campaign, the third descriptive statistics instead looks at what happens in the post-campaign period. Its purpose is then to study the evolution of a start-up that successfully completed its equity crowdfunding project. The idea is to understand how the additional capital received through this financial instrument is invested by the firm, and, therefore, how the characteristics and indicators of the company are affected by a successful campaign. Clearly there are some immediate and direct effects as for the shareholding and capital structure, since the firm is receiving equity funds. However, additional consequences need to be taken into account, like a potential expansion of the start-up in terms of employees or assets, or an increase of the investments in R&D. Moreover, also the effects on the profitability must be considered in this analysis. The aim of this third descriptive statistics is then to identify and highlight the consequences of a successful equity crowdfunding campaign on the profile of the company, in order to understand at the end why a start-up should prefer or, at least, give priority to this form of financing instead of the more traditional ones, like banks, VCs and BAs.
Below each of the topics just mentioned is specifically analysed, with a detailed description of the related variables selected and results obtained.

3.6.3.1. Demographic Variables

The first set of variables for the third descriptive statistics aims at analysing how a start-up changes from a demographical point of view after a successful equity crowdfunding campaign. A list of all the indicators selected with related motivation is reported below.

Results show that the dimension of the start-up in terms of human resources significantly grows after the completion of a successful equity crowdfunding campaign. This phenomenon could be determined by the greater financial availabilities of the firm thanks to the financing instrument exploited, but also to the externalities of a successful campaign on brand and reputation.
A list of all the indicators selected with related description, graph and comment is reported below.

Employees

This variable represents the total number of employees working for the firm. It could be interesting to understand if a start-up that performed a successful equity crowdfunding campaign uses part of the capital received to hire new personnel and feed its growth. Therefore, the analysis compares the average number of employees before and after a successful campaign, in order to depict a potential increase of this indicator with significant statistic relevance.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Employees	2,17	3,65	0,001556064
# of observations	41	23	

Table 3.43 Comparison of the number of employees for Descriptive Statistics 3

The table above (Table 3.43) reports the average number of employees before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As clearly presented by the chart (Table 3.43), the average number of employees grows significantly after the completion of a successful equity crowdfunding campaign. As a matter of fact, if before the funding project this indicator is equal to 2,17 people, after the success of the financing instrument it peaks to 3,65. This means that, on average, a campaign with positive outcome generates a growth in terms of employees equal to approximately 70%. Moreover, this consideration is extremely reliable, given a P-Value equal to 0,16%.

It is then possible to conclude, with high statistical significance, that the completion of a successful equity crowdfunding campaign determines a substantial increase in the number of employees working for the start-up.

3.6.3.2. Assets

This second set of indicators focuses instead on the assets owned by the firm. In particular, the analysis is centred on the evolution of the expenses in R&D and expansion of the business after a successful equity crowdfunding project.

Results highlight that the investments in R&D increase significantly after the funding project, while the ones devoted to the expansion of the start-up remain almost the same.
A list of all the indicators selected with related description, graph and comment is reported below.

R&D expenses

This variable represents the total amount of capital the start-up has invested in research and development and is reported in the balance sheet under the voice "intangible assets". This type of investments are the ones able to provide to the firm a competitive advantage with its competitors in the long term, therefore, part of the funds received through a successful equity crowdfunding campaign could be invested in additional R&D. The purpose of this indicator is then to understand if this assumption is verified or not.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
R&D expenses [k€]	32,67	129,79	0,104397533
# of observations	12	23	

Table 3.44 Comparison of the R&D expenses for Descriptive Statistics 3

The table above (Table 3.44) reports the average R&D expenses before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related

number of observations for which the information is available and the P-Value of the Test-T performed.

As presented by the table (Table 3.44), the capital invested by the start-up in research and development increases drastically after the conclusion of the campaign. More precisely, if before the beginning of the funding project the investments devoted to R&D are, on average, approximately equal to 32 thousand €, this value rockets to almost 130 thousand € just few months after the conclusion of the campaign. This result can be considered as quite statistically significant, given a P-Value of 10%.

In conclusion, results demonstrate that an equity crowdfunding campaign concluded with positive outcome generates a drastic growth of the investments made by the start-up in R&D.

Start-up and expansion costs

This indicator describes the total amount of capital invested in the development and expansion of the start-up and its business. The same reasoning explained for the R&D expenses could be reported here. As a matter of fact, the firm could decide to dedicate part of the funds received through this innovative source of financing in its necessary expansion.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Start-up and expansion costs [k€]	4,8	11,1	0,248962347
# of observations	12	23	

Table 3.45 Comparison of the start-up and expansion costs for Descriptive Statistics 3

The table above (Table 3.45) reports the average start-up and expansion costs before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

Results presented in the chart (Table 3.45) demonstrate that it is not experienced a significant increase of start-up and expansion costs after the conclusion of a successful campaign. It is in fact reported an irrelevant growth of this indicator, approximately equal to 6 thousand €. Moreover, this difference is not statistically relevant, because of a P-Value of the Test-T performed around 25%.

It is then possible to conclude that the completion of a successful equity crowdfunding campaign does not influence the amount of capital invested by the start-up in its expansion.

3.6.3.3. Equity

The variables selected and discussed in this sub-chapter aim at understanding how the characteristics of the equity of a start-up change after the conclusion of an equity crowdfunding campaign. In particular, the attention is focused on the evolution of the relevance of equity capital and the profitability for shareholders.

The analysis related to this topic reports, as expected, that the amount of shareholders' funds increases significantly after the conclusion of a successful equity crowdfunding campaign. No statements could be instead presented in relation to the effects on shareholders' profitability, given the insufficient level of statistical significance.

A list of all the indicators selected with related description, graph and comment is reported below.

Total shareholders' funds

This indicator reports the total amount of capital the firm has collected from its shareholders. Given that the financing typology topic of this paper is classified as an equity instrument, it is expected that the indicator will experience a significant growth after the completion of a successful equity crowdfunding campaign.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Total shareholders' funds [k€]	277,93	435,47	0,000368452
# of observations	42	23	

Table 3.46 Comparison of total shareholders' funds for Descriptive Statistics 3

The table above (Table 3.46) reports the average amount of shareholders' funds before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As clearly shown by the chart (Table 3.46), the equity capital collected by the start-up increases significantly after the completion of the financing instrument considered. In particular, this indicator tends to growth by almost 60% after a successful equity crowdfunding campaign, which represents an average increase of 160 thousand €. Moreover, the result presented has strong statistical relevance, given a P-Value equal to 0,03%.

As expected, it is then possible to conclude, with high level of certainty, that a start-up that completes an equity crowdfunding campaign with positive outcome experiences a significant growth of its equity capital.

Return on equity

The return on equity is a direct measure of the remuneration of shareholders for their investment in the firm. It is, in fact, equal to the ratio between the net profit and the total equity capital. It is clear that the immediate consequence of a successful equity crowdfunding campaign and, therefore, of the reception of the funds collected is a drop of the ROE, generated by the growth of the denominator. However, the capital received through this innovative financing mechanism could be invested to favour the profitability of the firm and, at the end, its net profit. In conclusion,

a complete analysis of the effects of a successful campaign on the return on equity has to be performed.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Return on equity [%]	-12,22	-21,37	0,188591735
# of observations	42	23	

Table 3.47 Comparison of the return on equity for Descriptive Statistics 3

The table above (Table 3.47) reports the average return on equity before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

Results reported in the chart (Table 3.47) seem to state the existence of a deterioration of the return on equity after the conclusion of the campaign, equal to approximately nine percentage points. Given that both the values are negative, this is an unexpected outcome, considering that shareholders' funds increase drastically after the conclusion of the financing instrument. This means that the average net profit drops after collecting the capital from the investors on the platform. The result presented is, however, not reliable in terms of statistical significance, since the P-Value is equal to 19%.

Therefore, no reliable conclusions can be presented in relation to the effects of a successful equity crowdfunding campaign on shareholders' profitability.

3.6.3.4. Debt

This last set of variables for the third descriptive statistics has as a purpose the understanding of the evolution over time of the capital structure of a start-up that successfully completed an equity crowdfunding campaign.

As expected, the reception of additional equity capital through this innovative financing instrument reduces the exposure of the firm towards third party sources of capital.

A list of all the indicators selected with related description, graph and comment is reported below.

Debt to equity ratio

This indicator clearly explains the position of the firm's capital structure. It is in fact calculated as the ratio between debt and equity capital collected by the start-up. It is expected that, after a successful equity crowdfunding campaign, this indicator will drop, because of the immediate growth of the denominator. The purpose is then to understand if a positive result of this financing instrument reduces the exposure of the start-up to third party sources of funding.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Debt/equity ratio [%]	1,89	0,3	0,123887051
# of observations	30	23	

Table 3.48 Comparison of the debt to equity ratio for Descriptive Statistics 3

The table above (Table 3.48) reports the average debt to equity ratio before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

A first consideration that can be made according to the numbers shown in the table (Table 3.48) is that the start-ups that complete the funding project with success are almost not in debt with banks. The values related to the indicator are in fact extremely low. This means that, even before the campaign, the majority of the funds are collected through equity capital.

The second consideration highlights the limited reduction of this indicator after the completion of the campaign. The smallness of this variation, however, must be attributed to the low amount of debt capital collected by the firms.

In conclusion, it is not experienced a significant reduction in the debt to equity ratio after a successful equity crowdfunding campaign because of the capital structure that characterises these firms.

Leverage

The leverage is another indicator able to describe the capital structure of the firm. The same reasoning explained for the debt to equity could be then reported here. The objective of this specific study is, therefore, to understand if a successful equity crowdfunding campaign reduces the leverage effect and, as a consequence, the return on equity.

	Avg. Pre Campaign	Avg. Post Campaign	P-Value
Leverage	6,37	1,71	0,138124357
# of observations	42	23	

Table 3.49 Comparison of the leverage for Descriptive Statistics 3

The table above (Table 3.49) reports the average leverage before and after the campaign for all the innovative start-ups that successfully exploited equity crowdfunding, the related number of observations for which the information is available and the P-Value of the Test-T performed.

As expected, results shown in the table (Table 3.49) demonstrate that the leverage experiences a drastic decrease after the completion of a successful campaign. In particular, if before the funding project the ratio is equal to 6,37, after the collection of the equity capital from the investors on the platform it drops to 1,71. This conclusion, however, is not supported by strong statistical relevance. The P-Value computed is in fact around 14%.

It is then possible to conclude, with moderate statistical significance, that a successful equity crowdfunding campaign reduces the exposure of the innovative start-up towards third party sources of funding.

In conclusion, the main trend that emerges from this third descriptive statistics is related to the dimension of the innovative start-up, as also observed for the two analyses previously presented (**Errore. L'origine riferimento non è stata trovata.** and **Errore. L'origine riferimento non è stata trovata.**). As a matter of fact, completing an equity crowdfunding campaign with positive result allows the firm to reinforce its structure both in terms of human resources and assets. After completing the successful funding project, in fact, the number of employees working for the start-up tends to growth by almost 70%. Moreover, a significant part of the capital collected is invested in research and development, in order to foster the competitive advantage with competitors. One last relevant consequence of a successful equity crowdfunding campaign is a clear reduction of firm's exposure towards third party sources of capital.

3.7. Econometric Models

The purpose of this chapter is to describe the econometric models performed as second part of the study of this paper. As also briefly explained in the second chapter (Typologies of Analysis and Hypothesis), the models created aim at further analysing two main relations between equity crowdfunding and the innovative start-ups that decide to collect risk capital through this innovative financing instrument. The first one is represented by the firm's characteristics that are associated to the access to equity crowdfunding, with the aim of understanding with a more deep and complete approach the dynamics of a potential selection effect already highlighted by the results of the first descriptive statistics (Descriptive Statistics 1). The second link between innovative start-ups and the funding instrument considered is instead represented by the structure and dimension of the firm, with particular attention given to its level of professionalization. The aim, in this case, is then to analyse the evolution of the managerial team of the venture after the conclusion of the equity crowdfunding campaign, in order to identify a potential treatment effect generated by a positive outcome of this financing source on the level of professionalization of the backed firm.

Given the differences in terms of purpose of these two analyses, the chapter is split in two parts, the first one related to the selection effect on the access to equity crowdfunding, the second, instead, to the treatment effect on venture's level of professionalization. For both the sections, an explanation of the estimation technique exploited is provided, together with the presentation of the econometrics models computed and the description of the dependent and independent variables considered. The results of these analyses are instead presented in the following chapter (Results), together with related comment and potential explanation.

3.7.1. Selection Effect on Access to Equity Crowdfunding

As presented by the results of the Descriptive Statistics 1 (Descriptive Statistics 1), early-stage ventures that launch an equity crowdfunding campaign are typically characterised by a specific profile if compared to the ones that instead prefer other financing instruments. As a matter of fact, start-ups that promote an equity crowdfunding project on a platform are usually more structured and bigger than the others. More precisely, their average values of tangible, intangible and financial assets are significantly higher, with specific focus on the IPRs and R&D expenditures. Moreover, these firms tend to employ a greater number of workers and are managed by more managers than the ones that are instead backed by business angels, venture capitalists or banks.

The idea is then to create an econometric model able to study with higher statistical significance the presence of a potential selection effect related to the access to the equity crowdfunding instrument. In regard of this topic, the selection process could be determined by both the actors involved in the promotion of a crowdfunding campaign. As a matter of fact, a self-selection could take place, meaning that start-ups decide whater or not to use equity crowdfunding based on their perceived fit with this funding source. It could in fact happen that the capital needed is raised from more traditional financial instruments rather than equity crowdfunding, in the case the managers of the venture believe that its characteristics are not adequate to this innovative typology

of funding. One the other side, also the equity crowdfunding platform plays a relevant role in regard of this topic. As in fact presented in the review of the literature (Platform Rules, Regulations), the due diligence performed by this actor is fundamental to prevent low-quality ventures to promote funding projects and, at the end, avoid market failures. A plausible consequence is then a preference by the platform for specific start-up profiles that are considered as signals of entrepreneurial quality and trustworthiness.

The verification of one or both of these two phenomena would lead then to a selection effect on the access to equity crowdfunding based on specific venture's characteristics considered as more suitable for this innovative financing instrument.

For what concerns the variables taken under consideration in the computation of the econometric models related to the selection effect, a first topic is represented by the results obtained from the Descriptive Statistics 1. More precisely, variables able to describe the structure and dimension of the venture are identified and included in the regressions. Moreover, also other aspects are considered, ranging from the geographical location and industry of the firm to specific indicators of innovativeness defined by *Ministero dello Sviluppo Economico*. The purpose is then to guarantee a wide approach to the analysis of the selection effect touching all the potentially relevant aspects, as also done for the descriptive statistics presented.

3.7.1.1. Estimation Technique for Selection Effect

The estimation technique used for the econometric models created for the selection effect on the access to equity crowdfunding is the probit, given then binary nature of the dependent variable considered. In probability theory and statistics, the probit function is the quantile function associated with the standard normal distribution, which is commonly denoted as N(0,1). Mathematically, it is the inverse of the cumulative distribution function of the standard normal distribution, which is denoted as $\Phi(z)$, so the probit is denoted as $\Phi^{-1}(p)$. It has applications

in exploratory statistical graphics and specialized regression modeling of binary response variables.

Largely because of the central limit theorem, the standard normal distribution plays a fundamental role in probability theory and statistics. If we consider the familiar fact that the standard normal distribution places 95% of probability between −1.96 and 1.96, and is symmetric around zero, it follows that

$$\Phi(-1.96) = 0.025 = 1 - \Phi(1.96)$$

The probit function gives the 'inverse' computation, generating a value of an N(0,1) random variable, associated with specified cumulative probability. Continuing the example,

$$\text{probit}(0.025) = -1.96 = -\text{probit}(0.975)$$

In general,

$$\Phi(\text{probit}(p)) = p$$

and

$$\text{probit}(\Phi(z)) = z$$

3.7.1.2. Econometric Models for Selection Effect

In this subchapter, the econometric models performed to study a potential selection effect on the access to equity crowdfunding are presented, along with an explanation of the dependant and independent variables considered. For what concerns this part of the analysis, the models created are four, and they differ between each other in terms of year to which they refer and number of explanatory variables used.

Starting from the first point, the goal is to compare early-stage ventures that promoted an equity crowdfunding campaign and the ones that preferred other financing instruments in relation to two specific years, more precisely 2016 and 2017. This choice is motivated by the fact that the number of equity crowdfunding campaigns launched in Italy in these two years is sufficient to guarantee

a satisficing statistical significance to the econometric model, while for 2013 and 2014 the sample is too small. As a matter of fact, the dataset provided by *Osservatori Entrepreneurship and Finance* clearly shows that the campaigns promoted in Italy in 2016 and 2017 are, respectively, 43 and 44 while, for 2014 and 2015, just 11 and 19.

Moreover, as also explained in the description of the datasets created (Dataset Description for Selection Effect), variables from *Aida* and *Registro Imprese* are referred to the year before the one related to the model for both the innovative start-ups that launched an equity crowdfunding campaign and the ones that, instead, did not. This choice allows, first of all, to have a snapshot of firm's profile just before the beginning of the campaign. Secondly, it permits a comparison between early-stage ventures circumscribed to the same year, therefore more appropriate also to take into account the evolution of the Italian entrepreneurial ecosystem.

The first two econometric models created in relation to the selection effect on the access to equity crowdfunding are the following:

(1)

$$Pr\,(Campaign_{2016,i} = 1 \mid GDP_{2015,i}, North_i, Manufacturing_i, Services_i, Age_{2016,i}, PreviousCampaign_{2014\text{-}2015,i}, Innovativeness_i, SocialVocation_i, FemalePrevalence_i, ForeignerPrevalence_i, YouthPrevalence_i) = \beta_1 GDP_{2015,i} + \beta_2 North_i + \beta_3 Manufacturing_i + \beta_4 Services_i + \beta_5 Age_{2016,i} + \beta_6 PreviousCampaign_{2014\text{-}2015,i} + \beta_7 Innovativeness_i + \beta_8 SocialVocation_i + \beta_9 FemalePrevalence_i + \beta_{10} ForeignerPrevalence_i + \beta_{11} YouthPrevalence_i$$

(2)

$$Pr\,(Campaign_{2017,i} = 1 \mid GDP_{2016,i}, North_i, Manufacturing_i, Services_i, Age_{2017,i}, PreviousCampaign_{2014\text{-}2015\text{-}2016,i}, Innovativeness_i, SocialVocation_i, FemalePrevalence_i, ForeignerPrevalence_i, YouthPrevalence_i) = \beta_1 GDP_{2016,i} + \beta_2 North_i + \beta_3 Manufacturing_i +$$

$$\beta_4 Services_i + \beta_5 Age_{2017,i} + \beta_6 PreviousCampaign_{2014\text{-}2015\text{-}2016,i} + \beta_7 Innovativeness_i +$$

$$\beta_8 SocialVocation_i + \beta_9 FemalePrevalence_i + \beta_{10} ForeignerPrevalence_i + \beta_{11} YouthPrevalence_i$$

As clearly shown by the presentation of these two models, the dependent and independent variables are exactly the same for both the regressions, however referred 2016 or 2017 for the ones that are related to the year. Below is provided a description of all the variables considered.

$Campaign_{k,i}$ is the dependent variable of the model and describes the access to equity crowdfunding in a specific year. More precisely, it is a dummy variable that is equal to 1 in the case the early-stage venture *i* has launched an equity crowdfunding campaign in the year *k*, 0 otherwise.

The first two explanatory variables are selected in order to consider in the ecosystem in which the start-up is located as potential driver of the choice to access or not equity crowdfunding. $GDP_{k,i}$ is a continuous variable that is considered as proxy of the richness of the region where the firm operates. In particular, it indicates the gross domestic product per capita for the year *k* and the region in which the start-up *i* is located. The level of geographical aggregation considered is the one of the regions present in Italy, therefore the models consider 20 different locations and, for all of them, two years, namely 2015 and 2016.

The second independent variable related to firm's geographical location and potentially able to generate a selection effect on the access to equity crowdfunding is $North_i$, which is a dummy variable that assumes value 1 if the venture *i* is located in the North of Italy, 0 otherwise. More precisely, the regions considered in the North of Italy are Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige, Emilia Romagna, Lombardia, Piemonte, Valle d'Aosta and Liguria.

The second group of explanatory variables included in the sample describes the sector in which the firm operates. As in fact stated by the literature, the instrument of equity crowdfunding is more suitable for early-stage ventures that are focused on some specific sectors rather than others.

$Manufacturing_i$ is a dummy variable that is equal to 1 if the start-up *i* operates in the manufacturing sector, 0 otherwise. Similarly, $Services_i$ is another dummy equal to 1 if firm *i* operates in the services sector, 0 otherwise.

The third group of explanatory variables has as purpose the description of the experience of the firm in relation to its business and the financing instrument of equity crowdfunding. As a matter of fact, $Age_{k,i}$ is a continuous variable that represents the age in terms of months of the start-up *i* at the end of the year *k* from the date of registration to the special section *Start-up Innovative* of *Registro Imprese*. To be more precise, $Age_{2016,i}$ indicates the number of months the venture *i* has been registered to the section *Start-up Innovative* at 31/12/2016. This number describes for how long the firm has had the opportunity to promote an equity crowdfunding campaign at that date. The second variable of this group of explanators is $PreviousCampaign_{k,m,i}$, a dummy that assumes value one if the start-up *i* has performed at least one equity crowdfunding campaign in the years *k* and *m*, 0 if it did not. To be more clear, $PreviousCampaign_{2014\text{-}2015,i}$ is equal to 1 if *i* has launched one or more campaigns on an equity crowdfunding platform during the years 2014 and 2015, 0 otherwise. This variable indicates then if the venture considered has already accessed equity crowdfunding or not.

The successive group of independent variables aims at describing the level of innovation reached by the start-up. $Innovativeness_i$ is in fact a dummy variable that assumes value 1 if the early-stage venture *i* satisfies at least two of three requirements set by the Italian legislation. In particular, the first one is satisfied if the 15% of the greater between the costs and the total value of production is related to research and development activities. The second if the team is composed of 2/3 of personnel with a MSc, otherwise of 1/3 of PhDs or graduates with three years of experience in certified research activity. The last requirement is instead satisfied if the start-up owns an intellectual property right or a registered software. Given that to be defined as *start-up innovativa*, according to the Italian legislation, it is sufficient that the venture satisfies just one of these three

requirements, together with other constraints listed in the previous chapter (Typologies of Analysis and Hypothesis), fulfilling two or three of them is a strong indicator of firm's innovativeness.

$SocialVocation_i$ is another dummy variable that instead describes the potential beneficial impact of the start-up on collective wealth. In particular, it assumes value 1 if the firm *i* operates in the sectors defined by the discipline of social entrepreneurship, or in others with high technological content if they have the potential to impact on collective wealth.

The last group of explanatory variables aims at describing the human resources working for the early-stage venture. The first one is $FemalePrevalence_i$, a dummy variable that is equal to 1 in the case the average between the percentages of female social capital and female directors is greater than 66%, 0 otherwise. Similarly, $ForeignerPrevalence_i$ is a dummy that assumes value 1 if the average between the percentages of foreign social capital and foreign directors is higher than 66%, 0 otherwise. The same criterion is repeated also for the dummy $YouthPrevalence_i$.

Beside the models (1) and (2) previously described, two other econometric models are created in relation to the selection effect on the access to equity crowdfunding, introducing two explanatory variables more in the equation. Models (3) and (4) are presented below.

(3)

$$Pr\,(Campaign_{2016,i} = 1 \mid GDP_{2015,i}, North_i, Manufacturing_i, Services_i, Age_{2016,i}, PreviousCampaign_{2014\text{-}2015,i}, Innovativeness_i, SocialVocation_i, FemalePrevalence_i, ForeignerPrevalence_i, YouthPrevalence_i, TotalAssets_{2015,i}, Sales/Assets_{2015,i}) = \beta_1 GDP_{2015,i} + \beta_2 North_i + \beta_3 Manufacturing_i + \beta_4 Services_i + \beta_5 Age_{2016,i} + \beta_6 PreviousCampaign_{2014\text{-}2015,i} + \beta_7 Innovativeness_i + \beta_8 SocialVocation_i + \beta_9 FemalePrevalence_i + \beta_{10} ForeignerPrevalence_i + \beta_{11} YouthPrevalence_i + \beta_{12} TotalAssets_{2015,i} + \beta_{13} Sales/Assets_{2015,i}$$

(4)

$$Pr\ (Campaign_{2017,i} = 1 \mid GDP_{2016,i}, North_i, Manufacturing_i, Services_i, Age_{2017,i}, PreviousCampaign_{2014\text{-}2015\text{-}2016,i}, Innovativeness_i, SocialVocation_i, FemalePrevalence_i, ForeignerPrevalence_i, YouthPrevalence_i, TotalAssets_{2016,i}, Sales/Assets_{2016,i}) = \beta_1 GDP_{2016,i} + \beta_2 North_i + \beta_3 Manufacturing_i + \beta_4 Services_i + \beta_5 Age_{2017,i} + \beta_6 PreviousCampaign_{2014\text{-}2015\text{-}2016,i} + \beta_7 Innovativeness_i + \beta_8 SocialVocation_i + \beta_9 FemalePrevalence_i + \beta_{10} ForeignerPrevalence_i + \beta_{11} YouthPrevalence_i + \beta_{12} TotalAssets_{2016,i} + \beta_{13} Sales/Assets_{2016,i}$$

As clearly shown by the equations (3) and (4), these two models are still related to the same specific years, namely 2016 and 2017, however they introduce two new explanatory variables able to describe the dimension of the firm and its ability in generate revenues from its assets.
In particular, $TotalAssets_{k,i}$ is a continuous variable that represents the total assets owned by the start-up *i* and reported in its balance sheet at the conclusion of the financial year *k*, expressed in thousand €. $Sales/Assets_{k,i}$ is also a continuous variable that describes the ratio between sales and assets at the end of the financial year *k* for the specific venture *i*.

In conclusion, regressions (1), (2), (3) and (4) represent the econometric models created to evaluate the presence of a potential selection effect on the access to equity crowdfunding from innovative start-ups. The results of these equations are reported in the following chapter (Results of Selection Effect).

3.7.2. Treatment Effect on Level of Professionalization

A significant association between the dimension of the human resources employed by the early-stage venture, with particular focus on its level of professionalization, and the instrument of equity crowdfunding is highlighted by all the three descriptive statistics performed and previously described. As a matter of fact, as reported in the chapter Descriptive Statistics 1, the average number of managers appointed by the companies that launch an equity crowdfunding campaign is significantly greater than the one of the ventures that instead prefer more traditional sources of

funding. If, in fact, for the first group of start-ups the managers are approximately 2,87, for the second one this value is equal to 1,97, highlighting then a difference of almost one manager. This trend is also significant along the evolution of the equity crowdfunding process. More precisely, the level of professionalization is strongly associated to the outcome of the crowdfunding campaign. As in fact presented in the chapter Descriptive Statistics 2, early-stage ventures that are perceived as high-quality entrepreneurial projects from potential investors on the platform and, therefore, are able to conclude a successful campaign, are managed, on average, by around 0,5 managers more than the firms for which the financing instrument fails. Also the third descriptive statistics describes this relation between human resources more in general and a successful equity crowdfunding campaign, in particular for what concerns the period after the collection of the risk capital raised from crowdinvestors. Descriptive Statistics 3, in fact, shows that after the completion of a successful equity crowdfunding project the number of employees working for the firm increases, on average, by 1,5 people. It could be then hypothesised that a positive outcome of this financing instrument could stimulate the appointment of new managers, therefore increasing the level of professionalization of the early-stage venture.

The relevance of the hypothesis formulated in relation to the potential treatment effect of a successful equity crowdfunding campaign on the professionalization level of the firm is also supported by the significance of this phenomenon for the more traditional sources of risk capital. As reported in the formulation of the hypothesis (Typologies of Analysis and Hypothesis), business angels and venture capitalists tend to favour the introduction of new managerial profiles in the ventures backed, so to have a stronger control on strategic decision and economic performances. A similar effect could be then hypothesised as a consequence of a successful equity crowdfunding project, especially because of two factors. Firstly, the collection of fresh capital increases the financial capabilities of the start-up in appointing skilled and experienced managers.

Secondly, the notoriety and reputation provided by a positive campaign could stimulate external managers in joining the early-stage venture.

The purpose of the four econometric models presented below is then to identify a potential association between a successful equity crowdfunding campaign and the increase of the dimension of the managerial team of the backed venture. Models differ among them first of all because of the main explanatory variable considered as a measure of campaign success. Secondly, because of the introduction of two additional control variables able to describe the dimension of the firm, as also done for the previous models (3) and (4). Independent variables that instead are present in all the regressions are related to the firm's characteristics, as the location, sector and number of managers before the campaign, as well as campaign characteristics, as the year during which the campaign was promoted or the target capital.

As last consideration, as also explained in the previous chapter (Dataset Description for Treatment Effect), the companies considered in the sample are all the ones that performed an equity crowdfunding campaign. Moreover, the data from Aida are related to the year previous to the one of the campaign.

3.7.2.1. Estimation Technique for Treatment Effect

The estimation technique used for the econometric models created for the treatment effect on the professionalization of the backed venture generated by a successful equity crowdfunding campaign is the OLS. In statistics, ordinary least squares (OLS) or linear least squares is a method for estimating the unknown parameters in a linear regression model. OLS chooses the parameters of a linear function of a set of explanatory variables by minimizing the sum of the squares of the differences between the observed dependent variable in the given dataset and those predicted by the linear function. Geometrically, this is seen as the sum of the squared distances, parallel to the axis of the dependent variable, between each data point in the set and the corresponding point on

the regression line – the smaller the differences, the better the model fits the data. The resulting estimator can be expressed by a simple formula, especially in the case of a single regressor on the right-hand side.

The OLS estimator is consistent when the regressors are exogenous, and optimal in the class of linear unbiased estimators when the errors are homoscedastic and serially uncorrelated. Under these conditions, the method of OLS provides minimum-variance mean-unbiased estimation when the errors have finite variances. Under the additional assumption that the errors are normally distributed, OLS is the maximum likelihood estimator.

OLS is used in fields as diverse as economics (econometrics), political science, psychology and engineering (control theory and signal processing).

3.7.2.2. Econometric Models for Treatment Effect

In this subchapter, the econometric models performed to study a potential treatment effect on the level of firm's professionalization generated by a successful equity crowdfunding campaign are presented, along with an explanation of the dependant and independent variables considered. Also for what concerns this second part of the analysis, the models created are four, and they differ between each other in terms of the main explanatory variable considered for the purpose of the hypothesis formulated and two other control variables also included in models (3) and (4).

Starting from the first element of difference, two different explanatory variables are considered as description of the outcome of the equity crowdfunding campaign, one for each of the models created. The first two econometric models for the treatment effect on the level of firm's professionalization are then reported below.

(5)

$$DeltaManagers_i = \beta_1 North_i + \beta_2 Age_{beginning\ of\ campaign,i} + \beta_3 Managers_{beginning\ of\ campaign,i} + \beta_4 Manufacturing_i + \beta_5 Services_i + \beta_6 Campaign_{2014,i} + \beta_7 Campaign_{2015,i} + \beta_8 Campaign_{2016,i} + \beta_9 Campaign_{2017,i} + \beta_{10} Success_i + \beta_{11} TargetCapital_i + \beta_{12} PlatformCampaigns_i + \varepsilon_i$$

(6)

$$DeltaManagers_i = \beta_1 North_i + \beta_2 Age_{beginning\ of\ campaign,i} + \beta_3 Managers_{beginning\ of\ campaign,i} + \beta_4 Manufacturing_i + \beta_5 Services_i + \beta_6 Campaign_{2014,i} + \beta_7 Campaign_{2015,i} + \beta_8 Campaign_{2016,i} + \beta_9 Campaign_{2017,i} + \beta_{10} CapitalRaised_i + \beta_{11} TargetCapital_i + \beta_{12} PlatformCampaigns_i + \varepsilon_i$$

For both the econometric models (5) and (6) the dependent variable is the same, namely $DeltaManagers_i$. It is a continuous variable that represents the evolution of the dimension of venture's managerial team along the process of equity crowdfunding. More precisely, $DeltaManagers_i$ is equal to the difference between the current number of managers of the start-up *i*, computed at January 2018, and the number of managers of the same company at the beginning of the equity crowdfunding campaign, around 1-2 months before. These data were collected manually on purpose for this study. The operational process performed for the data collection is described in the previous chapter (Operational Process for Treatment Effect).

As clearly shown by the equations, the two regressions differ because of the explanatory variable considered to explain the outcome of the campaign. As a matter of fact, in model (5) the dummy $Success_i$ describes the result of the equity crowdfunding project performed by the start-up *i*, with a value equal to 1 in case of success, 0 in case of failure. In model (6), instead, the outcome of the same campaign is described by the independent variable $Capitalraised_i$, which is a continuous variable that represents the ratio expressed in percentage between the capital effectively collected and the target set by the venture *i* at the beginning of the campaign, expressed as a percentage. More precisely, in the case of the regime *tutto o niente* this indicator is equal to 0% or 100% or

greater than 100%, because, under this mechanism, the funding project is considered successful only in the case all the target capital is collected. Under the regime *offerte scindibili*, instead, this variable can assume any value, given that the capital provided by crowdfunders on the platform is effectively collected by the start-up, independently of the initial target capital defined.

The other control variables included in the econometric models (5) and (6) are the same for both the regressions. More precisely, a first group aims at defining some characteristics of the early-stage venture at the beginning of the equity crowdfunding project.

$North_i$ is the same variable considered in the models (1), (2), (3) and (4), it is a dummy equal to 1 if the start-up *i* is located in the North of Italy, 0 otherwise. The list of the regions considered as part of the North of Italy are reported in the previous chapter (Econometric Models for Selection Effect). $Age_{beginning\ of\ campaign,i}$ is a continuous variable that reports the age of the firm *i*, in terms of months, at the beginning of the campaign from the date of registration to the special section *Start-up Innovative* of *Registro Imprese*. $Managers_{beginning\ of\ campaign,i}$ is a continuous variable that describes the number of managers working for the early-stage venture *i* at the beginning of the equity crowdfunding project, around 1-2 months before.

The last two variables of this first group of controls simply describe the sector in which the firm operates, and are the same used also in the econometric models (1), (2), (3) and (4). $Manufacturing_i$ is a dummy that assumes value 1 if the start-up *i* belongs to the manufacturing sector, 0 otherwise. The same reasoning could be repeated for the dummy variable $Services_i$.

The second group of independent variables has as purpose the description of some characteristics of the equity crowdfunding project. Besides the two indicators of funding success previously described, six more variables belong to this group.

$Campaign_{k,i}$ is a dummy that assumes positive value if the early-stage venture *i* promoted its equity crowdfunding campaign during the year *k*, 0 otherwise. This variable is related, through its four versions, to the years 2014, 2015, 2016 and 2017. These selection in terms of years is

determined by the fact that before 2014 no equity crowdfunding campaigns were launched in Italy, and the dataset related to this financing instrument provided by *Osservatori Entrepreneurship and Finance* was compiled during 2017, therefore no information are available about 2018.

$TargetCapital_i$ is a continuous variable that simply reports the target capital set by the start-up *i* while launching the campaign on the equity crowdfunding platform, expressed in thousand €.

$PlatformCampaigns_i$ is also a continuous variable that highlights the level of experience of the crowdfunding portal when the firm decides to access equity crowdfunding. More precisely, this indicator reports the number of equity crowdfunding projects promoted by the same platform when the venture *i* launches its campaign.

The last factor of equations (5) and (6) is given by ε_i, which represents the error term of the estimated regression, namely the difference between the actual value of the dependent variable and the one predicted by the explanatory variables, for the specific firm *i*.

Beside the models (5) and (6) previously described, two other econometric models are created in relation to the treatment effect on venture's level of professionalization generated by a successful equity crowdfunding campaign, introducing two explanatory variables more in the equation. Models (7) and (8) are presented below.

(7)

$$DeltaManagers_i = \beta_1 North_i + \beta_2 Age_{beginning\ of\ campaign,i} + \beta_3 Managers_{beginning\ of\ campaign,i} + \beta_4 Manufacturing_i + \beta_5 Services_i + \beta_6 Campaign_{2014,i} + \beta_7 Campaign_{2015,i} + \beta_8 Campaign_{2016,i} + \beta_9 Campaign_{2017,i} + \beta_{10} Success_i + \beta_{11} TargetCapital_i + \beta_{12} PlatformCampaigns_i + TotalAssets_{year\ before\ campaign,i} + Sales/Assets_{year\ before\ campaign,i} + \varepsilon_i$$

(8)

$$DeltaManagers_i = \beta_1 North_i + \beta_2 Age_{beginning\ of\ campaign,i} + \beta_3 Managers_{beginning\ of\ campaign,i} + \beta_4 Manufacturing_i + \beta_5 Services_i + \beta_6 Campaign_{2014,i} + \beta_7 Campaign_{2015,i} + \beta_8 Campaign_{2016,i} + \beta_9 Campaign_{2017,i} + \beta_{10} CapitalRaised_i + \beta_{11} TargetCapital_i + \beta_{12} PlatformCampaigns_i + TotalAssets_{year\ before\ campaign,i} + Sales/Assets_{year\ before\ campaign,i} + \varepsilon_i$$

The two additional control variables introduced in models (7) and (8) are the same used for models (3) and (4), and describe the dimension of the venture and its ability to transform its assets into revenues. $TotalAssets_{year\ before\ campaign,i}$ is a continuous variable that reports the total assets owned by the start-up *i* and reported in its balance sheet at the conclusion of the financial year before the one of the equity crowdfunding campaign. $Sales/Assets_{year\ before\ campaign,i}$ is also a continuous variable equal to the ratio between the revenues and the assets owned by firm *i* at the conclusion of the financial year before the one of the crowdfunding project.

As already highlighted, for both these two variables the year selected is the one previous to the date of approval from the platform for the financing project, because it provides a profile of the early-stage venture that is the closest to the beginning of the campaign and, therefore, the most adequate for the analysis to be performed.

In conclusion, regressions (5), (6), (7) and (8) represent the econometric models created to evaluate the presence of a potential treatment effect on the level of venture's professionalization generated by a positive equity crowdfunding project. The results of these regressions are reported in the following chapter (Results of Treatment Effect).

3.8. Results

The purpose of this chapter is to present and describe the results of the econometric models reported in the previous section (Econometric Models). The discussion is split in two parts, the first one dedicated to the selection effect on the access to equity crowdfunding while, the second, to the treatment effect over the venture's level of professionalization. For each of the eight econometric models created, the coefficients and standard deviations for each explanatory variable are reported, together with an information about their p-value, the number of observations and the statistical significance of the whole model.

3.8.1. Results of Selection Effect

This section aims specifically at showing and describing the results of the econometric models created and performed to test the existence of a potential selection effect on the access to equity crowdfunding. The goal is then to identify potential correlations between the launch of an equity crowdfunding campaign and some specific characteristics of the early-stage venture or of the ecosystem in which it is located. Out of eight models created, four belongs to this particular topic (Selection Effect on Access to Equity Crowdfunding). Their results are reported below, with the models aggregated according to the year to which they refer, so to have a more adequate comparison. As a consequence, results of econometric models (1) and (3) are described firstly, followed by (2) and (4) as second part of the discussion of this subchapter.

Econometric Model (1)		Econometric Model (3)	
	Coefficients (Standard Errors)		Coefficients (Standard Errors)
GDP $_{2015}$	0.0317 (0.0162)**	*GDP* $_{2015}$	0.0666 (0.0272)**
North	-0.1175 (0.1797)	*North*	-0.3831 (0.2540)
Manufacturing	0.3522 (0.3622)	*Manufacturing*	3.9063 (398.8366)
Services	0.2540 (0.3447)	*Services*	3.6721 (398.8366)
Age $_{2016}$	-0.0078 (0.0060)	*Age* $_{2016}$	-0.0041 (0.0095)
PreviousCampaign $_{2014-2015}$	-3.3366 (452.7548)	*PreviousCampaign* $_{2014-2015}$	-3.6582 (949.5677)
Innovativeness	0.3009 (0.1756)*	*Innovativeness*	0.6303 (0.2112)***
SocialVocation	0.5553 (0.2621)**	*SocialVocation*	0.9487 (0.3204)***
FemalePrevalence	0.0662 (0.1824)	*FemalePrevalence*	0.3633 (0.2371)
ForeignerPrevalence	-3.3666 (175.8584)	*ForeignerPrevalence*	-4.2003 (669.6739)
YouthPrevalence	0.2416 (0.1426)*	*YouthPrevalence*	-0.0818 (0.2807)
		TotalAssets $_{2015}$	-0.0002 (0.0004)
		Sales/Assets $_{2015}$	-0.3146 (0.2060)
Number of observations	5295	Number of observations	3329
Pseudo R^2	0.0452	Pseudo R^2	0.1530
Prob > x^2	0.0608	Prob > x^2	0.0019

* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 3.50 Results of Econometric Models (1) and (3)

The table above (Table 3.50) reports the results of the econometric models (1) and (3) in terms of coefficients, standard deviations and p-values of the explanatory variables considered, together with the number of observations of the regression and indicators of its statistical significance.

Starting from the econometric model (1), the number of observations is significant and equal to 5295. On the other side, however, the overall statistical significance is not optimal. As a matter of fact, even if the p-value could be considered as satisficing, the percentage of variance of the dependent variable explained by the model, indicated by the Pseudo R^2, is quite limited.

For what concerns the role played by each independent variable, the table (Table 3.50) clearly shows that four are the ones with statistical significance under a level of the p-value equal to 10%. The first one is the GPD_{2015} that seems to be positively correlated to the access to equity crowdfunding in the following year. This could be motivated by the fact that, even if the phenomenon of crowdfunding is geographically dispersed, the role played by family and friends and local investors in stimulating other crowdfunders in financing the project is of extreme

relevance. A region characterised by a proactive ecosystem could then favour the efficacy of equity crowdfunding and, in the end, increase its rate of access from early-stage ventures seeking for risk capital.

The second significant explanatory variable positively associated to the access to this innovative financing instrument is *SocialVocation*, with a p-value below 5%. This means that being a start-up with social vocation is positively correlated to the launch of an equity crowdfunding campaign, probably because of the role played by crowdfunding in general in regard of entrepreneurial activities of this typology. Indeed, at the beginning crowdfunding was extremely focused on the donation-based mechanism, through which people had the possibility to fund projects to improve, overall, the wealth of the population. Still lots of crowdfunders on equity crowdfunding platforms are philanthropists, who provide capital to social ventures just to be part of their entrepreneurial projects. This dynamic could be then the cause of this relevant correlation.

The two other interesting explanatory variables related to the access to equity crowdfunding are *Innovativeness* and *YouthPrevalence*, with a p-value below 10%. Both of them are positively associated to the launch of a campaign on an equity crowdfunding portal, probably because of two reasons. First of all, the fact that young entrepreneurs on average do not have already the professional network and social capital needed to raise capital from the more traditional sources of funding, like business angels, venture capitalists and banks, therefore may prefer more new and innovative financing instruments. Secondly, the fact that their level of innovativeness and the presence of young entrepreneurs could be valued by crowdfunders on platforms and, therefore, facilitate the collection of risk capital through equity crowdfunding.

The econometric model (3) introduces two additional independent variables, able to describe the dimension of the firm and its ability of creating revenues from its assets. As clearly shown by the table Table 3.50, the number of observations is significantly decreased, because of the scarce

availability of the indicators $TotalAssets_{2015}$ and $Sales/Assets_{2015}$ on Aida. Nevertheless, this value is equal to 3329, which is still a more than satisficing dimension of sample. Moreover, the introduction of these two explanatory variables increases relevantly the statistical significance of the overall econometric model. As a matter of fact, the p-value decreases to below to 1%, while the percentage of variance of the dependent variable explained is, approximately, the 15%.

Comparing the statistical significance of the independent variables of the two models, results highlight that the same conclusions described for the model (1) can be reported also for model (3). As a matter of fact, the relevance of *Innovativeness* and *SocialVocation* is even stronger, with a p-value lower than 1%. On the other side, GPD_{2015} has the same statistical significance with a p-value below 5%, while *YouthPrevalence* seems not to be correlated anymore to the access to equity crowdfunding.

In order to evaluate and compare among them the effects of these explanatory variables on the probability to access equity crowdfunding in the year 2016, the marginal effects and standard deviations of all the independent variables included in the models (1) and (3) are reported in the table below (Table 3.51).

Econometric Model (1)		Econometric Model (3)	
	Marginal Effects (Standard Errors)		Marginal Effects (Standard Errors)
GDP $_{2015}$	0.0004 (0.0046)	*GDP* $_{2015}$	0.0002 (0.0161)
North	-0.0015 (0.0172)	*North*	-0.0011 (0.0924)
Manufacturing	0.0044 (0.0514)	*Manufacturing*	0.0113 (0.5222)
Services	0.0032 (0.0372)	*Services*	0.0106 (0.5342)
Age $_{2016}$	-0.0001 (0.0011)	*Age* $_{2016}$	-0.0000 (0.0010)
PreviousCampaign $_{2014\text{-}2015}$	-0.0415 (5.5059)	*PreviousCampaign* $_{2014\text{-}2015}$	-0.0105 (2.7264)
Innovativeness	0.0037 (0.0438)	*Innovativeness*	0.0018 (0.1521)
SocialVocation	0.0069 (0.0808)	*SocialVocation*	0.0027 (0.2289)
FemalePrevalence	0.0008 (0.0099)	*FemalePrevalence*	0.0010 (0.0877)
ForeignerPrevalence	-0.0419 (1.7303)	*ForeignerPrevalence*	-0.0121 (1.7680)
YouthPrevalence	0.0030 (0.0352)	*YouthPrevalence*	-0.0002 (0.0197)
		TotalAssets $_{2015}$	0.0000 (0.0000)
		Sales/Assets $_{2015}$	-0,0009 (0.0759)

Table 3.51 Marginal Effects of Econometric Models (1) and (3)

After the discussion of econometric models (1) and (3) in relation to the access to equity crowdfunding in Italy during 2016, the results of models (2) and (4) for what concerns the year 2017 are presented and listed in the table below (Table 3.52).

Econometric Model (2)		Econometric Model (4)	
	Coefficients (Standard Errors)		Coefficients (Standard Errors)
GDP $_{2016}$	-0.0013 (0.0159)	*GDP* $_{2016}$	-0.0192 (0.0205)
North	0.3189 (0.2062)	*North*	0.4757 (0.2824)*
Manufacturing	-0.5455 (0.3115)*	*Manufacturing*	-0.5835 (0.4116)
Services	-0.0377 (0.2234)	*Services*	0.0386 (0.2837)
Age $_{2017}$	-0.0128 (0.0052)**	*Age* $_{2017}$	-0.0208 (0.0075)***
PreviousCampaign $_{2014\text{-}2015\text{-}2016}$	-2.9227 (159.5681)	*PreviousCampaign* $_{2014\text{-}2015\text{-}2016}$	-3.3683 (494.2331)
Innovativeness	-0.0840 (0.2641)	*Innovativeness*	-0.2484 (0.3587)
SocialVocation	-2.9874 (104.5032)	*SocialVocation*	-3.4493 (356.2506)
FemalePrevalence	-0.6508 (0.3351)**	*FemalePrevalence*	-0.3943 (0.3526)
ForeignerPrevalence	0.2232 (0.2896)	*ForeignerPrevalence*	-3.5082 (362.2964)
YouthPrevalence	0.1919 (0.1361)	*YouthPrevalence*	0.1592 (0.1800)
		TotalAssets $_{2016}$	0.0000 (0.0000)
		Sales/Assets $_{2016}$	-0.0683 (0.1028)
Number of observations	6925	Number of observations	4582
Pseudo R^2	0.0645	Pseudo R^2	0.0838
Prob > x^2	0.0022	Prob > x^2	0.0288

* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 3.52 Results of Econometric Models (2) and (4)

The table above (Table 3.52) reports the results of the econometric models (2) and (4) in terms of coefficients, standard deviations and p-values of the explanatory variables considered, together with the number of observations of the regression and indicators of its statistical significance.

Starting from the econometric model (2), the dimension of the sample of companies for which all the information are available is extremely wide, being equal to 6925 innovative start-ups. Moreover, the level of statistical significance of the whole model is satisficing, with a p-value below 1%. The percentage of variance of the dependent variable explained by the controls set in the equation is, however, quite limited, given that it is equal to approximately 6,5%.

Analysing the table of the results (Table 3.52) in relation to the econometric model (2), what clearly emerges is that three are three explanatory variables with statistical significance below

10%. Age_{2017} seems to play a relevant role in relation to the access to equity crowdfunding in Italy during the year 2017. More precisely, it is experienced a negative correlation between the number of months the early-stage venture has been registered to the special section *Start-up Innovative* of *Registro Imprese* until the end of 2016 and the launch of an equity crowdfunding campaign. This phenomenon could be motivated by the fact that the greater the experience in business of the firm, the easier the possibility to collect capital from the traditional sources of funding. More precisely, if the firm has been operating for a longer period, it is more likely that it will provide detailed financial statements and guarantee enough cash flows to require bank loans, if compared to a venture founded just few months ago. Moreover, a greater experience in business could be also correlated to venture capital financing. As in fact reported in the literature review, during the last years venture capitalists, but also business angels, increased their minimum level of investment, therefore becoming more appropriate for start-ups already somehow developed and grown. In conclusion, the negative association between firm's age and access to equity crowdfunding in 2017 could be motivated by the ease of collection of funds through the more traditional sources of financing when the start-up gets older.

The two other statistically significant explanatory variables are *FemalePrevalence* and *Manufacturing*. More precisely, the first one has a p-value below 5%, while the second one below the level of 10%, therefore less relevant. Both of them experience a negative correlation with the access to equity crowdfunding in 2017, meaning that early-stage ventures that are characterised by prevalence of females and/or operate in the manufacturing sector are associated to lower probabilities of launching a campaign on an equity crowdfunding platform.

The econometric model (4) introduces the same two independent variables of the model (3), however related to the year 2016. As shown by the chart (Table 3.52), the dimension of the sample of this regression is significantly lower than the one of model (2), because of the lack of information related to the two additional variables introduced. Nevertheless, the number of

innovative start-ups for which all the data are available is 4582, which is still an optimal sample's dimension. The overall statistical significance of the model is slightly reduced, but still with a p-value below the 5%, while the Pseudo R^2 has increased by, approximately, 2 percentage points.

Analysing the p-values of the explanatory variables in the model, what seems to be confirmed is the role played by the age of the venture in relation to the probability of access to equity crowdfunding during the year 2017. As a matter of fact, the statistical relevance of Age_{2017} in econometric model (4) is even stronger, with a p-value below 1%.

On the other side, the role played by *FemalePrevalence* and *Manufacturing* in not reconfirmed by the results of this regression, that instead introduces the statistical significance of another variable, namely *North*. This indicator, significant below the 10%, is positively correlated to the access to equity crowdfunding in 2017. This means that early-stage ventures that are located in Lombardia, Piemonte, Liguria, Veneto, Emilia-Romagna, Friuli-Venezia Giulia, Trentino-Alto Adige and Valle d'Aosta are associated to greater probabilities of launching an equity crowdfunding campaign, probably because of a higher awareness of entrepreneurs and development of this innovative financing instrument in the North of Italy.

In order to evaluate and compare among them the effects of these explanatory variables on the probability to access equity crowdfunding in the year 2017, the marginal effects and standard deviations of all the independent variables included in the models (2) and (4) are reported in the table below (Table 3.53).

Econometric Model (2)		Econometric Model (4)	
	Marginal Errors (Standard Errors)		Marginal Errors (Standard Errors)
GDP $_{2016}$	-0.0000 (0.0001)	*GDP* $_{2016}$	-0.0001 (0.0037)
North	0.0026 (0.0174)	*North*	0.0025 (0.0926)
Manufacturing	-0.0045 (0.0297)	*Manufacturing*	-0.0031 (0.1135)
Services	-0.0003 (0.0027)	*Services*	0.0002 (0.0077)
Age $_{2017}$	-0.0001 (0.0007)	*Age* $_{2017}$	-0.0001 (0.0040)
PreviousCampaign $_{2014\text{-}2015\text{-}2016}$	-0.0239 (1.2364)	*PreviousCampaign* $_{2014\text{-}2015\text{-}2016}$	-0.0180 (2.4564)
Innovativeness	-0.0007 (0.0050)	*Innovativeness*	-0.0013 (0.0483)
SocialVocation	-0.0245 (0.7195)	*SocialVocation*	-0.0184 (1.5499)
FemalePrevalence	-0.0053 (0.0354)	*FemalePrevalence*	-0.0021 (0.0767)
ForeignerPrevalence	0.0018 (0.0124)	*ForeignerPrevalence*	-0.0187 (1.5776)
YouthPrevalence	0.0016 (0.0105)	*YouthPrevalence*	0.0008 (0.0310)
		TotalAssets $_{2016}$	0.0000 (0.0000)
		Sales/Assets $_{2016}$	-0.0004 (0.0133)

Table 3.53 Marginal Effects of Econometric Models (2) and (4)

In conclusion, econometric models (1) and (3) highlight a strong and statistically significant positive association between the level of innovativeness of the early-stage venture, the potential social vocation of the entrepreneurial project and the geographical location, expressed in terms of GDP, with the probability of launching an equity crowdfunding campaign. Econometric model (2) and (4), instead, report the relevance of the age of the start-up as significantly negatively correlated with the probability of asking risk capital to crowdfunders on the platform. These differences in terms of associations could be determined by the fact that equity crowdfunding is still a new phenomenon in Italy, indeed the first funding project was launched just four years ago. As a consequence of that, its dynamics could vary across the years until they reach a stable regime.

3.8.2. Results of Treatment Effect

This section aims specifically at showing and describing the results of the econometric models created and performed to test the existence of a potential treatment effect on the level of professionalization of the backed venture generated by a successful equity crowdfunding campaign. The goal is then to understand if it is experienced a statistically significant association between the growth of the managerial team and measures of campaign success, considering also other control variables related to firm's and funding project's characteristics. Out of eight models created, four belongs to this particular topic (Econometric Models for Treatment Effect). Their

results are reported below, with the models aggregated according to the main explanatory variable used as indicator of the outcome of the equity crowdfunding campaign, so to have a more adequate comparison. As a consequence, results of econometric models (5) and (7) are described firstly, followed by (6) and (8) as second part of the discussion of this subchapter.

Econometric Model (5)		Econometric Model (7)	
	Coefficients (Standard Errors)		Coefficients (Standard Errors)
North	0.1998 (0.2252)	*North*	0.1886 (0.2533)
Age $_{beginning\ of\ campaign}$	0.0062 (0.0114)	*Age* $_{beginning\ of\ campaign}$	-0.0104 (0.0131)
Managers $_{beginning\ of\ campaign}$	-0.2476 (0.0954)***	*Managers* $_{beginning\ of\ campaign}$	-0.2272 (0.1126)**
Manufacturing	0.0276 (0.5733)	*Manufacturing*	0 (omitted)
Services	0.2783 (0.4994)	*Services*	0.0736 (0.3266)
Campaign $_{2014}$	0 (omitted)	*Campaign* $_{2014}$	0.8042 (0.6341)
Campaign $_{2015}$	-0.4206 (0.5162)	*Campaign* $_{2015}$	-0.1313 (0.4950)
Campaign $_{2016}$	-0.6614 (0.4218)	*Campaign* $_{2016}$	0.2005 (0.3899)
Campaign $_{2017}$	-0.8321 (0.5235)	*Campaign* $_{2017}$	0 (omitted)
Success	0.9641 (0.2434)***	*Success*	0.6643 (0.2996)**
TargetCapital	0.0000 (0.0007)	*TargetCapital*	-0.0008 (0.0010)
PlatformCampaigns	0.0016 (0.0227)	*PlatformCampaigns*	-0.0165 (0.0265)
		TotalAssets $_{year\ before\ campaign}$	0.0008 (0.0003)***
		Sales/Assets $_{year\ before\ campaign}$	0.2588 (0.1846)
Number of observations	82	Number of observations	49
R^2	0.2844	R^2	0.5191
Prob > F	0.0095	Prob > F	0.0031

* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 3.54 Results of Econometric Models (5) and (7)

The table above (Table 3.54) reports the results of the econometric models (5) and (7) in terms of coefficients, standard deviations and p-values of the explanatory variables considered, together with the number of observations of the regression and indicators of its statistical significance.

Starting with the model (5), the total number of observations of the regression is equal to 82. This value seems to be quite low, however a significant constraint to this analysis is represented by the limited number of companies that performed an equity crowdfunding campaign in Italy from its regularization by the CONSOB. As a matter of fact, in the database provided by *Osservatori* "Entrepreneurship & Finance" the total number of early-stage ventures that launched an equity crowdfunding project from 2014 until mid-2017 is 117. Moreover, some of these firms are not

reported in the database created by *Registro Imprese*, generating then a final number of 82 observations. This dimension of the sample, even if limited, is however still sufficient to analyse the presence of a potential treatment effect over firm's level of professionalization with satisficing statistical significance.

For what concerns the statistical significance of the model, both the indicators are extremely promising. Indeed, the p-value on the goodness of the regression is below 1%, while the R^2 is equal to 0.2844, meaning that approximately 28% of the variance of the dependent variable is explained by the independent variables introduced.

Analysing the p-values of the coefficients reported in the table Table 3.54 in relation to the econometric model (5), two are the main explanatory variables associated to the growth of the managerial team. Moreover, both of them result to be extremely significant, because of a p-value lower than 1%.

The first indicator is this sense is the variable *Success*, which is the one that identifies the result of the equity crowdfunding campaign and, therefore, is the most relevant for the purpose of the hypothesis previously stated (Typologies of Analysis and Hypothesis). The outcome of the funding project seems to be positively correlated to the growth of the managerial team. As a matter of fact, completing an equity crowdfunding campaign with success is associated to the appointment of 0.96 managers more than in the case the financing instrument fails. This result seems to support then the hypothesis according to which the level of professionalization of the backed venture is subjected to the treatment effect generated by a successful equity crowdfunding campaign.

The second statistically significant independent variable in the econometric model (5) is $Managers_{beginning\ of\ campaign}$. As shown by the chart (Table 3.54), it is experienced a strong statistically significant correlation between the number of managers working for the firm at moment of launch of the equity crowdfunding project and the successive evolution of the

managerial team. More precisely, results show a negative association between these two factors. Interpreting the coefficients computed, the presence of an additional manager at the beginning of the campaign is associated to a reduction of the growth of the managerial team equal to 0.25 managers. This result is quite expected given that, besides the phenomenon of equity crowdfunding, innovative start-ups that are more professionalised do not need to foster this aspect related to human resources as instead the ones that are managed by few professional figures.

Econometric model (7) introduces the same additional explanatory variables related to the dimension of the early-stage venture and its ability in generating revenues from its assets, also used by the models (3) and (4), that are $TotalAssets_{year\ before\ campaign}$ and $Sales/Assets_{year\ before\ campaign}$. As reported in the table (Table 3.54), the total number of observations for this regression is equal to 49 innovative start-ups. This reduction, if compared to the sample of econometric model (5), is determined by the scarce availability of information on the database downloaded from Aida in relation to the two variables introduced. Nevertheless, it is interesting to consider also this regression in order to understand if the conclusion about the treatment effect previously presented stands also in this case or not.

Moreover, even if the dimension of the sample is limited, the statistical significance of the model has significantly improved after the introduction of the two additional independent variables. As a matter of fact, the p-value of the model overall is lower than 1% and the R^2 peaks to 0.5191, meaning that almost the 52% of the variance of the growth of the managerial team is explained by the explanatory variables considered.

Also in this case, variables *Success* and $Managers_{beginning\ of\ campaign}$ result to be statistically significant, with a p-value lower than 5%. The correlation between these two indicators and the growth of the number of managers appointed by the start-up is the same reported for the econometric model (5). More precisely, the conclusion of a successful equity crowdfunding campaign is associated with an increase of the growth of the managerial team equal to 0.66

managers. On the other side, the presence of an additional manager at the beginning of the campaign is associated to a reduction of the growth of firm's professionalization equal to, approximately, 0,23 professional figures. In conclusion, also econometric model (7) seems to support the hypothesis according to which an equity crowdfunding project concluded with positive outcome is correlated to an increase of the level of professionalization adopted by the firm.

One last relevant explanatory variable highlighted by the result of econometric model (7) is represented by $TotalAssets_{year\ before\ campaign}$, which has a p-value lower that 1%. Results report a positive association between this indicator and the level of firm's professionalization, even is extremely limited in the impact. Interpreting the coefficients, in fact, an increase of total assets before the campaign equal to 100 k€ is associated to the appointment of 0.08 managers more.

After the discussion of econometric models (5) and (7) in relation to the level of start-up's professionalization, the results of models (6) and (8), with the main explanatory variable *CapitalRaised* as measure of campaign success, are presented and listed in the table below (Table 3.55).

Econometric Model (6)		Econometric Model (8)	
	Coefficients (Standard Errors)		Coefficients (Standard Errors)
North	0.2589 (0.2294)	*North*	0.1737 (0.2540)
Age $_{beginning\ of\ campaign}$	0.0037 (0.0116)	*Age* $_{beginning\ of\ campaign}$	-0.0136 (0.0128)
Managers $_{beginning\ of\ campaign}$	-0.1429 (0.0889)	*Managers* $_{beginning\ of\ campaign}$	-0.1390 (0.1038)
Manufacturing	-0.0646 (0.6019)	*Manufacturing*	0 (omitted)
Services	0.2529 (0.5178)	*Services*	0.1874 (0.3422)
Campaign $_{2014}$	0 (omitted)	*Campaign* $_{2014}$	0.9148 (0.6455)
Campaign $_{2015}$	-0.3534 (0.5294)	*Campaign* $_{2015}$	0.0241 (0.5134)
Campaign $_{2016}$	-0.6872 (0.4340)	*Campaign* $_{2016}$	0.3332 (0.3986)
Campaign $_{2017}$	-1.1258 (0.5485)**	*Campaign* $_{2017}$	0 (omitted)
CapitalRaised	0.3376 (0.1008)***	*CapitalRaised*	0.2741 (0.1276)**
TargetCapital	0.0003 (0.0007)	*TargetCapital*	-0.0007 (0.0010)
PlatformCampaigns	0.0069 (0.0234)	*PlatformCampaigns*	-0.0199 (0.0264)
		TotalAssets $_{year\ before\ campaign}$	0.0009 (0.0003)***
		Sales/Assets $_{year\ before\ campaign}$	0.2010 (0.1898)
Number of observations	82	Number of observations	49
R^2	0.2451	R^2	0.5155
Prob > F	0.0344	Prob > F	0.0034

* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 3.55 Results of Econometric Models (6) and (8)

The table above (Table 3.55) reports the results of the econometric models (6) and (8) in terms of coefficients, standard deviations and p-values of the explanatory variables considered, together with the number of observations of the regression and indicators of its statistical significance.

Starting from econometric model (6), the number of companies for which all the variables selected are available is equal tom 82. The reasons behind this quite moderate dimension of the sample are the same provided also for the model (5). The level of statistical significance of the regression is also moderate, given a p-value lower than 5% and an R^2 equal to 0.2451.

What clearly emerges from the results of econometric model (6) is that the variable *CapitalRaised* is strongly statistically correlated to the growth of the managerial team of the early-stage venture. Indeed, the p-value of this indicator is lower that 1%. Furthermore, trying to interpret the coefficients computed, an increase of one percentage point in the ratio between the capital effectively collected and the target set at the beginning of the campaign is associated to an increase of the growth of the number of managers equal to 0.34 managers. Also in this case, then, results

seem to confirm the hypothesis related to the treatment effect of a successful equity crowdfunding campaign on the level of professionalization of the backed early-stage venture.

Focusing instead on the last econometric model performed, namely regression (8), the dimension of the sample is equal to 49 innovative start-ups and the reasons behind are the same provided for model (7). Despite, the reduced number of observations, it is still interesting to understand if the conclusion stated for the previous model about the treatment effect are verified also in this case or not. Moreover, the statistical significance of the regression is extremely high, given an overall p-value lower than 1% and an explained percentage of the variance of the dependent variable around 52%.

Also in this case, Table 1.1 shows that the main explanatory variable in relation to the hypothesis formulated, namely *CapitalRaised*, is statistically significant, given a p-value lower than 5%. Moreover, it is reported a positive association between this independent indicator and the growth of the managerial profile. To be precise, an increase of one percentage point of the *CapitalRaised* is correlated to an improvement in the growth of the manager appointed by the start-up equal to, approximately, 0,27 managers. In conclusion, also econometric model (8) seems to confirm the goodness of the hypothesis formulated about the treatment effect generated by a positive equity crowdfunding project.

One conclusive consideration about this last econometric model is, as for regression (7), the relevance of the variable $TotalAssets_{year\ before\ campaign}$, that reports a p-value lower than 1%. Besides the statistical significance, however, the impact of this indicator on the growth of the managerial team is extremely limited. Indeed, an increase of 100 k€ in the value of the total assets is associated to the appointment of just 0.09 managers more.

In conclusion, econometric models (5), (6), (7) and (8) seem all to support the hypothesis formulated in the chapter Typologies of Analysis and Hypothesis, according to which the

conclusion of a successful equity crowdfunding campaign stimulates the growth of the level of professionalization of the backed early-stage venture. Models (5) and (7), in fact, demonstrate that the explanatory variable *Success* is strongly and positively correlated to the growth of the number of managers appointed by the firm. This result stands also in the case the outcome of the crowdfunding project is described by the variable *CapitalRaised*, as demonstrated by econometric models (6) and (8).

4. Conclusions

The analyses performed and presented along this paper aim at studying with a 360° approach the phenomenon of equity crowdfunding in the Italian ecosystem, in order to depict the main dynamics behind the three different phases that characterise this innovative source of financing. In particular, the first part of the study is composed of three descriptive statistics, whose purpose is to highlight the mechanisms that guide the access to equity crowdfunding, the completion of a successful campaign and the consequences of a crowdfunding project with positive outcome. The second part is instead dedicated to the econometric models, with the aim of understanding if equity crowdfunding is subject to a potential selection effect on the access from early-stage ventures, as well as a potential treatment effect on the level of specialisation of the backed start-up generated by a successful campaign. To our knowledge, this topic has never been studied before by academics and researchers, representing then a cutting-edge study for the existing literature on equity crowdfunding.

The clear trend that emerges from the results of the first descriptive statistics is that, on average, the innovative start-ups that decide to launch an equity crowdfunding campaign are more structured and developed than the ones that prefer more traditional sources of funding. As a matter of fact, it is experienced a consistently greater expansion of the companies that exploit this innovative financing instrument in terms of assets and human resources employed. The level of tangibles, financials and intangibles reported in their balance sheet is in fact much greater, with particular reference to IPRs and investments in R&D. Moreover, these firms are characterised by a consistently higher number of employees, executives and external advisors appointed. Another relevant element of difference is represented by the capital structure, more exposed towards third party sources of capital for the start-ups that did not access equity crowdfunding. For what concerns profitability and liquidity, no disparities were discovered between the two groups of firms.

The most relevant and interesting trend emerging from the second descriptive statistics is that, also for this phase of the financing instrument, the innovative start-ups that complete with success an equity crowdfunding campaign are, on average, more structured and characterised by a greater dimension in terms of human resources than the ones for which the financing instrument fails. More precisely, these companies tend to appoint more directors, managers and advisors before the launch of the equity crowdfunding project. The other main elements of difference between these two groups of firms are represented by the intellectual property rights owned and the duration set for the campaign. As a matter of fact, innovative start-ups that complete the funding project with positive result report on their balance sheet a significantly higher value of IPRs and launch a campaign that, on average, lasts for half of the months of the unsuccessful ones.

The main trend that emerges from the third descriptive statistics is related, also in this case, to the dimension of the innovative start-up, as also observed for the two analyses previously presented. As a matter of fact, completing an equity crowdfunding campaign with positive result allows the firm to reinforce its structure both in terms of human resources and assets. After completing the successful funding project, in fact, the number of employees working for the start-up tends to growth by almost 70%. Moreover, a significant part of the capital collected is invested in research and development, in order to foster the competitive advantage with competitors. One last relevant consequence of a successful equity crowdfunding campaign is a clear reduction of firm's exposure towards third party sources of capital.

As further development of the analysis performed through the first descriptive statistics, the econometric models created and computed in relation to the potential selection effect on the access to equity crowdfunding demonstrate the existence of a strong and statistically significant positive association between the level of innovativeness of the early-stage venture, the potential social vocation of the entrepreneurial project and the geographical location, expressed in terms of GDP, with the probability of launching an equity crowdfunding campaign. Moreover, results

highlight the relevance of the age of the start-up as significantly negatively correlated with the probability of asking risk capital to crowdfunders on the platform.

With the purpose of further studying the trend identified by the three descriptive statistics about the relation between the structure and dimension of the start-up and the equity crowdfunding, the econometric models related to the potential treatment effect of a positive campaign on the level of professionalization of the backed early-stage venture represent a clear standing point with the existent literature on the topic. Results seem to support the hypothesis formulated in the chapter Typologies of Analysis and Hypothesis, according to which the conclusion of a successful equity crowdfunding campaign stimulates the growth of the level of professionalization of the innovative start-up that collected risk capital from crowdinvestors. Econometric models, in fact, demonstrate that success is strongly and positively correlated to the growth of the number of managers appointed by the firm. This result is verified also in the case the outcome of the crowdfunding project is described by the ratio between the risk capital effectively collected and the target set at the beginning of the campaign.

For what concerns the limitations of the study presented in this paper, a first relevant issue is given by the limited dimension of the sample for what concerns the Descriptive statistics 2 and 3 and the econometric models related to the treatment effect on firm's level of professionalization. Given that equity crowdfunding is a quite recent phenomenon in Italy, the first campaign launched is dated 2014 and the total number of crowdfunding projects performed at the date of this paper is equal to 117. As a consequence of that, the conclusions presented are based on a limited sample and, therefore, are able to describe the Italian equity crowdfunding market with moderate significance.

A second limitation is related to the estimation technique of analyses computed for the descriptive statistics. As a matter of fact, the use of the test-T allows to depict statistical differences among two groups of firms, however does not permit to state conclusions related to cause-effect relations.

All the results presented for the descriptive statistics must be then considered as simple statistical associations with the different phases of equity crowdfunding and not as precise causal links.

The study presented in this paper represents an interesting starting point for further research projects related to the topic of equity crowdfunding. As first consideration, the analysis of the treatment effect on firm's level of professionalization generated by a successful campaign should be performed on a greater sample of companies, in order to obtain results with higher statistical significance. As previously stated, at the date of this paper the number of innovative start-ups that launched an equity crowdfunding campaign in Italy is quite limited, being equal to 117 firms. This study should be then repeated when the data available from the Italian market will be comprehensive enough to provide econometric models with undeniable conclusions.

A second relevant topic not covered by the study of this paper and, therefore, potentially object of further research on the dynamics of equity crowdfunding is represented by the understanding of the precise reasons that determine the treatment effect explored in the paper. To be more precise, the positive association between a successful equity crowdfunding campaign and the growth of the managerial team of the funded venture could be motivated by two phenomena. The first one is given by the greater financial availabilities of the firm as consequence of the conclusion of the funding project with positive outcome. The collection of fresh capital could, in fact, stimulate the early-stage venture in appointing new skilled and experienced managers so to improve its level of professionalization. A second indirect phenomenon to be considered is represented by the positive externalities on public awareness generated by a successful equity crowdfunding campaign. As a matter of fact, the effective collection of risk capital through this innovative financing instrument could improve the reputation and quality of the start-up perceived by professional managers, who can be in turn stimulated in joining the early-stage venture and fostering its business development. To conclude, further research should focus on this topic, in order to understand if the treatment effect on firm's professionalization discovered in this paper

is generated by the greater financial availabilities of the backed venture, the positive externalities of the financing instrument on perceived quality and reputation, or both of them.

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