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THE OPERATING PERFORMANCES OF ITALIAN FIRMS AFTER AN EQUITY CROWDFUNDING CAMPAIGN

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ABSTRACT - ENGLISH

Equity crowdfunding can be a valid alternative for ventures that struggle in finding the capital to finance their operations. It can also foster the entrepreneurial ecosystem in terms of innovation and contribution to economic growth. Several papers have studied the characteristics of campaigns and the dynamics of capital raising. However, there is little research aimed at explaining the relationship between the operational results of companies which ran an equity crowdfunding campaign and the outcome of the campaign itself. This work aims at filling this gap with respect to the Italian market, representing an absolute novelty for academic research at a national level: the dataset that was used includes the companies that ran crowdfunding equity campaigns up to 2017 on authorized Italian platforms. This study analyzes the relationship between the outcome of the campaign, the type of capital raised by firms who failed the campaign, operational performances and survival probabilities. Among the results, it is shown that Italian companies that have successfully closed an equity crowdfunding round have better results than their counterparts: in fact, they grow more in the following year and they are less likely to be liquidated. However, if they compensated for the failure of the campaign finding other forms of equity capital, no difference in performance can be seen. Also, a strong correlation between revenue growth and raised capital is highlighted, regardless of the type of investment. Hence, the idea that financial resources are well allocated in this market is supported, although there seems to be no advantage in receiving ECFs rather than equity in other forms. The "wisdom of the crowd" seems to be partially confirmed: investors are able to recognize the best companies thanks to a form of collective intelligence. This research can be interesting for the community of industry professionals and it is a starting point for further studies concerning the impact of alternative finance in Italy.

Keywords: *Equity crowdfunding, Post-campaign, Performances, Operating results*

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ABSTRACT - ITALIANO

L'equity crowdfunding può rappresentare uno strumento importante per gli imprenditori che hanno difficoltà nel reperire i capitali necessari a finanziare la propria attività. Può inoltre contribuire ad una maggiore vitalità nell'ecosistema imprenditoriale in termini di innovatività e contributo alla crescita dell'economia. Diversi studi riguardanti le caratteristiche e le dinamiche durante la raccolta sono stati condotti, ma poche sono le ricerche che mirano a spiegare la relazione fra i risultati operativi delle imprese e l'aver raccolto capitale in questa maniera. Questo lavoro si pone l'obiettivo di affrontare queste lacune sul mercato italiano, rappresentando una novità assoluta nel panorama nazionale della ricerca. Sono state considerate le imprese che hanno concluso campagne di equity crowdfunding fino al 2017, analizzando la relazione fra risultato della campagna, quale tipo di capitale raccolto se hanno fallito la campagna e performances operative. Tra i risultati, si dimostra che le aziende Italiane che hanno chiuso con successo un round di equity crowdfunding crescono di più l'anno successivo alla campagna e hanno minori probabilità di essere liquidate rispetto alle loro controparti che non hanno avuto successo. Tuttavia, se esse hanno sopperito al fallimento della campagna tramite equity di altro tipo, non si osserva una differenza nei risultati. Si dimostra in seguito che c'è una forte correlazione fra la crescita del fatturato e il capitale raccolto, a prescindere dal tipo di capitale. Viene supportata l'idea che le risorse finanziarie siano ben allocate in questo mercato, nonostante non sembra esserci un vantaggio nel ricevere ECF piuttosto che equity in altre forme. Sembra almeno parzialmente confermato il "wisdom of the crowd": gli investitori sono capaci di riconoscere le migliori aziende grazie a una forma di intelligenza collettiva. Questa ricerca può essere d'interesse per la comunità di professionisti del settore, nonché fungere da punto di partenza per studi successivi riguardanti l'impatto della finanza alternativa in Italia.

Parole chiave: *Equity crowdfunding, Post-campagna, Performance, Risultati operativi*

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1. EXECUTIVE SUMMARY

Introduction

Crowdfunding has been defined as "the act of collecting monetary contributions together with feedback and suggestions from a crowd of contributors (either in form of donation or in exchange for some forms of reward) through an open call on enabling web platforms" (Butticé et al. 2018) In recent years, it has gained significant attention from both the academia and the community of practitioners, since it is seen as a solution for startups and young ventures to receive critical early-stage investments. But there is the need to clarify how this new phenomenon impacts companies and the economy. Here lies the purpose of this dissertation: there is the desire to deepen the knowledge of this phenomenon and its effects in our national borders, to support and facilitate all the stakeholders in the valuation of this alternative finance instrument.

There are different sub-categories of crowdfunding, which are generally classified according to the type of reward that the contributor receives, which can be financial or also non-financial. In particular, this dissertation deals with equity crowdfunding, which allows SMEs and startups to raise money by issuing new shares to offer to the crowd of online investors through dedicated platforms.

This financing mode is relatively young. Its main novelty comes from the opportunity for small investors to buy stocks of startups and SMEs on Internet portals: before its development, investments in startups were carried out mostly by Venture capitals or Business angels. However, these actors have increased their minimum investment in innovative entrepreneurial projects in the last years, making harder to receive funding from these investors for newborn ventures. Moreover, debt is not a viable option given the scarce collaterals and the lower probability to repay interests. The relevance of equity crowdfunding comes from the fact that it can be a solution for this market failure, overcoming

the difficulties in raising funds for entrepreneurial ventures, generating innovation and eventually driving economic growth.

To date, academics have focused mostly on the following research streams:

- classifying different typologies of crowdfunding and defining their characteristics,
- studying how the information asymmetry existing between the investors and the entrepreneurs is overcome by the platform, how signals are perceived by the investors and how they impact on the outcome of the campaign.

Currently, there is little research regarding the post-campaign outcomes of equity crowdfunding: the relationship between crowd-investments and operating performances of investee companies is still a pending question. This represents a relevant knowledge gap, especially when compared to other more established fields of research – e.g. impacts of VC or BA investments.

Thanks to the exclusive database of the Osservatorio Crowdinvesting at Politecnico di Milano, it was possible to analyze all the equity crowdfunding deals happened since the birth of the Italian market. In this work, performances of successfully crowdfunded firms are compared against their counterparts who tried but did not manage to collect capital through Internet platforms. Not all companies are suitable for an equity crowdfunding campaign, and not all of them pass the due diligence of the platforms. Hence, this comparison makes possible to focus only on the effect of crowdfunding avoiding the risk of selection bias. Our results offer a first glance into the operating performances of Italian companies after an equity crowdfunding campaign, paving the way for future streams of research on after-investment effects of alternative finance.

Literature Review

This dissertation stems from the academic literature regarding crowdfunding, crowdinvesting and entrepreneurial finance. Crowdfunding derives from the concept of crowdsourcing, which is an open call over the Internet, with the intention of animating individuals to make a contribution to the firm's (Kleemann, Voß, and Rieder 2008). There are some key elements that characterize crowdfunding, such as the presence of a crowd of investors, the use of Internet platforms avoiding traditional intermediaries, the interaction with the crowd and the different typologies of reward for the investor. Indeed, crowdfunding offers both financial (Deffains-Crapsky and Sudolska 2014; Dushnitsky and Marom 2013; Mollick and Robb 2016a) and non-financial (Colombo, Franzoni, and Rossi-Lamastra 2015; Skirnevskiy, Bendig, and Brettel 2017; Riedl 2013; Butticè, Colombo, and Wright 2017) benefits to startups and SMEs. Donation-based and reward-based give respectively a social return and a material, non-financial return to the contributor. Lending and equity crowdfunding are proper investments, since they imply the sale of a financial security (Hornuf and Schwienbacher 2014). Equity crowdfunding (ECF), which is the focus of this dissertation, can be defined as *"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."* (Ahlers et al. 2013). ECF has been a booming topic in academic literature during the last years, because on the one hand it represents a new form of financing that can help startups and SMEs grow, on the other hand its environment is characterized by high information asymmetry populated by unsophisticated investors. The average funding received through ECF is few hundred thousand dollars, which is quite small compared to standard VC investments (Vulkan, Åstebro, and Sierra 2016). This characteristic is able to fill the funding gap – called the valley of death – between seed capital and the first round of investment (Barr et al. 2009). The disintermediation brought by crowdfunding in the entrepreneurial finance

market is able to reduce the costs of transaction and at the same time untie the startups from the typical value drivers searched by VCs and BAs (Bruton et al. 2015). This context generated the question of whether ECF represents a first choice or a last resort for SMEs (Walthoff-Borm, Schwienbacher, and Vanacker 2018). At the same time, the information asymmetry and the lack of financial education of the investors make this environment at high risk of opportunistic behaviour.

Given the focus of this dissertation, literature regarding the impact of entrepreneurial finance on companies' performances was reviewed, focusing in particular on Business Angels, Venture Capitals and Equity Crowdfunding. As regards BAs, it is generally agreed that these actors have a positive effect on growth and innovation (Levratto, Tessier, and Fonrouge 2018; Bonini, Capizzi, and Zocchi 2019; D. J. Cumming and Vismara 2017). Analogous considerations can be drawn with respect to VCs (Puri and Zarutskie 2012; Croce, Martí, and Murtinu 2013; Bertoni, Colombo, and Croce 2010) even if their intervention may increase the risk attitude of investee firms (Manigart, Baeyens, and Van Hyfte 2002).

Finally, the current state-of-the-art regarding ECF and companies' results is fairly underdeveloped. In particular, most researches focus on the post-offering survival of crowdfunded companies (Signori and Vismara 2018; Walthoff-Borm, Schwienbacher, and Vanacker 2018; Hornuf and Schmitt 2016), while very few tried to evaluate the impact on innovation and operating performances. The only example is the study of Eldrige, who claims that ECF does not impact significantly the innovation capabilities of British SMEs, but it has a positive effect on growth (Eldridge, Nisar, and Torchia 2019). Studies of this kind have not been carried out in the Italian context yet, mainly due to its novelty and smaller dimension. This work tries to fill this research gap, supporting future researches on this new branch of research.

Objectives and methodology

This dissertation focuses on Italian companies that have run an equity crowdfunding campaign through an authorized ECF platform up to 2017. The objective is to study the operating performances and survival rates, trying to understand if there is an effect linked to the equity crowdfunding campaign. To do so, the performances of the years right before and after the campaign have been compared between the companies that ran a successful campaign and the ones that tried a crowdfunding campaign, but failed it. First, we check if a significant difference exists between the two subgroups. Then the reason for this potential difference is searched, supposing a selection effect from the crowd. Afterwards the group of companies which failed the campaign is divided into subcategories, depending on the type of investment they received in the following years, trying to determine if different financing modes are linked to different results and if ECF has a special role. Finally, the amount of capital received is added to the analysis, aiming to understand its role with respect to performances. the hypotheses are formulated accordingly to the chosen objective and with the final aim of understanding the main drivers of causality:

- *HP 1. Companies that ran a successful ECF campaign have better financial performances than the ones that tried and failed, considering the years after the campaign.*

- *HP 2. Crowdinvestors pick companies with better operating performances*

- *HP 3. Companies that received capital from ECF perform better than those who failed the campaign and received other forms of financing.*

- *HP 4. ECF improves performances regardless of the amount of capital received*

The main data sources are: the database of the Crowdinvesting Observatory with the information regarding crowdfunding campaigns and platforms; AIDA, the database of Bureau Van Dijk regarding Italian limited companies with information regarding financial statements and other business details; Telemaco Infocamere, with registration documents, the financial statements (when missing from AIDA) and resolutions on capital increases.

Consequently, we define the variables used in the econometric models (OLS, 2SLS and Difference-in-differences, used together to compare different results and perspectives). As dependent variables, the focus is on operating performances rather than studying innovation, productivity or other metrics. This is due to the lack of objective and consistent non-financial indicators regarding the set of companies. Analyzing some basic statistics of the sample, log-revenues seems to be the most suitable and objective performance indicator for these analyses.

To explain the effects of the campaign and of the type of capital, dummy variables indicating the outcome of the campaign and the typology of investment are used: *success/unsuccess* and *ECF/debt/other equity/none*. In the last section of the empirical study the amount of capital injected in the company is included, too. Control variables are taken from previous academic studies and adapted to our work. They included *log-assets before the campaign, age of the firm, industry, year of the campaign and geographical region*.

For the survival analysis, the time between the campaign and the failure/end of observation moment is taken, with a dummy variable that distinguish the two, using a Kaplan Meier estimation. To analyze the operating performances, various econometric techniques are used to explore different alternative models and check the robustness of the results: Difference-in-difference, standard OLS and 2SLS.

Model implementation and results

Year 0 is the year of the campaign, which is taken as reference point. Regressions have been run between year -1 and year 1 as well as between year -1 and year 2, using the difference in differences technique and considering the campaign as *treatment event*. Results show that the campaign's outcome is not correlated with company performances, but this seems to be mainly due to a survival bias. The performances of the failed-ECF group seem to be improved on average, but this is due to the fact that worst-performing companies failed, thus they are not observed in the years after the campaign. Another methodology is introduced to control this distortion. As dependent variable, the difference of log-revenues between the two considered years is used in an OLS regression. Thus, only the companies with observations both before and after the campaign are included. Potentially, this might cause a selection bias because it excludes worst performing observations. However, it yields more precise results which seem to be more stable and less biased than in the difference in difference. With this methodology, it is found that companies that succeeded perform better.

With respect to the likelihood of being liquidated, a significant difference between the survival functions of the two groups of our dataset is found. As predictable, successful-ECF companies are less likely to fail. Hypothesis 1 is confirmed: companies that receive ECF capital perform better the year after, under the condition of considering only companies that survive in the post-campaign year. Poor results regarding year 2 are obtained, due to the limited number of observations. Thus, we are not able to conclude anything after the first year.

Then, the reasons for this difference are explored investigating Hypothesis 2. The goal is to understand if the successful companies were chosen because they were better, or they improved the performances thanks to the investment. To do so, two techniques are employed. In the first, it is checked if the growth in revenues

was already present before the campaign running an OLS regression between year -1 and year 0. A significant difference between the two groups is found, meaning that companies that ran a successful ECF campaign were already performing better than their counterparts. We estimate that between 45% and 65% of the gap in performances between the two groups after one year was already observable in operating revenues at the moment of the campaign.

Then, the endogeneity effect is tackled using a two Stage Least Squares model. The instrumental variable is the target capital of the ECF campaign, which is assumed to be correlated with the outcome of the campaign but uncorrelated with the performances of the company before the campaign. The variable *success campaign* is estimated using this instrumental variable, eliminating the endogeneity. The result of this model indicates that the estimated outcome of the campaign is not significant, differently from the results we had answering HP.1. From this, it can be deducted that the selection ability of the investors is the explanation for the correlation observed in the previous analysis between the campaign outcome and the operating results. Indeed, if treatment effect was present, the second stage of the 2SLS would yield significant result. Given the results of the two approaches explained above, Hypothesis 2 is accepted.

In the next step, the unsuccessful-ECF group is divided into subcategories according to the type of investment that was received after the campaign: *Debt*, *Equity* (other than ECF), or *None*. The purpose is to verify if the way through which companies collected capital brings to a difference in operating results. The methodology is the same as before, in order to make results comparable: first with the DID methodology and then with the OLS applied on the difference of log-revenues. Even in this case, a survival bias makes our analysis with the DID invalid, leading to non-significant results. On the contrary, when the OLS is used it seems that companies that successfully run an ECF campaign perform better than those who received debt capital or no following investment at all. However, if a company is able to collect equity capital other than ECF, there is no evident

difference in the revenue growth. The same result comes from the survival analysis: statistically significant difference in the survival rate is found between the ECF and the groups debt and no investment, but this is not the case with other forms of equity. More generally, companies that receive equity capital, under any form, are much more likely to survive regardless of the outcome of the campaign. We estimate that a company that receives ECF is 2.5x more likely to survive in the 5 years after the campaign, than companies that received debt or no capital at all. So, Hypothesis 3 is rejected for *Equity* (other than ECF), but it is accepted for *Debt* and the non-investment group, which was used as control group.

Going on, the effect of capital availability is investigated for Hypothesis 4. It is found that a strong correlation exists between the amount of capital received, whatever the source, and the revenue growth between year -1 and year 1. In other words, the higher the investment received the better the operating performances. Moreover, the type of capital injected in the firm does not have a sensible impact on growth. These findings suggest that the type of capital is perfectly substitutable, and there is a correlation with the performance that the company will have. Thus, we shall refuse HP.4: given the same level of funds, ECF does not imply better performances.

This dissertation is empirical, and our results are based on a limited set of observations. To improve the robustness of the results, a wider dataset is required. It would be interesting to extend this approach to comparable markets, such as other EU countries, USA and China. Other indicators can be used to widen the scope, especially if they are non-financial thus more time responsive.

Conclusions

This study shows a correlation between the amount of collected capital, the outcome of the campaign and operating performances. One explanation could be that companies that fail the campaign underperform because they are financially

constrained. But this would imply a treatment effect, which is not observed in our dataset. Another explanation is that investors do recognize better companies and invest on them on the portals. Then, more collected capital makes more likely that the threshold of the target capital is met, determining the success in the campaign. This is consistent with our finding of a selection effect.

The conclusions presented above suggest that there is a good allocation of financial resources, since the marginal impact of capital is the same and does not depend on the source of the capital itself. Moreover, equity crowdfunding collects funds that would not be invested otherwise. Thus, it seems that it has a positive impact to the overall economy.

The selection effect explains at least a good part of the extra performances, thus it makes sense to evaluate startups through the information available on the portals. This finding can also be applied in startup valuation through Bayesian statistics, using our results as *prior belief*. Moreover, it justifies the *herding effect* of investors: investing in campaigns because they already collected a lot of capital becomes a rational behavior under the light of these findings: given the same boundary information, they have a higher expected value. For what concerns policy makers, the confirmation of the *wisdom of the crowd* would justify a relaxation of the legal constraints of ECF. This can be done extending the scope of entities that can run an ECF campaign and making more efficient the existing market.

This dissertation helps in understanding what happens to Italian companies after an equity crowdfunding campaign. At the same time, it points out some open questions that can determine the path of future researches. We hope that this work will generate interest in the community for the post-campaign performances, bringing the attention to the local equity crowdfunding market, which is getting more and more dynamic and relevant in today's economy.

2. INTRODUCTION

Equity Crowdfunding allows startups and small companies to raise capital, selling shares of the new venture on specialized platforms with the possibility to reach a vast number of investors. They are able to invest also small amount of capital and the whole transaction happens on the platform.

It is a new phenomenon appeared in the alternative finance environment together with other forms of crowdfunding, which aim to collect capital in different ways. The enabling technology was the establishment of the Internet for the mass, together with the technologies to transfer money online. Other forms of crowdfunding, such as reward-based and donation based, do not involve the issuance of securities: thus, the regulation can be less pressing. On the other hand, equity crowdfunding could gain momentum only in 2012, when the US president Barack Obama approved the JOBS Act: this measure legalized the issuance of shares for innovative companies on online platforms, putting the necessary ground for the growth of crowdfunding as a solution for startups and small-medium ventures which look for capital.

Its novelty comes from the opportunity that it offers to small retail investors: before its introduction, investing in startups was a prerogative of Venture capitals or Business angels. The entry barrier of this market was the size of the required investments, which was too high for averagely wealthy individual. But equity crowdfunding platforms can aggregate the investments of hundreds of investors (the crowd) and centrally manage the deal with the startup which will receive the capital.

It also answers the need of newborn startups, which crave funds to finance their operations and usually have hard time in finding them. This is especially true when the firm is located far from the major VC districts such as the Silicon Valley, Shanghai, London and so on.

Of course, this new opportunity brings many concerns and doubts from established communities. Investing in new ventures implies a high-risk, potentially high-return profile: typically, common crowd-investors do not have the preparation to fully understand where to invest and the related risks. Moreover, the exchange of information is intermediated by the platform and a proper due diligence similar to the one run by VCs before an investment is not feasible. These are the reasons why regulators have always paid attention to equity crowdfunding and researchers tried to understand which dynamics are involved in the process of running an equity crowdfunding campaign.

There is not an accepted international approach: every national regulator has different standards and approaches toward equity crowdfunding. In Italy, regulators are interested in understanding this new phenomenon in order to improve its potential for innovative companies, since it recently attracted a lot of attention.

Their role is mostly centered in protecting investors, usually considered *non-sophisticated investors*, from frauds or investments that they do not fully understand. This is strictly linked with the intermediation of platforms and the reduced transparency related to these deals. Indeed, there is often a reference to *information asymmetry*, meaning that between the issuing company and the investor there is no full knowledge. This information asymmetry can damage in different ways the investors.

Academics and practitioners tried to understand the possible actions that platform managers can undertake to reduce the information gap between the investor and the entrepreneurs. At the same time, they tried to understand the entity and the relevance of these phenomena.

Despite these concerns, Crowdfunding received a lot of interest from specialized media, retail investors and the other stakeholders, and it became soon a worldwide phenomenon, attracting increasing interest from companies looking

for funds, small and institutional investors, regulators and academics. Also the Italian market, where crowdfunding started a few years later, is showing a growing interest in this financing method. Especially in the last couple of years, this phenomenon gained momentum and grew exponentially, with respect to both the number of investments and the collected capital.

In this country there is a structural lack of innovative companies, which are driving productivity in other countries. The possible reasons are many, but what is usually targeted by researchers is the lack of funds for startups in the early stage, so that even companies that have innovation potential are doomed to fail because of financial constraints.

At the same time, the macroeconomic conjuncture brought a situation in which since years standard investments are not profitable anymore and the financial world is at the constant seek of any investment that return something more than nothing. An emblematic example is that the bond that is generally considered risk- free - the German Bund - in its 10 years version used to provide an interest 4.1% on average in the period 2000-2009, and it decreased to 0.8% on average in the following decade 2010-2019, and it has reached twice the negative-interest territory in this period. Interest margins for banks are compressed, and retail investors are having a hard time in finding investments that give more than a percentage point more than inflation. This macrotrend is pushing both institutional and retail investors into a risk-prone attitude, and for the latter this attitude is easily represented by the growth of equity crowdfunding investments.

Given these premises, it is easy to imagine why equity crowdfunding attracted so much attention in Italy. Indeed, according to the 4th report of Italian crowdfunding published by the Osservatorio Crowdfunding of Politecnico di Milano - € 82.3 million were collected through Equity crowdfunding (up to 30th June 2019). It is not a sizeable market yet, but it is necessary to consider that 49 million€ of them were collected during the last 12 months to understand the

magnitude of the growth. 401 companies launched an equity crowdfunding campaign on Italian platforms in that period, 261 of which succeeded and raised capital, backed by an average of 86 investors.

These numbers can be compared with Italian business angels, whose investments have a similar size. In fact, they ran 167 operations with an aggregate value of €46.5mln in 2018, with an average of €278.000 (source: survey Italian Business Angel Network 2018).

At the present date, there are no studies regarding the post-campaign effect of equity crowdfunding in Italy. There are different theories on the advantages that equity crowdfunding can bring to the financed company. They are mainly the financial support and the non-financial support that the crowd gives. The latter is basically the crowd of people that can support through feedbacks from investors that are also 'fans'. The 'crowd' is able to give feedback not only in the moment of the campaign, through their decision to invest or not, but also after the campaign when the management needs a feedback about the product/service.

These are commonly considered the pros of a crowdfunding campaign. On the other hand, there are also disadvantages and costs: the first one is the cost of the campaign itself, since platforms require a fee in order to manage the crowdfunding campaign. Moreover, in order to conclude successfully the campaign it is necessary to invest in marketing tools and advertisement. Once the campaign has ended, it will be necessary to manage the investors, like any other investor that is not participating in the executive decisions. There must be a constant feedback that use precious time of the entrepreneurs of the startup.

Thus, there are pros and cons of equity crowdfunding, which have not been assessed by researchers univocally: given the novelty of the phenomenon, the effects are not evident yet. However, the situation is rapidly evolving.

This year has been a turning point for the research regarding equity crowdfunding in Italy. In fact, enough time passed since the birth of ECF to have a good number and quality of observations about campaigns and financial performances, so we are in the position to assess what are the effects of equity crowdfunding on Italian companies for the first time. We already saw exits in 2018, and some failures. We are actually able to have a general overview of what happens to the company after the campaign. Having an idea of what happens *after* the crowdfunding campaign is relevant especially in Italy, where crowdfunding has attracted much attention from practitioners and is gaining a lot of visibility in the last years.

This thesis aims at understanding how equity crowdfunding impacted companies that decided to run an equity crowdfunding campaign. We intend to serve the crowdfunding community with more aggregated and structured observations of financial performances of these startups/SMEs. The hope is to provide a key to read the role of equity crowdfunding in the alternative finance landscape, in order to see if and how an equity crowdfunding can support companies.

Similar studies have been broadly developed in topics like Business Angels and Venture Capitals. Equity crowdfunding is often compared to these two financing solutions; sometimes they are also put in competition among each other, when it comes to entrepreneurs that have to decide how to get funds. So, a good approach would be running studies that can be directly compared with these other two streams of research.

In this research, we will focus on financial performances, because we want to see if these companies were able to convert funding into improved financial results (e.g. increased revenues) in the mid-term.

On the other hand, we will compare the companies that succeeded in the campaign with the unsuccessful counterparts, in order to understand the

differences between these two groups not only before the campaign, but also after. We will focus our attention on the way they followed to receive resources once that they were not able to collect capital through crowdfunding.

The target audience of this dissertation are both academics and practitioners, those who need answers to the above-mentioned topics. Throughout this dissertation, analytical techniques will be used to provide ground for our conclusions regarding the influence of equity crowdfunding on funded companies.

Since this is a new field of research, it will be probably hard to provide clear and univocal answers. But since similar researches have not been carried out yet, our goal is to prepare the ground for following researches that can focus on our results to run researches with different samples, larger time horizon, and generally with a more complete dataset

3. LITERATURE REVIEW

In the first paragraph (3.1) the methodology that has been applied to analyze the state of the art and gather all the necessary knowledge to identify a gap in the literature and develop this dissertation will be presented.

In the following ones, the state of the art at the date of elaboration of this dissertation is presented, resumed and discussed in order to show the gap in the literature that we aim to close.

3.1 RESEARCH METHODOLOGY

A *top-down approach* has been applied: it is generally considered the most suitable when there is a topic that is still developing and does not have well defined terminology and fields of research.

Indeed, crowdfunding is a recent topic that is developing fast and broadly, so it has been necessary to start from a general overview to understand what is defined as crowdfunding, what phenomena are known and what are not yet well defined or are studied. Then, we narrowed the scope to the equity crowdfunding to identify the characteristics and the research branches that are more active and with more potential. Some papers compare equity crowdfunding to similar phenomena, like venture capitals and Business angels; this gave the ground to run a brief comparative analysis of the literature, to have a wider view of the issue we tackled.

The structure of the literature review chapter follows the same order, guiding the reader from an introduction of the general idea of crowdfunding to issues that are more specific of the equity crowdfunding, eventually underlying the gap in the literature thanks to the last paragraph, which explicates the comparison with similar phenomena.

The research engine we used to identify the papers of interest is *Scopus*. It is the largest online database of academic literature existing today, which provides abstracts, citations and other public information of around 25000 papers about any scientific field published in over 16500 academic journals. It has been created by Elsevier in 2004 with the purpose of supporting and empowering institutions working in research and development; today it is widely used in the academic environment.

We used the following filters on "title, abstract and keywords":

- Equity + Crowdfunding
- Crowdfunding

Moreover, Google Scholar was used to identify articles and reports that have been published by private or public institutions but not in academic journals. Google Scholar is a search engine derived by a spinoff of the well-known Google Search that focus specifically on publications that are considered reliable sources like peer-reviewed articles, theses and technical reports.

We also used publications and studies of sources within Politecnico of Milano. Specifically, we relied on some publications of the Entrepreneurship & Finance observatory of the Politecnico of Milano or of professors who collaborate with it. It is worth to mention the 3rd and 4th versions of the *'Italian Crowdinvesting Report',* which is the main publication of the aforementioned Observatory regarding Crowdfunding. This report gave the background to our research: it presents the situation of Crowdfunding market in Italy with quantitative data.

From these different sources, we finally collected 178 different documents from which we got a general overview of crowdfunding and more specifically equity crowdfunding. We have also been able to dive in specific topics, which presented the state of the art in the research regarding Crowdfunding. Specifically, we have

been able to identify a gap in the literature that regards the economic results of Italian companies which raised capital through Equity Crowdfunding.

In the following literature review, we will present a selection from the documents we consulted. This selection was done excluding the outdated researches and the ones that presented qualitatively crowdfunding. All the papers that will be presented in the following paragraphs are the most recent researches that presented new results or reviews of the extant literature. All of them are high-quality publications on established journals or from esteemed institutions, measured by common metrics of academic relevance based on number of citations.

3.2 CROWDFUNDING

During the years, many scholars have tried to give a definition of crowdfunding. Academics agree on the fact that crowdfunding is the practice of collecting money from a crowd of users, but each of them has focused on the particular aspect they deemed more relevant. The concept of crowdfunding stems from the earlier and broader concept of crowdsourcing. (Kleemann, Voß, and Rieder 2008) claims 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*". This formalization helps in building the definition of crowdfunding but it is not sufficient. The term crowdfunding made its appearance for the first time in 2006 on Wire Magazine (Howe 2006) but, as we will show in the following section, the practice has older origins. Some scholars focused on the crowd itself, defining crowdfunding as the practice of entrepreneurs collecting money from an external source that consists in a large community of investors(Belleflamme, Lambert, and Schwienbacher 2014). Others underlined the importance of means, that is to say the Internet. For instance (Schwienbacher and Larralde 2012) 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". Another perspective highlights the absence of classic intermediary agents, substituted by enabling online platforms that facilitates the matching between the parties of the transaction (Kaufmann et al., 2013). Moreover, some scholars focused on the opportunity of interacting with the crowd, thus receiving feedbacks which could lead to the emergence of a collaborative design and so to a better product (Gerber and Hui 2013; Riedl 2013). Finally, we believe that the most comprehensive and recent definition of crowdfunding is the one provided by (Butticé et al. 2018) which includes all the aforementioned elements. The authors define crowdfunding as "*the act of collecting monetary contributions together with feedback and suggestions from a crowd of contributors (either in form of donation or in exchange for some forms of reward) through an open call on enabling web platforms*".

3.2.1 DEVELOPMENT OF CROWDFUNDING

The definitions provided above are quite recent, since academics devoted their attention to the subject only in the last decade. However, the idea of collecting money from a wide group of people to finance a common project is rooted in history. It is hard to trace back to the first time crowdfunding was put in practice: charitable projects have been funded thanks to the collectivity for centuries. A famous example is the construction of the Statue of Liberty (Beck et al. 2016). In 1884 the renowned journalist Joseph Pulitzer initiated a fundraising campaign on The New York World, aiming at collecting $100,000 in order to built the pedestal of the statue. The project was a success, since in 5 months more than 160,000 donors contributed to the cause, with the overwhelming majority of the donations amounting to less than a dollar. Many years later, the rock band "Marillion" was widely accepted as the first example of contemporary crowdfunding (Greenberg, Hui, and Gerber 2013). The English group successfully asked to its fans to contribute for their 1997 tour in the USA, and

even in by pre-ordering a non-existing album in 2001. Music was indeed a catalyzer for the birth of modern crowdfunding: the first platform to allow fan-based fundraising via the Internet was ArtistShare[1]. The website, funded in 2001, allowed people to sustain independent bands and musicians, connecting fans to their favorite artists.

Of course, platforms like ArtistShare could emerge only after the appearance of the Internet, which was the enabler of the exponential growth of this form of financing. It is impossible to disentangle the concept of crowdfunding as we know it today from the one related to web platforms. In particular, Web 2.0 played a pivotal role in the development of crowdsourcing (Brabham 2008; Kleemann, Voß, and Rieder 2008), and so indirectly crowdfunding. The main reason behind this was the creation of an efficient and direct channel between entrepreneurs and supporters, even when the two sides are hundreds of kilometers apart. Moreover, the collaborative nature of the Web 2.0 allowed funders to contribute actively to the project with comments and feedbacks, thus helping creators in the development of their idea.

The two most famous examples of platforms are IndieGoGo, funded in 2008, and KickStarter, funded in 2009. Up to June 2019, the latter has collected a total amount of $4.340.804.733, successfully funding 164.380 projects and involving a total of 16,370,808 backers[2]. After these two platforms, others followed all around the world.

With respect to the present situation, Fundly.com[3] provides some estimates related to crowdfunding in the world up to the year 2017.

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[1] *https://www.artistshare.com/*

[2] *https://www.kickstarter.com/help/stats?ref=global-footer*

[3] *https://fundly.com/*

The global amount raised by crowdfunding is $34 billion, of which $25 billion in lending crowdfunding, $5.5 billion in reward and donation-based crowdfunding and 2.5 billion in equity crowdfunding (these categories will be described further in the next chapter).

- 270,000 jobs are linked to enterprises funded with crowdfunding
- 50% of campaigns are successful
- 78% of successful campaigns raise more than their minimum goal

The following picture shows the distribution of money collection through crowdfunding in the world in 2017.
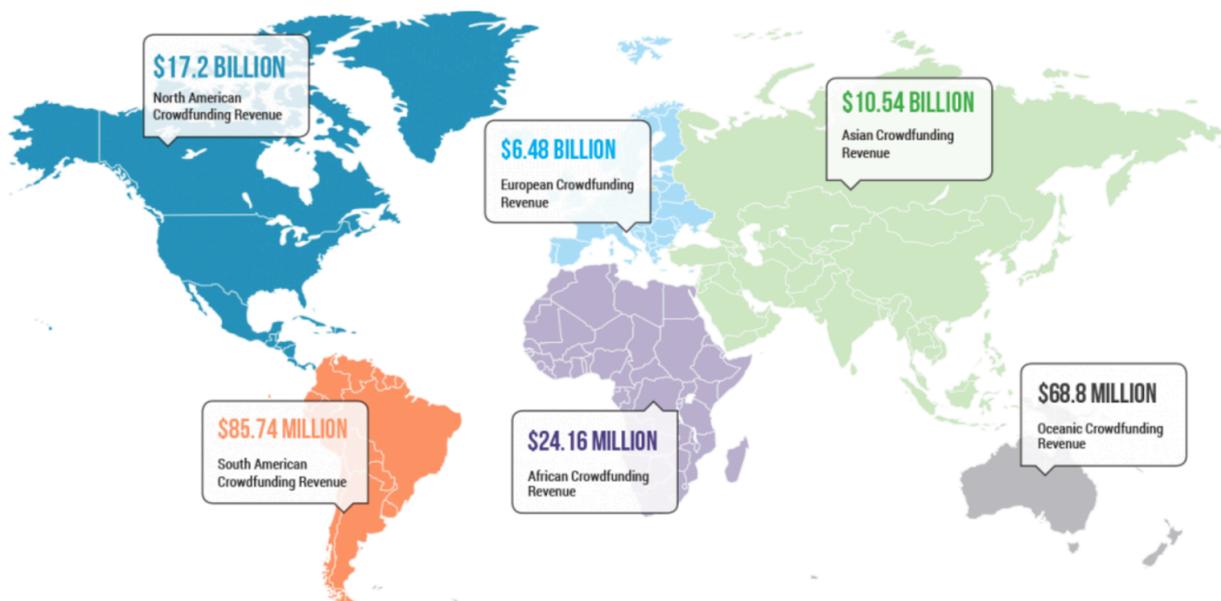
Fig. 3.1 Size of capital collected worldwide through crowdfunding, from Fundly.com

3.2.2 CLASSIFICATION OF CROWDFUNDING

Scholars have proposed several ways of classifying the different models of crowdfunding. The most relevant and the most widely used one is based on what backers receive in exchange for their contribution (Ahlers et al. 2013; Griffin 2012; Lehner 2012). According to this taxonomy, crowdfunding can be divided into four categories: donation-based, reward-based, lending-based and equity-based.

1) *Donation-based crowdfunding*: In this type of campaign, the backer does not expect anything in return from his contribution. Typically, the donor feels a strong connection with the project and he firmly believes in the cause. Non-Governmental Organizations, charities, non-profit organization are often involved in the support or in the management of the project. Altruism, philantropy, social returns are the driving forces that convince the backer to give his contribution.

2) *Reward-based crowdfunding*: This crowdfunding model offers the backers a non-financial reward, i.e. no equity nor debt is given to the supporters. The underlying motivation is mainly material, but it is not limited to that: quite often contributors want to support the entrepreneur in its mission and to engage with the project community (Greenberg, Hui, and Gerber 2013). The crowdfunders can receive any kind of reward: from a copy of the product to a mug, from a tshirt to an invitation for a meeting with the founders. Platforms generally offer different rewards for different levels of contribution. A particular case of reward-based crowdfunding is pre-selling: in this model, customers pay for a product that is still not existing. With the money collected through the platform, the firm will develop, produce and distribute the product; this type of agreement is legally binding so there are no trust issue between the funder and the entrepreneur. this sense, this variant of crowdfunding is very similar to e-commerce, where customers pay for a product on an online platform in order to receive it after a certain period of time. Typically this output is offered to crowdfunders with a special

discount comparing to the price the product will have once it will be on the market. This comes with the uncertainty of a product that is usually under development, on which there is uncertainty on the quality and delivery time.

3) *Lending-based crowdfunding (or lending crowdfunding)*: In this case, crowdfunders receive a debt security in exchange for their contribution. Thus, the borrower gets the money from the crowd and not from a bank. Platforms can either act as middle-man and manage the exchange of money and the repayment to the lender, or simply as match-makers and just connect the two parties.

4) *Equity-based crowdfunding (or equity crowdfunding)*: Also this model gives securities to backers, but in this case they receive shares instead of bonds. Crowdfunders become shareholder in the new venture. As for normal shares issues, the reward for the investor will consist either in future dividends or capital gain on the price of the share. This last type of crowdfunding is the focus of the present work, so we will address it more precisely in the following sections.

3.2.3 ROLE OF PLATFORMS

The collection of money from the Internet can be performed on proprietary websites or on dedicated online portals. Sometimes the web page can act simply as a showcase of the project, redirecting the visitor to the website of the company or indicating the personal contacts of the entrepreneur, through which the backer will be able to contribute "offline" (e.g. club deals). However, online platforms acting as intermediaries are the enablers of most of today's crowdfunding campaigns, thus they are the main focus of academic works.

Portals are essential actors from the beginning to the end of the crowdfunding campaign: in fact, they are expected to perform several activities:

1. Pre-selecting ventures, projects and business opportunities. platforms run a due diligence when they receive the application of a startup. Thus, the first selection of eligible companies is done by them.

2. Preparing the legal groundwork. They support and sometimes directly do the paperwork for the capital increase and the campaign and after campaign phase.

3. Processing the financial transactions. They receive the money, and then deliver it directly to the company if the campaign is successful. Otherwise, it refunds contributors in case the goal is not reached.

4. Displaying the project to the crowd and keeping the community updated about the evolution of the campaign.

A feature that is often present in crowdfunding campaigns is the all-or-nothing principle (D. J. Cumming, Leboeuf, and Schwienbacher 2019). Following this rule, the entrepreneurs receive the collected money only if they reached the pre-defined funding goal, otherwise all the funds are given back to contributors via the platform. The opposite of this case is the take-it-all principle, in which the initiators are paid out any collected amount: this rule is generally applied in donation-based crowdfunding.

Online portals act as two-sided platforms between two markets for the collection of funds is beneficial for all the parties. The entrepreneur saves in time and costs that he would need to bear to create a proprietary website. Moreover, portals provide great visibility on the project, thus enhancing the possibilities of a successful fund collection. On the other hand, portals generate revenues in the form of percentage fees on the amount of funds they are able to gather (Burkett 2011). Finally, the backer as well sees positive effects in the use of portals, since they can suffer a lower risk of scams and frauds (Löher 2017).

3.2.4 BENEFITS OF CROWDFUNDING

Crowdfunding is a peculiar way of financing a business that brings to companies both financial and non-financial advantages

- *Financial benefits*: Startups and small enterprises often find themselves in situations of financial restriction: it is often hard for them to find the investors that are necessary to finance their growth (Deffains-Crapsky and Sudolska 2014). According to the Pecking Order Theory (Myers and Majluf 1984), companies choose their financing source from the cheapest to the most expensive. After self-financing the cheapest solution is debt, but this solution is often precluded to young enterprises. In fact, information asymmetry problems are worsened in the early stages of a venture (Denis, Denis, and Yost 2002). Startups have little or no collateral and they can provide banks with no information about their history, so traditional financing institutions cannot set a price in terms of interests on the debt. Several authors have claimed that ventures having difficulties in accessing traditional sources of funds can benefit greatly from the possibility of leveraging the crowd (Mollick and Robb 2016b; Dushnitsky and Marom 2013). Thus, some companies can find in crowdfunding the best way to receive funds. Moreover, crowdfunding possesses some peculiar characteristics that differentiate it from other sources of equity funds and make it attractive especially for small companies. The reasons behind this are less strict disclosure requirements, a more favorable cost of capital, the fact that money collection is much faster (allowing a quicker expansion) and the possibility of keeping more control over the firm (Agrawal, Catalini, and Goldfarb 2014; Brown et al. 2018).
- *Non-financial benefits*: Even if financial aspects are important, the complementary non-financial ones are probably even more relevant for small and medium venture. A phenomenon that is often mentioned in literature is the so-called "*wisdom of the crowd*", a concept first developed

by Surowiecki in 2004. It is the idea is that a large group of people is (sometimes) better than individual experts in taking decisions, solving problems, making estimates and generating innovative ideas, in other words large crowds are collectively smarter than individuals. More recent papers highlight how people *"bring various pools of local knowledge together"* (Collins and Pierrakis, 2012) if their backgrounds are diverse. In the case of crowdfunding, this concept can explain how the market potential of a company is defined by a crowd of people with much less expertise and competencies of professional investors. Brown et al. in 2018 found some factors that were important for entrepreneurs who turned to crowdfunding, such as increased level of notoriety, end-user engagement, feedback on the product, interaction with new shareholders: *"investors in crowdfunding often become quite vocal advocates of these firms"*. Scholars agree in saying that products developed after crowdfunding can perform better and show more innovative features thanks to feedbacks. For instance, fundraisers can exploit comments and reactions of users to better develop projects and ideas (Riedl 2013; Colombo, Franzoni, and Rossi-Lamastra 2015; Skirnevskiy, Bendig, and Brettel 2017). Moreover, they can develop a virtual community of followers (Butticè, Colombo, and Wright 2017), which provides a valuable source of validation for those who are developing prototypes and early version of innovative products. Also in relation to this aspect, scholars note the possibility to create networks through crowdfunding campaigns that enable open innovation(Di Pietro, Prencipe, and Majchrzak 2018): these network effects can turn into a critical success factor even years after the end of the campaign. Another important advantage of crowdfunding is the possibility to increase awareness on the project and access to media coverage with little effort. The reputation of the company also benefits from this type of campaign, which is especially important in early phases to create competitive advantage even before the product is released on the market. Finally, the

creators are encouraged to participate in crowdfunding because they can improve personal skills on effective fundraising (Boylan, Nesson, and Philipps 2018).

As we have seen, crowdfunding is beneficial for startups and small and medium enterprises. So, this form of financing entrepreneurial activities is beneficial for the whole economic system where it is deployed. (de la Viña and Black 2018) list some of the positive influences they have studied on the US economy: an increase in the rate of business start-ups; a wider range of potential projects and funding goals; a slower failure rate for small businesses; the creation of more jobs (since small business account for 55% of the US workforce in 2015); more funding of ventures outside traditional innovation hubs and major urban areas.

We see that, in the interest of the economic community, policy-makers should make adequate choices when dealing with the regulation of crowdfunding. As an example, the Jumpstart Our Business Startups (JOBS) Act signed by the Obama administration in 2012 marked a huge increase in the level of notoriety of equity-based crowdfunding: the act simplified the previous regulation and relaxed some restrictions regarding the sales of securities, allowing the actual birth and growth of this model of entrepreneurial finance.

After that, many other countries followed. Crowdfunding entered as one of many solutions for funding in emerging markets, where it developed fast (D. Cumming and Zhang 2016). This traction is linked with both a less developed entrepreneurial finance market and the higher barriers linked to geography which happens to be an issue in those countries.

Indeed, crowdfunding is based on the internet, thus it can collect funds also for startups that are geographically far from more well-known entrepreneurial clusters and there is no personal relationship. This supported riskier ventures in those countries, fact which stems hope for the creation of more productive and

innovative sectors. On the other hand, a general lack of trust that characterize emerging economies puts limit in the development of ECF at a broader scale.

For example, in China the general investment culture is hardly compatible with ECF, since investments are done by institutions, mainly banks, which have the control of the market (Liang, 2015). A less clear regulation makes it harder. Anyway, Crowdfunding has been seen as a solution to the need of capital of SMEs with examples of success (Huang et al. 2018).

3.3 CROWDINVESTING

Crowdinvesting is defined as a subgroup of crowdfunding, characterized by the offering of a financial security to investors, who expect as a consequence a financial return under the form of dividends, interests or profit sharing (Hornuf and Schwienbacher 2014). Thus, participating in a crowdfunding project of this type is considered an actual investment.

Crowdinvesting is recognized from the major motivations that pushes the crowd – called in this case investors - to take part to the project. Indeed, financial return becomes the main reason to give money on the platforms, coupling with the intrinsic motivations that usually are the drivers of other crowdfunding forms.

Investors are usually non-sophisticated agents without knowledge of how financial markets work and with no basis of economics, while a minority of them are professionals, like business angels, and institutional investors.

Platforms of crowdinvesting have the role of making these investors find the possible investments and provide the required information, acting as intermediaries. They also have been appointed by regulators as the ones with the responsibility of reducing the information asymmetry and control the investment proposals, as much as protect and give guarantees to the investors. Indeed, authorities created, in the majority of advanced economies, an ad-hoc regulation

that protects the investors and requires minimum standard of transparency on each investment proposal.

As intermediaries, they manage the transaction and the bureaucracy to finalize the deal in exchange of a fee. This model aligns the interests of the platform with the entrepreneurs, who want a smooth and effective process to raise capital, and investors, who need transparent information and trustfulness by the counterparties. The activities of the platforms are modelized in the Fig. 3.2, taken by a paper of Hornuf & Schwienbacher:

- The crowdinvesting platform supports the issuers with its network and marketing experience. They also advise the company regarding the size and the use of the capital that will be raised and the paperwork that is necessary after the transaction.
- It manages the relationship with the investors (the crowd) providing all the relevant information and clearing the due diligence of the companies in invstors' behalf.
- It manages the transaction formalizing the deal with ad hoc contracts, safeguarding the interests of both parties in which the amount, the returns and the covenants of the deal are explicated. It also manages the financial transaction itself.
- The fee can be a share of the returns (more common in the crowdlending) or as a share of the capital (more common in the equity crowdfunding).

The role of the platform has been of great interest among academics, who ask if platforms are effectively closing the information gap between issuers and investors.
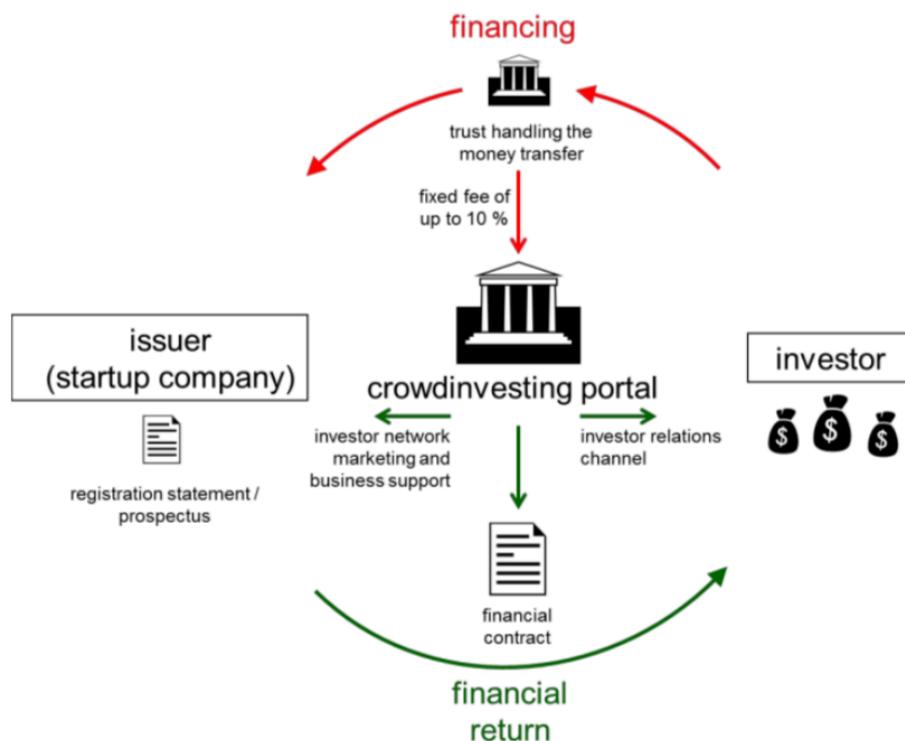
Fig. 3.2 Typical dynamic of a crowdfunding investment among parties. Source: Hornuf & Schwienbacher (2014)

3.3.1 CLASSIFICATION AND DIFFERENCES IN REWARD

Crowdinvesting is commonly further subdivided in two categories of crowdfunding commonly considered in the literature, namely equity crowdfunding and crowdlending (also called lending crowdfunding). The difference between the two subcategories is that the former gives shares of the company in exchange of risk capital as reward; the latter implies the restitution of the debt capital plus interests, regulated by a debt contract and guaranteed and managed by the platform.

A transversal category is the real estate crowdfunding, that is a specific type of crowdinvesting where the crowd is tapped to raise capital to invest in real estate; the capital can take the form both of debt or equity or hybrid forms of financing.

It became more common since 2017, when it was seen as a revolution of the barriers to entry for retailers to invest in real estate. Many platforms have been created with the role of brokering some real estate investments proposed by professionals, proposing them to the crowd. Given the business model of the platform, the investment type can be of different types: under the form of debt, equity or mixed forms.

The different types of crowdinvesting serve different purposes, and are driven by some qualitative factors of the project to finance. We find that enterprises prefer to raise capital through equity crowdfunding if the required capital is relatively higher, compared to the value of the market, or for early stage startups which fate is still particularly uncertain (Belleflamme, Lambert, and Schwienbacher 2014). Enterprises that are more stable, generate cash flows and they deliver high social value can easier raise debt capital from the crowd, as demonstrated for social ventures (Meyskens and Bird 2015). The same studies show that social ventures or startups with less economic value or with a later stage of development (i.e. they already have developed a prototype) usually avoid raising capital through crowdinvesting and prefer other forms of crowdfunding: reward-based or donation-based. A different case comes from the individuals that ask for loans on crowdlending platforms: they often need to finance personal expenses, and they choose the option of borrowing from the crowd for personal convenience, being a competitive choice among the loan market.

We will describe further how literature considers different types of crowdinvesting, giving examples and details on their main characteristics.

3.3.1.1 Crowdlending

We can distinguish three categories within this model (Buysere 2012):

- *Social lending*: The crowd lends money with no interests to projects that have some sort of social impact. This is usually done in developing countries in order to microfinance local businesses.

- *Peer-to-peer lending*: In this case investors receive interests on the money they lend. On the other side, borrowers have the chance to access to funds rapidly and at interest rates which are generally lower than the ones offered by banks. Platforms select individuals asking for credit, evaluate their track records and give them a credit rating according to their insolvency risk. As for regular bank loans, interests vary according to this rating.

- *Peer-to-business lending:* Similarly to the previous case, a crowd of investors receives interests on the money they lend, but in this case borrowers are small and medium enterprises. Firms issue debt to finance their projects, which are typically larger than those of individuals, so the amount of money requested is higher. For this reason, a higher level of disclosure with respect to the investor is required.

Crowdlending lets individual investors, considered as *the crowd*, to invest in loans given to individuals or companies. Then, the borrower will pay back the capital plus an eventual interest, following a contract that is settled through the platform to all the financers. Even though not everyone in the academic world agrees in considering it a form of crowdfunding due to the reduced interaction between the crowd and the borrower (Butticé et al. 2018), we considered it since it completes our overview on crowdinvesting.

It is also often called *peer-to-peer lending* (Griffin 2012), underlying the de-intermediation that it implies. The role that normally is done by a bank, of raising money by people and lending it making the demand meeting, is done by the

platform: it receives proposals from potential borrowers and tap the crowd to raise capital. The intervention is of the platform is relevant to find the parties and set the agreement, but its intervention is minimal, especially compared to the one of a bank, since "The idea is that borrowers can pay less interest and lenders can earn more interest because overhead from a bank's involvement is minimized" (Kuiper et al. 2017). Thus, the competitive advantages of this form of lending are the cost reduction and the reduced transaction time derived from the de-intermediation and the use of the internet.

Sometimes a particular case of crowdlending is considered in the literature overviews: a case in which no interest is paid back to the lender, and the borrower is a business with social impact, usually in underdeveloped regions of the world. This type of crowdlending is called social lending or microfinancing crowdfunding (Kuiper et al. 2017; Meyskens and Bird 2015). It is not considered as an investment, since it does not pay back interests and the lender will bear anyway the risk of default of the debt, with little guarantees and no credit risk management. It is anyway a way to support businesses for humanitarian reasons, in the framework of microfinancing studied by Yunus broadly during his life.

Usually the amount of the campaigns done through these platforms are very small and the social value particularly high (Meyskens and Bird 2015; Kuiper et al. 2017).

The most common example of this kind of crowdfunding is kiva, a non-profit institution that pools together many microfinance institutions located in underdeveloped regions and lenders. In this way, the latter are able to finance local businesses and small projects, and then reuse the capital in other projects if they like once it is paid back. The humanitarian mission of Kiva is underlined also by the fact that it collaborates only with the ones that are non-profit and use all the amount raised through capital, interests and donations of third parties for humanitarian purposes.

Excluding this exception, that cannot be considered a form of investment since there is no return and the reason of the investment is only from intrinsic and social motivations, crowdlending can be considered an investment opportunity. Indeed, its role in a portfolio is considered relevant (Hernando 2017). Hernando compared the risk-return profile of crowdlending and other more traditional investment opportunities for retailers, and it shows that since there is a low return of traditionally less risky assets in this historical phase – supposing a bottleneck in the supply of financial products to retailers – and retailers need less risky options, the profile of risk-return of crowdlending is more suitable for retailers that want to differentiate investments and avoid cyclicity, at least in this period.

3.3.1.2 Equity crowdfunding

A quite complete definition of equity crowdfunding is provided in a paper that has been written during the dawn of this phenomenon: *"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."* (Ahlers et al. 2013). This definition is able to merge the main characteristics of equity crowdfunding:

- The request of risk capital to finance an enterprise or a project towards a wide audience of potential investors
- The participation of the actual investors as shareholders of the company, that receive equity as reward for the investment
- The relevant role that an intermediary, recognized in an internet-based platform, has in making the entrepreneurs and the investors meet.

It is considered as a form of profit-sharing model that can be used by companies, especially startups and small enterprises, as an alternative way to raise capital to

be invested. At the same time, it is a more direct access for small retail investors to shares of startups. This market was previously accessible only for funds (i.e. venture capital funds) and individuals with a very high personal wealth and often experienced in economic fields (i.e. business angels), but the internet made possible smaller investments.

The dynamic of the investment itself is quite different from standard Venture capital or business angel investments: the entrepreneurs make a call on the internet setting the price of the shares and providing information, and the investors decide whether to accept the conditions given the information (Belleflamme, Lambert, and Schwienbacher 2013).

On this point the majority of the literature developed: equity crowdfunding from one side has the potential of a new form of financing and investments, from the other it is an environment characterized by high information asymmetry where non-sophisticated investors participate in. The latter, together with the fact that is equivalent to the sale of a security, explains why regulators were more conscious and weighted in regulating equity crowdfunding and gave stricter norms compared to other forms of crowdfunding (de la Viña and Black 2018): there is high risk of creating an environment characterized by adverse selection. Since regulators have permitted equity crowdfunding and equivalent forms of profit-sharing crowdfunding, it had an exponential growth.

These peculiar characteristics and its high potential made equity crowdfunding a hot topic in the literature. We will explain in the next chapter the main topics developed by existing studies and the state of the art of equity crowdfunding.

3.3.2 *EQUITY CROWDFUNDING MAIN CHARACTERISTICS*

Equity crowdfunding (since now, ECF) is considered as an alternative source of capital for startups and fast-growing companies to get seed capital or growing capital, instead of relying on Venture capital (VCs) or Business Angels (BAs). From a modelized perspective, the disintermediation brought by crowdfunding

in the entrepreneurial finance market is able to reduce the costs of transaction and at the same time untie the startups from the typical value drivers searched by VCs and BAs (Bruton et al. 2015).

Equity crowdfunding has the potential to become a funding source for startups at seed stage that does not answer to potential return requirements of VCs or are out of the scope of BAs.

The size of the average funds received through ECF is quite small compared to VC standard investments, which is hardly lower than some hundred thousand dollars (Vulkan, Åstebro, and Sierra 2016). This shows how ECF belongs to a different market than VC and tries to answer to companies with different needs. Indeed, the seed investments required from new ventures are getting smaller, especially taking into consideration the hi-tech start-up based mainly on dematerialized businesses.

Trying to put ECF in the funding history of startups, we can see how this characteristic is able to fill the funding gap of seed capital and growth capital (Barr et al. 2009), also called the valley of the death because a huge percentage of startups fail before getting the necessary finance. This period is seen as the biggest obstacle in the development of a venture. Many companies fail in this period, because they do not have enough resources or they do not become profitable early enough. On this point, there is a biggest interest of the academia and policy makers in order to find a solution to this gap and make possible the generation of more ventures.

Startups need capital to grow, and they receive it from external investors in exchange of equity (Collins and Pierrakis 2012). The most common source of funds at this moment is financial support from family or friends. It has been studied how startuppers that have more wealthy relatives or live in a richer environment tend to be more risk-taking and have more opportunities to open a risky business as a startup.

Then (i.e. when the required investment reaches some hundred thousand dollars), the funds are given mainly by business angels, and then by venture capitals. The dimension of the investment is generally proportional with the stage of the evolution of the startup, that is inversely correlated with the level of risk of the business.

Into this scheme, Collins and Pierrakis sees ECF as a solution for startups at seed level to get funds: in the years before the study (2012) the average investment from business angels had increased and the majority of their investments were above 100.000$. In the same period, venture capitals abandoned more and more the seed stage investments because of higher costs per transaction and higher risk. Thus, the funding gap got wider.

Given the average dimension of 10k-500k$ of ECF investments, it can be considered as a good solution when a startup finds itself at seed stage, so it can receive enough capital to sustain itself till the next round of investments. ECF can fill the equity gap and make the model of startup functional and successful.

Still in Collins and Pierrakis (2012), it is described how the risk-reward profile of startups changes when non-financial returns are considered by investors. Let's assume that there are startups that have a good business model and are able to generate value and growth, but this growth does not satisfy common requirements for VCs or BAs because it is not enough to repay them for their capital. Still, the risk is too high due to uncertainty to get finance through established sources like bank loans. These startups are actually able to provide different types of return to crowd-investors (e.g. non-financial rewards, or the intangible benefit of being part of an entrepreneurship) thanks to which the investors can be interested in giving risk capital despite of the longer illiquidity period or the lower return. The fig 3.3 shows a representation of these reward-risk relationship as explained by Collins and Pierrakis (2012).
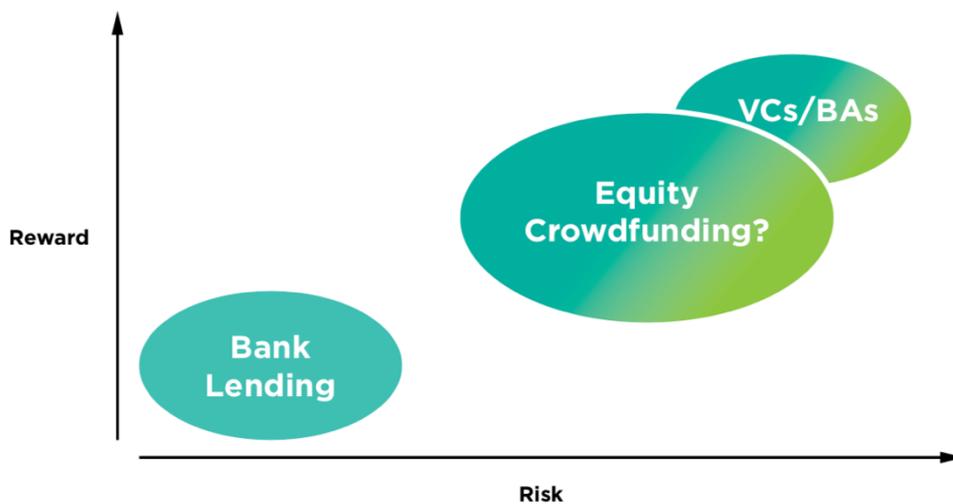
Fig. 3.3 Relation Risk-reward in financing ventures. Source: Collins (2012)

Equity crowdfunding role in entrepreneurial finance

From this dissertation, we can ask ourselves: are the startups collecting money on platforms because it is their only way to get funds, or are they willing to ask for support on platforms because it is cheaper or convenient anyhow?

To face this question with a traditionally academic perspective this issue, some researchers have got the basis from the *Pecking Order Theory* (Myers and Majluf 1984). It states that the decision on which source of capital to use is taken based on the cost of the capital itself: the entrepreneurs will prefer cheaper sources of capital, starting from internal funds then debt and finally external fund under the form of equity.

We assume that a fast-growing enterprise with still a small business does require external funds, being generated cashflows insufficient. The cheapest solution, then, is debt. But this source is strongly limited in companies that have low or negative profitability, lack of any collateral and an insufficient cash flow (Collins and Pierrakis 2012; Walthoff-Borm, Schwienbacher, and Vanacker 2018). Startups and small new enterprises hardly have already collaterals, which require already

capital invested in physical assets, or have a satisfactory turnover, since they still need to grow.

Indeed, startups invest often in R&D, that is by definition a high-risk investment that bring mostly immaterial assets. Moreover, debt is considered as a personal liability by entrepreneurs, and the investment of equity is seen as a better way to share the value generated by the enterprise. These are common justifications to explain why startups and companies are mostly looking for new equity when they need capital. This model of financing is sometimes defined *inverted pecking order*, for which equity is preferable due to the reduction of the principal-agent problem, the new knowledge acquired with new involved investors and the signaling that an equity deal implies (Fourati and Affes 2013).

Focusing again on ECF, companies that search for it are found less inflow of cash and with less internal funds than companies that do not do so before raising capital, compared to the ones that raise debt. Moreover, also companies with higher level of debt and less collaterals tend to ask for equity crowdfunding. This has been read as a proof of the use of ECF as last resort, thus a confirmation of the pecking order theory applied to the ECF case. This point of view is strengthened knowing that companies that tried to raise capital through ECF but failed the campaign (i.e. they have not received funds) had a higher failure rate after two years compared to the ones that had similar characteristics but raised capital through debt in the UK. So, companies that failed a campaign did not find another viable way to finance themselves (Walthoff-Borm, Schwienbacher, and Vanacker 2018; Brown et al. 2018).

To complete this analysis, we will compare ECF with other more traditional forms of receiving equity capital. ECF is often compared with Business angels or venture capitals, so similarities and differences have been underlined in the literature. VCs and BAs are able to provide funding only to a very limited amount of companies, creating a rationing since fund supply does not match the demand

(Bellavitis et al. 2016). So, ECF can be seen as a second choice, since the crowd is able to recognize good projects with the same patterns of VCs but they have a broader scope, less constraints and a more 'democratic' vision of the project, without biases from the team sex, characteristics or the geographic location (Mollick and Robb 2016a). It can fill the equity gap to make some sectors that are not often considered by VCs or BAs more competitive (Camilleri 2018).

A self-assessment done by the entrepreneurs themselves shows that they choose ECF because they were *"unlikely to be able to obtain debt funding from banks (62%) or equity funding from VCs (40%) and business angels (45%)"* (Brown et al. 2018).

But ECF is not just a second choice: we see how crowdfunding can indeed answer to different needs other than just financial: we have already seen in previous chapters some advantages that are typical of crowdfunding: exposure to the public and branding, having support, feedbacks and validation from the investor/customer (Belleflamme, Lambert, and Schwienbacher 2014; Brown et al. 2018). There are also some advantages that are specific of ECF, as shown by Brown et al. (2018): *"Unquestionably, the biggest single advantage associated with crowdfunding was the speed at which a round of crowdfunding can be completed, in comparison with other sources of financing"* or highlighting *"the importance of retaining their autonomy and control of their business by having a dispersed owner- ship structure rather than having a single dominant shareholder"*.

ECF does not exclude other forms of financing. It can be paired with other external equity investments (e.g. BAs funds or public funds) and foster competitiveness, merging the advantages of two different fund sources and increase visibility (Boylan, Nesson, and Philipps 2018). Indeed, being ECF a seed investment, the need of further rounds of investment is already considered and planned. So, entrepreneurs go for ECF also because it is able to attract the attention of BAs or VCs for further rounds (Brown et al. 2018). This statement has

been verified with data in the UK and German market, were (Hornuf, Schmitt, and Stenzhorn 2018).

Indeed, since VCs tend to abandon the seed stage market and they have different characteristics compared to ECF. Thus, we can say that these two forms of funding are not in competition with each other, but they are rather complementary, and they can generate synergies. VCs can freeride on the crowd: "*sharing the costs of due diligence with the crowd […] and nurturing potential candidates for follow-up investments letting the crowd to bear the risk*" (Giudici 2015). So they can wait for entering in a follow-up round monitoring the company thanks to the crowd.

Not only financial return

In the previous paragraph we referred to a non-financial reward for investors. In spite of considering equity crowdfunding a way to invest capital and differentiate the investments of retails, it has been found that intrinsic motivation and immaterial rewards play a relevant role in the decision of investment. These motivations are similar to the ones that push investors to support other forms of crowdfunding, like donation-based and reward-based.

While professional investors that take part to crowdfunding campaigns are more likely to pursuit mere financial return, non-professional investors tend to support campaigns with a social purpose, or environmental purpose. This can come from the fact that a sense of community is relevant in the crowdfunding dynamics, or from motivations that are detached from financial purposes commonly called *intrinsic motivations*, like generation of non-financial value for society (Belleflamme, Lambert, and Schwienbacher 2013; Vismara 2019; Giudici 2015; Hemer 2011). No n-profit organizations tend to receive a higher amount of single investments and are more likely to succeed.

Breaking down these intrinsic motivations, they have been recognized in the will of the investor to support a socially relevant mission, the satisfaction of being

part of a community that support a project and seeing that project succeeds, the feeling of being a pioneer in a new technology, enjoying the interaction with other crowdinvestors and the team of the company and a personal identification in the project's goals and mission (Hemer 2011).

So, apart from the financial return the investor expects recognition from bring pioneers of a new business and part of the community, as well as supporting and participating in an activity that generates a social impact.

For these reasons, ECF is a change of meaning for the entrepreneurial finance from private investors and it can be an alternative to generate social value, a purpose that is usually pursuit through governmental policies with direct or indirect use of public funds (like GVCs or tax incentives for VCs). For these different forms of preferences, crowdinvestors can have a different risk-return profile, which can compensate the gap created by the high risk-high return frontier, but it is a fully private solution to fill this gap. The return can be different also thanks to different forms of non-financial returns.

Managing the drawback - Information asymmetry

The most criticized characteristic of crowdfunding is the existence of information asymmetry between the entrepreneur and the funder. This means that there is no full disclosure of information between them and the entrepreneur can choose which elements to provide to the crowdfunders. This creates opportunities of taking advantage of the investors, giving information that biases the valuation of the company (Collins and Pierrakis 2012).

This is true not only for crowdfunding, but also for all the other methods of investment for early-stage ventures, as Denis et al. presented in 2002 (Denis, Denis, and Yost 2002). Small and new entreprises are difficult to evaluate objectively, since their value drivers are not evident yet. There are also less disclosed information, and the organization is more chaotic.

This problem becomes even more evident when there is an intermediated relationship between the funder and the entrepreneurs, as it is with crowdfunding: the platform shows some specific information which are standardized, but often the real ability of the founders and the potential of the idea is not shown.

This can generate lack of trust, because there is the risk of unfair behaviour from the side of entrepreneurs, who assume several risks (Kirby and Worner 2014):

- *Risk of default,* with the consequence of losing the capital. It is the most obvious, but it becomes extremely hard to quantify when there is such information asymmetry,
- *Risk of non-payment,* which comes from bankruptcy fraud. It is very hard to verify if the capital has been well used when there is crowdfunding,
- *Risk from the platform,* if the platform closes or fails, the investor loses the guarantees, or even the money if the investment was running,
- *Illiquidity risk*, it is hard to quantify how long the investment will remain illiquid. Sometimes, wait longer than expected to exit the company,
- *Lack of transparency in operations,* for which the investor is not aware of how the venture is run and how the cash flow is managed.

These risks make more expensive equity capital from investors, because they expect higher return. This could generate a bias in the market selection, for which the best investments are cut out of the market because they cannot demonstrate to be better thus be worth of cheaper capital. This effect is defined as the *market for lemon* problem, for which the companies are self-selected and the best ones will prefer to collect capital in other ways. Thus, it is possible that only risky companies try to collect money on ECF platforms (Ibrahim 2015).

On the other hand, it could be that entrepreneurs, knowing of this information gap, take advantage of the investors proposing non-convenient investments. For these reasons, there is a strong regulation of ECF and of the platforms. This fear

is not totally unfounded, since there is a study that shows that more likely than not companies go overbudget and do not answer to expectations (Mollick 2014).

Indeed, the key role of platforms is to reduce as much as possible the information gap, providing enough elements to the investors which will decide based on them and running a basic due diligence on the companies. Indeed, investors totally trust the information published on the platform and decided based on them (Ahlers et al. 2015), thus platforms are able to make safer investing in crowdfunding if they follow best practices (Löher 2017). Talking in a more academic way, platforms have the main role in reducing as much as possible the information gap required to make this type of equity market efficient: they provide information, make a first due diligence and guarantee that the legal standards are fulfilled, reducing the transaction cost for the investor; this is where value is generated. This is especially true given the low bargaining power and control power of crowdinvestors, who own a small share of the companies; thus, a formalization is required beforehand (Giudici 2015).

Still, the information asymmetry that is intrinsically linked with new and dynamic companies and is typical of entrepreneurial finance cannot be eliminated, determining a market imperfection.

The way in which investors cope with this market imperfection is studied through the *signaling theory.* Given the information asymmetry, investors try to find some signals that are perceived as correlated to a higher quality project. A signal is a characteristic that only a good company can have, but it is too hard or too costly to get for low-quality company. This topic is the most studied, the majority of papers that have been published are referring to this issue. It is of special interest for practitioners, because entrepreneurs can try to show their signals to the investors. At the same time, if the investors know about these signals are less likely to be influenced in their decision. Indeed, non-professional investors often rely on signals from other investors that they consider more

expert (Landström, Mason, and Hornuf 2016). But they do not only follow more expert investors; they also base their decisions on different factors, not all actually depending on the quality of the companies but also on the campaign itself, on the idea as it is.

Often, the quality of the marketing campaign or the city in which it is incorporated is a driver for the investment, even though it does not depend on the idea of the venture.

3.4 ALTERNATIVE FINANCE AND COMPANY PERFORMANCES

3.4.1 INTRODUCTION TO THE IMPACT OF EQUITY FINANCING ON PERFORMANCES

The purpose of this section is to investigate if and how external capital injections affect companies' performances. The assumption underlying this question is that startups and new high-growth ventures do need external resources to run their operations. Otherwise, they are forced to delay or cancel investments, with potential consequences on their ability to grow and innovate. So, we will review some of the options that entrepreneurs have and the academic evidence of the impact on operating performances that they entail.

As stated before, crowdfunding is just one of the many alternatives that entrepreneurs have when they are seeking capitals. Private equity and hedge funds, venture capitals, business angels are some of the capital sources a newborn venture can rely upon (Cumming & Johan, 2012). Broadly speaking, in all of these cases the objective is to inject consistent amounts of money into the company, so that it is able to launch new products, patent its invention, hire new personnel, target larger market shares and so on. In other words, the objective is to make the company grow more or less rapidly and seek a consistent financial return afterwards.

In this section we will focus on equity capital, rather than debt, since it is unlikely for traditional banking institutes to lend money to highly risky businesses such as startups. In fact, the magnitude of information asymmetry problems linked to these companies cuts them out of the lending market. For instance, most startups have no collaterals to offer in exchange for loans (Mann and Sanyal 2012).

Moreover, within the equity capital market we will refer mainly to two other forms of financing apart from crowdfunding: Business Angel investors and Venture Capitalists. This is due to the fact that these types of investors cover the wide majority of early stage investments in the European market (even if similar considerations can be drawn at a global level). The chart below (Figure 3.4) shows that almost 95% of the early stage investment market originates from BAs and VCs. The total size of the market, when excluding ICOs, is approximately 11,4 billion Euros. Business angels constitute the largest share of the investment market with € 7. 3 billion invested in early stage ventures, followed by Venture Capitals, who injected € 3.5 billion into newborn companies. As seen previously, equity crowdfunding investments are growing quickly and are expected to continue at a fast pace: today, the market share for this form of investment reaches around 5,5%, or € 630 million (EBAN - Statistics Compendium European Early Stage Market Statistics, 2017).
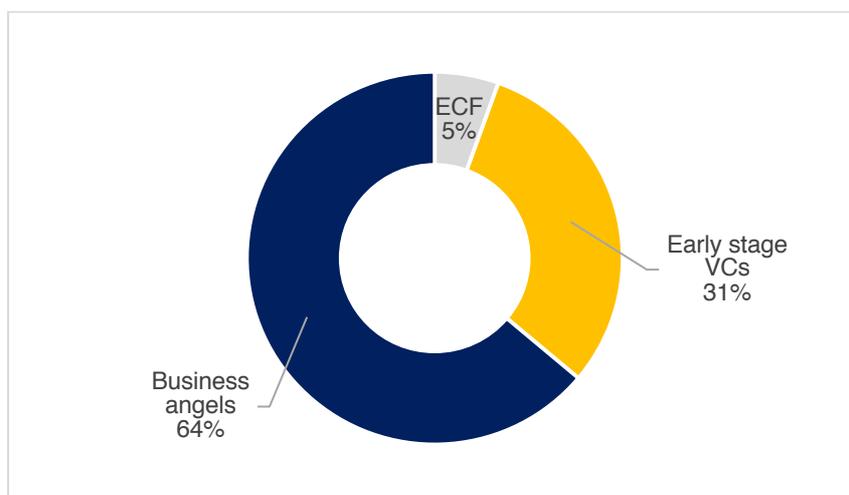
Fig. 3.4 Share of investments per type of investor, Data from EBAN report

These statistics are indicative of the European and Italian situations, where the VC industry has not reached the level of development of other markets, such as USA and China: in these cases, the share of early stage investments attributable to VC is way larger than Europe (France, Germany, Italy, Spain and the United Kingdom Building: Momentum in Venture Capital across Europe, British business bank 2016). So, it is evident that BAs and VCs are worth our attention given their importance in the investment landscape (Pandorino 2014).

In the following pages, we will see how their intervention impacts on firms' performances and by how much. Before that, it is interesting to analyze some of the differences between CF, BAs and VCs: Table 3.1 from (Wilson and Testoni 2014) compares the main characteristics of these three type of investors.

Table 3.1 Comparison of types of investors in early stage ventures

	Crowdfunding	**Business Angels**	**Venture Capitalists**
Background	Unsophisticated investors: many different backgrounds, many have no investment experience	Many different backgrounds, many former entrepreneurs and managers	Mostly background in Finance and Consulting
Investment Approach	Invest own money	Invest own money	Manage other investors' money
Investment stage	Seed and early stage	Seed and early stage	Range from seed to later stage, increasingly focused on later stages

Investment Instruments	Mainly common shares	Mainly common shares	Preferred shares
Deal flow	Through web platform	Through networks and angel groups	Through networks or proactive outreach
Due diligence	Individually performed, if any. Sometimes conducted by the platform	Performed by angel investors based on their previous experience	Performed by VC staff, eventually counselled by external firms
Geographical proximity	Online investments, therefore venture and investors can be quite distant	Mostly local investments	Invest nationally and internationally
Post-investment role	Depends on the individual, but most remain passive	Active	Board seat, strategic
Return on investment and motivation for investment	Financial return important but not the only reason for investing	Financial return important but not the main reason for investing	Financial return critical, since the VC must provide a return to its investors and to appeal to new potential investors

At a first-level analysis, business angels appear like a middle ground between crowd investors and venture capitalists. On the one hand, crowd investors and business angels target similar startup stages (seed and early stage) while formal Venture Capitals seem to prefer businesses which are in a more advanced phase, moving towards later stages. On the other hand, if we consider for example the role of the investor after the financing round, we can see how crowd investors

are mostly passive, while BAs and VCs are actively involved in the company's management, very often demanding seats in the board of directors.

Figure 3.5 shows the evolution of publication statistics regarding these three topics, highlighting the papers published on Scopus in the period 1978-2016. It is evident how VCs is the most widely researched topic. Nevertheless, crowdfunding, which is a relatively new concept, rapidly overcame BA in terms of publications and will probably get closer to VCs in the future.

Publication Statistics (Scopus)
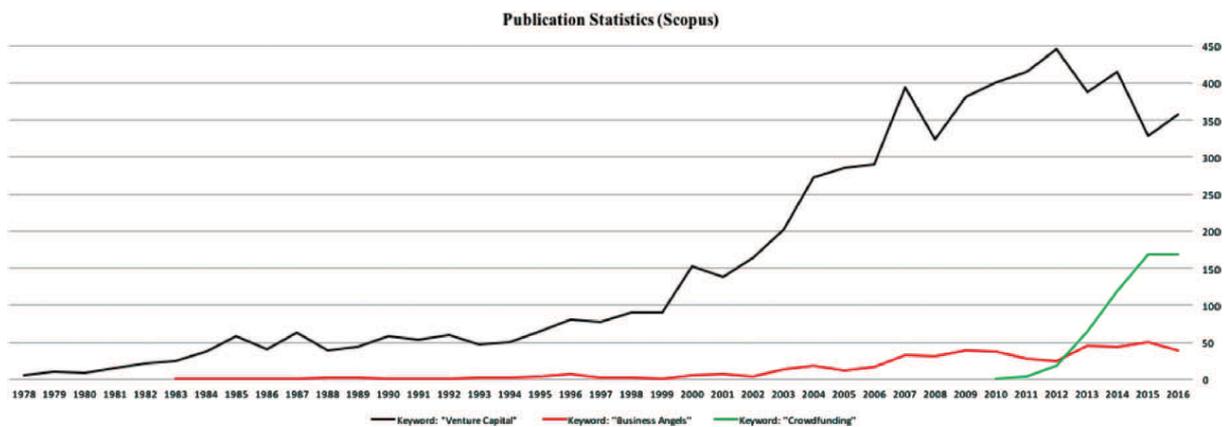
Fig. 3.5 N. of publication per topic in time

When analyzing the impact of these investors, several performance dimensions can be evaluated: growth speed, patenting activity, productivity, probability to be listed on a stock exchange, ability to export, survivorship profile and many more.

It is not in the interest of this dissertation to analyze them all, but rather to understand the way academics have used to evaluate the effects on performances and to identify potential literature gaps that we might fill. The following paragraphs offer a synthetics overview of this topic from the perspective of Business Angels, Venture Capitals and other forms of financing.

3.4.2 IMPACT OF BUSINESS ANGEL INVESTMENTS ON COMPANY
PERFORMANCES

Business angels are private informal investors who provide risk capital to newborn firms in which they have no family connection. Most of them are either entrepreneurs, company directors or business-related professionals (e.g. accountants, consultants); they are self-made and have a high net worth (Mason and Harrison 1996). Due to their background and despite their informal role, they possess financial and business competences which make them capable of properly evaluating risks and opportunities of the prospective investments (Wetzel 1987). Business angels invest a proportion of their assets, together with their time and expertise in unquoted entrepreneurial ventures in the hope of financial gains (Freear, Sohlf, and Wetzel 1995). Since angel investors invest their own financial capital, they have greater freedom than institutional investors to consider interpersonal fit with an entrepreneur (Amit, Brander, and Zott 1998). Being less constrained by external stakeholders, angel investors do not just aim at financial, instrumental goals, but they seek affectively rewarding experiences and are more receptive to interpersonal signals (Aernoudt 1999). BAs help startup meeting the high financial needs faced in earlier stages before the intervention of VCs, which are typically not interested in small and high-risk companies. This motivates the interest of public administrations, which are interested in fostering business angels' networks ("Financing High-Growth Firms", report OECD 2011).

Normally, business angels ask for positions in the board of directors, or they are involved in the company's management either as external consultants or as employees (Erikson and Sørheim 2005; Freear, Sohlf, and Wetzel 1995). The contribution of business angels to businesses is not limited to equity capital: they give strategic support regarding business development, recruitment, networking, mentoring, strategy definition, monitoring and control, etc. Business angels can provide all of this thanks to their great experience and training, i.e.

human capital, and their reputation (sometimes defined as social capital) (Politis 2008). The value of this non-monetary contribution can be as high as the financial investment (Harrison and Mason 1992). So, the presence of an angel investor on board is generally considered as an advantage for startups not only in the initial phases: according to some academics, they are able to influence the company's future and growth path even in later stages (Davila, Foster, and Gupta 2003; Gregson, Mann, and Harrison 2013).

Having said this, much work must be done in order to understand how angel investors impact business performances (D. J. Cumming and Vismara 2017). In fact, most studies regarding this topic are based on samples that are biased towards the best performing companies, therefore they cannot be considered well representative of the firms' population. Anyway, we believe it is worth mentioning some recent studies that tried to evaluate this impact.

Levratto (Levratto, Tessier, and Fonrouge 2018) aims at assessing the situation 432 angel-backed French companies which are compared to two control groups, one containing random firms and the other one containing matched similar companies. Differing from most of the previous work regarding BA, the paper takes the perspective of the company instead of the investor return. The research hypothesis is that "angel-backed companies are more likely to present higher performance than non-backed ones". The authors approximate performance through employment, sales, and tangible capital asset rate of growth. Similarly to the models that will be used in this dissertation in chapter 6, their econometric equation can be explained as:

$$Growth = \alpha + \beta BA + \delta Control + \varepsilon$$

where BA is a dummy variable equal to 1 when BAs have invested into the company and 0 otherwise. The findings are highly sensitive to the test group: BA-backed companies show better performances only when compared to the random group. However, when the test group is compared to a set of similar

companies, this advantage disappears. These results seem to confirm the existence of a selection bias.

Another example of this type of study is published in "the performance of angel-backed companies (Bonini, Capizzi, and Zocchi 2019), where they study qualitative and quantitative data regarding 690 deals made by 380 business angels. The authors perform comprehensive post-investment analysis of 111 angel-backed companies about survivorship and financial performances up to 3 years after the deal. Again, differently from previous works focusing on the determinants of BAs' investment decisions, the main unit of analysis is the investee company. As regards the performance metrics, Bonini et al. claim that traditional measures such as turnover or profits have low predictive power. Moreover, the considered time period is too short to have meaningful frequencies of successful exits, preventing the use of exit-based metrics. Thus, the authors develop an original "Performance Index", an ordinal variable that can assume five different values and that is based on a combination of revenues, asset value and profits. The results show that the operating performance and the survivorship probability of the target companies are positively impacted by the investment and involvement of angel investors, especially when they perform syndicated deals.

3.4.3 IMPACT OF VENTURE CAPITAL INVESTMENTS ON COMPANY PERFORMANCES

Venture Capital is generally considered the most suitable financing form for new ventures. It is a type of private equity fund that invests in unquoted companies with growth potential. The investment horizon is typically medium-long term and it is done in exchange for shares of the company. Hisrich defined VC as "a professionally managed pool of equity capital" (Fried and Hisrich 1995), whereas Burgyl focused on its role of intermediary between institutional investor (i.e.

banking and insuring institutes, pension and hedge funds, etc.) and portfolio companies (Burgyl, 2000). In fact, VC funds are able to relax the financial constraints that startups face in the first stages of their growth, by injecting high amounts of equity capital into the firms. As for BAs, they do this in the hope of high returns on their investment. At the same time, this kind of professional investor is well aware of the risks that these entrepreneurial projects entail. The screening process is everything but random: VCs select firms by continuously screening the market in order to find good investment opportunities (Muzyka, Birley, and Leleux 1996). VCs are considered to have a superior capability in addressing information asymmetry problems comparing to other investors and intermediaries, especially when dealing with unlisted firms (Amit, Brander, and Zott 1998).

The distribution and the investment capabilities of VC funds are not homogenous around the world: some conditions must be met in order to favor the development of this financing mode in a certain country. For instance, some of the requirements are the presence of liquid stock exchange markets, a florid pension funds sector, and flexible labor markets (Jeng and Wells 2000; Da Rin, Nicodano, and Sembenelli 2006). These conditions are evidently lacking in Italy, where the VC market is way underdeveloped comparing to other European (e.g. UK) and extra-European countries (USA, Israel and China on top of all).

Extensive research has been conducted in order to understand the impact of Venture Capital intervention on firms' performances. The general belief is that VCs have a positive effect on several dimensions: the empirical evidence seems to support this consideration. This encourages entrepreneurs to seek for VCs and compete in order to receive funding. However, there is an open question that has been hard to address in these many years of academic development on VCs: is the superior performance of VC-backed companies (comparing to non-VC-backed firms) due to a good screening (selection effect) or it is due to the intervention itself, which improved the performances (treatment effect)? This

research question is still unanswered, due to the problems in modelling it quantitatively.

Supporting the selection effect hypothesis, Puri and Zarutskie studied a large set of small businesses and found out that, before the investment was carried out, VC-backed companies tended to be younger, faster-growing, and larger compared to non-VC-backed companies (Puri and Zarutskie 2012). In fact, one of the main criteria for VC to select a certain company is scalability and market potential (rather than profitability, which is usually very low in the case of startups). Fast growth reflected in higher CEOs turnover rate: the set of skills required to manage a large multinational is quite different from the one commonly held by founders.

In this dissertation, we believe it is interesting to mention some Italian studies regarding this topic, applied in the national market. First, Bertoni studied a sample of 379 Italian unlisted new-technology-based firms, observed over a 10-year period (Bertoni, Colombo, and Croce 2010). Moreover, they differentiated between IVC and CVC in order to distinguish potential variations. The study highlights the positive correlation between investment rate and current cash flows; furthermore, startups increase their investment rate after receiving VC funding, independently from the type of VC. The authors studied cash flow sensitivity as well, discovering that CVC-backed companies remained cash sensitive, while IVC-backed companies were not, which is a signal of the overcoming of financial constraints.

Another study worth mentioning is the study of A. Croce (Croce, Martí, and Murtinu 2013), which started from the consideration that European VC-backed companies perform better than their counterparts. The paper aimed at understanding if these superior results were to be ascribed to the screening or to a value-added provided by the investors. The monitored performance was Total Factor Productivity (TFP) growth, which is the portion of growth in output not

explained by growth in traditionally measured inputs of labor and capital used in production. The authors were able to discriminate between selection and treatment effect by comparing portfolio firms' productivity growth before and after the equity capital injection, using a matched control group as benchmark. The difference in TFP growth is not significant before the first round of financing, whereas it becomes significant after the investment: this is an empirical evidence supporting the value added by VC funds.

On the other hand, some studies have assessed VC intervention in a negative way. In particular, this type of investor seems to increase the risk attitude of the target companies: the study of Manigart shows that VC-backed firms are less likely to survive and have a significantly higher probability of going bankrupt than non-VC backed companies (Manigart, Baeyens, and Van Hyfte 2002). A possible cause may be adverse selection, so that companies which do not need external capital or firms that are able to raise capital in less costly way do not ask to Venture Capitals for money. Another explanation could lie in the fact that VCs manage companies on a portfolio basis, rather than individually: this means that the funds' managers may be willing to let some companies go bankrupt, as long as the portfolio as a whole returns high yields thanks to some high performing companies within the portfolio. Bankruptcy could be considered as a preferable step of the investment process, since portfolio managers may find it more efficient to liquidate their "living dead" investments and to concentrate on profitable ones.

In conclusion, although it is generally believed that VC funds help the invested companies in achieving superior performances, not all the academia agrees on this positive effect. Moreover, even when a positive difference is found, it is not yet univocally understood how much it is due the screening phase and how much is linked to an added value provided by VCs.

3.4.4 IMPACT OF OTHER FINANCING FORMS ON COMPANY PERFORMANCES

Business Angels and Venture Capitals are not the only way for entrepreneurial ventures to raise capital. Startups and SMEs have the possibility to rely on other forms of equity capital, such as:

- Private Equity: they are similar to VCs, but they target companies in different stages of development. The risk appetite is typically lower, as for returns.

- FFF (Friends, Family and Fools): It is also called "love capital" and it is generally the first form of capital that is collected by the entrepreneur. It comes from the people belonging to the network of the founders and has the advantage of good rates and lenient credit standards.

- Crowdfunding: It is the focus of this dissertation (see previous sections)

Furthermore, equity is not the only type of capital that can help businesses achieving their goals when they do not own the necessary financial resources. In fact, they could theoretically ask for debt capital in some of the following forms:

- Bank loans: It is the traditional form of borrowing, where banking institutes provide debt capital under certain conditions regarding interest rates and collaterals. The loan is tailored according to the company's needs, which make them more flexible comparing to other debt sources.

- Bonds: The companies address the financial markets and asks them to buy debt securities, typically in exchange for coupons. Bonds usually have longer payment periods comparing to loans

- Shareholder loans: this kind of debt is the most similar to equity. In fact, it is the most junior debt in the company portfolio, with long repayment periods and low interests.

Of course, there are other ways through which an entrepreneurial venture could raise money to run its operations. However, rather than browsing all the possible alternatives, we believe it is interesting to see how scientific literature has assessed the impact of these capital injections on companies' performances. In particular, for the purpose of this dissertation it is clearly more interesting to focus our attention on the academic research that links (equity) crowdfunding to post-campaign performances of startups and SMEs. Generally speaking, this is a quite recent field of study and much work needs to be done before having a clear, univocal picture. As stated before, the topic of post-offering lives of crowdfunded firms has been treated, among others, by Signori and Vismara who emphasize the importance of participation and presence of qualified investors as drivers of post-campaign successful performances (Signori and Vismara 2018). Their study, based on a set of 212 firms that successfully raised capital on the UK platform Crowdcube, focused on exits performances. It highlights how a consistent percentage of exits are constituted by bankruptcies (18% of the sample), even if this rate is lower than comparable BA investments (56% failure rate in the UK). Other outcomes were further rounds of investment: acquisitions, investments by BAs or VCs, or capital increases on the same crowdfunding portal. Generally speaking, a significant proportion of ECF companies went on to raise further capital, showing that there may be potential monetary returns for initial crowdfunding investors. Walthoff-Borm compared the performance of ECF firms to comparable ventures that raised capital from other sources: they found out that, in their sample, ECF companies had a higher failure rate (8.5 times the matched firms), but also higher innovation capabilities (Walthoff-Borm, Vanacker, and Collewaert 2018). In fact, ECF firms filled 3.4 times more patent applications than their counterparts. However, Eldrige came to opposite results. In their analysis of UK SMEs for the 2014-2017 period, the authors suggest that equity crowdfunding does not impact significantly the innovation of small firms (Eldridge, Nisar, and Torchia 2019). On the other hand, crowdfunding has a positive influence on the so-called growth opportunity (GO), that indicates the

growth within the context of sales performance, and on return on assets (ROA). Hornuf and Schmitt (2016) studied the British and German ECF market, in particular they investigated the survival rate of crowdfunded firms through the Kaplan-Meier-estimates. Focusing on the German context, 85 percent of the ECF were still alive three years after the date of incorporation. In comparison, only 70% of German startups survive. The authors suggest that for this reason Germany ECF market did not become an Akerlof lemons market, where only the worst start-ups look for funding. Another possible explanation is that crowdfunding provided some extra value to the funded firms, but the authors were not able to disentangle this effect from the possibility that investors chose the best companies in their paper. A more recent study from the same authors (Hornuf, Schmitt, and Stenzhorn 2018) correlated the number of senior managers in the board and the number of crowd investors to the probability of obtaining subsequent rounds of financing after the campaign, and they also found a negative relationship between the average age of the team and the likelihood to obtain other funds.

This is the state of the art from which this dissertation will start, trying to replicate the same studies of Hornuf and Schmitt in 2016 in the Italian market and extending it also to operating performances. The methodology that will be shown hereby takes inspiration from the studies that we presented in chapter 3.4.2 and 3.4.3, that deals with more established research fields, trying to compare our results with the ones of BAs and VCs.

4. THE CONTEXT: EQUITY CROWDFUNDING IN ITALY

4.1 INTRODUCTION TO THE ITALIAN CONTEXT

In the previous chapter we showed our literature review about the concepts of crowdfunding and crowdinvesting, their history, their advantages, their problems and so on. In particular, we focused on equity crowdfunding, i.e. the funding mechanism that enables a broad group of investors (the crowd) to receive shares (equity) of a startup or small business in exchange for money thanks to a web platform. Afterwards, we highlighted the research findings regarding the link between alternative forms of financing and companies' performances. In all of the literature review, we followed a theoretical perspective, paying more attention to the common points among all of the researches and to their generalizable results. Most of the researches had a US or international framework.

In this section, we will follow a different approach. We wanted to ground our work on a more empirical, practical basis and to frame our research within the specific context of the Italian equity crowdfunding market. We did so because Italy is an established market with high growth potential, and many practitioners in this country are longing for some tools and researches to better understand the phenomenon. This is why we relied on the 4th Italian Report on CrowdInvesting (July 2019), edited by Giancarlo Giudici and his research group (including ourselves) at "Osservatori Entrepreneurship & Finance". At the present date, this is the most complete and accurate research about the state of equity crowdfunding in Italy. It provides a general overview of of various crowdfunding segments of the Italian market. It is conceived as a quantitively driven report for the ECF Italian community, with a focus on practitioners (e.g. entrepreneurs). The Observatory is an independent institution within the School of Management of Politecnico di Milano; this distinguishes this report from the ones provided by crowdfunding platforms or privately-owned institutions.

Hence, the main characteristics, regulatory frameworks, actors and descriptive data of the Italian ECF industry will be discussed.

4.2 REGULATORY FRAMEWORK

First of all, we will present the regulatory framework in Italy since it sets the structural conditions of the equity crowdfunding market in Italy. Regulations changed over time, following international trends and the stimulus provided by the private market. Here we will present the main characteristics of each measure and their historical evolution.

Equity crowdfunding was first introduced in Italy in 2012 as part of the D.L. 179/2012 (Decreto Sviluppo bis), which modified the pre-exisiting art. 30 of the Consolidated Finance Act (Testo Unico della Finanza, TUF). The aim of this policy intervention was to introduce the collection of equity capital through the Internet in order to favor the development of innovative enterprises and startups. Among other measures, this Act also defined for the first time the status of *innovative startup*, a special condition entailing some advantages to small newborn, knowledge-intense entreprises; it also kickstarted the growth of the mini-bond industry, in the interest of Italian SMEs looking for access to the capital market, thanks to a series of simplifications and deregulations.

D.L. 179/2012 also introduced a list of rules for the Italian ECF industry:

1. The collection of capital must be carried out through authorized Internet platforms. There are two possible types of platforms:
   a. platforms managed by investment firms and banking institutes that have previously communicated to Consob the management of a portal (portals classified as "special" in the register);

> b. platforms owned by actors that are authorized by Consob thanks to a series of requisites (portals enrolled in the "ordinary" section of the register).
>
> These entities must transmit subscriptions and exchanges of financial securities and instruments linked to equity capital exclusively to banks and investment companies.

2. ECF campaigns must be initiated by firms holding the *innovative startup* status and must cover equity shares.
3. The maximum threshold for capital collection is € 8 million (this threshold was subsequently modified in November 2018).

The actor that was required by legislators to define the operating rules for the sector was Consob. In fact, Consob (*Commissione Nazionale per le Società e la Borsa*) is the Italian government authority responsible for regulating the financial securities market. Its main goal is the protection of the investing public[4] In June 2013, Consob published its regulation, stemming from a consultation with market stakeholders at the beginning of the year. The following principles were established:

1. The integrity and professionalism requirements of portal managers authorized in the "ordinary" section of the register.
2. The authorization and sanctioning process.
3. The code of conduct of platform operators and the minimum information to be disclosed to potential investors, especially regarding risks for investors.
4. The requirement that a minimum threshold equal to 5% of the financial securities issued on the market must be acquired by professional investors, i.e. banking foundations, firms financing innovation and

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[4] http://www.consob.it/web/consob-and-its-activities/consob

development, startup incubators. The goal is to provide small investors with a minimum signal about the quality of the issuer.

5. The obligation for issuers to include in their statutes or deeds of incorporation adequate rules to ensure a way out to the investor, in the eventuality that the controlling parties cede the control on the firm. In other terms, the inclusion of tag along and termination provisions in the startups' statutes.

In 2015 the law was modified by the "Investment Compact Decree" (D.L. 3/2015) and other legislative measures that extended the possibility to launch an equity crowdfunding campaign to the new category of *innovative SMEs* – which are SMEs that fulfill specific criteria regarding innovativeness of the business model and technology – to collective investment schemes (OICR) and to investment companies working with innovative SMEs and startups, and finally to "tourism startups" defined by art. 11-bis of D.L. 83/2014.

In light of these developments and thanks to its experience in controlling the platforms in the first period of activity, Consob decided to modify accordingly the 2013 regulation. The new document (2016 Consob regulation) introduced modifications and attenuated some constraints: these changes were positively accepted by the community that was forming around the newborn industry.

Here are the changes that have been made:

1. The range of professional investors was extended to actors classified as on-demand investors by their intermediaries under the MiFID standard; moreover, the 5% threshold included the part subscribed by serial crowdfunding investors (e.g. business angels) or persons with managerial experience in startups or SMEs.

2. The obligation for platforms to start activities within 6 months from the authorization was introduced.

3. Portals' managers were given the possibility to directly verify that customers have the required level of expertise and competence in order to properly understand the essential characteristics and the risk of investment. This control was previously carried out by banks and SIMs – *Società di Intermediazione Mobiliare*.

Another incentive to the reduction of transaction costs was the introduction (with the same act D.L. 3/2015) of the potential dematerialization of shares of innovative SMEs and startups. This laid the foundations for the development of a secondary market that supports the trade of shares subscribed through equity crowdfunding. The cost of the transfer procedure, which is typically above 400€, can constitute a strong disincentive for small investments.

The Budget Law 2017 (*Legge di Stabilità 2017*, Law 232/2016) extended the possibility to raise capital through equity crowdfunding to all SMEs (in other words, not only the *innovative SMEs*). However, at that time the prohibition for limited liability companies (*Società a Responsabilità Limitata*) to offer shares to the public market was still valid. Thus, the following Decree D.L 129/2017 explicitly removed every doubt about the applicability of the norm, for both S.p.a. (joint-stock) and S.r.l (limited) companies.

After a public consultation, with the 17/1/2018 n. 20264 Deliberation, Consob recognized the legislative novelties mentioned above and it updated the 2013 Regulation, introducing the following innovations:

1. The definition of requirements for the minimum insurance cover to offer to investors, at both platform level and single investment level.
2. The possibility for platforms to give up the authorization voluntarily.
3. The reinforcement of organizational measures to prevent conflicts of interests (thanks to a specific discipline for platform managers willing to raise capital through their own platform).

4. The decrease in the minimum threshold that must be subscribed by qualified investors in each campaign, from 5% to 3%. This rule holds valid for SMEs possessing the certification for their (consolidated) financial statements of the two years preceding the campaign.

5. The definition of whistleblowing polices

6. The extension of all the norms previously reserved only to *innovative SMEs* to all SMEs, including the obligation to include in the statute the termination and tag-along clauses for investors and to publish potential shareholders' agreements, as well as other information regarding the issuer's financial consultants, its governance entities and its auditors

Another innovation regarding the Italian equity crowdfunding market was the increase up to 40% in January 2019 of tax credit (for natural persons) and fiscal deduction (for juridical persons) in favor of startups/innovative SMEs investors, under the conditions described by ministerial decrees (e.g. D.M. 25/02/2016).

In recent months, the most interesting novelty has been introduced by Budget Law 2019 (Law 145/2018). Equity crowdfunding portals authorized by Consob can now sell bonds issued by SMEs to professional investors in a different section of the portal from the one used to raise equity capital. The actualization of the law concerns Consob, which, on 20/06/2019, published a consultation document with the aim of modifying the current regulation. Another topic which will be modified by the next regulation will be the possibility for investors to sell or buy securities on special sections of the portals. It will be a sort of showcase which will be useful to foster the secondary market.

4.3 ITALIAN PLATFORMS

On 30/06/2019, there were 35 equity crowdfunding portals authorized by Consob in Italy. 33 of these 35 are enrolled in the "ordinary section", while only

two (Unicaseed.it and Tifosy.com) are enrolled in the "special section" (see Table 4.1). This number is considerably high, taking into account the dimension of the market and other European countries' situation. In the last 12 months there were 8 new authorizations: Extrafunding.it, Crowdinvestitalia.it, House4crowd.com, Doorwayplatform.com, Buildaround.eu, Startfunding.it, Forcrowd.it and Gopmi.it. Two platforms (Buildaround.eu and House4crowd.com) focus on the real estate market.

The most important event that characterized 2019 was the Initial Public Offering of Crowdfundme Srl on the *AIM Italia* segment (Alternative Investment Market), which is reserved to Italian high growth potential SMEs. Thanks to the IPO, the firm was able to collect € 2,8 million. Furthermore, the company run a crowdfunding campaign on its own platform in 2017, collecting € 278.345: as a result, Consob contested the operation and sanctioned the firm with a €12.000 fine. Another event of 2019 regarded BacktoWork24 Srl: Neva Finventures, the corporate venture capital belonging to Intesa Sanpaolo group, invested € 4 million into a capital increase for a minority stake of this platform.

Table 4.1 List of all authorized Italian platforms

Website	Managing company	Authorization date
Unicaseed.it	Unica SIM	Special section
Tifosy.com	Tifosy Limited	Special section
Starsup.it	Starsup Srl	18/10/13
Actioncrowd.it	Action crowd Srl	26/02/14
200crowd.com	The Ing Project Srl	18/06/14
Nextequity.it	Next equity crowdfunding marche	16/07/14
Crowdfundme.it	Crowdfundme Srl	30/07/14
Muumlab.com	Muum lab Srl	06/08/14
Mamacrowd.com	Siamosoci Srl	06/08/14

Fundera.it	Fundera Srl	10/09/14
Ecomill.it	Ecomill Srl	29/10/14
Wearestarting.it	Wearestarting Srl	16/12/14
Backtowork24.com	Backtowork24 Srl	14/01/15
Investi-re.it	Baldi Finance SpA	28/01/15
Crowd4capital.it	Roma Venture Consulting Srl	08/10/15
Opstart.it	Opstart Srl	11/11/15
Cofyp.com	Cofyp Srl	14/04/16
Clubdealonline.com	Clubdeal Srl	08/03/17
Walliance.eu	Walliance Srl	30/03/17
Europacrowd.it	Europa HD Srl	07/06/17
Italyfunding.com	Italyfunding Srl	06/09/17
Ideacrowdfunding.it	Idea Crowdfunding Srl	29/11/17
Thebestequity.com	Gamga Srl	14/03/18
Leonardoequity.com	Management Capital Partner Srl	17/04/18
Concreteinvesting.com	Concrete Srl	24/04/18
It.lita.co	1001Pact Italy Srl	31/05/18
Lifeseeder.com	Lifeseeder SpA	28/06/18
Extrafunding.it	Extrafin Srl	05/07/18
Crowdinvestitalia.it	Crowdinvest Srl	10/07/18
House4crowd.com	4crowd SpA	17/07/18
Doorwayplatform.com	Doorway Srl	28/11/18
Buildaround.eu	Build Around Srl	12/12/18
Startfunding.it	Start Funding Srl	04/06/19
Forcrowd.it	Forcrowd Srl	12/06/19
Gopmi.it	Gopmi Srl	19/06/19

4.4 CAMPAIGNS

From the entry into force of Consob regulation (2013) up to 30th June 2019, the total amount of campaigns presented by authorized platforms was equal to 401. Among these, 261 offers were closed successfully whereas 103 did not reach the minimum target, thus not collecting any capital. 37 campaign were still going on at that date and many of them had already reached the minimum target threshold. Figure 4.1 graphically represents these numbers.
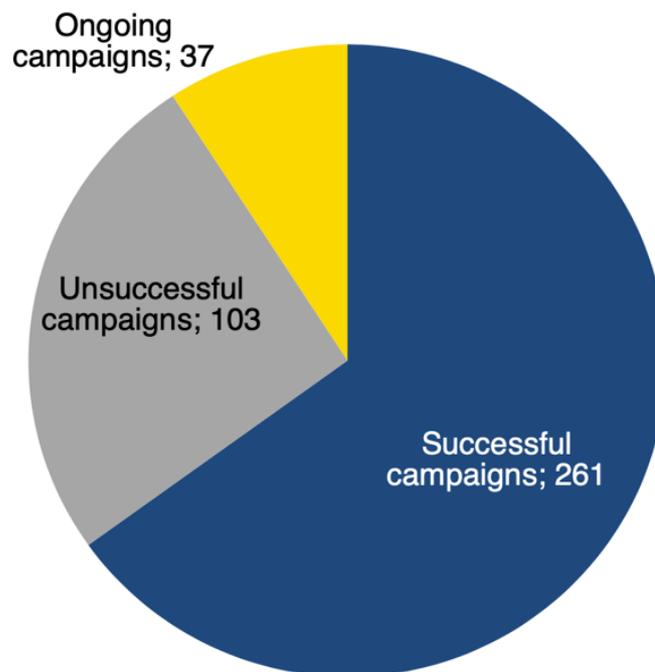
Fig. 4.1 Distribution of the outcome of Italian ECF campaigns

Campaigns which were run on Clubdealonline.com are not included in this calculation, since its projects are visible only to the platform's subscribers and not to the whole Internet crowd.

With respect to the evolution over time of campaigns, we can see how the year 2018 witnessed a remarkable market growth. Considering the end date of registered campaigns, in 2018 there were 143 offerings, among which 115 were successful, almost doubling the amount of the previous year. 2019 is probably going to beat this result, since only in the first semester there have been 88 campaigns and many more are still to be closed. Figure 4.2 shows these trends.
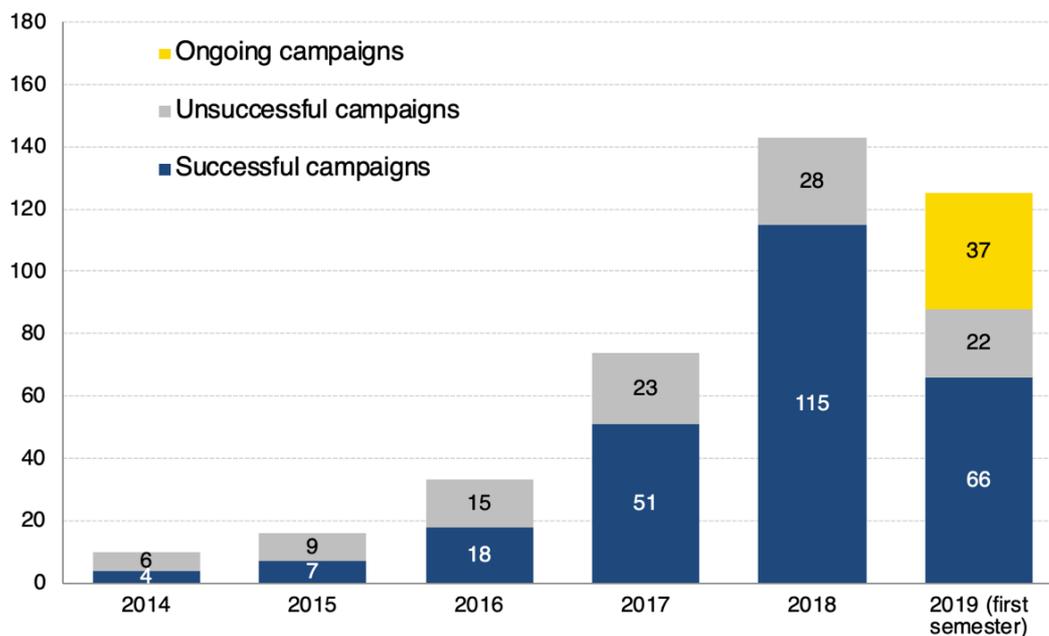
Fig. 4.2 Outcome of the campaigns per year

Success rate increased notably from 2014, showing how the market is maturing from the perspective of acquired competences, marketing capabilities and potential catchment area. While the success rate was below 50% in 2014 and 2015, it reached 80,4% in 2018 and 75% in the first half of 2019. Capital collected during the 261 successful campaigns was equal to € 82,27 million (until 30th June 2019). Figure 4.3 shows the market growth in terms of the investments: the total invested capital was equal to € 36,39 million in 2018 and it reached € 26,87 million in the first semester of 2019. Part of the credit goes to record-breaking capital collection such as those of Startupitalia! Srl (€2,66 million) and Pordenone Calcio Srl (€ 2,28 million). The accumulated invested capital reached €82,27 million.
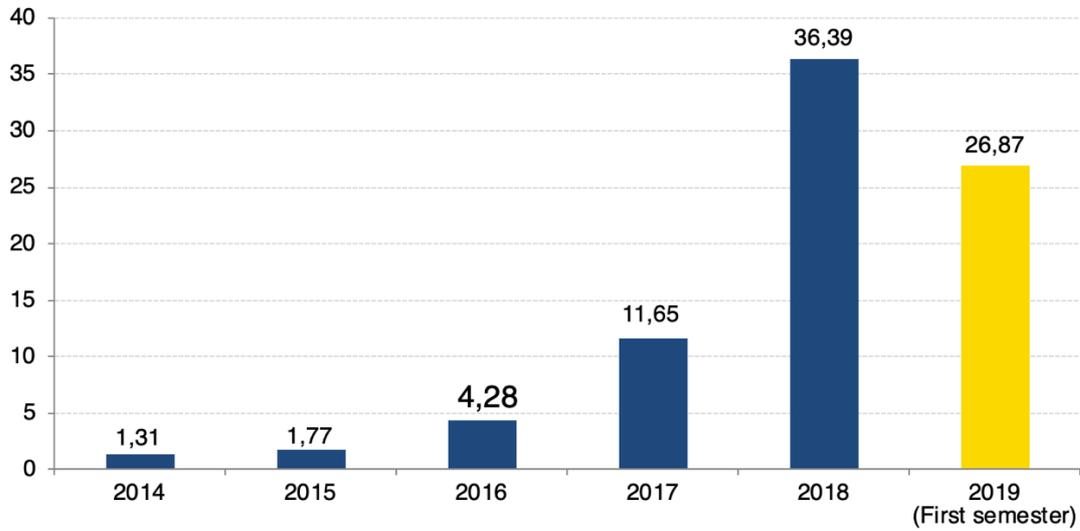
Fig. 4.3 Capital collected in Italy through Equity Crowdfunding

Figure 4.4 displays the distribution of collected capital among the platforms: Mamacrowd took the lead, collecting € 21,96 million in total and € 12,66 million in the last 12 months, followed by Crowdfundme, who gathered € 14,96 million in total and € 8,1 million in the last year.
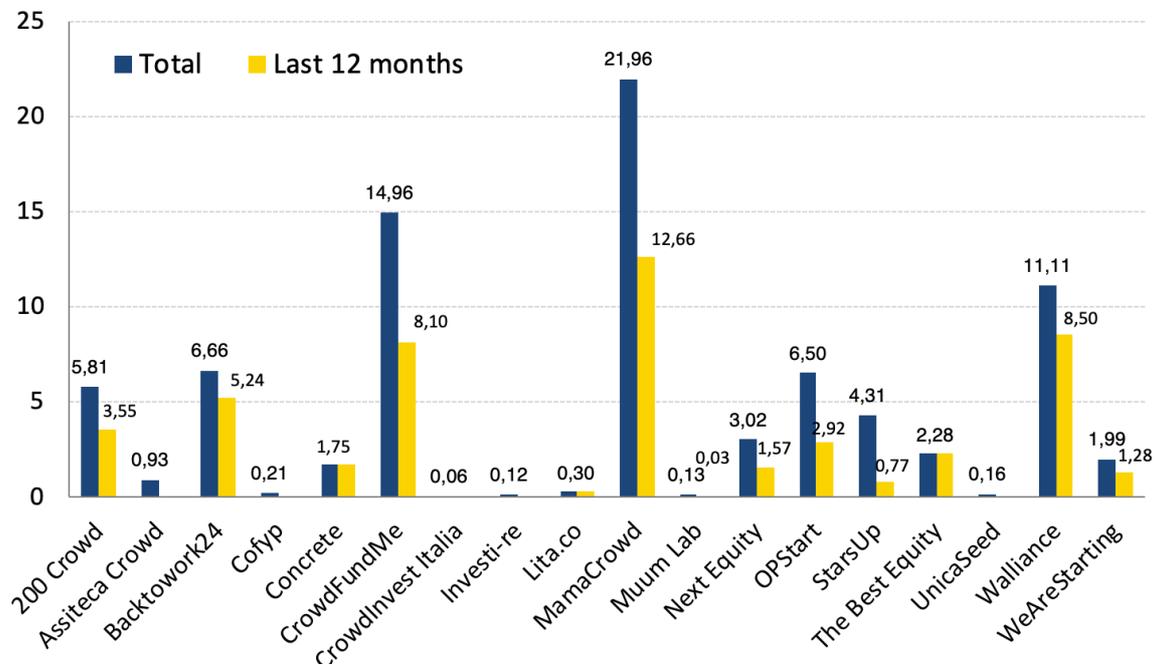
Fig. 4.4 collected capital per platform (€million)

Figure 4.5 segments the success rate of campaigns according to platforms. This parameter does not constitute a proper factor in assessing the quality of portals, since some platforms published few offerings. Indeed, this percentage must be appraised together with the number of campaigns and the target capitals.
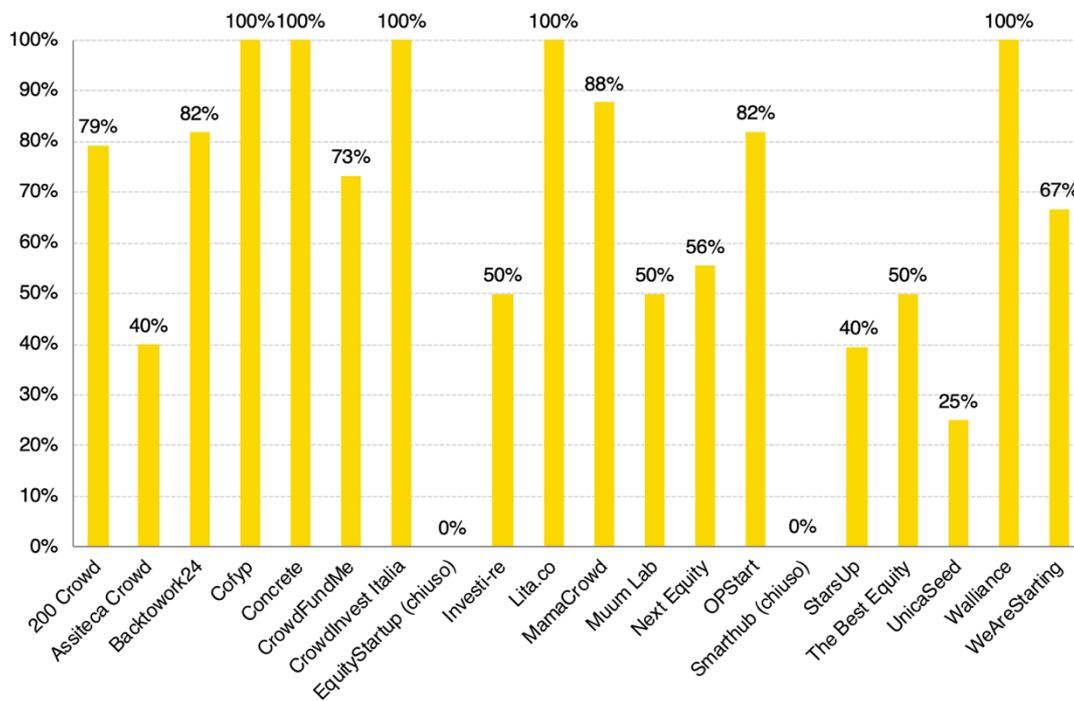
Fig. 4.5 Success rate of the campaign per portal

The distribution of campaigns according to platforms is represented in Figure 4.6, together with the last 12 months flow. It is interesting to notice how, despite the growing number of portals, the market keeps being very concentrated in a small number of platforms. The 6 largest portals host 79,3% of offerings, while last year this number was equal to 78,8%. Crowdfundme achieved the first place with 79 offerings, followed by Mamacrowd (71) and Opstart (51). Looking at the last 12 months, only 17 platforms presented some offerings: the most active were Mamacrowd (33), Crowdfundme (32) and BacktoWork24 (23). This is true also in terms of collected capital, which follows the same ratios.
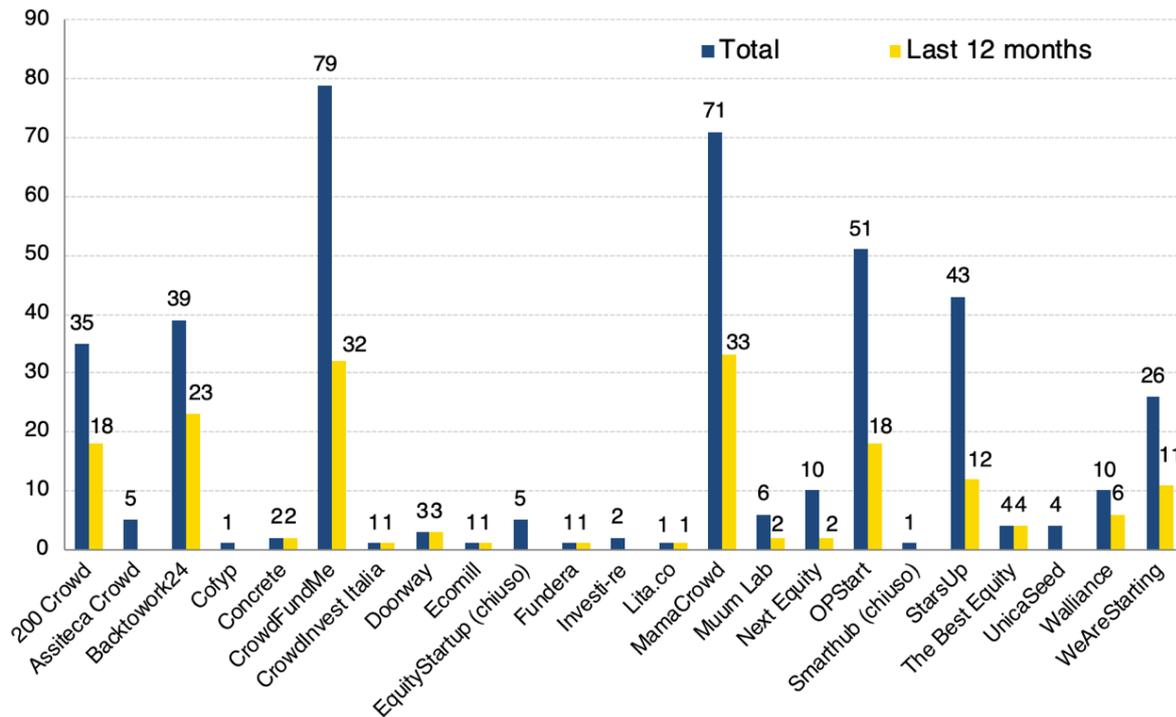
Fig. 4.6 N. of campaigns per platform

Table 4.2 shows the statistics regarding the 401 published offerings, regarding the target capital. Since the crowdfunding campaign is structured as an equity capital increase, each campaign must be compatible with the capital increase resolution published by the company. Normally, issuing companies approve a capital increase document that excludes the pre-existing shareholders from the right to exercise their options. The capital increase is made up of a "divisible" part and an "indivisible" part, allowing companies to define a minimum threshold under which the capital increase is unsuccessful - the indivisible part - and a maximum threshold, reached when the divisible part is saturated. However, there have been some campaigns were the capital increase addressed to the crowd was entirely divisible: in those cases, the offering was closed successfully even with low subscription levels. Typically, this kind of campaign is run when it is part of a broader operation, involving well identified investors: in this cases capital increase is subdivided into tranches and temporal slots. It is quite infrequent for companies to run campaigns characterized only by the

indivisible part, i.e. the offering is successful only when the raised capital is exactly equal to the target value. Table 4.2 distinguishes between real estate and other projects because the first ones generally aim to raise larger capitals. The real estate projects (13 in total) are concentrated between 2018 and 2019, when crowdfunding was extended to all SMEs. The average collection target for non-real estate offerings was equal to € 191.956, with a median value of € 100.000 (in other words, half of the firms set a target below this value). Targets decreased progressively over time, stabilizing in 2017 and 2018 but with an additional decrease in the first semester of 2019. The most ambitious campaign was the one run by Aerotec Innovation Srl on Next Equity platform, aiming at collecting € 3.000.000 (even if the effective raised capital was well below, given that the minimum success threshold was € 500.000). On the other side, the smallest campaign was launched by Mynoelia Srl on The Best Equity platform, with a target of € 20.000. With respect to real estate projects, the average value is € 664.231 (more than three times the target of other projects), ranging from € 85.000 to € 1.500.000.

Table 4.2 Size of the target capital per year

Average collection target (€)	Average value	Median value	Minimum value	Maximum value
Non real estate projects	191.956	100.000	20.000	3.000.000
2014	284.745	250.000	99.200	636.000
2015	421.201	325.000	80.000	1.000.227
2016	210.233	149.980	50.000	720.000
2017	174.001	120.000	40.000	1.507.908
2018	182.477	100.000	36.000	3.000.000

2019 (first semester)	139.027	100.000	20.000	1.000.000
Real estate projects	664.231	500.000	85.000	1.500.000
2018	500.000	500.000	500.000	500.000
2019 (first semester)	927.000	1.000.000	85.000	1.500.000

Figure 4.7 segments the average collection target according to platforms. As written before, Concrete and Next Equity show higher targets, given their specialization in the real estate market. Focusing on platforms which have published many projects, we can notice how Opstart aimed at more modest capital increase (€ 87.791), while Startsup and 200 Crowd show higher average values (€286.314 and € 189.286).
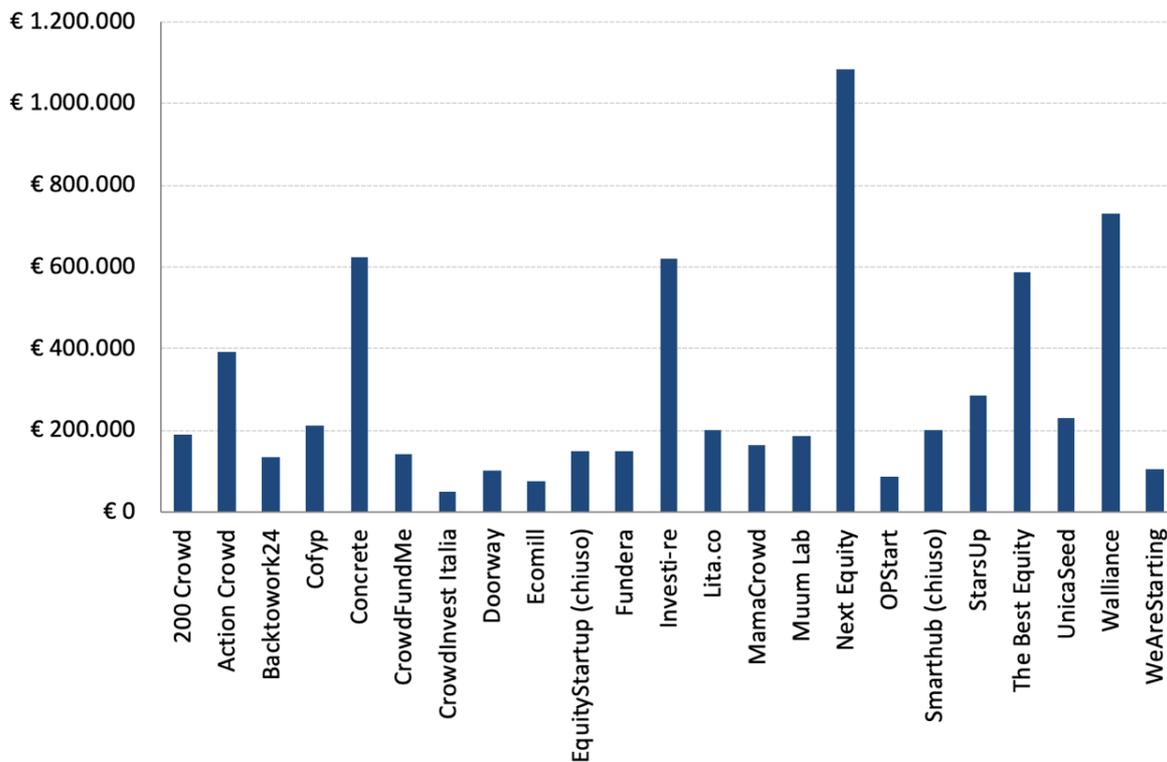
Fig. 4.7 Size of the average investment per platform

Considering successful campaigns, we can analyze the percentage of achievement of the initial target, i.e. the ratio between the sum of investments deposited by contributors and the initial target. There is no full correspondence between these statistics and the outcome of the campaign (success/unsuccess), since it depends on how the capital increase is structured. Some campaigns could be successful even with low percentage of achievement because the indivisible part was very low or even null (as for Cynny Spa and Papem Srl). Some other offerings could result unsuccessful even if they attracted large cashflows because they set the threshold for the indivisible capital increase at a high level. Out of the 364 campaigns that were closed by the date of 30th June 2019,19 offerings (5,2% of the subsample considered) reached less than 1% of the target: in many cases these were campaigns run during the first stages of development of the crowdfunding market, when both potential investors and platforms had not proper knowledge industry dynamics.
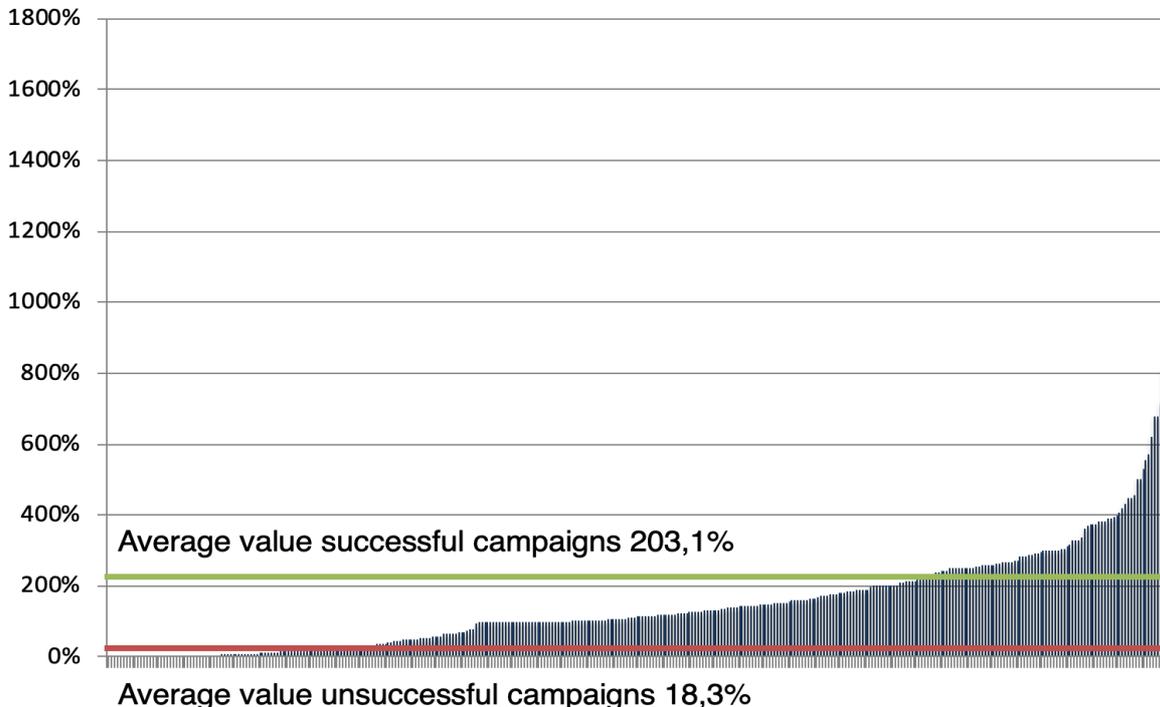
Fig. 4.8 Distribution of collected capital on target capital

Overfunding was also a consolidated phenomenon: from this perspective, the most successful campaigns were Ges Site Zero Srl on Opstart, which collected € 1 million starting from an initial target of € 60.000 and Recrowd Srl (on Opstart as well) which raised € 418.880 instead of € 50.000. On average, successful campaigns collected 203,1% of the initial target, while unsuccessful campaigns reached 18,3% of their funding goal (see Fig. 4.8).

The share of equity capital that was offered in exchange of cash was on average equal to 10,4% and the median value was 6,4%. Variability was very high: the campaign that offered the smallest share of capital (0,17%) was the fourth campaign of Cynny Spa, while the campaign that ceded the highest percentage (99%) was the first campaign of Take Off Srl. It is important to highlight that the fraction of capital that was actually ceded varied according to the capital that was eventually collected: these statistics are computed based on the target value, which can be higher or lower that the actual collection. The percentage of offered shares decreased over time: the average value of offerings published in the first semester of 2019 went down to 6,5%, while the median value is just above 5%. The trend confirms the willingness of pre-existing shareholders to maintain control over the company's operations, keeping the majority of voting and property rights. Table 4.3 sums up the abovementioned statistics.

Table 4.3 Size of the % of shares offered to investors

Offered shares (%)	Average value	Median value	Minimum value	Maximum value
Complete sample	10,4%	6,4%	0,17%	99,0%
2014	27,0%	20,0%	5,1%	86,7%
2015	20,9%	19,7%	0,95%	49,4%
2016	17,2%	11,5%	1,7%	53,2%
2017	10,9%	8,0%	0,20%	99,0%
2018	7,4%	5,3%	0,17%	40,1%
2019 (1° semester)	6,5%	5,6%	1,3%	33,3%

As regards the typology of issued shares, it is common practice for companies to offer securities having different rights compared to the ones belonging to the founders so that they depend on the amount of invested capital. As a rule of thumb, if an investor invests small capitals he/she often gets. shares without voting right, if the capital is bigger he will probably get voting shares. In other cases, companies propose only one time of shares. Figure 4.9 shows that 108 campaigns (27% of the sample) offered ordinary shares (with voting and property rights identical to founders' rights), while there were 41 firms that issued shares without voting rights (10%) and a net majority of 248 "mixed" offerings, giving the right to vote in the general assembly only to the bigger investors. The remaining campaigns constituted particular cases, such as securities with limited voting rights or specific privileges. Looking at the last 12 months, the majority of offerings regarded voting shares above a certain threshold (72%) while pure ordinary shares decreased considerably and were concentrated mostly on Starsup, Next Equity, Backtowork24 and Wearestarting.

Total sample

4%
27%
10%
59%

- Voting shares
- Non-voting shares
- Voting (over a threshold) and non-voting
- Other typologies

Last 12 months

3%
13%
12%
72%

- Voting shares
- Non-voting shares
- Voting (over a threshold) and non-voting
- Other typologies
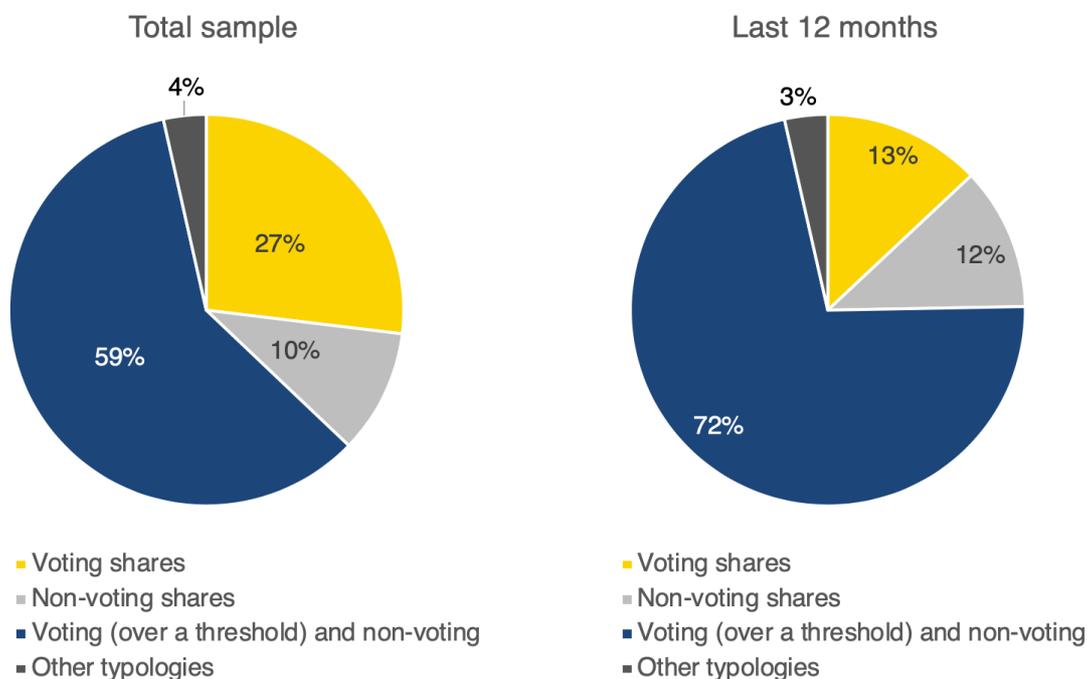
Fig. 4.9 Type of offered share, overall and last 12 months

The duration of campaigns varied remarkably: some raised capital in very few days, some others lasted for several weeks, sometimes extending the time window defined before the campaign. Thus, it is not interesting to elaborate statistics regarding this aspect: moreover, it is common practice for portals to notify their members with information regarding issuers, anticipating the official beginning of campaigns.

Another parameter which is interesting to monitor is the minimum required investment for each campaign. Figure 4.10 highlights diversified strategies: in 23 campaigns (6% of the total) the minimum threshold for natural persons was very small (lower than 100€) but none of these campaigns happened in the last 12 months; the largest group (52%) included campaigns with a minimum investment ranging from € 101 and € 499,99. Furthermore, 34% of campaigns had a minimum chip between € 500 and € 1000: this group grew in size in the last 12 months, reaching 42% of the sample.

Total sample

Last 12 months

■ Up to € 100
■ Between € 101 and € 499,99
■ Between € 500 and € 1.000
■ Between € 1.001 and € 2.000
■ Between € 2.001 and € 5.000
■ > € 5.000
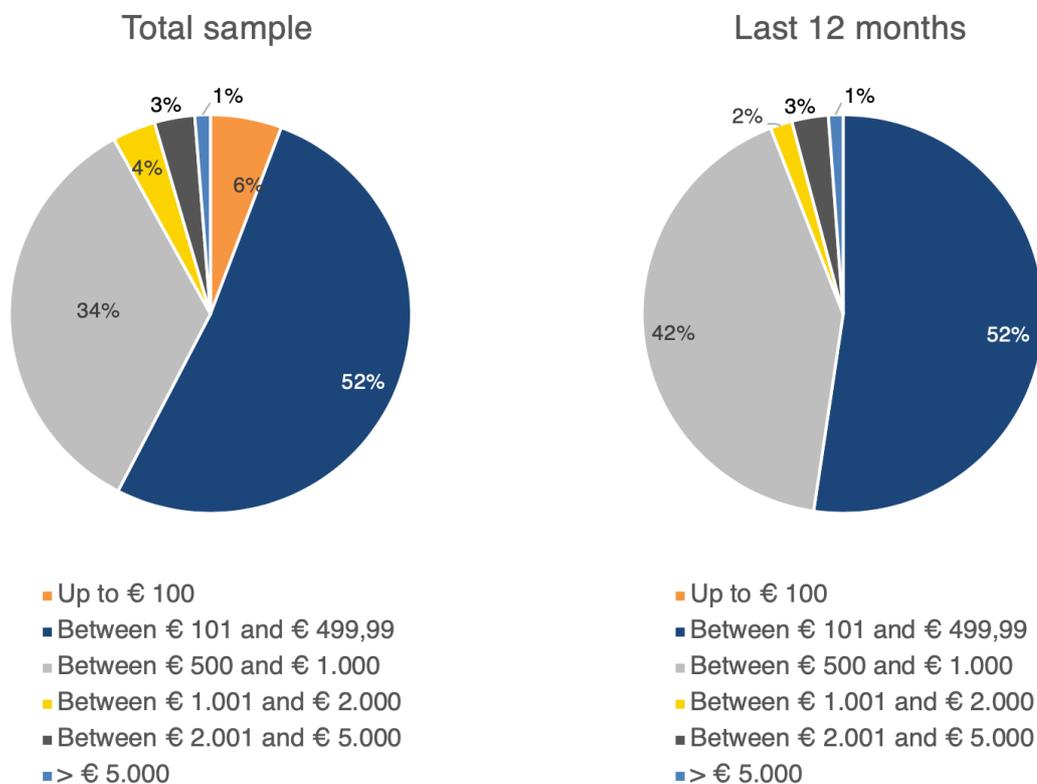
Fig. 4.10 Invested capital per investor, overall and last 12 months

Finally, there were 14 campaigns between € 1001 and € 2000, 13 between € 2001 and € 5000, 5 campaigns with a minimum required investment larger than € 5000. This does not follow a specific rule, but it comes from the necessities of the company brokered by the expertise of the platform interlocutors.

4.5 THE ISSUING COMPANIES

We described our sample of 401 campaigns but it is important to underline that the issuing companies were 369 in total. This difference is due to the fact that several issuing companies ran more than a campaign in different years (on the same platform or on a different one).

Figure 4.11 explains the different typologies of company, which are subdivided into:

- *293 Innovative startups* (79,4% of the sample), among which 280 S.r.l. (the equivalent of LLC companies), 4 agricultural companies, 8 S.p.a. (equivalent to P.L.C. companies), one foreign company.
- *37 Innovative SMEs* (10% of the sample), among which 33 S.r.l. and 4 S.p.a.
- *31 SMEs* (8,4% of the sample), among which 30 S.r.l.: these companies leveraged the innovation in legislation done with the Legge di Stabilità 2017, which extended the possibility to run a crowdfunding campaign even to small and medium enterprises.
- *8 Investment vehicles* in innovative startups, innovative SMEs, other SMEs (2,2%): these firms invested in portfolios of shareholding or they were constituted *ad hoc* to carry out one single investment.

It is also evident how, in the last 12 months, the market was dominated by innovative startups, even if other types of company gained importance.

Total sample

Last 12 months

Innovative startup

Innovative SME

SME

Investment vehicle
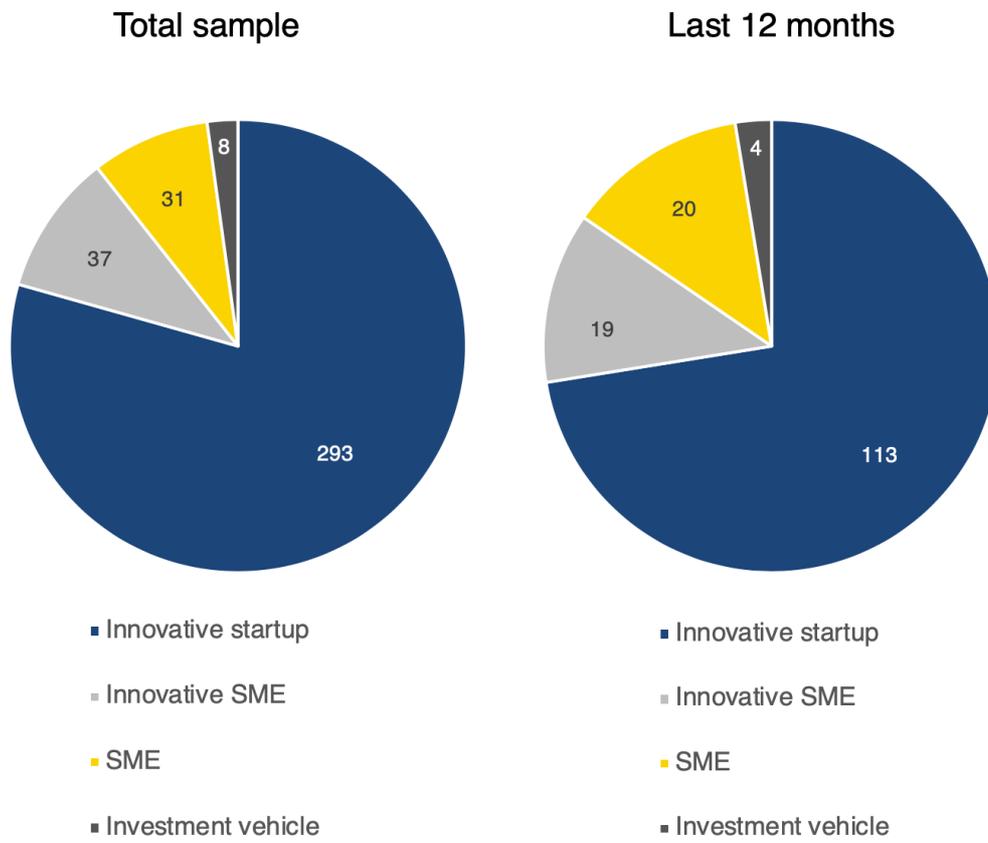
Fig. 4.11 Denomination under the Italian law of companies that ran a campaign, overall and last 12 months

With respect to the geographical distribution of issuing companies, Lombardia ranks first with 146 firms (39,6% of the sample); Lazio with 36 companies and Emilia Romagna with 30 complete the podium. Puglia dominates the South Italian market, with 17 issuers. Veneto appears to be undersized comparing to its economic and productive relevance in the national landscape, with only 12 issuing companies. Valle d'Aosta had its first campaign in the last year, so that now every region has a representative. Figure 4.12 displays these numbers, also highlighting the last 12 months statistics.
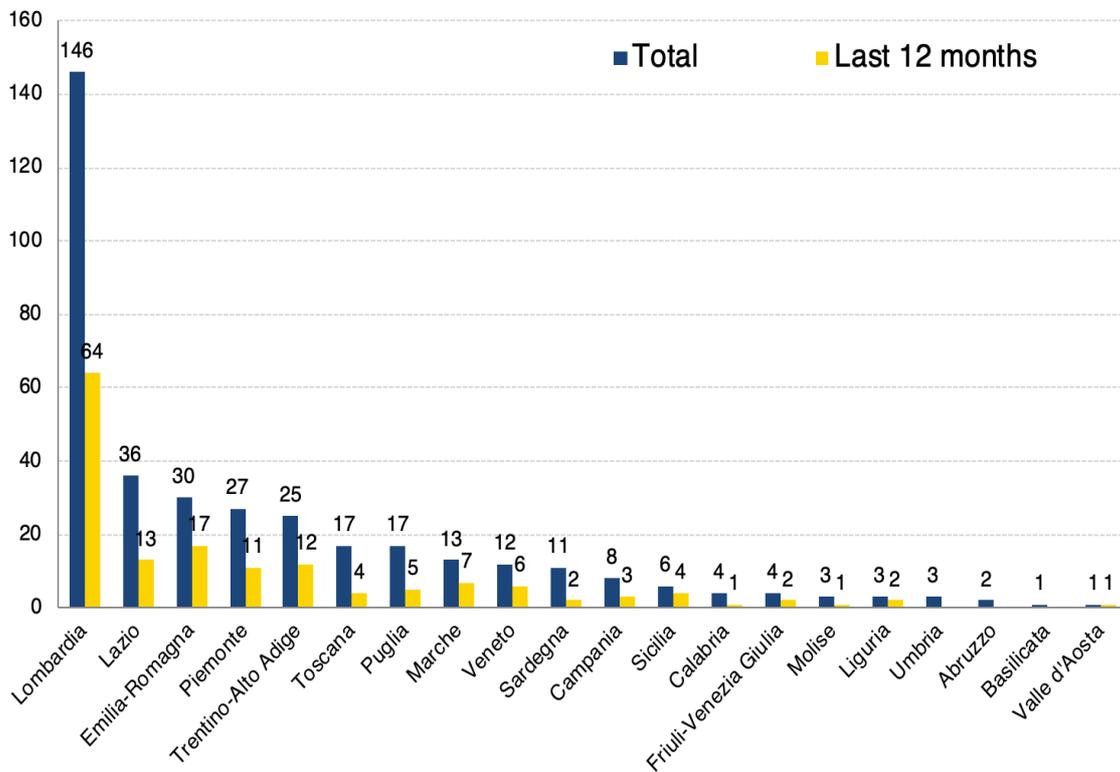
Fig. 4.12 Number of companies per Italian region - complete sample and last 12 months

Figure 4.13 segments the sample according to the ATECO code. Clearly, these numbers are conditioned by the fact that the dominating typology is the innovative startup, thus this sample does not represent the distribution of the population of new ventures. However, several industries are represented: for instance, 155 companies have the code J (information and communication services), 59 are under code M (professional and scientific activities), 47 are classified as C (manufacturing activities). No particular deviations were found in the last 12 months.
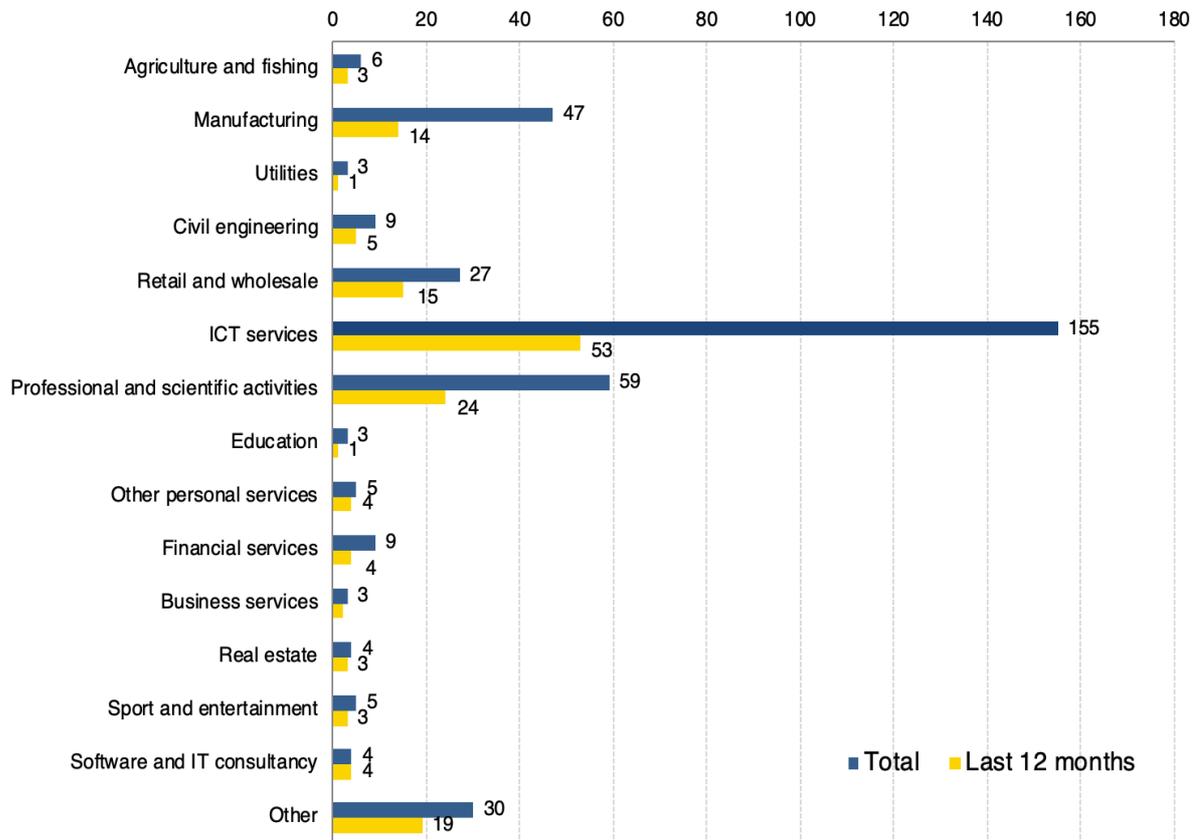
Fig. 4.13 N. of campaigns per industry (ATECO code)

Table 4.4 displays some statistics regarding the issuing companies' financial statements. Many companies were active since less than a year, so in their case it is not possible to evaluate their financials. Moreover, investment vehicles without significant pre-campaign assets were excluded. It is interesting to notice median values of revenues (€ 43.875) and age (2 years), which derive from the high number of startups in the sample. Companies making profits are few (less than half) and losses are often remarkable. The number of shareholders before the campaign is also reported, with an average and median value of 6,2 and 4, respectively.

Table 4.4 estimated value pre-campaign of successful companies

	Average value	Median value	Minimum value	Maximum value
Book value of equity pre-offer (€)	115.804	25.000	-555.372	4.521.847
Age	3,0	2	Zero	30
Last fin. year revenues (€)	346.955	43.875	Zero	50.214.561
Last fin. Year net profit (€)	-51.320	-20.003	-3.115.804	4.076.692
# of shareholders pre-offer	6,2	4	1	79
Implied pre-money valuation (€)	1.509.098	1.500.015	10.000	43.478.261

Finally, it is worth monitoring the implied pre-money valuation: once the capital increase and the offered share of equity is defined, it is possible to compute the implied valuation attributed to the company given the invested capital and the % of shares. For instance, if there is a target collection capital of € 100.000 in exchange for 20% of post-campaign capital, then the total post-money valuation is € 500.000 and if we exclude the collected capital, the pre-money valuation is € 400.000. Even if the sample is constituted mostly by startups, pre-money valuations are quite high, with an average and median value around € 1,5 million; the maximum valuation is the one of Sixth continent Europe Srl, above € 43 million. Figure 4.14 shows the detailed distribution of valuations: in the last year, the trend was a relative increase in issuing companies valued between € 1 million and € 5 million, which represent two thirds of the sample. It is interesting to notice that the pre-money valuation is set before the beginning of the campaign, when the entrepreneurs decide at what price to put each share on the platform.
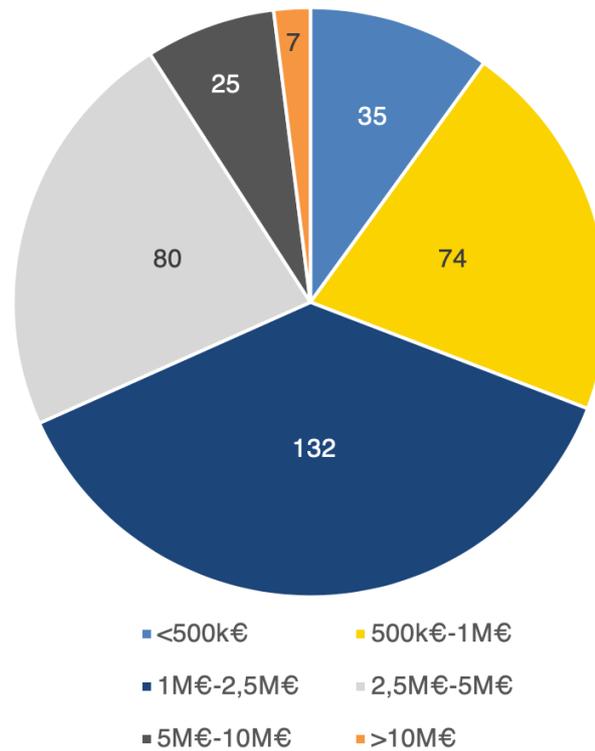
Fig. 4.14 Pre-money valuation - pie chart

Figure 4.15 reports the kinds of investment that were going to be financed thanks to the campaign.
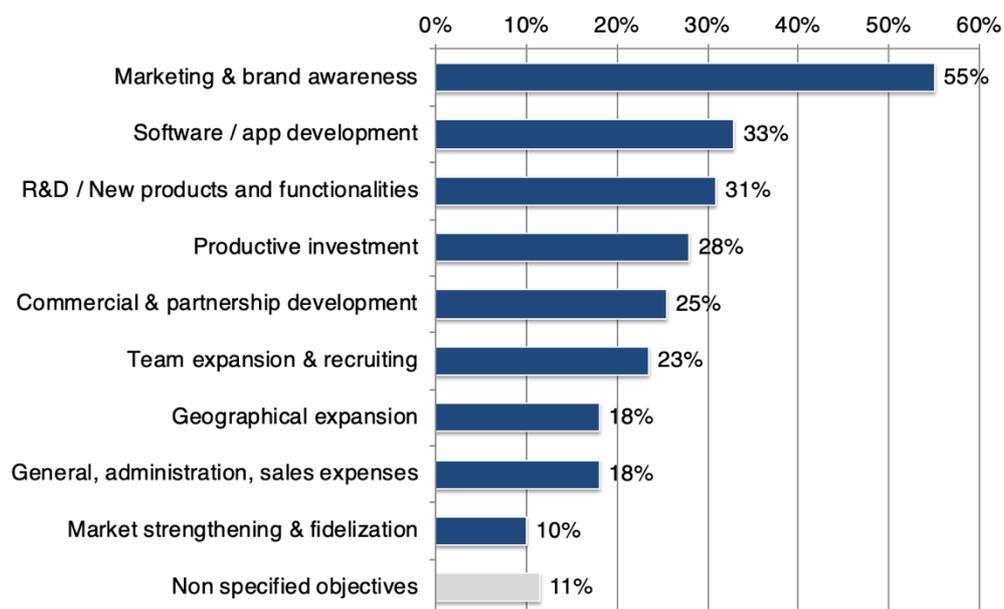
Fig. 4.15 Destionation of the investment from ECF, according to business plans

The most frequent objective written in business plans is *marketing* (55%); 33% of campaigns aimed at financing an IT platform or the release of an app; investments in R&D follow right after (31%). Investments in tangible assets were mentioned in 28% of cases, while the development of a commercial network appeared in 25% of the sample. 11% of business plans did not mention a well-identified objective. These data have been gathered from the business plans submitted to the platform and that were available during the campaign.

The team composition (Figure 4.16), which in the case of startups is often coinciding with the founders, is fairly variable: 10% of companies were managed by only one person, 28% by two, 29% by three, 21% by four persons; in 12% of cases the team was formed by 5 or more individuals. The chart on the right displays a striking statistics: in 71% of companies there were no women in the managerial team, in 25% of cases there was one women and only in few cases there were two or more women, highlighting a predominance of men in the teams.
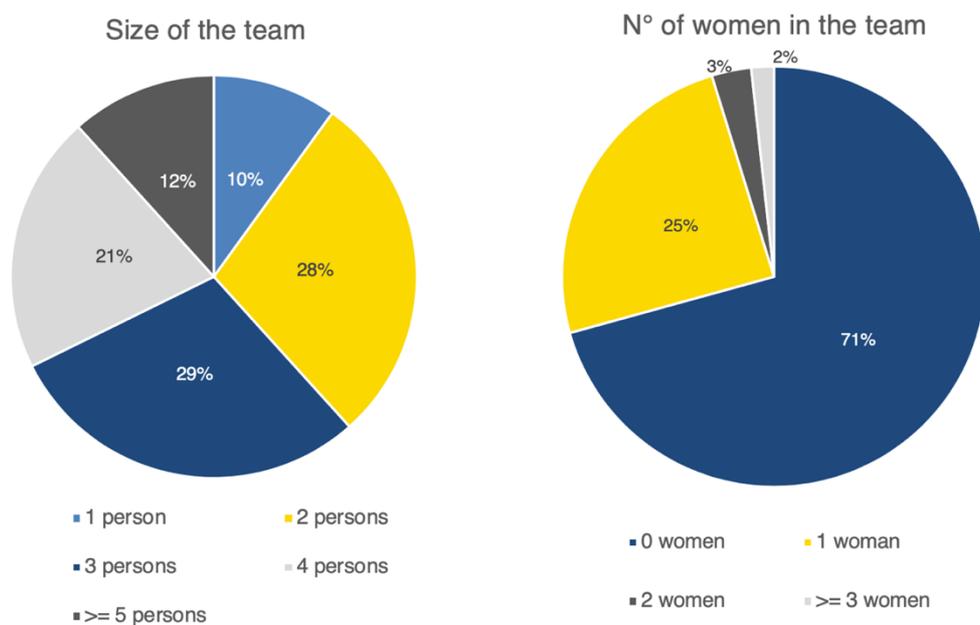
Fig. 4.16 Size and sex of founders of crowdfunded companies

Figure 4.17 presents the age of the managerial team. For each company the average value of age was computed: in most cases the age was between 30 and 50 years; 11% of firms had an average age below 30 years.
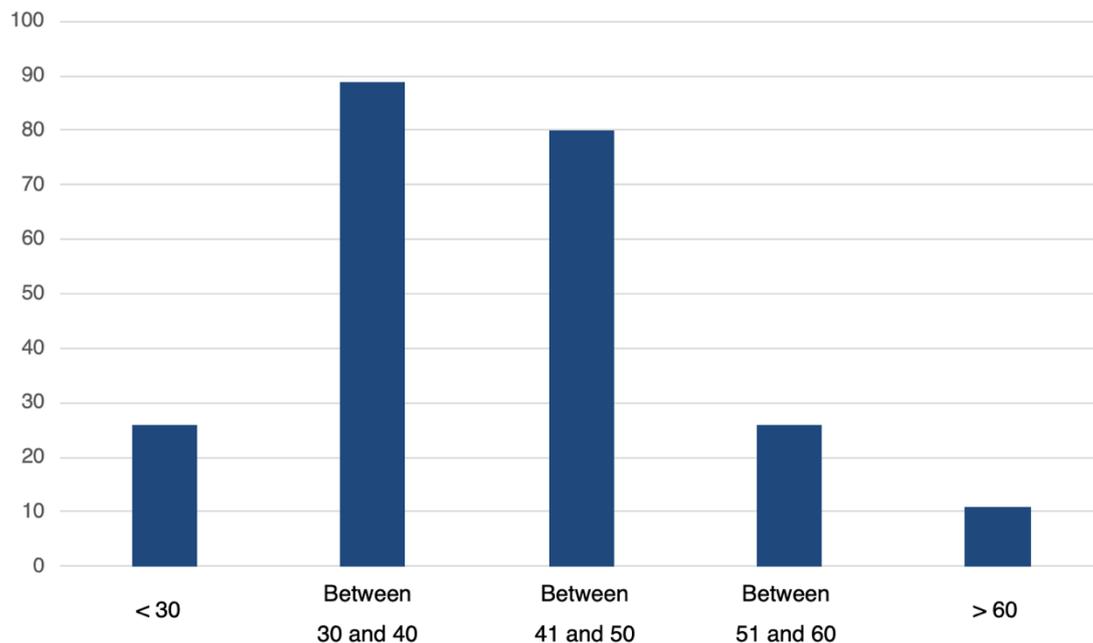
Fig. 4.17 Age of managerial team of ECF companies

4.6 AFTER THE CAMPAIGN

In the last year, several companies who had run a successful ECF campaign in Italy tapped into the Internet crowd in order to raise capital in subsequent round. Moreover, the first exits arrived: Crowdfundme Srl was listed on the AIM Italia segment; Cesynt Advanced Solution Srl announced the listing on the Access segment of Euronext (the firm that manages the stocklists of Paris and other European cities); two real estate projects were successfully closed and other companies were involved in M&A deals. Inevitably, the first write-offs arrived, with the liquidation of some issuing companies.

Excluding the 35 companies that were collecting capital for the first time on 30/06/2019, it is interesting to notice that, among the 101 firms that failed the first campaign, one was able to raise capital through another campaign, 13 were liquidated and 87 were still active. On the contrary, among the 233 campaigns that successfully ran the first campaign, 21 were able to raise capital through other campaigns, 2 were running a campaign on 30/06/2019, 5 were liquidated, 7 encountered either an exit or a subsequent capital increase other than crowdfunding. Figure 4.18 shows these numbers.
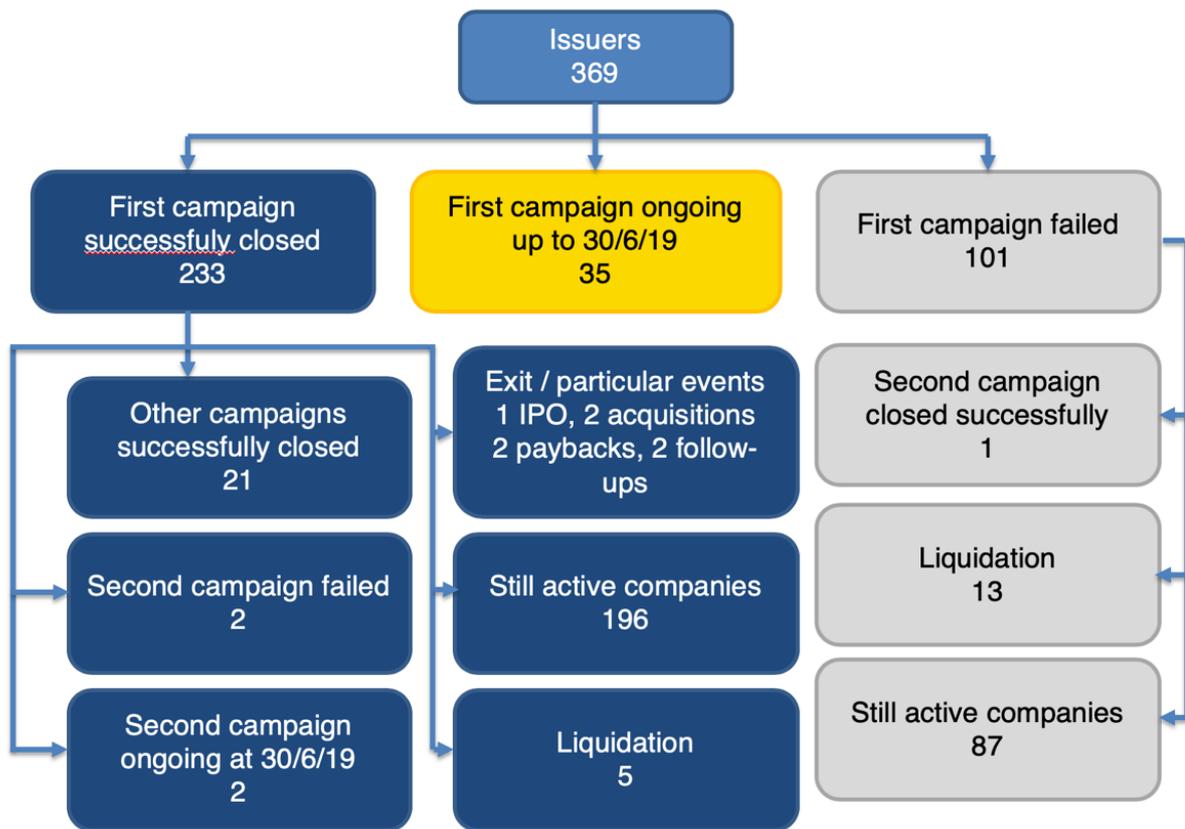
Fig. 4.18 Destiny and consequences of an ECF campaign, N. of companies

With respect to operating results, financial statements were collected and the variations in revenues, EBITDA and net profits were analyzed. These analyses show the evolution over time of financial performances of those companies that published data before and after the crowdfunding campaign. Firms that did not respect this criterion were excluded from our charts. We considered as year 0 the year when the campaign took place. Figure 4.19 displays the evolution of revenues.
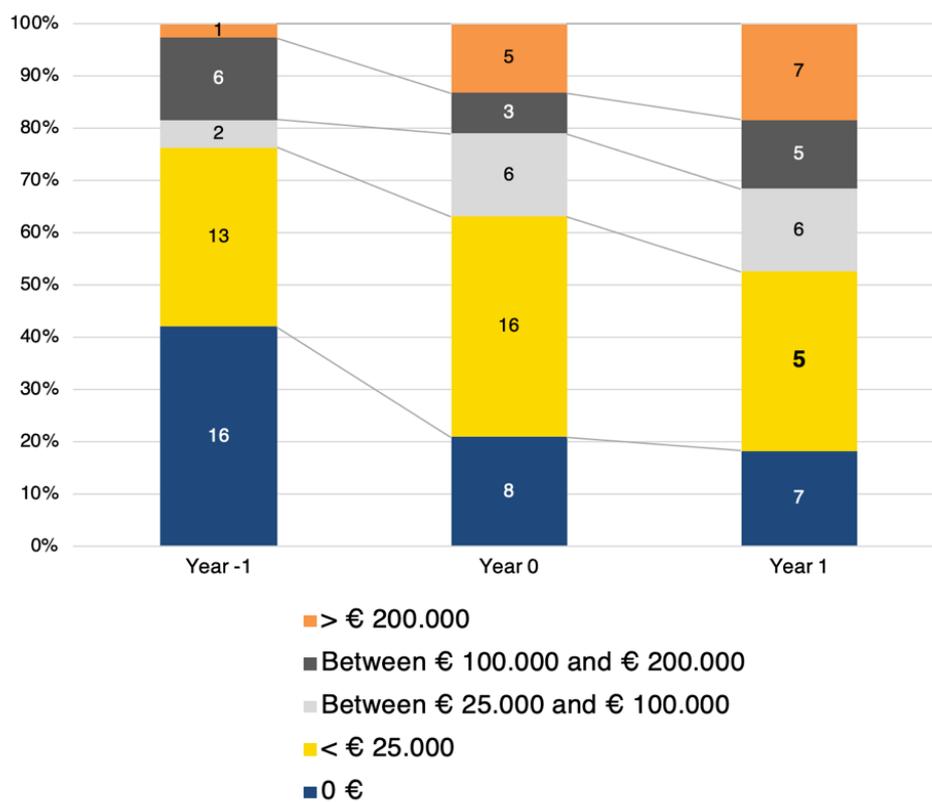
Fig. 4.19 revenues of a sample of companies that received capital, in three years

It appears that there are two types of issuers: some enterprises remain still and even after the campaign their revenues are null; some others acquire progressively increasing volumes. Generally, it seems that a good portion of firms improves the capability to sell their product/service after the campaign. This is a good starting point for the topics we will deal later on, trying to understand the entity of the improvement and the correlation with the campaign itself.

Figure 4.20 refers to EBITDA and even in this case it looks like there are two groups of companies: on the one hand some of them are able to increase their margins right from the first year following the campaign; on the other hand, many firms keep on burning cash because their costs exceed their revenues.
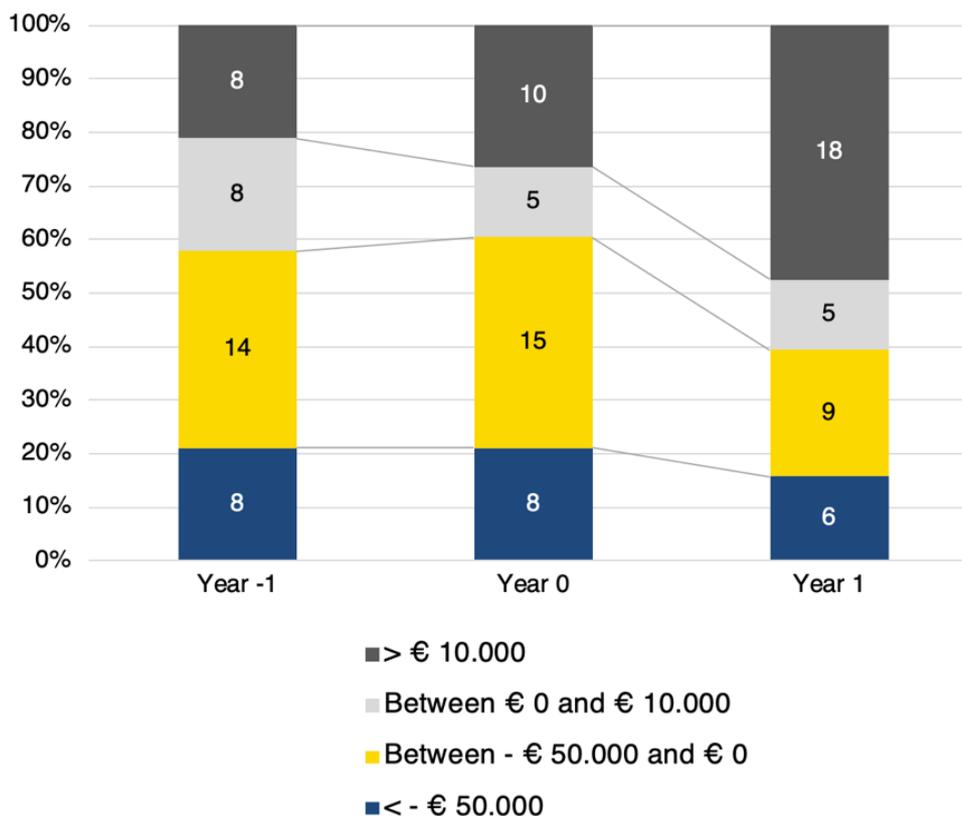
Fig. 4.20 EBITDA of a sample of companies that received capital, in three years

Figure 4.21 concerns net profits. In this case the number of profitable companies decreases significantly. The difference with EBITDA may be due to interest expenses or taxes, but most probably it is linked to high values of the item depreciation & amortization: the huge investments aimed at kickstarting the business are amortized in the profit and loss of the issuing firms. As the figure shows, most of the considered companies are making negative profits before and after the campaign.
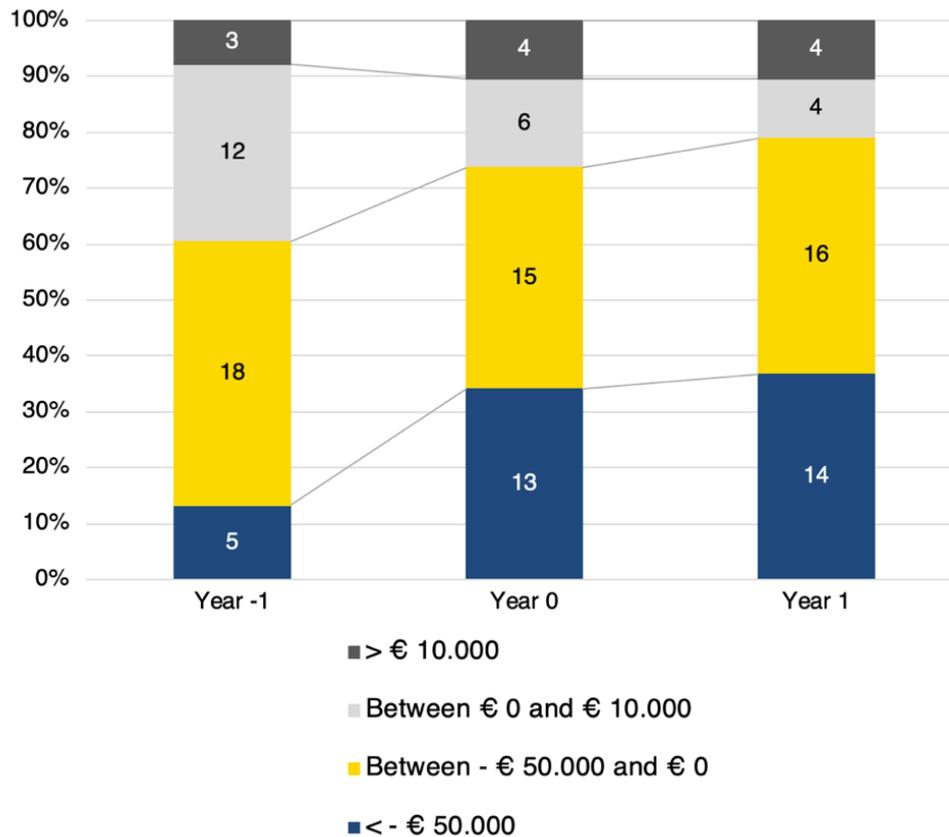
Fig. 4.21 Net profits of a sample of companies that received capital, in three years

If we compare the actual results with those forecasted in the business plans (see Figure 4.22) it is possible to notice how these two values differ. In just 5 cases the real value of revenues was higher than the forecasted one (the dots above the green line, which represents 100% of projected revenues). All the other issuing companies are quite below the expectations, in terms of ratio between target and actual value. None of them seem to change the pace in the second year, and performances keep being under the target even in the following year.

These statistics seem to be in line with academic evidence regarding startups: only a small percentage of newborn innovative ventures is able to reach successful results, while the majority is doomed to failure or underperformance. It is also a sign of optimism from the side of the entrepreneur, and it could also be a hint of moral hazard: entrepreneurs could overestimate the performances declared in the business plans to attract more capital.
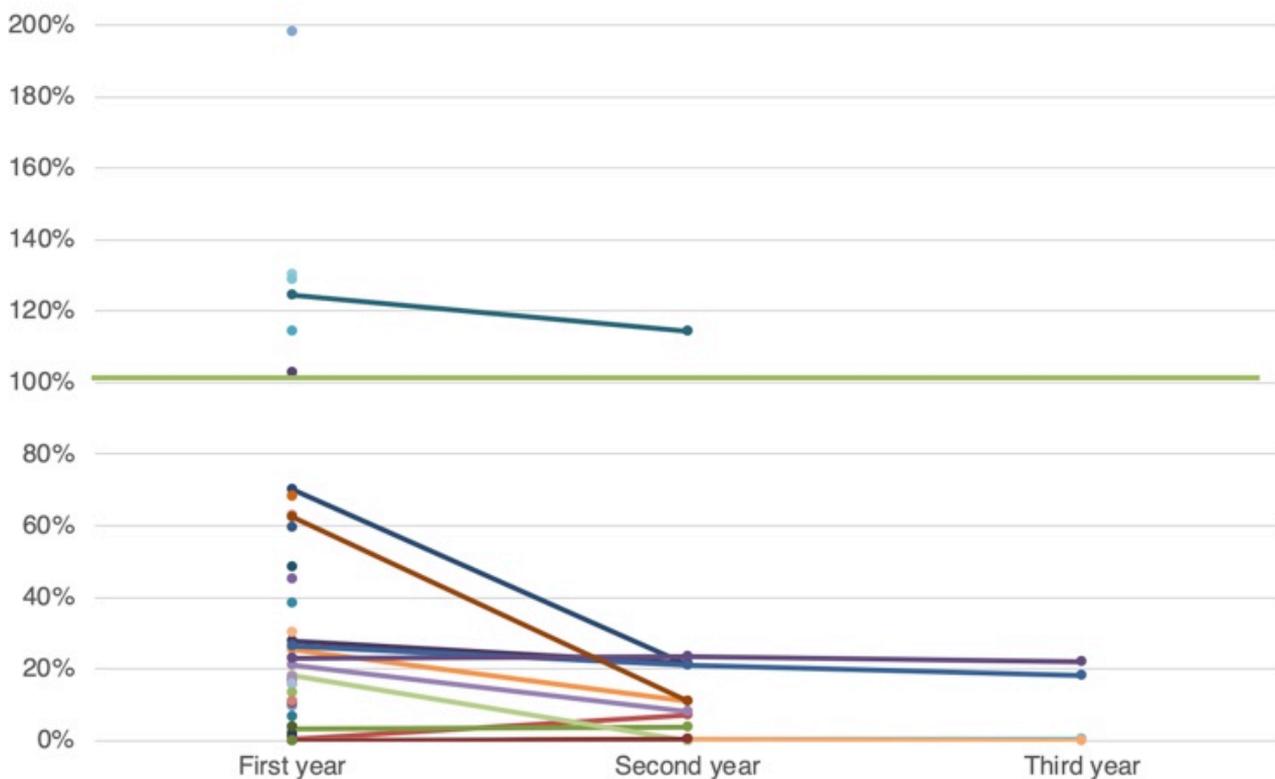
Fig. 4.22 Deviation of actual revenues from business plan

4.7 EXITS AND RETURN ON INVESTMENTS

The remuneration of an investor over the risk capital of a company (equity) derives either from distributed dividends or from capital gains after the transfer of securities. This second case happens when there is a buyout, when there is a private sale of shares or when the company goes public. The risk of capital loss exists when the investor sells its shares to a price which is below the acquisition price. On the extreme side, there might be a write-off of the investment, in case of liquidation of the company.

As regards the Italian equity crowdfunding market, it is necessary to highlight how the majority of issuing companies has the status of *innovative startup.* This means that they cannot distribute dividends until they fall into this category. With respect to SMEs, on the basis of the reports of shareholders' meeting that it was possible to collect, none of them decided the distribution of dividends on the 2018 net profits. Only Cesynt Advanced Solutions Srl announced the payment of dividends, given that it started the stock listing process on Euronext's Access stocklist.

As stated before, if we want to draw some conclusions upon yields, we need to take into consideration those companies who had a successful exit. First, we witnessed the IPO of an issuer (Crowdfundme Spa). Then, there were two real estate projects on the Walliance platform that were concluded successfully with the reimbursement of investors: Mak Capital Srl, with an annualized ROI equal to 16,77% and Baia Blu Capital Srl, with an annualized ROI equal to 12,24%. Moreover, there were some acquisitions from external players. For example, the Engineering group bought 100% of Kyunsys Srl's shares, which ran a successful ECF campaign on Starsup in 2015. Another example was the takeover of Me Group Srl operated by Mecolpress group, which acquired the overall majority of share capital. It is interesting to notice that Mecolpress bought a small minority share of Me Group when the latter ran a € 300.000 campaign on 200 Crowd in 2015.

Moreover, we have witnessed subsequent rounds of capital increase, carried out with different multiples of the premium (*sovrapprezzo*) that was asked during the crowdfunding campaign. This causes a theoretical variation in the share value, which is a function of both the difference in the premium and the entity of capital dilution realized in the following round. In other words, if after the equity crowdfunding campaign there is a further capital increase with a larger premium, there will be a theoretical revaluation of securities held by crowd-investors, which will increase together with the amount of new shares that will

be issued. Clearly, the opposite is true in case of subsequent rounds with smaller premiums. Finally, apart from subsequent crowdfunding rounds, there have been cases of private placement. The last one was announced in June 2019 by Stirapp Srl (a startup which raised € 210.997 in 2018 on Crowdfundme.it): Servizi Italia group became a shareholder by subscribing 25% of share capital, with an investment of € 550.000.

In order to compute the potential revaluation or devaluation of the investments made in the Italian equity crowdfunding market, the Crowdinvesting Observatory at Politecnico di Milano developed the Italian Equity Crowdfunding Index. This index is able to describe synthetically the theoretical yield from the birth of the market. On 1st July 2019, the index had a value of 109,43: in other words, if an investor had subscribed 1% of the share capital of every crowdfunding campaign that was closed successfully, the theoretical value of his portfolio would have increased by 9,43%. Figure 4.23 displays the evolution over time of this index. The operations that contributed the most to the appreciation of the portfolio were: CleanBnB Srl which ran a second round of crowdfunding with a pre-money valuation of € 4 million with a ten-fold increase with respect to the valuation of € 404.545 of the first round; Take Off Srl (pre-money valuation went from € 10.000 to over € 3 million); Glasstopower Srl (from € 1.500.000 to € 4 million).
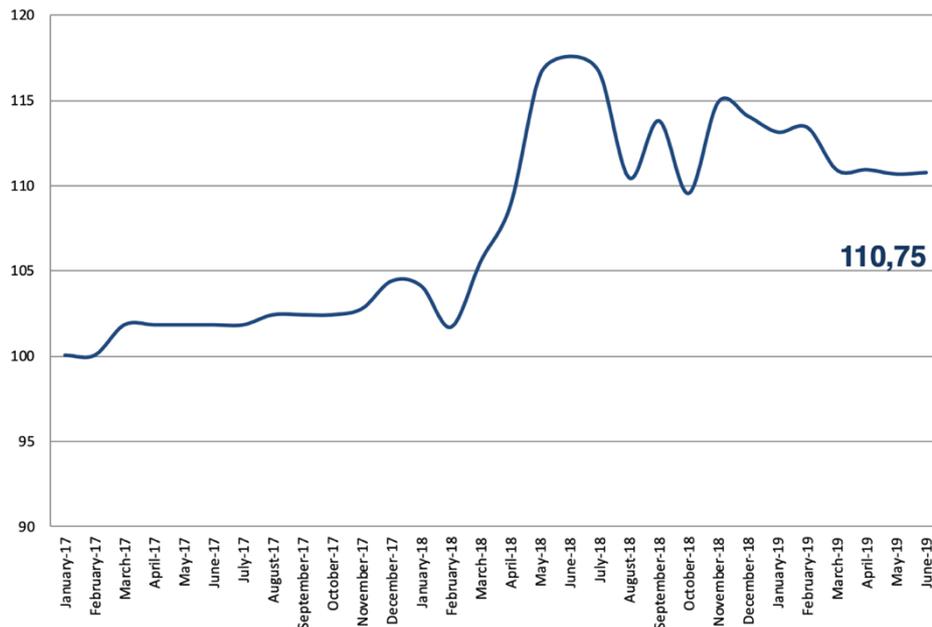
Fig. 4.23 Synthetic index of value of crowdfunded companies, valuation from Observatory of crowdfunding, Polimi

Still, in case of absence of an actual transfer of shares, these yields are totally theoretical. Investors will be able to cash in their financial commitments when there will be real sales of securities: this possibility is made harder by the lack of an efficient and effective secondary market, with low information asymmetries and transaction costs.

At this regard, as stated above in paragraph 4.2 Consob is currently carrying out a consultation with market stakeholders: it appears that it will be possible in the future to open a showcase section in online portals, where people will have the opportunity to buy and sell securities on a secondary market. Several platforms are moving in this direction: for instance, Opstart is activating a specific portal, called Crowdtrading.it. Nevertheless, the issue of high transaction costs remains valid. Today, costs for opening the divesting procedure are high, unless the investor opted for the fiduciary ownership (*intestazione fiduciaria*), in accordance with Article 100-ter of the Consolidated Finance Act (Testo Unico della Finanza). This option allows crowd-investors of Srl companies to subscribe their securities through a financial intermediary, which will appear in the chamber of commerce

company registration. He will be a representative of the investor in the registration, leaving him the ownership and all the rights. At the moment of share transfer, it will be sufficient to change the current header. New developments on this topic will come in 2020.

This was a data-driven overview of Italian equity crowdfunding. We found some hints to the issue we will try to face in the following chapters: there is interest in understanding the value of the owned shares, as well as the capability of the startups to grow, and still many questions that are unanswered yet.

5. OBJECTIVES AND METHODOLOGY

5.1 OBJECTIVES AND SCOPE OF RESEARCH

It has been brought to the reader's attention in the previous chapter that Italian crowdfunding is becoming an element of interest for both academics and practitioners, thanks to its growth and solid bases. In the same time, a deep analysis of the literature regarding the worldwide crowdfunding phenomenon has been run in chapter 3 and we saw that there is so far, there have not been papers that tried to observe the performances of the companies after the campaign of equity crowdfunding in the Italian market.

Italian market for equity crowdfunding is becoming an established phenomenon attracting more and more capitals, and institutional investors' attention as a consequence. Many practitioners, both entrepreneurs and investors, are trying to get a clearer picture of what crowdfunding implies and what can be the consequence on their business, the markets and the economy as a whole. Policy makers, especially local ones, are trying to understand if crowdfunding is actually able to support local economies and boost innovation.

Making a parallel with venture capital literature, we found a quite substantial literature that analyzed the VC impact on the performances of companies both from a financial perspective, a productivity point of view and impact on the exiting process (described in chapter 3.4).

We find no similar studies regarding the Italian crowdfunding world, despite the similarities of these two equity-based alternative finance methods. In the same way, academics focus mainly on the aspects of crowdfunding that is related to the campaign as an event and does not follow the company after it. Regarding the post-campaign phase, one of the few available studies shows the probability for crowdfunded startups of failure or acquisition after a fixed number of years (Vismara 2016).

This is probably due to these reasons: crowdfunding is a relatively new way of financing, which made hard to follow the companies after the campaign to highlight clear effects; the small size of these companies bring a lack of observability of financial and industrial results because they are not usually published with a level of detail as good as big or listed companies; finally the interest was focused on the campaign because it the implicit goal was helping entrepreneurs in running a successful campaign, rather than supporting the investors in their decisions.

However, these premises are changing in these years, at least regarding the Italian equity crowdfunding market:

- ECF campaigns have been run since 2014 in Italy, offering several years of observations as today; and thanks to the work of the Observatory of Crowdfunding of the Politecnico of Milano, we have a complete and detailed records track of the whole equity crowdfunding market since its birth;
- Due to legislation and norms regarding SMEs and startups in Italy, companies must reach a minimum level of transparency, publishing a financial statement and some further information that are then made public by the Italian government;

These elements, together with the general absence of references to financial results of companies that received capital through equity crowdfunding in academic literature, creates an opportunity to contribute to the scientific community and stimulate further research.

The scope of this dissertation is on Italian companies that have run an equity crowdfunding campaign through an authorized ECF platform up to 2017, because they offer the key characteristics that are required to make possible these analyses: disclosure about financial and business data, possibility to evaluate subsequent years, detailed information regarding the campaign.

The objective is to analyze the performances of these companies and the financial statement is the most objective, standardized and transparent instrument that exists to evaluate the performances of companies. This is why this dissertation will start from these data to analyze and evaluate the effect of the crowdfunding campaign. Financial results and survival rates in the years right before and after the campaign will be analyzed, trying to discern if there is an effect that is linked to the equity crowdfunding campaign.

Our objective is *evaluating the financial performances of Italian companies that have run a crowdfunding campaign*. We want to investigate whether there are differences attributable to the fact of having succeeded in a crowdfunding campaign or not. We also want to verify if a potential difference in *performances is linked only to financial availability that comes from raising funds, or if the crowdfunding campaign offers some sort of added value, comparing to other forms of financing*.

To do so, we look into the performances of the years right after the campaign and compare the results with companies that tried a crowdfunding campaign, but failed it. These second typology of firm is not intrinsically different from the first one, given that in both cases the management teams self-selected the firm and decided to run a campaign.

5.2 RESEARCH HYPOTHESES

To reach these objectives, the first step of the analysis is to understand if there is a significant difference in performance after the campaign between the companies that succeeded and the ones that failed in the campaign. To do so, we also need to check whether our two subsamples are running from the same starting line or not: financials can have driven the decision of the investors when they decided to back one company instead of another.

If the performances changed differently among the two groups after the campaign, we could be able to say that the crowdfunding campaign impacted directly the financial performances. Thus, our first research hypothesis is:

> HP 1. Companies that ran a successful ECF campaign have better financial performances than the ones that tried and failed, considering the years after the campaign.

If there will be a positive difference in performance between the two groups, this hypothesis will be accepted. Still, we would not be able to identify the source of this potential difference. It is possible that the performances were already better before the campaign and the investors just choose the ones with more potential. This is what we called in the literature review the endogeneity between selection and treatment effect. To discern this effect, it is common to check the period before the campaign to see if there are traces of a selection effect. Thus, the second hypothesis will be:

> HP 2. Crowdinvestors pick companies with better operating performances

Then, the other face of the medal is the impact of equity crowdfunding: does it give any sort of extra value compared to other source of financing?

This effect can be discerned considering the companies that failed a campaign, differentiating subgroups based on the types of risk capital that they managed to get after the campaign in order to run their daily operations. We will avoid the selection bias, since all the companies tried a campaign, thus their management felt it was the best way to receive capital. At the same time, they will have received capital, so there will not suffer (or much less) of the *opportunity cost* of not having risk capital. Thus, if companies that received capital from crowdfunding will perform differently from the ones that collected funds from

other sources, this effect would be strictly linked to the intrinsic characteristics of crowdfunding and not to the mere availability of funds. Indeed, we know that our set of companies has different starting conditions compared to a sample of companies which received other sorts of funds as first choice.

Thus, a direct comparison between subgroups of companies that received different forms of capital will let us see if there is a substantial difference in performances between the companies that have been chosen by investors and received funds and the ones that did not manage to collect the capital and had to find other sources. So, we defined our hypothesis 3:

> *HP 3. Companies that received capital from ECF perform better than those who failed the campaign and received other forms of financing.*

In this way, we will see if different sources of capital lead to different performance levels. To complete this perspective, it is necessary to understand the source of this difference. We know that capital, under any source, gives a boost to the company. Thus, these differences can be driven by different levels of capital or different timing, and not only from the fact that ECF was the preferred form. Moreover, companies that failed the campaign receive capital later than expected, and they must bootstrap in the meanwhile. It is legit to ask if an eventual positive difference in performance is just linked to the *opportunity cost* of not having risk capital, or if this comes also from other sources.

Using companies which raised capital in other ways, it is possible to observe the performances net of the effect of new funds, too. This will let us understand the impact of crowdfunding excluding the simple effect that capital availability can have. As a consequence, our fourth hypothesis will be:

> *HP 4. ECF improves performances regardless of the amount of capital received*

These are the hypotheses which will define the development of this quantitative dissertation.

5.3 DATA COLLECTION METHODOLOGY

5.3.1 DATA SOURCES

In this chapter, the data sources will be presented, and their reliability will be discussed. Our effort to generate a consistent dataset and collection procedure is detailed in this chapter.

A key part of the information we need comes from the authorized Italian equity crowdfunding platforms. In fact, they publish essential information regarding the company that wants to raise capital; in this way, the Crowdinvesting Observatory of the Politecnico di Milano is able to collect and structure the information with a coherent structure. Every company that tried to run a campaign on an Italian platform has been included in the dataset. All the published information has been registered in a standard format and the observatory kept track of the success or failure of the campaign, collecting key information regarding the subscribers and the collected capital. The focus has been kept on information that are consistent across all the platforms: the starting and ending dates, the target and maximum capital, the type of shares offered and so on (see Chapter 4). Being built for this specific purpose, the dataset of the Observatory can be considered consistent and reliable in every aspect: the information is fully disclosed by the platforms and has been collected with the same procedure.

All the information regarding the companies, their incorporation information and their financial statements have been downloaded by AIDA (*Analisi*

Informatizzata delle Aziende Italiane), the Italian version of the Bureau Van Dijk company database.

It contains financial, master data and commercial information of all the "Società di Capitali" (*limited companies)* incorporated in Italy. It follows the IV Accounting Directive of the EEC (78/660/EEC) for the classification and elaboration of data. It contains also the historic series of the last 10 years and the full description of the activity. We have been able to use this database with the full license offered by the Politecnico of Milano institution.

The database periodically updates the state of every existing company in Italy and uploads all the information mentioned above. In this way, AIDA can discover with a lag of maximum 3 months if the company has failed, if it changed headquarter and potential statutory changes. All financial statements are regularly published by the Camera di Commercio, which is the official source, and AIDA collects this data and organize them in a standard format.

This database is perfectly suitable for our purpose, because it lets us have all the information of interest structured in a dataset that is intuitive and can be easily used, and it is internationally well-known for the completeness. The drawback is that the reporting standards of the small firms we are interested in can differ, the accounting methodology is not published by the Camera di Commercio and the values can be slightly inconsistent. Indeed, this is more evident for data that are not covered by Italian jurisdiction for SMEs, like number of employees or financial ratios. Whilst some other variables, like revenues and net profits and all the incorporation and liquidation information, are strictly defined by the legislation and IFRS standards for SMEs, so they are mostly consistent across companies. Overall, the method of publication of AIDA is transparent and reliable.

When necessary, we cross-checked the information collected from the two sources described above with the documents published by the Camere di

Commercio, the institutions directly depending from the Italian government and locally managed, which manages and publishes the official documents for all the Italian companies. All these documents are centrally collected and made available online on the platform called "*Telemaco - Infocamere*". Consulting this online tool, we have been able to guarantee the consistency of the dataset we built and reconstruct the history of the capital increases and changes in share distribution in all the companies that ran a crowdfunding campaign.

For the sake of our analysis, we also needed information about source of funding different from ECF campaigns, in particular the typology (Equity or Debt) and the amount. So, for every company in our dataset we investigated whether the firm collected capital after the crowdfunding campaign or not. To do so, we crosschecked data from AIDA and Telemaco: we computed differences in share capital, equity reserves and debt for every year. When we noticed relevant differences, we analyzed the chamber of commerce company registration documents ("visure camerali"), balance sheets and resolutions on capital increase ("delibere di aumento capitale") to understand the nature and the magnitude of funds. Sometimes there were hybrid cases, i.e. companies that raised capital of different types or in different years. If the sizes of capital injections on the same company were significantly different, we kept the most relevant one. If funds were similar and close in time, we collapsed them into a single investment. setting as the date the one of the earliest investments. Remaining exceptions were very few, and we managed them one by one, computing average sizes/dates or excluding the company from the sample when this was not possible.

Our conclusion is that the data that we will deal with are overall consistent and robust thanks to the use of reliable sources and the cross-checking between the data provider and the official national data source. This is true under the practice that we will avoid the data that are not standard by norms and laws. We kept this observation into consideration when we decided which variable to use in our analysis, in order to use only the ones for which we can guarantee consistency.

The variables we considered in the following chapter are derived from this reasoning.

5.3.2 VARIABLES DESCRIPTION

The information that have been used for the purposes of this dissertation can be classified in this way:

- **Company characteristics**: master data and intrinsic characteristics of the company per se, objective and constant in time. They are defined during the incorporation and are sourced from AIDA and the Camera di Commercio website.

- **Financial results:** they are published yearly by each company, following legal requirements and accounting standards to the Camera di Commercio. These data are then collected and encoded by AIDA, the database of Bureau Van Dijk, which publishes them. Even though accounting methods can slightly vary, some items are compulsorily published every year and must be consistent with European and Italian standards (IFRS and IFR for SMEs). These are the ones that has been considered for this dissertation. Moreover, legal requirements to be an *innovative startup* or *innovative SME* are quite strict, thus there is sufficient reasons to rely on these data despite the small size of these companies. Following capital increases have been determined from accounting data and elaborated through our own calculations. In order to have a meaningful and consistent dataset, we reclassified the accounting year referring to the year of the crowdfunding campaign, considering the year before the campaign (year -1), the year of the campaign (year 0) and the two following years (year 1 and year 2).

- **Information about the ECF campaign:** Some information refers specifically to the crowdfunding campaign run by each company. When a campaign is on-going or over, some pieces of information are published by the platform on its site. These data are collected and catalogued by the

Observatory of Crowdfunding in Politecnico of Milano, which we cross-checked with the information from Camera di Commercio.

It is worth to explain why only financial performances have been considered. It is not rare to see studies that use other performance indicators which are not financials. Number of patents and number of employees have been often used. It is not uncommon to see productivity measures which are semi-quantitative.

We decided not to consider other measures of performances for the following reasons:

- Data availability –Financial data are almost always available and under strict accounting standards, whilst non-financial ones are not provided unless voluntarily disclosed when we refer to startups and SMEs;
- Precision of the data – Even though it is possible to find some data sources which can provide data like employees and productivity, these data are most of the times derived by unprecised and not checked sources. Moreover, it is hard to divide between internal resources (employees) and external (counselors, consultants…) when we refer to fast-growing startups
- Impossibility to cross-check the data – this dissertation is characterized by a solid and robust dataset, which has been cross-checked between original sources. Even
- though we could find some sources of the previously cited data, there was not the possibility to check them via an official source of information.

Thus, we felt the necessity to focus only on the financial data as indicator of performances.

Here below, all the variables that have been included in our dataset are listed and detailly explained.

Table 5.1 Company characteristics

Variable	Type	Description
Year of incorporation	Date	The year in which the company was officially incorporated, considering the moment in which the acts were deposited
Region	Categorical	The Italian region of incorporation of the company. For our purposes, Italian regions have been aggregated in four macro-regions that are commonly considered for statistical purposes: *North-West, North-East, Center and South and Islands*. The aggregation is suggested by the best practices of the Italian institution of statistics, ISTAT, which commonly use this aggregation considering economic and cultural characteristics. • North-West: Lombardia, Piemonte, Valle d'Aosta, Liguria • North-East: Friuli-Venezia Giulia, Trentino-Alto Adige, Veneto, Emilia-Romagna • Center: Toscana, Umbria, Marche, Lazio • South and Islands: Sardegna, Campania, Molise, Basilicata, Calabria, Abruzzo, Sicilia, Puglia
Industry	Categorical	To define the industry starting from public information and avoiding any subjectivity, we referred to the NACE classification. NACE classification is the one used and endorsed by the European Bureau of Statistics (EUROSTAT). It has a tree structure, which breaks down each major sector in subsectors and so forth. A code classification helps in reconstructing this breakdown. We took into consideration the first level of classification: the Economic Area, to which we will refer as industries.

		To make this classification suitable for our analysis, we aggregated the industries which occurred less frequently under the label "others".
Classification of company typology	Categorical	All the companies that are considered are small or medium enterprises, thus commonly belonging to the definition of SMEs (which in Italian are called PMI – piccole e medie imprese). If the company fulfills some conditions, it can request the status of *PMI innovativa* (innovative SME) or the one of *Startup innovativa* (innovative startup). These statuses, which differ in requirements and purpose, guarantee tax discounts and financial advantages of different kinds. It is possible that this status provides an advantage to the company, in financial terms or only as signal to customers and investors. For the purpose of our analysis, we considered two groups: Startups, with the status of startup innovative, and PMI, all the others.
Liquidated	Binary	If the company has been liquidated before the end of 2018, this binary variable will be 1. On the contrary, if the variable is 0 the company was still in activity up to 01/01/2019
Date of liquidation	Date	This variable contains the day in which the company has been formally liquidated, if this is the case. Otherwise, the value is missing

Table 5.2 Financial results

Variable	Type	Description
Revenues	€	Company revenues declared in the compulsory yearly financial statement, and encoded by AIDA database. These data is used to calculate the revenue growth as well.
EBIT	€	Company EBIT (earnings before interests and taxes), as provided by AIDA database. Most of the times it is not explicitly provided, so AIDA database calculates it as revenues minus operating costs. It differs from net profits because it is gross of taxes and interests.
Net profits	€	Net profits of the company at the end of the year. It is the bottom line result declared in the compulsory yearly financial statement, and encoded by AIDA database
Assets	€	Company assets declared in the compulsory yearly financial statement, and encoded by AIDA database
Equity	€	Company book value of equity declared in the compulsory yearly financial statement, and encoded by AIDA database
ROA	Percentage	Accounting ratio defined as EBIT/Assets. For every company, we took this value from the AIDA

		database in order to have a consistent method of computation.
ATR	Percentage	Accounting ratio defined as Revenues/Assets. For every company, we took this value from the AIDA database in order to have a consistent method of computation
Type of investment	Categorical	Some companies may have raised capital in different ways after the crowdfunding campaign. We focused on the ways in which companies that failed the campaign tried to fulfill their capital requirements. We defined these categories: • **ECF**: If they succeed in a ECF campaign • **Equity:** A company which failed a campaign but received other equity capital, either from previous shareholders, or from new shareholders such as business angels or VC. • **Debt:** Companies who failed a campaign can answer to their needs of capital by raising debt. It can have different forms: from banks or from current shareholders who gave debt capital or convertibles. This solution has different characteristics and imply a completely different behavior from the management, given that the debtholder is internal to the company. • **None:** Some companies can just keep going without any external investment, applying a

		bootstrapping strategy or divesting in previous assets. This can be due to the inability to find investors, or to the management's preference not to raise any further capital. • **Both:** If a company who succeed in a campaign will also raise capital other ways, we considered them in this category. For the majority of the analyses this group will not be considered, having hybrid characteristics.
Year of investment	Date	The year in which the company received the investment. It will match the year of the campaign if the company succeeded in the campaign, it will be the year of the equity capital increase or the debt capital receival if they relied on a different source. When comparing performances of different companies, the year of the investment will become year 0, and subsequent years will be year 1 and year 2, in order to standardize results.
Amount of investment	€	Capital that the company managed to raise through the equity crowdfunding campaign, through other types of equity sources or by asking debt.

Table 5.3 Information about the ECF campaign

Variable	Type	Description
Starting date of the campaign	Date	Beginning of the period in which the call for crowdfunding was open on the platform
Ending date of the campaign	Date	End of the period in which the call for crowdfunding was open on the platform
Platform	Categorical	Name of the platform that managed the crowdfunding campaign of the considered company. For our analysis, it was necessary to aggregate the platforms in two main categories, that have already been used in the literature: the 3 main platforms that cover almost the totality of the market share, that were ranked as *Primary platform*, and all the other platforms, that are high in number but ran very few campaigns. These will be called *Secondary platforms*. This classification is done because it is reasonable to believe that primary platforms give an extra boost to campaigns thanks to their wide investor base and their visibility, and this can have a positive effect on the campaign result.

Success/failure of the campaign	Binary	The outcome of the campaign, i.e. whether the firm was able to raise capital through the Internet platform or not. In most cases, companies raised capital with a indivisible/divisible scheme (see Chapter 4). So, when the campaign was able to meet the minimum threshold (target capital or indivisible part), the campaign ended successfully and the capital increase took place (Success = 1). On the contrary, if the minimum target was not reached , the campaign failed (Success = 0). For campaigns characterized only by a divisible part of capital increase, the campaign was always successful.
Collected capital	€	The amount, in euro, that was collected during a crowdfunding campaign and transferred to the company. If the campaign failed, it will be N.A.
n. investors	Numerical	The number of backers that invested during the campaign on the platform, if the campaign was successful.

5.3.3 BASIC STATISTICS

From the complete list of companies that ran an ECF campaign in Italy, we needed to identify a set of companies that we can use to answer to our hypothesis of research, with consistent characteristics and having the necessary information to run the models. For this purpose, only the companies that fulfill these criteria were considered:

- Italian companies that concluded a campaign before the end of 2017. This criterion was necessary because we need financial results of at least one year after the campaign, in order to evaluate the impact of the campaign itself;

- Italian companies that were already incorporated before the equity crowdfunding campaign, that deposited a financial statement by the Camera di Commercio in that same year and that continued to do so in all the following years

- Companies that initiated a crowdfunding campaign through an Italian platform authorized by Consob;

- Investment vehicles were excluded (in particular real estate projects);

- Companies which ran multiple campaigns had to be excluded. In fact, it was not possible to attribute the result of the campaign to a single event and to evaluate its impact in the following years.

- Then, we excluded all the campaigns that presented inconsistent data or that did not presented the financial statement to the Camera di Commercio

In this way, we could guarantee consistency of the accounting data that we used as well as coherence on the qualitative information regarding the company.

We identified **125** firms which answer to these requirements from the 131 companies that ran a campaign before 2017 on Italian platforms. These

companies became our sample for this dissertation, which is further described in this chapter.

Consistently with the recent history of crowdfunding and the exponential growth of this phenomenon worldwide, all campaigns took place starting from 2014, two years after ECF was authorized by Italian legislators and one year after the first Consob Regualtion . The number of participating companies grows more and more: around half of the observations refers to campaigns happened in 2017. This disproportion urges us to consider the fixed effect of the year of the campaign..

As regards the proportion between successful and unsuccessful campaigns, our sample presents similar characteristics to the one described in Chapter 4 (this is obvious, as we are dealing with a subset of all the Italian campaigns). So, first years (2014 and 2015) presented a majority of failed capital collections, whereas the trend was inverted starting from 2016 (see Table 5.4).

Table 5.4 Sample description - Campaign outcomes

Sample description - Campaign outcome	Year				
	2014	**2015**	**2016**	**2017**	**Total**
Failed campaign	6	9	15	22	53
Successful campaign	4	6	17	46	74
Total	10	15	32	68	**125**

Another key classification for our analysis comes from the type of investment that companies which failed the campaign sought, in order to answer to their financial needs. We can notice how the majority of the companies that failed a campaign in 2015 eventually raised debt. Moreover, the proportion of companies that did not raise any fund grows over time, with the majority of firms of this type in the year 2016 and 2017. This is due to a temporal bias: obviously, the more time goes by, the higher is the probability that a specific company will raise new

capital somehow. We can also notice how raising equity in ways other than crowdfunding is a choice that remains common, while debt has a decreasing incidence, letting us think that debt is not a preferred way to solve the financial gap (see Table 5.5).

Table 5.5 Type of investment per year

Year	Type of investment per year					
	ECF	Equity	ECF and other	debt	none	**Total**
2014	3	1	1	1	2	8
2015	4	2	2	7	0	15
2016	13	4	4	2	11	34
2017	41	6	5	2	14	68
Total	61	13	12	12	27	125

Companies that ran a campaign are classified according to the region, as we described above. The distribution is hereby presented:

Table 5.6 Geographical distribution

Region	Freq.	Percent
Centre	25	20.00
North-East	17	13.60
North-West	60	48.00
South	23	18.40

It is clear that north-western regions are predominant, driven by the very high amount of companies headquartered in Milan and Lombardy. Still, there is a sufficient number of observations for the other 4 macro-regions to have a statistical significance when we will use the region as a control variable.

Table 5.7 Industry distribution

Industry	PMI	SU inn	Total	Percent
Others	5	11	16	(12.80%)
Manufacturing	9	12	21	(16.80%)
Scientific and Technical Activities	12	11	23	(18.40%)
Information and Communication services	24	41	65	(52.00%)
Total	50	75	**125**	
Percent	(40%)	(60%)		

From the table above it is possible to see how the firms of our subsample are more likely to belong to the ICT sector, with a good representation of professional and scientific activities and manufacturing companies. These values are in line with the overview described in Chapter 4. Also, commercial and distribution enterprises have enough observations to be useful for our purposes, whilst we had to compress all the other industries into the "other" label for the sake of this research.

From the company typology classification, we see that 60% of the companies are legally defined as startups. Indeed, crowdfunding in Italy is mostly used by new companies that need capital to grow fast: this seems to be especially true in the ICT industry, in which 42 companies are innovative startups.

In some of our analyses, the industry variable was compressed into a binary variable that indicates whether the company works in an IT or ICT company (66 observations) or in other industries (61 observations). This was sometimes necessary to make some OLS easier to run without losing any explanatory power.

The following table shows the descriptive statistics of the yearly results, which we considered as dependent variables of our analysis. Those numbers are able to give an overview of the size and growth of the companies, their profitability and how much value they generate/burn. As previously explained, to make results from different years comparable for our analysis, the accounting year is referred to the year of the campaign (year 0), from the year before the ECF campaign (defined as year *precampaign*) to 2 years after it (year 2). It also presents the number of observations we have for each year.

Table 5.8 Descriptive statistics of dependent variables

	N	Mean	Median	min	p25	p75	max
Revenues precamp.	91	87110.11	11117	0	0	77118	1821322
EBIT precampaign	91	-25200	-4092	-707220	-25511	3539	171228
Net Profit precamp.	91	-29500	-4126	-1070103	-25641	724	88293
Total assets precamp.	91	356000	132083	900	67566	335956	3061749
ROA precampaign	91	-18.998	-5.62	-183.71	-24.37	1.32	95.77
ATR precampaign	91	.337	.05	0	0	.33	3.91
Revenues 0	121	122000	14244	0	343	79057	2223055
EBIT 0	121	-52700	-13811	-2041288	-71073	1487	479392
Net Profit 0	121	-56400	-13895	-2313842	-61278	263	359038
Total assets 0	121	644000	293120	2424	130499	587361	1.33e+07
ROA 0	121	-18.525	-8.375	-186.61	-26.98	.615	23.73
ATR 0	121	.305	.08	0	0	.37	3.39
Revenues 1	90	152000	28167.5	0	1500	123236	3094897
EBIT 1	90	-101000	-35784	-3070425	-84417	-3712	280080
Net Profit 1	90	-101000	-31558	-3115804	-79147	-4558	267843
Total assets 1	90	705000	274000	11457	134589	688905	1.24e+07
ROA 1	90	-30.801	-12.38	-456.22	-32.45	-1.17	21.95
ATR 1	90	.33	.125	0	0	.37	2.76
Revenues 2	40	140000	19192.5	0	0	91929.5	1485750
EBIT 2	40	-134000	-16288	-1415192	-126000	3481.5	550097
Net Profit 2	40	-129000	-14728	-1220539	-129000	698.5	394085
Total assets 2	40	1063247	379000	15588	161000	1200000	1.31e+07
ROA 2	40	-11.572	-7	-69.19	-29.34	2.32	38.85
ATR 2	40	.203	.055	0	0	.275	1.63

This overview shows some interesting information regarding the financials of these startups. First of all, the size: total assets have kept growing year after year; the biggest growth happened in year 0, for the obvious reason that most of the companies received extra capital. But this effect is evident also in the following years.

We cannot say the same for the revenues: the distribution shifted upwards until year 1, but then it dropped in year 2. The relative measure of ATR, calculated as revenues on assets, makes even more evident the fact that revenues productivity received a push in year 1, but then slowed down. One interesting element of our analysis will be trying to explain if this growth is directly related to the ECF campaign.

Another information that is worth noticing is the development of net profits over time, especially focusing on the 75th percentile: in year 1, almost all of the companies were unprofitable, in contraposition with the other years. This can be related to the large investments aimed at expanding revenues and market share required in the first years. Indeed, firms required capital to boost growth, and this is the obvious consequence.

Focusing only on the companies that received ECF capital, it can be useful to have an idea about the size of the investment and from how many investors this investment came. In the table below, we can notice how funds do not have a high variance, since the 25th and 75th percentile are not that distant, € 105.000 and 267.000 respectively. This is due to the intrinsic characteristics of crowdfunding: as already seen in the literature review, this way of financing is more suitable for small investments. As regards startup, crowdfunding is adequate to fill the gap between seed stage and subsequent rounds of investments.

Table 5.9 descriptive statistics - Investors and collected capital

	N (successful)	Mean	Median	min	p25	p75	max
n. investors	74	52.1	38	1	20	71	285
Investments (€)	74	239000	188060	45000	105000	267000	1000000
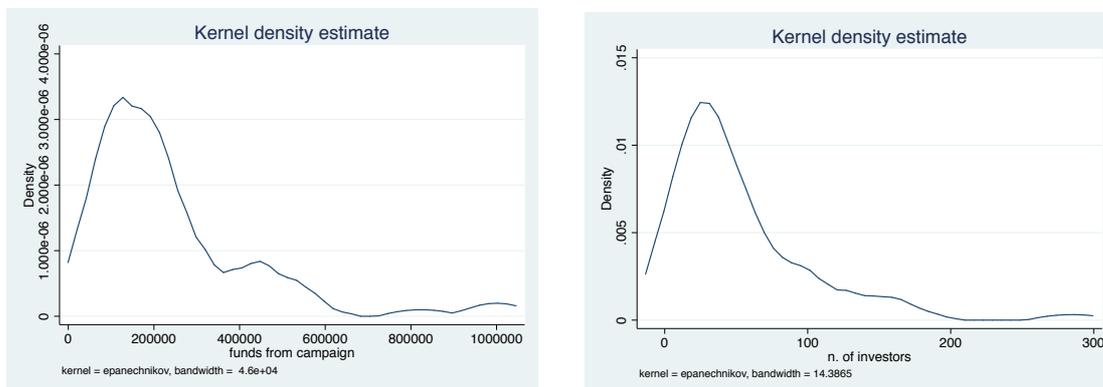
Fig. 5.1 Density of n. investors and collected capital

In our sample, 14 companies failed before our last observation date (end of 2019). It can be interesting to see the distribution of failure across companies.

Table 5.10 Liquidated companies given the type of investment received

Type of investment	Years of surviving after the campaign				Total
	Campaign year	Campaign year +1	Campaign year +2	Campaign year +3 or later	
ECF	0	2	1	0	3 (4.9% of 61)
Both types of equity	0	0	1	0	1 (8.3% of 12)
	0	0	0	0	0 (of 13)
Debt	1	0	2	2	5 (41.7% of 12)
None	1	2	2	0	5 (18.5% of 27)
Total	2	4	6	2	14

Even if the observation is not complete since most of the campaigns happened in the last two years, we can have an idea about the survivor rate of our sample. If

the company did not manage to raise capital and did not find further equity, it was more likely to fail. We also see that the deadliest year is the second year after the investment. Still, we do not have complete observation of our sample after year 2, since a good part of the companies ran a campaign less than two years ago.

5.4 ECONOMETRIC MODELS

In this section, it is appropriate to explain the theoretical framework for the analysis of this dissertation. Hereby, the econometric techniques that have been used will be presented: we will present a brief description of each, together with the advantages and disadvantages they entail and some disadvantages that we must keep into account when using them. The conditions required for their use will be discussed in the case of this dissertation and the available data.

5.4.1 ORDINARY LEAST SQUARES METHOD

It is the most common and most well-known technique in econometrics. Thus, it is unnecessary to present it in detail but only the most relevant characteristics which are peculiar for this dissertation will be brought to the reader's attention.

OLS method is able to estimate the relationship between some independent variables, or *regressors*, and a dependent variable Y. This relationship must be linear by definition, and the output is an estimation of the parameters which, multiplied with the explanatory variables, are able to approximate the dependent variable.

OLS can manage transformed variables and reach consistent results quickly. On the other hand, the linear relationship among variables is a strong assumption and should be furtherly discussed. Moreover, there are strict conditions on the application of the OLS.

This technique can be applied only when some conditions are verified, i.e. the necessary conditions for the consistency of the estimation (Hayashi 2000).

Moreover, if some conditions are not verified alternative methodologies should be implemented. These conditions depend on the nature of the data that are used:

- *Exogeneity:* the regressors must be uncorrelated with the error, whose expected value must be zero given any set of explanatory variables. This assumption is critical for the OLS estimation, which is invalid otherwise.

- *The regressors must be linearly independent:* each variable must be independent from the others. This is true when the rank of the matrix with all the observed regressors has a full rank. When it does not happen, there a so-called *perfect multicollinearity.* There is another case, which does not invalid the regression but makes it strongly inefficient, which is called *quasi-multicollinearity.* It happens when some of the regressors are strongly correlated, even though they are not mathematically linked. This can be verified with the correlation analysis.

- *Spherical errors*: the variance of the error term should be constant and not correlated with the independent variables. This is not a necessary condition, but if it is not met then the regression will not be effective. It implies two different characteristics of the regression:
    - *homoskedasticity*, which means that the error term has the same variance in each observation
    - *absence of autocorrelation,* which means that the error of each observation is not correlated with the ones of the other observations.

    Adaptations of the OLS can improve the efficiency of the regression despite the unfulfillment of this condition.

- *Normality of the errors:* If the errors are distributed according to a Gaussian distribution, the estimation is the most effective possible.

The exogeneity of the variables is the hardest to verify, due to the absence of a test that can demonstrate it. In this dissertation, the endogeneity will be deeply discussed throughout the analysis since it is a controversial element in the

literature regarding external finance: it is extremely hard to identify the effect of investments on companies since, given real-world observations, this *treatment effect* gets confused with a potential *selection bias* done by the investors. In this dissertation, we will discuss this through two methods:

- Verifying if a selection bias exists *before* the treatment, which will be a preliminary analysis.
- Using *instrumental variables* to try to decouple the effect of the selection from the treatment.

All other potential endogeneity sources are controlled selecting the right variables for the regressions, both independent and control variables.

The absence of multicollinearity is verified and discussed with the VIF test at each regression, plus the correlation matrix done on all the used variables.

Homoskedasticity takes place in some of our analyses, so we will apply the necessary transformations to our variables. Specifically, we will log-transform variables when they will present a log-normal distribution (e.g. with revenues, assets, investments…) and we will run regression on modified dependent variables.

Moreover, robust standard errors will be used to improve the results when homoskedasticity is not fully verified.

5.4.2 *DIFFERENCE IN DIFFERENCE METHODOLOGY*

Difference in difference is an econometric technique that uses panel data to calculate the effect of a treatment (Abadie 2005; Lechner 2010). It is a technique which is borrowed by the experimental research design; it compares a dependent variable (an observable outcome) between two subgroups which are differentiated by an independent variable: the *treatment* group, which is the one that bear the treatment of our interest, and the *control* group, which theoretically

has the same characteristics of the former but did not receive any treatment. The effect is identified comparing the average change over time of the two subgroups; if it presents a significant difference, the effect of the treatment will be observable (and this will be the difference between the differences which give the name to the technique).

Since difference in difference works with the averages, it needs only perfect exchangeability between the two groups and does not need that all the observations are homogeneous. Thus, the advantages of this technique are mainly the mitigation of the selection bias, together with the possibility to use it on natural experiments.

These are the reasons for which it has been thought suitable for our case, in which we have an evolution over time of two different groups (e.g. success/failed campaign). In order to have an unbiased application of the methodology, some assumptions must hold. The general assumption is that the difference between the two considered groups remain constant in time, if the treatment is not applied (Bertrand, Duflo, and Mullainathan 2004). In practice, this is verified when:

- *Exchangeability assumption* - The treatment is not correlated with the outcome (which would determine a *reverse causality bias*).
- *Positivity assumption* – the two groups follow parallel trends before the treatment is applied; which means that the difference of the averages is constant over time. This is the most critical assumption, and also the hardest to be fulfilled. It is more likely to be verified when the tested period is smaller.
- *Stable Unit Treatment Value assumption (SUTVA)* – The composition of the two groups must be stable and unchanged for the whole considered period, and there must not be any spillover effect of one group on the other.

The difference in difference is run as a regression model with the following linear expression:

$$Y = \beta_1 * timeindicator + \beta_2 * successindicator + \beta_3 * time\_success\_interaction + \gamma * controls$$

Figure 5.2 is a visual interpretation of the regression above. The points A, B, C and D are the averages of each individual group, and the other parameters are the same ones used in the regression model.
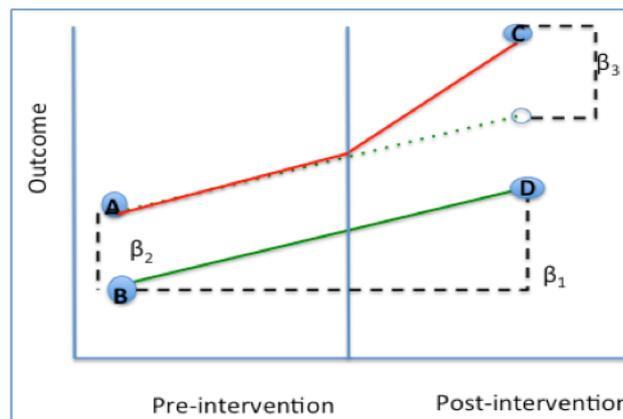
Fig. 5.2 Graphical interpretation of difference in difference

The interpretation is the following:

- Y is the outcome, which is the dependent variable in the regression.
- β_1 is the time trend, which is supposed to be the same in the two groups excluding the intervention effect. It is the change in time in the two periods of interest.
- β_2 is the difference between the two groups before the intervention; this difference is supposed to be constant in time, without considering the treatment impact.
- β_3 is the effect of the treatment. As it is possible to see from Figure 5.2, it is equivalent to the difference between the treatment group after the intervention and the treatment group if the intervention had not happened. If this parameter is significantly different from zero, we can say that there has been a treatment effect.

5.4.3 SURVIVAL ANALYSIS

Survival analysis is commonly carried out in engineering (also referred as *reliability analysis*) and the medical field. It is a methodology that permits to study the expected duration of time before that an event occurs (usually referred as *Failure*). In the case of this dissertation, there is an interest in knowing how long companies survive after the crowdfunding campaign, and how many of them are liquidated after a given period of time. Specifically, we are interested in the survival rate: it is the percentage of companies that are still alive after a given period of time (Hosmer, Lemeshow, and May 2011).

Since the observed time period is finite, we will rely on methodologies which are able to manage the survival analysis with a right-censoring of the observations, to make the study feasible. There are two kind of censoring:

- Time-limit censoring: the subjects will be observed only a for given period of time

- Number of failures censoring: the subjects will be observed until a given number of subjects fails

We will apply the first type of censoring, which best fits our sample. Through the survival analysis, it will be possible to have:

- An estimation of the *survival function* S(t) through the Kaplan-Meier estimation method. It is the empirical way to estimate the survival function, which is the function that determines the probability to survive of a given subject

- An empirical *life table*. It is a summary of the number of failures (i.e. *events)* that occur and the number of subjects at risk at each given time. It is also possible to have an estimation of the survival probability (a punctual version of the survival function) with its relative confidence interval.

- A statistical test to compare two survival functions. The *log-rank test* is based on a Chi-square test on two different Kaplan-Meier survival functions, to verify if they are different. The null hypothesis of the test is that the two empirical survival functions are estimations of the same function. It is possible to verify the differences between survival functions which are characterized by a categorical variable (Mantel 1966).

5.4.4 TWO STAGES LEAST SQUARES

Also called instrumental variables analysis, it is a technique that makes possible the use of linear regression when the assumption of exogeneity does not hold.

When an independent variable can be correlated with the error, the regression is not able to give consistent results; to solve this, instrumental variables are considered in the model, in order to decouple them.

An instrumental variable is a variable which does not belong initially to the model, that is correlated with the variable that is supposed to be endogenous, but it is exogenous to the error.

The instrumental variable will be used to estimate the endogenous variable; then, the estimation of the independent variable will be used in the model. This makes the exogeneity assumption hold. This is the reason why this model is also called two stages: the first stage is the estimation, through the instrumental variable, of the variables that are supposed to be endogenous. Then, the second stage is the regression that tries to explain the dependent variable.

5.4.5 PROBIT MODEL

Probit is a non-linear model that is used when the dependent variable is dicotomic. It is a probabilistic method, since it tries to estimate the probability that, given certain condition, the outcome will be one or the other.

The estimation is done through the maximum likelihood built on a Gaussian model: the probability model is a normal distribution with variance 1 and mean that is linearly function of the independent variables. The coefficients of this linear function will be estimated with the method of the maximum likelihood through a linear regression.

5.5 UNIVARIATE ANALYSIS ON DEPENDENT VARIABLES

Many papers that concern startups mainly focus on *revenues* and its *growth* to quantitatively evaluate the performances of a startup. This is done for several reasons: first of all, these two variables are directly related to the operations and the success of the venture, so it is a direct indicator of performance; revenues are also always positive and generally present distribution which can be approximated as a log-normal one, which makes easier the use of quantitative analysis; finally, it is also the most widely available financial result.

Anyway, since it was possible to gather different financial data on the companies present in our sample, we will discuss which variable is the most suitable for the analysis that will be run in the next chapter. We already described the dependent variables that are available to us in Chapter 5.3.2 (*Financial results)*; they have also been quantitatively described in chapter 5.3.3. They represent the key financial indicators that have been available for the majority of the considered companies which can represent the financial performances and which we were able to collect.

In this chapter, we will also discuss their distribution and their fit as dependent variables. This is necessary since we have a limited number of observations, thus we need effective measures in order to obtain relevant results. In the evaluation of the most effective measures, they must:

- Be directly linked to the results of the venture, condition which we assume as true after the evaluation in the chapter 5.3.2

- Transform a variable into the form that makes possible the quickest convergence to a significant result possible (i.e. optimal conditions are a normal distribution and small variance)

- Be promptly affected by the explanatory variables in one-year time (the minimum time period we will consider).

The best form of the variables and their suitability for effective regressions will be evaluated hereby:

- **Revenues** present a log-normal distribution. Since all values are positive it is possible to log-transform them. The transformed variable fits a normal distribution, then using the log-transformed version of revenues is preferable. Figure 5.3 displays the plot of log-revenues in year 0 and a normal distribution.
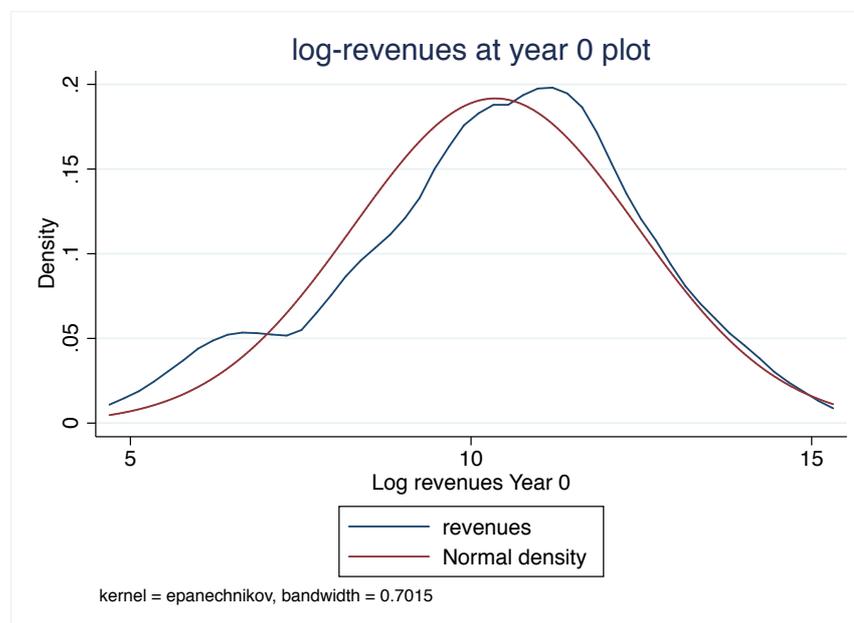
Fig. 5.3 Distribution of log-revenues in our observations - comparison VS. normal distribution

- **Revenue growth** present both positive and negative values, with a very long right tail, similarly to a log-normal distribution. Anyway, it is not possible to log-transform its value, otherwise we would lose 86 observations that are lower than 0. The best form is the natural one, even though the problem described above makes revenue growth less likely to give significant results.

- **EBIT and Net profits** have very similar shapes, as it is evident from Figure 5.4. Their distributions are strongly skewed to the left. The natural form is preferable. Its variance is high, thus the predicting power of an eventual regression would be reduced.
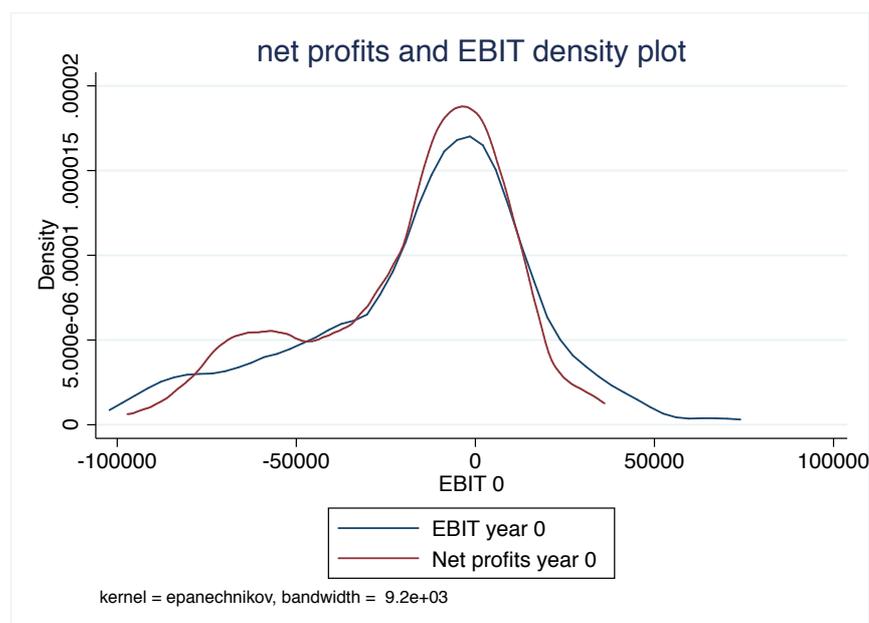
Fig. 5.4 Distribution of EBIT and net profits

- **ATR** is a relative indicator. It presents approximately a log-normal shape, as presented in Figure 5.5. From an analytical point of view, it would be possible to log-transform it since all the values are positive by construction. On the other hand, ATR is derived from the ratio of other two measures: revenues on assets. Log-transforming it is equivalent to:

$$log(ATR) = log\left(\frac{revenues}{assets}\right) = log(revenues) - log(assets)$$

Since using the difference between log-revenues and log-assets is a less meaningful transformation, using log-revenues will be preferred so that the result will not be influenced by the log-assets value. Since log-revenues dominate ATR, it will not be considered.
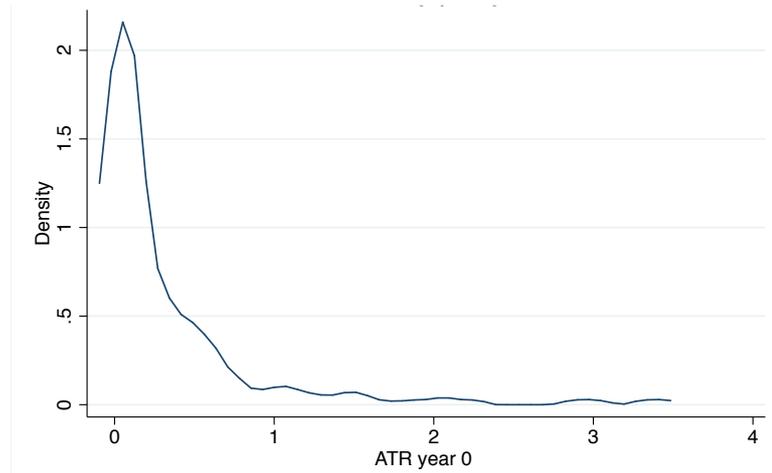
Fig. 5.5 Distribution of ATR

- Another relative indicator is **ROA,** which presents a shape similar to the one of EBIT, from which it derives. But differently from EBIT, ROA presents a lower variance, with more values compressed around the mean. This makes it a more powerful indicator when it comes to regressive power. The preferred form is the natural one.
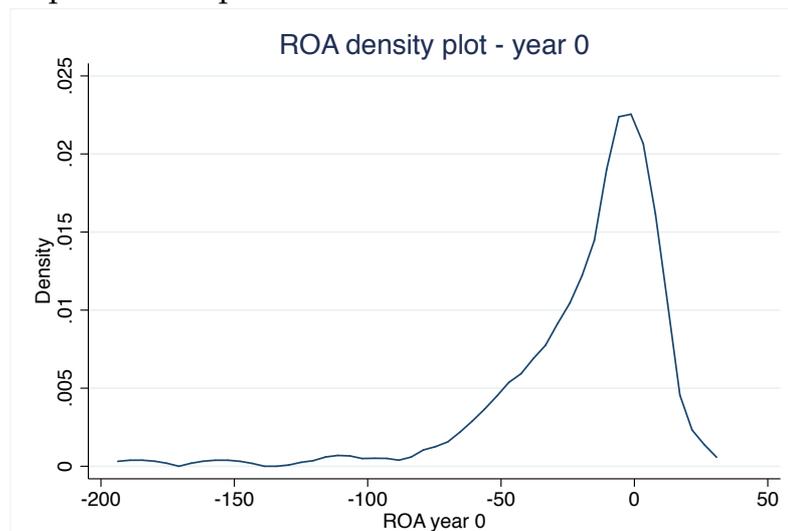
Fig. 5.6 Distribution of ROA

Now that the potential dependent variables have been discussed, we will use them to explore the impact of the ECF campaign on the performances. The first preliminary analysis regards the two subgroups of our interest: companies that had success in the ECF and the ones that failed it. They are identified by the binary variable *success campaign*.

We ran t-tests to identify which variables present a substantial difference between these two groups. These will be the variables that will be analyzed further through the methodologies explained in the chapter 5.4. This is useful to see which are the performance indicators that actually differ between the two groups, so that the analysis will be able to explain the source of this difference and if it is somehow linked with the ECF campaign.

Here below, in the table 5.11, it is possible to find the results of the t-tests.

Table 5.11 Key statistical factors per depened, variable

T-tests on dependent variables	n. obs failed	obs success	Mean failed	Mean success	Diff.	St_Err	t_value	p_value
Logrevenues precampaign	25	35	9.927	10.511	-.585	.547	-1.05	.29
Logrevenues year 0	41	49	9.904	10.759	-.857	.439	-1.95	.054
Logrevenues year 1	22	19	9.902	11.07	-1.168	.565	-2.05	.045
Logrevenues year 2	8	6	10.604	9.809	.795	1.435	.55	.59
Rev. growth year 0	24	33	1.677	4.248	-2.571	2.13	-1.2	.233
Rev. growth year 0	22	16	2.437	21.653	-19.215	16.118	-1.2	.241
Rev. growth year 0	9	5	.122	.47	-.347	.473	-.75	.477
EBIT precampaign	38	52	-22600	-27500	4916.678	19168.7	.25	.798
EBIT year 0	50	69	-39000	-65900	26958.81	39205.6	.7	.493
EBIT year 1	26	27	-87500	-176000	88198.47	126000	.7	.487
EBIT year 2	12	10	-172000	-115000	-57600	180000	-.3	.753
Net profit precampaign	38	52	-21911	-35591	13680	25321.6	.55	.591
Net profit year 0	50	69	-39080	-70300	31208.83	42434.81	.75	.464

Net profit year 1	26	27	-89200	-174000	85303.4	128000	.65	.507
Net profit year 2	12	10	-178000	-106000	-71800	160000	-.45	.659
ATR precampaign	37	53	.387	.309	.077	.141	.55	.583
ATR year 0	51	68	.381	.247	.134	.102	1.3	.193
ATR year 1	24	29	.282	.18	.102	.11	.95	.357
ROA precampaign	37	53	-.122	-.232	.11	.089	1.25	.222
ROA year 0	51	68	-.569	-.211	-.357	.364	-1	.329
ROA year 1	24	29	-.192	-.309	.117	.184	.65	.527
ROA year 2	9	13	-2.833	-.166	-2.667	2.268	-1.2	.254

The only variable that presents a significant difference is **log-revenues**. It is possible to identify a significant difference in the level of performance in the year 0 and year 1. This is coherent with its role as the most direct indicator of competitiveness of the startup, as previously explained.

Another interesting element is that the difference is significant only in the year of the campaign and the following, while this is not the case the year before: companies that succeeded in the campaign have significantly more revenues than the other group. This can be a sign of an impact of the ECF itself, which gives quantitative ground to go further with the hypotheses of this dissertation. The fact that the difference is not anymore significant in year 2 can be due to the small number of observations.

All other indicators do not show any difference between the two groups, which means that it is not possible to observe superior performances from the group that succeeded in the campaign. There are different possible explanations to this:

- They are not directly influenced by better non-financial performances; thus, the impact is not seen in such a small timeframe;
- There is no difference in potential results between the two groups, thus the hypotheses will be invalid;

- T-test is built on the assumptions of the *central limit theorem* which approximate the distribution of a set of observations to a t-student. The assumption of a sample big enough to have this result can be not as valid as expected with this limited number of observations. The only variable that has a quasi-normal distribution reached the result more efficiently, giving a significant result

Concluding, log-revenues seems to be the most suitable dependent variable for the purposes of this dissertation. It will be at the center of all the regressions that will be run in chapter 6. Less space will be given to the other variables, for the reasons explained here above. Still, further insights to identify why only the revenues present a significant difference can be found in the following analyses.

6. MODELS APPLICATION AND RESULTS

In the following chapter, we will run the models we discussed in the previous section and we will comment upon the results. We presented our findings in a logical order presenting the evolution of our research, i.e. the one of our research hypotheses. This is done in order to have a better insight of the problem at each iteration, since subsequent steps come as logical consequences of the previous ones.

6.1 CONDITION OF PARALLELISM IN PERFORMANCE TREND BEFORE THE CAMPAIGN

The first part of our analysis consists in a difference in difference model, which will be used to verify the *hypotheses of research*: the treatment group will be the set of companies that ran an ECF campaign and had success, while the control group is formed by the ones that ran an ECF campaign and failed it. The treatment event will be the campaign itself, occurred in year 0. The year before the campaign will be compared with the two years after the campaign.

However, in order to properly run a Difference in Difference model, it is necessary to assume the parallelism condition between the two subsets before the *'treatment event'* (this concept has been more thoroughly explained in paragraph 5.4.2). Our data source is empirical, and we have no way to guarantee the parallelism *a priori*: in fact, the discretional event – the campaign - is not linked with the same trend in performance, i.e. having done a crowdfunding campaign does not guarantee similar performances before the campaign among the companies.

On the contrary, given the studies regarding the signaling effect that has been presented in the literature review, there is the concrete possibility that the

performances before the campaign drive the result of the campaign itself, thus companies that succeeded are expected to have better observed performance.

However, only the fact of having better performances is not a sufficient condition to invalidate the DID model: the assumption we must verify is that the change in time is the same before the campaign, even though performances can be punctually unequal. Thus, we will run a test to be able to assume the parallelism between the group that had success in the ECF campaign and the one that had not.

6.1.1 *THE MODEL*

This preliminary condition is formalized in the following sentence: *In the time period between the year preceding the campaign and the campaign itself, Italian companies that succeeded in an equity crowdfunding campaign performed in the same way as the ones that failed.*

It will be denied if the test will demonstrate the absence of parallelism of the performance indicator, which will be *revenues,* between the year before the campaign (from now called *year precampaign*) and the year of the campaign (defined as *year 0*).

The test is a difference in difference model between the year precampaign and the year 0 and it regards only the period before the campaign. The same dataset and the same groups that will be used in the difference in difference for the Hypothesis 2 will be considered.

The model is an OLS that is explained by the following equation:

$$Log(revenues) = \beta_1 * successcampaign + \beta_2 * timeeffect +$$
$$+ \boldsymbol{\beta_3} * \boldsymbol{time\_success\_interaction} + \gamma * controls$$

The variable *timeeffect* contains the information of the year linked to each value of revenues (year precampaign = 0 ; year 0 = 1). The variable *successcampaign*

determines the group of observation, and the interaction variable defines the potential pre-treatment (or non parallelism) effect.

If the parameter β_3 is found significant, it means that before the campaign there is a significant difference between the trend of the successfully crowdfunded companies and those of the companies that failed the campaign, invaliding the necessary assumption for the DID. If it will not be significant, we can consider our assumption valid.

Two regressions will be run: with and without fixed effects from the year, the region and the industry. This is done to highlight the robustness of the result.

6.1.2 THE RESULTS

The results can be found here below, in Table 6.1:

Table 6.1 Preliminary difference in difference pre-campaign

VARIABLES	log-rev year 0	log-rev year 0 with fixed effects
Success campaign	0.135	-0.136
	(0.504)	(0.520)
Time effect	0.303	0.288
	(0.480)	(0.483)
Interaction: time*success	0.384	0.455
	(0.631)	(0.639)
Log-assets precampaign	0.475***	0.529***
	(0.129)	(0.133)
Age when campaign	0.237***	0.245***
	(0.0854)	(0.0870)
Constant	3.423**	3.329*
	(1.539)	(1.690)
Observations	153	153
Adjusted R-squared	0.212	0.229
Year Fixed effect	NO	YES
Industry Fixed effect	NO	YES
Region Fixed effect	NO	YES

Standard errors in parentheses   *** p<0.01, ** p<0.05, * p<0.1

The interaction parameter is not significant. It is also worth mentioning that even the *success campaign* and the *time effect* parameters are not significant in explaining the revenues. Only control variables have a significant and strong effect: the assets and the age of the company are able to explain 22% of the variance of the revenues.

The regression without fixed effects provides the same result, showing a strong robustness of the result. Fixed effects improve marginally the precision of the regression.

6.1.3 FINDINGS AND COMMENTS

Thanks to this preliminary analysis, we can assume that the parallelism condition holds. This allows us to run the Difference in Differences that will be carried out in the following chapter.

It is also possible to state that there is no substantial difference between the two groups: not only it is possible to assume a parallel trend, but it is also possible to say that the performances of the two groups are – on average - substantially the same before the campaign. In the same way, being the time effect factor not significant, we can state that the trend is on average flat, without any substantial change between the year precampaign and the year of the campaign.

The assets of the company in the year precampaign (used as a proxy of the size of the company before the campaign) and the age of the company strongly influence the performances. This is a result that will be often seen in the following analyses, and it is a sign that our analysis is consistent.

6.2 EFFECT OF THE CAMPAIGN – DIFFERENCE IN DIFFERENCE

Now that the preliminary condition is guaranteed, Hypothesis 1 will be tested. Here below its definition:

> *HP 1. Companies that ran a successful ECF campaign have better financial performances than the ones that tried and failed, considering the years after the campaign.*

The objective is to determine if the success in an ECF campaign is linked with better performances in the years right after the campaign.

6.2.1 THE MODELS

The model will be the same one defined in the chapter 6.1.1, which is an OLS regression with the following structure:

$$Log(revenues) = \beta_1 * successcampaign + \beta_2 * timeeffect +$$

$$+ \boldsymbol{\beta_3} * \boldsymbol{time\_success\_interaction} + \gamma * controls$$

This model will be applied on two datasets:

- The first one includes all the observations of the companies in the year before the campaign and in the year after the campaign (*year 1*)
- The second one is made of the observations of the year precampaign and 2 years after the campaign (*year 2*)

The variable *time effect* contains the information of the year to which the observation refers. As before, we will focus on the parameter $\boldsymbol{\beta_3}$ in order to see if there is an effect of the campaign on the performances. If it is positive and significant, we can confirm the *Hypothesis* 1. If this is not the case, we will not be able to confirm the hypothesis using this methodology.

Four regressions will be run, with and without fixed effects for both year 1 and year 2. This is done to highlight the robustness of the result.

6.2.2 THE RESULTS

In table 6.2, the results of the four regressions described here above are shown.

Table 6.2 Difference in difference on year 1 and 2

VARIABLES	log-rev year 1 no FE	log-rev year 1 with FE	log-rev year 2 no FE	Log-rev year 2 with FE
Success campaign	0.601	0.495	0.614	0.684
	(0.457)	(0.466)	(0.523)	(0.562)
Time effect	0.271	0.431	-0.0180	0.388
	(0.493)	(0.502)	(0.700)	(0.803)
Success*time interaction	-0.0941	-0.230	-1.085	-1.214
	(0.631)	(0.633)	(0.951)	(1.060)
lnassets	0.637***	0.692***	0.916***	0.951***
	(0.136)	(0.136)	(0.200)	(0.205)
Age when campaign	0.251***	0.289***	0.161	0.175
	(0.0855)	(0.0887)	(0.129)	(0.141)
Constant	1.545	0.615	-1.574	-2.733
	(1.586)	(1.697)	(2.280)	(2.552)
Observations	134	134	89	89
Adjusted R-squared	**0.300**	**0.328**	**0.289**	**0.276**
Year Fixed effect	NO	YES	NO	YES
Industry Fixed effect	NO	YES	NO	YES
Region Fixed effect	NO	YES	NO	YES
Platform effect	NO	YES	NO	YES

The interaction parameter is not significant to explain the performances in terms of revenues. *Success campaign* and *time effect* are not significant either, and this is true for all the four regressions, in which only the assets and the age of the campaign seems to be relevant to explain the result. These regressions have an adjusted R squared around 30%, which can be considered a sign of good quality in the regression.

It seems that there is no treatment effect given this result. The plots of the residuals show a good quality, non-biased regression. We show the plot of year 1 with FE, which is the most representative one, in Fig. 6.1.
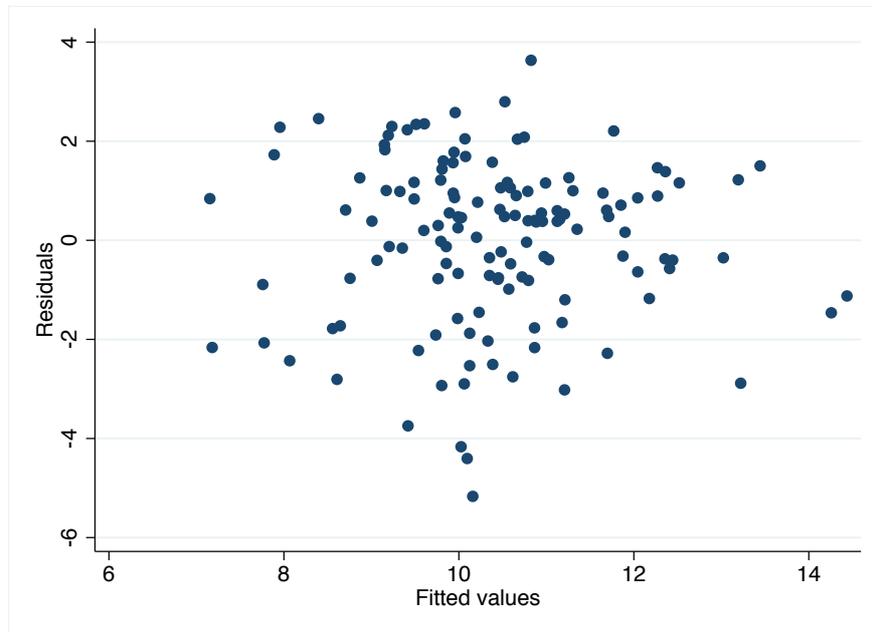
Fig. 6.1 Plot of residuals VS. Fitted values – DID with FE year 1 and 2

6.2.3 *FINDINGS AND COMMENTS*

The result we obtained differs from what we expected. It seems that the campaign does not impact company performances in one or two years. This seems to be a counterintuitive result, because at least a capital injection effect should be observed: companies that received risk capital had the opportunity to invest more and this should impact somehow the revenues.

Another peculiarity of this result is that in the regressions regarding year 2 assets are not significant, while they were so in all the previous regressions. This would suggest a lack of precision in the regressions, which we should explore further.

Discussion of the criticalities

Some potential reasons for this result may be the following:

- **Not enough observations** which bring to inaccurate results. Due to the high variance of the dependent variable, it could be possible that there is not enough information in the data provided to have a consistent result;

- **Companies which bootstrap effectively perform in the same way**. This means that companies do not need capital from equity crowdfunding necessarily, but the ones which fail the campaign are able to operate anyway and find resources in other ways, bootstrapping in the first period and then finding alternative finance. This makes them perform in the same way of the companies which succeeded. It is coherent with the idea that crowdfunding is a preferred source of financing in certain conditions, and it is not a last resource for financing, as expected from the pecking order theory (Myers and Majluf 1984);

- **Survival bias:** We have yearly performances of all the companies that had a campaign in Italy and which survived until the year considered. But observations in the year precampaign do not refer to the same companies which are considered for the years after the campaign: <u>the sample is constituted only by those firms which did not fail in the meantime</u> in the year after the campaign. Indeed, some companies that were observed before the campaign just dropped out of the observed companies. Those are not random elements, but they are generally the worst performing ones. This generates a so-called <u>survival bias</u>: performances can be perceived as improved even if this improvement is just virtual, since worst-performing companies are not observed anymore.

  This bias is verifiable in a fairly simple way. It is necessary to see if the number and the performances of the companies that dropped out from the two groups were negatively biased. In the table below (Table 6.3), it is possible to have an overview of how many observations there are per

group, per year, and how many companies failed in that year per group. In paragraph 6.3 the survival rate will be analyzed, to see if there is a substantial difference in the probability to fail between the two considered groups.

Table 6.3 average log-revenues and n. of liquidation per year

		Year precampaign	Year 0	Year 1	Year 2
Successful campaign	N° of observations	36	51	46	15
	Average log-revenues	10,36	10,74	10,9	10,61
	Accumulated liquidations	//	0	2	4
Failed campaign	N° of observations	25	42	27	13
	Average log-revenues	9,93	9,89	10,12	10,23
	Accumulated liquidations	//	2	4	8

From this overview, it is possible to see how relevant the liquidated companies are when it comes to the average performance. Whilst they are almost irrelevant in year 0, they drop out each year more, comprehensibly.

The number of liquidations doubles in the subset of companies which failed the campaign, and they become more relevant also in relative terms: in year 2, liquidated companies are 61% of the of the total in the 'failed campaign' group and 27% of the 'successful campaign' group. In chapter 6.3, we will find if this difference is statistically significant or if it is just attributable to a random effect.

It is reasonable to say that the ones that are liquidated are those having the worst performances. This is suggested also by the level of the mean log-revenues in the two groups and its trend it time: failed companies start with a level which is slightly smaller, but while the trend in the 'successful campaign' group is almost flat, we see that performances in the failed campaigns improve in year 1 and 2, getting closer to the successful ones. This behavior suggests a survival bias.

To verify this, we will run the analysis in chapter 6.4, which should neutralize the survival bias effect through a methodology which control the sample used. After that, a clearer idea of the reason of these results will be given.

6.3 EFFECT OF THE CAMPAIGN – SURVIVOR RATE

In the previous analysis, we focused on the financial performances of the observed companies to verify the Hypothesis 1. Another perspective of it is to verify not only financial performances of survived companies, but also the probability to survive that they have, given the result of the campaign.

There are controversial studies regarding this aspect. On the one hand, it is intuitive that companies that receive capital have a longer *runway* and will survive longer and with more probability; in this sense, crowdfunding can be considered just as a round of investment which reduces sensibly the probability of default in the short term. On the other hand, the opposite result was discovered in some studies that focused on the effect of venture capital investment (Manigart, Baeyens, and Van Hyfte 2002). The reason may be linked to the risk appetite that those funds have: they seek high-growth companies with high potential and are willing to finance them even if their risk profile is higher, because they look for high return. While companies which are safer, but offers lower return, do not receive the capital. Another reason may lie in the way investee companies are managed, i.e. on a portfolio basis: some firms may be sacrificed (the *walking deads*) if the return of the overall portfolio is good thanks to the best performing ones (the *stars*). Since the behavior of crowdinvestors is often compared to the one of VCs, it is possible to check if academic results about VCs are applicable even to equity crowdfunding.

6.3.1 THE MODELS

The model that will be used is the survival analysis described in chapter 5.4.3. The parameters will be the following:

- It is a _right-truncated survival time model_, which means that all the subjects are not observed anymore after a fixed amount of time from the origin time,

- The _time unit_ is a year and it is discrete,

- The _origin time_ is set at the moment of the campaign,

- The _failure event_ is the liquidation of the company, and the _time of the failure event_ is the year in which the company failed. If the company is liquidated in the year of the campaign, it will be considered a _failure at T = 1_ (the first year of observation),

- The observations end in the last observed year, which is 2018,

- The variable which determines the group is _successcampaign_.

6.3.2 THE RESULTS

A graphical analysis is available in the graph 6.2, using the Kaplan-Meier survival estimates. It is evident that companies which had success in the campaign of ECF have higher probability to survive in any given year after the campaign, answering to Hypothesis 2 from a different perspective.
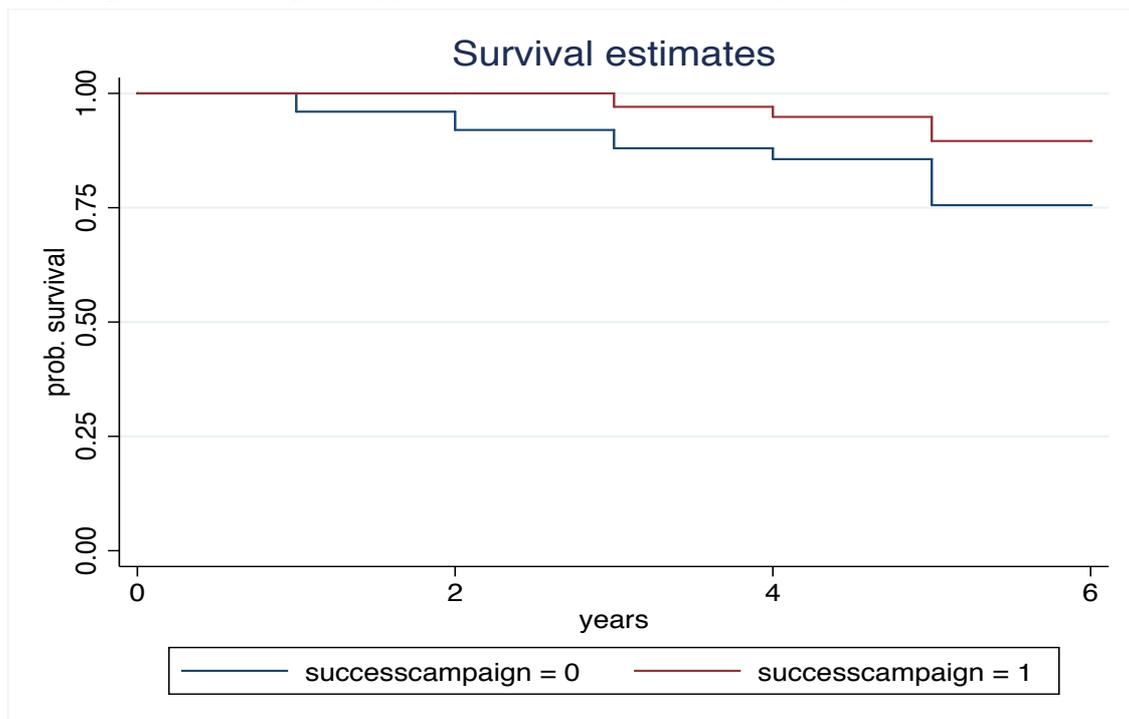
Fig. 6.2 Estimated survival function (Kaplan-Meier methodology)

The empirical evaluation of the hazard rate shown below is the numerical description of the curves shown in the previous graph. The number of observations each year is displayed, as well as the number of failures and drop-outs. The survivor probability is found, and it is interesting to check the level of confidence. After 3 years around 12% of the companies which failed the campaign were liquidated, while only 3 percent of the ones which successfully concluded the campaign had the same destiny. It is also interesting to see the 5 years survival rate, which is 75% for the unsuccessful-ECF companies and 90% for the successful ones.

Table 6.4 Analytical description of survivor function

```
. sts list, by(successcampaign)


        failure _d:  failed10
   analysis time _t:  (survivaltime1-origin)
           origin:  time agewhencampaign
```

Time	Beg. Total	Fail	Net Lost	Survivor Function	Std. Error	[95% Conf. Int.]	
successcampaign=0							
1	50	2	0	0.9600	0.0277	0.8494	0.9898
2	48	2	0	0.9200	0.0384	0.8007	0.9692
3	46	2	7	0.8800	0.0460	0.7522	0.9442
4	37	1	19	0.8562	0.0505	0.7212	0.9289
5	17	2	10	0.7555	0.0804	0.5544	0.8752
6	5	0	5	0.7555	0.0804	0.5544	0.8752
successcampaign=1							
1	72	0	1	1.0000	.	.	.
2	71	0	3	1.0000	.	.	.
3	68	2	22	0.9706	0.0205	0.8875	0.9926
4	44	1	25	0.9485	0.0296	0.8452	0.9835
5	18	1	10	0.8958	0.0583	0.7039	0.9661
6	7	0	7	0.8958	0.0583	0.7039	0.9661

In order to have a statistical verification that having had a successful campaign is correlated with a higher survival probability, a test has been run. This log-rank test gave the following result: the companies which had success have a higher survival probability, with a significant level of confidence (**p-value = 0.054**).

6.3.3 FINDINGS AND COMMENTS

There is a significant difference in the survival function of the two groups of our dataset. We have been able to demonstrate that the performances of the companies that received capital through equity crowdfunding have better performance, for what concerns the survival probability. This is consistent with the idea that if a company succeeds it will have more resources available, making the company in a better position. This is a major difference with the venture capitals and what is known on their effects on companies.

This result also supports the possibility that in the previous analysis there was a survival bias. Being the default rate significantly different, there could be an impact on the mean performances if we assume that the liquidated companies are the ones which perform the worst. We were able to give good estimation of survival rates after 5 years: 75% of the companies survive if they failed a campaign; this value is 90% for the campaigns which succeeded.

6.4 EFFECT OF THE CAMPAIGN – OLS ON GROWTH

In this chapter, an alternative methodology to the difference in difference will be used. It will be based on a standard OLS regressions, as described in chapter 5.4.1 . The objective of this analysis is to verify Hypothesis 2, overcoming the issue of the survival bias.

6.4.1 THE MODEL

The model uses as dependent variable the growth of each company between two given years. This simplifies the regression, since we do not need any more interactions between variables. This approach has some advantages:

- It overcomes the survival bias, since only companies that are observed in the two given years are actually included in the analysis
- The dependent variable has more information content, since it is referred to the evolution in time of a specific company, and not only punctual observations
- The regression will converge faster, since there is no interaction

There are also some disadvantages, which are more evident when compared with the difference in difference method:

- Less observations (up to half the observations compared to the DID model)
- Selection bias, which comes when we decide to exclude all the companies that do not have observations for the two years.

To better specify the selection bias, it is necessary to underline that this regression will correlate operating performances and outcome of the campaign, given that these companies survived until the considered year; this means that we will evaluate a conditional probability. Anyway, the expectation is that the results are consistent with the difference in difference model, even though more informative.

The model that will be run in this part of analysis is:

$$(logrevenues_{1\ or\ 2} - logrevenues_{-1}) = \boldsymbol{\beta * successcampaign} + \gamma * controls$$

The choice of the dependent variable structured in this way was taken after a complex valuation. It was necessary to define a variable that had a gaussian distribution; plus, we wanted to use an indicator of growth in time of each individual company, in order to converge effectively to a solution that could give a relative measure of performance. We already saw in chapter 5 that growth ratio did not bring any significative result. Since log-revenues performed quite well in the previous analyses, we focused on it to find the solution to this issue.

Eventually, we wanted to keep a variable that had a meaningful value even as an indicator. Thus, we decided to use the difference between the logarithm of the revenues, because it is the logarithm of the ratio between the most recent year (year 1 or year 2, depending on the case) on the year -1, which means that it is the logarithm of how many times revenues grew in between the considered years.

We tried both regressions with and without fixed effects, expecting mixed results since we had fewer observations than with the DID model.

6.4.2 THE RESULTS

Here below the output of the regressions of the model described above.

Table 6.5 OLS regressions in year 1 and 2, with the impact of the campaign

VARIABLES	(1) year 1 without FE	(2) year 1 with FE	(3) year 2 without FE	(4) year 2 with FE
Success campaign	**1.012****	**1.544****	0.554	0.606
	(0.457)	**(0.605)**	(1.094)	(2.134)
Log-assets precampaign	-0.413*	-0.456*	-0.132	-0.316
	(0.211)	(0.235)	(0.616)	(0.827)
Age when campaign	-0.201	-0.185	-0.551	-0.666
	(0.119)	(0.153)	(0.463)	(0.796)
Constant	6.232**	5.498*	3.953	-1.428
	(2.448)	(2.943)	(6.586)	(8.917)
Observations	41	41	17	17
Adjusted R-squared	0.255	0.191	0.053	-0.127
Year Fixed effect	NO	YES	NO	YES
industry Fixed effect	NO	YES	NO	YES
region Fixed effect	NO	YES	NO	YES
platform Effect	NO	YES	NO	YES

In this output, we find an interesting element: the coefficient of the variable *success campaign* is significant in year 1, and so is the one of log-assets. R-squared is higher without fixed effects, meaning that they do not influence the result in an incisive way. Notably, the year of the campaign is not significant in this regression. This can be due to the small number of observations, or either previous results were actually biased by the survival bias.

In year 2, no variable is significant, and F-test is not significant either, invalidating the regression. We associate this result to the extremely low number of observations (only 17), compared to the number of variables, leaving only 14 degrees of freedom. For this reason, regressions with this methodology on year 2 will not be shown from now on.
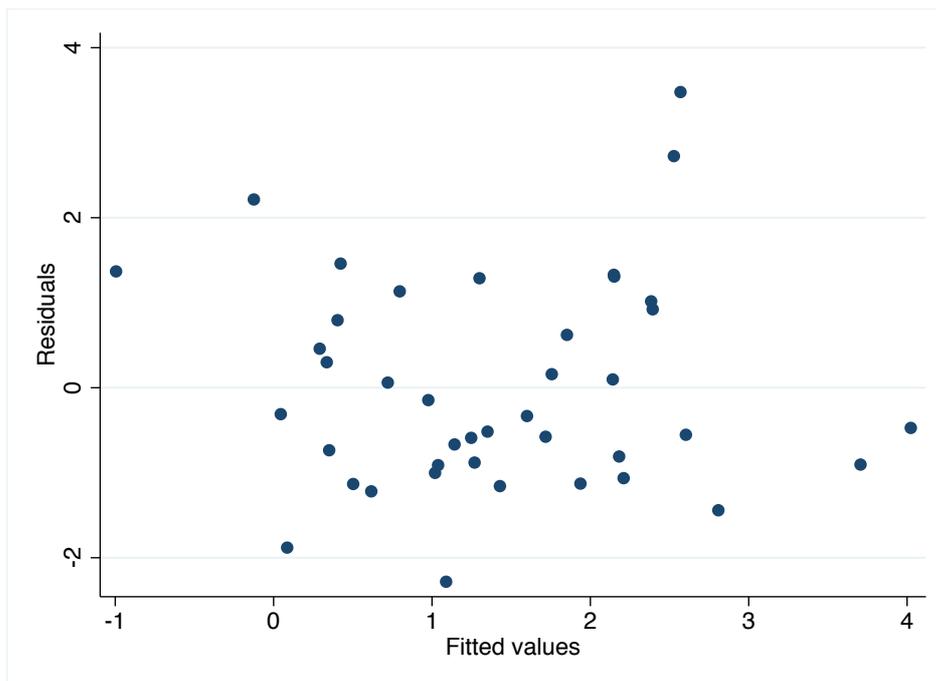

Fig. 6.3 Residual plot of regression (1)

The plot of the residuals of the regression (1) does not show heteroskedasticity, even though high variance of the residuals seems to suggest that the regression is not as precise as expected.

6.4.3 FINDINGS AND COMMENTS

The regression with the standard OLS model is valid, and we have different results compared to the difference-in-difference model applied to the same data. Thus, it seems that survival effect was actually relevant in the results. More specifically, we find that having success on a crowdfunding campaign leads companies to an increase of the revenues after one year. Unfortunately, it is not possible to say anything about the following year, due to the low-quality regression with data of year 2.

We see that assets, which are a proxy of the size of the company, impact negatively the performance. This is not in contrast with the previous result: in the difference in difference regressions, the revenues were considered in absolute value. Thus, it is intuitive that the bigger the company is the higher the revenues are; this is why it was an important control variable. Here, we considered the difference of revenues between two years and we saw that assets have a negative impact. This is consistent with the literature regarding performances of companies in general: bigger companies improve performances slower. Still, it is the proof that having log-assets as a control variable is relevant.

For the same reason, we can explain why the age of the company is not relevant anymore: assuming that companies become more efficient over time, age is a relevant factor when we consider revenues as an absolute number. But considering growth, it is not anymore true. Indeed, we find that it is not relevant in our dataset. Still, we have reasons to consider this result not definitive: the sample is not big enough to reach final conclusions. Moreover, we considered a sample that could suffer of selection bias, since we excluded failed companies due to unobservability.

Up to now we can say that in our dataset, if a company survives in its first year after the campaign, it has better results in revenues if it had success in a crowdfunding campaign.

Putting together these last results, we can partially confirm it saying that companies that receive ECF capital are more likely to survive, and they seem to perform better in the year after the campaign, if we assume that they survive.

These findings make us confirm Hypothesis 1, but only under specific boundary conditions: only if the company survives one year and only in that year, companies that receive ECF capital perform better.

6.5 SELECTION ABILITY OF THE INVESTORS – OLS PRECAMPAIGN

After the results of the previous chapter, it is interesting to understand not only if performances are different, but also why. In other words, are companies performing better because they were intrinsically superior even before the investment (and so they were able to collect capital) or rather they improved thanks to the investment?

We can get a little closer to the answer by looking at the pre-campaign operating performances. Even though operating performances do not show the potential performance improve in the future, they are one of the few information that are always disclosed on the platforms and they are one of the main evaluation criteria for the investors. On this regard, we already found in chapter 6.1 that both subsets of companies can be assumed to grow at the same pace before the campaign. This was the *parallelism condition*. Still, we do not know if the level of performance of the two groups was the same or it had already a difference before the campaign.

It is reasonable to think that investors invest on companies that perform better at the time of the campaign, hoping in better performances even after the campaign. Thus, we defined our next research hypothesis as:

> *HP 2: Crowdinvestors pick companies with better operating performances*

If we are able to confirm or refuse this hypothesis, we will be a step closer to the solution of the endogeneity between the effect of the selection of the investor and the treatment that capital injection gives. If performances were better before the campaign, it would partially explain the superior performances that we found in chapter 6.4.

Still, it would be hard to know if this difference will be constant or growing after the campaign, or even if it was just linked to the variability and it will decrease following the effect of a *regression to the mean*.

6.5.1 THE MODELS

The model that we will use in this analysis is very close to the one explained in chapter 6.4, with the purpose of being comparable with only minor adjustments. In this way, we can see how much of the performance can be explained by the choice of the investor more prone to invest in already higher performing companies and how much of the performance improvement comes after the campaign.

To do this, we will consider the difference of log-revenues between the year of the campaign, defined as year 0, and the year before the campaign. Our objective is to represent the momentum of growth in revenues that was already present before the campaign. However, the campaign happens in year 0, so it is possible that the performances of that year are influenced by the investment. For instance, if the campaign takes place in January, the firm has the time to invest and potentially influence its operating performances before the end of the year.

To explicit this effect, we added a variable: *month end campaign*. It is a discrete, numeric variable that goes from 1 to 12 representing the month in which the campaign ended (from January to December, year in which companies close the accounting year). Since the effect of the investment is supposed to be higher if the company receives the capital earlier, we expect a negative correlation between this variable and the revenues. In this way, we should be able to limit the distorting effect of using only yearly values.

As in the previous model, success campaign differentiates between companies that succeeded and the ones that did not. So, the model is the following:

$$(logrevenues_0 - logrevenues_{-1}) = \boldsymbol{\beta * successcampaign} +$$

$$+ \delta * month\ end\ campaign + \gamma * controls$$

As we already found in the previous analysis, there is the possibility of having a selection effect. Not all the companies were already existing in year -1 since some firms were incorporated the year of the campaign: these companies will not be considered in order to avoid a bias.

Thus, the correlation conditional to the fact of being already incorporated the year before the campaign will be analyzed.

6.5.2 THE RESULTS

Here below the results of the regression with and without fixed effects.

Table 6.6 OLS regression in year -1/0, considering the month of end of campaign

VARIABLES	(1) without FE	(2) with FE
Success campaign	**0.649****	**0.688****
	(0.291)	**(0.326)**
Month end campaign	-0.0190	-0.366
	(0.0380)	(0.0466)
Log-assets precampaign	-0.273**	-0.272**
	(0.125)	(0.122)
Age when campaign	-0.131*	-0.113
	(0.0684)	(0.0792)
Constant	4.106***	5.407***
	(1.489)	(1.496)
Observations	58	58
Adjusted R-squared	0.202	0.231
year Fixed effect	NO	YES
industry Fixed effect	NO	YES
region Fixed effect	NO	YES
platform Effect	NO	YES

The regression seems to be of a good quality: the adjusted R-squared reaches 0.23 when we consider also the fixed effects, F-test shows that the regression is significant, and the analysis of the residuals shows that there is no apparent heteroskedasticity (as shown in the plot in Fig. 6.4) and they are well distributed. Moreover, observations are numerous enough to yield to stable results.
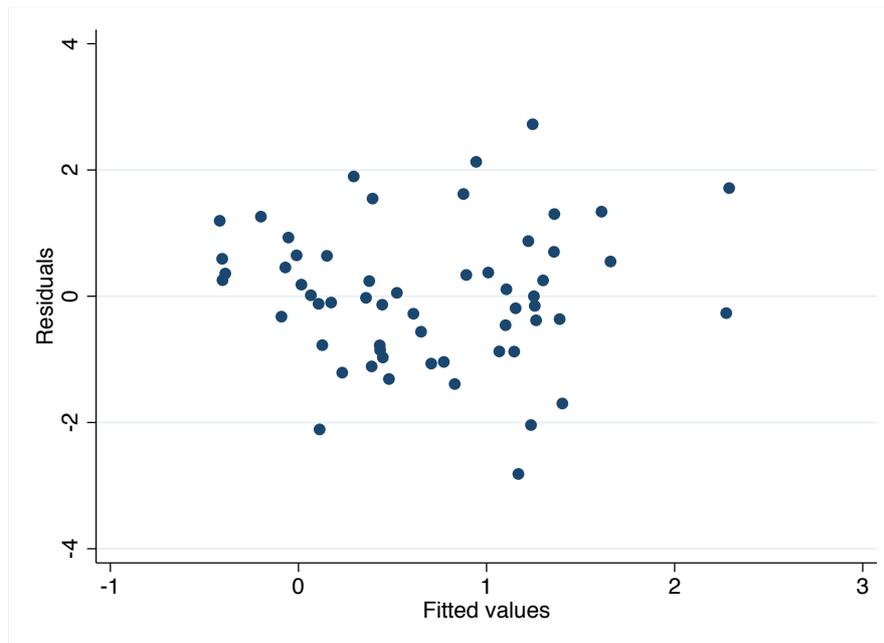
Fig. 6.4 Residuals of OLS regression in year -1/0 with FE

The result is interesting: the variable *success campaign* is significant, which means that companies that were financed have grown more in the year of the campaign.

Month end campaign is not significant. This means that we can assume the results of year 0 homogeneous and not influenced by the investment that the companies received in that year.

The control variable *log-assets* is significant with a negative coefficient, which is consistent with the findings in chapter 6.4. *Age when campaign* is significant in the regression without fixed effects, but it is not anymore with the fixed effects. This can be due to the number of observations compared with the number of independent variables, which reduce the degrees of freedom in the regression (2). Alternatively, it can be due to a correlation between *age when campaign* and a fixed effect variable, which generated endogeneity in the regression (1).

6.5.3 FINDINGS AND COMMENTS

Considering our dataset, it seems that companies were already performing better before being chosen. This suggests that the selection of the investors solves

partially the dilemma of the cause of higher performances. It is also possible to evaluate quantitatively how much the selection effect explains the higher performances found in chapter 6.4. In fact, it is sufficient to compare the coefficient of the variable *success campaign*. The coefficient of the binary variable *success campaign* is 0.65 without fixed effects and 0.688 with fixed effects, two values that are comparable and consistent. While considering year -1 and year 1 the coefficients are 1.01 without fixed effects and 1.51 with fixed effects; numbers that are less stable, also due to less observations. Given these values, it is possible to estimate that between *45% and 65% of the gap in performances between the two groups can be linked with higher financial performances that were already actualized in operating revenues before the campaign.* This result is reliable, since these regressions are consistent with the ones shown in chapter 6.4.

Even though previous performances explain a good part of the gap between the two groups, there is another good chunk of the difference that comes after the campaign: if 45/65% of the gap between year -1 and year 1 was already existing in year 0, there is a remaining 35/55% that is generated in the year after the campaign.

So, are successful companies already overperforming, and thanks to the resources they were able to realize the potential? Or the financial opportunities and support from the crowd give a boost to performances? In the next chapter, we will try to deepen these questions.

6.6 SELECTION ABILITY OF THE INVESTORS – 2 STAGES LEAST SQUARES

In this chapter, we will analyze the other side of hypothesis 2: while in the previous chapter we have been able to demonstrate that successfully crowdfunded companies were already performing better before the campaign – and this partially explains the higher performance of companies with crowdfunding – here we will investigate the impact of the treatment given by a successful ECF campaign.

As we brought to the reader's attention in the previous chapters, there is a matter of endogeneity when we try to understand the impact of the crowdfunding campaign on the companies: there are two ways in which the crowdfunding campaign can be found correlated to higher performances:

- There could be a **treatment effect**, which means that the crowdfunding is able to boost the performances of the company thanks to its characteristics (explained extensively in chapter 3, for instance the support of a crowd, the marketing effect, or merely the increased financial resources);
- It is also possible that crowdinvestors simply choose companies that have more potential, thus they decide to invest in them expecting higher returns in the future. This is defined in the literature as **selection effect.**

Sadly, it is really hard to discern which is the actual reason when econometric regressions are used to identify quantitatively the effect. This is due to the endogeneity problem: the success of the campaign is strictly correlated with the potential of the company, which is impossible to observe. Thus, the effect of this unobserved variable is absorbed by the error, making it correlated with the variable the describes the result of the campaign (in our case *success campaign*).

6.6.1 *THE MODELS*

In this work we use the *two stages least squares* method, which exploits an instrumental variable to overcome the endogeneity. The instrumental variable must be correlated with the independent variable *success campaign*, but it should not be correlated with the unobserved variable (in our case the unobserved potential of the company). Therefore, the instrumental variables will be used to explain the variable *success campaign* and eventually the estimated variable will be used for the regression in the second stage.

The first step in applying this method is defining the first stage model: since the variable *success campaign* is dichotomic, it is necessary to use a non-linear model.

Often the Probit model is used in these cases: it is a probabilistic model based on the normal distribution which is able to predict a binary variable (see chapter 5.4.5).

The challenge of this model is to find proper instrumental variables. We tried with different ones that have been used in previous academic researches (Vismara 2018). The variables we tried are:

- The weekday of the beginning of campaign: sometimes there is a correlation with the result of the campaign, because of the day in which investors are more prone to check the opportunity for investment. Moreover, it is clearly uncorrelated with the potential of the company. Typically, the beginning of the campaign is the moment with the highest rate of new contributors.
- The weekday of the end of campaign: for the same reasons as the previous point. It is the other moment in which there is a peak of subscribers.
- The target capital: literature about signaling theory highlighted this factor as negatively correlated with the probability of having success. Furthermore, the size of the investment is linked with the financial need of the company, which does not depend on the potential that the company will have in the long run. Even though this assumption is less obvious, we believe it is more likely that the target capital reflects the present need rather than the future potential (which is linked to the capital that is eventually collected, taking also into account the investors' feedback).

After having tried to run regressions with all three of them, we opted for the *target capital* as instrumental variable:

1° stage: $\quad\quad PROBIT : pr(success\ campaign) = \phi[\log(target\ capital) + \varepsilon\,]$

The reason is that the log-target capital is able to explain with statistical significance the variable success campaign, while the other two are weaker

instruments. Moreover, we found a negative correlation, as we could expect from the literature review.

Then, in order to be consistent with the previous analyses we built the second step reflecting the standard OLS model (see chapter 6.4), but in this case substituting the variable *success campaign* with *success campaign_hat*, which is the fitted variable coming from the first stage. Comparing the results with the ones of chapter 6.4, we will be able to understand what was the reason that drove higher performances in the successfully crowdfunded companies: if *success campaign_hat* is significant, we will be able to confirm that we observed a treatment effect. If it is not, we should accept the null hypothesis of the test, that means that selection effect is the main reason.

$2°$ *stage:* $\qquad (logrevenues_1 - logrevenues_{-1}) = \boldsymbol{\beta * \widehat{successcampaign}} +$

$$+ \gamma * controls$$

Finally, it is worth talking about the effectiveness of this method. We do not expect a high effectiveness because of two reasons: the Probit, being a non-linear regression, converges much slower than an OLS model; moreover, having two stages with two different models, the outcome will be less reliable with a limited number of observations.

Anyway, the results that will be presented in the following paragraph a spark for reflection: even though the results cannot be considered solid, together with the previous results it helps to read the phenomenon in a clearer way.

6.6.2 THE RESULTS

The first column is the result of the first stage, the other two columns show the results of the second stage with and without fixed effects.

Table 6.7 2-Stages least square regression output

VARIABLES	2SLS probit 1st stage	2SLS 2 stage with FE	2SLS 2 stage without FE
Success campaign_hat		**-1.879**	**-0.751**
		(3.759)	**(3.425)**
Log-assets precampaign		-0.363	-0.420
		(0.272)	(0.249)
Age when campaign		-0.172	-0.227
		(0.180)	(0.149)
Log-target cap	**-0.263***		
	(0.141)		
Constant	3.366**	7.047	7.425*
	(1.694)	(4.284)	(4.027)
Observations	125	37	37
R-squared	Pseudo-R2 0.02	0.300	0.211
Country Fixed effect		YES	NO
industry Fixed effect		YES	NO
region Fixed effect		YES	NO
platform Effect		YES	NO

The Probit shows a negative correlation between the success of the campaign and the target capital, as it was expected. Still, the pseudo R-squared is quite low, thus only little part of the variance is explained by this single instrumental variable.

In the second stage we see that no variable explains the difference of revenues with statistical significance: in particular, *success campaign_hat* and *log-assets* are not significant, differently from our results of chapter 6.4.

Despite this fact, the regression as a whole is found significant both with and without the fixed effects and it presents an R-squared of respectively 0.30 and 0.21. This suggests that the lack of significant variables is linked with the imprecision of the model and the small number of observations. This is supported by the much higher variances that each variable has compared to their counterparts in the one stage model we used previously.

6.6.3 FINDINGS AND COMMENTS

The second stage must be directly compared with the results we obtained previously, in which we find that the variable *success campaign* is significant. Here, after having tried to isolate the endogeneity effect, the estimated variable is not significant anymore. These evidences suggest that the main effect that makes the outcome of the campaign relevant for the operating performances was the *selection ability of the investors*. Indeed, if it was linked with the treatment effect it should be significant also in the second stage.

Still, there are many limitations to this result. First of all, we are not able to confirm the selection effect, since we may have incurred in a second type error in the second stage, i.e. incorrectly assuming as not significant a variable. Then, there are several factors that reduce the precision and the meaningfulness of this portion of the study: the first stage is quite approximate, since it is a non-linear Probit with a very low explanatory power on the variance (because of the low pseudo R-squared). This, together with the limited number of observations in the two regressions, reduces the reliability of our model.

Anyway, given both the evidences shown in chapter 6.5 and here in chapter 6.6, it seems that we can accept the hypothesis 2: investors actually choose companies that already perform better, or that will perform better in the future actualizing their capabilities. Still, further researches are necessary to develop this topic and overcome the limitations of our study.

6.7 IMPACT OF DIFFERENT TYPES OF FUNDS ON PERFORMANCES – DID

Up to now, our analyses focused on the differences in performances between two groups only: the companies that failed an ECF campaign and the ones that succeeded. However, we can also exploit data regarding other typologies of investment, to verify if there is any additional information or pattern that can add value to our work. Our purpose is to compare companies which received ECF capital to the ones which received other forms of capital.

To do this, we took into considerations data regarding the companies that received investments after the campaign took place, as explained in chapter 5.3.1. Both the companies that succeeded and those who failed the campaigns could have received capital injections, such as:

- Another ECF campaign
- An equity investment of VCs, BAs or other non ECF investors
- Debt capital from banks or the so-called *shareholder debt*

In order to build a consistent subset of companies and avoid contradicting results, it was necessary to define disjointed subgroups. Thus, we considered only the following subgroups:

- **ECF subgroup:** companies that received only and exclusively ECF capital in one campaign.
- **Equity subgroup:** companies which failed the campaign and then received an equity investment other than an ECF campaign.
- **Debt subgroup:** companies that failed the campaign and answered to their need of capital through a debt.
- **No investment:** companies that failed the campaign and managed to survive by bootstrapping. These companies tried to survive thanks to internal resources (improving revenues or cutting costs).

This information has been formalized in a categorical variable, as described in chapter 5.3.2. As a logical consequence, we excluded the companies that concluded positively a campaign and then received further capital of other type or that received different types of capital: it would have been too complex to evaluate mixed investments.

Then, we tried to understand whether the type of fund that the company receives brings to differences in terms of operating performances, or if the only influencing element is the availability of capital. This has been formalized in the hypothesis 3:

> *HP 3. Companies that received capital from ECF perform better than those who failed the campaign and received other forms of financing.*

To be able to compare the impact of different types of investment, time reference needs to be changed. From now on, year 0 is the year in which the company received the investment, unless it received none. In this case, year 0 remains the year of the campaign and it will be considered the control group. Other years changed coherently with this new principle: year -1 will be the year before the investment, whichever type it is, and year 1 and 2 the years after the investment.

6.7.1 THE MODEL

The model we wanted to apply was very similar to the previous one: we wanted to have results that were directly comparable with the same degree of detail. It will be a difference in difference model with the data from the year pre-investment, and the year immediately after. Specifically, two sets of regressions have been run for the data from year 1 and from year 2. The performance indicator (the dependent variable) will be log-revenues, as in previous analyses.

Since the objective was to compare the ECF-funded companies to the ones that found other solutions, we must run several regressions. In each of them, we introduce a binary variable that defines if the company received a specific form of capital or equity other than crowdfunding. One regression for each alternative funding type has been run. This was necessary in order to make the results consistent with the ones from chapter 6.2.2 and to make the difference in difference analysis feasible. The interaction will be between the *time effect* variable and this binary variable.

The model that will be applied is this one:

$$logrevenues = \beta_1 * ECFvsotherfund + \beta_2 * timeeffect +$$

$$+ \boldsymbol{\beta_3 * time\_ECFvsotherfund\_interaction} + \gamma * controls$$

6.7.2 THE RESULTS

Only results with fixed effects will be shown, since they had higher adjusted R-squared when compared to those without-fixed effect. These are the results:

Table 6.8 DID on year 1 and 2, with different investment types

VARIABLES	(1) Y1 ECF vs. no inv. - with FE	(2) Y1 ECF vs. debt - with FE	(3) Y1 ECF vs. equity -with FE	(4) Y2 ECF vs. no inv.- with FE	(5) Y2 ECF vs. debt - with FE	(6) Y2 ECF vs. equity - with FE
Ecf vs other fund	0.753	-0.122	0.395	1.133	-0.148	0.442
	(0.719)	(0.872)	(0.743)	(0.919)	(1.182)	(0.965)
Time effect	0.969	-0.966	0.340	1.667	-1.097	0.545
	(0.833)	(0.922)	(1.036)	(1.623)	(1.279)	(1.665)
Interaction variable	-0.864	0.982	-0.210	-2.766	0.109	-1.456
	(0.944)	(1.010)	(1.105)	(1.772)	(1.596)	(1.809)
lnassets	0.795***	0.905***	0.761***	1.192***	1.210***	0.985***
	(0.175)	(0.181)	(0.170)	(0.282)	(0.274)	(0.253)
Age when investment	0.181*	0.179*	0.253**	0.0386	0.0423	0.193
	(0.108)	(0.107)	(0.105)	(0.186)	(0.181)	(0.177)
Constant	0.565	-1.075	-0.211	-4.866	-4.966	-3.097
	(2.202)	(2.272)	(2.355)	(3.586)	(3.425)	(3.452)
Observations	90	85	83	55	56	54
Adjusted R-squared	0.333	0.351	0.353	0.293	0.280	0.292
Fixed effects	YES	YES	YES	YES	YES	YES

As in chapter 6.2.3, no significance has been found for any of the regressions for the interaction factors. The assets are significantly correlated with the revenues consistently in all the regressions, whilst the age of the investment is significant in all the regressions of year 1, but in non in year 2. This can be due to the small number of observations in the year 2.

The results are anyway reflecting the same ones we had in chapter 6.2.3 . This is consistent with what we found before, and we also found that the predicting power is higher this time (adjusted R-squared is around 30-35%). The residual plot does not show major biases (Fig. 6.5).
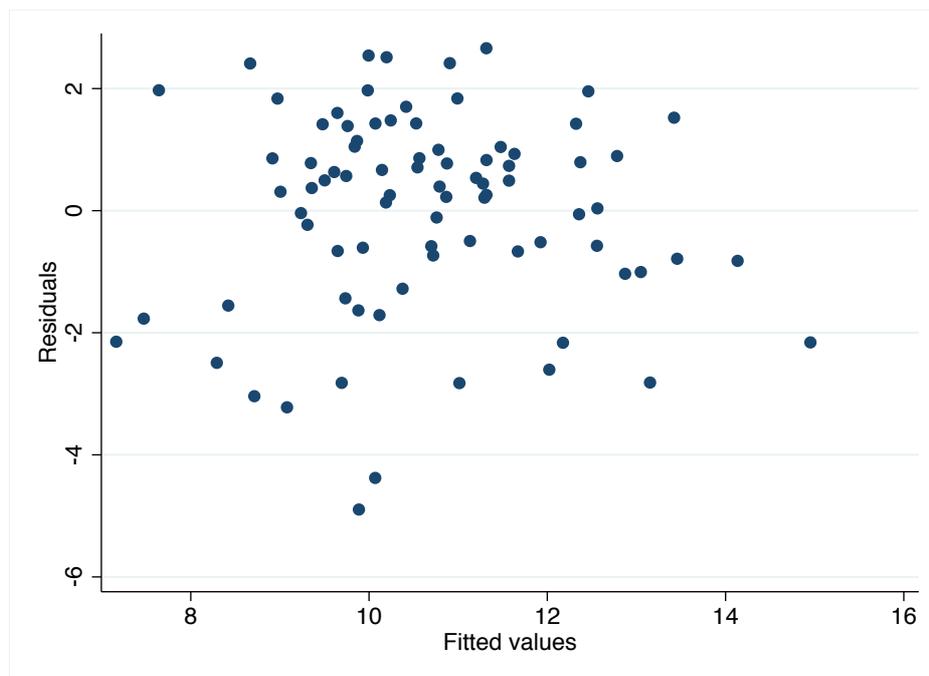
Fig. 6.5 Residual plot of regression (1)

6.7.3 *FINDINGS AND COMMENTS*

We can say that given the companies that survived, we have no evidence of a difference in performances among any of the investments, not even the group that did not receive any capital. There is no significant difference even in time as in the previous regression.

As well as in chapter 6.2.3, the same problem regarding the non-significance of the interaction factor holds true: there could be a problem of imprecision of the model, which in this case seems of a larger entity especially in year 2, as well as a survival bias in the analysis.

We can say that the survival bias does not apply only in the case of ECF vs. Equity, since there are very few dropouts which should not alter the result.

Thus, it makes sense also here to apply the same procedure as before, in order to neutralize the survival bias and check if our results change. We will do this in chapter 6.8 with the survival rate and in chapter 6.9 .

6.8 IMPACT OF DIFFERENT TYPES OF FUNDS ON PERFORMANCES – SURVIVOR RATE

As for Hypothesis 2, it is interesting to consider not only the financial performances given the type of investment received, but also the survival rate that those companies had. We already saw what is the survival function of the companies that run a campaign but did not receive capital: in fact they show a significantly lower probability to survive comparing to their successful counterparts.

Nevertheless, the group that did not receive ECF capital in our dataset is quite heterogeneous: the survival probability can differ considerably given the characteristics of the company or of the investment. In this chapter, this will be checked to see if there is a difference in performance given the type of capital injected in firm. It is also possible that the companies which failed are those that did not manage to find on time any source of capital, and the ones that found alternative sources of finance managed to survive.

On the other hand, ECF was the preferred source of capital for all of them at the moment of the campaign, since they all tried a campaign. Hence, the ones that failed have less potential, and this could be reflected on the survival rate.

6.8.1 THE MODEL

The model is the same that has been used in 6.3, favouring comparability and consistency. Only the categorical variable will change: the type of capital received will be used instead of the outcome of the campaign.

- It is a *right-truncated survival time model,* which means that all the subjects are not observed anymore after a fixed amount of time from the origin time,
- The *time unit* is a year and it is discrete,
- The *origin time* is set at the moment of the campaign,
- The *failure event* is the liquidation of the company, and the *time of the failure event* is the year in which the company failed. If the company is liquidated in the year of the campaign, it will be considered a *failure at T = 1* (the first year of observation),
- The observations end in the last observed year, which is 2018,
- The variable which determines the group is *type of investment*.

6.8.2 THE RESULTS

First of all, a graphical analysis was performed through the Kaplan Meier estimation of the survival function. The graph is shown here below (graph 6.6). It shows that the difference between the ECF group and the non-ECF has been driven mainly by the companies that raised debt after the failed ECF campaign and by the firms that did not raise any other funds. The group that raised equity, on the other hand, shows no liquidated companies which is shown as a constant survival function at 1.
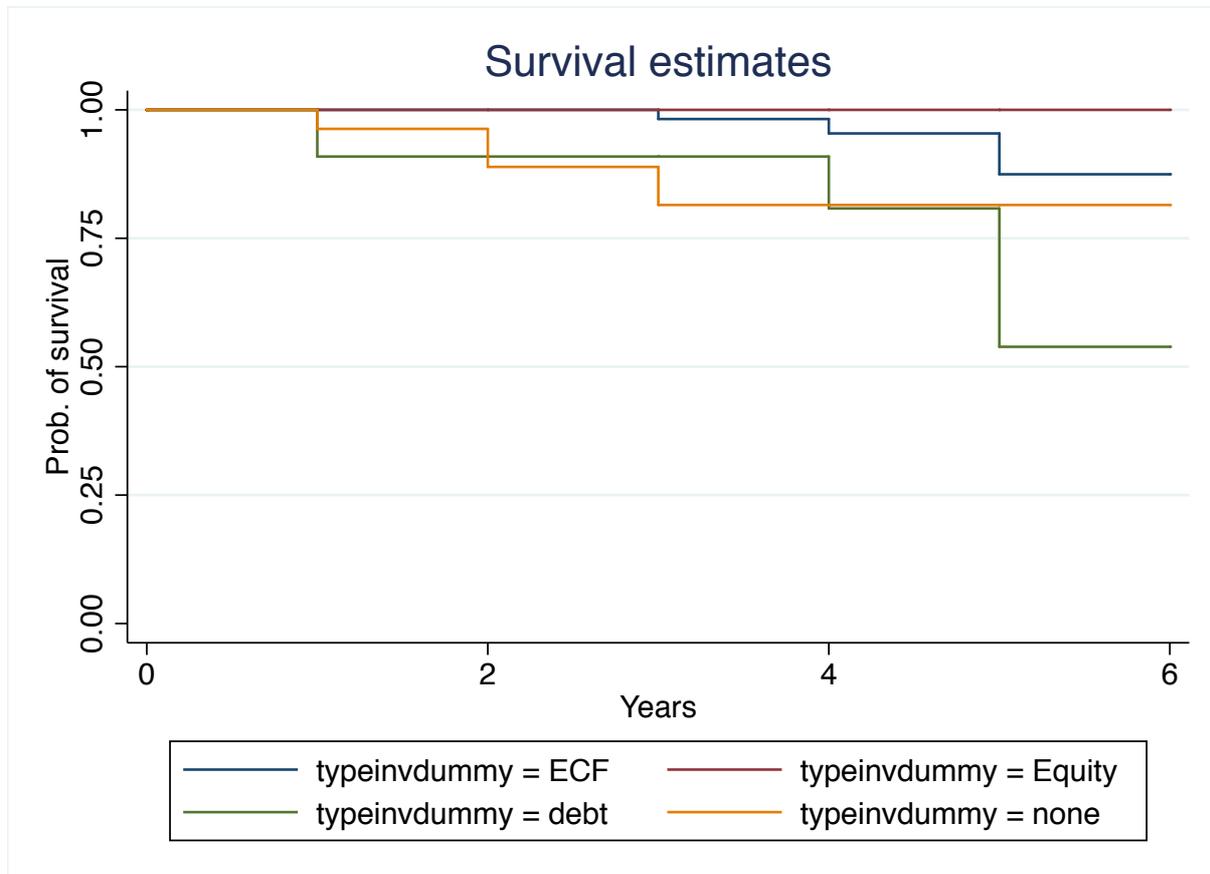
Fig. 6.6 Kaplan-Meier empirical survival functions per type of investment

A log-rank test has been run on groups, to verify if there is a statistically significant difference between the survival function of the ECF subset of companies and those of the other groups. The difference between the survival rates has **statistical significance**; here below the results:

- *ECF vs. debt - p.value = 0.034*

- *ECF vs. no investment - p.value = 0.053*

- *ECF vs. equity was not possible to calculate (no 'equity' failed)*

Even though it was not possible to evaluate the equity group, the survival function of both the debt group and the no-investment group are statistically lower than the ECF one.

6.8.3 FINDINGS AND COMMENTS

These results come out of a small number of companies, but they can give a hint of the link between the type of investment and the probability to survive. We have a statistically significant difference in the survival rate between the ECF and the groups debt and no investment. If a company receives equity it is much more likely to survive, even if it has not succeeded in a campaign.

The survival rate of companies which raised debt is the lowest, and this can be explained by the harsh situation and the constraints that this implies. In the same way, companies that tried to bootstrap were objectively in a situation of lack of resources, since they needed capital but did not succeed in collecting it. This means that in the previous analyses in chapter 6.3.3 we aggregated under the label of 'failed campaigns' companies that had much different survival rates, and that the result was mainly driven by the companies which used debt or did not find any financing source.

These results seem to support the possibility of a survival bias that was hypothesized in the previous difference-in-differences analysis. The interesting fact is that this result is coherent with the previous sections. The conclusion of this chapter is that we had a better insight into the sources of difference in performances, thanks to the different ways of financing for the companies.

6.9 IMPACT OF DIFFERENT TYPES OF FUNDS ON PERFORMANCES – OLS ON GROWTH

So far, we have showed a general overview of the characteristics and performances of our sample. We saw significant differences in survival probability in the previous chapter, so we can say that, depending on how companies answered to their capital needs, there are differences in results.

After chapter 6.7, it seems that the type of investment is not significant. But we already saw answering to hypothesis 1 that the difference-in-differences tends to be a less precise method, and that our sample suffers significantly of survival bias. Thus, to answer more comprehensively to the hypothesis 4, it is useful to run a model which is similar to the one applied in chapter 6.5. This time we will use the same dummy variables of the two previous chapters to define the type of capital that was received by the companies.

6.9.1 THE MODEL

We will apply the OLS model on the difference of log-revenues of two years. Even in this case, we ran our regressions between year -1 and 2 and between year -1 and 1. In this way we can compare the results with the ones we previously had and have a complete overview.

As independent variables, we will use the usual dummies describing the type of funds that the company received, together with control variables. This time, all the dummies will be included in the regression.

$$(logrevenue_{1\ or\ 2} - logrevenues_{-1}) = \boldsymbol{\beta} * \boldsymbol{investment\ indicator} +$$

$$+ \gamma * controls$$

6.9.2 THE RESULTS

The dummy that represents an investment in the form of equity crowdfunding has been excluded, to avoid collinearity. Thus, all the coefficients of the other three dummies are relative to the benchmark value of the equity crowdfunding one.

These are the results:

Table 6.9 OLS regression with investment types

VARIABLES	Year 1 – Type of investments – with FE	Year 2 - Type of investments – without FE
Equity dummy	0.174	0.709
	(0.910)	(1.907)
Debt dummy	**-1.942****	-1.049
	(0.794)	(1.583)
No investment dummy	**-2.513*****	-0.221
	(0.885)	(0.955)
Log-assets preinvestment	-0.212	0.0754
	(0.181)	(0.701)
Age when investment	-0.127	-0.587
	(0.122)	(0.633)
Constant	5.342**	1.844
	(2.144)	(7.835)
Observations	37	16
R-squared	0.523	0.311
Country Fixed effect	YES	NO
Industry Fixed effect	YES	NO
Region Fixed effect	YES	NO
Platform Fixed effect	YES	NO

The regression regarding year 1 presents the fixed effects, since the regression showed a higher R-squared. Regarding the year 2 regression, we did not have enough observations to converge to a result with the fixed effects, so we showed only the regression without fixed effects.

Year 1 regression seems to be of high quality: with an R-squared equal to 0.523 we are able to explain more than half of the variance. Moreover, we have interesting results for what regards the dummies of our interest. We see no difference between equity crowdfunding and an investment with other forms of equity in terms of performances. The difference becomes significant when equity crowdfunding is compared to the group that received debt capital, or to the control group that did not receive capital at all.

An element of interest is that both *log assets* and the *age when investment* are not significant, showing a parallelism with the results of chapter 6.4 that used the same type of model.

This regression shows how heterogeneous the subgroup *failed campaign* was in the analysis done in 6.4. With this insight, we are able to say that companies that received equity improved the average performance of the group, while debt and no investment were dragging performances down enough to make the average performance significantly lower. Of course, this interpretation is simply qualitative and cannot be directly quantified since the time frame is different from the one of chapter 6.4.

The graphical residual analysis (graph 6.7) does not show any major bias. Still, incisive contradictions with the difference in difference in chapter 6.7 creates margin for further studies:
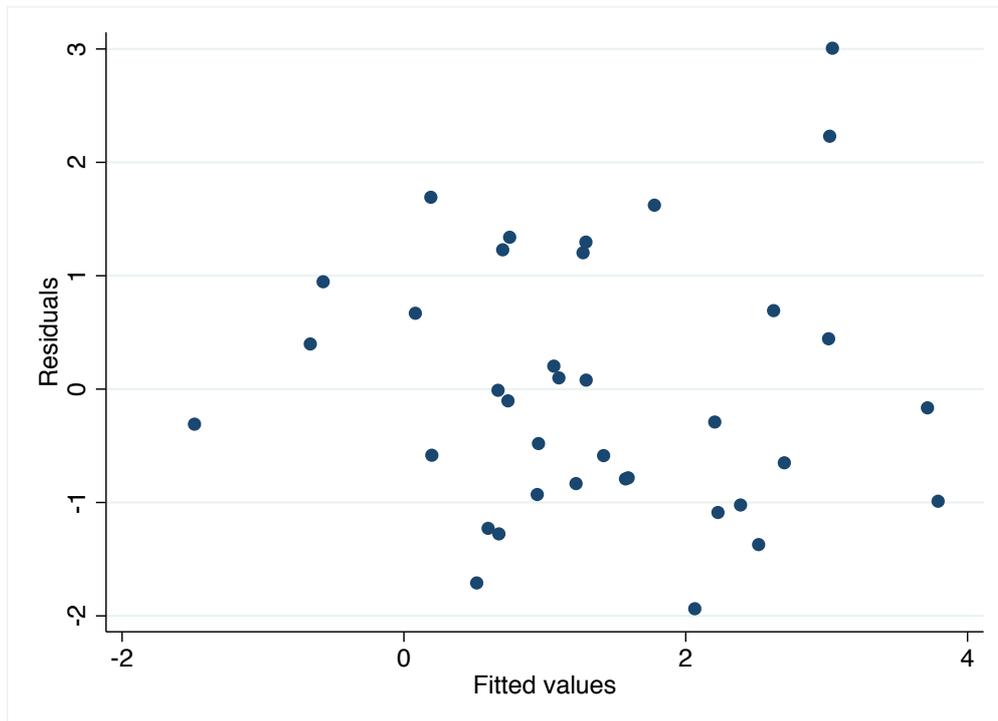
Fig. 6.7 Residuals of OLS with types of investment with fixed effects

For what concerns the regression of the difference with year 2, we do not have enough observations to run a meaningful regression.

6.9.3 *FINDINGS AND COMMENTS*

Commenting this result is interesting for two reasons: the regression on year 1 yields results of good quality. At the same time, it shows different outcomes concerning the control variables: *log assets* and *age when investment* are not anymore relevant enough to determine a significant change in performance. The dummies related to the type of investment received seem to be significant now, contrarily to what happened when we used the difference-in-differences model.

A hint to explain this contradiction is supplied by the survival analysis carried out in chapter 6.8: companies which raised debt and the ones did not collect any capital present the highest failure rate. This consideration let us think that the survival bias is the most likely reason for these apparent contradictions: performances in the difference-in-differences between the subgroups seem to be similar even if in reality they are not, because the average performance of debt

and no-investment subgroups are biased by dropped-out observations. Even though we know that there is a selection bias by construction in these data, the difference in performances between subgroups should be only marginally influenced. Thus, these results are considered more reliable.

One of the most relevant results here is that it looks like receiving equity can compensate the failure of the ECF, at least in terms of operating performances, while receiving debt capital does not yield comparable performances. Thus, equity crowdfunding seems to have a positive effect on the operating performances, even if it does not guarantee superior performances comparing to other forms of equity injections.

This result, together with the one that we obtained in the previous chapter, let us give a partial confirmation of Hypothesis 3, with some due limitations: it seems that a company performs better if it receives equity crowdfunding compared to debt capital or no following investment at all. But if the company receives equity in other forms that are not crowdfunding, there is no evident difference in performance and they can be assumed to be equivalent.

Since the confirmation of Hypothesis 2 suggests that companies are rather chosen because they perform better or will do so in the future, rather than receiving a treatment effect by ECF, it seems that both crowdinvestors and traditional equity investors prefer to pick companies that are able to perform better.

Thus, we cannot say that equity crowdfunding offers exclusive advantages to the companies that succeed in a campaign, even when it is the preferred source of financing of the entrepreneurs. It seems that it is given to companies that are expected to be worthy and it is a good alternative.

6.10 EFFECT OF CAPITAL INJECTION ON PERFORMANCES

Given the conclusion of the previous point, it is interesting to investigate whether some types of investment bring advantages over other financing modes. A

possible explanation is capital availability: performances improve simply when there is more capital, regardless of the source, because it allows the realization of the business plan or because investors give it exclusively to companies that they expect to be better, and this expectation is then realized. This would be consistent with previous findings, if we see that debt capital is given in smaller amount being correlated with the type of capital. Let's see the distribution of the collected capital according to type of investment:

Table 6.10 Distribution of size of investment per type

Quantiles of Capital received [€]	Min	25%	Median	75%	Max
Debt	30000	50000	83000	130000	803543
ECF	45000	105000	163637	260116	1 000 227
Equity	12411	110000	219100	333106	1 200 000

These figures show that debt capital is usually given in much smaller amounts compared to ECF. The latter, on the other hand, is comparable in size to the investments under the form of equity that is not given through crowdfunding.

Thus, it is not possible to exclude that capital availability is correlated somehow with superior performances and with the type of capital. Still, the focus is on equity crowdfunding and we are interested in understanding if it has an extra impact on the performance apart from the capital effect. The fourth hypothesis has been phrased as:

> *HP 4: ECF improves performances regardless of the amount of capital received*

In this way, we are able to model a regression that can potentially lead to an answer.

6.10.1 THE MODEL

The model that will be used to verify this last hypothesis must be comparable to the previous ones, thus it will use the same dependent variable and the same indicators. Only the data until year 1 will be considered because, as we show in the previous analyses, there are too few observations to have solid results in year 2.

A new variable will be added to the ones previously considered: the collected capital. This variable represents the money (in €) that has been collected by each company, regardless the source: it can be collected with equity crowdfunding, raising other equity or collecting debt. The same dummies that have been used in the previous analysis will be used to distinguish the type of capital.

The observations of companies that did not raise further capital were excluded by this analysis to make the dataset consistent with the new model. This means that all the observations characterized by the dummy *no investment indicator* are not considered in this model, otherwise the result would be strongly biased.

The main model will be the following:

$$(logrevenues_1 - logrevenues_{-1}) = \beta_1 * \log invested\ capital\ +$$

$$+ \beta_2 * investment\ type\ indicator + \gamma * control$$

Moreover, in order to have a broader perspective on this topic, another variation of this model will be considered. Indeed, it is worth focusing on what we actually expect to demonstrate with these models: it will be possible to evaluate if the capital that the companies received is correlated with the performances, and if the performances are influenced by the type of capital received or if there was an endogeneity effect, being the size of capital correlated with the type of investment.

It is also possible to understand if the capital raised through crowdfunding is more impactful than other sources of capital, but to do so, it is necessary to include the interaction between the invested capital and the type of investment. Since we want to focus on the difference of impact between equity crowdfunding and other financing forms, it will be more meaningful to consider the difference of the impact on performances between the equity crowdfunding compared with all the other forms together. To do so, we can use the variable *success campaign*, which distinguishes the companies that succeeded in raising capital and the ones that failed. Since we do not consider companies that did not receive any form of capital, the observations that will with a binary variable *success campaign* = 0 will be the ones that raised either equity or debt after the campaign.

Thus, the model of the second regression is the following:

$$(logrevenues_1 - logrevenues_{-1})$$
$$= \beta_1 * \log invested\ capital\ + \beta_2 * successcampaign +$$

$$+ \beta_3 * successcampaign * loginvested\ capital + \gamma * control$$

We will show the regressions including the fixed effects, since the result is better in terms of adjusted R-squared.

6.10.2 THE RESULTS

Here below the results:

Table 6.11 OLS regression considering invested capital

VARIABLES	(1) All investments - categorical	(2) ECF vs. others	(3) Interaction ECF vs. others
Log-investedcapital	**1.147***	**1.066***	**1.108**
	(0.370)	**(0.335)**	**(0.417)**
Equity Dummy	0.106		
	(0.802)		
Debt dummy	0.567		
	(1.061)		
Success campaign		-0.270	1.059
		(0.668)	(6.640)
Interaction_typecapital			-0.110
			(0.568)
lnassetsprecampaign	-0.452**	-0.416**	-0.410**
	(0.206)	(0.189)	(0.189)
Age when campaign	-0.236**	-0.218**	-0.204
	(0.104)	(0.104)	(0.156)
Constant	-6.033	-5.082	-5.630
	(5.172)	(4.721)	(5.229)
Observations	33	33	33
Adjusted R-squared	0.339	0.369	0.336
Country Fixed effect	YES	YES	YES
industry Fixed effect	YES	YES	YES
region Fixed effect	YES	YES	YES
platform Effect	YES	YES	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Log invested capital is significant in each regression, becoming the key element that explains the growth of revenues. It can be considered a solid result.

It is also important to underline that the coefficient for the equity and debt dummy in regression (1), success campaign and the variable of interaction in (2) and (3) are not significant. This is another sign of robustness, moreover it will be important for the interpretation of the result.

As it has been in all the previous regressions, the amount of assets before the campaign are a relevant factor to explain the level of performances: the bigger the company, the smaller the growth. The age at the moment of the investment is relevant only in the first two regressions, but not in the last one. The coefficient is approximately equal in all three regressions, and standard deviation is bigger in the last. This suggests us that the last regression is less precise due to the interaction variable, which reduces the degree of freedom and increases the correlation between variables.

The R-squared is similar for all three the regressions at a level around 0.35, showing again consistency between them.

With a graphical analysis of the residuals (graph 6.8) of regression (3), we do not see major distortions that could invalidate the results. This is also due to the robust regression we ran, that limits distortions linked to heteroskedasticity.
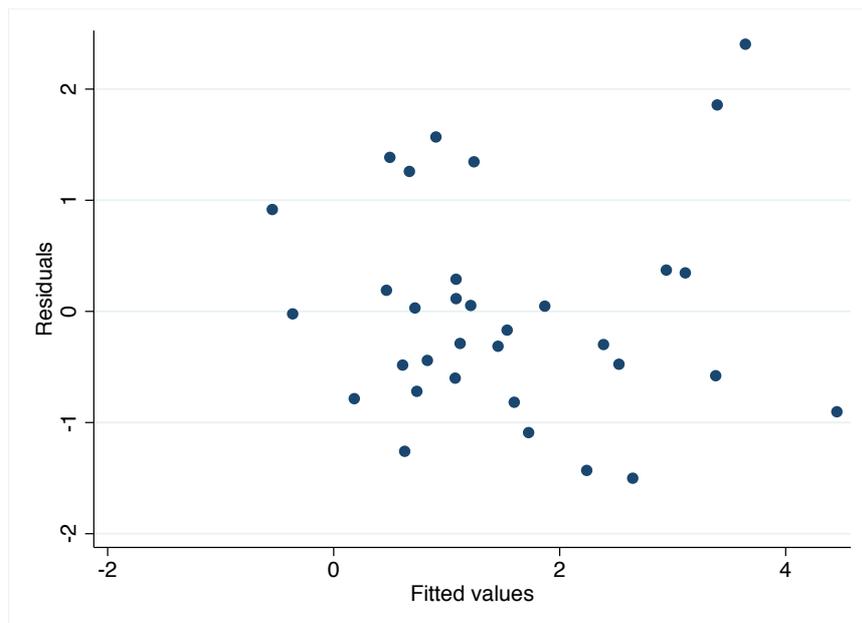
Fig. 6.8 Residuals plot of regression (3) with invested capital

6.10.3 FINDINGS AND COMMENTS

The first finding is that the size of the capital received, whatever the source is, has a strong correlation on the revenues in the year after the investment. The higher the investment, the higher the improvement in performances between the year before the investment and the one after it. This result is very robust.

The second one is that it seems that the type of capital received does not influence sensibly the performances. This is visible in two moments: in regression (1) and (2), the dummy variables that define the type of investments are not significant, meaning that companies perform equally regardless of the type of investment, net of the positive effect of the capital received.

Then, we are able to evaluate the impact of the quality of the capital in regression (3). As a reminder, all the entrepreneurs that lead the considered companies had preference for the equity crowdfunding in our dataset; only after that they failed a campaign, they received capital in other forms. Thus, it is possible to expect that capital received through crowdfunding has a more positive impact than other forms of capital. In our dataset, this does not happen. We can say so looking at the results in the third regression, since the interaction factor is not significant.

Finally, we can also explain with a certain level of confidence the results we obtained in chapter 6.8 and 6.9: there is a strong correlation between the type of capital and the quantity that the company received. Specifically, companies that received debt capital performed worse, but they also received less capital than peers that received ECF or equity investments.

Given these results, we have to reject Hypothesis 4: it seems that there is no impact derived from the type of capital received.

It is also possible to evaluate the allocation of financial resources. If we are not able to say that ECF is a better source of capital compared to more traditional sources, it is also true that resources collected through crowdfunding are given

to companies that are able to exploit them and have better results, at levels comparable to other sources. Thus, it looks like there is no inefficiency in the allocation of resources, since if the same resources were given to other companies instead of the ones chosen by the investors, they would have performed equally.

Moreover, equity crowdfunding is a way to collect capital from a source that would be untapped otherwise. These two elements together suggest that crowdfunding is actually able to increase overall efficiency in capital allocation.

After all the concerns of regulators and the doubts that have been raised by academics, it seems that eventually the crowd is actually wise.

6.11 VALUATION OF THE ROBUSTNESS OF RESULTS

In this paragraph, we aim to sum up all the considerations regarding the robustness of the results we had in all the analyses of chapter 6.

While running the regressions, we took into consideration two elements to evaluate the consistency of the results and their sensitivity in each model:

- The period of observation: the first considered year is the one before the campaign. Then, the considered period changes: often we ran the same regressions considering each time year 1 or year 2 as end of the period. This puts us in the position to observe the evolution in time, but sadly this opportunity was limited by the small number of observations in year 2;

- The impact that the fixed effects of the industry, the type of platform and the geographical area has on the regressions: we ran the same ones both with and without the fixed effects of these variables, observing the changes in results. This lets us see the robustness that our results have towards these boundary conditions.

Generally, we found that using fixed effects improved slightly the quality of the regression, as it is expected for panel regressions with more information. This also means that the considered variables (industry, region and platform) are capable of explaining performances. Sometimes, when the number of observations was reduced, using fixed effects worsened the results, since they include 5 extra variables that reduce the degrees of freedom of the regression.

On the other hand, we found no consistency between the results of year 1 and year 2. Specifically, regressions regarding year 2 were less precise and not informative. Even this problem can be linked to the limited number of observations for the second year after the campaign. Since our dataset covered the universe of Italian ECF campaigns up to year 2017, it was not possible for us to extend it or study in a deeper way this phenomenon. It is necessary to wait at least one more year, so that the companies that we observed at the moment of drafting this dissertation will have one more year that it will possible to evaluate. Moreover, companies that concluded the campaign in 2018 would present the first results.

In the development of this dissertation, robustness of the results was checked also changing the models one step after the other. In this way, influences and correlations of the variables were observed. For instance, the regressions with the difference-in-differences model and the OLS that used the difference between log-revenues lead to different conclusions. Our interpretation is that the second model is more effective and reached in a quicker way a significant result, while there were not enough observations to make the difference in difference model converge, despite of its broader scope. Still, this incoherence between the two models let us think that the result of this part of the analysis is questionable.

The models used in chapters 6.7 and 6.9 tried to better specify the results derived from chapters 6.2 and 6.4, extending the set of variables by dividing them into subcategories. This can be considered, apart from an extension of the scope of research, a check on the robustness of the results. Indeed, we found that the results obtained in chapters 6.2 and 6.4 are not true across all the types of investments alternative to crowdfunding, since other equity investments seem to behave similarly to ECF, in terms of influence on operational performances.

Giving a general comment to the robustness of our results, we can say that the core of our findings is solid, but when we tried to extend the scope we found less stable results. It is necessary to study further these elements, extending the time of analysis and enlarging the sample. More details on this will be given in chapter 7.3 regarding the limitations.

7. CONCLUSIONS

7.1 CONCLUSION OF THE EMPIRICAL RESEARCH

First of all, a summary of the results regarding the research questions is presented in Table 7.1. Since we have good results concerning the year after the campaign, but less relevant for the following, our conclusions regard only year 1.

Table 7.1 Answers to research questions

Hypothesis	Results
HP 1. *Companies that run a successful ECF campaign have better financial performances than the ones that tried and failed, considering the years after the campaign.*	**Accepted***
HP 2. *Crowdinvestors pick companies with higher financial performances*	**Accepted***
HP 3. *Companies that received capital from ECF perform better than those who failed the campaign and received other forms of financing.*	3.a, ECF vs. Equity - **Refused*** 3.b, ECF vs. Debt - **Accepted***
HP 4. *ECF improves performances regardless of the amount of capital received*	**Refused***

*Results are limited to year 1

First of all, **companies that run a crowdfunding campaign are more likely to survive if they succeed**. However, if they manage to raise equity capital from other sources (even if they failed the campaign) their survival rate is comparable.

Referring to numerical results:

- if a company succeeds it has a probability to survive of 97% after 3 years and 90% after 5 years
- if it fails it will survive with a probability of 88% after 3 years, and 76% after 5 years.

However, survival probabilities depend also on how the company that has failed the campaign faced its financial needs: if a company is able to collect an equity investment even though it failed the campaign, the probability to fail is equivalent to the one of crowdfunded companies. But if it must survive bootstrapping or asking for debt, its failure rate is 2.5x times higher.

The other core aspect of this dissertation is the assessment of post-campaign operating performances, in particular revenues. The sample suffers of survival bias, due to the difference in failure rate that we saw in the paragraph above. But if we assume that a company survives, it will **have higher performances in case of success** in collecting crowdfunding capital. This is true unless it managed to find an investor that injected equity capital. In this case, performances are fully comparable considering the year after the investment. This result is relevant especially because our sample is constituted by companies that decided to go for equity crowdfunding at first, so they assumed it was the best available option, thus being self-selected as suitable to run a campaign.

From these two findings, it seems that **equity crowdfunding does not offer an extra advantage compared to other forms of equity financing**. It is comparable in performances and survival likelihood to other sources of equity. We did not find any evidence to support that the crowd facilitates the venture somehow (e.g.

with its support, its feedback or the following network). It is interesting, because these elements are often cited as the advantages of running an ECF campaign when compared to alternative sources of entrepreneurial finance. Even though our results cannot reject the hypothesis of the existence of these presumed advantages, it seems that there is no strong evidence supporting them. This is an important consideration when entrepreneurs need to decide where to look for external financing.

It is true that if you succeed in an ECF campaign you will have better performances. This is interesting for both investors, who want to make the most out of their investments, and for entrepreneurs that can have a chance to monetize a competitive advantage that they assume to have towards their competitors.

Thanks to the results regarding our Hypothesis 2, we can say that **most of the extra performances that successful companies have on the others is explained by a selection effect**: investors choose actively and wisely companies that were already having better performances. We estimate that this effect accounts for 45/65% of the total difference in performance. There is no evidence to support the hypothesis of a treatment effect.

So, **it seems that who invests in ECF is able to recognize best-performing companies and choose them** on top of others when they invest. It is also true that some other companies, even though they did not receive crowdfunding capital, perform well supported by equity capital from private investors. Thus, we could say that equity capital, whichever the form, is invested in companies that will overperform their counterparts.

This supports an interpretation of equity crowdfunding as a valid alternative for companies to raise equity capital from the crowd, even though this does not bring any specific advantage for the company apart from fund availability. Considering this conclusion and the pecking order theory, it makes sense to run

a campaign only if it is cheaper than other sources, thus if you are able to demonstrate to the crowd that you will perform well, in order to be chosen. Referring to the academic framework, ECF shall be chosen if the costs of raising capital through ECF, considering fees and signaling costs, are lower than raising equity in other ways. This conclusion is relevant because it is directly linked with the wide taxonomy of signals that the company sends to investors to show that they are worth their capital.

Another strength of this study is bringing proofs to the alternative finance community that **crowdfunded companies perform better, creating a potential signal of quality** for the company in case it will need a following investment round.

Answering to the last research question, we found that **higher performances are correlated with higher collected capital, whatever the source is**. In other words, performances are not influenced by the type of capital, net of the effect that is already explained by the size of the investment. There could be two ways to read this phenomenon:

- *Capital availability effect:* it implies a causality link between the size of the investment and the performances. Assuming that companies ask for capital because they have a plan that requires a given amount of liquidity, the ones that receive the required amount of capital are able to implement the plan and potentially use extra resources to improve it. While companies that collected less capital will not have the resources to implement the plan, thus the performances will be lower. This explanation is reasonable and consistent with the literature-backed models of entrepreneurial finance. However, we do not have empirical evidences to support this thesis, since it implies a treatment effect that we did not investigate in this dissertation.

- *Rational allocation of capital*: if a company is considered worthy of investment, it means that it is expected to give a higher return. Assuming that investors are able to identify the best companies, it would make sense that they try to allocate more resources into them. In the case of equity crowdfunding, this means that the crowd as a whole would contribute with more money into the campaign. Then, more capital means that the campaign will more likely succeed in an all-or-nothing model. Assuming a competitive environment in the entrepreneurial finance world, this is true not only in the case of ECF, but also for all the equity investments and credit market. This will create a correlation between the amount of capital collected, the success of the campaign and higher performances. Thus, both better performances and success of the campaign are correlated with the collected capital making them hard to distinguish with econometric techniques. The correlation works also in the opposite way: if a company that is not expected to deliver good performances seeks capital, it will collect less because investors will recognize it as a bad allocation of resources. Thus, the difference in performance will be correlated with the amount of capital collected. Being an implication of the selection effect, that was observed in our analyses, we tend to support this narrative.

Finally, it is interesting to comment what we said regarding the *wisdom of the crowd*. Academic literature has characterized individuals who invest in crowdfunding companies as non-sophisticated investors. From this research, there is evidence to maintain that a group of such people, even without specific financial knowledge, is able to effectively choose companies that will perform better.

7.2. IMPLICATIONS FOR STAKEHOLDERS

Here we would like to state briefly the implications of our work towards relevant stakeholders, namely policy makers, investors, ECF platforms, entrepreneurs and managers. Their degree of interest into the results of this dissertation varies,

but all of them can have some interests on having insights about the relation between crowdfunding and operating performances, thus improving their processes or generating new opportunities.

Platforms

Currently, it seems that campaigns are processed efficiently enough, since there is enough information to let 'the crowd' pick the right companies. Thus, the key role of the portal is confirmed, and this study should be able to help overcome potential lack of trust in the crowdfunding environment. The confirmation of the positive role played by equity crowdfunding can work as a marketing tool for these players, convincing both sides of the platform (i.e. entrepreneurs and investors) in participating in a campaign.

Entrepreneurs and managers

The first key element of interest is that equity crowdfunding shows no difference from other forms of equity, in terms of operating performances. For the entrepreneurs, this means that these sources of capital are potentially equivalent, and the driver of choice should be the cost. Rationally, equity crowdfunding should be chosen over a business angel or other sources of equity in case it is cheaper to source capital in this way. Still, equity should be preferable to debt.

If the existence of the *wisdom of the crowd* will be accepted following this study, having success in an ECF campaign implies the expectation that it will overperform your competitors. This increases the implicit value of the company and it is both a signal of quality and a recognition of the potentiality of the business idea. This increased credibility can be spent with following rounds or with other stakeholders.

Since the crowd is able to evaluate a company during a campaign, it is beneficial for entrepreneurs to spend resources in showing evidences of their quality and to carefully plan the ECF campaign, by putting great effort on the success signals.

Investors

This study justifies herding: since it is an evidence that the crowd chooses higher performing firms, an individual investor can use this information in such an environment with limited rationality. If no other information is collected regarding an open campaign, an investment in a company that already collected the minimum capital to have success has an expected value higher, in average, than one that have not collected enough yet.

The evaluation of the enterprise value becomes easier. The results of our regressions can be used as *prior beliefs* in an application of Bayesian statistics to evaluate the value of a share in an ECF investment, to which company-specific information shall be added.

Policy makers

It seems that the problem of information asymmetry, which was the main concern of the regulatory authorities, is somehow overcome. Investors are actually able to avoid bad investments, limiting the risk of opportunistic behaviors. This should bring more trust into the equity crowdfunding environment.

This shows an efficient allocation of resources, which are given to companies that are expected to perform better. This is especially interesting because this market is open to retail investors. Moreover, not only resources are well allocated but there are no alternative equity investments among which retail investors can invest. At the same time, those resources are able to reach locations that are normally not covered by existing entrepreneurial finance market. This brings confidence in considering ECF a solution to improve productivity and innovation in the economy, especially in peripherical locations.

For these two reasons, our dissertation gives evidence that equity crowdfunding market shall be facilitated as much as possible by regulators and legislation. This can be done in different ways:

- Extending the possibility to run crowdfunding campaign to other players, such as subsidiaries of major companies, project finance plans, public institutions and related undertakings (*imprese participate*) with the constraint of using the collected capital for a given project.

- Liberalize the market: regulation should reduce constraints that limit the expansion of this phenomenon, at the same time it should maintain and guarantee the quality of the process of campaigns as they are today. The constraint of a minimum percentage of professional investors could be reduced.

- Improving the secondary market: it is necessary to define an easy way to exit for investors, making the market more liquid, in order to incentivize the investments. A secondary market for the shares is a solution, which should be regulated to be a facilitated exit and not a speculation opportunity.

7.3 LIMITATIONS AND FURTHER STUDIES

This work is set in a very uncertain context, due to the novelty of the Italian equity crowdfunding market and to the little data that we have available. We just started to scratch the surface of this topic addressing post-campaign equity crowdfunding in Italy. We already anticipated the reasons for which we were not able to bring definitive results; hereby we will present the limitations of our study, hoping to draft a starting point for following, more determinant studies.

The main limitations refer to **the data, the model and the results.**

We already partially discussed the limitations regarding the data. This dissertation is based on a dataset of 125 companies which ran ECF campaigns in Italy before 2017. Our dataset includes almost all the companies that launched campaigns on authorized Italian ECF platforms, since we excluded investment vehicles and companies whose data was unavailable. However, this number may not be high enough to have definitive and significant results. The **number of observations** falls short of the critical mass to have effective regressions and provide univocal results.

Moreover, the **observed years are few**, only from 2014 to 2017, thus data can be biased by economic cycles or macrotrends that is not possible to control in the quantitative analyses: extrapolation is not possible with such a limited dataset. Being a growing phenomenon, equity crowdfunding can change characteristics over time, so it is important to keep track of the changes and the effects of those changes and includes the most recent observations into the analysis.

This is why similar analyses shall be done with a wider dataset, that comprehends the campaigns of 2018 and following years; this is especially relevant because there are more and more campaigns. It is also true that the possibility to have more years of observations after the campaigns would lead to research on the long-term trend: in our analysis, we focused only in the two years after the campaign, but in the long run it is possible to study the equilibrium trend, which is more interesting from the point of view of practitioners. With more observed years after the campaign, it is also possible to analyze the evolution over time of the performances and the trend, not only the punctual performances.

Changing topic, another way to extend the scope of this branch of research would be **extending the geographical limits**. This dissertation focuses (on purpose) only on Italian companies, which can give a more consistent view of the phenomenon and can be of interest at national level. Nevertheless, since ECF is a

worldwide phenomenon, with slightly different characteristics in each country, it could be interesting to run post-campaign analyses to compare results in different countries at both EU and international level. This can help in different ways: it would support legislators to define the best practices and make ECF more effective and, from a sociological perspective, it can give interesting results on the national characteristics when it comes to an alternative investment.

Regarding the **quality of data**, our observations were heterogeneous; we included all the non-real estate companies that run an ECF campaign in Italy which data were available. Indeed, when it came to the robustness analysis we saw that changing partially the dataset changed the results. For instance, excluding from the dataset the companies that failed in the observed period changed drastically the result. In the same way, considering the year after the campaign gave different results from two years after. This fact weakens the robustness of our results.

This is also partially due to the updating time of the results: using financials, we have only one observation per year per company. More frequent observations help in understanding the evolution in time, since startups often evolve fast and in one year they can change drastically. Using **different indicators of performances** would make more timing observations and would allow more consistent results. Having more punctual observations would extend the observed horizon, since financials are lagged of one year (we publish this dissertation at the end of 2019, and the financials are the ones referring to 2018).

Apart from the advantage of more responsive analysis as explained above, using non-financial performances would help also to understand the real driver of value creations in these small ventures. Often, the value within a new venture comes with a new technology or high performing people which work in it. These drivers generate value that is reflected only indirectly on financials. But there are

other proxies that can be used: number of employees or patents are common measures in the literature.

We were not able to use them due to the impossibility of collecting such data in a consistent way. It is extremely hard to identify patents that are linked with a company, as well as it is hard to define who is working within a startup or not when there are very few involved people who change fast. But a narrower research can have a more direct contact with the companies and include also these elements to better understand and how ECF is correlated with these competitiveness drivers.

A strong difficulty we found in the data is the existence of a **survival bias** in the data: observed companies are the ones that publish financials in the years, but if they are liquidated they drop out, since they will not publish financials anymore. Assuming that the companies that fail are the ones that perform the worst, the sample of the survived companies will be biased and will not fully reflect the performances. We tried to overcome partially this limitation excluding failed companies from the dataset, but this generated a selection bias which excludes from the beginning a given subset of companies. We also tried to dimension this impact with the survival rate analysis and we saw that the bias is actually incisive on the results; eventually it was not possible to give a general result, since it was anyhow biased.

It is true that financial performances were our focus. But given the characteristics of the individual indicators, in the end **we used only revenues** since it was the only positive variable and it followed a log-normal distribution. This can be a strong limitation: only one indicator does not give a full overview of the financial performances. This limitation goes together with the one of the small number of observations, since convergence to a good result depends on the number of observations together with its distribution. Thus, it would be possible to

overcome this problem once that more observations will be collected in the following years.

Another limitation is the **endogeneity of the selection effect and the treatment effect**. It is a famous issue, which characterizes many researches about financing methods. It is extremely hard to discern the effect that a financing method had on a company and the fact that only selected companies receive funds in that way. Furthermore, selected companies usually have better performances or specific characteristics which bias the results. Thus, there is often a difference in the samples which is driven by the aggregation of the *selection effect* and the *treatment effect*.

In this dissertation, this issue has been seen and we also tried to partially solve it in chapter 6.5, but results were ambiguous: the analysis was giving hints in the direction of a selection effect, but the results were too poor to give a definitive answer. So, we actually identified a difference in performances, but we were not able to define univocally the reason of it. Moreover, we found that gap to be the partial explanation of a difference in performance in the following year, but we do not know if the investors were actually able to choose better, or they just relied on past performances and did not find any competitive advantage, which will be evident with a regression toward the mean. Future researches could actually try to overcome this endogeneity issue, defining better the causality that generates the difference in performances.

Another limitation we faced regarded **the choice of the model**. Indeed, given different models we obtained different results. Specifically, the difference-in-differences did not show a significant effect of the ECF campaign on the performances, while it was found when we ran OLS models on all the survived companies. It seems that the model influences the result, maybe because the convergence power for each model was different. Thus, to have clearer results agreement between different models should be required. To wrap up what we

said before, if we had to trace the path for future researches in this field, we would suggest focusing on the following aspects:

- Run a similar analysis with more data coming from the campaign of 2018 and the following years;
- Define a model that is able to compare the long-term impact and the differences in the trend for companies that ran an ECF campaign, using data for more years after the campaign
- Compare the results with other European and extra-European countries, focusing on the elements of difference in the legislation and in the market;
- Use different dependent variables to explain the performances of the companies, which can be related more promptly to the competitive drivers
- Evaluate the value generated by the ECF campaigns for the investors, not only in terms of potential value (the ownership of the companies) but also in the actualization at the moment of the exits;
- Identify homogeneous subsets of companies, even outside the ECF world, and compare the results in order to narrow the scope and have different insights;
- Try to define the causes of the differences in performances, discerning the selection power of the investor from the treatment of the campaigns.

The major constraint to this is time: with time, more data will be available, and more observations will be gathered. This is why we hope to see in the next future great improvements in this field of research. We will wait impatiently for it.

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Sempre sarò grato al Politecnico, per avermi dato le opportunità che hanno reso eccezionale le mie esperienze, e all'Europa, per aver reso i più bei momenti possibili e per gli ideali che ormai mi porto dentro. Fortuna ha voluto che lungo questo mio percorso trovassi gente magnifica; ho così imparato che ogni persona è unica e ogni momento condiviso, anche solo uno, è un dono che lega nonostante le distanze. E il mio orgoglio è nell'avere un tesoro infinito di questi momenti con voi. Con voi Pandorini, ne abbiamo condivisi così tanti in questi cinque anni che abbiamo persino un nome per chiamarci. Con voi della famiglia di ESN; e con voi Imbuconi, quei momenti che continueremo a raccontare ogni volta che ci vedremo. Con voi amici sparsi per il mondo che forse non leggerete queste parole, ma spero di portarvele presto a voce. Con voi Richi e Mavi, compagni di viaggio insostituibili, che siete il filo rosso che collega tutte queste vite. Tanti ne ho con te che mi hai accompagnato praticamente ogni giorno da 2 anni, Gigi, con la tua tranquillità, pensiero acuto e cuore grande, fino a concludere questa tesi insieme. È stato un onore percorrere con te questo cammino. E con te che leggi, che sei qua a condividere con me un momento così importante.

Questo percorso non è finito, e spero che con voi gli anni a venire continuino ad essere straordinari ed emozionanti come questi cinque. Nel frattempo, questa Tesi è per voi.

Grazie.

Lorenzo