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A COMPARATIVE ANALYSIS ON BUSINESS ANGELS AND CROWD-FUNDING

THE IMPACT OF BEHAVIOURS AND ATTITUDES ON INVESTMENT DECISIONS

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Abstract (English version)

In the context of Entrepreneurial Finance, two actors have gained more and more importance in the segment of Early Stage financing of start-ups: business angels and crowd investors. These players have a great impact on start-ups funding, thus driving innovation and, eventually, boosting economic growth. Therefore, scholars are devoting increasing effort in understanding their characteristics and behaviours. However, few articles focus on the investment from the perspective of the investor, and, when they do, only look at the investment in terms of Go/No-Go decision. In addition, behavioural and attitudinal perspectives are often overlooked in these studies, with few researches focusing on them. Finally, no research ever focuses on the comparison of two different financing sources.

This work tries to fill these knowledge gaps and provides original evidence on the differences between business angels and crowd investors in terms of their behaviours and investment decision processes. Using a novel dataset containing 1000+ deals performed by angels and crowd investors, I show that the commitment to control or actively contribute to the financed venture ultimately have an impact on the risk capital deployed by investors, even though crowd investors are less sensitive to these behaviours. On the other hand, also investors attitude and past experience affect the capital committed: crowd investors specialized on investing always in the same industry, angels with more deals performed in the past and former work experience as a manager or entrepreneur; investment decision-process depends on all these features.

These results extend my knowledge of the investment behaviour of business angels and crowd investors and of their differences, laying ground for the new stream of research of comparative analysis.

Keywords: business angels; crowd-funding; crowd investors; behaviour; monitoring; active involvement

Abstract (Versione in italiano)

Nel contest della finanza imprenditoriale, vi sono due categorie di investitori che hanno guadagnato sempre più importanza nel segmento di finanziamento alle start-up nelle loro prime fasi di vita: i business angel e gli investitori crowd.

Questi soggetti hanno un impatto fondamentale nel finanziamento delle start-up, promuovendo di conseguenza innovazione e, in ultima istanza, migliorando la crescita dell'economia. Per questo gli studiosi hanno dedicato un impegno sempre maggiore con il fine di capire quali siano le caratteristiche e il comportamento di queste parti. Tuttavia, pochi articoli analizzano l'investimento dalla prospettiva dell'investitore, e, quando lo fanno, si concentrano sul successo dell'investimento in termini di effettivo raggiungimento di un accordo. Inoltre, raramente le analisi adottano un punto di vista comportamentale o attitudinale da parte dell'investitore e, infine, non esistono attualmente ricerhe che si basano sul confronto di diverse tipologie di fonti di finanziamento in questo ambito.

Questo lavoro cerca di colmare queste mancanze di conoscenze e fornisce per la prima volta degli spunti sulle differenze tra business angel and investor crowd e in particolare sul loro comportamento e il loro processo decisionale riguardo l'investimento. Grazie all'utilizzo di un dataset contenente informazioni riguardo più di 1000 accordi effettuati da business angel e investori crowd, si dimostra che l'impegno a controllare ed eventualmente a contribuire attivamente all'azienda finanziata hanno un impatto sulla decisione di investimento dei soggetti considerati, anche se questo è meno evidente per gli investitori crowd. D'altro canto, anche l'attitudine e l'esperienza regressa influenzano il capitale immesso nell'investimento: investotori crowd specializzati in una specifica industria, business angel con più investimenti alle spalle, e passata esperienza lavorativa a livello manageriale o imprenditoriale; la decisione di investimento dipende da da tutti questi fattori.

Questi risultati estendono la nostra conoscenza riguardo alle procedure di investimento dei soggetti considerati e riguardo alle loro differenze, ponendo le basi per un nuovo indirizzo di ricerca.

Parole Chiave: business angel; investitori crowd; crowd-funding; controllo; contributo attivo

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1. Executive Summary

Introduction

Entrepreneurial Finance has an enormous impact is promoting new venture development, stimulating innovation and eventually driving economic growth. Given the potential advantages deriving from a developed market for entrepreneurial finance, research on the topic has been in the past decades a very dynamic field, continuously developing new stream of study to increase my understanding of the topic and achieving a higher effectiveness in policymakers stimulation of innovation (Wallmeroth, Wirtz, & Groh, 2018).

Looking at the well-known Equity Gap issue (Ferrari & Granovetter, 2009), there are few actors competing on the same segment of very early stage financing for start-ups. Other more renowned sources of finance as Venture Capital funds have specialized in later stages of the financed ventures, leaving only business angels and crowd investors as possible sources of funds for start-ups having little or no track records, financial statements, and assets.

Despite the role that these players have in the market for early stage financing, my understanding of their characteristics, procedures and behaviours is still limited. Indeed, business angels' market show a distinctive opaqueness that makes data collection difficult. On the other hand, crowd-funding market has only recently developed in recent years, with research on the topic that still has to take off.

In addition, currently there is no open research aimed at formalizing the differences between these actors in the mentioned features, as most studies focus on a single source of finance (Wallmeroth, Wirtz, & Groh, 2018). The difficulty in applying similar theoretical approaches to diverse investors' classes can be a serious hindrance to comparative research, leaving however room for a few feasible streams including investment decision process of the analysed investors categories.

The mentioned topic represents an important knowledge lack that this work tries to fill by providing innovative results on a comparative analysis on angels' and crowd investors' decision-making process from a behavioural perspective. Thanks to a unique and vast dataset comprising deals performed by angels and crowd investors in recent years, this work tries to shed light on this novel topic, providing innovative

results in determining differences and similarities in the decision process of the mentioned actors, and laying ground for a new stream of research.

Objective and Methodology

Given the identified knowledge gap, the objective of this work is to increase the scholarly understanding of a very specific topic, that, in details, is related to the investment procedures of business angels and crowd investors. In addition, closely related to the objective is the willingness to better explore the differences between these two actors.

Accordingly, the preliminary activity of this work consisted in an extensive literature analysis aimed at better mapping the knowledge on the actors I am considering, respectively business angels and crowd-funding.

Consequently, while after choosing as unit of analysis the single deal performed by each angel or crowd investor, I could set the literature-backed dependent variables of the model: the first metric is the variable *Share (%)*, meant as the post-financing equity stake that investor get through their investment, while the second metric is *Capital (€)*, that represent the absolute investment amount.

I formulated the hypothesis accordingly to the chosen objective and with the final aim of understanding the main drivers of causality in the investment decision-process. Therefore, the formulated hypotheses are as follows:

H1. The acquired equity share and amount of capital committed depend on the investor typology. In particular, business angels invest higher amount buying larger stakes in the invested venture compared to crowd investors.

H2. "Soft" monitoring has a positive effect on the investment performed by business angels and crowd investors, both in terms of share acquired and capital provided.

H3a. The willingness to contribute into the invested venture leads to higher investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

H3b. The willingness to contribute into the invested venture leads to smaller investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

H4. Specialized investors devote a higher amount of capital and acquire a larger share in the invested venture.

H5. The number of past deals negatively affects the investment decision in terms of capital committed and positively in terms of share acquired. In addition, this effect is more relevant for business angels than for crowd investors.

Thanks to the collaboration with two leading institution in the research on the topic, I was able to build a novel and extensive dataset comprising comparable variables on both business angels and crowd-funding. The involved organizations are:

Osservatori Crowdinvesting, the research branch of the Management Engineering facoulty in Politecnico di Milano. Osservatori Crowdinvesting is host of high-quality research in many fields related to economics and management, as logistics, operations, and so on. In particular, it is the leading figure for its studies on Italian crowd-funding. Its well-established contact with the Italian crowd-funding platforms and crowd-Backed companies strongly supported the project in its initial stages, for data collection. Moreover, thanks to the knowledge acquired, the professor involved provided insightful breakthroughs in undertaking the strategic decision of the project.

Università degli Studi del Piemonte Orientale (UNIUPO), is the leading figure in Italy for its research on business angels, thanks to its affiliation and proximity to IBAN association (Italian business angels Network). The supporting professor shared a structured and novel database consisting of years of surveys deployed to business angels in the reach of the organization. Moreover, its help was fundamental in undertaking high-level decisions in the initial stages of the project.

Literature review

The level of analysis considers at the same time each investor typology and a comparison between them. It is therefore of paramount importance to have a clear understanding of who these actors are, what are their objectives and so on.

Business angels are high net worth individual accredited as investors that invest their private wealth into a venture that is usually local, unlisted and without any connection to the business angel (Bonnet & Wirtz, 2012) (Capizzi V. , 2015) (Wetzel W. , 1983) (Agrawal, Catalini, & Goldfarb, 2014) (Berger & Udell, 1998). They usually assume minority stakes in the financed start-up (Mason C. , 2008), by satisfying very specific investment need, usually lower than 500k € (Jeng & Wells, 2000) (Caprenter & Petersen, 2002). Angels are acknowledged to add value to the financed venture by granting strategic support, networking, knowledge and control. Generally, a close tie is formed between the invested venture and the business angel, that often is deemed as a consultant or as a new member of the board of directors (Landstrom, 1993)

(Mason, Harrison, & Chaloner, 1991). Business angels are often former entrepreneurs or former managers who accumulated a considerable amount of wealth and are willing to find investment opportunities. Their career is relevant for the know-how they can provide to the invested venture.

Overall, most scholars agree that the business angel group is quite heterogeneous. This heterogeneity can be found not only in the angel characteristics but also in their investment practices and processes (Croce, Tenca, & Ughetto, 2016).

Understanding the real dimensions of the angel phenomenon is difficult if not impossible: even though some angels are organizing in higher level organizations called Angel Groups (AGs) or Business Angel Networks (BANs), thus giving an increasing visibility on their number and composition, the business angels market is deemed to be extremely opaque, with a lack of transparency that leads to difficulty in collecting data and to many unanswered research questions (Wetzel W. , 1983).

A major example is represented by their investment process, that is still a partly unexplored stream., requiring more study to understand the procedures and implications related to this type of investors. In addition, most studies on the pre-investment stage only focus on the success of the investment decision in terms of go/no-go decisions. These studies increase my knowledge by finding why angels might decide to accept or reject an investment, but do not give a clear idea on how the angels choose their actual economical involvement in the financed venture. Moreover, most studies are performed from a venture perspective, undermining the importance that behavioural traits and intentions have in the angels' investment decision process.

The other financing source analysed in this work is crowd-funding. The term "crowd-funding" is quite recent and was coined in 2006 to describe the new developing phenomenon of raising funds through the internet by a group of investors. This fact also gives an idea of how recent the development of crowd-funding is. Crowd-funding is a financing mechanism based on the internet, and often on a platform through which entrepreneurs are able to get in touch with potential investors (Griffin, 2013). The investors are not a specific group or segment, but are generally deemed as the "crowd" (Belleflamme, Lambert, & Schwienbacher, 2014). It's interesting to notice how crowd-funding is rapidly spreading to many industries and developing in different forms. To the aims of this work, I only focus on equity-based crowd-funding, since it's the only crowd-funding typology related to acquiring equity of the financed venture, in contrast to other typologies where crowd investors either lend their money (peer-to-

peer lending) or buy in advance the product that the entrepreneurs are willing to develop (reward-based or pre-purchase crowdfunding).

On the contrary to other investors types, as business angels and Venture Capitalists, crowd-funding are not institutional investors. The crowd is deemed to be quite heterogeneous in terms of composition and characteristics, even though it is generally acknowledged that they are on average less sophisticated investors. These topics do not find a general consensus in literature, even though this might be traced to the novelty of crowd-funding, that make literature on the topic at its initial stage.

Indeed, findings on the topic are often basic, while research questions tend to focus on features affecting the success of each crowd-funding campaign, or on outlining the differences among the several crowd-funding typologies (Bradford, 2012) (Griffin, 2013). In general, the first few conclusions are started to be drawn, but the topic is far from covered.

A major issue when dealing with crowd-funding is the lack of available data. Given the development of crowd-funding in the last few years, data lack is a serious hindrance for many research streams, both in terms of sample reporting information and sample size (Hornuf & Schmitt, 2016).

This work is aimed at increasing knowledge on the topic on two dimensions: it draws notable conclusions on the two investors' classes behaviours, and on the differences between their decision process.

Model implementation

The model implemented to test the hypotheses is a set of robust linear regression, designed to test not only my hypotheses but also the impact of control variable and other influences as time fixed effect. Each equation is run twice, first using the variable *Share (%)* and then *Capital (€)* as dependent variables.

In addition, each equation is run on the whole dataset first, and then on the two subsamples obtained by splitting angels-backed deals by crowd-backed ones.

Robustness and errors are addressed in different ways. As regards the validity of the statistical model, robust regressions models are used to overcome any issue arising from heteroskedasticity. Then, the base equations are developed in a multiplicity of similar but different variants, to assess the robustness to changes of findings. Finally, to further verify the robustness, models are tested in different sub-samples determined by other variables.

Findings

Results of the models confirm the hypotheses. I was able to test novel and innovative metric as the willingness to show active involvement in the financed venture or to adopt soft monitoring mechanisms, and how these variables impact the decision-making process of involved investors. The results are interesting and provide novel ground for theoretical knowledge and further research.

In the analysis, I found the formal evidence of the difference between the two classes of actors. Angels invest more, buy larger stakes and show different behaviours when investing, with higher tendency to monitoring the on-goings of their investments and to practically contribute to the financed venture, while crowd investors perform lower amount investment and show a considerable, but lower than angels' one, predisposition to an active involvement. I also find that crowd investors more often perform investments in ventures belonging to the same industry. This behaviour can be traced to the crowd characteristics, often comprised of individuals who are highly enthusiast on a very specific topic, or a specific set of topics and therefore favour start-ups in the same industry. In addition, since business angels are more sophisticated investors, they are more familiar with the concept of diversification to minimize risk. So, while many angels only invest in a single specific industry, for example to take advantage of their knowledge or expertise, the majority of the group performs investment in more than one market. The higher sophistication of business angels is reflected by their experience: angels have a higher track records of past investments compared to crowd investors, are more likely to be or to have been managers and entrepreneurs and are generally older.

The dataset allowed for more comprehensive research such as to control for the above-mentioned factors in a causal perspective for the impact they have on investment behaviours. To test the hypotheses, I performed an extensive set of multivariate models, to assess not only how investment features are affected by the investor typology, but also how they are affected by the investor characteristics. The analysis let me understand the differences among the investors and the investor categories.

In the analysis I could demonstrate how investor past experience and future willingness to monitor and actively contribute to the invested venture, jointly with the investor typology, have a strong effect on the investor decision process. It's interesting to notice how these processes differ across the actors' categories. Soft monitoring implemented by the investor is relevant in terms of perceived risk reduction driving an increased financial effort. On the other hands, investors deploying non-monetary

contributions consider them as an alternative to pure financial investment, therefore decreasing their economic involvement. Interestingly, crowd investors still show a high preference for soft monitoring mechanisms and the majority of the crowd deploys some kind of non-financial support to the financed venture. However, multivariate analysis shows that their willingness to follow these behavioural patterns does not have the same impact on investment decision as for business angels. Indeed, while crowd investors are still willing to verify the pace of the financed ventures, they rely more on social control mechanism, by sharing information among all the investors involved in each deal. They are also willing to contribute to start-ups' development, but they feel they are only a voice in the crowd. Their contribution is probably perceived to be less likely to bring value added benefit.

Investors attitude and track records as an important causal effect as well. Not only are crowd investors keener to specialize in a specific industry, but, when they are, the financial resources they deploy are also higher. This behaviour is in line with their enthusiastic attitude, that, when present, drives to higher investment amounts. Angels are more likely to have performed more investments in the past. As already stated, this feature can be traced to the angels' market having existed for a longer time. However, having many companies in the portfolio has a consequence since it freezes financial means that are unavailable to new deals and is an indicator of differentiation strategy that only occur in a portfolio comprising several companies. Overall, it drives down investment absolute value of business angels.

Investors past career has strong impact on decision process, an effect that is more visible if the investor is a business angel. Former entrepreneurs are likely to be more risk propense, while former managers are more likely to be more confident in choosing their investments. In both cases the final effect is larger investments and stakes acquired.

Conclusions

The implications of these findings can be observed on multiple dimensions. In current times, policymakers are continuously supporting and stimulating the role of early financing sources with the aim of promoting entrepreneurial activities. The effectiveness of proposed policies can be boosted by increasing the understanding of these actors.

From a theoretical viewpoint, this work is a first of its kind, comprising elements of several research stream as entrepreneurial finance, behavioural finance and, mainly,

comparative analysis. It is useful to demonstrate the feasibility of comparative studies, that so far have been overlooked given the difficulty in finding numerous and comparable data. Even though the results of this work are only the foundation of what could be an unexplored research stream, I would expect it to strongly develop in the future. Indeed, scholars should have a strong interest in developing comparative analysis, especially for those actors that have some comparable characteristics, as it is for business angels and crowd investors, both competing in the same channel in early stage financing.

From a managerial perspective, this comparative study can be effective in helping ventures to determine their more suitable financing source, that is possibly aligned with their objective. For instance, when looking for active involvement from the shareholders, ventures should look for angels' investments. If they know that their project presents some innovative features that can attract passionate investors, they should look for a crowd-funding round to raise more money.

The research conducted has some limitations and by acknowledging them, I provide hints for future studies and developments. The main limitation lies in the data used for the model. The crowd-funding industry is, by its nature, highly visible, and therefore the crowd-funding sample represent a complete overview of the Italian market. By contrast, business angels' market has an intrinsic opacity that makes it difficult, if not impossible, to develop a full picture of its current features. This problem was already addressed in the explanation of the data gathering process, stating that the procedure has been performed and refined for so many years that available data can be considered to have a good representativeness. However, if possible, the analysis should be repeated with newer data collected through the most recent questionnaires.

Another issue is the possible selection bias in final dataset used for the analysis. Since I had to exclude many deals for missing or impossible data, the model is exposed to a possible selection bias that could be solved by using a improved initial dataset. By doing so, not only would selection bias be overcome, but also the available number of deals for the analysis would largely increase, leading to improved and more solid results.

In addition, there is a concerning feature in crowd-funding deals related to Italian regulation that is not treated in this work. Indeed, by law, a predefined share in any crowd-funding campaign must be financed by institutional investors. As a consequence, some of the crowd-funding deals are performed by other kind of

investors, eventually also angels, that do so through the crowd-funding platform and are therefore reported as crowd investors, influencing the analysis results. Even though they are a minority, the model could be improved by distinguishing among institutional and non-institutional investors in the crowd-funding campaigns.

This work's results can be further improved by taking into account other variables that are not considered in this model, as the belonging to Business Angel Networks for angels and platform characteristics for crowd investors. Another possible evolution of this work would consist in adding a third sub-sample comprising venture-backed start-ups, to give a complete overview of the early stage financing world.

The most important future developments are related to the research stream of comparative analysis. Just to mention an example, in a couple years' time, the vast majority of deals considered will have released their financial statements allowing performance analysis for all deals up to three years post investment. An important consequence of this work, related to the investment decision process under the effect of behavioural features and investors characteristics, would be to understand how these behavioural features have an impact on the post-investment performances of the financed ventures.

Finally, as already stated this work only gives an overview of the Italian market, without considering data coming from other regions, also due to the difficulty in finding data of other countries deals and implementing a research of this kind at an international level. However, I cannot exclude that eventually this will become easier in the future, leading therefore to new breakthrough results comparing not only different actors' behaviours, but also how these behaviours change across countries.

Overall, this work has provided both practitioners and academic with valid contribution, showing the effect of behavioural and personal characteristics on investment decisions, and laying the ground for the original stream of research of comparative finance.

2. Introduction

Research on Entrepreneurial Finance has always been a very active and dynamic field, with many and different topics of research (Wallmeroth, Wirtz, & Groh, 2018). This is due to the large number of topics that are ascribed under the label of Entrepreneurial Finance, that are, in details, the alternative sources of early stage capital. The Oxford Handbook identifies in Entrepreneurial Finance several sources as Hedge Funds, Private Equity, Venture Capital, business angels and crowd-funding (Cumming, The Oxford Handbook of Entrepreneurial Finance, 2012). The main focus of this work is to analyse the very early stage of venture financing, with a particular focus for a specific class of capital seeking ventures, namely start-ups. Indeed, often conventional financing sources are not available to start-ups since these ventures usually do not have track records or assets, a problem also known as the "Equity Gap" (Ferrari & Granovetter, 2009). It is generally acknowledged that start-ups face many difficulties in finding investors to finance their growth, so these ventures often have to look for alternative financing sources.

At first, the Equity Gap was filled by Venture Capital funds. However, over time these actors specialized and started to focus on intermediate stages of the new ventures, a behaviour that determined the so-called "Valley of Death" (Barr, Baker, Markham, & Kingon, 2017). This new gap has been filled by new actors, namely business angels and, more recently, crowd-funding. The Chain of Financing is a simplified representation of the segmentation of the market for early stage financing, as shown in "Figure 1 – The chain of financing ". By analysing this visual framework, it seems that each actor involved has specialized by positioning himself in a very specific stage of the start-up lifecycle. Indeed, Venture Capital funds prefer later stages of the new venture development, characterized by higher capital requirement but also by lower risk. Instead, business angels and crowd-funding share the very early stage of start-ups' lifecycle.
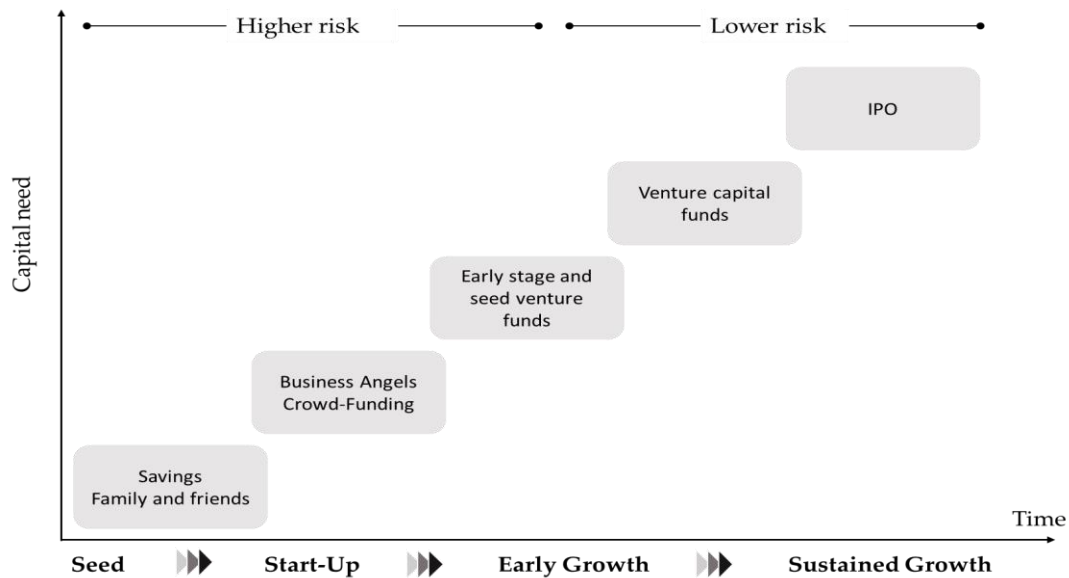
FIGURE 1 – THE CHAIN OF FINANCING (DEFFAIN & SUDOLSKA, 2014)

There are many knowledge gaps on the topic and current research is trying to address them by increasing my knowledge in many of the known sub-fields. However, there are some research streams that have been completely overlooked. For instance, the majority of existing studies is focusing only on a single category of investors, either business angels or crowd-funding (Wallmeroth, Wirtz, & Groh, 2018).

Most of the times, studies on multiple financing sources can performe their analysis only in case of co-investment among different categories of actors, trying to understand how different players behave when investing together or subsequently (see Hornuf & Schimm (2016) and Brown et al. (2015) for co-investments between BA and CF, see Goldfarb et al. (2014) and Witlbank & Boeker (2007) for BA and VC co-investments). There are a few studies comparing different financing sources (see Witlbank & Boeker (2007) and Ibrahim (2008), analysing BA and VC on contracting), but rarely these studies compare business angels and crowd investors. Given that Venture Capital funds are moving towards later stages in start-ups financing, business angels and crowd-funding are remaining as the two most important sources of finance for early stage ventures. As they are competing on the same segment it's important to understand the differences in their behaviour, and eventually the impacts that these differences have on the invested ventures. Cosh et al. (2009) state that comparative research is hampered not only by lack of data but also by the difficulty of applying a similar theoretical approach to the diverse investors' categories. However, the authors conclude that in a few cases the analysis of different typologies of investors can

overlap: how investors deal with asymmetry problems, how they support the invested venture and how they get to their investment decision.

The mentioned topics represent important knowledge lacks that this paper tries to fill. There are several research streams on the topic (from the venture or investor perspective, analysing post-investment features, contracting, etc.) but this paper only focuses on the investment behaviour of the actors involved. This work proposes to be one of the first studies of its kind, a comparative study on business angels and crowd-funding. Thanks to a unique dataset comprising data on both business angels and crowd-funding investment, it tries to shed light on the differences and similarities of these actors in their investment decision, and I hope it will contribute to pave the way to new works, and to a new stream currently under researched.

The following sections are organized as follows. Chapter "3. Objectives and Methodology" gives an overview of the main activities involved in the research program. The first chapters, Sections "4. Context", "5. Business Angels" and "6. Crowd-Funding", are dedicated to outline my current knowledge of business angels and crowd-funding, with a specific focus on the investor perspective. Then, in Section "7. Hypothesis development", the main objectives of the paper are outlined, stating the most important assumptions holding them. Data collected are explained in Section "8. Sample data and variables", with an overview of the main variables characteristics, and in-depth details on the model and its results are provided in Section "9. Model implementation and results". Finally, the last Section "10. Conclusions" addresses the final remarks and provides suggestion for future research.

3. Objectives and Methodology

The first task to be addressed was related to defining the field of research and the research objective, accordingly to the discovery or identification of a literature gap. To achieve this first objective, the work was articulated in a series of analysis of existing books, articles, scientific papers and on-line sources. This first task gave me the idea of the breadth of my research field, characterized by many unexplored research streams, and numerous starting points and ideas to direct my own activity afterwards. In general, the main findings that came out reveal that:

- The topic of business angels is generally extensively covered worldwide, with some lacks regarding Italy specifically. Still, there is space for innovative analyses that differentiate from the traditional ones performed on conventional variables.
- Crowd-funding is an original research stream, mainly due to the novelty of the phenomena itself, grown only in recent years. Few studies are renowned and unsurprisingly most of them deplore the difficulty in finding data, coherently with a recently developed trend.
- No study is devoted to compare the characteristics of business angels and crowd Investors, even though both these actors play a role in the early financing of new ventures.

Given these main findings, discriminating among all the possible research opportunities proved to be an easier task thanks to focus groups with experts who had the opportunity to express insightful and relevant viewpoints. Through these debates, it came out that there are few papers focused on the differences between the two categories of investors, so that the study of my work should be a comparative analysis. Moreover, as regards the specific features to be investigated, there was an overall strong interest on behavioural traits that distinguish the two categories of financier. Therefore, the study falls within the category of behavioural finance, a sub-field of behavioural economics, whose purpose is to discover the determinants of financial choices.

Afterwards, the research aimed at finding literature gap coherently with the outcomes of my previous activity, to determine a specific research question and proceed with

the development of the research hypothesis. A more detailed and specific literature analysis was performed, and, in addition, I had some meetings with a few of the experts in the topic. This further step in my analysis led me to the conclusion that the objective was related to determine the effect of behavioural traits on investment decision and afterwards performances of the financed venture. These ventures had to belong to a specific category, namely start-ups, and to a specific geography, Italy. The unit of analysis was the single investor, or, better, the single financial transaction, as each investor could perform multiple investment, and each start-up could be financed by numerous investors, which is especially true for crowd-backed companies, but it's normal also for business angels (Capizzi, Bonini, Valletta, & Zocchi, 2016). This behaviour is however completely different by the one exhibited by other categories of early financer as Venture Capital, who usually make agreements with a limited number of external investors to avoid coordination and conflicts of interest problems (Lerner, 1994) (Manigart, et al., 2006) (Tian, 2012).

At the time of hypothesis formulation, part of the initial scope emerged during the meetings had to be left behind for a more in-depth research in the future. In fact, it became soon clear that finding the determinants of start-ups performances was a daunting task for crowd-backed companies, whose investment happened too recently for this kind of data to be available, as they are measured over years. Even the research of unconventional performance metrics proved to be unsuccessful. Existing literature on the performance of Venture Capital investments usually looks at assets, turnover, market share, employee number or successful exit as a proxy for growth and performance (Brav & Gompers, 1997) (Davila, Foster, & Gupta, 2003) (Kerr, Lerner, & Schoar, 2014) (Puri & Zarutskie, 2012). However, angel-backed and crowd-backed start-ups are often in a very early stage, they have not started generating revenues and their asset value is negligible and not a significant indicator of performances. The scope of the project was further refined to focus on investment decisions.

Subsequently, a set of hypotheses was formulated based on investors behaviours and experiences, in order to increase my understanding on the selected research topic, related to the investment procedures of business angels and crowd-funding, trying to understand the differences in the decisions making process of the two actors.

Given the selected dependent variables *Share (%)* and *Capital (€)*, the developed hypotheses are:

H1. The acquired equity share and amount of capital committed depend on the investor typology. In particular, business angels invest higher amount buying larger stakes in the invested venture compared to crowd investors.

H2. "Soft" monitoring has a positive effect on the investment performed by business angels and crowd investors, both in terms of share acquired and capital provided.

H3a. The willingness to contribute into the invested venture leads to higher investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

H3b. The willingness to contribute into the invested venture leads to smaller investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

H4. Specialized investors devote a higher amount of capital and acquire a larger share in the invested venture.

H5. The number of past deals negatively affects the investment decision in terms of capital committed and positively in terms of share acquired. In addition, this effect is more relevant for business angels than for crowd investors.

During the definition of the scope of research, I also performed he activity related to data gathering. This activity took place through two parallel channels:

- Data regarding business angels were collected thanks to the collaboration to UNIPO, and the survey that it periodically submits to IBAN (Italian business angels Network) and any independent investor willing to answer.
- Data concerning crowd-funding were collected through multiple sources, that ranged from manual online search on the different Italian crowd-funding platforms, to a survey, and single interview with the crowd Backed companies.

The information collected by the different sources had to be organized in a coherent way on a single dataset in order to allow further analyses. The resulting database contains an extensive set of information of 4000+ deals, with 3600 deals related to 80 different crowd-funding rounds, and more that 800 deals performed by 300+ investors on 600+ ventures.

After building the database with all the relevant information, most of the work was related to learning to use the statistical software Stata and to properly formulate a statistical model. All the variables in the model had to be literature backed, to provide to the model a solid and robust theoretical foundation. Given the typology of data

available, I choose to perform a regression analysis. OLS regression was performed for the simple model, but given its limitation, the robust regression variant was finally chosen, since it is less sensitive to heteroskedasticity and outliers. Moreover, sensitivity analyses were performed to test the robustness of the results to changes in the model. The model was thereby run on subsets of the selected dataset and with different control variables selected by literature, respectively related to industry, investor or firm characteristics.

By means of this model I was able to elaborate on the available data and to draw conclusions of the overall work, while confirming or denying the research hypotheses. In addition, I tried to formulate as accurately as possible the limitation of the model, as well as possible follow-ups for future research.

"Table 1 – Objectives, methodology, activities" summarizes the methodology used and the main activities performed in order to achieve all the main milestones along the project lifetime. Those milestones were the high-level objectives and important steps forward in the work advancement.

OBJECTIVE	METHODOLOGY	ACTIVITIES
Field of research and research objectives definition	- Literature review - Systematic Web-based research - Focus group	- Keywords definition - Analysing lack of literature sources - Classification of works and papers -
Finding literature gap	- Literature review - Systematic Web-Based research - Focus group - Meetings with experts	- Keywords definition - Identifying literature gaps - Selection of potential metrics - Refine research scope
Hypotheses development	- Literature review - Systematic Web-Based research - Focus group - Meetings with experts - Brainstorming	- Definition of main metrics - Understanding how to measure the selected variables - Understanding potential impact on dependent variables
Data collection	- Collaboration - Survey - Manual On-Line search - Structured Interviews	- Identification of main On-Line Sources - Identification of respondent - Survey definition - Construction of a final uniform database
Model definition	- Focus Group - Brainstorming - Literature review	- Online search for statistical methods - Database cleaning and filtering - Model application on Stata software - Robustness and sensitivity analysis
Conclusions drawing and follow-up	- Focus group - Brainstorming - Literature review - Meetings with experts	- State model consequences - Identifying follow-ups - Identifying main limitations

TABLE 1 – OBJECTIVES, METHODOLOGY, ACTIVITIES

The research was performed with the support of two Universities and in particular with the support of the professors and expert already involved in the mentioned field of research. In addition, these professors have been crucial with their advice and guidance in the definition of field of research, objectives and hypothesis. Their belonging organizations are respectively:

Osservatori Crowdinvesting, the research branch of the Management Engineering facoulty in Politecnico di Milano. Osservatori Crowdinvesting is host of high-quality research in many fields related to economics and management, as logistics, operations, and so on. In particular, it is the leading figure for its studies on Italian crowd-funding. Its well-established contact with the Italian crowd-funding platforms and crowd-Backed companies strongly supported the project in its initial stages, for data collection. Moreover, thanks to the knowledge acquired, the professor involved provided insightful breakthroughs in undertaking the strategic decision of the project.

Università degli Studi del Piemonte Orientale (UNIUPO), is the leading figure in Italy for its research on business angels, thanks to its affiliation and proximity to IBAN association (Italian business angels Network). The supporting professor shared a structured and novel database consisting of years of surveys deployed to business angels in the reach of the organization. Moreover, its help was fundamental in undertaking high-level decisions in the initial stages of the project.

The activities performed are described in the following Chapters. After having described in this Chapter the methodology used, Chapters "4. Context", "5. Business angels" an "6. Crowd-funding" are focused on the firsts two objectives listed in Table 1, respectively "Field of research and research objectives definition" and "Finding literature gap". In these Chapters, an extensive literature review is summarized, to understand not only the overall context of the work but also identify specific topic of interest and gaps in the existing knowledge systems. It becomes soon plain and clear that no paper comparing business angel and crowd-funding from a behavioural perspective exists. The following Chapter "7. Hypothesis development" is related to the third objective in Table 1 and provides detailed motivation for the formulation of the hypothesis that are the foundation of the statistical model. Chapter "8. Sample data and variables" give in-depth insights on the process of data gathering, database configuration and metrics used to test the hypothesis formulated. Additionally, this chapter provides some statistics on the data collected to visualize information, trends and breakdowns. The implementation of the model and the subsequent analyses are described in Chapter "9. Model implementation and results". The outcomes of the

model are then discussed and commented laying the foundation for the last section, Chapter "10. Conclusion", dedicated to the implications of the model, highlighting both the main limitation in the conclusion drawn and the potential directions for future research.

4. Context

This topic provides an overview of the topic called Entrepreneurial Finance, highlighting its impact on economy and society overall. Moreover, I address the importance of early stage financing, stating that the unconventional financing means needed by start-ups in their first stages are necessary for their development. In addition, start-ups are the main drivers of innovation and are responsible for economic growth. This paper wants therefore to focus on the first stage of start-ups' lifecycle and on the main actors involved: business angels and crowd-funding. In particular, I address an important research gap that has been almost completely overlooked so far: even though angels and crowd investors compete on the same segment, there are no studies aimed at understanding the differences between these actors in their investment behaviour.

4.1. Innovation and start-ups

In a business environment, innovation is deemed as one of the major drivers of competitive advantage and, more in general, economic growth (Deffain & Sudolska, 2014). An innovation is characterized by distinctive features, in particular it delivers something that is better than existing solution or completely new. Innovation has been subject of studies and researches for a long time. Schumpeter (1960) was the first to provide a definition for the word innovation and to underline its impact on the development and growth of an economy. Innovation was for the first time marked as critical for economic changes, which depends on some major determinants as innovation itself, entrepreneurship and market power. Innovation is a wide term that, depending on the purpose, can be ascribed to different level of change. In a strict, more rigid sense, innovation is a change in the final product or in the production system achieved thanks to the exploitation of new or unused knowledge. On the other hand, many authors interpret innovation with a wider meaning, and relate it to any change based on novel knowledge (Schumpeter, 1960). According to another definition that capture the essence of innovation in a modern sense (Deffain & Sudolska, 2014), innovation is an iterative procedure that starts with the willingness to target a new market or provide a new product/service, based on the exploitation of a technology-based invention, and that terminates with the development, production and marketing of such an invention (OECD, 2005).

4.1.1. Incremental and radical innovation

As already stated in the previous paragraph, the term innovation is open to different interpretations, and therefore there is a vast literature studying how to classify change. A first and generally accepted categorization distinguishes between incremental and radical innovation. For instance, an innovation might deliver only minor improvements and adjustments to current practices and products (Garcia & Calantone, 2002). This kind of novelty only aims at enhancing something that already exists in the market, making it faster, cheaper, better. This innovation type is usually defined incremental.

By contrast, a radical innovation delivers something that is completely new, and it does so by changing traditional and conventional industries and by positively affecting customers' expectations. Even though there is vast literature on the merits, a generally accepted definition of radical innovation states that it is a kind of change based on a new technology that results in new market infrastructures (Colarelli O'Connor & McDermott, 2004) (Song & Montoya-Weiss, 1998). In other words, Deffain and Sudolska (2014) underline that the output of a radical innovation exploits a new technological knowledge in such a different way compared to conventional ones that the new innovative products make traditional ones non-competitive. Radical innovation can be studied not only at the product level, but also on a multi-dimensional approach. At a market level, a radical innovation can deliver completely new benefits to customers that shift to the novel product following the renowned Roger's Adoption curve. Conducing the analysis at the single company dimension, it is revealed that innovative companies assist to a substantial growth of their business. Deffain and Sudolska (2014) significantly conclude that a radical innovation therefore results in a discontinuity, both at a macro and at a micro level. Garcia and Calantone (2002) in their paper also point out that radical innovations give birth to new markets or even new industries afterwards, since it often determines or creates a new and previous unrecognised demand of final customers, which in turn determine the birth of new channels, activities, competitors.

If such an innovation is so advantageous for those who pursuit it, why not all incumbent companies try to exploit its advantages? The answer to this question has been widely studied, and the conclusion is that radical innovation is often sought by entrepreneurs, or, more in general, by entrepreneurial start-ups that reject conventional solutions of already established and bigger firm to achieve higher flexibility and novel approaches (Colarelli O'Connor & McDermott, 2004) (Eisenhardt

& Martin, 2000). Incumbent, as bigger and established firms are often called in these studies, are obstructed by a more rigid internal structure that seriously hinders their attempt to re-organize their processes for a radical innovation. Apart from this, following the path of a radical innovation is in general an extremely risky activity characterized by high uncertainty. Research and development activities are extremely costly, and the output might not be marketable. If it can be sold, might not be profitable, its cost being too high. If it is, it might not provide a sustainable competitive advantage that make it a strategic asset. Noci (2016) identifies a strategic advantage as characterized by:

- Inimitability
- Durability
- Substitutability
- Appropriability
- Competitive superiority

These difficulties sum up with other hindrances that incumbents have to face when dealing with radical innovation. For instance, the new product initially has inferior performances compared to traditional ones. In addition, the fact that the new product is usually targeted toward a new smaller market poses a problem. Finally, incumbent face the risk of disappointing their already existing customers (source: Noci, Strategy & Marketing - 17. New Models, Big Bang disruption).

Therefore, radical innovation is generally promoted by entrepreneurs. Moreover, there is spread consensus that entrepreneurs are also a major cause affecting the success of the innovation itself. Their drive and persistence allow him to succeed against difficulties and doubters. Financing the launch phase of radical entrepreneurial activity, which means for instance of start-ups, is a fundamental topic, of major interest also from a political point of view, and often called the "Equity Gap".

To summarize, in "Table 2 - Main characteristics of incremental and radical innovation" the main features of incremental and radical innovation are listed as elaborated by Deffain and Sudolska (2014) based on a review and an analysis of the works of Stringer (2000), Sorescu, Chandy and Prabhu (2003), Christensen, Anthony and Roth (2010).

Incremental Innovation	Radical Innovation
New to the firm	New to the world
Builds upon existing knowledge and resources	Requires new knowledge and resources
Exploits existing technology, utilises existing competencies and processes	Explores new technology, requires new competences, skills or expertise
Enhances existing organizational competencies	Destroys existing organizational competencies that lose their value
Low uncertainty and risk	High uncertainty and risk
Operates within the existing business model	Requires a change in business model
Relatively small change in performance	Step change in performance
Focuses on cost or feature improvements in existing products or services, processes, marketing or business model	Focuses on processes, products or services with unprecedented performance features
Improves competitiveness within current markets or industries	Creates a dramatic change that transforms existing markets or industries, or creates new ones
Perpetuates existing social practices	Necessitates social and systemic change
Is the lifeblood of innovation	Appears relatively rare

TABLE 2 - MAIN CHARACTERISTICS OF INCREMENTAL AND RADICAL INNOVATION

4.1.2 Innovation as a driver of economic growth

Economist worldwide have by now recognised the great importance of innovation in promoting economic growth (Deffain & Sudolska, 2014). The economic development of a country largely depends on its ability to create and embody innovations (Wong, Ho, & Autio, 2005). In fact, it's out of questions that often innovation constitutes a firm's source of sustainable competitive advantage. Stronger and successful companies also determine the wealth of the region or country where they are located. This is especially true for radical innovation, based on technological shifts. As a conclusion, technology drives growth, and it can boost the economy by:

- Creating workplaces, also in new industries.
- Boosting the efficiency of processes.
- Developing exports of superior and more advanced products.

The effect on the overall economy is even more evident considering that in the long run, technological productivity appears to be the most important driver of growth, considering that the other factors productivity (as infrastructure, human capital, etc.) seems to have diminishing returns.

Bearing in mind what said in this paragraph, radical innovation is of paramount importance: it determines the success of companies, growth of markets and eventually

the development of entire economies. That's why start-ups, new ventures promoting their new radically innovative idea, are often called the Engines of Growth.

4.1.3 The engines of growth: start-ups and equity financing

Thinking that a start-up is a smaller version of a bigger company is simplistic and wrong. As pointed by Blank (2010), the founder of the Lean start-up movement, a start-up is a "temporary organization on search of a scalable, repeatable, profitable business model". The concept of Engine of Growth is entangled with the idea of start-up. Indeed, a start-up is a temporary organization that not only aims to achieve a dominant position in the market, but also to achieve it in a relatively short period of time (source: Noci, Strategy & Marketing - 20. Start-Up). In alternative, a start-up might be willing to disrupt the existing market thanks to an innovative business model that should rapidly outpace conventional solutions. In other words, a start-up should operate in a completely different way compared to incumbent. It's interesting to notice that innovation can arise not only by the product or process itself, but also from a strategic exploitation of existing technologies that allow to achieve network effect, virality, or improved analytics. Overall, the innovation should be already visible by analysing the start-up business model. Interestingly, finding the optimal business model is close to a trial and error activity, and it often happens that start-ups have to revise or change it several times (Blank, 2010).

Many studies point out that young start-ups face difficulties in finding investors to finance their growth (Deffain & Sudolska, 2014). First, conventional financing resources are often precluded to start-ups. Financial institutions as banks are risk-averse agents, and in presence of uncertainty reduce their commitment to give access to funds (Ferrari & Granovetter, 2009). In fact, entrepreneurial financing is affected by the same problems of corporate financing, related to asymmetric information and agency problems. However, these problems are worsened in the first stages of a venture (Denis, Denis, & Yost, 2002). Indeed, new start-ups with no history behind cannot provide information to financial institutions that, in turn, are not able to adjust their price in term of interests to the demand. With such an information asymmetry scenario, the Pecking Order Theory (Myers & Majluf, 1984) results useful in understanding where start-ups try to retrieve their funds. According to this theory, agents choose their sources of finance starting from the cheapest to the most expensive: they start using their own saving and therefore self-finance themselves, then look for debt, and finally resolve to equity financing. However, as previously pointed out, debt financing is extremely difficult to obtain in case of innovative start-ups, therefore new

ventures resort to entrepreneurs' own savings or, in case of larger projects, to external equity.

Old studies and research highlight how the Equity Gap was at first filled by venture capital funds. Yet, over time these funds have shown the tendency to specialize and focus on intermediate stages of the new ventures, a behaviour that determined the well-known "valley of death" (Barr, Baker, Markham, & Kingon, 2017). This gap has been filled by new actors, namely business angels and, more recently, crowd-funding. The Chain of Financing is a simplified representation of the segmentation of the market, showing that actors have specialized each in specific parts of the start-ups life, where investing earlier means assuming a higher risk, but also benefit more from possible escalation of the invested venture. By contrast, investing in later stager means undertaking a lower risk, however capital requirements are higher and higher. This concept is summarized in "Figure 1 – The chain of financing " at page 12, showing where each investor type positions himself in the start-up life cycle.

A first summary of the main acknowledged characteristic of the early stage investors are presented in "Table 3 – Key characteristics of crowd-funders, business angels and Venture Capital ". As a preliminary outcome, business angels and crowd investors appear more similar than formal Venture Capital funds, competing on the same start-ups stage. By contrast, Venture Capital are moving away from early stage financing, showing a preference for at least launched businesses.

	CROWD-FUNDING	BUSINESS ANGELS	VENTURE CAPITALISTS
Background	Many different backgrounds, many have no investment experience	Many different backgrounds, many former entrepreneurs and mangers	Most 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 social networks and angel groups	Through social 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

TABLE 3 – KEY CHARACTERISTICS OF CROWD-FUNDERS, BUSINESS ANGELS AND VENTURE CAPITAL (WILSON, 2011)

Total European early stage investment market is estimated to be worth 11.4 billion Euros. Venture Capital funds invest 3.5 billion Euros, preferring to focus on later stages start-ups. business angels invest the largest share and hold almost two third or the overall market. Equity crowd-funding represent a minority in the scenario, however their investments have increased at a very fast pace and are expected to continue

growing rapidly. This is information is summarized in "Figure 2 – Early Stage investment market breakdown" (source: EBAN, 2017).
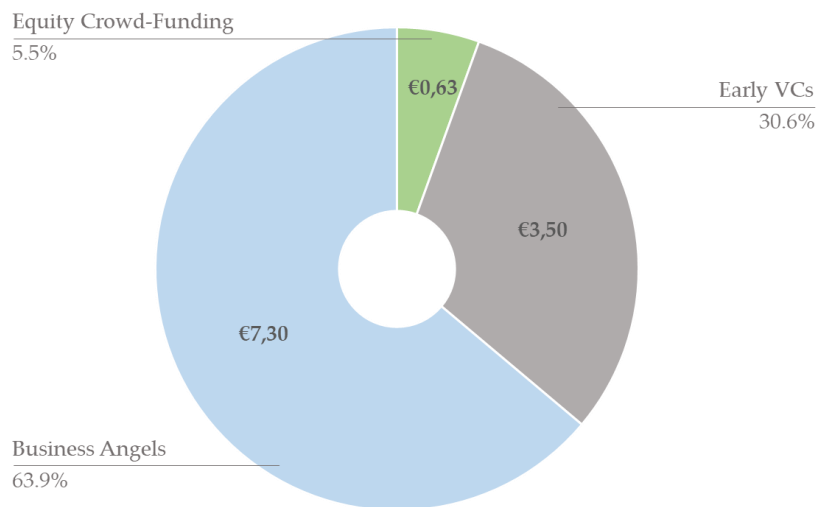
FIGURE 2 – EARLY STAGE INVESTMENT MARKET BREAKDOWN

The characteristics and roles of those actors are investigated in more in-depth details in the following sections, starting with a general overview of entrepreneurial finance, and its main features.

4.2. Entrepreneurial finance

Entrepreneurial finance can be ascribed to numerous alternatives of investment finance. The Oxford Handbook of Entrepreneurial Finance includes in entrepreneurial finance a wide variety of topics covering several capital sources, which include Hedge Funds, Private Equity, Project Finance, Venture Capital, business angel investors, crowd-funding, etc (Cumming, 2012). In this work, I focus on business angels and crowd investors, with some mentions on Venture Capital funds. The objective of the following sections is to analyse existing literature in order to obtain a complete overview on those actors' characteristics, behaviours, feature, practices.

The market for entrepreneurial finance has considerably increased in complexity in the last decades. It is populated by several actors who play different roles in distinct stages of the innovative venture. Their capital commitment, managerial involvement and risk undertaken differ depending on the characteristic of the investor and the stage of start-up as in can be seen in "Figure 3 – start-ups lifecycle and financing ".

← Early stage financing →

	Pre-seed 0,1 mln €	Seed < 1 mln €	Start-Up 1 - 5 mln €	Second Round 5 - 20 mln €	Expansion 10 – 50 mln €
	Crowd-Funding Business Angels Savings Family & Friends Grants	Crowd-Funding Business Angels Savings Family & Friends Grants	Venture Capital	Venture Capital Private Equity	Private Equity IPO

Equity need

Time
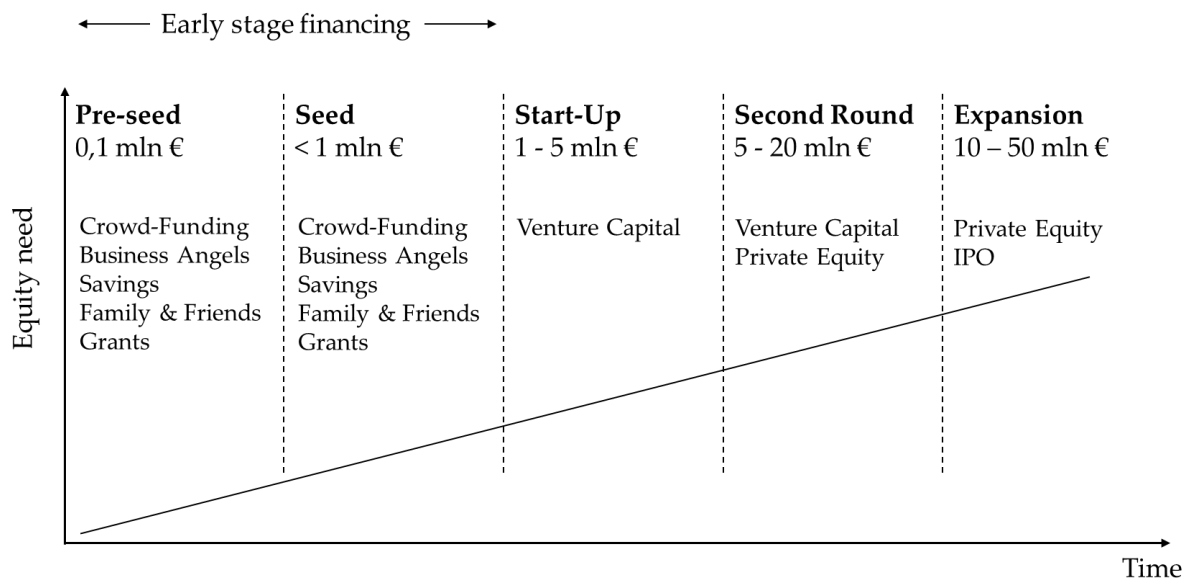
FIGURE 3 – START-UPS LIFECYCLE AND FINANCING (BECHI, 2015)

Venture Capital funds were the first to enter the market in the 1940s, and their role had become recognised and more institutionalized already by the 1980s, becoming a spread practice worldwide (Gompers, 1994) (Bruton, Fried, & Manigart, 2005). The spread of Venture Capital coincided with increased effort in the research on the topic. In the 1980s, research on Venture Capital took off (Wallmeroth, Wirtz, & Groh, 2018). Instead, business angels research is developed in more recent times, gaining consistency only in 2000s. This is caused by intrinsic features of the business angels market, that is said to have an invisible component that make it difficult to analyse (Mason C. , 2006) (Wetzel W. , 1987) (Wetzel W. , 1983) (Wetzel W. , 1994). The relative importance of financing sources changes over time, adapting to shifts in the markets. business angels have taken a more central role over time as they were perceived as a potential solution for closing the financing gap in early-stage ventures. Thanks in part to governmental support, angel investors have progressively organized in group generally called business angels Networks (BANs) to develop a more visible and structured market for equity financing. Finally, crowd-funding is the last developed source of finance in the entrepreneurial market. crowd-funding origins can be traced to many sources, as technological development, in particular the internet, and the social media. crowd-funding was enabled by these tools and circumstances to enter the entrepreneurial financing market as the youngest option. Indeed, the term crowd-funding was used for the first time in 2006, and it drew the attention of researches and scholars only in the last decade (Everett, 2014).

Wallmeroth, Wirtz and Groh (2018) performed a research by keywords on the Scopus database to help visualize the evolution of research in the entrepreneurial finance market. The results are presented in "Figure 4 – Scopus Publication Statistics", showing the trends for Venture Capitals (black), business angels (orange) and crowdfunding (blue).
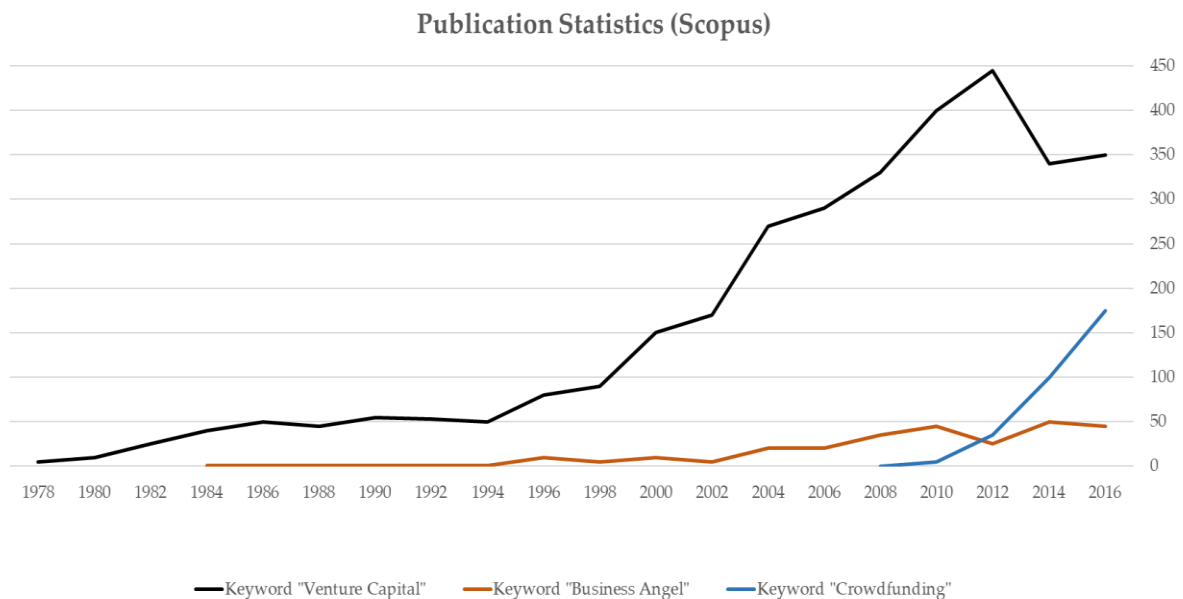
FIGURE 4 – SCOPUS PUBLICATION STATISTICS

4.2.1. A framework for literature classification

Research on entrepreneurial finance is in general quite active and dynamic, with many and different topics of research (Wallmeroth, Wirtz, & Groh, 2018). Wallmeroth et al. (2018), in their extensive analysis of literature review, try to build a model to categorize the knowledge in the field. The framework works on two dimensions: investor type and investment stage. The former category distinguishes among Venture Capital funds, business angel investors and crowd investors. The latter looks at some investment features analysed in the papers, namely the investment stage that can be:

- Pre-investment
- Contracting during investment
- Post-investment

Each paper on the topic can be visualized in the conceptual framework in "Figure 5 – A Classification framework for papers on Entrepreneurial Finance".

Investor type	Investment stage		
	Pre-investment - Deal flow - Due diligence - Evluation	Contracting - Ownership structure - Incentives - Contracts	Post-investment - Exit - Return
Venture Capitalist			
Business Angels			
Crowd-Funding			

FIGURE 5 – A CLASSIFICATION FRAMEWORK FOR PAPERS ON ENTREPRENEURIAL FINANCE

After having outlined such a framework, the vast body of early stage financing literature can be categorized following this structure. On the first dimension, Wallmeroth (2018) concludes that the majority of studies focus on a single investor category and develop the analysis on one or more of the investment stages mapped out above. Interestingly, while there exist some paper analysing the interactions in co-investments, in a simultaneous syndication or in more sequential investments, very few researches are dedicated to the study of two or more investors categories (Cosh, Cumming, & Hughues, 2009). The lack of data and the difficulty in applying similar theoretical approaches are a serious hindrance to comparative studies. However, there are just a few cases in which analyses of different investor types overlap: how they deal with information asymmetry issues, the investment decision and the support delivered to the financed venture (Cosh, Cumming, & Hughues, 2009).

Given the vast amount of literature available on the topic, the framework mentioned above results particularly useful to structure the research and allow an overall perspective. Some topics have been extensively studied, other present a scarcity of research. Some of them represent a growing research trend, with the development and exploration of several research topics. Finally, other research on some topics still falls below expectations, presenting clear gaps in the knowledge system of entrepreneurial finance. These results are presented in a simplistic and simplified version of the framework that summarizes the amount of literature for each topic, as shown in "Figure 6 – Body of literacy per topic". Coherently to previously achieved conclusions, there is large room for improvement in the research on business angels and crowd-funding. This work not only adds to the knowledge on the topic, but also introduces a

new stream of research, since its analysis is based on a comparative study between the two different classes of actors.

Investor type	Investment stage			
	Pre-investment - Deal flow - Due diligence - Evluation	Contracting - Ownership structure - Incentives - Contracts	Post-investment - Exit - Return	Overall
Venture Capitalist	Very high	Medium	High	Very High
Business Angels	Medium	Low	Low	Low - Medium
Crowd-Funding	Medium	Low	Low	Low - Medium
Overall	High	Low	Medium	

FIGURE 6 – BODY OF LITERACY PER TOPIC (WALLMEROTH, WIRTZ, & GROH, 2018)

4.2.2. Conducting research on entrepreneurial finance

Research on business angels and crowd investors continuously requires novel databases with new and innovative variables. Lack of data, difficulty in finding the required information and other similar problems unavoidably slow down research (Barry, 1994). This is a hot topic in a research that requires the collection of information on private investment, that may be reluctantly provided, or not provided at all. However, in my study I was able to take advantage of the networking operated by Osservatori Digital Innovation, tied to the world of crowd-funding in Italy, and Università degli Studi del Piemonte Orientale, for its connection with IBAN (Italian business angels Network). Thanks to the support of those institutions, I was able to collect a novel dataset with several variables and, most importantly, coherent for the different classes of actors involved. This work proposes to be a study, first of its kind, to open, eventually, new streams of the field of comparative analysis. The following sections analyse more in details the main characters of this research, business angels and crowd investors, providing general definitions, characteristics, and actual knowledge on their investment process, pre- and post- investment. At the end of the chapter the reader should have a general but complete idea of how the market for early financing works.

5. Business Angels

The objective of this Chapter is to provide an overview on the scientific knowledge on business angel investors, trying to provide an understanding of their main characteristics and practices. The following sub-sections first look at definition and general characteristic of both the investors and the market in which they operate. Subsequently, investment processes are analysed, breaking down the investigation following the Wallmeroth et al. (2018) framework. Therefore, following sub-sections can be grouped in Pre-Investment, During the Investment and Post-Investment practices, as findings of past research. Finally, a brief conclusion of the chapter highlighting how the main literature gap have led to this work. Indeed, I find that most of studies on entrepreneurial finance and in particular in angels investing are start-ups oriented, and therefore, perform their analysis from the financed venture point of view. Moreover, I add that studies on behavioural features are at a basic level and represent an interesting expansion of currently overlooked research streams. Finally, this work opens to the new potential stream of research of comparative analysis between different financing sources.

5.1. Definition and characteristics

Business angel definition is generally quite uniform across literature. Most definitions agree that: business angels are high net worth individuals accredited as investors that invest their private wealth into a venture that is usually local, unlisted and without any connection to the business angel (Bonnet & Wirtz, 2012) (Capizzi V. , 2015) (Wetzel W. , 1983) (Agrawal, Catalini, & Goldfarb, 2014) (Berger & Udell, 1998). Other definitions also add that business angels only assume minority stakes in the companies in their portfolio (Mason C. , 2008). business angels usually a specific dimension of investment need, usually comprised between 100k and 500k euros, that is overlooked by institutional investors as venture capitalists. Because of the extremely high costs of assessing, due diligence, contracting, related to businesses in their early stages, these investments are not deemed interesting or profitable by institutional investors (Jeng & Wells, 2000) (Caprenter & Petersen, 2002) (Mason C. , 2009). business angels fill the equity gap derived by this lack of interest.

The role of business angels are not simple providers of equity capital. They play a major role also granting strategic support, networking, knowledge, monitoring and control, even though in a less structured way compared to institutional investors. This kind of non-monetary contribution is deemed as valuable as the invested sum (Harrison & Mason, 1992). Typically, business angels exercise these contributions either by becoming consultants of the invested firm, or by directly entering the board of directors of the venture (Mason & Harrison, 1996) (Mason, Harrison, & Chaloner, 1991) (Landstrom, 1993). Moreover, a close tie and interaction is formed between the angel investor and the venture, to safeguard but also endorse the investment. Sometimes, business angel are themselves former entrepreneurs. (Politis & Landstrom, 2002) (Ibrahim, 2008). Other times, they were in a managerial position inside another company (De Clercq, Fried, Lehtonen, & Sapienza, 2006) (Ibrahim, 2008). Their past career is relevant as their contribution and know-how are related to entrepreneurial and management (Mason C. , 2006) (Politis, 2008). Stating that all angel investors are either former manager or former entrepreneurs, however, is not true. Most researches agree that Business Angles are an overall heterogeneous group. These heterogeneity is reflected not only in their past experience but also in their investment practices and processes (Croce, Tenca, & Ughetto, How business angel groups work: Rejection criteria in investment evaluation, 2016) (Lerner, 1998). Overall, Politis (2008) classifies the possible non-monetary value brought by an angel in four main categories:

- Strategy – The business angel provides strategic input also based on its previous managerial or entrepreneurial experience. Its contribution lies in high-level decision making.
- Supervision and monitoring – The business angel shows commitment to avoid mistake in the invested venture management, in order to protect its investment.
- Networking – The business angel can further help the invested venture thanks to its professional contacts developed in a working lifetime. The network results helpful in finding business partners, in term of suppliers or customers, and in raising additional capital.
- Mentoring – The business angels relies on its experience to relief the start-up from the burdens that unavoidably arise from starting a new business.

Over time angel investors have begun to organize in higher level organizations. These organizations are called business angel Networks (BANs) or angel Groups (AGs). Participation in such groups is beneficial for five main reasons (Kerr, Lerner, & Schoar, 2014):

1. It is easier for entrepreneurs and start-ups' founders to get in touch with business angel Networks rather than with individual investors. Investors are enabled to increase their investment portfolio.
2. BANs usually combine investment from individual investors. While the single angel can invest less and reduce their exposure, the overall investment amount in each venture is larger.
3. Angels are able to increase the diversification of their portfolio and therefore reduce the risk deriving from their early stage investments.
4. The economies of scale in investments results in lower legal costs and due diligence costs.
5. There is a higher likelihood of finding more experience angels inside a network, angels that can leave a higher impact on the invested start-up.

In addition to these insights, further research highlights other characteristics of business angel Networks (Mason & Harrison, 1997):

- Often business angels Networks are locally developed
- BANs tend to be not for profit organizations
- BANs can have specific targets, showing for instance the propensity to invest in a specific industry, or focus on specific traits (as a BAN specialized in investing on women entrepreneurs, see Mason, Botelho, & Harrison (2016)

Analyses deriving from BANs associations are the very promising, leading often to interesting results. For instance, BANs are found to provide valuable information, networking and monitoring to a level unachievable by an independent angel investor (Bonini, Capizzi, Valletta, & Zocchi, 2016). The same authors conclude that angels in groups benefit from risk reduction, and decreased monitoring costs. Moreover, first findings on business angels' behaviours determine that their unwillingness to monitor negatively affect the investment amount, but only if the angel is independent. In case of investors inside a BAN, they can take advantage of the shared control exercised on the invested start-up. Therefore, not only are BANs beneficial to angels, but angels also acknowledge these benefits and are willing to take advantage of them.

Below, some key numbers on the business angels' market are presented in "Figure 7 – Key figures on the European business angels Market" (source: EBAN, 2017)

	Average investment per company		Average investment per BAN		Average investment per BA
2017	€ 182.000	2017	€ 1.536.000	2017	€ 25.400
2016	€ 166.000	2016	€ 1.386.000	2016	€ 22.500
2015	€ 184.000	2015	€ 1.291.000	2015	€ 19.990
2014	€ 174.000	2014	€ 1.232.000	2014	€ 20.000
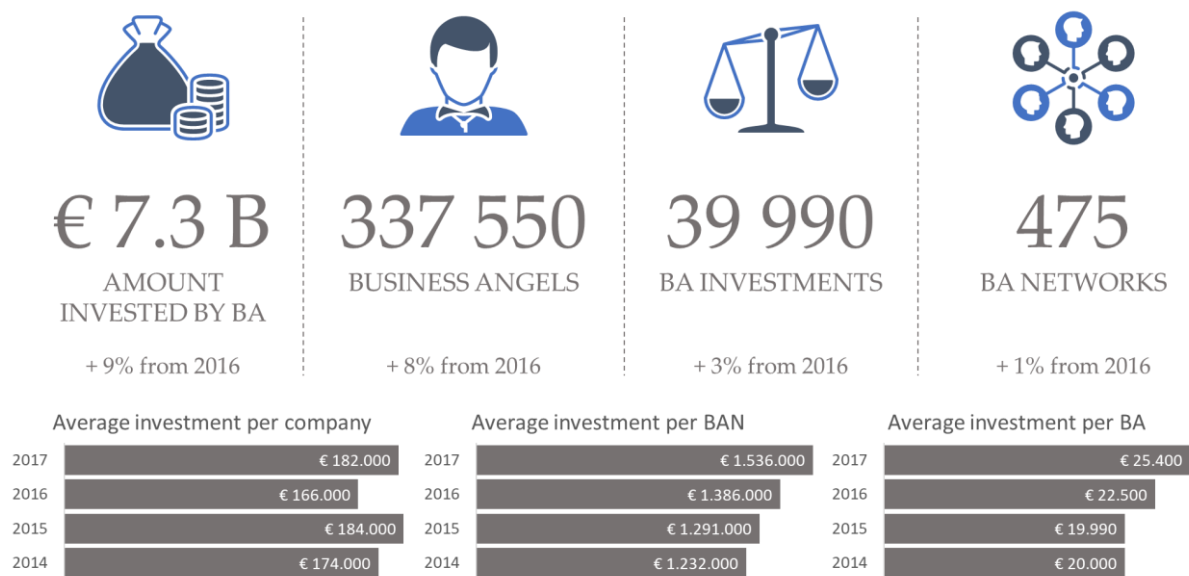
FIGURE 7 – KEY FIGURES ON THE EUROPEAN BUSINESS ANGELS MARKET

5.2. Market and research

When trying to understand the dimension of the business angels' market, Wetzel (1983) interestingly notes that for each venture financed by a venture capital funds, there are ten start-ups backed by business angels investments. Therefore, the market of informal venture capital is of considerable dimensions and for sure plays a significant role in start-ups early financing. However, its study has always proved to be difficult. The market is highly opaque, and this lack of transparency lead to numerous unanswered questions (Wetzel W. , 1983). Mason (2006) express the same view in a more definitive way stating that information as dimension of the market is unknown, and probably unknowable. This characteristic of the angels' market is a serious hindrance while conducting research affecting the data availability and the representativeness of any sample based on survey (Capizzi V. , 2015). However, the emergence of angels' groups and angels' networks constitutes a breakthrough as the self-organization of the angels into institutions makes them more visible, laying the basis for new research streams.

Mason (2006) suggests to periodically seek out contact with those groups to collect information on their investments, rather than spending effort and time in search of individual angels whose informal contribution remains invisible. Indeed, there is evidence on how easier it is becoming to collect data on business angels for research,

a trend that can be explained by the rise of co-investments and angels' groups (Wallmeroth, Wirtz, & Groh, 2018).

Sources of data have developed accordingly. Data can come from open sources as online platforms (Werth & Boeert, 2013) or from surveys (Mason & Harrison, 2002) (Bonnet & Wirtz, 2012) (Bonnet, Wirtz, & Haon, 2013). Recently, few researches in Italy showed hand-collected dataset collected thanks to the collaboration with the Italian business angel Network (IBAN), (Capizzi, Valetta, & Zocchi, 2016) (Bonini, Alkan, & Salvi, 2012).

According to Wallmeroth et al. (2018), researches is developing in three main directions and topics:

1. The individual angel – This stream works on the identification of business angels to understand how they operate in the market.
2. Comparison between formal and informal Venture Capital – This stream works on the main differences between institutional investors as Venture Capitalists and business angels
3. Comparison between independent angels and angels' organizations – Given the increasing importance of business angel Networks (BAN), this stream analyses the differences between BAN and non-BAN angels' investments.

In particular, the last research topic is particularly interesting since, as already mentioned, finding business angels Networks is far easier than identifying individual investors. Analyses starting from BANs associations are the most promising, nevertheless the limited data availability allowed research to took off only in recent years. Moreover, research on business angels Networks is seen to be likely to replicate itself. Indeed, studies very often depend on BANs that have local reach and are therefore very fragmented. Different databases are in conclusion developed for each region, with authors specializing in their own country. Mason and Harrison in UK, Bonnet and Wirtz in France, Capizzi and Bonini in Italy are currently leading the research. In particular, the collaboration with Capizzi and UNIUPO is enabling the research conducted in this paper.

Finally, this paper works on a fourth stream of research that has been overlooked so far: the level of analysis is a comparison of the behaviour of different investors categories. In particular, business angels are analysed in contrast to crowd investors.

5.3. Pre-Investment Stage

Wallmeroth et al. (2018) in their literature review deduce that research in the investment process of business angels is still a partly unexplored stream, requiring more study to understand the procedures and implication related to this type of investors. This lack of knowledge is partly traceable to the heterogeneity of this category. This heterogeinity takes place in terms of characteristics of the individuals as well as comprehensive features of the investment, whether performed independently or in a group. This differentiation is relevant since the processes applied by independent investors strongly differ from those of networks and syndications (Mason, Botelho, & Harrison, 2016).

Different authors outlined different model for their analysis of business angels' investors. Amatucci & Sohl (2004), develop for example a three stages model consisting of search, negotiation and post-investment. Other authors outline a more comprehensive models comprising an eight stages procedures (Riding, Haines, & Madill, 2003) (Van Osnabrugge & Robinson, 2000). However, all these models are based on theoretical assumptions with no empirical basis. Instead, Paul, Whittam, & Wyper (2007) have developed a valid framework based on empirical foundations. This model has five steps: familiarization with the venture, screening, negotiation, post-investment relations and exit. This model also takes into consideration possible differences between formal and informal proccesses. The former are related to business angel Networks, the latter comprises independent investments and co-investments if performed by independent angels. Wallmeroth, Wirtz, & Groh (2018) remark that even these small differences and details (Networks and co-investment performed by independent angels) are relevant, and should be taken into account. The time proximity of the analysis by Paul et al. (2007) is an indicator of how under-researched is each stage of the angels' investment process, and that my knowledge can therefore only be at an basilar level. The complexity is hightened considering that formal associations as business angel Networks work by different stages (Mason, Botelho, & Harrison, 2016). Future analysis showd focus on differences between angel processes when acting individually or in groups (see Bonin et al., 2016) and on differences between formal and informal venture capitalists (VC and BA) (see Goldfarb et al., 2007).

Most studies of pre-investment stages focus on the factors influencing the decision. The investment decision is determined by many features, as specific details in the relationship between angel and venture, as well as a successful pitch show to the

business angels (Carpentier & Suret, 2015). Findings have often practical implication to improve the market. Indeed, a relevant identified reason for an investment rejection is that start-ups' entrepreneurs are not well-versed in business angels' procedures. In addition, investments are growing in heterogeneity, a fact that reflects in a more consistent split between angels in network, with more established and formal procedures, and independent business angels, who act more on a case-by-case basis.

Not only investments, but also business angels are a heterogeneous group, with differences that can be found in any feature, characteristics or behaviour, and these differences have an impact. For instance, the level of industry expertise varies among angels. Mitteness, Baucus and Sudek (2012) find that this difference has a less significant impact in the screening stage, growing stronger in more advanced steps. On the other hand, these differences are often a strenght point: business angels in co-investment can share also other resources, as knowledge for instance (Leavitt, 2005). Other interesting result are related to Business Angel Networks. Diamond (1984) has long identified possibile hindrance to the development of the investment markets. Costs as information, search and monitoring have strong consequences: as they increase, fewer business angel find convenient the entrance in the market, resulting in fewer deals (Hellman & Thiele, 2015). Business Angels Networks act as intermediaries, decreasing search cost and enjoying economies of scale related to information and, in later stages, monitoring (Mason & Harrison, 1997).

Investment criteria range in a wide spectrum of investment features, venture characteristics, and investor traits. The most important ones are presented below in "Figure 8 – Decisive factors to start an investment". (source: Directorate European Commission, 2017)

Team	Growth Potential	Idea Concept	Quality of Business Plan
90 %	51 %	50 %	24 %
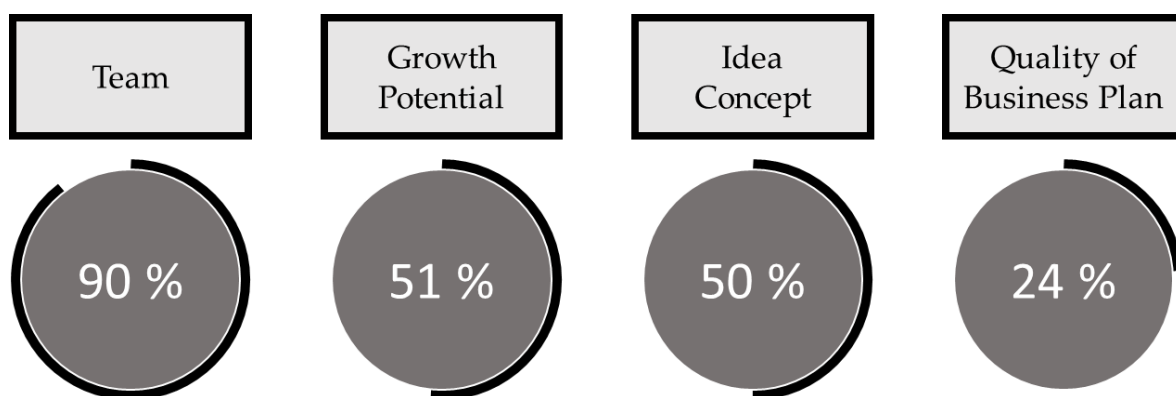
FIGURE 8 – DECISIVE FACTORS TO START AN INVESTMENT

Instead, in "Figure 9 – Main reasons to reject an investment" the main reason to refuse an investment opportunity are presented.
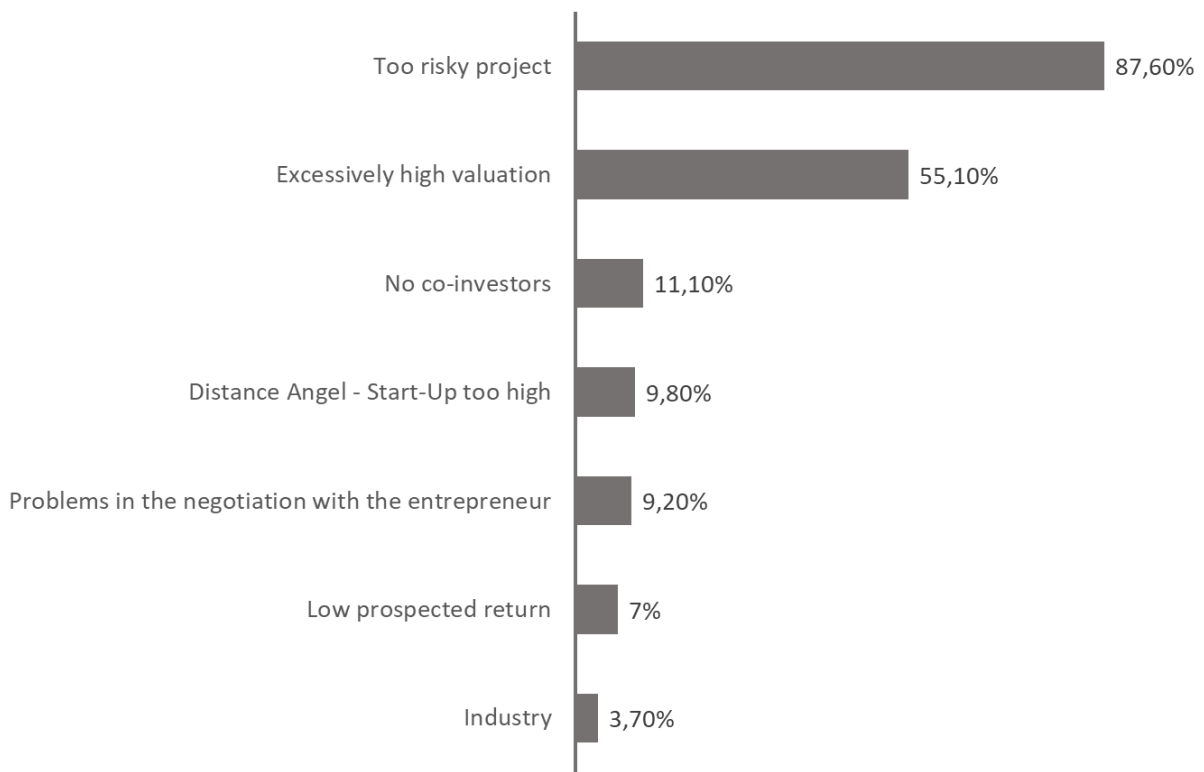
FIGURE 9 – MAIN REASONS TO REJECT AN INVESTMENT (EBAN, 2018)

Venture already related with institutional investors are more likely to overcome the screening phase of business angels (Croce, Tenca, & Ughetto, 2016). Angels show the highest interest for the start-up entrepreneurs and management team. These elements are often the main reason for rejection, as confirmed by a variety of studies. As an example, Wetzel (1983) concludes that main reasons for rejections are a lack of belief and trust in the venture management team, followed by unsatisfying deal features, as a perceived wrong pricing, and finally entrepreneurs' inadequacy or knowledge lack of their product or market. Capizzi (2015) again states that the management team is the critical aspect in overcoming the screening phase from angels. Moreover, other reasons for rejection are a lack of information provided by the entrepreneurs, and unsatisfactory features regarding the deal itself, as pricing, or regarding the start-up, as products and process issues or weak growth potential (Prowse, 1998). In addition, deals are more likely when the angel's objectives are aligned with the objectives of the entrepreneurs (Goldfarb, Hoberg, Kirsch, & Triantis, 2014). Other researches point to behavioural traits. Important highlights show that business angels show a more

favourable attidude if entrepreneurs are of similar nature and likeminded. Similarly, entrepreneurs showing mentoring attitude positively influence its relationship with business angels, increasing deals likelyhood (Balachandra, Sapienza, & Kim, 2014). Finally, a few sudies focus on purely behavioural traits. For instance, the relationship between entrepreneurs and business angels is influenced by the entrepreneurs dedication to the project. Higher passion results in a stronger tenacity, and those traits are extremely valued by business angels. The impact is even higher for business angels with entrepreneurial experience themselves, that can more easily link with the start-ups' founders (Murnieks, Cardon, Sudek, White, & Brooks, 2016).

5.4. Investment Stage

Investments performed by business angels are divided in four main categories:

1. Individual Investments
2. Investments with other business angels, either in a syndicate or in a business angel Network
3. Investment with crowd-funding investors
4. Investments with institutional investors

Taking into consideration these four categories together with differences among business angels mentioned in the previous paragraph, it is reasonable to believe that each typology can achieve a deal showing different contracting and ownership structure. Studies in this field are at an embryonic level. As a further drawback, there is a good chance that the minimal conclusions achieved are influenced by local regulatory frameworks, losing in absolute validity.

When investing in a venture individually, business angels acquire an ownership structure that recalls that of a minority equity holding. Goldfarb et al. (2014) find that entrepereneurs keep a large majority after the investment. In their analysis, business angels only retain an average 7.5% of common equity shares, compared to the remaining almost completely in the hands of entrepreneurs. Concerning contracting, usually business angels do not put strict limitations on expected cash flow (Goldfarb, Hoberg, Kirsch, & Triantis, 2014). Not even one of the investments analyzed included the distribution of cumulative dividends in the deal. Authors therefore conclude that deals are very often more favourable toward entrepreneurs. Indeed, less stringent deals are more advantageous to start-ups, and it has often been pointed out that business angels want to be aligned with entrepreneurs interests (Bonnet & Wirtz, 2012). Another explaination accounting for this feature lies in the fact that often

business angels invest with other objectives a part from profit (Ibrahim, 2008). Indeed, business angels are the originators of the capital they are willing to invest, and therefore they do not need to provide justifications or returns to investors, as Venture Capitalist have to instead. On average, common equity is the most frequent in deals between angels and entrepreneurs, more complex forms are used only for larger investments (Wong, Bhatia, & Freeman, 2009). Also contracting shows peculiar features, especially if compared with institutional investors. Indeed, investments are often delivered in single tranches, business angel presence in the financed venture board is found only in half of the investments, negative covenants are quite uncommon and exit rights are not specified. However, this is only a general indication of contract characteristics, that generally can vary a lot also given the heterogeneity of the business angels population. In addition, the features specified in a contract depend on the business angel's expertise (Prowse, 1998). Interestingly, Prowse (1998) also finds that business angels often hold a seat on the board and the majority of voting rights. This contraddictory result on business angels' contracting shows how, different samples can lead to different outcomes and conclusions.

Co-investments show specific features, in contracting and in the deal. Indeed, when business angels co-invest, contracts are more similar to Venture Capital funds' ones (Ibrahim, 2008). To understand this conclusion, the author suggests that investments performed by groups involve a larger flow, and larger investments amount are only required for more advanced and developed ventures, so it's reasonable to expect the contracting process to resemble that of Venture Capitals. Moreover, the involvement of many business angels in co-investments results in higher information asymmetry issues, a problem that the parties try to limit through higher contractual means (source: MIT Entrepreneurship Centre, 2000). Consequently, often contract arising from groups of angels also include a list of rights, namely: voting rights, provisions, demand rights and information rights.

A combination of business angels and crowd-funding is often documented (among the possible causes, also for regulatory framework stating that a percentage of the flow collected from crowd investors must arise from institutional investors). However, research on this topic is minimal and the roles and impacts of business angels in regards of crowd-funding is still unclear (Hornuf & Schmitt, 2016) (Brown, Mawson, Rowe, & Mason, 2015). Contracting is generally eased, as business angels invest through a platform as the crowd investors, and generally agree to the same contract of

all the other investors, even though their invested capital is typically higher than the average crowd investor (Klohn, Hornuf, & Schilling, 2016).

Deals involving both business angels and Venture Capitalists show peculiar features. When an angel partners with an institutional investor, its control rights are usually weakened (Goldfarb, Hoberg, Kirsch, & Triantis, 2014). In addition, its rights are not as strong as the Venture Capitalists' ones, and they also invest less than the institutional counterparty (Witlbank & Boeker, 2007). Ibrahim (2008), in his study, argue that this feature might be required by Venture Capitalists: simpler contract and less control are a fundamental prerequisite for possible future contributions or investments by the VC itself. A lower complexity is not pursued only by Venture Capitalists, but also by business angels. Indeed, their behaviour already consist in monitoring and getting involved in the start-ups' ongoing, meaning that a more formal contractual control is not necessary as it is for Venture Capitalists. Other reasons include a reduction of legal expenses related to simpler and less strict contracts, that in turn increase the efficiency of the deal for a business angel (Ibrahim, 2008).

5.5. Post-Investment Stage

Even though recent research has begun to uncover aspects related to the post-investment phase, this stage is currently the most under-examined among all the five steps of the investment process (Paul, Whittam, & Wyper, 2007). However, this stage is where business angels add their contribution to the invested venture, and therefore scientific interest is increasing.

Findings related to features of the post-investment stage have a considerable implication for entrepreneurs looking for funding and are therefore of highest interest to them. Indeed, venture financed by business angels in early or seed stages have a higher likelihood of succeeding in subsequent funding rounds, for instance with more institutional investors as Venture Capitalists. Instead, experiencing a business angel investment in later stages is related to higher chances of success, when measured by IPO valuation of exit through acquisition (Croce, Guerini, & Ughetto, 2016). Moreover, funding from business angels and co-investment with a Venture Capital funds is found to increase the likelihood of a successful IPO. These results have an impact on entrepreneurs looking for funds that may reconsider business angels as possible alternative to conventional institutional investors. In terms of venture performance, results are encouraging (Kerr, Lerner, & Schoar, 2014). Start-ups financed by angel investors outpace similar not financed venture by having a higher probability of

success, experiencing higher growth rate and, again, by increasing the chance of succeeding in following funding rounds. Interestingly, the authors use innovative metrics to measure success, metrics that are more closely related to the nature of the start-ups and less to conventional indicators. For instance, a good proxy for growth is considered the growth rate of web-site traffic.

Moreover, governments can play a role in ventures' performances. In fact, Business Angel Networks reduce information issues and can often provide help to the financed start-ups in dealing with financial aspects. When analysing the effects of governmental subsidiaries on business angel Networks, Collewaert et al. (2010) argue that it is beneficial to the ventures increasing the availability of funds to the start-ups, and eventually leading to further economic development. However, this study has to be refined to achieve more robust conclusion, also given the local level of analysis, related to a single country. In general, deals arising from Business Angel Networks are at least as qualitatively good as deal from indeendent angels. Business Angel Network do not carry higher risk, have analogous growth rates and return when compared to independent deals.

Returns of business angels' investments are subject of analysis of Capizzi (2015) in Italy, and Mason and Harrison (2002) in UK, thanks to the exploitation of unic databases comprising more that a hundred of deals. Capizzi (2015) shows that business angels achieve higher than expected internal rates of return (IRR) is the investment lasts for at least three years, suggesting that business angels should look for longer term investment in their strategy. This is generally a spread practice among business angels, as found in the annual statistical report drafted by EBAN (2017). The investment duration is summarized in "Figure 10 – Time horizon of business angels investments".
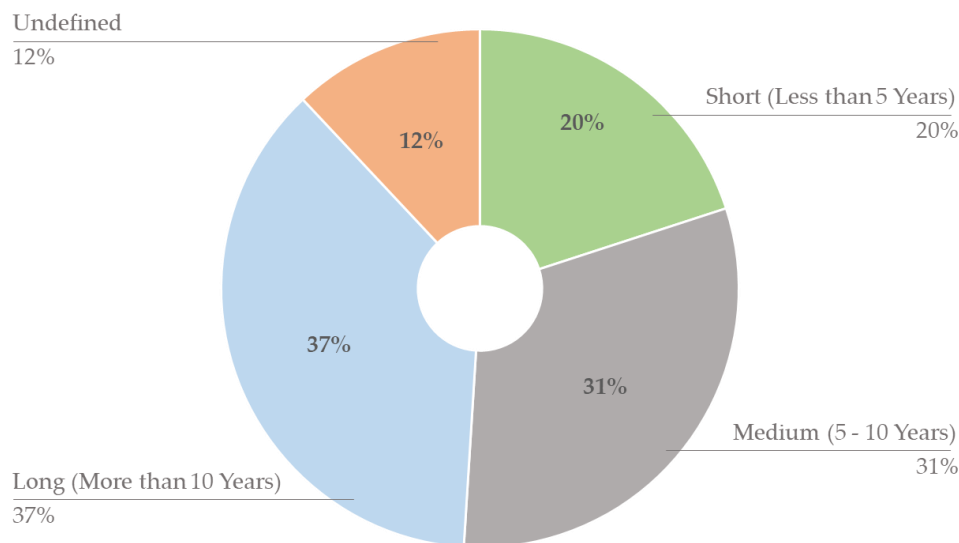
FIGURE 10 – TIME HORIZON OF BUSINESS ANGELS INVESTMENTS

The IRR gained by the angel investors often depends on the selected exit stategy. Capizzi (2015) identified five preferred options for exit:

1. Closed activity
2. Buy-back from the entrepreneur or the management team
3. Sell to another company
4. Sell to another investor (also institutional)
5. Exit through IPO

The analysis suggests that buy-back is the least profitable exit strategy, and that is usually pursued when all the others have failed, while closed activity shows negative returns for obvious reasons. business angels' expertise plays a role, however with unexpected implications for the achieved IRR. Indeed, the relationship between IRR and angels' experience is in the form of an inverse U-Shape. Higher expertise positively impacts returns up to a certain level, after which the correlation becomes surprisingly negative. Capizzi (2015) attributes this phenomenon to overconfidence. Higher returns are correlated to longer terms investments, in particular IRR increases for long term investments with a duration longer than three years. Moreover, more selective business angels, analysing a higher amount of deal and rejecting more of them, show a higher IRR. Mason and Harrison (2002) only partly confirm these results. They find that almost half of their overall investment sample result in a loss (34% lose all the investment, 13% achieve a small loss or eventually repay the initial investment), and only a minority constitutes great profit (around 23%) with a IRR of at least 50%.

In their sample, most investment are held for four years and the divestment strategy is a trade sale to another company, thus differently from the analysis performed by Capizzi (2015), that studies on a more variegated sample. On average, successful seems more likely when business angels do not invest alone, so either in a syndicate or in a Network, or when the venture receives following investment rounds. Follow-up investments are correlated to an initial investment of at least 100,000 pounds. In most co-investments, the players involved are other business angels, even though a considerable share of angels collaborate with institutional investors. Another insight is related to the angels' objective. It is generally acknowledged that Venture Capital funds are willing to find the so-called one-in-a-million start-ups, even at the cost of losing money in other investments. Instead, business angels' objective is to contain losses, and therefore to avoid investing in possible failures. The different mindsets of these two investors categories are a possible concern of internal conflict when they co-invest.

Co-investing with institutional investors as Venture Capitals has positive and negative consequences. Indeed, co-investing allows knowledge sharing that result in higher growth rates of the invested start-ups (Bonnet, Wirtz, & Haon, 2013). However, in general business angels and Venture Capitalists have different objectives, and these objectives may in their turn be different from entrepreneurs' ones. (Stevenson, Muzyka, & Timmons, 1987). These difference in goals may eventually lead to conflicts, and conflicts negatively impact on the venture's performances (Collewaert, 2008). On the other hand, differences among investors group and also entrepreneurs can also stimulate a higher and faster learning, thus resulting beneficial to the venture and boosting growth (Bonnet & Wirtz, 2012). In general, as already stated previously, entrepreneurs and business angels tend to be more aligned (Business angels prefer investing when they sense a like-minded entrepreneur), so most problems arise when a third party enters in the game, as an institutional investor. In this case, the relationship among all the actors increase in complexity and the learning process may be hampered (Bonnet & Wirtz, 2012). To conclude, differences among parties involved may be on one hand useful to accelerate the venture's growth, if properly managed (Bonnet & Wirtz, 2011), on the other may be harmful to the venture, for instance pushing institutional investors to exercise their contractual control right, at the expenses of the angels investors (Leavitt, 2005).

Co-investments among business angels, in the form of syndication or inside a network, have a significant impact increasing the chance of success of the exit, whether it

happens through an IPO or a trade sale to another company (Werth & Boeert, 2013). Indeed, this feature is credited to the relationship built among angels. The connections among investors help building the success of the investment thanks to a shared managing and control, as well as an increased possibility to draw on other contacts for counsel. Co-investment between angels are reported to consist of larger deals and to ease subsequent investments rounds (Gregson, Mann, & Harrison, 2013). On the other hand, a trend toward larger deals means that overall less investments of higher entity are generated, with the possible creation of a further equity gap for start-ups requiring lower investment amount.

Another feature analysed is the distance between business angels and the invested start-ups (Harrison, Mason, & Robson, 2010). Research shows that the higher the investment amount, the higher the distance among parties. However, co-investment involving more than one angel tend to be short-distance, as the angels group wants to develop a stronger bond and relationship with the invested venture. Another result points that short distance investments are more focused on early stages start-ups, but the same applies to business angels: at their first investments they prefer ventures nearly located, and as they proceed with further investments, they start looking for more distant start-ups. Finally, angels willing to play an active role in the venture management and to invest a higher amount of money usually look also for high distance investments, while passive angel investors putting less money in the venture prefer more close-by ventures. Statistics representing the distance between the angel investors and the financed ventures as collected by EBAN (2017) are reported in the graph "Figure 11 – Distance between business angels and financed start-ups".
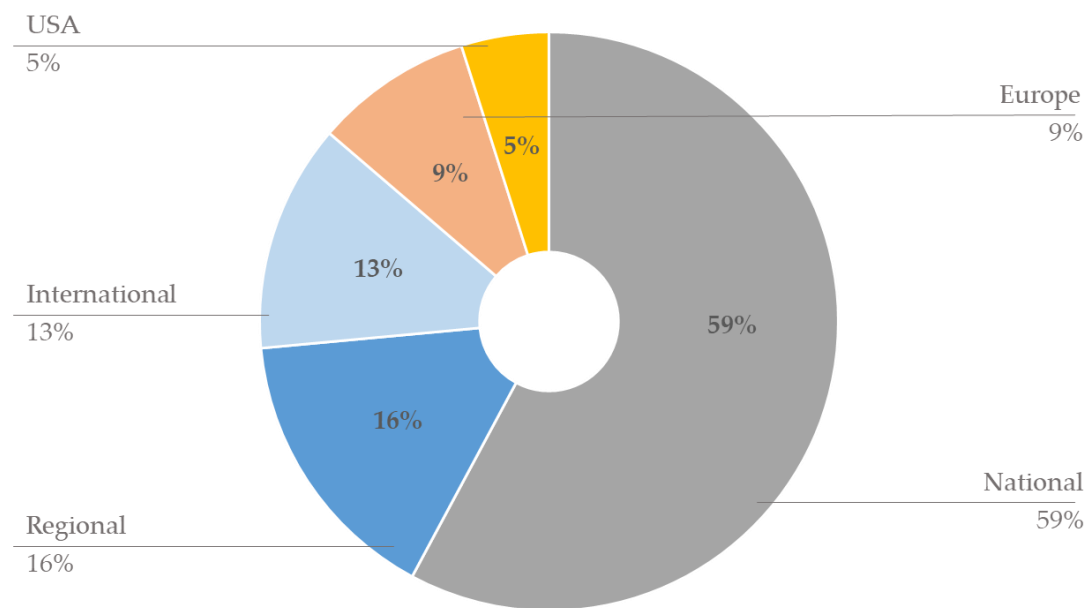
FIGURE 11 – DISTANCE BETWEEN BUSINESS ANGELS AND FINANCED START-UPS

5.6. Conclusions and gaps

In the previous sections, all the main theoretical achievement on business angels' research are displayed, categorized by a common topic classification (Pre-investment, during investment, post-investment stage).

The main outcome of research is a high level of heterogeneity inside the business angels' market, much higher than, for instance, Venture Capital one. Indeed, the latter has undergone over the years to a process of standardization that has not happened yet among business angels. In such a context, individual characteristics as knowledge and expertise are relevant and should always be considered in current research. Heterogeneity also leads to partial if not contradictory results (as mentioned in the previous sections, see Prowse (1998) and Wong et al. (2009)) while difficulty in data gathering leads to a fragmented and local research. The increasing role of organizations as business angel Networks have helped shedding light on the topic, partly also because they decrease the heterogeneity of business angels making the investment process more rigorous and formal. As the difference between business angels and Business Angel Networks grows, research should highlight it better and proceed in future analyses considering the two entities as separated (Carpentier & Suret, 2015). Overall, heterogeneity is not only a major research topic but also a central point of discussion regarding the theoretical approach used to study business angels.

Even currently accepted results must be considered at least partially incomplete. For example, it is unclear why some relationship between business angels and entrepreneurs generate more value compared to others. This means that conventional approaches, considered more than valid for Venture Capitalists and based on traditional view on an investment based on monitoring, control and principal-agency theories (Wirtz, 2011). The author also suggests using other theories commonly used in strategic management as the renowned Resource-Based View (RBV) or Knowledge-Based View (KBV) to better understand the decision process and eventually the behaviour and contribution of business angels.

To conclude, research on business angels is at a cross-road. Future research of independent business angels will probably go on in the examination of business angels' heterogeneity to further develop the understanding of this topic. The other stream that will receive a growing attention is related to Business Angel Networks, keeping in mind that those analyses should be kept separated. Indeed, business angel Networks will probably be studies with a theoretical approach more similar to Venture Capitalist one, due to the growing rigorousness and formalized processes of these organizations, that so far resemble those of early stage Venture Capital (Ibrahim, 2008).

As regards the literature gaps identification, Wallmeroth et al. (2018) in their literature review deduce that research in the investment process of business angels is still a partly unexplored stream, requiring more study to understand the procedures and implication related to this type of investors. This lack of knowledge is partly traceable to the heterogeneity of this category. This heterogeinity takes place in terms of characteristics of the individuals as well as comprehensive features of the investment, whether performed independently or in a group. This differentiation is relevant since the processes applied by independent investors strongly differ from those of networks and syndications (Mason, Botelho, & Harrison, 2016). Most studies of pre-investment stages focus on the factors influencing the decision. The investment decision is determined by many features, as specific details in the relationship between angel and venture, as well as a successful pitch show to the business angels (Carpentier & Suret, 2015).

Most studies on the pre-investment stage focus on the success of the venture in managing to secure the investment. Those study look at the investment success in terms of go/no-go decision. Wetzel (1983) identifies the main reasons for rejection of an investment opportunity. In its analysis, the primary reason to reject an investment is a lack of trust in the management team, followed by unsatisfying deal features (as a

perceived wrong pricing) and finally business plan inconsisttency or entrepreneurs' lack of knowledge. Also Capizzi (2015) states that the management team is one of the most critical aspects in determining the success of the investment. Again, a report from the Directorate European Commission (2017) looks at the major factors determining the successful closing of the investment. In conclusion, the majority of the studies are start-up orionted, and look at the features required in the ventures to have higher likelyhood of success.

There are a few researches analysing behavioural traits. Goldfarb et al. (2014) states that deals are more likely when the angel's and the entrepreneur's objective are aligned. Murnieks et al. (2016) show that deals are more likely if entrepreneurs show a higher dedication to the project and a higher tenacity.

To conclude, most of existing studies on the business angels' investment decision-process focus only on the success of the investment and perform their analysis mainly from the venture view point. Capizzi et al. (2018) first start analyzing the practices of business angels from the investors perspective, looking at behavioural features of the angels involved. Capizzi et al. (2018) laid the foundation for this paper by poiting to a new research stream and a knowledge gap that still requires furter investigation. In addition, this work builds on the former one by preseting comparison features between different investor categories.

6. Crowd-Funding

The objective of this Chapter is to provide an overview on the scientific knowledge on crowd-funding investors, trying to provide an understanding of their main characteristics and practices. The following sub-sections first look at definition and general characteristic of both the investors and the market in which they operate. Subsequently, following the same analysis performed on business angels, investment processes are analysed, breaking down the investigation following the Wallmeroth et al. (2018) framework. Therefore, following sub-sections can be grouped in Pre-Investment, During the Investment and Post-Investment practices, as findings of past research. Finally, a brief conclusion of the chapter highlighting how the main literature gap have led to this work.

Indeed, I find that research on crowd-funding has started to gain traction on in the last few years, and, therefore, even though the first conclusions are started to be drawn, they are still deemed to be at their initial stage, with any contribution adding to a knowledge that is still under-researched. In this work, for the first time I try to provide evidence on crowd investors behaviour, and I also open to a new significant research stream of comparative study between different financing sources.

6.1. Definition and characteristics

The term crowd-funding was coined in 2006, after the rise and development of funding through the internet. This funding mechanism is based on the internet, and the spreading of the latter contributed to the propagation of crowd-funding practices all over the world. The crowd-funding model has spread in a variety of industries, and has been used to fund projects in many and diverse fields, that range from more innovative businesses as cleantech, biotech and e-commerce to more traditional sectors, as entertainment, food and beverage and energy (Hervé, Manthe, Sanajust, & Schwienbacher, 2016) (Kuppuswamy & Baus, 2015).
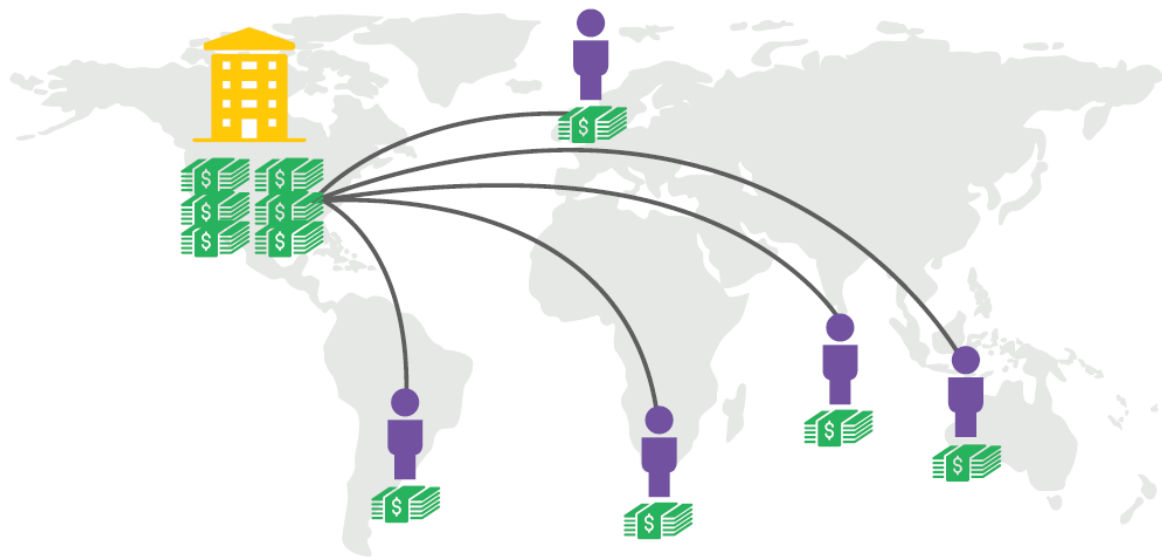
FIGURE 12 – HOW CROWD-FUNDING WORKS: SEVERAL SMALL CONTRIBUTORS SUPPORT A SINGLE INITIATIVE

Various definitions of crowd-funding generally agree but may focus on specific feature of the investment. If the focus is on the means that enable it, crowd-funding is defined as the channel through which entrepreneurs are able to get in touch with potential investors using the internet, and specifically through a platform that presents the start-up's business plan to potential investors (Griffin, 2013). Other definitions focusing on the type of investors point that crowd-funding is the practice of entrepreneurs collecting money from an external source that is represented by a large community of investors, the crowd (Belleflamme, Lambert, & Schwienbacher, 2014). Alternative points of view argue that crowd-funding is only one among many new smaller means of financing that arose after the crisis, thanks to very low interest rates that made the equity and debt crowd-funding grow at a rapid pace (Bruton, Khavul, Siegel, & Wright, 2015). Initially conceived in very specific institutional settings, crowd-funding is now spreading and evolving toward new forms. Indeed, crowd-funding was born to fill an increasing equity gap in the technology sector but is now diversifying into many separate niches as Real Estate (one of the most developed), art, and others (Felipe, Mendes-da-Silva, & Gattaz, 2017). These niches are in the end equity gaps in several sectors that might not have explicitly existed or been identified, but that have grown and are financed mainly by crowd-funding (Mollick, 2014). The growing presence of crowd-funding has implications on all the components of the chain of early finance. Indeed, the crowd-funding impact on very early stages of the financed venture has post-investment consequences (Drover, Wood, & Zacharis, 2017). These

consequences are however under-researched so far, in terms of implications both for the financed ventures, that have an easier to achieve source of funding in their first stages, and for other actors in the market, as business angels and Venture Capitalist, to whom the impact of crowd-funding and reaction to the new player has not been investigated yet.

Crowd-funding practices can be divided into six main practices, based on the type and mode of return provided by the invested venture to the crowd investors, respectively donation-based crowd-funding, reward-based crowd-funding, pre-purchase crowd-funding, lending-based crowd-funding, equity-based crowd-funding and royalty-based crowd-funding (Bradford, 2012) (source: Massolution, 2015). Often, the reward-based and the pre-purchase models are considered as one. Below, "Figure 13 – Crowd-funding typologies" gives an overview of the main features of each crowd-funding model, while a more extensive description is presented afterwards.

FIGURE 13 – CROWD-FUNDING TYPOLOGIES

The trends for all the crowd-funding categories can be seen in "Figure 14 – Breakdown of crowd-funding growth". Overall, these different streams show peculiar features:

1. The donation-based model states that the investor is purely donating capital to the entrepreneur and will not receive anything back for the money invested, making it an effective donation. Because of this feature, donation-based method is not the most used, and typically spread mostly for charitable fund-raising or not-for-profit organizations

2. The reward-base model, as suggested by the name, will provide investors with a prize or a reward, that cannot be related to payment of interests or share of

profits. Moreover, investors do not acquire a portion of the financed company equity. The reward can be anything, from a dedicated picture for the investors or meeting the entrepreneur to receiving the product in advance. In this sense, often reward-based and pre-purchase are considered related and often the same terminology can indiscriminately refer to both

3. The pre-purchase model is, as indicated by the name, a purchase in advance of the product that will be produced thanks to the capital injection by the crowd-investors. In this sense, this model is quite similar to e-commerce as investors pay on-line to receive a product after a certain period.

4. In the lending-based model, also called Peer-to-Peer lending, the capital provided by crowd investors has to be remunerated by interest payment. Interestingly, this typology is currently the most spread crowd-funding practice so far. In this case, an on-line platform works as an intermediator performing a series of tasks. Indeed, the platform lists and selects the companies or privates asking for loans and analyses the applicants track records, in order to assess their credibility and assign them an interest rate to be paid. At the same time, the platform collects money from many lenders, and whenever a loan is approved it splits the lenders' money among many loans for risk diversification. This kind of practice, more than competing on the early stage financing of start-ups is actually competing against the banking system and growing at a fast pace. However, its dimension is still too small to represent a real threat to established firms. Moreover, there are some differences, as the banking system is currently heavily regulated while for Peer-to-Peer there are softer constraints. Overall also loans typology generally asking on these platforms are considered riskier and charging higher interest rates, while good rating companies still approach conventional banking loans

5. The equity-based model comprises in turn many different sub-categories as investment-based, securities-based and crowd investing. In equity-based crowdfunding investors give money in exchange of a share of the invested venture. This work focuses on this category, which is the one referred to when analysing the early stage financing market.

6. The royalty-based model is based on the concept of royalty as for any other company, so that crowd investors will receive a share of the revenues earned by the funded venture.

Crowd-Funding growth 2012-2015
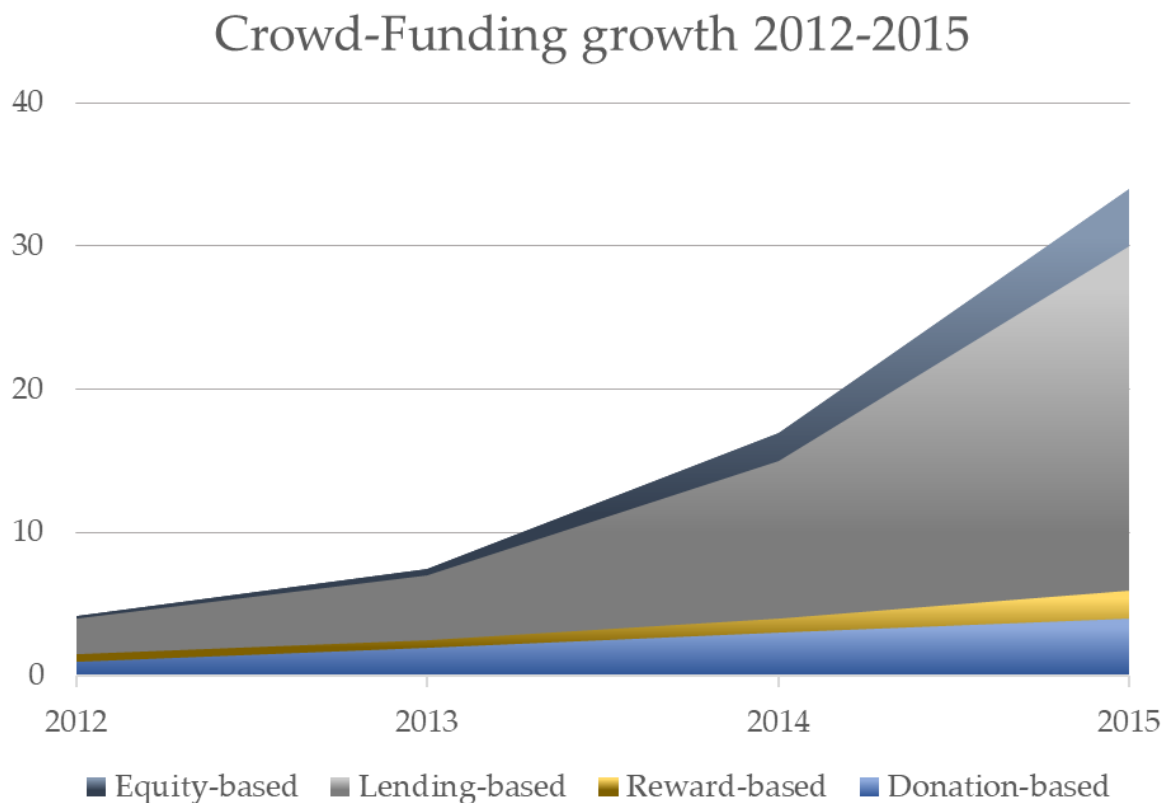
FIGURE 14 – BREAKDOWN OF CROWD-FUNDING GROWTH

Overall, the crowd-funding market, taking into consideration all the possible segments, has totalled around 34 billion of dollars. The leading market is the North America with more than $ 17 billion, even though I should consider that a minimal percentage is related to equity crowd-funding. Asia and Europe show a developed crowd-funding market raising more than $ 10 billion and $ 6 billion respectively, as shown in "Figure 15 – Crowd-funding money raised worldwide in 2015" (source: Fundly.com).
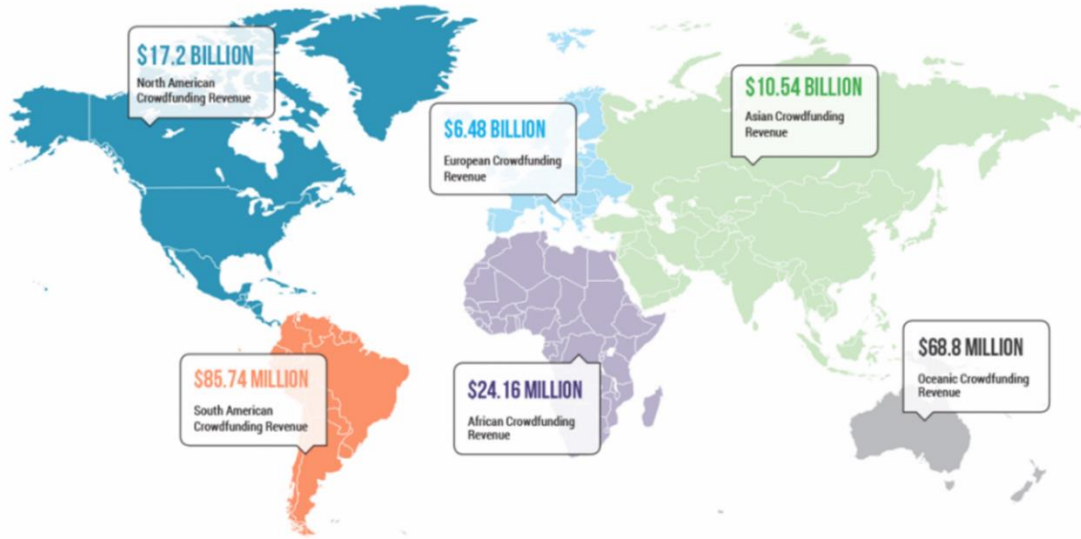
FIGURE 15 – CROWD-FUNDING MONEY RAISED WORLDWIDE IN 2015

Interesting as well is the extremely fast growth experienced by the crowd-funding market. From 2014 to 2015 the market roughly doubled, as shown in "Table 4 – Crowd-funding market growth in 2014-2015" (source: Massolution, 2015). These statistics has to be considered cautiously however. Indeed, these numbers comprise any typology of crowd-funding and, in particular, the figures of lending based crowd-funding is dominant on the equity based one, which is the focus of this work.

REGION	MONEY RAISED 2014 (BILLION $)	MONEY RAISED 2015 (BILLION $)	GROWTH 2014-2015
North America	9.46	17.20	81%
South America	0.06	0.09	50%
Europe	3.26	6.48	99%
Asia	3.40	10.54	210%
Africa	0.01	0.02	100%
Oceania	0.04	0.07	75%

TABLE 4 – CROWD-FUNDING MARKET GROWTH IN 2014-2015

The strong interest on crowd-funding is due to the evolution of the phenomena, born in recent years, and yet experiencing sharp growth in all the major streams. Currently, the most developed segment is Peer- to-Peer lending, both toward consumers and business. In addition, the latter is the fastest growing type of crowd-funding. Equity-based crowd-funding is the third stream in order of dimension and almost doubles every year. This information is summarized in "Figure 16 – Crowd-funding segments growth in Europe 2013-2015" (source: Cambridge Centre for Alternative Finance) and in "Figure 17 – Crowd-funding Segments breakdown and growth worldwide in 2014"

(source: Massolution, 2015). Both figures clearly show the current predominance of lending-based crowd-funding, a segment that is also growing at a very fast pace. However also the other typologies are experiencing consistently positive growth trends as the equity-based crowd-funding model, that is also the focus of this paper.

The outcomes of different types of crowd-funding can considerably vary, and a high variance is seen also along the same crowd-funding typology (Giudici, Nava, Rossi-Lamastra, & Verecondo, 2012). Indeed, in equity-based crowd-funding, only 6% of the projects raised less than $ 10.000, while 21% managed to raise more than $ 250.000, an amount that is at a comparable level if compared with traditional financing sources as business angels and Venture Capitalists. Instead, capital raised in the donation-based and reward-based crowd-funding is usually considerably lower, and only 10% of the launched projects manage to overcome $ 10.000 (source: Crowdsourcing LLC, 2012).
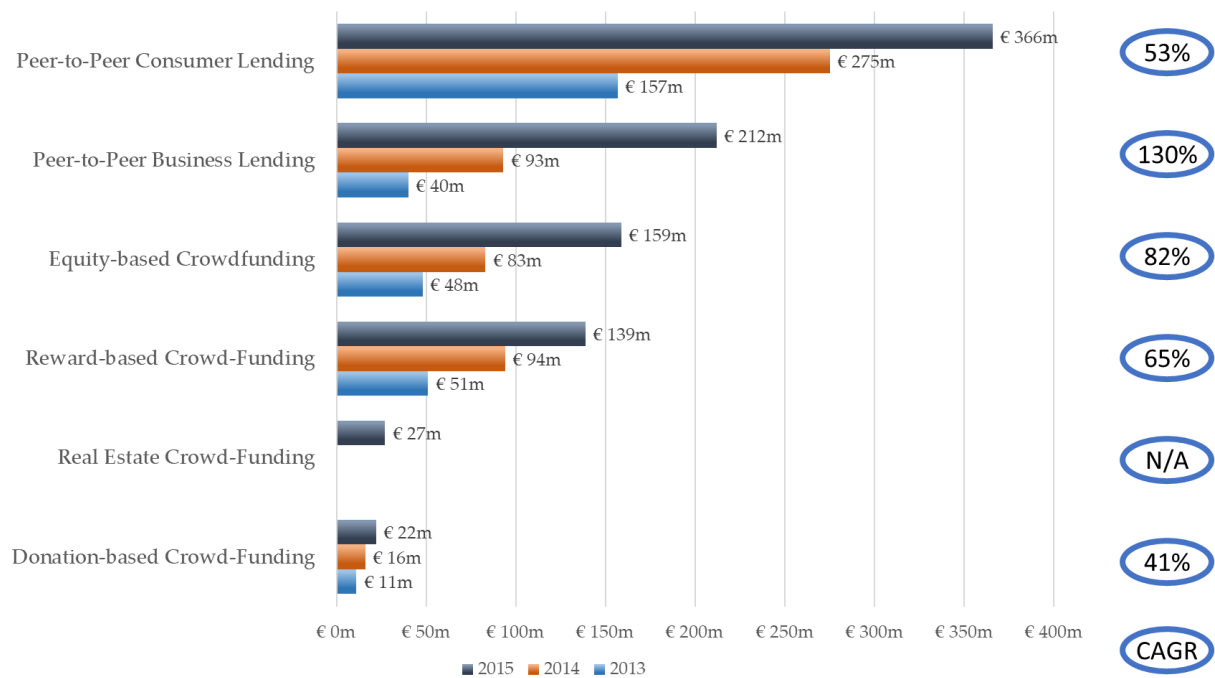
FIGURE 16 – CROWD-FUNDING SEGMENTS GROWTH IN EUROPE 2013-2015
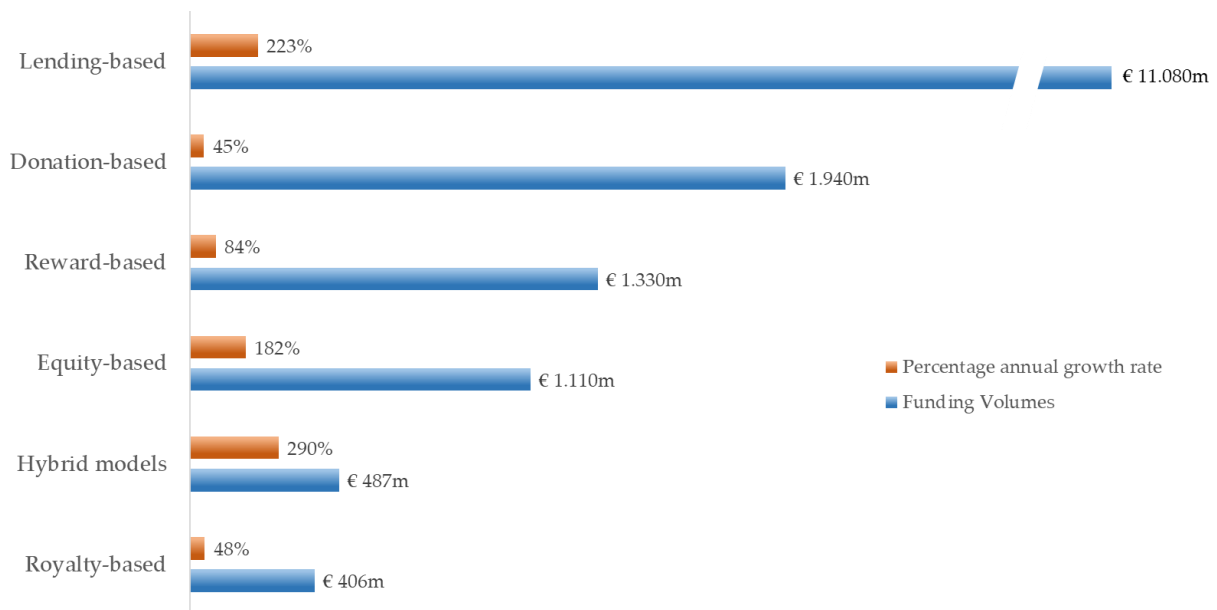
FIGURE 17 – CROWD-FUNDING SEGMENTS BREAKDOWN AND GROWTH WORLDWIDE IN 2014

Investment in crowd-funding can be directed toward a variety of purposes: projects can be civic, philanthropic or cultural aimed. In this paper, a central focus will be given to Entrepreneurial Projects. Another important distinction lies in the agreement between the financed project and the investors in the investment stage. This agreement can be structured in three main typologies:

1. "Take it all" – Investor are willing to accept any sum they manage to arise from the crowd-funding campaign. This contract is usually used only in the donation-based crowd-funding or in charitable projects, where even small amounts can be and are accepted. It is unlikely applied to entrepreneurial projects since it is not credible: Entrepreneurs must usually specify what they are going to do with the investment proceed, and therefore the amount they need is usually specified in advanced.

2. "All or nothing" – The crowd-funding campaign starts by stating a pre-defined investment sum that is the objective of the campaign. If the entrepreneurs do not manage to raise at least that amount, they will give the money back to the crowd investors. When the entrepreneurs manage to collect the selected amount, the campaign is closed, and no more individuals can invest money in the project. This feature raises the credibility of the project since entrepreneurs have to provide an accurate and reliable estimation of how they are going to use the investment proceed, and from this estimation the invested amount is

derived. This means that investors must present a realistic business plan that also leaves less room for frauds.

3. Minimum/Maximum Amount – This is similar to the "All or nothing" approach. The only difference lies in the fact that, rather that accepting only a specific selected amount, any total investment falling into a pre-defined range will be declared as a successful campaign. Campaigns that do not manage to raise their minimum threshold will be declared unsuccessful, and money will be given back to crowd investors, while if during the campaign the overall investment amount reaches the maximum threshold, then the campaign is successfully closed. As for the "All or nothing" approach, this kind of procedure increase the credibility of the capital seeking project. The two thresholds are set to leave some degree of flexibility to the projects. Indeed, within some limits the projects can be scaled up or down. So, usually entrepreneurs present a business planning analysing two possible scenarios, respectively one with minimum and the other with the maximum amount raised, to show how they would use the additional money raised.

An interesting issue when considering crowd-funding is related to protection of the crowd investors. Indeed, some stream of crowd-funding offer no regulation for investors, as in reward-based crowd-funding, that has been fertile ground for many frauds. Pre-selling offers the same degree of protection of any e-commerce deal. Instead, lending-based and equity-based are more regulated, offering debt and equity to the market. In particular, equity-based crowd-funding is related to securities sale to the mass market and is highly heterogeneous across countries, depending on the existing regulatory framework (Fraser, Bhaumik, & Wrigh, 2015). For instance, this crowd-funding form is less common in me due to issues in local regulation (Bradford, 2012). Another study confirms this finding, revealing that of the 1.5 billion $ invested in the equity crowd-funding, most are in the real estate financing (Mamonov, Malaga, & Rosemblum, 2017). The authors also contribute to the crowd-funding knowledge underlining the fundamental role of the platforms, that reduce information asymmetries between crowd investors and the financed start-ups, by performing analysis of the presented projects. Other countries have specifically developed laws to increase investors protection (Klohn, Hornuf, & Schilling, 2015). However, how protected the crowd investors are when they perform these kinds of deals is still on open question in many countries. In addition, the equity crowd-funding sector is

impacted by more protective laws that result in more conservative and slower growth (Bruton, Khavul, Siegel, & Wright, 2015).

Crowd-funding is a unique financing channel. In both Venture Capital and business angels, as well as in other conventional financing sources, there is always direct contact between the capital provider and the capital seeker. In crowd-funding instead, there is a platform acting as an intermediary, which constitutes also the specialness of this channel. The platform has such an important role in crowd-funding that it has to be studied and understood, and eventually formalized by researches. Platforms can vary both in terms of how they work, the services offered, the pricing mechanisms, of which very little is known in general. Some authors tried to shed some light on the platforms functioning by revealing that platforms have three main sources of income, respectively interests earned on capital committed by the crowd investors, fees charged for additional services, and transaction fees on the invested amount (Belleflamme, Omrani, & Peitz, 2015). The authors perform their analysis on multiple countries platforms, their strategy, characteristics and mechanisms, confirming the previously stated claim that crowd-funding platforms are quite heterogeneous among themselves. This heterogeneity reflects in the majority of internal processes, and services offered as well. For instance, the screening of potential start-ups is a valuable service whose offering varies across all platforms. Moreover, most platforms tend to specialize in only one of the mentioned crowd-funding streams.

Another peculiarity of crowd-funding is that the crowd investors very often are not professional investors, as opposed to Venture Capital funds and business angels. crowd characteristics have been investigated in many studies. Most crowd investors are male (Hervé, Manthe, Sanajust, & Schwienbacher, 2016), higher capital provision arise from investors that invest an higher amount but invest less often (Wallmeroth J. , 2016). In addition, more in-depth analysis reveal that crowd investors cannot be considered a homogeneous group, consistently varying among themselves. Often, part of the crowd belongs to the group of family and friends that support an acquaintance's project (Agraqal, Catalini, & Goldfarb, 2015). However, in literacy there is no general consensus on the characteristics of the crowd investors, varying consistently among countries and among different investments (Felipe, Mendes-da-Silva, & Gattaz, 2017).

6.2. Market and research

Among all the possible financing sources for early stage ventures, crowd-funding, and in particular equity crowd-funding, is the most recently developed. Its track records

in terms of practices and characteristics might not have settled yet because of its recentness and studies on the topic might not be conclusive, yet they are significant due to the emerging role of crowd-funding in alternative finance. The interest around crowd-funding is extremely high, as shown in "Figure 4 – Scopus Publication Statistics", which shows that more papers are produced every year on crowd-funding than on business angels. However, there are several different types of crowd-funding, as described in the previous Section, and a minority of the studies has a specific focus on equity crowd-funding.

An impacting feature on equity crowd-funding is the regulatory framework of each country. Indeed, regulation on the topic continuously changes and these changes have the can potentially alter the market as well. Overall, it is still unclear whether differences among countries depend on the regulatory framework or on other specific characteristics, and this might help explaining why researches prefer to focus on single countries' data so far (Wallmeroth, Wirtz, & Groh, 2018). The case of Germany is emblematic, since in the first years in this country the maximum amount invested was constrained by a local regulation (Hurnuf & Schwienbacher, 2015). This local regulation limited the maximum amount of capital that could be raised through crowd-funding, and this slowed the market growth of this product. Below, are presented the main data related to the Italian equity crowd-funding market in "Table 5 – Equity crowd-funding market in Italy". So far, the market in Italy is quite concentrated: 4 out of 23 platforms represent 90% of campaigns. Also, likelihood of success is quite high, more than 60%, so crowd-funding represent a good opportunity. Considering the impact of local regulations, in Italy the market is experiencing strong growth thanks to tax relief up to 30%. (source: Corporate Finance Course - Part 3 crowdfunding).

Authorized Platforms	**23**
- of which "authorized"	21
- of which "de jure"	2
Offerings	**185**
- of which: successful	102 (62.6%)
- of which: unsuccessful	71 (34.4%)
- of which: still occurring	22
Offered by	
- Innovative Start-Ups	153
- Innovative SMEs	15
- Investment Vehicles	3
- Other SMEs	4
Average Fundraising Target	**€ 224.560**
Average fraction of equity capital offered	**14.49%**
For successful projects only:	
- Average % between money raised and target funding	170.7%
- Average number of investors	62.7
For unsuccessful projects only:	
- Average % between committed money and target funding	14.8%
Total equity capital raised up to now	**€ 24.688.076**

TABLE 5 – EQUITY CROWD-FUNDING MARKET IN ITALY

As regards research, in me crowd-funding was considered a financial product that could be acquired only by institutional investors, and this help explaining why most available research was led in Europe. Even in Europe, research on crowd-funding has started gaining traction only from 2014. Therefore, findings often are basic, while research questions tend to focus on features affecting the success or unsuccess of the single campaign. Many authors are still devoted to outline the differences among different crowd-funding typologies, as Bradford (2012), Griffin (2013) and Cholakova & Clarysse (2015).

Few authors in the last years provide breakthrough in the research on the topic. Loher (2016) for the first time tries to understand and investigate the selection process of new ventures implemented on the platforms. Hervé et al. (2016) were the first to investigate the characteristics and decision process of investors in the various campaing of Equity

crowd-funding. However, the range of possible research is still very vast and basically unexplored, with many research gaps unsolved.

By contrast, there are two important aspects there are being given higher consideration. The first one is the heterogeneity of the platforms, since their role, services offered, and intermediation strongly affect the investment procedures (Belleflamme, Omrani, & Peitz, 2015). The second feature studied is related to regulatory differences among countries. Indeed, given the low level of investors' sophistication in crowd-funding, where most investors are non-institutional ones, regulators probably hold a considerable influence on this practice, retaining high heterogeneity among themselves and making analysis involving more countries difficult to perform (Dushnitsky, Guerini, Piva, & Rossi-Lamastra, 2016) (Hainz & Hornuf, 2016). Another stream of research is related to the comparison of this source of finance with more conventional ones (Bellavitis, Filatotchev, Kamuriwo, & Vanacker, 2017).

In general, it seems clear that research on crowd-funding, and Equity crowd-funding more specifically, is in earliest stages, still focused on addressing and describing the features and characteristics of this financing source. A special mention is addressed to Massolution, a comprehensive research report on crowd-funding showing a complete overview of current development and making reliable forecasts. Below, an example of the results of the Massolution crowdfunding report, showing a macro break-down of worldwide crowd-funding by typology and region in the two figures "Figure 18 – Crowd-funding total raisings, break-down by category" and "Figure 19 - Crowd-funding total raisings, break-down by region".
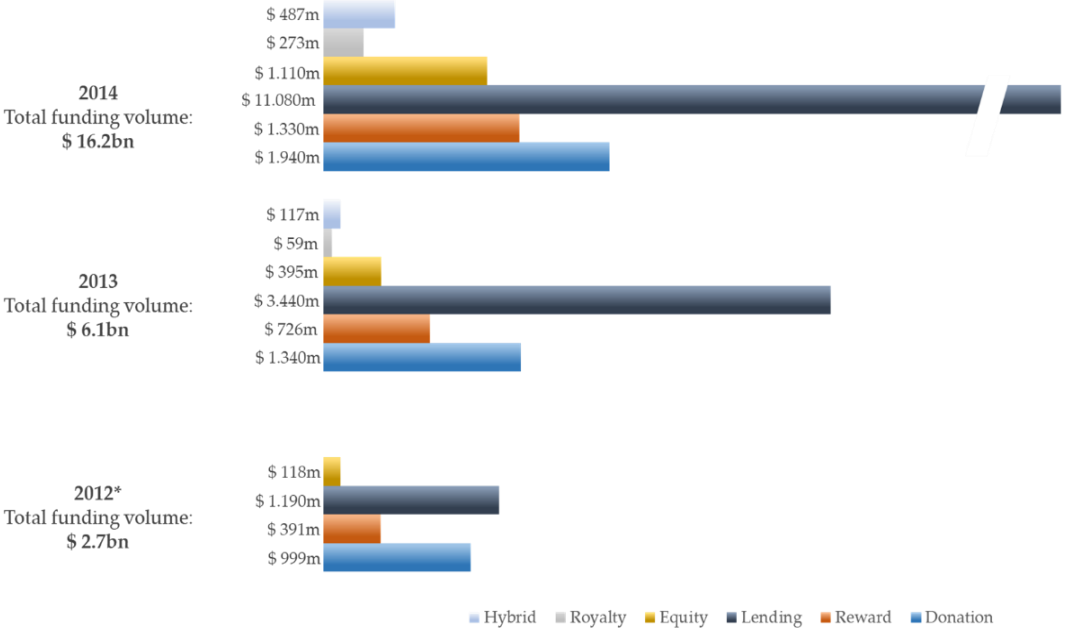
*Please note that Hybrid-based and Royalty-based Crowd-Funding were not identified by Massolution in 2012
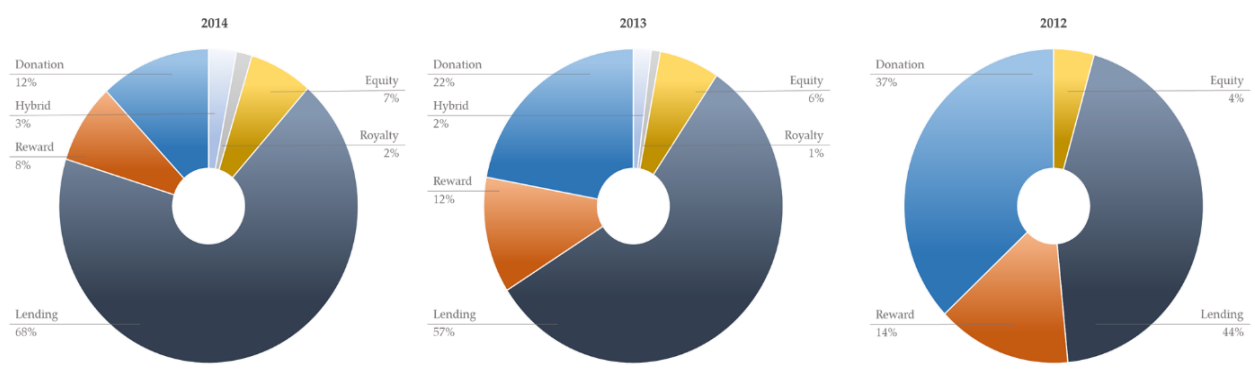
FIGURE 18 – CROWD-FUNDING TOTAL RAISINGS, BREAK-DOWN BY CATEGORY

2014
Total funding volume:
$ 16.2bn

$ 12m
$ 57m
$ 43m
€ 9.470m
$ 3.400m
$ 3.300m

2013
Total funding volume:
$ 6.1bn

$ 6m
$ 21m
$ 27m
$ 3.860m
$ 810m
$ 1.350m

2012
Total funding volume:
$ 2.7bn

$ 6m
$ 8m
$ 7m
$ 1.610m
$ 33m
$ 945m

■ Africa   ■ South America   ■ Oceania   ■ North America2   ■ Asia   ■ Europe
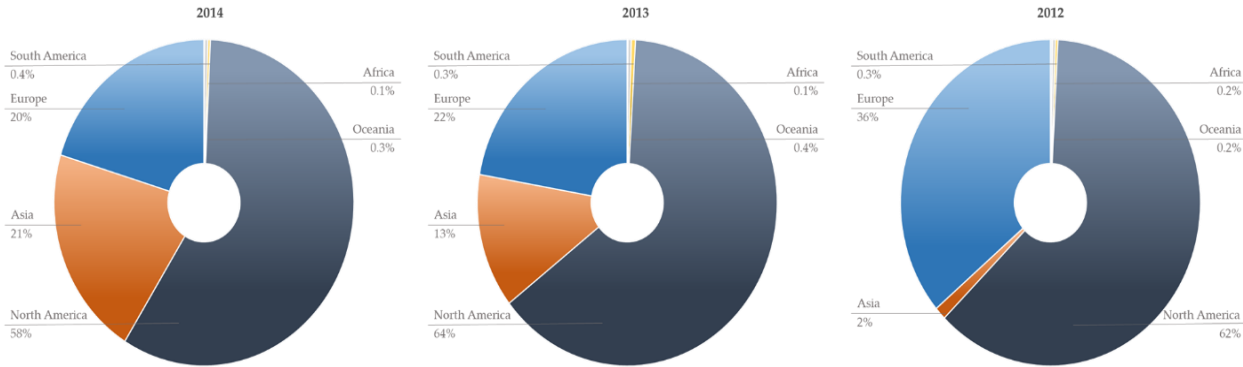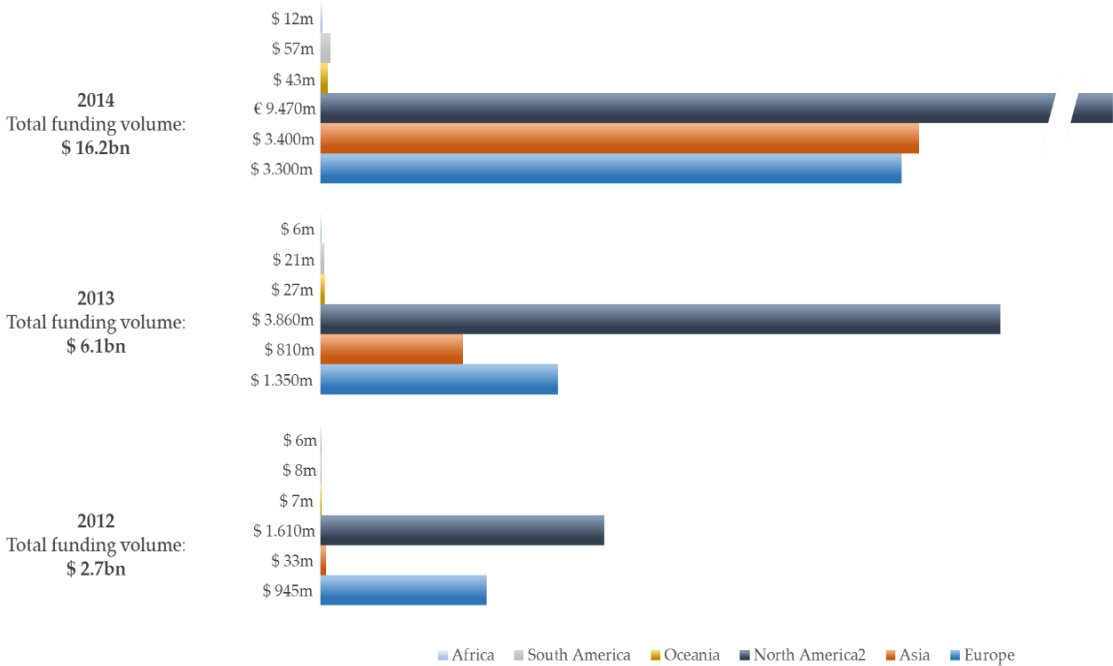
FIGURE 19 - CROWD-FUNDING TOTAL RAISINGS, BREAK-DOWN BY REGION

6.3. Pre-Investment Stage

Critical features in the pre-investment phase are related to numerous topics as sourcing of the deal, decision process and criteria, and deal flow. Moreover, research has to be conducted on all the several players involved, which are the crowd investors, the financed ventures and the platforms. Analysis should can be performed on different dimensions, for instance crowd-funding plays a role in many industries. In addition, the selection criteria of platforms that result in a venture rather than another hosted on the platform has not been researched thoroughly, not even for equity crowd-funding. The behavioural process that leads individual to choose a company over another one is under-researched as well, even though some basics assumptions are being stated by some authors as Block, Hornuf, & Moritz (2016) and Moritz, Block, & Lutz (2015).

As regards the capital providers, it is acknowledged that there are several differences between crowd investors and other actors into the entrepreneurial finance world (Ley & Weaven, 2011). The authors identify a set of eleven factors required to fully integrated this novel finance source into the more traditional stream of entrepreneurial finance, intended as actors playing a role in providing capital and financial means to start-ups and early stage ventures. These identified factors try to determine and outline the features needed on one side by the crowd-funding platform and on the other side by the capital seeker ventures to result as the best or optimal choice for crowd investors. These factors, apart from determining an important contribution from a theoretical point of view, also provide interesting insights. Indeed, they outline some inefficiencies still present in the market. For example, the authors suggest that, in order to minimize agency costs, crowd-funding platforms should perform the section of deals with the aim to align the investment opportunities with the crowd investors knowledge. This objective is rarely achieved. Indeed, it is difficult to consider the crowd investors as a homogeneous group when in fact investors are quite diverse in term of personal characteristics, behaviours and backgrounds. This heterogeneity is reflected in the funds raised, where empirical results reveal that crowd-funding often shows an 80-20 feature, in which 20% of investors contribute up to 80% of the funds raised. So, the crowd population can be segmented determining in particular a sub-group of higher amount investor. At first sight therefore, crowd investors show diverse level of commitment (Wallmeroth J. , 2016). Crowd investors are a heterogeneous group on any dimension of analysis as age, gender, experience and investment objectives. For example, women usually invest more in term of amount,

and they are also more risk-averse as they choose less risky investments (Hervé, Manthe, Sanajust, & Schwienbacher, 2016). Ley & Weaven (2011) nuild on this concepts by stating that platforms should adopt the best model to reflect the crowd investors composition. This suggestion is found also in Lukkarinen et al. (2016), that conclude that conventional criteria on decisions and investments traditionally applied to business angels and Venture Capital funds cannot be applied to equity crowd-funding as well.

It is generally acknowledged that, even though investors are supposed to be experienced and knowledgeable, the sophistication level of many crowd is still too low. This can be traced to several investors' attitudes. First, an essential characteristic of the deal is the belonging to a trusted network, as the platform itself can be, or coming from the suggestion of acquaintances. This behaviour can be similarly found in business angels and Venture Capitalists as well. Croce et al. (2016) argue for example that deals suggested by Venture Capitalists to business angels have an higher probability of being approved by the business angels, overcoming their selection process. Second, it is not required to deliver to the crowd investors information categorized as confidential for the venture (Ley & Weaven, 2011). Venture seeking capital through crowd-funding are not supposed to have a complex nature, in terms of offer, business model, planning, and, especially, are not supposed to require a long and in-depth due diligence process. This two features, respectively the requirement of a trusted network and of simple evaluations, point to low sophistication level, even thogh the actual knowledge and expertise of the crowd investors is still under research (Ahlers, Cumming, Gunther, & Schweizer, 2015) (Vismara, 2016). The conclusions of these authors support what previously stated. Indeed, crowd investors as a group are quite heterogenetic among themselves: even though many crowd investors are characterized by a low level of sophistication, there is a small sub-group of investors that provide higher amounts and that are generally more sophisticated.

Again, crowd investors are looking for a trusted network, and are in general influenced by signalling indicators and features as comments of other investors, updates and further information delivered by the financed venture, or a venture rapidly collecting its required amount (Hornuf & Schwienbacher, 2016). In general, it is acknowledged that crowd investors make decisions not only on available information released by the venture but also on other influencing actors. In particular, there is a mutual dependence among crowd investors on several dimensions: not only crowd investors promptly investing in a campaign tend to bring in other investors, but

they also conduct discussions on forums and social network to find new investment opportunity or discuss on existing ones (Wallmeroth J. , 2016).

Another feature strongly affecting the outcome of crowd-funding platforms is the innovation of the project (Chan & Parhankangas, 2017). The authors find that different types of innovation have a different reception on crowd investors, even though they analyse the reward-based crowd-funding. The authors conclude that the campaigns of project concerning radical innovation have lower outcome while those of projects with incremental innovation have more positive closing of the deals. This is probably linked to the complexity of the ideas, which means that, as described before, crowd investors prefer not complex projects, and to the risk aversion of the investors. Therefore, in crowd-funding incremental innovation are a more feasible choice, with a higher likelihood to determine successful campaigns. One possible explanation is related to cognitive features of crowd investors: this result suggests that that crowd investors a low understanding of innovations that are too distant from their experience. crowd investors have limited comprehension of what of something that is far from current reality and experience as a radical innovation can be, and they therefore prefer incremental innovation, whose advantages are more tangible. The problem is not related to information asymmetry but to difficulty in interpretation on the information given. This conclusion also offers evidence on the kinds of ventures that have a higher likelihood of success in crowd-funding, a field still under-researched.

The relevance of cognition in early stage financing research is highlighted and recognised also by other authors. Specifically, there is evidence to state that crowd-funding and specifically crowd investors are influenced by linguistic styles (Parhankangas & Renko, 2017). The authors analyse four different types of linguistic styles, respectively concrete, interactive, precise, and psychological distancing, concluding that commercial campaigns are less impacted by different linguistic styles than social ones. Indeed, a precise and concrete style and pose has a positive effect on social campaigns, however are not significant at all for commercial ones. In addition, behaving in a friendly manner putting low psychological distance between entrepreneur and the potential investors, as well as showing a highly interactive attitude and language positively affect social campaigns while their effect on commercial ones is still unclear. Finally, the authors conclude that linguistic style are also intuitively important for entrepreneurs with a social purpose, as these allow the social entrepreneurs to better communicate and transmit their message, and to create a tie with the potential investors. However, they leave ground for another stream of

research, as the results for commercial campaigns are still inconclusive and also the investigations should take into consideration the different existing typologies of crowd-funding.

As already mentioned before, investors in a crowd-funding campaign can influence the other crowd investors. Indeed, studies mentioned so far concern the pre-investment process, however the various investment steps in a crowd-funding campaign have to be analysed simultaneously, since each phase has an influence on the other ones and the separation among the stages is not very clear and distinct. Indeed, when the first individuals have already invested their capital, there are many other investors who are still evaluating the investment opportunity. These potential investors are clearly in their pre-investment stage, however those who have already committed their capital can be already considered in a post-investment stage. Therefore, the separation of the different investment phases is faded in crowd-funding, and during the campaign there is always a period of time in which co-exist investors in their pre-investment stage with investors in their post-investment one. This crowd-funding feature is critical since the first investors can influence the individuals that are still evaluating the investment (Wallmeroth, Wirtz, & Groh, 2018). They do this through signalling. Moreover, the first days of a campaign are critical for the success of the overall campaign (Vismara, 2016). Campaigns receiving many crowd investors applicants are more likely to reach the funding target, declaring the campaign a success, while campaigns that have difficulty in raising funds in the first days are more likely to have a negative outcome. These results are partly confirmed and partly developed by further studies. Hornuf and Schwienbacher (2016) analyzeequity crowd-funding campaigns in Germany to conclude that the mechanism behind this scurity allocation has an L-shaped feature, which means that most investments are performed in the initial days of the campaign while the remaining days have a lower amount of contributors. By contrast, Kuppuswamy and Baus (2015) argue that their study on reward based crowd-funding reveal an U-shaped figure. According to the authors, investment are considerably higher in the initial and last days of the campaign, while contributions in the remaining period are considerably lower. Hornuf and Schwienbacher (2016) build on this result showing that even though there is a modest increase in the amount of investments in the last few days, the dominant characteristic is an L-shaped feature.

There are actors in the crowd-funding world that are playing an increasing role in influencing campaigns with their choices. Typically, these individuals are classified as

public profile investors, can connect their social media to their investment profile on the platforms, and can impact the outcome of a campaign by creating interest on a campaign as it starts. Public profile investors, as influencer on the crowd-funding platforms, play a role in decreasing the level of risk perceived by the other crowd investors. This study points to two main conclusions and opens as many new research streams, regarding risk and investors connections. Indeed, since the role of public profile investors is to diminish the perceived uncertainty, it must be considered relevant, and it has been confirmed that risk is a factor affecting crowd-funding investments and that crowd investors take into high consideration the degree of uncertainty of their investments (Ahlers, Cumming, Gunther, & Schweizer, 2015). As regards the connections of the crowd-investors, Vismara (2016) shows that higher engagement between the crowd investors and the entrepreneurs is beneficial and useful to overcome problems related to the asymmetry of information bewteen the players involved.

The pre-investment process on the platform side is usually more structured (Loher, 2016). Platforms must search and find capital seeking ventures using a pro-active approach that also depends on the links and networks of the actors involved. A regards the plaltforms, the selection process can be broken down to four main steps that are required for a venture to be selected and actually start a crowd-funding campaign:

1. Deal sourcing – Loher (2016), after an analysis of several concluded campaigns, notes that a small minority of the start-ups hosted managed to be accepted on the platform by completing an application on their own. Most of the platforms were proposed and thereafter accepted thanks to the network and to connections of the platforms.
2. Screening and evaluation – In this stage, applicant start-ups are screened on the basis of early features required by the new ventures, for instance platforms verify the formation of the venture as a regulatory entity. Evaluation instead is conducted at a higher level of details and analysis. The management team is assessed and the final decision takes into account the start-up's pitch, eventual existing investors, and so on.
3. Deal structuring – the structuring of the dead comprises several activities that results in as many decision on the campaign to be held. The most important are related to the valuation of the venture, to the setting of minimum and maximum investment amounts, fees for the platform support and services. Valuation can be performed both appling traditional methods, as financial multiples, to more

innovative ones more applicable in case of Satrt-Ups with no business activity to consider.

4. Campaign preparation – Finally, the venture is allowed to create it own profile on the crowd-funding platform. To attract and inform potential crowd investors, start-ups use several channels to communicate with the crowd and to make the campaign attractive to them. These channels include social media, newsletters, press releases and others. It is interesting to point that crowd-funding is the only early stage financing mechanism taking advantage of these channel to retrieve funds.

As regards the pre-investment phase on the entrepreneurial point of view, a notable result analyse the selection criteria between the equity crowd-funding or the reward-based crowd-funding type. When choosing between giving equity or selling the product in advance, start-ups founders prefer equity crowd-funding when the capital they require is large compared to the overall market size. By contrast, if the required amount is small compared to the market, then the reward-based crowd-funding is more likely to be chosen (Belleflamme, Lambert, & Schwienbacher, 2014). The authors point that there is a fundamental difference among the two crowd-funding typologies. The reward-based crowd-funding, in its pre-ordering type, allow start-ups' founders to test the pricing of their products in the markets they are willing to enter. In reward-based crowd-funding, the crowd investors are potential customers that will probably become loyal customers once the product is definitely available on the market. Therefore through the crowd-funding mechanism entrereneurs get an idea of the pricing structure of their market.

6.4. Investment Stage

The ownership structure of crowd-funding investments has been properly revised only for equity crowd-funding. For the other types, studies have been performed only at a superficial level, though arguing that, for instance, in reward-based crowd-funding there is no ownership given to the crowd in exchange of their provided capital. However, this is addressed as a potential gap in the knowledge (Wallmeroth, Wirtz, & Groh, 2018). Another under-researched topic is the equity structure assumed by financed venture when other more institutional investors provide additional capital after a crowd-funding campaign, as well as the relationships among the different investors' classes.

As regards equity crowd-funding, the topic has been slightly deepened compared to the other types but still at a basic level. However, the first conclusions are being developed on some topics. For instance, Signori and Vismara (2016) analyse the structure of the deal concluding that on average ventures are willing to offer around 15% of their equity through crowd-funding.

Taking into consideration all the possible typologies, crowd-funding shows heterogeneous contractual structure that often depends on several factors as the kind of crowd-funding, the regulatory framework and the location (Hornuf & Schwienbacher, 2016) (Wroldsen, 2016) (Shwienbacher & Larralde, 2010). Wroldsen (2016) in his study determines the six securities usually traded on crowd-funding channels comprehensively, that are respectively common and preferred stocks, future equity, loans bearing future interest of payment, debt securities convertible to equity, securities based on the share of revenues.

Wroldsen (2016) also conclude that crowd-funding deals and contracts resemble the Venture Capitalists ones, however they are more simply structured. Moreover, he concludes that the loss of investors' protection due to these simpler contracts is balanced by a higher protection that crowd investors gain thanks to their network and connection, with the possibility to receive information from social networks and other crowd individuals on the ongoing of the financed venture. Wallmeroth (2016) confirms this finding in his own study by noting that the crowd investors are used to communicate on dedicated channels on the platforms or by creating specific discussion online to comment and inquire on their investment status.

Among all the security types identified, common stock is the most common (Wroldsen, 2016). If common stock is given also voting rights, in the majority of the cases the amount distributed to crowd investors represent a minority of the overall equity, so that crowd investors cannot heavily affect the decision process and the management of the financed start-up.

The overall conclusion by the authors is that even the contracts and therefore the deals are quite heterogeneous. Apart from the varying typologies of securities offered, also investors' rights are different in each campaign. Securities can hold pre-emption, tag-along, profit priority and anti-dilution rights, but each campaign takes this decision independently.

As regards contracts in the crowd-funding industry, there is still lot of research to be conducted, and even more in the typology of equity-based one. This is especially true

for the markets that are developing or that have started developing recently, as the me equity crowd-funding market, but also for more developed and established markets as Germany and France. Even in these ones the typologies of contracts are in a continuous evolution adapting to a fast-changing regulatory framework, that is changing as well aiming to institutionalize crowd-funding and increase crowd individual protection. Studies are currently limited by geographical features and are therefore specific to each country. crowd-funding difference among countries can be ascribed to regulation, culture, legal and economy only to cite a few factors (Dushnitsky, Guerini, Piva, & Rossi-Lamastra, 2016). Moreover, these factors are expected to continue changing also in the future, first among all the regulation aimed at protecting the crowd investors (Klohn, Hornuf, & Schilling, 2015).

6.5. Post-Investment Stage

Studies of post-investment phase in crowd-funding are in their first and starting steps. Overall, the crowd-funding post-investment is the less studied stage and has not been thoroughly analysed. For instance, very few studies have been performed analysing the return of the crowd-funding investment, partly due to lack of data. Because of the difficulty in finding data, often success in crowd-funding is not tied to economic performances but to the outcome, successful or unsuccessful, of the campaign. The lack of data can be traced to the recent development of crowd-funding. Many investments do not have post-investment track records to be analysed, and the ones having them are usually still ongoing investments and are not fit for exit or success analysis. In general, whenever there is availability of data the dataset only comprises samples of small size (Hornuf & Schmitt, 2016) (Hornuf & Schwienbacher, 2014). There are some attempts to shed light on the topic, but current available studies on analyse the divestment or success and failure in equity crowd-funding on a descriptive or empirical level (Signori & Vismara, 2016) (Hornuf & Schmitt, 2016). There is however hope for the future: the me developed the equity crowd-funding market only recently, so hopefully it will release more data boosting research, and at the same time ingoing investment in Europe will provide the further data on the results of the crowd-funding investments.

From an empiricallevel, crowd-funding investments are described by Signori and Vismara (2016). The authors look at the years following the investment period of successfully financed start-ups. Among this group, roughtly 10% of ventures failed. An additional 30% were sold to other investors or tried to be succeed in other financing rounds. It is not possible to calculate the return of these ongoing investments, namely

ventures that are still active, have been sold, have seeked and obtained subsequent financial support, and that have not gone bankrupt. However, the authors state that the average expected return is close to 8-9%, even thought the few start-ups financed through equity crowd-funding, that in the end manage to achieve a successful divesture, then fail to make public the actual achieved returns. Moreover, often start-ups offered an exit to existing crowd investors only to leave space to Venture Capital funds or business angels that showed interest in the venture (Hornuf & Schmitt, 2016). It is also acknowledged that many crowd-funding campaigns received funding recources from other entities as business angels or Venture Capitalists, and not only after the investment, but sometimes also during or before the investment. This feature can be artly traced to regulation stating that a certain amount of the crowd investment must be erformed by institutinoal investors. However, the impact of these external actors in equity crowd-funding has not been researched yet.

One of the most studied aspects of crowd-funding is related to determinants of success of the crowd-funding campaign. Many studies state that the first days of a campaign are a good proxy of a campaign success: achieving good level of investments in the first days is highly correlated to concluding the overall campaign as a success (Colombo, Franzoni, & Rossi-Lamastra, 2015). In particular, the authors investigate the internal social capital and its relation and impact on the investment amount and numbers achieved at the beginning of a crowd-funding campaign. By internal social capital the authors point to connections and contacts. The authors find that early contributions are more likely to arise from acquaintances, so internal social capital is of primary importance during a campaign, as the early contributions amount drives the success or failure of the crowd-funding campaign. By measuring the campaigns outcomes, the authors find that an increased number of early contributors raises from 9% to 17% the likelihood of success, while the amount risen by early investments has even stronger consequences and increase the probability of success up to 22%. Even though the number of early backers has stronger effect that their number on the campaign success, the authors find that internal social capital is more correlated to the number rather that the amount of early backers.

The other crowd-funding typologies are less investigated in their post-investment stage, however there are a few studies showing the first results. Mollick (2014), analysing donation-based and reward-based crowd-funding, find that the projects outcome in terms of success or failure is highly affected by several factors as location and geography, quality of the project, connection, social capital and network.

Signalling in crowd-funding is extremely relevant: entrepreneurs dedicate high attention to the preparation and presentation of their idea, its realism and practicality. Often, successful campaigns show a smaller but realistic profitability in their projections, while failed ones had forecasted higher margins. In the reward-based crowd-funding, the author notices that the majority of reward-based projects show consistent delays in delivering the promised products, and this effect is amplified for overfunded campaign. The overfunding phenomenon is related to campaigns that raise much more that their maximum target. However, its effects are still under-investigated.

6.6 Conclusions and gaps

Crowd-funding represent a growing segment in entrepreneurial finance, however my understanding of its practices, procedures, and behaviours remain at a basic stage, with many research opportunities that can be explored. Compared to other actors in the entrepreneurial finance world the main difference is clear: in the case of business angels or Venture Capitalists the investors are clearly identified and afterwards studied in their traits. By contrast, in the case of crowd-funding the crowd, the corresponding capital provider, has still to be perfectly identified. This must not be interpreted in the sense that the former two investment mechanisms are perfectly known and studied, however implies an enormous difference between them and crowd-funding (Wallmeroth, Wirtz, & Groh, 2018).

Studies are being conducted by actor category, in terms of crowd, platform or invested venture, and by investment features, as control and interest alignment. Moreover, research should also take into consideration that each study should be expanded and applied to different countries with different regulatory frameworks. The firsts to be studied will very likely be the invested start-ups and the platforms, more visible on the market. Indeed, I can expect the first studies to apply conventional market theories as the agency one, aimed at understanding some investment features as alignment among actors, monitor and control. When research will advance enough to include the crowd as well in their conclusions, also cognitive process and more in general behavioural traits of the crowd will be investigated to fully understand the decision-making process of the crowd investors.

The main objective of future research should therefore be to integrated crowd-funding into existing theories where possible, and, if not possible, how to expand existing ones to fit crowd-funding as well.

As regards the main gaps identified, I must point out that research on crowd-funding has started gaining traction only in the last few years. Therefore, findings often are basic, while research questions tend to focus on features affecting the success or unsuccess of the single campaign. Many authors are still devoted to outline the differences among different crowd-funding typologies, as Bradford (2012), Griffin (2013) and Cholakova & Clarysse (2015). Academic interest on the topic has sharply increased in the last years, also due to the strong growth of the phenomena, but most research questions remain unanswered. The few conclusive results are addressed toward describing the features and characteristics of this financing source or the determinants of success of the single crowd-funding campaign.

First results are being drawn. For example, it is now acknowledged the importance of signalling in crowd-funding campaigns, so that early investment in the first days of the campaign dramatically increase the likelihood of success (Wallmeroth, Wirtz, & Groh, 2018). (Vismara, 2016) (Hornuf & Schwienbacher, 2016) (Kuppuswamy & Baus, 2015). Moreover, among the crowd investors there is a sub-segment with higher level of sophistication compared to their peers, that are also used to invest larger amount (Ahlers, Cumming, Gunther, & Schweizer, 2015) (Vismara, 2016). Lukkarinen et al. (2016) suggest that conventional criteria on decisions and investments traditionally applied to business angels and Venture Capital Funds cannot be applied to Equity crowd-funding as well, and that researcher should look for innovative metrics.

A major issue when studying crowd-funding is the availability of data. Given the crowd-funding development only in the ast few years, data lack is a serious hindrance for many research streams. For example, research on post-investment features is halted since many crowd-funded start-up do not have sufficient track records to be analysed. Moreover, whenever there is availability of data the dataset only comprises samples of small size (Hornuf & Schmitt, 2016) (Hornuf & Schwienbacher, 2014). Therefore, most research is still open on crowd-funding. This work proposes to shed light on wo streams. On one hand, it outlines and draws initial conclusion on the crowd-funding behaviour, on the other hand it also determines whether there are significant differences between the crowd investors and business angels.

7. Hypothesis development

According to the analysis of literature, the selected research topic is related to the investment procedures of business angels and crowd-funding, while trying to understand how their behaviour can be ascribed to similar patterns or to different ones instead. Accordingly, I determine my research field, that, at a high level, is aimed at determining the investment choices and behaviours of angels and crowd investors, and the factors influencing these choices and behaviours. Moreover, I expand this scope by stating that, in addition to what previously stated, I also want to understand the differences in the decisions making process of the two actors.

Most studies on investment practices focus on the success or unsuccess of the investment procedure (see Wetzel, 1983, Capizzi, 2015, Directorate European Commission, 2017 for BA, see Wallmeroth et al., 2018, Vismara, 2016, Hornuf & Schwienbacker, 2016 for CF). This research work instead focuses on the risk capital amount invested by the two investors categories. Prior research on this topic, mainly performed on Venture Capital, have often developed this metric in term of absolute capital invested (Lerner, 1998) (Jeng & Wells, 2000) (Cumming & Johan, 2013). The use of this metric has then extended also to more informal investors as business angels (Lahti, 2011) (Witlbank & Boeker, 2007) (Maula, Autio, & Arenius, 2005). Moreover, according to other research on Venture Capital and Private Equity, a second dependent variable is selected in term of post-investment equity share (Gomper & Lerner, 2000) (Hellman & Puri, 2002) (Cumming & Walz, 2010) (Capizzi, Bonini, Valletta, & Zocchi, 2018). I use these two metrics as dependent variables since it can provide more useful insights and add weight to the results obtained.

Accordingly, the two metrics adopted are *"Share (%)"*, the equity acquired in the deal-flow by the investors, and *"Capital (€)"*, the absolute investment amount. The first variable is measures as a percentage, while the second one is the investment value expressed in Euro.

Developing the work on these selected variables, I model the expected impact on the actors' investment decision as follows.

7.1. Investor typology and investment decision

The most important difference between business angels and crowd-funding is related to the capital committed by the single investor. Indeed, while the overall angels' and crowd's investments can be or similar amount (see Jeng & Wells (2000), Caprenter &

Petersen (2002), Mason (2009) for BA, Giudici et al. (2012) for CF), the commitment of the single crowd investors is tipically of lower entity compared to the business angel investment. This is partly diminished by the presence of a sub-group of crowd investors that are used to invest larger amounts (Ahlers, Cumming, Gunther, & Schweizer, 2015) (Vismara, 2016), and also by local regulatory framework that might force part of the crowd investment to arise from institutional investors (Hornuf & Schmitt, 2016). However, it is generally acknowledged that business angels and crowd investors commit different amount of own capital. I therefore develop the first research hypothesis as follows:

H1. The acquired equity share and amount of capital committed depend on the investor typology. In particular, business angels invest higher amount buying larger stakes in the invested venture compared to crowd investors.

Even though this feature might be taken for granted, I want to formally test this hypothesis.

7.2. Investor's planning and investment decision

Literature has consistently researched the importance of monitoring, a way to reduce moral hazard and asymmetric information arising from financial investments (Diamond, 1984) (Aghion & Bolton, 1992). Institutional investors are used to control the management of the invested companies through a variety of means, as stricter contracts, clauses and incentives to avoid entrepreneurs displaying opportunistic behaviours. This feature has been extensively studies by researchers (Triantis, 2001) (Kaplan & Stromberg, 2003) (Cumming & Johan, 2013) (Sahlman, 1990).

However, business angels tend to adopt different controlling mechanisms compared to other institutional investors. Ibrahim (2008) calls the monitoring implemented by business angels *"non aggressive in their informality"*. In general, business angels prefer simpler and less strict contractual deals with their invested ventures (Goldfarb, Hoberg, Kirsch, & Triantis, 2014) (Bonnet & Wirtz, 2012). business angels have some substitutes to monitoring specified by the investment contract that are represented by interactions with the invested venture and closeness to the venture in terms of distance (Wong, Bhatia, & Freeman, 2009). The monitoring implemented by business angels is therefore very different from the so-called "hard" monitoring often applied by institutional investors, and whose effects have been largely researched. According Capizzi et al. (2018), business angels rather prefer a "soft" monitoring, not built on a contractual basis but on a clorer tie with the invested venture. Moreover, this can be

applied to crowd-funding as well. Wroldsen (2016) argues that crowd-funding contracts are quite heterogeneous, and also rights offered to crowd investors can vary considerably among campaigns. The author notes that the single crowd investors has usually a very small equity stake in the invested venture and therefore has limited power in influencing decisions and the start-up management. In addition, contracts resemble those of Venture Capital, but are more simply structured coherently with the lower sophistication level of the crowd (Wallmeroth J. , 2016) (Ahlers, Cumming, Gunther, & Schweizer, 2015) (Vismara, 2016). Wroldsen (2016) concludes that the loss of investor protection is balanced by a higher degree of involvement that the crowd manages to achieve thanks to the network formed with other investors. Still, the crowd, or part of the crowd in any given investment, is still likely to implement the same monitoring mechanisms implemented by business angels called "soft" monitoring. "Soft" monitoring is the mean that these actors apply to reduce the perceived risk of their investment. The higher the risk, and the higher the threat of information asymmetry, the higher the monitoring needed to control the performance of the investment. On the other hand, monitoring is meant to reduce information asymmetry issue and also the perceived risk. Investors willing to apply higher monitoring level therefore feel safer on their investments and are should be willing to make higher amount investment, given that they can always control its progress.

The second research hypothesis is formulated accordingly.

H2. "Soft" monitoring has a positive effect on the investment performed by business angels and crowd investors, both in terms of share acquired and capital provided.

As already mentioned, business angels also play a major role in in providing non-monetary contributions as strategic support, mentoring, networking, operational and market knowledge (Harrison & Mason, 1992) (Mason & Harrison, 1996) (Mason, Harrison, & Chaloner, 1991) (Landstrom, 1993). These contributions are deemed as valuable as the invested amount (Harrison & Mason, 1992). However, Capizzi et al. (2018) note that research centres (IBAN, EBAN, EIF) disclosing their yearly held survey report the unwillingness of some investors to actually play this active role in the invested venture. Actors showing this kind of behaviours are more eager to earn in a passive way by capital increase of their investments. Due to the heterogeneity of crowd investors I can expect similar behaviours from the crowd, with more sophisticated investors willing to contribute to the management of the firm and loss sophisticated ones unwilling to do the same, preferring a passive role in their investment performances. This is confirmed by the crowd characteristics, composed by many

small investors that invest due to enthusiasm for a project, but often do not have the knowledge and expertise to actually have an impact on the investment performances (Ahlers, Cumming, Gunther, & Schweizer, 2015) (Vismara, 2016). Capizzi et al. (2018) point out that passive angels often implement diversification strategy coherently with their lack of contributions and therefore they tend to decrease their investment in a single venture. While I can expect a similar behaviour in crowd investors, the impact is diminished as often the crowd do not invests taking into account diversification or similar strategy that require a higher financial knowledge.

Accordingly, I formulate my third research hypothesis and an expansion of the same.

H3a. The willingness to contribute into the invested venture leads to higher investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

However, I could also argue that non-monetary contribution delivered by the investors can be considered as an alternative source of investment as well: in this case the investors are not investing their own monetary means but other resources as time and effort. Time and resources involved can be seen as an alternative to conventional investments, so that investors actually provide less financial support and more support of other types. Also, these investors might be looking for smaller investments' entities but higher returns, on which they can have a major impact thanks to their active involvement.

Accordingly, I formulate an alternative and opposite research question.

H3b. The willingness to contribute into the invested venture leads to smaller investments both in terms of share acquired and capital invested. In addition, this effect is stronger for business angels than for the crowd investors.

7.3. Investor's experience and investment decision

Portfolio theories support the idea that a fundamental strategy aimed at reducing risk in equity investment is diversification (Elton & Gruber, 2005).Thanks to diversification, investors should be able to reduce the intrinsic uncertainty in their investment performances, as, statistically, the return of a single investment has its own uncertainty, but the return of a set of investment is more defined and aligned to the market growth patterns. Low performances investments are compensated by higher performances investments leading to an overall return that is less risky. The main principle of diversification is to structure the investment portfolio in many smaller and

diverse securities, arising from different companies, industries, regions. The opposite concept is to build a portfolio of one or few larger investments. Even though diversification issues are mostly considered by pure financial investors, they can apply also to investment performed by business angels and crowd-funding. Investors looking for diversification among their investments will provide a lower amount of capital to each invested venture as seek opportunities in several industries, showing a behaviour more aligned to financial markets' one. On the other hand, I can expect the opposite from investors performing one or few investments in the same industry. In this case, investors specialize in a specific context where they can provide more value-added contribution thanks to their knowledge and support. This typology of investors, not depending on a diversification logic, will invest a higher amount in ventures of the same industry.

Therefore, I formulate the fourth research hypothesis.

H4. Specialized investors devote a higher amount of capital and acquire a larger share in the invested venture.

Experience is feature playing a major role in entrepreneurial finance. Indeed, it has been often argued that more experienced business angels are able to bring more value to the start-up. angels that performed more investment in the past have increased and mastered their expertise in a set of topics ranging from new venture development to improving the relationship with the entrepreneurs. Many studies point out that business angels experience has a strong impact on pre- and post-investment features as start-up performances (Mason & Harrison, 1996) (Van Osnabrugge, 2000) (Collawaert & Manegart, 2016) (Sudek, Mitteness, & Baucus, 2008). Indeed, investors that performed more deals in the past can leverage on their higher expertise gained in these experiences to invest with more confidence. Past experience works as a risk reducing factor, letting investors understand more easily the opportunities in each investment. Therefore, they can invest a higher amount being confident that the risk they are subject to is lower. On the other hand, investors with more past deals might still have more companies in their portfolio of investment. It is likely that they will not be able to dedicate a sufficient amount of time to each invested venture and therefore will prefer lower equity stake and more passive roles. Accordingly, investors with a higher number of past deals should acquire lower equity stakes in the invested companies. However, I can distinguish among investors categories:

Business angels often provide substantial amount in each selected investment and are therefore more affected by the amount they have already invested in the past. By contrast, the majority of crowd investors are likely to be less affected by the investments performed in the past, since they lend lower amount of money that should have a minor influence on their personal wealth.

Accordingly, I formulate the last research hypothesis and its expansion.

H5. The number of past deals negatively affects the investment decision in terms of capital committed and positively in terms of share acquired. In addition, this effect is more relevant for business angels than for crowd investors.

8. Sample data and variables

8.1. Sample collection and coverage

The data are collected following two main methodologies, different for the two investors typologies. Data on business angels are collected periodically by the IBAN (Italian business angel Network) and were available to the research thanks to the participation of UNIUPO (Università degli Studi del Piemonte Orientale) in the project. Data on crowd-funding were collected in collaboration to Osservatorio crowdinvesting, part of the Osservatori Digital Innovation of the School of Management of the Politecnico di Milano.

The Italian business angel Network, or IBAN, is the Italian national association and the reference point for angels and other angel groups. The organization periodically collects data from affiliated and unaffiliated business angels through a survey. Over time it has managed to partially solve a well-known obstacle to research in the angels' market. Indeed, it has often been pointed that the angels market is highly opaque (Wetzel W. , 1983) (Mason C. M., 2006). It has a not visible component that makes results achievable through surveys partial and incomplete. IBAN has however adopted an effective approach in trying to integrate the visible part of the business angels' market, comprised of affiliated angels and other groups and networks, with the invisible part, made by independent angels. The integration of the hidden component of the market is achieved through estimation using a conventional snowball sampling (Schuesser, 1979), where potential business angels are identified thanks to their connections and links to the known population of angels affiliated to BANs. The snowball approach was implemented along with an inferential procedure aimed at identifying independent angels with stakes in existing companies, a result that was based on the research of Private Equity Monitoring (PEM), another program of research. PEM is specialized in collecting and analysing data on Private Equity and Venture Capital investment. The IBAN analysts performed a research on the Venture backed companies, collecting data on these companies' equity structures from the Bureau Van Dijk/AIDA. This procedure is made possible by the Italian regulation that forces companies to provide very high disclosure on information related to financial structure and ownership. For the analysed companies, the research identified shareholders with characteristics coherent with the business angels' ones. The features

researched were individual investors, who perform one or more investment in newly established ventures and acquire neither an executive role nor a majority share in the invested company.

Even though the sample of independent investors collected accordingly might be subject to sample biases, the rigorous procedure applied repeatedly for many consecutive years can be considered a valid mitigation factor to the bias and justifies the confidence in the representativeness of the sample.

The survey is then performed on the selected population each year, aimed at collecting information on the investment performed during that year. Data are collected through a mixed sequential approach (Snijkers, Haraldsen, Jones, & Willimack, 2013) consisting of four steps: the survey is sent to all the known BAN affiliated and to affiliated angels(1st step), then non-responding angels are contacted again after a pre-defined period (2nd step), while collected responses are reviewed to identify respondents' possible incomplete answers (3rd step), that are further contacted (4th step).

The data collection process for crowd-funding is completely different. Osservatorio Crowdinvesting is responsible for collecting data on all the crowd-funding campaigns conducted so far in Italy, and for periodically update such dataset to maintain its completeness. In addition, the crowd-funding market is not characterized by the same invisible feature that makes difficult research on the business angels. All the crowd-funding platforms operating in Italy are well-known, and these platforms disclose plenty of data on the concluded campaigns, both the successful and the unsuccessful ones. This market features means that research on the Italian crowd-funding market has the possibility to include all the performed deals. The novel variables required by this work were collected for all the existing crowd-funding campaigns through two main means: first, a manual online search on the crowd-funding website for disclosed data and on InfoCamere for balance sheet data when not available, and, second, start-ups were contacted one by one. Indeed, the former part of such approach was allowed by the Italian regulation that requires a high level of disclosure of ventures financial information. Integration of data already available at the Osservatorio crowdinvesting and new collected data was aimed at duplicating the business angels dataset for crowd-funding with all the corresponding variables.

The result is a novel dataset comprising both business angels' and crowd-funding's data on 150+ variables. For further information on the overall dataset composition please refer to "Exhibit 1 – Complete database structure", displaying all the variables

collected in the complete database, while for further information on the final dataset used for the analyses please refer to "Exhibit 2 – Stata database structure". Dataset statistics are reported in Table 6. Out of the 4000+ deals reported, some of the deals had to be discarded for survey inconsistency (e.g typos that led to impossible values of variables) or missing data on investors information. In Table 6 data are presented the figures of the entire dataset and immediately below the ones selected in the final dataset, with the rate of data kept inside the brackets. As a result, approximately 23% of the overall sample was selected for the analysis. In addition, this figure is provided also for the selected investors and firm. Differences among investors, firms, and deals numbers happen because investors can perform multiple investments and investment in each venture can be performed by more than one investor. A major issue arising from this procedure is a possible selection bias that might prevent the sub-sample to be perfectly representative.

	Both Samples	Business Angels	Crowd-Funding
Total Deals	4684	993	3691
Selected Deals	1096 (23.40%)	400 (40.28%)	696 (18.85%)
Total Investors	2868	468	2601
Selected Investors	719 (25.06%)	175 (37.3%)	544 (20.92%)
Total Companies	903	834	69
Selected Companies	304 (33.67%)	275 (32.97%)	34 (49.28%)

TABLE 6 – SAMPLE COVERAGE

In the end, the selected dataset contains information on 1096 unique deals, performed by a total of 719 investors on 304 different companies. In Table 7 the statistics of the dataset are shown, with their breakdown among business angels and crowd investors as regards the figures for deals, investors and firms amount. I can see that the number of deals is quite balanced (36.5% vs 63.5%), an advisable feature when comparing two different sub-samples. However, analysis of the sample under the investors of firms view point reveal some unbalances. Indeed, the number of crowd investors is considerably higher (75.7% vs 24.3%) while the number of crowd-backed firms is consistently lower that angel-backed ones (9.5% vs 90.5%). This is due intrinsic different characteristics of the two sub-samples. Indeed, each crowd-funding campaign is performed by a high amount of crowd investors that unavoidably

unbalance the two sub-samples. It's interesting to notice that even the total number of crowd-backed companies is much lower that the angels-backed ones. This is due to the recent development of crowd-funding that makes its figures lower compared to the angels ones, even though, given the high number of investors per campaign, the crowd investors number is already comparable, if not superior, to the angels one in my dataset. I leave this possible concern to future development since I am aware that the crowd-funding market is in its first stages of development and in the future data quality and quantity will be considerably higher.

	Selected Deals	Selected Investors	Selected Companies
Both Samples	1096	719	304
Business Angels	400 (36.50%)	175 (24.33%)	275 (90.46%)
Crowd-Funding	696 (63.50%)	544 (75.66%)	34 (9.54%)

TABLE 7 – DATASET COMPOSITION

8.2. Univariate statistics

In Table 8 are reported the investments distributions per year and per industry, showing the breakdown among business angels and crowd-funding thanks to the creation of the dummy variable *Investor Typology*, a variable that assumes the value of 0 if the investment is performed by a business angel, 1 if it is performed by a crowd investor.

As I can see from Panel 1, the coverage over the years is not uniform. Indeed, the most densely populated years in my sample for business angels range from 2010 to 2015. This is due to several reason. As regards years 2008 and 2009, I should take into account that those were the years of the financial crisis, characterized by a much lower investment activity. Moreover, 2008 is the starting year for IBAN survey, so it is likely that in the following years IBAN used a more effective survey procedure based on the inefficient results of the first year. As regards 2016, the drop in the sample is due to a tightening of inclusion conditions mentioned above, that resulted in a consistent drop in reported data. The crowd-funding sample is not uniform either. I can see that the

first reported investment for crowd-funding dates back to 2013 and then the figure steadily increases coherently with the crowd-funding growth in these years. Missing data before 2013 can be traced to the development of the crowd-funding mechanism: the first equity crowd-funding investment in Italy took place in 2013.

Even though this not uniform distribution is a concerning issue, I take countermeasures so that the results will be, in case, only partially impacted. Indeed, I add a variable in my statistical model to test for year fixed effects, that should mitigate the heterogeneity arising from this irregular distribution. Moreover, a robustness check will be performed on the overlapping years to further confirm the hypotheses.

Panel B presents the investments distribution across industries. As expected, half of the investments are concentrated in industry as ICT (Information and Communication Technology) and Biotech, that traditionally have attracted a consistent amount of early stage investments. A rough 10% of investment is directed towards Cleantech ventures, coherently with the rise of the sector in the last years. Another 10% is invested in start-ups dedicated to e-Commerce, as these ventures try to take advantage of the growing phenomena. Figures show that the investor typology influences the industry choice, as suggested by the Pearson Test, showing a very high significance level (p-value < 0.001). Apparently, crowd-Investors show a preference for ICT and Financial start-ups much higher than business angels, while disdain traditional sectors as Textile and Communication. However, these sectors receive a generally low interest also from angels.

Finally, Panel C shows the co-investment standards for the two investors types. Investors in my sample prefer either investing with few people, or with a lot of other investors. This can be traced to the two subsets comprised in my sample. business angels, even though are often used to co-invest, rarely do it with a considerable number of other investors, and therefore more than 90% of investments are performed with less than 20 co-investors, and 75% with less than 10. The opposite is true for crowd investors: deals comprising a few investors are a minority, while industry standards show that more than in 85% of the cases the crowd co-invests with at least 30 people. The differences in the two sub-samples are, as expected, extremely significant, resulting with a p-value < 0.001 at a Pearson Test.

Panel A – Year Distribution

Year	Investments	Percentage	
	Whole Sample	Business Angels	Crowd Funding
2008	6	6 (100.00%)	0 (0.00%)
2009	0	0 (n.a.)	0 (n.a.)
2010	61	61 (100.00%)	0 (0.00%)
2011	86	86 (100.00%)	0 (0.00%)
2012	98	98 (100.00%)	0 (0.00%)
2013	119	58 (49.74%)	61 (51.26%)
2014	99	46 (46.46%)	53 (53.54%)
2015	235	45 (19.15%)	190 (80.85%)
2016	392	0 (0.00%)	392 (100.00%)
Total	1096	400 (36.50%)	696 (63.50%)

Panel B – Industry Distribution

Industry	Percentage		
	Whole Sample	Business Angels	Crowd-Funding
Biotech	11.86%	19.25%	7.61%
Cleantech	11.68%	14.25%	10.20%
Commerce and distribution	11.77%	10.25%	12.64%
Financial services	17.15%	2.25%	25.72%
ICT (SW and HW, App Web and Mobile)	32.21%	26.00%	35.78%
Food & Beverage	1.73%	2.75%	1.15%
Mechanical engineering	3.65%	3.00%	4.02%
Media & entertainment	5.11%	9.00%	2.87%
Electronics	3.28%	9.00%	0.00%
Telecommunications & similar services	0.36%	1.00%	0.00%
Textile & apparel	1.19%	3.25%	0.00%
Test Pearson – χ^2	Significance level	0.000***	

Panel C – Co-investments practices among Angels and Crowd investors

Co-investors number	Percentage		
	Whole Sample	Business Angels	Crowd-Funding
< 10	29.20%	75.00%	2.87%
11 – 20	10.58%	21.00%	4.60%
21 – 30	4.56%	2.50%	5.75%
> 30	55.66%	1.50%	86.78%
Test Pearson – χ^2	Significance level	0.000***	

TABLE 8 – DATASET STATISTICS

8.3. Dependent variables

The statistics related to the dependent variables are reported in Table 9 and comprise general statistics as well as statistics conditional on the belonging of the two investors groups. The dependent variables are:

- *Share (%):* the share of equity capital acquired by the investors through their investments in a single deal.
- *Capital (€):* the amount invested in each deal by a single investor.

As shown by the descriptive statistical data, the deals have a wide range and variability both in terms of share acquired and of amount invested. This can be traced to the sub-samples in my dataset, that show very distinctive behaviours. It's interesting to notice that both the overall sample and the sub-sets show a mean consistently higher than the median for both variables. This is due to consistently positive *skewness* for both variables and both champions. Also, a *kurtosis* coefficient higher than a normal distribution suggest the presence of high value investments that highly contribute to increase the mean but have obviously a much weaker effect on median. This is not a concern however, since the presence of consistency of those features across the different sub-samples and variables suggest that this is a characteristic of the investment distributions and must not be traced to outlier or data entry.

On average, business angels tend to acquire a share that is 10% higher than crowd investors (p-value < 0.001), and statistics show that this difference cannot be traced to the presence of extremely high or low values in the sample, as also the median are significantly different (p-value < 0.001).

The same results are found for the other dependent variable. Indeed, as expected angels invest on average a considerable higher amount, in the magnitude of tens of thousands of euros, compared to crowd investors that on average invests a few thousand euros (p-value < 0.001). Again, the statistical significance in the median comparison let me conclude that it is not traceable to extreme values in the dataset (p-value < 0.001).

It's interesting to note that the two well-distinct sub-samples appear to overlap. Indeed, consistently with literature findings, there is a minority of high amount crowd investors that acquire equity share comparable to angels while investing. While it is possible to find that some crowd investors follow a typical angel's behaviour, it is more difficult to reach the opposite conclusion. Indeed, the minority of angels investing very low amount still invests more than the majority of crowd investors.

Dependent variable = *Share (%)*	Total Sample	Business Angels	Crowd-Funding	Statistical Test
Mean	4.720%	12.480%	0.253%	T-test for means comparison t = 18.7***
Standard deviation	11.960%	17.190%	1.068%	
1st Quartile	0.031%	3.000%	0.021%	
Median	0.180%	3.000%	0.046%	Median Equality Test X^2 = 636.8***
3rd quartile	3.000%	16.500%	0.156%	
Min	0.001%	2.500%	0.001%	
Max	100.000%	100.000%	16.107%	
Total	1096	400	696	

Dependent variable = *Capital (€)*	Total Sample	Business Angels	Crowd-Funding	Statistical Test
Mean	€ 68.214	€ 180.770	€ 3.526	T-test for means comparison t = 8.7***
Standard deviation	€ 334.404	€ 535.323	€ 13.559	
1st Quartile	€ 499	€ 15.000	€ 333	
Median	€ 2.500	€ 40.000	€ 500	Median Equality Test X^2 = 634.4***
3rd quartile	€ 23.000	€ 150.000	€ 2.000	
Min	€ 90	€ 7.500	€ 90	
Max	€ 7.000.000	€ 7.000.000	€ 237.500	
Total	1096	400	696	

Note on statistical test used.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%
The test applied are:
- *One tail t-test for mean comparison, degree of freedom = 1094*
- *Two sample equality-of-median test*

TABLE 9 – DEPENDENT VARIABLES: SUMMARY STATISTICS

8.4. Independent and control variables

Table 10 provides an overview of my model representation of the variables used to test the hypothesis previously stated, specifying how the variables where designed. In addition, Table 11 provides basic statistics for all the variable previously described, both the main variables in the model and the control ones.

Independent Variables	Description
Investor typology	Dummy variable assuming value 0 if the investor is a Business Angel, 1 if he is a Crowd investor
Soft Monitoring	Ordinal variable ranging from 1 to 5, where 1 means very low or absent monitoring, while 5 means a very frequent contact with the invested Start-Up
Active involvement	Dummy variable assuming value 1 if the investor is willing to actively bring some contribution to the invested venture, 0 otherwise
Specialized investors	Dummy variable assuming value 1 if the investor either declares or is used to invest always in the same industry, 0 otherwise
Number of past deals	The number of past investment in the investor lifetime

Control Variables	Description
Investor Specific	
Age	Age of the investor
Former Manager	Dummy variable assuming value 1 if the investor has a managerial working experience, excluding the ventures he/she has invested into, 0 otherwise
Former Entrepreneur	Dummy variable assuming value 1 if the investor has a entrepreneurial working experience, excluding the ventures he/she has invested into, 0 otherwise
Firm Specific	
Start-Up Equity	Pre-money equity valuation of the invested venture in the investment year
Pre-investment Revenues	Firm's revenues on the year previous the investment
Industry Specific	
Industry PBV	Industry Price to Book Value, in the investment year
Industry Capex/Sales	Industry Capital Asset to Sales, in the investment years

TABLE 10 – INDEPENDENT VARIABLES DESCRIPTION

As already mentioned, *Investor Typology* is the dummy variable representing the investors category. In my final sample, a rough 60% of the deal presented are performed by crowd investors.

To test H2, I built a specific variable named *Soft Monitoring*, coherently with other literature on the topic (Capizzi, Bonini, Valletta, & Zocchi, Angel Network Affiliation and Business Angels' Investment Practices, 2018). *Soft Monitoring* is an ordinal variable assuming values from one to five, where one means very little control exerted by the investors on the financed venture, while five is the opposite. This variable was built coherently with the survey questions of the number of visits and contacts between the investor and the firm, where one represents basically no visit or communication at all, while five means a very high investor involvement by showing a constant presence or continuous communication with the financed firm. Even though this kind of information is ex-post compared to the investment, I argue that investors know in advance their willingness to monitor the invested start-up, and therefore, when they have to decide whether to invest, they can base their investment decision on their pre-determined willingness. In particular, higher monitoring effort reduces the perceived risk of the investment and is followed by higher invested amount. Unreported statistics show that both investors categories show the same monitoring behaviours, ranging from an extremely active monitoring to no monitoring at all. However, percentiles show that the more than half of the investors reveal average monitoring efforts, ranging from two to three in my sample.

In order to answer my hypothesis H3, I determine another variable named *Active Involvement.* Addressing literature (Capizzi, Bonini, Valletta, & Zocchi, 2018) (Capizzi V. , 2015), I built my variable based on the question related to the contributions brought to the start-up. Investors declaring only financial contributions are given the value of 0 for this variable, while investors naming any other active contribution or knowledge provided were given the value of 1. As for the previous variable, *Active Involvement* is a kind of information observable only ex-post compared to the investment time. However, it is reasonable to believe that, when financing a venture, investors can already have an idea of the potential contribution they can bring to the start-up. For example, angels that are expert in a specific industry probably already know that they can bring valuable know-how to a firm in that industry, and also know if they are willing to do so. Therefore, as for the previous variable I justify the introduction in my model to ex-post variables thanks to the willingness, which means that behaviours that are only observable at a future time can still be pre-determined. Statistics reports that around three quarters of investors bring some kind of value-added thanks to their active involvement. However, this figure is higher for angel investors than it is for the crowd. This is consistent with literature findings of a lower sophistication of the crowd

investors, that often are not even professional investors and are therefore less able to deliver valuable contribution. Second, by contrast to monitoring, that in the crowd can benefit from a social effect, so that information and updates known by one of the crowd investors are shared to others, contribution depends on the active involvement of the single individual, that may have lower mean to reach the financed venture and practically convince them of the importance of their support. That's why while monitoring is at comparable levels between business angels and crowd-funding, *Active Involvement* shows higher figures for the angel investors. In addition, that's why I expect a higher impact on the involvement choice on the side of the business angels rather than on the crowd investors.

The variable *Specialized investors* is built to understand the implications of my fourth hypothesis. This variable is a dummy assuming value of 1 if the investor specialized into a single industry, and 0 if the investor is used to perform investments in multiple industries. This information is self-declared for business angels as an answer of the specific regarding question, while is deducted for crowd investors by looking at all the crowd campaigns a noting whether all the transactions performed by a single crowd investor are concentrated on the same industry. As a result, a rough half of the deals considered are performed by specialized investors. Moreover, only 25% of angels are used to invest in a specific industry compared to almost 60% of the crowd investors. This difference can be ascribed to two main factors. First, I have already said that crowd investors are often less sophisticated investors, who make deals because of an enthusiastic interest in a specific topic. Since it is reasonable to assume that investors are enthusiast on a single topic or on related ones, I can expect crowd investors to prefer specialization. A second reason can be ascribed to the variable definition. Indeed, since I stated that for crowd investors their specialization is deducted from past investments, individuals performing a single deal will be recorded as industry specific. While this is of possible concern, I address this risk in my post-model analysis by performing opportune robustness checks.

The last variable in my model is *Number of past deals.* Consistently with previous literature (Capizzi V. , 2015) (Hsu, Haynie, Simmons, & McKelvey, 2014), the number of performed investments is a good proxy for experience. In this work, however, I look at this variable from the investor's wealth perspective and state that the more the investment performed, the lower capital is available to new investments. This effect is expected to be much stronger for high amount investors as angels, and weaker for crowd investors given the restrained invested amount. The investors on average have

a track records of 4.5 deals. This figure differs between the two investors categories, as business angels show a higher propensity to retain a more variegated portfolio, while often crowd investors perform a single investment. More than 50% of the angels analysed performed at least seven deals in their career. By contrast, 50% of the crowd investors performed only one transaction. However, a small sub-group inside the crowd distinguishes by performing a considerable amount of investment, much larger than angels' ones.

Independent Variables	Obs.	Mean	Median	Standard Deviation	Max	Min	Dummy=1 Percentage
Investor typology	1096	-	-	-	-	-	63.50%
Soft Monitoring	1096	2.620	3	0.965	5	1	-
Active involvement	1096	-	-	-	-	-	76.46%
Specialized investors	984	-	-	-	-	-	53.96%
Number of past deals	1096	4.460	3	5.508	33	0	-

Control Variables	Obs.	Mean	Median	Standard Deviation	Max	Min	Dummy=1 Percentage
Investor Specific							
Age	1096	45.236	45	10.440	86	19	-
Former Manager	1096	-	-	-	-	-	26.00%
Former Entrepreneur	1096	-	-	-	-	-	32.11%
Firm Specific							
Start-Up Equity	895	1810211	442231	6466792	166666667	14423	-
Pre-investment Revenues	1096	62581	150	147255	1500000	0	-
Industry Specific							
Industry PBV	1096	3.9785	3.5400	1.8612	8.6200	0.7100	-
Industry Capex/Sales	1096	0.0551	0.0453	0.0550	0.2296	0.0005	-

TABLE 11 – INDEPENDENT VARIABLES: SUMMARY STATISTICS

In addition to the main variables of the above-mentioned hypothesis, I introduce a set of variables that are acknowledged, from existing studies, to have an impact on the investment decision. The selected metrics are control variables.

We classify my control variables into three main groups, respectively investor specific, firm specific and industry specific variables.

Investors specific variables are related to personal characteristics of the investors. The first metric is investor age, since I can expect older investors to be more risk averse and therefore to perform investments of lower amounts (Samuelson, 1997) (Forsfalt, 1999). In addition, background career also plays a role, especially in case of investors being former entrepreneurs or managers (Sudek, 2006) (Sudek, Mitteness, & Baucus, 2008) (Collewaert & Manigart, 2016) (Morissette, 2007). Investors specific variables are therefore related to their age and past experience, whose causal effect to investment has been already observed multiple times (Shane, 2000) (Paul, Whittam, & Wyper, 2007).

Investor specific control is modelled through investor *Age* and former work experience. In particular, investor's career may have an impact on their investment decision. For example, ex entrepreneurs might be more risk propense and provide higher investment amounts. The variables are built as follows. *Age, Former Manager* and *Former Entrepreneur* are self-declared in the survey delivered to the business angels and hand searched on LinkedIn for all the involved crowd investors. While *Age* is a continuous variable, *Former Manager* and *Former Entrepreneur* are dummy variables assuming the value of 1 if the investor involved in the deal worked as a manager or entrepreneur respectively, and 0 otherwise. It's interesting to notice that the model variables are not uncorrelated as it can be noticed in Table 12. In particular, it seems that most managers and entrepreneurs invest as business angels, and moreover the two categories show behaviours that differs among themselves and the remaining sample. Managers contribute more to financed ventures, and also are more likely to diversify their investments. On contrary, these characteristics are less important to former entrepreneurs that are more interesting in having an effective monitoring of the invested venture. The variables representing the investors past experience are therefore relevant, as in the model they absorb the effect provoked on the other variables. Moreover, I address the possible concern raised by this feature with opportune robustness checks.

Independent Variables	Former Manager		Former Entrepreneur	
	Mean comparison test	P-value	Mean comparison test	P-value
Investor typology	-	0.000***	-	0.000***
Soft Monitoring	+	0.1517	+	0.0008***
Active involvement	+	0.000***	+	0.0665*
Specialized investors	-	0.000***	-	0.2207
Number of past deals	+	0.0535*	-	0.3942

Note on statistical test used.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%
The test applied is: one tail t-test for mean comparison.
The + sign means that the test is performed on the following hypothesis: «If the investor is a former manager/entrepreneur the expected mean is higher»
The – sign means the opposite

TABLE 12 – MANAGERS AND ENTREPRENEURS VARIABLES TESTS

Firm specific variables are related to the invested venture stage. For instance, more developed start-ups have higher capital needs, that will however be conceded for a lower equity share. A good proxy for start-ups development is determined by two variables that have already been extensively studied: start-up equity (Mason & Harrison, 2000) (Van Osnabrugge, 2000) and start-ups with positive revenues at the moment of the investment (Witbank, Dew, Read, & Sarasvathy, 2006) (Alemany & Villanueva, 2015). Indeed, more developed start-ups are bigger and have already started to sell their product in the market.

Turning to how I built firm specific control variables, I point that firm dimension and development has an impact on the investment, since larger ventures have higher capital requirements that will be sold for a smaller equity share. As a proxy for dimension I use to variables: start-up *Equity* and *Pre-investment Revenues. I* do this believing that larger and more developed ventures will have a higher equity value and also an already active presence in the market, having started to sell their product or service. start-up *Equity* is the pre-money valuation of the invested venture. It is directly asked to entrepreneurs as a question of the survey, and hand-searched on Telemaco

for start-ups when this data was not directly mentioned among the campaign disclosed information. Analysis on the equity of the venture involved show that more than 50% of the start-ups have a pre-money equity valuation lower than 500 k€, and 75% of the ventures lower than 1.5 M€. These figures are similar when looking only at business angels or crowd-funding. The minimum value lower that 15 k€ shows that some angel and crowd investors provide money to newly formed venture with basically no assets. This supports the view that these actors provide funding to start-ups in such an early stage of their life-cycle that they would hardly manage to arise funds from VC or other more conventional financing sources. The higher percentile for business angels' investments, reaching +10 M€ in equity valuation, show that part of the angels also invests in more developed ventures thus overlapping to the role of VC.

As regards *Pre-investment Revenues*, the variable is defined as the revenues invested the year preceding the investment. This variable was either declared or hand-searched on Orbis for angels' deals, while it was found on Telemaco for crowd investments when not directly available among the campaign disclosed information. Unreported percentiles show that 25% of the financed start-ups are in a pre-revenues stage, and that more than 50% collect negligible amounts in revenues. Still, 25% present revenues higher than 50 k€, showing that a non-negligible number of invested ventures is already successfully selling their product in the market, and is probably looking for funds not to launch their business, but to scale up. As for start-up *Equity*, I expect positive relationships between *Pre-investment Revenues* and the dependent variable *Capital*, and a negative relation with *Share*.

Finally, industry specific variables are added to the model, representing economic features that have an impact on the investment activity. When dealing with industry issues that may have had an influence on the investment decision, I add a set of industry specific control variable that have been shown to influence the overall funding flows. The selected metrics are *Industry PBV*, which is the price to book value for a specific industry in the investment year, and *Industry Capex/Sales,* which the ratio of total capital asset expenditures on the industry revenues.

In Table 13 I also report the main statistics for the main regressors of my model for the two sub-samples determined by the variable *Investor typology.* In other words, I report the statistics for the angels' and the crowd investors' deals.

Independent Variables	Sample	Obs.	Mean	Median	Standard Deviation	Max	Min	Dummy=1 Percentage	T-value for staistical test
Investor typology	Overall	1096	-	-	-	-	-	63.50%	
	BA	400	-	-	-	-	-		
	CF	696	-	-	-	-	-		
Soft Monitoring	Overall	1096	2.620	3	0.965	5	1	-	4.0495***
	BA	400	2.790	2	1.233	5	1	-	
	CF	696	2.522	3	0.755	4	1	-	
Active involvement	Overall	1096	-	-	-	-	-	76.46%	
	BA	400	-	-	-	-	-	91.75%	
	CF	696	-	-	-	-	-	67.67%	
Specialized investors	Overall	984	-	-	-	-	-	53.96%	
	BA	400	-	-	-	-	-	25.00%	
	CF	495	-	-	-	-	-	65.95%	
Number of past deals	Overall	1096	4.460	3	5.508	33	0	-	10.3721***
	BA	400	6.478	7	4.264	26	0	-	
	CF	696	3.300	1	5.802	33	1	-	

Note on statistical test used.
*Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%*
The test applied is: two tail t-test for mean comparison.
The test is performed on the following hypothesis: «If the investor is a a Business Angel or a Crowd investor the expected mean is different»

TABLE 13 – INDEPENDENT VARIABLES: SUMMARY STATISTICS ON SUB-SAMPLES

As I can see, means are always significantly different in the two subsamples. The variable *Number of past deals* seems to be more affected. Indeed, most of crowd investors have much lower experience compared to the business angels. This can be traced to the novelty of the crowd-funding phenomenon and is a feature I will take into account in my results.

We also repeat the same the same analysis for all the control variables in Table 14. Results on mean comparison tests confirm the previously stated finding on the difference between the two samples.

Control Variables	Sample	Obs.	Mean	Median	Standard Deviation	Max	Min	Dummy=1 Percentage	T-value for staistical test
Investor Specific									
Age	Overall	1096	45.236	45	10.440	86	19	-	9.2502***
	BA	400	48,850	51,5	9,423	70	30	-	
	CF	696	43,159	42,5	10,436	86	19	-	
Former Manager	Overall	1096	-	-	-	-	-	26.00%	
	BA	400	-	-	-	-	-	51.25%	
	CF	696	-	-	-	-	-	11.49%	
Former Entrepreneur	Overall	1096	-	-	-	-	-	32.11%	
	BA	400	-	-	-	-	-	46.00%	
	CF	696	-	-	-	-	-	24.15%	
Firm Specific									
Start-Up Equity	Overall	895	1810211	442231	6466792	166666667	14423	-	2.4793**
	BA	400	2466814	766666	9458172	166666667	14423	-	
	CF	495	1279622	245867	1672220	4281079	66579	-	
Pre-investment Revenues	Overall	1096	62581	150	147255	1500000	0	-	-3.6996***
	BA	400	40853	100	148741	1500000	0	-	
	CF	696	75069	201	145033	842962	0	-	
Industry Specific									
Industry PBV	Overall	1096	3.9785	3.5400	1.8612	8.6200	0.7100	-	-4.2825***
	BA	400	3.6749	3.1900	1.6823	8.6200	0.7100	-	
	CF	696	4.1530	3.5400	1.9364	8.6200	1.8300	-	
Industry Capex/Sales	Overall	1096	0.0551	0.0453	0.0550	0.2296	0.0005	-	-13.0482***
	BA	400	0.0300	0.0110	0.0431	0.2296	0.0005	-	
	CF	696	0.0695	0.0544	0.0599	0.2296	0.0188	-	

Note on statistical test used.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%
The test applied is: two tail t-test for mean comparison.
The test is performed on the following hypothesis: «If the investor is a a Business Angel or a Crowd investor the expected mean is different»

TABLE 14 - CONTROL VARIABLES: SUMMARY STATISTICS ON SUB-SAMPLES

Finally, for further reference, in "Exhibit 3 – Correlation matrix, variance and co-variance matrix" are reported Table 27 and Table 28, showing respectively the correlation matrix the and variance & covariance matrix among all the variables described.

9. Model implementation and results

9.1. Investors behaviour and investments decisions

The first analysis is performed with the aimed of validating the overall specifications of my model and hypotheses. To achieve this, I run a set of multiple linear regression using alternatively the dependent variable *Share (%)* and *Capital (€)*. The models also take into account control regressors and time fixed effects. In my models, I manage to address any potential heteroskedasticity issues in two ways: first, I point that variables following a non-normal distribution is not a concerning issue when the sample is quite numerous, and second, I calculate in my regression robust standard errors as a way to control for heteroskedasticity. Indeed, while ordinary regression methods are overly affected by the violation of any of their assumptions, such as the homoskedasticity one, robust regression methods are built to deliver consistent result also in presence of heteroskedasticity, which is fairly more representative in many real-world scenarios.

Our base model considers all the regressors depending on my hypothesis, where the dependent variable can be either:

$$y_1 = Share\ (\%), \qquad y_2 = Capital\ (€)$$

All the models analysed perform the regression on a set of main regressors used to test my hypotheses:

$$x = \begin{pmatrix} Investor\ typology \\ Soft\ Monitoring \\ Active\ involvement \\ Specialized\ investor \\ Number\ of\ past\ deals \end{pmatrix}$$

We than add to the model the control variables and time effect to understand the validity of my results to specifications change, therefore adding to my base model one of the following vectors of regressors:

$$x_1 = \begin{pmatrix} Age \\ Former\ Manager \\ Former\ Entrepreneur \end{pmatrix}$$

$$x_2 = \begin{pmatrix} StartUp\ Equity \\ Preinvestment\ revenues \end{pmatrix}$$

$$x_3 = \begin{pmatrix} Industry\ PBV \\ Industry\ Capex/Sales \end{pmatrix}$$

$\tau = Time\ fixed\ effect$

Below in Table 15 are presented the results of the base model. The two different model specifications run the regression using either *Share (%)* in model (1), or *Capital (€)* in model (2).

Main Regressors	Share (%) (1)	Capital (€) (2)
Investor typology	-0.103***	-149596.2***
	(0.00865)	(26046.3)
Soft Monitoring	0.0283***	46153.3**
	(0.00551)	(21902.4)
Active involvement	-0.0286***	-45655.8***
	(0.00613)	(17234.8)
Specialized investors	-0.00114	-11653.9
	(0.00614)	(11161.9)
Number of past deals	-0.00119**	-258.9
	(0.000532)	(1030.9)
Intercept	0.0578***	76180.6***
	(0.0117)	(23890.6)
R^2	0.3118	0.0884
Observations	984	984

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors.
Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 15 – BASE MODEL REGRESSION RESULTS

Below, Table 16 and Table 17 report the result of a set of regression based on the more advanced models.

Models in Table 16 use *Share (%)* as dependent variable. Model (1) is a repetition of the base model as presented in Table 10, while models (2), (3) and (4) each use asset of control variables in the regression, respectively Investor specific, Firm specific and Industry Specific control. Model (5) is performed without control variables but adding *Time effects* to balance eventual influence determined by the investment year on the

model results. Models (6), (7) and (8), in addition to using a set of control variables each, also add *Time effects.*

Equations presented in Table 17 are the same applied in Table 16, but using the dependent variable *Capital (€).*

Regressors	Share (%) No time effect				Share (%) With time effect			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investor typology	-0.103***	-0.0921***	-0.110***	-0.0991***	-0.146***	-0.136***	-0.148***	-0.148***
	(0.00865)	(0.00779)	(0.0103)	(0.00866)	(0.0200)	(0.0188)	(0.0211)	(0.0202)
Soft Monitoring	0.0283***	0.0277***	0.0351***	0.0312***	0.0251***	0.0249***	0.0313***	0.0287***
	(0.00551)	(0.00555)	(0.00671)	(0.00638)	(0.00511)	(0.00514)	(0.00640)	(0.00573)
Active involvement	-0.0286***	-0.0283***	-0.0204***	-0.0354***	-0.0314***	-0.0314***	-0.0241***	-0.0409***
	(0.00613)	(0.00626)	(0.00689)	(0.00828)	(0.00676)	(0.00678)	(0.00805)	(0.00809)
Specialized investors	-0.00114	-0.000593	-0.00422	-0.000937	-0.00786	-0.00736	-0.0119	-0.0105
	(0.00614)	(0.00597)	(0.00777)	(0.00614)	(0.00661)	(0.00639)	(0.00843)	(0.00679)
Number of past deals	-0.00119**	-0.000969**	-0.00251**	-0.00122**	-0.00160***	-0.00144***	-0.00294***	-0.00169***
	(0.000532)	(0.000488)	(0.00104)	(0.000536)	(0.000577)	(0.000542)	(0.00109)	(0.000588)
Investor Specific								
Age		0.000138				0.000205		
		(0.000201)				(0.000212)		
Former Manager		0.0151*				0.0109		
		(0.00912)				(0.00841)		
Former Entrepreneur		0.0185***				0.0151**		
		(0.00702)				(0.00666)		
Firm Specific								
Start-Up Equity			-3.48e-09***				-2.16e-09**	
			(1.30e-09)				(1.01e-09)	
Pre-investment Revenues			-7.75e-10				-3.29e-08**	
			(1.67e-08)				(1.63e-08)	
Industry Specific								
Industry PBV				-0.00215				-0.00562***
				(0.00147)				(0.00197)
Industry Capex/Sales				-0.0855*				-0.138**
								(0.0561)
Intercept	0.0578***	0.0356**	0.0495***	0.0664***	-0.00913	-0.0332	-0.0180	0.00383
	(0.0117)	(0.0178)	(0.0153)	(0.0138)	(0.0111)	(0.0209)	(0.0143)	(0.0106)
Time effects	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.3118	0.3210	0.3197	0.3167	0.3567	0.3630	0.3594	0.3732
Observations	984	984	783	984	984	984	783	984

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 16 – REGRESSION RESULTS, DEPENDENT VARIABLE SHARE (%)

Regressors	Capital (€) No time effect				Capital (€) With time effect			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investor typology	-149596.2***	-160435.1***	-99640.6***	137920.2***	-78511.5**	-85529.3***	-27932.3	-79970.3**
	(26046.3)	(31249.7)	(15602.8)	(20769.5)	(31505.0)	(32622.1)	(28177.2)	(32025.3)
Soft Monitoring	46153.3**	44431.6**	21333.7**	55533.2**	56119.0**	53830.8**	32996.5***	60735.5**
	(21902.4)	(20750.4)	(8678.2)	(27110.6)	(27015.2)	(25415.7)	(11278.0)	(29722.0)
Active involvement	-45655.8***	-42481.2***	-74749.1***	-66661.6**	-57504.8***	-55022.3***	-53897.0***	-68962.6**
	(17234.8)	(15690.6)	(18572.0)	(27829.6)	(21794.0)	(20553.8)	(15165.2)	(27674.7)
Specialized investors	-11653.9	-14124.0	26050.4*	-10963.4	-6205.6	-8220.0	4525.8	-9457.8
	(11161.9)	(12053.1)	(15617.7)	(10997.7)	(10010.5)	(10306.2)	(13307.5)	(10519.0)
Number of past deals	-258.9	-370.1	4224.5**	-348.6	685.8	832.2	4865.6***	577.2
	(1030.9)	(1080.9)	(1957.9)	(1076.6)	(820.4)	(880.1)	(1826.4)	(834.2)
Investor Specific								
Age		-155.9				-616.1		
		(449.5)				(570.5)		
Former Manager		-34525.9				-36058.8		
		(23989.9)				(24663.8)		
Former Entrepreneur		12491.3				23709.6		
		(15241.5)				(21540.6)		
Firm Specific								
Start-Up Equity			0.0672***				0.0719***	
			(0.0198)				(0.0192)	
Pre-investment Revenues			0.0344				-0.0386	
			(0.0342)				(0.0273)	
Industry Specific								
Industry PBV				-6416.9				-6633.4
				(4154.1)				(4583.0)
Industry Capex/Sales				-288167.3				-191255.3
				(194511.7)				(149229.8)
Intercept	76180.6***	98892.3*** -	17025.0	101575.4***	-68474.2	-25898.8	-144780.4***	-53670.7
	(23890.6)	(34449.3)	(39356.2)	(22672.0)	(58268.9)	(51955.8)	(47043.7)	(53146.8)
Time effects	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.0884	0.0917	0.6159	0.0942	0.1024	0.1076	0.6576	0.1054
Observations	984	984	783	984	984	984	783	984

Note on statistical model used.

The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.

Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 17 – REGRESSION RESULTS, DEPENDENT VARIABLE CAPITAL (€)

As seen from the previous tables, results are extremely coherent among all the possible specifications. Indeed, as confirmed from mono-variate analysis, the typology of investor has the strongest effect on the investment decisions. Considering the base model, angels are expected to invest 150 k€ more than crowd investors to acquire a stake in the venture that is by 10% larger. Looking at the other models' specifications, the results are qualitatively unchanged.

The models provide strong support for my second hypothesis H2. The acquired stake and absolute amount invested largely increase with the willingness to exploit soft monitoring mechanisms, confirming once again the relevance of an increased monitoring even if not contractually agreed, as it often is between angels, crowd, and the invested venture.

As regards my third hypothesis, the models coherently prove H3b, showing that investors value their active contribution to the financed venture as an alternative to pure financial means, and therefore they reduce their exposure in the financed venture.

Our fourth hypothesis cannot be confirmed by my model. On contrary to my expectations, investors specialized in investments concentrated in the same industry have not developed the expertise and confidence to increase their exposure and support to the financed start-up. This might however be traced to the sample composition, since many angel investors did not declare their whether they were specialized on a single industry, while for crowd investors, given the presence of a very short track records, may be too early to talk about expertise arising from targeted investments.

Finally, the last hypothesis H5 is confirmed by my findings. Investors coherently decrease their stake in the invested ventures, and each 8 ventures in their portfolio they reduce their stake by 1%. Result are inconclusive for the capital they invest however, since it is statistically irrelevant in the majority of the models' specifications. When it is significant however, they show an expected positive sign in accordance to my last hypothesis. Indeed, investors leverage on their experience as a risk reduction factor and deploy larger investments thanks to their higher confidence.

As regards the controls, investor age appears not to be a decisive factor in the investment decision. The variable shows however the expected negative sign in the capital model, since, according to theory, risk aversion increases with age and therefore investors prefer lower amount financing. On the other hand, investor's past

experience as managers or entrepreneurs reveal to have a significant impact on the share acquired in the invested venture.

The firm specific variables have an extremely significant impact as well. As expected, larger, bigger and more developed firms with a higher equity value drive larger investment and sell lower stake in the company ownership. The same conclusions hold for the firms displaying pre-investment revenues, even though it is unclear their effect on the absolute capital invested.

Finally, industry with blown price compared to book value and highly capital-intensive drive down investments.

9.2. Business angels, crowd-funding and investment decisions

Since I have shown in the above chapters that investment decisions strongly depend on its typology (see Table 9), I want to further analyse these differences. Therefore, I also performed the model on the sub-samples determined by the dummy variable *Investor typology*, so respectively on the business angels and on the crowd-funding samples, in order to understand whether there are sensible differences in the behaviours of the two investors groups.

In Table 18 I run the base model on the sub-samples determined by the investor typology. Models from (1) to (4) use *Share (%)* as dependent variables, where (1) and (2) are run on the angels' sample using the base model with and without *Time effects*, while models (3) and (4) apply the same models on the crowd investors sample. Models from (5) to (8) respectively repeat the (1) to (4) set but using *Capital (€)* as dependent variable.

| Regressors | Dependent variable: Share (%) | | | | Dependent variable: Capital (€) | | | |
| | Business Angels | | Crowd-Funding | | Business Angels | | Crowd-Funding | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investor typology								
Soft Monitoring	0.0463***	0.0389***	-0.000903	-0.000612	74783.0**	86914.2**	-1170.2	-843.4
	(0.00861)	(0.00791)	(0.000569)	(0.00123)	(35749.2)	(42462.0)	(730.5)	(1264.2)
Active involvement	-0.0430	-0.0474*	-0.000816	-0.000625	-61608.4	-38578.7	-313.1	-240.4
	(0.0288)	(0.0273)	(0.00136)	(0.00268)	(48249.2)	(55696.2)	(1701.2)	(2886.1)
Specialized investors	-0.0105	-0.0270	0.00161**	0.000869	-76069.3*	-69858.8	2457.3***	1824.8***
	(0.0172)	(0.0189)	(0.000681)	(0.000570)	(44529.0)	(43670.7)	(803.9)	(637.7)
Number of past deals	-0.00490**	-0.00690***	-0.00000790	0.0000211	2497.1	6529.0	17.81	46.43
	(0.00208)	(0.00229)	(0.0000250)	(0.0000310)	(4623.7)	(4611.6)	(25.09)	(28.52)
Intercept	0.0495	-0.00895	0.00433***	0.00317***	8586.7	-184140.9	5009.3***	1941.3*
	(0.0303)	(0.0262)	(0.00105)	(0.000836)	(78693.0)	(131068.9)	(1364.9)	(992.6)
Time effects	No	Yes	No	Yes	No	Yes	No	Yes
R^2	0.1663	0.1853	0.0152	0.075	0.0432	0.0628	0.0139	0.081
Observations	288	288	696	696	288	288	696	696

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 18 – REGRESSION RESULTS ON INVESTORS TYPE SUB-SAMPLES

Table 19 and Table 20 give a specific focus on the result obtained by the regression on the single sub-sample. Table 19 only considers deals made by business angels. Models (1) to (4) use *Share (%)* as dependent variable, while models from (5) to (8) use *Capital (€)*. Each set of regression use a different set of control variables, respectively none, *Investor specific*, *Firm specific* and *Industry specific*. Therefore, models (1) to (4) use *Share (%)* as dependent variable, while models from (5) to (8) apply the same Equations using *Capital (€)* as dependent variable. The same regressions are applied in Table 20 on the sub-sample made by crowd-funding deals.

Regressors	Dependent variable: Share (%)				Dependent variable: Capital (€)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investor typology								
Soft Monitoring	0.0463***	0.0419***	0.0476***	0.0459***	74783.0**	69601.6**	44057.7***	75401.2**
	(0.00861)	(0.00868)	(0.00861)	(0.00854)	(35749.2)	(32857.0)	(12891.4)	(36378.3)
Active involvement	-0.0430	-0.0586**	-0.0427	-0.0415	-61608.4	-50508.3	-81873.6*	-64591.1
	(0.0288)	(0.0290)	(0.0290)	(0.0280)	(48249.2)	(49853.1)	(46597.1)	(48208.1)
Specialized investors	-0.0105	-0.0112	-0.0179	-0.0130	-76069.3*	-77505.0*	19372.0	-71938.3*
	(0.0172)	(0.0169)	(0.0170)	(0.0174)	(44529.0)	(45332.8)	(28437.1)	(42506.5)
Number of past deals	-0.00490**	-0.00437**	-0.00554**	-0.00533**	2497.1	1551.2	7121.2*	2844.6
	(0.00208)	(0.00189)	(0.00216)	(0.00212)	(4623.7)	(4950.1)	(3798.1)	(4596.6)
Investor Specific								
Age		-0.00109				-1236.6		
		(0.000763)				(2292.2)		
Former Manager		0.0466**				-49625.5		
		(0.0202)				(46177.4)		
Former Entrepreneur		0.0539***				24281.2		
		(0.0206)				(38962.4)		
Firm Specific								
Start-Up Equity			-3.69e-09**				0.0788***	
			(1.44e-09)				(0.0177)	
Pre-investment Revenues			5.80e-08				0.0526	
			(5.03e-08)				(0.0746)	
Industry Specific								
Industry PBV				-0.00310				-3654.9
				(0.00488)				(11087.1)
Industry Capex/Sales				0.440				-410728.7
				(0.275)				(588958.9)
Intercept	0.0495	0.0798	0.0577*	0.0521	8586.7	95042.4	-117398.3	31183.0
	(0.0303)	(0.0568)	(0.0306)	(0.0331)	(78693.0)	(146317.4)	(72038.3)	(74681.2)
R^2	0.1663	0.2002	0.1863	0.1769	0.0432	0.0482	0.7053	0.0450
Observations	288	288	288	288	288	288	288	288

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
*Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%*

TABLE 19 – REGRESSION RESULTS ON THE BUSINESS ANGELS SUB-SAMPLE

Regressors	Dependent variable: Share (%)				Dependent variable: Capital (€)			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Investor typology								
Soft Monitoring	-0.000903	-0.000777	-0.00130*	-0.000767	-1170.2	-928.6	-590.0	-1793.3
	(0.000569)	(0.000571)	(0.000765)	(0.000980)	(730.5)	(685.2)	(926.9)	(1397.2)
Active involvement	-0.000816	-0.000942	-0.00153	-0.000678	-313.1	-602.6	-1428.5	786.2
	(0.00136)	(0.00134)	(0.00174)	(0.00234)	(1701.2)	(1601.7)	(2204.8)	(3272.0)
Specialized investors	0.00161**	0.00115**	0.00141	0.00164**	2457.3***	1721.8***	2480.2***	2424.2***
	(0.000681)	(0.000572)	(0.000879)	(0.000702)	(803.9)	(666.4)	(951.3)	(836.0)
Number of past deals	-0.00000790	-0.0000445	-0.00000481	-0.0000106	17.81	-50.05	28.87	23.43
	(0.0000250)	(0.0000288)	(0.0000473)	(0.0000253)	(25.09)	(35.16)	(55.90)	(25.52)
Investor Specific								
Age		0.000117***				179.2***		
		(0.0000322)				(48.20)		
Former Manager		0.000628				300.5		
		(0.000575)				(614.2)		
Former Entrepreneur		0.00223				2407.0		
		(0.00146)				(1656.3)		
Firm Specific								
Start-Up Equity			-7.35e-10***				-0.000670***	
			(1.48e-10)				(0.000184)	
Pre-investment Revenues			-6.81e-09***				-0.00582*	
			(2.32e-09)				(0.00333)	
Industry Specific								
Industry PBV				0.000149				246.5
				(0.000277)				(417.8)
Industry Capex/Sales				-0.00653				5180.3
				(0.00553)				(8295.5)
Intercept	0.00433***	-0.00114	0.00786***	0.00371***	5009.3***	-3043.0	5710.4**	4456.4***
	(0.00105)	(0.00125)	(0.00240)	(0.00119)	(1364.9)	(1932.4)	(2870.8)	(1721.0)
R^2	0.0152	0.0369	0.0349	0.0161	0.0139	0.0184	0.0190	0.0150
Observations	696	696	495	696	696	696	495	696

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
*Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%*

TABLE 20 – REGRESSION RESULTS ON THE CROWD-FUNDING SUB-SAMPLE

The regressions run on the two sub-samples provide novel evidence on the specific differences between business angels and crowd-funding behaviour. Results across the several models developed are qualitatively unchanged, and coherence of my model let me draw some important conclusions.

Soft monitoring, that is developed between the investors and the financed ventures, is a determining factor in the investment decision only in the case of business angels. Indeed, crowd investors, even if willing to maintain active relationships with the invested venture, a feature I included in the soft monitoring mechanisms, might do that only because of their enthusiastic belief and participation in the project. As to monitoring, they often rely on different strategies, as a collective monitoring from the crowd with open discussions on dedicated forums. The number of calls or of presence inside the company are not seen as a reliable monitoring practice also due to their lower sophistication, that does not allow them to successfully determine the investment performances.

Similarly, the willingness to actively contribute to the financed start-up is a decisive feature only for business angels, even if the models show lower, but still acceptable, statistical significance for the parameter. Again, while angels invest substantial amount and therefore are willing to ensure that their investments perform adequately, crowd investors play a more passive role more often compared to angels. Even though the majority of crowd investors still shows some kind of contribution, this contribution does not affect their investment decisions. Probably, as they feel they are only a voice in the crowd, they might believe their contribution to be less meaningful and therefore they do not base their investment decision on it.

On the other hand, investors specialized in a single industry or in a single market conclude higher investment deals, but only if they are crowd investors. By contrast, this feature does not appear to be important from the angels' view point. This is probably due to the nature of crowd investors: when they look for campaigns always in the same market and industry, it means that they are probably enthusiastic investors discovering a new technology or a new stream of related technologies, and they are more than happy to dedicate higher resources to the investment. business angels instead, being professional investors, base their investment less on their emotional involvement and therefore are not influenced by their specialization.

Finally, as regard the last variable of my main model, investor's number of past deals is an impacting feature, but only if the investor is a business angel. In addition, this

result holds robust only as regards the invested share, that decreases coherently with my hypothesis, while parameters for the capital invested are less significant. I am however cautious about this result since crowd funding is a novel practice, and more than 50% of the deals reported in my sample are the first deal for the investor. Over time, as crowd-funding practices become more established, I expect this figure to get closer to angels one.

As regards *Investor control,* variables show different significance for the different investors' typology. While *Age* report an expected behaviour for business angels with a negative sign, even though it results not significant in my model, it results very significant for crowd investors showing also a positive sign. Older crowd investors are willing to invest more and acquire larger stakes in the invested ventures.

Investors past experience as a manager or entrepreneur only affects the investment decision in the case of business angels. This might also be traced to the lower percentage of ex managers and entrepreneurs among crowd investors, that does not allow for this feature to be representative.

Firm specific control variables are a significant determinant of decision for both angels and crowd investors, while, in the model run on the two sub-samples, industry variables seem to affect the investment decision of neither angels nor crowd investors.

9.3. Robustness analysis

9.3.1. Sampling by selected variables

In order to test the robustness of my model, I further run the regressions on different subsamples. The determined sampling procedure is performed on the variable *Number of past deals.* Starting from this data, I divide the overall sample in investors performing their first investment and investors with already at least one deal closed. The model is run on several specification considering both *Share (%)* and *Capital (€)* as dependent variables and considering also *Time effects.* Results are reported in Table 21. Models are grouped two by two since regressions are run first on unexperienced investors and then on experienced ones. Models (1) and (2) use *Share (%)* as dependent variable and run the base model regression. Models (3) and (4) also add *Time effect.* Models from (5) to (8) repeat the procedure using *Capital (€)* as dependent variable. As it is possible to see from Table 21, results are qualitative unchanged.

	Dependent Variables: Share (%)				Dependent Variables: Capital (€)			
	No Experience	At least 1 past deal	No Experience	At least 1 past deal	No Experience	At least 1 past deal	No Experience	At least 1 past deal
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main Regressors								
Investor typology	-0.0950***	-0.106***	-0.148**	-0.159***	-324111.9**	-161595.6***	-254359.9**	-116963.3***
	(0.0199)	(0.00970)	(0.0682)	(0.0276)	(125774.8)	(33511.5)	(118839.1)	(38056.5)
Soft Monitoring	0.00408	0.0376***	0.00671*	0.0314***	31827.9*	51836.8*	47753.7**	59177.2*
	(0.00254)	(0.00735)	(0.00368)	(0.00675)	(16428.5)	(29294.2)	(23028.9)	(35288.2)
Active involvement	-0.00375*	-0.0453***	-0.00847*	-0.0434***	-25463.9**	-55966.0**	-55439.0**	-54610.8**
	(0.00210)	(0.0115)	(0.00443)	(0.0109)	(11915.1)	(25646.7)	(25581.5)	(24998.6)
Specialized investors	0.0198	-0.00229	0.0268**	-0.0143	66310.6	-64551.7**	64857.1	-57335.9***
	(0.0143)	(0.0127)	(0.0119)	(0.0133)	(71360.6)	(25449.7)	(64720.4)	(20794.8)
Number of past deals		-0.00145***		-0.00174***		805.3		1380.6
		(0.000556)		(0.000585)		(1045.1)		(906.4)
Intercept	0.0707***	0.0506***	0.113*	-0.0180	202114.4***	66801.5*	114801.1	-81040.6
	(0.0188)	(0.0156)	(0.0681)	(0.0155)	(65637.0)	(36587.7)	(120431.2)	(80013.1)
Time Effect	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.514	0.277	0.563	0.317	0.380	0.069	0.409	0.079
Observations	451	533	451	533	451	533	451	533

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 21 – REGRESSION RESULTS BY SAMPLING ON *NUMBER OF PAST DEALS*

Since I showed that the investors former work experience has an impact on its investment behaviours, the next robustness check is performed sampling the variables *Former Manager* and *Former Entrepreneur.* Models results are shown in Table 22. Model (1) to (4) are the results of the sub-samples determined by *Former Manager.* The first two use *Share (%)* as dependent variable while the remaining two *Capital (€).* The same applies to models from (5) to (8) but using *Former Entrepreneurs* to determine the sub-samples. As it can be seen from the Table, results are qualitatively unchanged.

	Sampling by: Former Manager				Sampling by: Former Entrepreneur			
	Share (%)		Capital (€)		Share (%)		Capital (€)	
	No managerial experience	Former Manager	No managerial experience	Former Manager	No entrepreneurial experience	Former Entrepreneur	No entrepreneurial experience	Former Entrepreneur
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main Regressors								
Investor typology	-0.0910***	-0.149***	-185890.9***	-110490.5***	-0.0812***	-0.153***	-122294.5***	-144097.8***
	(0.00992)	(0.0228)	(45717.8)	(24728.9)	(0.00793)	(0.0216)	(18137.1)	(39325.9)
Soft Monitoring	0.0197***	0.0437***	59400.8*	18643.7*	0.0202***	0.0338***	16440.2**	84803.3*
	(0.00505)	(0.0115)	(32743.7)	(9510.9)	(0.00471)	(0.0106)	(7884.2)	(48913.0)
Active involvement	-0.0201***	-0.0510**	-53766.4**	-25863.8	-0.0232***	-0.0273*	-31361.1***	-51119.3
	(0.00554)	(0.0220)	(23508.2)	(20004.5)	(0.00613)	(0.0142)	(11879.6)	(34098.1)
Specialized investors	0.00372	-0.0287	-2385.6	-47753.2*	0.00889**	-0.0245	-14344.9*	-28637.9
	(0.00553)	(0.0206)	(14244.7)	(25514.7)	(0.00435)	(0.0162)	(8054.5)	(42506.0)
Number of past deals	-0.000128	-0.0105***	-300.3	-1493.7	0.000315	-0.00963***	-93.18	2237.4
	(0.000373)	(0.00352)	(1155.7)	(6483.1)	(0.000280)	(0.00273)	(809.2)	(5378.9)
Intercept	0.0555***	0.116***	79028.9***	112891.3**	0.0414***	0.128***	114884.4***	-16993.5
	(0.0108)	(0.0380)	(30563.4)	(53550.5)	(0.00904)	(0.0341)	(23131.3)	(64785.6)
Time Effect								
R^2	0.357	0.285	0.095	0.097	0.400	0.314	0.177	0.079
Observations	762	222	762	222	694	290	694	290

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 22 – REGRESSION RESULTS BY SAMPLING ON *FORMER MANAGERS* AND *FORMER ENTREPRENEUR*

Finally, I look into co-investments in the business angels sample to understand whether angels investing in group show behavioural patterns more similar to crowd investors. Results are shown in Table 23. The dependent variable is *Share (%)*, and results are reported for the sub-samples of angels investing alone, angels co-investing, and crowd investors respectively in models (1), (2) and (3). Then in models (4), (5) and (6) I also add *Investors control.* Not only are results qualitatively unchanged, but they reveal that business angels, even when co-invest, still show a behaviour that is much different from that of crowd investors and more consistent with that of solo angels.

		Dependent Variables: Share (%)				
	Solo Angels	Angels with co-investors	Crowd-Investors	Solo Angels	Angels with co-investors	Crowd-Investors
	(1)	(2)	(3)	(4)	(5)	(6)
Main Regressors						
Investor typology						
Soft Monitoring	0.0740**	0.0295***	-0.000903	0.0658**	0.0265***	-0.000777
	(0.0297)	(0.00551)	(0.000569)	(0.0274)	(0.00629)	(0.000571)
Active involvement	-0.209*	-0.0201	-0.000816	-0.292**	-0.0273	-0.000942
	(0.110)	(0.0239)	(0.00136)	(0.138)	(0.0248)	(0.00134)
Specialized investors	-0.0517	-0.0175	0.00161**	-0.0783	-0.0168	0.00115**
	(0.0623)	(0.0116)	(0.000681)	(0.0783)	(0.0118)	(0.000572)
Number of past deals	-0.0104*	-0.00295*	-0.00000790	-0.00648	-0.00295*	-0.0000445
	(0.00570)	(0.00151)	(0.0000250)	(0.00537)	(0.00153)	(0.0000288)
Investor Specific						
Age				-0.00360	-0.000787	0.000117***
				(0.00361)	(0.000773)	(0.0000322)
Former Manager				0.180	0.0243*	0.000628
				(0.114)	(0.0140)	(0.000575)
Former Entrepreneur				0.199**	0.0264*	0.00223
				(0.0857)	(0.0148)	(0.00146)
Intercept	0.233*	0.0411*	0.00433***	0.311	0.0713	-0.00114
	(0.126)	(0.0242)	(0.00105)	(0.230)	(0.0531)	(0.00125)
R^2	0.171	0.165	0.015	0.303	0.190	0.037
Observations	59	229	696	59	229	696

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 23 – REGRESSION RESULTS BY SAMPLING ON *CO-INVESTORS*

9.3.2. Sampling by investment year

As a final robustness check, I perform a final set of regression by dropping deals related to more distant years. Results are shown in Table 24. Models (1) to (3) use *Share (%)* as dependent variable, while models (4) to (6) use *Capital (€)*. The set of models presented respectively drop deals preceding year 2010, 2011 and 2012. As it can be seen from the Table, results are qualitatively unchanged.

	Dependent Variables: Share (%)			Dependent Variable: Capital (€)		
	Investment Year > 2010	Investment Year > 2011	Investment Year > 2012	Investment Year > 2010	Investment Year > 2011	Investment Year > 2012
	(1)	(2)	(3)	(4)	(5)	(6)
Main Regressors						
Investor typology	-0.103***	-0.110***	-0.151***	-150514.3***	-158800.7***	-116301.3***
	(0.00870)	(0.0109)	(0.0194)	(26264.3)	(33771.1)	(23470.2)
Soft Monitoring	0.0283***	0.0281***	0.0200***	46177.4**	43739.3*	5824.7
	(0.00551)	(0.00609)	(0.00694)	(21906.2)	(24189.2)	(6139.4)
Active involvement	-0.0290***	-0.0255***	-0.0248***	-46266.7***	-45209.0**	-21589.4**
	(0.00615)	(0.00620)	(0.00690)	(17343.6)	(18908.6)	(9172.7)
Specialized investors	-0.00146	-0.00189	-0.00709	-12140.4	-13670.5	2493.2
	(0.00615)	(0.00658)	(0.00757)	(11234.0)	(13029.9)	(5499.4)
Number of past deals	-0.00121**	-0.00123**	-0.00146**	-297.3	-898.0	1328.4**
	(0.000534)	(0.000552)	(0.000648)	(1034.0)	(1031.5)	(593.1)
Intercept	0.0589***	0.0646***	0.129***	77898.8***	94609.0***	113721.6***
	(0.0117)	(0.0137)	(0.0244)	(23743.6)	(23753.4)	(31190.9)
R^2	0.313	0.318	0.355	0.089	0.084	0.178
Observations	982	897	799	982	897	799

Note on statistical model used.
The model is a linear regression that is run using different variables sets as regressors. Value reported are the parameters coefficients as estimated by the model while values in parentheses are the regressors standard errors.
Significance level are as follow: *, **, *** are used for statistical significance of 10%, 5% and 1%

TABLE 24 – REGRESSION RESULTS BY SAMPLING ON *INVESTMENT YEAR*

10. Conclusions

Early stage financing is a strong drive of innovation and, as a consequence, of economic growth. While some of the actors involved in entrepreneurial finance have been more widely studied, as Venture Capital or Private Equity, knowledge is still at a less developed level for business angels and crowd-funding. In this work I focus precisely on these actors in the segment of early equity financing, trying to develop a topic that has not received great deal of attention so far for different reasons, that were properly addressed in the work. Indeed, business angels have received a comparably lower dedication from scholars due to the intrinsic opaqueness and invisible feature belonging to the angel market. In addition, research on crowd-funding is at its initial stages due to the novelty of the phenomena and is mostly concerned on collecting data and properly define crowd-funding categories and actors involved. Thanks to the collaboration from UNIUPO, a unique, vast and detailed dataset was employed in the analysis, while support from Osservatorio Crowdinvesting resulted fundamental to acquire the required information for crowd funding.

Despite the renowned role that actors as business angels and crowd investors play in early stage financing, the attention they receive from scholars is not comparable to what they deserve, given their implication at a theoretical, political and managerial level. Theoretical, because it is acknowledged that my current knowledge presents many gaps in diverse topics. Political, because the effectiveness of policymakers' measures in stimulating start-ups and innovation largely depends on their understanding of the actors involved. Managerial, because the selection of the funding channel comes along other consequences that eventually have an impact on the venture evolution as well.

In this work I try to shed light for the first time on this topic, belonging at the same time to three different research streams: early stage financing, behavioural finance and comparative analyse. The novelty of the work lies in these points: it is the first of its kind looking at differences between angels and crowd investors and is also one of the few focused on the behavioural perspective, that is a novel research stream for crowd funding. Therefore, this work lays the basis for a completely new research stream that can be deemed as follows: determine the investment choices and behaviour of business

angels and crowd investors, and the factors influencing these features and the differences between these two actors.

In order to achieve this target, in this work I test a statistical model on an extensive sample of 1000+ deals performed by business angels and crowd investors, using novel variables to test their impact on actors' investment decisions, and how the decision process differs between the actors involved, thus bringing my main contribution to the literature.

The following section are aimed at highlighting the implication of the model's findings, and limitation to the current study with suggestion to eventual new works.

10.1. Model implications

In this study I was able to provide original evidence on investment decision process of business angels and crowd investors, thanks to a novel set of variables related to investors behaviours and practices (*Investor typology, Soft Monitoring, Active involvement, Specialized investors* and *Number of past deals)*.

In the analysis, I found the formal evidence of the difference between the two classes of actors. Angels invest more, buy larger stakes and show different behaviours when investing, with higher tendency to monitor the on-goings of their investments and to practically contribute to the financed venture, while crowd investors perform lower amount investment and show a considerable, but lower than angels' one, predisposition to an active involvement. I also find that crowd investors more often perform investments in ventures belonging to the same industry. This behaviour can be traced to the crowd characteristics, often comprised of individuals who are highly enthusiast on a very specific topic, or a specific set of topics and therefore favour start-ups in the same industry. On the other hand, this conclusion could be traced to the recent development of the crowd-funding phenomenon, that did not allow crowd investors to perform many transactions. In addition, since business angels are more sophisticated investors, they are more familiar with concept of diversification to minimize risk. So, while many angels only invest in a single specific industry, for example to take advantage of their knowledge or expertise, the majority of the group performs investment in more than one market. The higher sophistication of business angels is reflected by their experience: angels have a higher track records of past investments compared to crowd investors, are more likely to be or to have been managers and entrepreneurs and are older.

The dataset allowed for more comprehensive research such as to control for the above-mentioned factors in a causal perspective for the impact they have on investment behaviours. To test the hypotheses, I performed an extensive set of multivariate models, to assess not only how investment features are affected by the investor typology, but also how they are affected by the investor characteristics. The analysis let me understand the differences among the investors and the investor categories.

In the analysis I could demonstrate how investor past experience and future willingness to monitor and actively contribute to the invested venture, jointly with the investor typology, have a strong effect on the investor decision process. It's interesting to notice how these processes differ across the actors' categories. Soft monitoring implemented by the investor is relevant in terms of perceived risk reduction driving an increased financial effort. On the other hands, investors deploying non-monetary contributions consider them as an alternative to pure financial investment, therefore decreasing their economic involvement. Interestingly, crowd investors still show a high preference for soft monitoring mechanisms and the majority of the crowd deploys some kind of non-financial support to the financed venture. However, multivariate analysis shows that their willingness to follow these behavioural patterns does not have the same impact on investment decision as for business angels. Indeed, while crowd investors are still willing to verify the pace of the financed ventures, they rely more on social control mechanism, by sharing information among all the investors involved in each deal. They are also willing to contribute to start-ups' development, but they feel they are only a voice in the crowd. Their contribution is probably perceived to be less likely to bring value added benefit.

Investors attitude and track records has an important causal effect as well. Not only are crowd investors keener to specialize in a specific industry, but, when they are, the financial resources they deploy are also higher. This behaviour is in line with their enthusiastic attitude, that, when present, drives to higher investment amounts. Angels are more likely to have performed more investments in the past. As already stated, this feature can be traced to the angels' market having existed for a longer time. However, having many companies in the portfolio has a consequence since it freezes financial means that are unavailable to new deals and is an indicator of differentiation strategy that only occur in a portfolio comprising several companies. Overall, it drives down the involvement of the investors in term of share they are willing to acquire.

Investors past career has strong impact on decision process, an effect that is more visible if the investor is a business angel. Former entrepreneurs are likely to be more

risk propense, while former managers are more likely to be more confident in choosing their investments. In both cases the final effect is larger investments and stakes acquired.

The implications of these findings can be observed on multiple dimensions. In current times, policymakers are continuously supporting and stimulating the role of early financing sources with the aim of promoting entrepreneurial activities. The effectiveness of proposed policies can be boosted by increasing the understanding of these actors.

From a theoretical viewpoint, this work is a first of its kind, comprising elements of several research stream as entrepreneurial finance, behavioural finance and, mainly, comparative analysis. It is useful to demonstrate the feasibility of comparative studies, that so far have been overlooked given the difficulty in finding numerous and comparable data. Even though the results of this work are only the foundation of what could be an unexplored research stream, I would expect it to strongly develop in the future. Indeed, scholars should have a strong interest in developing comparative analysis, especially for those actors that have some comparable characteristics, as it is for business angels and crowd investors, both competing in the same channel in early stage financing.

From a managerial perspective, this comparative study can be effective in helping ventures determine their more suitable financing source, that is possibly aligned with their objective. For instance, when looking for active involvement from the shareholders, ventures should look for angels' investments. If they know their project presents some innovative features that can attract passionate investors, they should look for a crowd-funding round to raise more money.

10.2. Limitation and further research

The research conducted has some limitations and by acknowledging them, I provide hints for future studies and developments. The main limitation lies in the data used for the model. The crowd-funding industry is, by its nature, highly visible, and therefore the crowd-funding sample represent a complete overview of the Italian market. By contrast, business angels' market has an intrinsic opacity that makes it difficult, if not impossible, to develop a full picture of its current features. This problem was already addressed in the explanation of the data gathering process, stating that the procedure has been performed and refined for so many years that available data

can be considered to have a good representativeness. However, if possible, the analysis should be repeated with newer data collected through the most recent questionnaires.

Another issue is the possible selection bias in final dataset used for the analysis. Since I had to exclude many deals for missing or impossible data, the model is exposed to a possible selection bias that could be solved by using a improved initial dataset. By doing so, not only would selection bias be overcome, but also the available number of deals for the analysis would largely increase, leading to improved and more solid results.

In addition, there is a concerning feature in crowd-funding deals related to Italian regulation that is not treated in this work. Indeed, by law, a predefined share in any crowd-funding campaign must be financed by institutional investors. As a consequence, some of the crowd-funding deals are performed by other kind of investors, eventually also angels, even though they do so through the crowd-funding platform and are therefore reported as crowd investors, influencing the analysis results. Even though they are a minority, the model could be improved by distinguishing among institutional and non-institutional investors in the crowd-funding campaigns.

This work's results can be further improved by taking into account other variables that are not considered in this model, as the belonging to Business Angel Networks for angels and platform characteristics for crowd investors. Another possible evolution of this work would consist in adding a third sub-sample comprising venture-backed start-ups, to give a complete overview of the early stage financing world.

The most important future developments are related to the research stream of comparative analysis. Just to mention an example, in a couple years' time, the vast majority of deals considered will have released their financial statements allowing performance analysis for all deals up to three years post investment. An important consequence of this work, related to the investment decision process under the effect of behavioural features and investors characteristics, would be to understand how these behavioural features have an impact on the post-investment performances of the financed ventures.

Finally, as already stated this work only gives an overview of the Italian market, without considering data coming from other regions, also due to the difficulty in finding data of other countries deals and implementing a research of this kind at an international level. However, I cannot exclude that eventually this will become easier

in the future, leading therefore to new breakthrough results comparing not only different actors' behaviours, but also how this behaviour changes across countries.

Overall, this work has provided both practitioners and academic with valid contribution, showing the effect of behavioural and personal characteristics on investment decisions, and laying the ground for the original stream of research of comparative finance.

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Exhibits

Exhibit 1 – Complete database structure

The complete database structure is described in "Table 25 – Complete database structure". The complete database comprises more 160+ different variables. In the table, column 1 is a reference and works as variables index, column 2 reports the variables name as in the database, while in column 3 a short description of the mentioned variables is provided.

#	Variables	Description
1	Year of investment	Year of BA investment
2	MSCI year before investment	MSCI index in t-1, where t is the investment year
3	MSCI year of investment	MSCI index in t, where t is the investment year
4	VC fundraising year before investment	VC fundraising worldwide in t-1, where t is the investment year
5	VC fundraising year of investment	VC fundraising worldwidein t, where t is the investment year
6	Valued BP	Number of business plan evalued by the investor
7	Rejection Rate	(1-number of investments done by the BA)/valued BP
8	High risk	Dummy variable taking value 1 for high risk project (evalued by the investor)
9	Company/business hard to value	Dummy variable taking value 1 for company/business hard to be valued by the investor
10	Weak BP	Dummy variable taking value 1 for company with a weak business plan
11	Lack of info	Dummy variable taking value 1 for project lacking info (evalued by the investor)
12	Lack of trust	Dummy variable taking value 1 for project lacking trust (evalued by the investor)
13	Lack of time	Dummy variable taking value 1 if the BA has not invested because he has not time to monitor the investment

Exhibit 1 – Complete database structure

#	Variables	Description
14	Weak managers	Dummy variable taking value 1 for project with weak managers (evalued by the investor)
15	Low growth potential	Dummy variable taking value 1 for project with low growth potential (evalued by the investor)
16	Product/service hard to value	Dummy variable taking value 1 for difficulty in evaluating the product or service (evalued by the investor)
17	Investor name	Name of the investor (BA)
18	Investor ID	ID of the investor
19	Number of investments	Number of investments made by the BA at the date of the investment
20	Industry PBV	PBV in the industry in which the company operates at the year of the investment
21	Net capex/Sales	Net capex/sales in the industry in which the company operates at the year of the investment
22	Industry	Industry of the company
23	Industry-ID	ID of the industry
24	Presente su ORBIS	Dummy variable taking value 1 for companies that was possible to find on ORBIS system
25	Distance last inv-2018	Years from last investments received by the company (at 2018)
26	Startup name	Startup's business name
27	Net Income 2y after invest.	Net income of the company two years after the investment
28	Company ID	ID of the company
29	Codice Fiscale	Fiscal code of the investor
30	Sito Internet	URL website of the company
31	Company's Province	Province of the company
32	Company's region	Region of the company
33	Distance investor-Company (km)	Distance between investor and company (km)
34	Innovation index	Innovation Cities Index of the City in which company is located
35	Investor and Company in the same province	Dummy variable taking value 1 if company and investor are located in the same province
36	Investor and Company in the same region	Dummy variable taking value 1 if company and investor are located in the same region

#	Variables	Description
37	Hi-Tech	Dummy variable taking value 1 if the company operates in high-tech industries
38	Soft due diligence, Length of valuation process (gg)	Lengh of the valuation process (months): it is the time that the investor takes to evaluate the startup
39	Revenues of the company	revenue of the company in the year of investment (declared by the investor, is an average data)
40	Capital invested	capital invested in the year of the investment (declared by the investor, is an average data)
41	Financing tranches- Single	Dummy variable taking value 1 if the company was financed in a single equity infusion
42	Financing tranches- First	Dummy variable taking value 1 if the company was financed in multiple equity infusions and this was the first
43	Financing tranches- Second	Dummy variable taking value 1 if the company was financed in multiple equity infusions and this was the second
44	Financing tranches- Third	Dummy variable taking value 1 if the company was financed in multiple equity infusions and this was the third
45	Financing tranches- Fourth or more	Dummy variable taking value 1 if the company was financed in multiple equity infusions and this was the fourth
46	Kind of financing - Equity	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
47	Kind of financing - Fin shareholders	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
48	Kind of financing - Collateral	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
49	Kind of financing - Other	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
50	Capital protection and control rights - None	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
51	Capital protection and control rights - Profit priority	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
52	Capital protection and control rights - Losses postponement	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question

Exhibit 1 – Complete database structure

#	Variables	Description
53	Capital protection and control rights - Sell-back	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
54	Capital protection and control rights - Tag along	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
55	Capital protection and control rights - Pre-emption	Dummy variable taking value 1 if 1 if the investor answer "yes" at the question
56	Capital Protection and control rights binomial	Dummy variable taking value 0 if capital protection and control right -None is 1
57	Co-investors	Number of co-investors
58	Kind of co-investors - BA	Dummy variable taking value 1 if the coinvestor is a BA
59	Kind of co-investors - Seed capital	Dummy variable taking value 1 if the coinvestor is a seed capital fund
60	Kind of co-investors - VC	Dummy variable taking value 1 if the coinvestor is a VC fund
61	Kind of co-investors - Participation	Dummy variable taking value 1 if the coinvestor is a participation fund
62	Share	Share of the investor in the company
63	Share combined	It is the sum of all investments that the investor holds
64	Monitoring - Very Low	Dummy variable taking value 1 if the monitoring provided by the investor in the specific company was very low
65	Monitoring - Low	Dummy variable taking value 1 if the monitoring provided by the investor in the specific company was low
66	Monitoring - Medium	Dummy variable taking value 1 if the monitoring provided by the investor in the specific company was medium
67	Monitoring - High	Dummy variable taking value 1 if the monitoring provided by the investor in the specific company was high
68	Monitoring - Very High	Dummy variable taking value 1 if the monitoring provided by the investor in the specific company was very high

#	Variables	Description
69	Monitoring_ordered	Evaluation of the monitoring provided by the specific investor in the specific company (likert scale)
70	Growth stage - Seed	Dummy variable taking value 1 if the stage of the company in the year of the investment is seed (provided by the investor when he fills the survey)
71	Growth stage - Start up	Dummy variable taking value 1 if the stage of the company in the year of the investment is start up (provided by the investor when he fills the survey)
72	Growth stage - Expansion	Dummy variable taking value 1 if the stage of the company in the year of the investment is early-growth (provided by the investor when he fills the survey)
73	Growth stage - Turnaround	Dummy variable taking value 1 if the stage of the company in the year of the investment is turnaround (provided by the investor when he fills the survey)
74	Corporate Form- S.p.A.	Dummy variable taking value 1 if the the corporate legal form is S.P.A.
75	Corporate Form- S.r.l.	Dummy variable taking value 1 if the the corporate legal form is S.R.L.
76	Corporate Form- S.r.l.s.	Dummy variable taking value 1 if the the corporate legal form is S.R.L.S.
77	Corporate Form- S.a.p.a.	Dummy variable taking value 1 if the the corporate legal form is S.A.P.A.
78	Corporate Form- Other	Dummy variable taking value 1 if the the corporate legal form is different from the ones mentioned above
79	Employed (team)	Number of employees of the startup at the year of investment
80	IBAN membership	Dummy variable taking value 1 if the investor is an IBAN member
81	Name of the investor	Yes, name of the investor
82	Investor ID	Investor ID
83	Age	Age of the investor at the year of the investment
84	Gender	Gender of the investor
85	Province of residence	Province of the investor

Exhibit 1 – Complete database structure

#	Variables	Description
86	Region of residence	Region of the investor
87	Innovation index	It refers to the city where the BA lives
88	Education - HS	Dummy variable taking value 1 if the investor has an HS degree of education
89	Education - Degree	Dummy variable taking value 1 if the investor has a bachelor's degree
90	Education - Master	Dummy variable taking value 1 if the investor has a master
91	Education missing	Dummy variable taking value 1 if investor experience was not specified or not found
92	Working experience (present) - BA	Dummy variable taking value 1 if the investor has a working experience as BA
93	Working experience (present) - Employee	Dummy variable taking value 1 if the investor has a working experience as employee
94	Working experience (present) - Entrepreneur	Dummy variable taking value 1 if the investor has a working experience as entrepreneur
95	Working experience (present) - Manager	Dummy variable taking value 1 if the investor has a working experience as manager
96	Working experience (present) - Professional	Dummy variable taking value 1 if the investor has a working experience as professional….of what????
97	Working experience (present) - Retired	Dummy variable taking value 1 if the investor is retired
98	Working experience (present) - missing	Dummy variable taking value 1 if the investor's current work experience was not specified or not found
99	Working experience (past) - BA	Dummy variable taking value 1 if the investor has had a working experience as BA in the past (the job role before the current)
100	Working experience (past) - Employee	Dummy variable taking value 1 if the investor has had a working experience as employee in the past (the job role before the current)
101	Working experience (past) - Entrepreneur	Dummy variable taking value 1 if the investor has had a working experience as entrepreneur in the past (the job role before the current)
102	Working experience (past) - Managerial	Dummy variable taking value 1 if the investor has had a working experience as manager in the past (the job role before the current)

#	Variables	Description
103	Working experience (past) - Professional	Dummy variable taking value 1 if the investor has had a working experience as professional in the past (the job role before the current)
104	Working experience (past) - missing	Dummy variable taking value 1 if the investor's past work experience was not specified or not found
105	Wealth	Wealth of the investor (his wealth excluding real estate, is an average data)
106	Wealth (thousand)	Wealth of the investor
107	Age at first investment	Age of the investor at first investment
108	Distance from home - Same province	Dummy variable taking value 1 if the investor and the startup are located in the same province
109	Distance from home - Same region	Dummy variable taking value 1 if the investor and the startup are located in the same region
110	Distance from home - Italy	Dummy variable taking value 1 if the investor and the startup are both located in Italy
111	Distance from home - Europe	Dummy variable taking value 1 if the investor and the startup are both located in Europe
112	Valuation process (in the past)	Average number of projects evaluated by the investor in the past (before the survey)
113	Favorite exit strategies - Trade sale	Dummy variable taking value 1 if the favorite exit strategy of the specific investor is trade sale
114	Favorite exit strategies - Other investors	Dummy variable taking value 1 if the favorite exit strategy of the specific investor is sale to othe investors
115	Favorite exit strategies - Sale back	Dummy variable taking value 1 if the favorite exit strategy of the specific investor is sale back
116	Favorite exit strategies - IPO	Dummy variable taking value 1 if the favorite exit strategy of the specific investor is IPO
117	Industry-specific investor	Dummy variable taking value 1 If the investor invests only on a specific sector
118	Investments in lifetime	Number of investments made by the investor in lifetime
119	Investments in lifetime (binomial)	Dummy variable taking value 1 if the investments made by the investor in the past are higher than 7, 0 otherwise

Exhibit 1 – Complete database structure

#	Variables	Description
120	Settlement of new Company	Number of investments made by the investors related to a new startup settlement at the survey date
121	Monitoring (past investments) - Very low	Dummy variable taking value 1 if the monitoring provided by the investor in previous investments was very low
122	Monitoring (past investments) - Low	Dummy variable taking value 1 if the monitoring provided by the investor in previous investments was low
123	Monitoring (past investments) - Medium	Dummy variable taking value 1 if the monitoring provided by the investor in previous investments was medium
124	Monitoring (past investments) - High	Dummy variable taking value 1 if the monitoring provided by the investor in previous investments was high
125	Monitoring (past investments) - Very high	Dummy variable taking value 1 if the monitoring provided by the investor in previous investments was very high
126	Companies in portfolio	Number of companies in portfolio at the survey date
127	% wealth invested	% of wealth invested at the survey date
128	% invested in the future - Increase	Dummy variable taking value 1 if the % of wealth invested is assumed to increase in the future
129	% invested in the future - Unchanged	Dummy variable taking value 1 if the % of wealth invested is assumed to be unchanged in the future
130	% invested in the future - Decrease	Dummy variable taking value 1 if the % of wealth invested is assumed to decrease in the future
131	Contributions to financed companies - Network	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is network
132	Contributions to financed companies - Financial knowledges	Dummy variable taking value 1 if, on average, the contribution provided by the investor to financed companies is financial knowledges
133	Contributions to financed companies - Industrial knowledges	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is industrial knowledges

#	Variables	Description
134	Contributions to financed companies - Capital	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is capital
135	Contributions to financed companies - Marketing knowledges	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is marketing knowledges
136	Contributions to financed companies - Strategy	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is strategy
137	Contributions to financed companies - Employees development	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is employees development
138	Contributions to financed companies - Other	Dummy variable taking value 1 if the contribution provided by the investor to financed companies is other
139	Issues considered before investing - Industry	Dummy variable taking value 1 if the issue considered by the investor before the investment was industry
140	Issues considered before investing - Market growth	Dummy variable taking value 1 if the issue considered by the investor before the investment was market growth
141	Issues considered before investing - Exit strategy	Dummy variable taking value 1 if the issue considered by the investor before the investment was exit strategy
142	Issues considered before investing - Capital gain	Dummy variable taking value 1 if the issue considered by the investor before the investment was capital gain
143	Issues considered before investing - Management team	Dummy variable taking value 1 if the issue considered by the investor before the investment was management team
144	Issues considered before investing - Product/service	Dummy variable taking value 1 if the issue considered by the investor before the investment was product/service
145	Issues considered before investing - Entrepreneurial role	Dummy variable taking value 1 if the issue considered by the investor before the investment was the entrepreneurial role

Exhibit 1 – Complete database structure

#	Variables	Description
146	Issues considered before investing - Tax relief	Dummy variable taking value 1 if the issue considered by the investor before the investment was tax relief
147	Issues considered before investing - Social issues	Dummy variable taking value 1 if the issue considered by the investor before the investment was social issue
148	Source of deal flow - Entrepreneur	Dummy variable taking value 1 if the entrepreneur is the source of deal flow
149	Source of deal flow - Banks	Dummy variable taking value 1 if banks is the source of deal flow
150	Source of deal flow - Universities	Dummy variable taking value 1 if univesities are the source of deal flow
151	Source of deal flow - Friends	Dummy variable taking value 1 if friends are the source of deal flow
152	Source of deal flow - BAN	Dummy variable taking value 1 if BAN is the source of deal flow
153	Source of deal flow - Investor club	Dummy variable taking value 1 if the investor club is the source of deal flow
154	Source of deal flow - Professionals	Dummy variable taking value 1 if professionals are the source of deal flow
155	Source of deal flow - VC	Dummy variable taking value 1 if venture capital funds are the source of deal flow
156	Source of deal flow - Personal network	Dummy variable taking value 1 if the personal network is the source of deal flow
157	Source of deal flow - crowdfunding platform	Dummy variable taking value 1 if the crowd-funding platform is the source of deal flow
158	Dummy Exit during 2016	Dummy variable taking value 1 if the exit happened in 2016
159	BA=0/CF=1	Dummy variable taking value 0 if the investor is a business angels, 1 if the investor is a crowd investor
160	Startup age	Age of the company

TABLE 25 – COMPLETE DATABASE STRUCTURE

Exhibit 2 – Stata database structure

The complete database structure is described in "Table 26 – Stata Database structure". The final database comprises more 25 different variables. In the table, column 1 is a reference and works as variables index, column 2 reports the variables name as in the database, while in column 3 a short description of the mentioned variables is provided.

#	Stata Variable Label	Description
1	Year of Investment	Variable reporting the year of the deal
2	Investor Name	Name of the investor performing the deal
3	Codice Fiscale	Id of the investor, fiscal code if available
4	Capital Invested	Variable representing *Capital (€)* in the model. Absolute amount of capital invested in the deal
5	Share	Variable representing *Share (%)* in the model. Relative amount of capital invested in the deal compared to the start-up post-deal equity
6	CF_BA	Dummy variable representing *Investor typology* in the model. Value of 0 means the deal was performed by a business angel while value of 1 by a crowd investor
7	Monitoring	Variable representing *Soft Monitoring* in the model. It can range from 1 to 5
8	Contribution	Dummy variable representing *Active involvement* in the model. It takes value 1 when the investor shows some kind of contribution to the invested company
9	Industry Specific	Dummy variable representing *Specialized investors* in the model. It takes value 1 if the investor is used to investing always in the same industry
10	Experience	Variable representing *Number of past deals* in the model
11	Age investor	Variable representing *Age* in the model
12	Work experience manager	Dummy variable representing *Former Manager* in the model. It takes value 1 if the investor has past work experience as a manager

Exhibit 2 – Stata database structure

#	Stata Variable Label	Description
13	Work experience entrepreneur	Dummy variable representing *Former Entrepreneur* in the model. It takes value 1 if the investor has past work experience as an entrepreneur
14	Start-up equity	Variable representing *Siart-Up Equity* in the model
15	Pre-investment revenues	Variable representing *Pre-investment Revenues* in the model
16	Distance (same province)	Dummy variable taking value 1 if the investor and the financed venture are in the same province
17	Distance (same region)	Dummy variable taking value 1 if the investor and the financed vnture are in the same region
18	Industry	Name of the industry of the deal
19	Industry ID	ID of the industry of the deal
a20	Industry PBV	Variable representing *Industry PBV* in the model
21	Industry Capex/Sales	Variable representing *Industry Capex/Sales* in the model
22	Sub-Sample Experience	Dummy variable used to determine the sub-samples based on investors experience. It takes value 0 if the deal is the first for the investor, 1 otherwise
23	Coinvestors	Variable representing the number of co-investors in any deal
24	Sub-Sample Coinvestors	Dummy variable used to determine the sub-samples basedon co-investors. It takes value 0 for angels investing alone, 1 for angels co-investing, and 2 for crowd investors
25	Share_2	Relative amount of capital invested in the deal compared to the start-up post-deal equity, without percentage

TABLE 26 – STATA DATABASE STRUCTURE

Exhibit 3 – Correlation matrix, variance and co-variance matrix

Tables below report the correlation matrix (Table 27 – Correlation Matrix) and the variance and co-variance matrix (Table 28 – Variances and Covariances Matri) among all the variables comprised in the final dataset.

	Dependent Variables		Model Variables				
	Share (%)	Capital (€)	Investor typology	Soft Monitoring	Active involvement	Specialized investors	Number of past deals
Dependent Variables							
Share (%)	1,0000						
Capital (€)	0,2233	1,0000					
Independent Variables							
Investor typology	-0,4685	-0,2446	1,0000				
Soft Monitoring	0,2967	0,1670	-0,0656	1,0000			
Active involvement	0,0806	0,0426	-0,2102	0,2638	1,0000		
Specialized investors	-0,2198	-0,1478	0,4565	-0,1452	-0,1399	1,0000	
Number of past deals	0,1608	0,1342	-0,4612	0,1348	0,1502	-0,5130	1,0000
Investor Specific							
Age	0,1144	0,0424	-0,2998	-0,1175	0,1145	-0,1269	0,1298
Former Manager	0,2281	0,0452	-0,4215	-0,0073	0,1131	-0,2272	0,0145
Former Entrepreneur	0,2082	0,0992	-0,1914	0,1337	0,0170	-0,0447	0,0232
Firm Specific							
Start-Up Equity	-0,0122	0,7599	-0,1260	0,1559	0,1257	-0,1222	0,0316
Pre-investment Revenues	-0,0282	-0,0350	0,1054	0,0172	-0,1766	0,1249	-0,0129
Industry Specific							
Industry PBV	-0,3530	-0,0433	0,1171	0,1322	-0,4182	0,0290	-0,0215
Industry Capex/Sales	-0,1774	-0,1229	0,4405	0,2680	-0,1571	0,1680	-0,1685

	Investor Specific			Firm Specific		Industry Specific	
	Age	Former Manager	Former Entrepreneurs	Start-Up Equity	Pre-investment Revenues	Industry PBV	Industry Capex/Sales
Investor Specific							
Age	1,0000						
Former Manager	0,1820	1,0000					
Former Entrepreneur	0,0907	-0,1715	1,0000				
Firm Specific							
Start-Up Equity	-0,0127	0,0021	0,0412	1,0000			
Pre-investment Revenues	-0,0874	-0,0114	0,0194	-0,0791	1,0000		
Industry Specific							
Industry PBV	-0,0907	0,0087	0,0294	-0,2442	0,3431	1,0000	
Industry Capex/Sales	-0,2255	-0,1916	-0,0174	0,0310	0,1285	0,4565	1,0000

TABLE 27 – CORRELATION MATRIX

Exhibit 3 – Correlation matrix, variance and co-variance matrix

	Dependent Variables		Model Variables				
	Share (%)	Capital (€)	Investor typology	Soft Monitoring	Active involvement	Specialized investors	Number of past deals
Dependent Variables							
Share (%)	0,01027						
Capital (€)	6862,06	9.2 e+10					
Independent Variables							
Investor typology	-0,02291	-35795	0,232825				
Soft Monitoring	0,027408	46166	-0,028941	0,830774			
Active involvement	0,003397	5374	-0,042199	0,100028	0,173061		
Specialized investors	-0,01109	22319	0,10971	-0,065918	-0,028986	0,248023	
Number of past deals	0,08862	193822	-1,06004	0,585091	0,29767	-1,217	22,6902
Investor Specific							
Age	0,118613	131577	-1,47964	-1,09584	0,48707	-0,646466	6,32285
Former Manager	0,010053	5961	-0,088456	-0,0002881	0,02046	-0,049211	0,299512
Former Entrepreneur	0,009744	13894	-0,042655	0,056299	0,003268	-0,010284	0,050942
Firm Specific							
Start-Up Equity	4174	7.8 e+11	-204986	479116	176314	-205185	507891
Pre-investment Revenues	-430	-1.6 e+9	7666	2337	-11068	9371	-9249
Industry Specific							
Industry PBV	-0,00731	-26848	0,115507	0,246191	-0,355604	0,029506	-0,209741
Industry Capex/Sales	-0,00107	-2218	0,012649	0,014536	-0,00389	0,004796	-0,047762

	Investor Specific			Firm Specific		Industry Specific	
	Age	Former Manager	Former Entrepreneurs	Start-Up Equity	Pre-investment Revenues	Industry PBV	Industry Capex/Sales
Investor Specific							
Age	104,647						
Former Manager	0,809933	0,18917					
Former Entrepreneur	0,428755	-0,03445	0,213328				
Firm Specific							
Start-Up Equity	-438083	3115	64245	1.1 e+13			
Pre-investment Revenues	-134751	-746	1348	-4 e+10	2.3 e+10		
Industry Specific							
Industry PBV	-1,89571	0,007726	0,02775	-1700000	105664	4,17758	
Industry Capex/Sales	-0,137279	-0,00486	-0,000478	6220	1152	0,055537	0,003542

TABLE 28 – VARIANCES AND COVARIANCES MATRIX

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Exhibit 3 – Correlation matrix, variance and co-variance matrix

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