The returns of business angel investments and their major determinants

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Vincenzo Capizzi*

Department of Economics and Business Studies, Università del Piemonte Orientale, Novara, Italy

This paper provides evidence on the performance of business angels' investments, using a unique data-set covering a representative sample of the main actors in the Italian informal venture capital market. An econometric analysis examines the returns on business angels' investments and their major determinants, making reference to an original set of independent variables. Whereas previous empirical studies have hypothesised linear relationships between the explanatory variables and the performance of informal venture capitalists' investments, this work tests different functional forms, both linear and non-linear. The main findings are as follows: (1) the relationship between experience and internal rate of return (IRR) is U-shaped and significant; (2) the widely accepted expectation that investments with a short holding period earn a lower IRR is confirmed by quantitative data; (3) an original explanatory variable – rejection rate – is put into the model and its impact on business angels' performance is positive, non-linear and significant; (4) the final overall econometric model shows relevant explanatory power, with an *R*-squared close to 35%. The outcomes of the empirical analysis performed in this study allow the identification of new and concrete insights into possible public policy interventions aimed at stimulating the informal venture capital industry and, therefore, entrepreneurship inside the economic system.

Keywords: business angels; informal venture capital; funding gap; determinants of performance; IRR; experience; holding period; rejection rate

JEL codes: G24; G32

1. Introduction

Based on a unique data-set on investments by business angels (BAs) in Italy in the 2007–2012 time period, this paper investigates the major drivers of the performance of investments by business angels. It therefore extends to the informal venture capital market research areas and methodologies widely applied in the literature dealing with the formal venture capital and private equity markets.

Both formal and informal venture capitalists play complementary roles in a country's financial system by filling the funding gap that exists between the demand for financial resources by start-up companies and the supply of early stage equity capital. However, business angels have received much less attention in the finance literature than venture capitalists, despite the mounting evidence of their importance in the creation and early growth of new firms. Indeed, since its development, the market for

*Email: vincenzo.capizzi@eco.unipmn.it, vincenzo.capizzi@uniupo.it

informal venture capital has consistently financed many more small firms than the formal venture capital market (Mason and Harrison 2000a, 2008; Sohl 2003a, 2008; EBAN 2008, 2012; Wiltbank et al. 2009; OECD 2011).

The market for informal venture capital includes various typologies of investors, among which the most important are business angels, who finance small and newly constituted companies by, usually, buying minority equity stakes. Business angels are typically private minority investors who finance predominantly early stage firms with their own private savings through the form of equity capital. Their purpose is to realise a financial gain when selling their shares as well as to obtain non-pecuniary benefits related to their non-institutional nature. Furthermore, business angels provide their investee businesses not only with equity capital, but also with knowledge and the fruits of their personal networks, filling not only the above-mentioned funding gap, but also the reputational and experience gap which normally affects start-ups (Harrison and Mason 1992; Landström 1993). They respect a code of ethics including, among others, rules for confidentiality and fairness of treatment (vis-à-vis entrepreneurs and other BAs), and compliance with anti-money-laundering.

Although there are similarities with formal venture capitalists as far as equity investment activity is concerned, business angels and venture capitalists are different types of investors. The first difference, and maybe the most important given its direct impact on their closer interaction with the invested company, is that business angels invest their own capital and not funds committed by others (Freear, Sohl, and Wetzel 1992; Coveney and Moore 1998). The second is that business angels have a small amount of capital to invest compared to that which venture capitalists have at their disposal, and thus prefer small companies (although in recent years business angels have started to syndicate investments in order to finance bigger projects: Mason and Harrison 2000a; Sohl 2007). The third difference between business angels and venture capitalists is their motivations for investing. Venture capitalists invest exclusively for achieving target financial returns, with predefined evaluation models, risk/gain profiles and investment strategies. On the other hand, the utility function of business angels is driven by financial returns as well as by non-pecuniary benefits such as playing an entrepreneurial role, working with and mentoring highly talented and creative people, discovering new technologies, being invited to pitch presentations, interacting with other angels and actors in the financial community, and the status from being perceived as a sophisticated investor (Haines, Madill, and Riding 2003; Morrisette 2007; Ibrahim 2008; Hsu et al. 2014). The fourth difference is that business angels have no or limited diversification strategies, nor do they commit themselves simultaneously in multiple investments. Their major risk management technique is the small proportion of invested capital over their total personal assets, thus limiting the impact of a negative performance on their net worth (Freear, Sohl, and Wetzel 1992; Van Osnabrugge 2000; Johnson and Sohl 2012). The fifth difference is that because of the limited publicity that angels attract, the deal flow of potential opportunities – and therefore the match between them and entrepreneurs – is much more limited when compared to the deal flow of formal venture capitalists deal flow, who can benefit from their higher visibility (Mustilli and Gangi 1999; Paul, Whittam, and Wyper 2007; Shane 2008; Kerr, Lerner, and Schoar 2011). Finally, the evaluation and due diligence process, as well as the negotiation stage, are different with greater personal involvement by business angels on account of the small size of investments which makes it uneconomic to use of auditors, and professional and legal advisors (Mason and Harrison 1996a, 2000b; Wiltbank et al. 2009; Mitteness, Baucus, and Sudek 2012).

Since the 1990s, informal venture capitalists have tried to increase the quality of their operations by gathering in semi-formal associations or groups of angels, usually on a territorial or industrial basis, sharing presentation pitches from potential entrepreneurs, due diligence on the potential investment opportunities, and the associated transaction costs and co-investing along with other group members (Mason 2006; Sohl 2007; Paul and Whittam 2010; Kerr, Lerner, and Schoar 2011). These associations have largely replaced business angel networks (BANs) whose role was to 'match' entrepreneurs with business angels. Potential entrepreneurs submitted business plans to the networks, which selected the best projects according to angels' preferences, ultimately generating an investment deal flow for a given angel or group of angels. Members had to prove that they were accredited angels. Unlike the BANs of the 1990s, today's equivalent angel networks are now interactive and much less fragmented (for instance, in Italy there exists only one network at a national level), and adopt similar templates and operating procedures, hence entrepreneurs who submit their projects are aware that they will be analysed by the best angels, which ensures professional screening of the projects and the best contribution of either monetary and non-monetary resources (among others, advisory, reputation and connections with the financial community).

Although angel networks have contributed to the visibility and prominence of business angels, it is still a major challenge to identify and collect representative samples of the population of business angels. This limits the possibility of extending to this segment of financial markets all of the many different research areas and empirical analyses conducted on venture capital and private equity, notably the identification and measurement of the performance of business angel investments and the major drivers which influence performance, which is the issue examined in this paper.

For this reason, the major contribution of this paper for the entrepreneurial finance literature is the extensive analysis of the Italian informal venture capital market, which is based on a unique database that contains the details of 143 disinvestments made in Italy by 102 informal investors in the 2007–2012 period. This data-set allows the possibility of running a multivariate regression aimed at testing the existence of a statistically relevant relationship between an original set of independent variables (industry, experience, holding period, rejection rate, year of divestiture) and the profitability of business angels' investments. As a further contribution, unlike in previous studies about informal venture capitalists which assume linear relationships between the explanatory variables and the return on investments, the empirical analysis will be performed through a multivariate regression based on different functional forms – both linear and non-linear – for the set of explanatory variables used as proxies for the major determinants of the performance of business angels' investments.

The major empirical findings are as follows. First, consistent with literature about formal venture capital, the relationship between experience and internal rate of return (IRR) is U-shaped and significant, confirming a tendency towards overconfidence for expert BAs. Second, the widely accepted expectation that investments with a short holding period (below three years) earn a lower IRR is confirmed by quantitative data. Third, an original explanatory variable – the rejection rate of investment proposals – is positive and non-linear and has a significant impact on business angels' performance. Fourth, the final overall econometric model, including as control variables BAs' exit strategies and education, shows relevant explanatory power, with an *R*-squared close to 35%.

The paper is structured as follows. The next section profiles the main features and investment strategies of Italian business angels and compares them with formal venture capital investors. The third section examines the relevant literature regarding the

informal venture capital industry. The fourth section is devoted to the empirical analysis, describing the data-set, the methodology and the outcomes obtained. A brief descriptive analysis of the 2007–2012 Italian venture capital market is also provided. The final section includes some concluding remarks and suggestions for policy-makers.

2. Literature review on informal venture capitalists

Business angels have been the subject of numerous studies during the past 30 years or so, with the first studies by Wetzel (1981, 1983, 1986) and Gaston (1989a, 1989b) dating back to the 1980s and relating to the USA. In those years, business angels were almost unknown and the research was aimed at discovering their main features. Subsequently, other contributions on the informal venture capital market in developed and later emerging countries emerged.

There are different ways of classifying the major streams of research on business angels over time. Most adopt a chronologic and evolutionary approach (Freear, Sohl, and Wetzel 2002; Mason 2008; Johnson and Sohl 2012). In this paper – consistent with the approach followed by Macht (2006) – a classification approach based on research themes will be used. Eight themes can be identified.

The first group comprises studies aimed at identifying and profiling business angels. A sub-theme considers the role played by BANs. These contributions answer research questions such as 'what are the main features of the business angels (age, gender, residence, etc.)?', 'what are their educational and working backgrounds?', 'how much money do they invest (also as a percentage of their wealth)?', 'what are the industries which receive the most investment?', 'what are the main specificities and operations performed by business angel networks?' and 'how is it possible to provide public policy support to business angel networks?' The most important studies which profile business angels include Wetzel (1986), Gaston (1989b), Freear, Sohl, and Wetzel (1992), Riding (1993), Landström (1993), Mason and Harrison (1994, 1997), Wetzel and Freear (1993), Coveney and Moore (1998), Lerner (1998), Aernoudt (1999), Visser and Williams (2001), Paul, Whittam, and Johnston (2003), Harrison and Mason (2007), Sohl and Hill (2007), Morrisette (2007), Sohl (2007), Mason (2009), Paul and Whittam (2010), Sohl and Becker-Blease (2010), Christensen (2011), KfW (2011), Festel and De Cleyn (2013) and Li et al. (2014). A further output stemming from these contributions is the evidence of the added value provided by BANs to both investors and entrepreneurs. It is now widely accepted that the unit of analysis and measurement when studying informal venture capitalists can be either single angels or angels groups.

The second stream of contributions comprises studies which measure the size, composition and growth trends of the informal venture capital market, either at the national or continental level, and shedding further light on the behaviour of its main actors, comprise. Some examples of research questions investigated are: 'what is the size of the growth trend of the informal venture capital market in a given country/region?', 'what are the industries which receive the most investment by BAs?', 'what is the typical holding period of business angels' investments?', 'what are their preferred exit strategies?'. Among the most important publications are those by Wetzel (1987), Landström (1993), Reitan and Sørhein (2000), Mustilli and Sorrentino (2003), Bygrave et al. (2003), Sohl (2003b, 2008), Fleming (2004), Mason and Harrison (2008), Scheela and Isidro (2009), Capizzi and Giovannini (2010), Nath (2010), OECD (2011), Kraemer-Eis and Schillo (2011), Lahti (2011), Scheela and Jittrapanum (2012),

Timm (2012), Moses and Adebisi (2013), Romani, Atienza, and Amoros (2013) and Carpentier and Suret (2015).

The third research theme examines the relationship between BAs and hi-tech firms, addressing such issues such as: 'do BAs' investments boost technology development?', 'do hi-tech firms generate a higher IRR when compared with non-hi-tech start-ups?', 'do BAs share peculiar technology-specific knowledge with target companies?', 'what are the specificities of technology angels when compared to other informal investors?'. The most relevant contributions include Freear and Wetzel (1990), Amason and Sapienza (1993), Manigart and Struyf (1997), Fenn, Liang, and Prowse (1998), Freear, Sohl, and Wetzel (2002), Mason and Harrison (2003), Erikson and Sørheim (2005), Madill, Haines, and Riding (2005), Shane (2008), Metrick and Yasuda (2011) and Festel and De Cleyn (2013).

The fourth group of contributions focuses on both the investment process undertaken by BAs and their investment evaluation procedures. This group of studies also includes empirical analyses dealing with the identification of the major value drivers of the capital invested. These studies answer research questions such as: 'how do BAs select target companies?', 'how do BAs appraise target companies?', 'what is the impact of non-pecuniary benefits in BAs' investment process?', 'how does the and background of BAs influence their investment criteria?', 'what is the role played by investee company managers?', 'what are the drivers of the capital invested?'. Among the major contributions include Landström (1995), Haar, Starr, and MacMillan (1988), Feeney, Haines, and Riding (1999), Van Osnabrugge (2000), Mason and Harrison (2002a, 2003), Mason and Stark (2004), Maula, Autio, and Arenius (2005), Sohl (2006), Paul, Whittam, and Wyper (2007), Wiltbank et al. (2006), Riding, Madill, and Haines (2007), Sudek, Mitteness, and Baucus (2008), Clark (2008), Harrison, Mason, and Robson (2010), Capizzi and Tirino (2011), Macht (2011a), Mitteness, Baucus, and Sudek (2012), Collewaert (2012) and Bammens and Collewaert (2013).

The fifth group of contributions, paralleling a defined research stream in the private equity and venture capital literature, investigates the determinants of the performance of investments by business angels, answering the following research questions: 'what are the major factors affecting the performance of BA investments?', 'what are the functional forms of the determinants of IRR of BA investments?' 'what's the role of BANs in explaining return differences amongst BAs?'[1]. Examples of empirical analyses focused on this research topic can be found in Lumme, Mason, and Suomi (1996), Mason and Harrison (2002b), Mason and Harrison (2004), Mason (2005), Wiltbank (2005), Heukamp, Liechtenstein, and Wakeling (2007), Wiltbank and Boeker (2007), DeGennaro and Dwyer (2008), Wiltbank et al. (2009) and Capizzi (2011).

The sixth stream of contributions addresses another issue that is also widely investigated in the private equity and venture capital literature, namely the impact of the hands on contributions of business angels on the value creation process and profitability of their investee companies. The typical research questions are: 'what is the performance of angel-backed firms?', 'does BAs' experience matter?', 'do angel-backed firms deliver better post-IPO performance?', 'what are the appropriate financial indicators to use in order to measure the impact of BAs post-investment?'. Among the most important publications in this recent research field are: Ardichvili et al. (2002), Davila, Foster, and Gupta (2003), Delmar and Shane (2006), Chahine, Filatotchev, and Wright (2007), Johnson and Sohl (2012), Macht and Robinson (2009), Kerr, Lerner, and Schoar (2011), Goldfarb et al. (2012) and Vanacker, Collewaert, and Paeleman (2013).

The seventh group of contributions includes all those studies aimed at comparing the activities and performance of business angels with those of venture capitalists (VCs) and analyses of the relationship between angel financing and venture capital financing. It is also possible to consider in this group contributions which investigate the effect of coinvestments between BAs and VCs and contributions which measure the impact of formal and informal investors on venture-backed and angel-backed companies. The main research questions are: 'what are the major differences between business angels and venture capitalists?', 'are BAs and VCs substitutes or complementary?', do BAs and VCs invest in the same firms?', 'do they invest sequentially or simultaneously?', 'what kind of impact do business angels and venture capitalists have on the firms in which they invest?'. The most important publications are: Mason and Harrison (2000a), Sohl (2003a), Chiruvolu (2004), Chahine, Filatotchev, and Wright (2007), Sudek, Mitteness, and Baucus (2008), Kerr, Lerner, and Schoar (2011), Johnson and Sohl (2012), Bonnet and Wirtz (2012), Goldfarb et al. (2012), Hellmann et al. (2013) and Hsu et al. (2014).

The final group of studies examines negotiation and contractual issues which characterise the relationship between BAs and entrepreneurs, making reference to the paradigm of information asymmetries and opportunistic behaviour. Examples of research questions investigated are: 'how do angels monitor investee companies?', 'what kind of contingent contracts or clauses do BAs require?', 'how do BAs protect their investments?', 'what are the specificities of financing contracts signed by BAs?' The most relevant contributions include Van Osnabrugge (2000), Elitzur and Gavious (2003), Chemmanur and Chen (2006), Cumming (2008), Wong, Bhatia, and Freeman (2009), Erzurumlu et al. (2013), Cumming and Johan (2013) and Caselli, Garcia-Appendini, and Ippolito (2013).

This paper investigates a research topic belonging to the fifth group of studies which address the identification and measurement of the major drivers of performance of BA investments. There are only a handful of published papers which have examined this issue, mostly because of the challenges in assembling statistically significant samples of BA exits. Mason and Harrison (2002b) used an econometric approach, selecting the following set of explanatory variables: exit strategy, holding period, life cycle of the target company, number of co-investors and potential of technologic innovation. The exit strategy and the holding period were significantly correlated with the IRR of angel investments. Wiltbank et al. (2009) used a different set of explanatory variables – investor experience, duration of due diligence process, holding period, number of co-investors and strategic emphasis – and found that the experience of the investor and the duration of the due diligence process were significantly correlated to the return on investment. Recently, Capizzi (2011) performed an empirical analysis of the Italian informal venture capital market, selecting four explanatory variables: exit strategy, experience of the investor, holding period and reference industry. The exit strategy and industry proved to be relevant determinants of the performance of BA investments. The other two explanatory variables did not show a statistically significant linear relation with the dependent variable.

The following empirical analysis is aimed at investigating the determinants of the returns that business angels achieve from their investments, making reference to an original set of explanatory variables when compared with previous contributions. However, before describing the methodology and the main results of the empirical analysis, the data collection process that was undertaken in order to build the data-set will be introduced along with a brief descriptive analysis of the informal venture capital market in which the investments were made.

3. Data, context, methodology and hypotheses

3.1. *Data issues*

This investigation of the Italian market faces the same identification and measurement challenges that have been encountered by other studies of informal venture capital market around the world. As Wetzel pointed out in his seminal work of 1983, the total population of business angels is unknown and probably unknowable due to their non-institutional nature, which implies an absence of the same information disclosure requirements which are a feature of venture capital funds, and which, due to their preference for anonymity, makes data collection difficult for researchers. Furthermore, the definition of angel investing is not univocal and has changed over the years. For instance, some studies consider financing from family or friends to be angel investment (Bygrave et al. 2003; Maula, Autio, and Arenius 2005). Some business angels do not even consider their investments as 'angel activity'. Another problem is the representativeness of the sample: it is impossible to weight the business angels who answer as representative of the complete population, even at a regional level. Furthermore, most business angels make relatively small investments, while only a few of them invest large amounts; thus, missing just one big investment could jeopardise the results of the research. Other issues include whether 'virgin angels', individuals looking for their first investment and 'non-active investors', investors who made some investments in the past but are no longer active because of a lack of liquidity and/or opportunities should be included in surveys (Aram 1989; Harrison and Mason 1992; Coveney and Moore 1998).

Over the years, data collection has been improved thanks to BANs and better knowledge about the basic features of this kind of investor, which allows researchers to record BAs and their investments so that they can perform more sophisticated research. Notwithstanding this, those BAs who are not members of BANs are still not measurable, making it impossible to analyse what is usually called the 'invisible market' (Mason and Harrison 2008).

The data-set used in this paper was created by processing data and qualitative information generously provided by Italian Business Angels Network (IBAN), the national association whose members include, on a voluntary basis, regional BANs, business incubators, angel groups and single angel investors. IBAN, with its network reaching – directly or through the associated BANs – about 300 business angels throughout the country, is the largest angel group in Italy and the only one legitimated at both the political and regulatory level.[2]

IBAN carries out a yearly survey that studies the activity of Italian business angels. It takes the form of an on-line questionnaire forwarded to its members, either individual angels or angels groups. The latter in turn manage the questionnaire fill in and collection process on behalf of IBAN. As part of the survey, questionnaires are also sent through a variety of distribution channels to a large number of individuals believed – or reported to by IBAN members – to be business angels operating in Italy.

Data covering the 2007–2012 time horizon were collected and processed in order to create an overview of the size and structure of the informal venture capital market in Italy and to extrapolate key features and expected trends in business angels' behaviour. The resulting output was disseminated by IBAN through an annual publication prepared under the author's scientific supervision. Authorisation was received to further process the IBAN data in order to build a data-set consistent with the kind of empirical analysis to be performed in this paper under the explicit – and highly reasonable –

Table 1. Sample's statistics.

| Year | Surveyed angels | Exit | | |
		No. deals	No. business angels	No. observations for the analysis
2007	104	20	16	8
2008	140	29	21	23
2009	260	32	21	24
2010	313	18	15	15
2011	225	20	14	11
2012	262	24	15	15
Total	1304	143	102	96

restriction that the confidentiality of single invested companies and business angels remain secure.

Thus, the data-set includes details on 1304 submitted completed questionnaires and 143 exits made during the reference 6-year time period. Given the high rate of would-be angels (potential investors who submitted the questionnaire but have not performed any operations), which in some years was more than 50%, only data from active angels (i.e. investors who perform at least one operation in any covered year) have been considered, thus reducing the sample to 230 investors and 554 entries. The number of angels is lower than the number of exits, as reported in Table 1, consistent with the possibility that some investors – sometimes defined as 'serial angels' – can make multiple investments/divestments in any given year.

However, because of the nature of the survey (self-reported), it is not possible to determine whether an investor has reported all their exits. Given the possible biases of self-reported data, the author and IBAN have performed a preliminary scrutiny in order to delete incomplete or inaccurate information and exits that were impossible to certify, producing a final data-set of 96 verified exits. It is important to emphasise that the data used for the following analyses must be interpreted with caution because it only includes evidence of activity which took place largely within the IBAN network – what has been termed the visible market (Mason and Harrison 2010, 2011). It therefore does not represent the full extent of the business angel activity which exists in Italy.

3.2. Context: the Italian informal venture capital market: descriptive analysis

This section uses the data reported in Table 1 to present a profile of Italian BAs in terms of their personal features, their investments and their exits. Summary information is presented in Table 2.

In terms of their wealth, the bottom 50% of the angels has personal wealth in the €250,000 to €1,250,000 range. However, 31% of the sample did not report this data. Their most important source of deal flow is BANs (more than 50% of closed deals were supervised by a BAN), followed by other entrepreneurs and investors' clubs. The most relevant issues considered when evaluating a business plan are the management team (76%) and the potential growth of the target company (68%). Angels are generally minority investors: 95% bought less than 50% of the shares of the companies in which they invested. Three-quarters of angels invest less than 15% of their personal wealth in angel investments. Most angels are relatively infrequent investors with three-quarters making less than eight investments in the 2007–2012 period. And only 38% of

Table 2. Descriptive statistics of the Italian informal venture capital market (2007–2012 average).

Variable	Value
Number of investments (2007–2012 total)	553
Average investment	€202,110
IRR	1.78%
Age	48
Gender	Male (94%)
Education	Degree or higher (92%)
Wealth	€1,540,600
Wealth invested	16%
Contribution to financed firms	Strategy (56%)
Source of deal flow	BAN (51%)

angels think that their most important contribution to their investee businesses is the finance that they provide. The most important contribution to the financed firms is advice on strategy (56%), followed by personal introductions to their industrial and financial networks (45%). The total amount invested by angels increased from approximately 18,750,000 in 2007 to almost 33,800,000 in 2012. This can be attributed to a combination of the following: different measurement methodologies, growth in the Italian market and a higher response rate. The preferred industries of angels have changed over the period. In 2012 most angels financed energy projects. In 2007, the industries attracting most angel investment were software and ICT services.

Turning to the analysis of reported exits that occurred between 2007 and 2012 these totalled 143 with only 12% of angels reporting one or more exits. The average holding period was 3.7 years, with 50% of exits taking place by the third year of the investment (and 75% by the fifth year). The average IRR is 1.8% but increases to 17.6% if only positive returns are taken into account. Approximately one-third of all exits resulted in a partial or total loss. These statistics need to be interpreted cautiously. First, there are the identification and selection challenges that were discussed earlier. Second, there may be a tendency for angels not to disclose underperforming investments. But third, and serving as a counter-balance to the previous point, angels, may be unwilling to report exceptionally high-performance investments on account of their preference for anonymity and to avoid the risk of fiscal investigation.

In summary, the Italian informal venture capital market has grown steadily in the past decade in terms of the number of reported investments. The financial crisis therefore does not appear to have adversely affected the willingness of angels to invest. This contrasts with the Italian venture capital market which declined over the same period (AIFI 2010, 2011, 2012, 2013). This highlights the crucial role that BAs play in the supply of early stage equity capital. The riskiness of such investments is managed through a cautious investment strategy in terms of both the amount invested and the proportion of personal wealth that this represents and the number of investments that they make each year. The average performance outcome is positive and has increased in the time period under consideration, which has been one of the economic recession and austerity, which underlines the ability of business angels to select good investment opportunities, giving rise to potentially more successful new ventures. A further possible influence on the improved investment performance is networking and training

activities that have been periodically organised by IBAN for its associates, which aims to improve the ability of BAs to read, criticise and grade business plans.

3.3. Methodology and research hypotheses

The sample for the econometric model is constituted of 96 exits, which reflects the limited number of exits (less than 20% of angels reported exits) and the exclusion of unconfirmed deals from the sample. The main goal of the empirical analysis is to test the existence of a statistically significant relationship between a dependent variable, built as a proxy for the performance of a given deal realised by angel investors, and a set of explanatory variables which make reference to both the investor and the deal. Regarding the dependent variable, business angels often evaluate their returns as a multiple of their initial investment (total return). However, consistent with literature about business angels, to better compare different investments we use as a proxy of profitability a ratio showing on a percentage basis the amount returned to investors to the amount invested (distributed-to-paid-in-capital), computed as annualised effective compounded rate of return which we label the IRR. Table 3 shows the IRR divided by year of exit, industry, experience of the investor (measured as number of investments performed in lifetime) and holding period. The average IRR is calculated as a non-compounded arithmetic mean, since the money value of some deals was not available due to incomplete questionnaires from respondent BAs.

With regard to the year of exit, in the years of the financial crisis (from 2008 to 2010) the average IRR is negative, as expected. However, there is a considerable

Table 3.   IRR descriptive statistics.

	Average IRR (%)	Number	Standard deviation (%)
Year of exit			
2007	17.67	8	42.31
2008	−5.50	23	43.62
2009	−1.74	24	38.11
2010	−9.16	15	38.92
2011	13.44	11	7.71
2012	12.49	15	20.71
Industry			
MCD	9.80	16	36.32
High-tech	8.04	39	36.36
M&E	−15.23	9	36.24
Financial Services	5.08	7	37.12
Services	−7.92	25	35.01
Experience (investments in lifetime)			
≤8	5.02	39	36.15
>8	−0.43	57	36.38
Holding period (years)			
≤3	−3.08	58	36.36
>3	9.19	38	36.51
Rejection Rate			
≤50%	−10.41	11	35.51
50–85%	3.96	47	35.18
>85%	0.31	38	34.82

variation between industries in this period, with media & entertainment (M&E) and services showing negative IRRs, while manufacturing, commerce and distribution (MCD), tech & ICT and financial services have positive returns. Once investor experience is taken into account, the results are unexpected: investors with less experience obtained a higher IRR, while the most experienced investors have negative returns. Finally, investments with a low holding period result in negative IRRs. This is likely to reflect the shorter lifespan of failed businesses, with other studies showing that most total losses usually occur within the first two years of investment (Mason and Harrison 2002b). Given the high standard deviation and presence of outliers in the IRR data, in the econometric models this variable is winsorised at a 10% level (i.e. equalling outliers to data in the 5th and 95th percentiles).[3] Furthermore, standard errors have been clustered for multiple investments in the same company.

Regarding the independent variables, the determinants of profitability of the investments by business angels have been selected by a 2-step process: selection of a wide set of variables from the literature dealing with investments by both formal and informal venture capitalists, as analysed and classified in Section 2 (step 1), and a screening process aimed at choosing a short list of determinants making reference to the output of the survey dealing with personal features of business angels (step 2). In this way, it has been possible to select an original set of explanatory variables when compared with previous studies, constituted initially by the following: industrial sector, experience, holding period, rejection rate of business angels and year of exit. Furthermore, the independent variable 'rejection rate' characterising the deal flow and screening process of business angels which is tested needs to be emphasised on account of its innovativeness as a determinant of the profitability of business angels' investment.[4]

The remainder of this section describes all the independent variables and a description of the research hypotheses to be tested.

3.3.1. *Industry*

This is a series of *dummy* variables. More precisely, the different sectors of economic activity are aggregated into five categories: *Manufacturing, Commercial & Distribution (MCD); Media & Entertainment (M&E); Financial Services; High-Tech;*[5] *Services.* This classification is based upon two considerations. First, the number of sectors is very high. Depending on the year, it can vary from 12 to 14. When compared with the number of observations could lead to wide differentials in terms of the number of observations across sectors and, thus, lead to limited statistical significance of the empirical analysis. Second, the list of sectors available to respondents varies each year, making the original classification inconsistent and hence not usable for comparison.[6] Embedding all the different sectors into clusters restores homogeneity across years and across observations. That being said, the high-tech sector plays a key role in the economy on account of both its rate of growth and contribution to job creation. Therefore, the following research hypothesis to be tested expresses the expected impact of this first explanatory variable.

> H1: Investments in the high-tech industry earn a significantly higher return than investments in other industries.

The data show that the high-tech industry has the second best average return, after MCD. It is worth noting, however, that high volatility could jeopardise the effort to find statistically significant differences amongst industries. In order to test the

hypothesis, high-tech investments have been set as the benchmark for returns on investments in other industries, thus setting aside the high-tech dummy variable from the econometric model.

The econometric model used to test H1 is as follows:

$$IRR_j = \alpha + \beta_1 MCD_j + \beta_2 M\&E_j + \beta_3 Financial\_Services_j + \beta_4 Services_j + \varepsilon_j$$

where α = constant, $_j$ = divestment j, IRR = return on investment (profitability proxy), MCD = dummy variable for MCD industry, M&E = dummy variable for media & entertainment industry, Financial_Services = dummy variable for financial services industry, Services = dummy variable for services industry, ε = residual error.

3.3.2. *Experience*

This is a *scale* variable. Following Wiltbank et al. (2009), it is computed by taking into account the number of investments made by the angel during her life. The functional form of the IRR related to experience is assumed to be non-linear and similar to an inverted U-shaped, where the most experienced angels obtain, on average, lower IRR than mid-experience ones. While it is clear why a low level of experience might lead to lower performance, three main reasons might underpin the fact that lower returns are also associated with a high level of experience compared with medium-level experience. First, an increase in the level of experience might reduce the angel's risk aversion. It is reasonable to argue that those investors who, over time, obtain high numbers of positive performances from their numerous past investments will show signs of overconfidence in their subsequent, as documented by other empirical studies (Shane 2009). This phenomenon also explains why the surveys performed by the major angels networks (EBAN, BBAA and IBAN, among others) show that over time experienced angels tend both to increase the percentage of their personal wealth committed to start-up investments and either abandon angel groups or are less likely to join angel syndicates and therefore foregoing the associated risk reduction benefits (Kerr, Lerner, and Schoar 2011). Second, as BAs increase the size of their investment portfolios over time this decreases their capability both to play an active role in their investee companies and to monitor the owner–manager of these companies, thus becoming like formal investors, but lacking their control rights (Wiltbank et al. 2009; Goldfarb et al. 2012). Finally, consistently with some contributions dealing with the investment process of BAs, serial angels do not show high and increasing ability to learn from their prior investment experiences and do not show higher performances than virgin angels (Farrell 2006). However, the limitations of the data-set makes it impossible to distinguish among the variety of experiences that an angel has had – such as industry experience, start-up experience, operating experience (Mitteness, Baucus, and Sudek 2012) – or to identify the amount and quality of relevant and private information BAs have ex ante their investment decisions.

The following research hypothesis to be tested expresses the expected impact of this first explanatory variable.

> H2. There is a U-shaped relationship between Experience and IRR. Return will initially increase, and beyond a certain point decrease.

This reasoning is consistent with the study by Wiltbank et al. (2009), who employs a metric similar to age – the number of years which angels have been investing in unquoted companies – to refine the measurement of experience. Strong grounds for this

practice is also provided by research on the relationship between CEOs and top management and firm performance (Henderson, Miller, and Hambrick 2006; Gottesman and Morey 2010).[7] The similarity between this field and the informal venture capital industry is based on two considerations. On the one hand, business angels are hands-on investors and entrepreneurs find their experience at least important as the capital they provide. On the other hand, the IRR of private investors is related to the actual or potential performance of the investee firm. For these reasons, in this paper experience is measured as the number of previous investments that the angel has made. Descriptive statistics shown in Table 3 give qualitative confirmation of the research hypothesis.

The econometric model used to test H2 is as follows:

$$\text{IRR}_j = \alpha + \beta_1 \text{Experience}_j + \beta_2 \text{Experience\_squared}_j + \varepsilon_j$$

where α = constant, $_j$ = divestment j, IRR = return on investment (profitability proxy), Experience = number of investments in lifetime, Experience_squared = squared number of investments in lifetime, ε = residual error.

3.3.3.   *Holding period*

This is a *scale* variable, but is expressed in the model as a *dummy*. There are several reasons to believe that the relationship between this variable and the IRR is somewhat ambiguous. One common belief about long holding periods is that the angel is having difficulties in divesting on account of the lack of success of the investee company. On the other hand, there are reasons to believe that the relationship will be positive. In fact, contrary to venture capital funds, which have a short time horizon for their investments in growth companies, angels are long-term investors, holding their investment for 3–5 years on average (Wetzel 1983; Sohl 1999, 2007; Johnson and Sohl 2012). This is also because they invest in the early stage of start-up businesses, even at the seed stage, hence time is needed to allow the investee company develop. Moreover, angels invest a very low proportion of their own wealth in entrepreneurial ventures, and therefore have the freedom to decide not to divest in situations where the market does not fairly value their company. For these reasons, it is reasonable to believe that divestments which occur within the third year (the minimum in the range provided above) will be related to abandonment of the project on account of the failure of the business. Therefore, data on holding periods have been divided into two categories: equal or lower than three years and higher than three years. This leads directly to the following research hypothesis.

H3: A holding period lower than three years is associated with lower IRR.

The data presented in Table 3 give us qualitative confirmation of this hypothesis. As can be seen, holding periods below three years are generally associated with negative returns, while angels who liquidate their investments after three years are generally rewarded with a higher return, averaging 9.19%.

The econometric model used to test H3 is as follows:

$$\text{IRR}_j = \alpha + \beta_1 \text{High\_holding\_period}_j + \varepsilon_j$$

where α = constant, $_j$ = divestment j, IRR = return on investment (profitability proxy), High_holding_period = dummy variable equal to 1 for durations higher than three - years, ε = residual error.

3.3.4. *Rejection rate*

This is a *scale* variable. It is computed as 1 minus the ratio number of investments over the total number of projects evaluated by the investor (1 − acceptance rate):

RR = 1 − (Number of investments performed/number of investments considered)

The best way to calculate this ratio would be to use the total number of investments ever made over the total number of investments ever evaluated by the angel. This latter number is very difficult for an individual to recall, and indeed are unlikely to count. The questionnaire, instead, provides us with the number of investment opportunities the investor came across each year. In order to maintain homogeneity, the numerator is computed as the number of actual investments made by the investor in the same year.

Regarding the relationship between this independent and the dependent variables, the IRR should increase at a diminishing rate together with the increase in the RR. Therefore, the relationship between the two variables is also expected to be non-linear and, more precisely, we chose a logarithmic one. The reason for the logarithmic form of the RR variable lies in the observed phenomenon that for professional investors it is quite easy to immediately identify the worst investment projects by simply having a look at the submitted business plan (Clark 2008). However, as the volume of deal flow increases it would be time consuming to identify the best projects without entering into deep analyses and due diligence. But if only a limited number of investments are available each year, a high RR implies that potentially good investment opportunities will be excluded.

Three main assumptions must hold for such a non-linear metric to add value to the model. First, the projects which come to the various business angels are, on average, of the same quality; otherwise an investor who receives a few high-potential business plans might register an RR equal to 0, but still makes a very high return compared with the others. The assumptions appear still more realistic when we remember the role and the screening process performed by the angel syndicates (Kerr, Lerner, and Schoar 2011), to whom the vast majority of surveyed angels belong. Second, as observed in the literature review, maximising financial returns is a major motivation for angel investors, though not the sole one. Pursuing such an objective implies for the need to carefully screen all proposals coming from their sources of deal flow, and the adoption of highly selective investment behaviours. A final assumption deals with the assumed rationality of the investment behaviours of business angels, implying that when informal venture capitalists subject investment proposals to scrutiny, they hold the money to invest in it during that given year. An angel who does not intend to invest would have RR = 1, even though she came across very good proposals, but then her evaluation would be a waste of time and resources, since she would not invest in the first place. A possible limitation to the explanatory power of this metric is that, given the economic period in which observations were collected, the rejection rate could be artificially high not because of differences in the application of the 'deal killers', but because of a lack of funds or poor market perspectives.

Therefore, the following research hypothesis to be tested expresses the expected impact of this fourth and novel explanatory variable.

H4: As the rejection rate increases, so does the IRR, at a diminishing rate.

The econometric model used to test H4 is as follows:

$$\text{IRR}_j = \alpha + \beta_1 \text{ln\_Rejection\_Rate}_j + \varepsilon_j$$

where α = constant, $_j$ = divestment j, IRR = return on investment (profitability proxy), ln_Rejection_Rate = natural logarithm of the rejection rate, ε = residual error.

3.3.5. *Year of divestiture*

This is a series of *dummy* variables. Divestments which occurred before the financial turmoil – in 2007 and 2008 – are expected to have obtained higher returns, *ceteris paribus*.

Since company valuations are often based on multiples of the valuations of comparable publicly traded companies (Weidig, Kemmerer, and Born 2005), the years of economic recession (2008, 2009, 2010) – characterised by decreasing annual GDP, significant volatility of capital markets, the credit crunch and high unemployment levels – are expected to cause lower market prices, and therefore lower returns for private investors, whose investee firm would be undervalued. Therefore, five dummies were created, with the base being 2007.

The following research hypothesis states the expectation about the impact of yearly macroeconomic growth on the IRR of business angels' investments.

> H5: IRR will be lower for divestments which took place in the immediate aftermath of the current financial turmoil and economic recession.

A first, qualitative look at the sample's data (Table 3) seems to confirm the hypothesis. The IRR is around 17% in 2007, 13% in 2011 and 12% in 2012, while the years in between register negative returns ranging from −8 to −9% and −2%.

The econometric model used to test H5 is as follows:

$$IRR_j = \alpha + \beta_1 Y\_2008 + \beta_1 Y\_2009 + \beta_1 Y\_2010 + \beta_1 Y\_2011 + \beta_1 Y\_2012 + \varepsilon_j$$

where α = constant, $_j$ = divestment j, IRR = return on investment (profitability proxy), Y_2008 = dummy variable equal to 1 if the exit took place in 2008, Y_2009 = dummy variable equal to 1 if the exit took place in 2009. Y_2010 = dummy variable equal to 1 if the exit took place in 2010. Y_2011 = dummy variable equal to 1 if the exit took place in 2011. Y_2012 = dummy variable equal to 1 if the exit took place in 2012. ε = residual error.

In order to test the interaction among all the independent variables and the IRR, a final overall econometric model has set the dependent variable as the IRR, while the independent variables are the full set of variables previously identified, together with specific control variables on both different exit strategies, as already anticipated, and the education of BAs, so as to avoid potential spurious effects due to their correlation with the independent variables themselves (see Appendix 1).

4. The performance of investments by business angels: empirical analysis

The final econometric model, which has been implemented using a backward procedure, is able to explain 34.9% (R^2) of the variability of the dependent variable.[8] Table 4 shows the results of the regressions for the five research questions, while Table 5 shows the results of the overall model regression analysis.

H1 is not supported. This means that, given the specification of the model, for the sample analysed, investments in the technology sector do not lead to significantly higher returns compared with investments in other industries. The results also show that

Table 4. Regression analyses testing the research hypotheses.

Independent variables	Dependent variable: IRR				
	(1)	(2)	(3)	(4)	(5)
Industry – MCD	−0.0306 (0.0456)				
Industry – M&E	−0.147*** (0.0499)				
Industry – Financial Services	−0.0358 (0.0651)				
Industry – Services	−0.0664 (0.0411)				
Experience		0.0369** (0.0158)			
Experience_squared		−0.00259** (0.00118)			
High holding period			0.0506* (0.0295)		
lnRejectionRate				0.0660 (0.0674)	
Y_2008					−0.0375 (0.0742)
Y_2009					−0.0471 (0.0711)
Y_2010					−0.0426 (0.0750)
Y_2011					0.0681 (0.0685)
Y_2012					0.0513 (0.0766)
Constant	0.0832*** (0.0225)	−0.0418 (0.0412)	0.0244 (0.0241)	0.0591*** (0.0212)	0.0561 (0.0646)
Observations	96	96	96	96	96
R^2	0.080	0.040	0.026	0.013	0.083

Note: Robust standard errors in parentheses.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

investments in the M&E industry are the worst performing when compared to the returns from the technology sector.

H2 is fully supported. Experience does have a positive impact on IRR (positive beta, significant at a 5% level). The variable *Experience_squared* is also significant (5% level) and has a negative beta. This means that experience positively affects IRR up to a certain level, after which additional levels of experience lead to decreasing returns on investment. Therefore, experience is related to IRR with an inverted U-shaped relationship, confirming the expectations in terms of experience, overconfidence and performance of BAs.

H3 is partially supported. The variable *Hold_high* is positive and significant at the 10% confidence level. Therefore, investors who maintain their financial resources in the investee company for more than three years show a return that is 5% higher than that of investors who, *ceteris paribus*, hold their investment for less than three years.

Table 5. Overall model regression analysis – significant variables only.

Independent variables	IRR
Industry – M&E	−0.154***
	(0.0374)
Exit – Sale Back	0.148***
	(0.0375)
Exit – Trade Sale	0.200***
	(0.0324)
Exit – Other Investor	0.230***
	(0.0452)
lnRejectionRate	0.104*
	(0.0594)
Y_2011	0.0745**
	(0.0335)
Constant	−0.0826***
	(0.0292)
Observations	96
R^2	0.349

Note: Robust standard errors in parentheses.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

In other words, the independent variable has a positive, although not strong, linear relationship with IRR.

H4 is supported. Investors who are more selective with the projects they evaluate earn on average 10.4% higher returns than less selective investors. Furthermore, it seems to confirm the assumption of the non-linear form of the independent variable rejection rate.

H5 is not supported. Even though the descriptive statistics showed that the average return during the period of financial crisis – from 2008 to 2010 – is negative and lower with respect to years less affected by the downturn, this difference is not statistically significant. Only exits in 2011 show a statistically significant higher return than exits in 2007, at a 5% level.

Amongst the many potential limitations of the analysis that are related to the identification and measurement issues affecting the sample of surveyed angels is the substantial unobservable heterogeneity across both angel investors and financed ventures. For this reason, as already specified in the previous section, we tested the robustness of results by excluding the potential effects of outliers, winsorising IRR, the dependent variable. The major findings of the empirical analysis which was run in this study can be partially compared with some relevant contributions at the international level dealing with the formal venture capital industry. Starting with the most interesting finding of this study, which is the quadratic relationship that links experience with the performance of business angels' investments, it can be noted that Parhankangas and Hellström's (2007) study of the Finnish venture capital industry also found – similar to Italian informal investors – that the most experienced venture capitalists tend to overestimate the probability of success of the ventures they finance, thus confirming the inverted U-shaped form of such an explanatory variable. Other contributions dealing with VC industries in developed markets (Rosenstein et al. 1993; Sapienza and Korsgaard 1996) have found that inexperienced venture capitalists earn lower returns than more experienced ones. However, Fleming (2004) finds that in emerging markets, experienced venture capital firms do not earn higher returns than inexperienced ones.

The conclusion is that the results of this study are consistent with the outcomes of many studies of the formal venture capital industry in demonstrating that both inexperienced angels and angels with overwhelming experience tend to earn lower returns. Obviously one major limitation of the data-set is that it is not possible to delve deeper into the kind of experiences of the surveyed angels, which prevents any differentiation between different kinds of experience (operating experience, industry experience, start-up experience) and, therefore, different degrees of 'post-investment involvement', as in the cases of Mason and Harrison (1996b), Macht (2011b) and Mitteness, Baucus, and Sudek (2012).

Looking at the relationship between holding period and IRR in the formal venture capital industry, Stevenson, Muzyka, and Timmons (1987) and Manigart et al. (2002) reach opposite results to those of this study. They demonstrate that venture capital firms expect to generate higher returns when they plan to divest within the first few years of making the investment. Closed-end venture capital companies need to return the financial returns that have been generated by successful exits to the investors in the fund. This implies that the fund cannot reinvest the money to increase returns, and will therefore require higher yields if a shorter holding period is anticipated. The key difference which explains the opposite result obtained in this research is that business angels invest their own money, and their involvement in the firm is high and effective when compared with that of venture capital fund managers. For these reasons, angels will gain a higher return with a longer holding period (minimum three years), during which period the entrepreneur can take advantage of the expertise and network that the angel can provide.

Finally, the relationship between rejection rate and IRR is also an important contribution from the empirical analysis, underlining the relevance of the selection process undertaken by BAs. Future research, based on a more powerful and unbiased data-set, should test the hypothesis presented in this study by controlling for the different stages of the investment decision process of BAs, either as sole investors or as members of a syndicate of angels. Furthermore, industry experience, which is different from the variable 'experience' used in this paper, could be a driver of the investment decision-making process of BAs, thus influencing the rejection rate.

5.   Conclusions and policy suggestions

The descriptive and econometric analysis performed in this paper sheds some light on business angel investing, a still opaque and minimally regulated segment of the capital markets, which is nevertheless crucial in order to fill the small business funding gap and boost the creation of new start-up companies. First, the study provided a comprehensive review of the literature on informal venture capital, sorting the different studies into eight different groups, each with specific research questions. Second, it analysed the results of six yearly surveys – from 2007 to 2012 – carried out by the IBAN (2009, 2010, 2011, 2012, 2013). This represents the most comprehensive database which provides data on Italian business angels over a 5-year time period. The descriptive analysis, performed with methodologies that have been adopted in many other contributions, provides an accurate and updated snapshot of the attitudes, behaviours and characteristics of Italian business angels. Finally, the empirical analysis produces some significant results and the econometric model, which both introduced an original set of independent variables (industry, experience, holding period, rejection rate, year of divestiture) and chose different and more appropriate functional forms for the independent variables (either linear or non-linear), is innovative.

Although the econometric model used in this study requires to be better specified – and there may also be scope for the identification of further explanatory variables – the outcomes of the empirical analysis provide insights for business angels regarding the key capabilities and behaviours to boost financial performance. BAs should adopt the following strategies in order to increase the performance of their investments: (a) develop selective investment strategies by accessing large volumes of investment opportunities and rejecting a high proportion of the business plans that they review; (b) increase their expertise by making more investments rather than a small number of large considerable ones; (c) avoid being overconfident, for instance, by sharing information with other angels and by co-investing and (d) invest with a long-term perspective.

In view of the roles played by experience and a selective investment approach this study also identifies some potential public policy interventions aimed at stimulating the size and expected profitability of the domestic informal venture capital market. The quadratic relationship between experience and IRR implies that angels should gather experience as quickly as possible in order to avoid being on the left part of the inverted U-shaped curve. Two instruments allow angels to accumulate experience without experiencing with lower IRRs. The first is to co-invest with other angels through syndicates. In this way, angels can learn from more experienced peers and thereby lower their risk exposure. The advice of co-investors and network members can also limit the risk of overconfidence which threatens the investment performance of expert angels'. The second is participation in specific training courses offered by the BANs to angel investors, with financial support coming from focused public policy measures, to give angels instruments to enable them to better evaluate business plans and improve the quality of their screening processes. The positive relationship between rejection rate and IRR demonstrates that angels with more stringent deal killer criteria will generate higher returns. Syndication and BANs play a key role in the refinement of angels' investment criteria and their ability to evaluate business plans with view to increasing their potential IRR.

Increasing the affiliation of angels in officially tracked and legitimated BANs would also increase the possibility of accessing a wider set of investment opportunities which have been pre-screened by BANs themselves, thus leveraging on the possibility of implementing highly selective approaches to investment. However, BANs in Italy are still not fully organised or officially legitimated and do not have the financial resources to offer the types of educational services which angels would benefit from. If public incentives were focused on both stimulating network membership and competence-building inside BANs (Mason 2009), BANs would have the financial resources needed to offer educational services and more angels would participate. In addition, angels would benefit from sharing experiences with other BAN members. Higher levels of experience and better evaluation skills, together with higher rejection rates, would lead to higher investment performance and, therefore, to a more efficient informal venture capital market. This, in turn, could further increase the financial resources available to start-up businesses, stimulating the growth of the economic and social system.

Notes

1. The following contributions provide empirical evidence on the major determinants of the performance of venture capital investments: Gompers and Lerner (2004), Cochrane (2005), Gompers (2010), Jeng and Wells (2000), Kaplan and Strömberg (2004), Kaplan et al. (2009), Phalippou and Gottschalg (2009), Metrick and Yasuda (2010).

2. Additional details on IBAN are available at: http://www.iban.it.
3. Kerr, Lerner, and Schoar (2011) chose a different strategy by using a regression discontinuity approach in order to build a more homogeneous sample of angel investors which removes the endogeneity issue coming from omitted variable biases.
4. We excluded from the original research programme and from a preliminary draft of this paper the variable "exit strategy" because of the high number of incomplete answers in the questionnaires, thus dramatically reducing the data-set, and because other contributions (previously mentioned in Section 2) proved the significance of such a variable. However, we considered exit strategy as a control variable in the final overall regression model later on specified at the end of this section.
5. Includes Electronics, ICT and Biomedical.
6. For instance, the sector 'other services', which includes construction, security and medical services (IBAN 2009, 2010, 2011, 2012), is present in the 2010 annual survey, but not in the 2008 one.
7. Research in this field widely uses age as a proxy for experience of manager, with conflicting results: Henderson, Miller, and Hambrick (2006) find that firm performance, especially for high-tech firms, declines across the tenure of the CEO, whilst Gottesman and Morey (2010) conclude that a manager's age is positively related to firms' results.
8. The backward procedure starts from the complete model, which includes all the possible explanatory variables. At each step the statistical software automatically removes the variable with the lowest t-statistic (if it is not significant). It is possible do define a criterion of minimum significance required to keep each explanatory variable in the final model. In this case, the minimum level of significance was set at 10%.

ORCID

Vincenzo Capizzi ⓘ http://orcid.org/0000-0003-3761-9942

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Appendix 1. Description of variables for the overall regression analysis

Variable	Description
IRR	The IRR % of BA's investment, winsorised at 10% level
Industry – MCD	A dummy variable equal to 1 if the industry is MCD
Industry – High-tech	A dummy variable equal to 1 if the industry is High-tech
Industry – M&E	A dummy variable equal to 1 if the industry is M&E
Industry – Financial Services	A dummy variable equal to 1 if the industry is Financial services
Industry – Services	A dummy variable equal to 1 if the industry is Services
Experience	The number of angel investments performed during the lifetime of the BA
Experience squared	The squared number of angel investments performed during the lifetime of the BA
High holding period	A dummy variable equal to 1 if fhe duration of the investment is higher than three years
Rejection Rate	The natural log of the rate of dropped projects among the total number of analysed projects
Year – 2008	A dummy variable equal to 1 if the divestiture took place in 2008
Year – 2009	A dummy variable equal to 1 if the divestiture took place in 2009
Year – 2010	A dummy variable equal to 1 if the divestiture took place in 2010
Year – 2011	A dummy variable equal to 1 if the divestiture took place in 2011
Year – 2012	A dummy variable equal to 1 if the divestiture took place in 2012
Exit strategy – Sale Back	A dummy variable equal to 1 if the exit strategy is sale back to the entrepreneur
Exit strategy – Other Investor	A dummy variable equal to 1 if the exit strategy is sale to other investor.
Exit strategy – Trade Sale	A dummy variable equal to 1 if the exit strategy is trade sale
Education	A variable equal to 1 for high school diploma, 2 for degree, 3 for MBA and 4 for PhD

The overall regression model has the following specification:

$$IRR_j = \alpha + \beta_1 MCD_j + \beta_2 M\&E_j + \beta_3 \text{Financial\_Services}_j + \beta_4 \text{Services} +$$
$$\beta_5 \text{Experience}_j + \beta_6 \text{Experience\_squared}_j + \beta_7 \text{High\_holding\_period}_j + \beta_8 \text{ln\_Rejection\_Rate}_j +$$
$$\beta_9 Y\_2008 + \beta_{10} Y\_2009 + \beta_{11} Y\_2010 + \beta_{12} Y\_2011 + \beta_{13} Y\_2012 + \beta_{14} \text{Exit\_Strategy\_Sale\_}$$
$$\text{Back} + \beta_{15} \text{Exit\_Strategy\_Other\_Investor} + \beta_{16} \text{Exit\_Strategy\_Trade\_Sale} + \beta_{17} \text{Education} + \varepsilon_j$$

Appendix 2. Correlation matrix

	IRR	High holding period	Industry – MCD	Industry – M&E	Industry – Financial Services	Industry – Services	Exit – Sale Back	Exit – Trade Sale	Exit – Other Investor	Experience	Experience squared	lnRejectionRate	Education	Y_2008	Y_2009	Y_2010	Y_2011	Y_2012
IRR	1																	
High holding period	0.142	1																
Industry – MCD	0.162	0.0311	1															
Industry – M&E	0.00591	-0.149	-0.202	1														
Industry – Financial Services	0.00953	-0.0186	-0.382*	-0.154	1													
Industry–Services	-0.00656	0.0891	-0.166	0.0793	-0.0181	1												
Exit – Sale Back	0.204	0.970	0.0976	0.0647	-0.0426	-0.453***	1											
Exit – Trade Sale	0.194	-0.0850	0.377	-0.145	-0.0185	-0.333	-0.350	1										
Exit – Other Investor	0.0485	0.196	-0.0674	0.113	-0.129	-0.0525	-0.164	-0.121	1									
Experience	0.0168	-0.00488	0.0237	-0.0845	-0.0426	-0.144	0.0757	0.153	-0.136	1								
Experience_squared	-0.0160	-0.0416	-0.0348	-0.104	-0.00920	-0.138	0.0689	0.147	-0.136	0.980***	1							
lnRejectionRate	0.113	0.00475	0.148	0.0711	-0.121	-0.227	0.0939	0.0922	0.168	-0.157	-0.178	1						
Education	0.08	-0.17	-0.09	-0.04	-0.02	0.02	-0.18	-0.05	0.21	-0.00	-0.07	0.10	1					
Y_2008	-0.0568	-0.0389	0.0358	0.225	-0.0586	0.0208	0.0489	-0.0310	-0.0205	-0.00777	-0.0344	-0.0730	0.07	1				
Y_2009	-0.135	-0.128	-0.156	0.111	0.152	-0.0121	-0.249	0.128	0.0773	0.0411	0.0442	0.171	0.06	-0.328	1			
Y_2010	-0.0875	0.00193	-0.0620	-0.125	-0.0271	-0.160	0.135	-0.150	0.0251	-0.250	-0.229	0.0664	0.03	-0.244	-0.259	1		
Y_2011	0.191	0.315	0.235	-0.104	0.0411	0.0500	-0.110	0.145	-0.0873	-0.0890	-0.110	-0.151	-0.14	-0.204	-0.216	-0.161	1	
Y_2012	0.167	-0.0964	0.0850	-0.120	-0.227	0.0515	0.160	-0.0642	0.0330	0.164	0.183	-0.104	-0.00	-0.234	-0.248	-0.185	-0.154	1

*$p < 0.1$;
**$p < 0.05$;
***$p < 0.01$.
Source: Author's elaboration.