Groups, networks and the business angels' investment process.

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Abstract

This paper provides previously unavailable evidence on the effects of membership in an angel group or network (AG/BAN) on the investment choices of business angels. Utilizing a proprietary dataset containing qualitative and quantitative information on over 800 investments by 625 business angels from 2008 to 2014, we show that AG/BAN membership generates valuable information, networking, monitoring and risk reduction effects, which ultimately affect the amount of financial resources available to invest as well as the equity stake in the investee company. These results extend our knowledge of the investing behavior and characteristics of business angels, which are rapidly gaining prominence in support of new ventures and the development of the global economy.

1. Introduction

In the last few years, both academics and practitioners have devoted increased attention to understanding the dynamics of business angel (BA) investments. Market data for both the US and Europe (US ACA, 2015; EVCA, 2014; EBAN, 2015; Kraemer-Eis et al., 2015; OECD, 2016) show that business angels[1] have become a major segment of the capital market industry, capable of allocating financial resources to one of the riskiest asset classes – startup companies – comparable to those historically provided by professional venture capitalists. As such, BAs have become crucial enablers of the development of new firms and a driving force of growth. Despite this recent attention, our understanding of the features of business angel investments is still very limited. In particular, little is known about the differential investment behavior of business angels when they join semi-formal organizations, such as angel groups (AG) and business angel networks (BAN). In a recent contribution, Kerr et al. (2014) provide case-study-based evidence of the impact of angel groups on later round financing. However, their sample does not shed light on the different investment behaviors (if any) of BAs within and outside semi-formal organizations. This paper aims to fill this gap.

Business angels are high net worth individuals who invest their own money in small unlisted companies, with no family connection, typically assuming a minority equity stake as well as active involvement in portfolio companies (Mason, 2006). Furthermore, it is now widely accepted that business angels are among the most suitable actors of the ecosystem for entrepreneurial businesses, considering their capability to fill the so-called "funding gap" between the demand and supply of early-stage equity capital (Mason and Harrison, 2000; Johnson and Sohl, 2012; Capizzi, 2015).

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[1] Also called "informal investors", to differentiate them from venture capitalists and other financial intermediaries investing on a professional and institutionalized basis capital raised from third parties (Wetzel, 1986; Freear et al., 1993; Landstrom, 1993; Harrison and Mason, 1996a; Van Osnabrugge, 2000).

First, business angels satisfy a size of investment need (usually falling in the range of 100k – 300k euros) that is not typically considered interesting or profitable for venture capitalists, due to both the relatively low cash flow generation potential and the relatively high costs of due diligence, contracting and monitoring given the relevant adverse selection and moral hazard issues affecting small-scale young businesses (Jeng and Wells, 2000; Carpenter and Peterson, 2002; Mason, 2009). Second, alongside capital injection, business angels provide non-monetary resources deemed highly valuable for entrepreneurs, such as industrial knowledge, management experience, advice, mentoring, standing and personal relationship networks (Harrison and Mason, 1992; Landstrom, 1993, Politis, 2008).

Over time, a growing number of angel investors started organizing themselves into groups (also referred to as syndicates, networks or clubs, depending on the level of their internal structure), usually on a territorial or industrial basis, sharing presentation pitches from potential entrepreneurs and due diligence costs over potential investment opportunities, ultimately reducing transaction costs (Mason, 2006; Sohl, 2007; Paul and Whittam, 2010; Gregson et al., 2013). These associations, called business angel networks, have grown to regional, national (for instance, ACA in the US, BBAA in the UK, and IBAN in Italy) and even continental proportions (among them, EBAN and BAE in Europe), increasing the internal structure and coordination among the members as well as the quality and variety of the services provided (e.g., deal flow, education and coaching, and legal and advisory services). Thanks to BANs and angel groups, the informal venture capital market is currently much more visible and, hence, easier to access on both the demand and supply sides (Mason, Botelho and Harrison, 2013).

Despite the increasing sophistication and growing importance as capital providers, there is very little evidence on the impact of BANs on the investment process

of business angels, with most existing research being based on anecdotal evidence or case studies (May, 2002; Payne et al., 2002; Mason, 2006; Johnson and Sohl, 2012; Ibrahim, 2008; Brush et al., 2012; Kerr et al, 2014; Collewaert and Manigart, 2016; Croce et al. 2016).

In this paper, we focus on business angels' investment choices, trying to isolate the differential role played by BANs compared to the investment process of individual informal investors. In particular, we investigate whether and how being members of a semi-formal organization matters by either affecting the share of angels' personal wealth invested in a given deal or affecting the amount of equity stake in portfolio companies. Looking at a unique dataset that collects qualitative and quantitative information on over 800 investments by 490 business angels from 2008 to 2014, our paper for the first time provides evidence of significantly different investment practices by angels who participate in BANs as opposed to unaffiliated angels investing as single, independent investors. In particular, we show that being part of an angel group generates valuable information and risk reduction effects that ultimately increase the amount of capital that angels invest in new ventures. BAN membership generates sizeable diversification benefits for angels. The larger deal flow and access to network screening and monitoring skills affect angels' portfolios by reducing the individual stake in each company while expanding the absolute size of the portfolio in a classical diversification exercise. Our results have interesting normative implications that may be useful for policymakers in creating new and effective measures aimed at stimulating entrepreneurship and contributing to the development and growth of economic and social systems (Baldock and Mason, 2015; Kraemer-Eis *et al.*, 2016).

The remainder of the paper is structured as follows: the second section will derive the research hypothesis to be tested from the literature dealing with business angels and

informal venture capital. The third section will introduce the dataset and specify the variables used to perform the empirical analysis, the results of which are shown and discussed in the fourth section. The final section will address the authors' concluding remarks and suggestions for future research.

2. Hypothesis development and related literature

Our research program adopts as its main unit of analysis the amount of own risk capital invested by business angels. Prior literature on both venture capitalists (Jeng and Wells, 2000; Lerner, 1998) and informal investors (Harrison and Mason, 2002; Maula et al., 2005; Wiltbank and Boecker, 2007) has commonly operationalized this measure as the amount of capital invested as a share of a single business angel's personal wealth ("*WEALTH*). This metric accurately captures the degree of involvement of the business angel in the invested company.[2]

In this study, we complement this measure with a second metric: the amount of capital invested as a share of the equity capital of the investee company ("*PARTICIPATION%*"). We believe this second measure can provide interesting insights useful for identifying the perceived risk drivers and their impact on the asset allocation decisions of informal investors.

Building on these two measures as the main dependent variables, we model the expected effects of BAN/AG participation as follows.

2.1 BAN/AG membership and investment decisions

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[2] As is common in the literature dealing with formal and informal venture capital, one major assumption in the asset allocation process is the impossibility of relying on existing asset allocation techniques developed by the theory of finance and presuming to have traded securities as possible asset classes.

One major evolutionary trend observed in the informal venture capital market over the last two decades addresses the growing relevance of associations of business angels, either structured or semi-structured, ranging from loose networks of individual investors to formal angel syndicates (Ibrahim, 2008; Mason, 2009; Paul and Whittam, 2010; Johnson and Sohl, 2012; Gregson et al., 2013; Mason, Botelho and Harrison, 2013). BAN members can join on a solicited or unsolicited basis and collaborate in organizing pitching events, training and mentoring activities, and coordinated lobbying efforts. Entrepreneurs are solicited to submit their proposals to the BAN through websites and other networking activities taking place inside the community. There is no or limited organized deal group processing, and the association does not make investments or recommend investments to members; rather, each member decides whether to invest on a deal-by-deal basis, typically finding co-investors (within or outside the BAN) and sharing due diligence, negotiations and term sheets.

A few recent papers have tried to shed more light on the investment practices of such associations. However, the research methodologies have been restricted to case studies due to the lack of aggregate data. Kerr et al. (2014) exploit data provided by two angel groups to study their internal structures and investment practices. Following a similar approach, Collewaert and Manigart (2016) and Croce et al. (2016) look at the type of services and contributions provided to the investee companies, whereas Mason (2007) and Paul and Whittam (2010) focus their attention on the advantages provided by BAN membership to their members. Ibrahim (2008), Brush et al. (2012) and Mason, Botelho and Harrison (2013) argue that being a BAN member benefits the angel investors mainly through the information and knowledge sharing effect taking place inside the community. The possibility for unexperienced angels to get in touch with experienced angels is particularly important inside the BAN, improving new investors'

human capital and knowledge about how to implement effective value-creating investment decisions (Shane, 2000). In addition, the role of so-called "gatekeepers", individuals who control access to and manage much of the day-to-day operations of BANs (Paul and Whittam, 2010), is crucial in the sharing of information among BAN members.

Therefore, investments made by BAN members, even if not in syndication with other co-investors, should be more informed and efficient, leading to wider capital allocation investment choices. In other words, because of the services and contributions provided by BANs to their members, it is reasonable to assume that BAN members, once they have selected an investment opportunity and undertaken the investment decision-making process, will invest more of their personal wealth than non-BAN members. When considering participation in the investee company, BAN members should benefit from the investment opportunities provided by the network inside angel communities, leading to investment in more companies, with the share of their personal wealth allocated to this asset class remaining unchanged. This would lead to a decrease in the equity stake acquired in a given deal.

We accordingly formulate our first research hypothesis:

H1: *Business angels' capital allocation investment decisions are affected by membership in a given BAN. The amount of capital invested by angels is positively affected by BAN membership, whereas the size of the equity stake is negatively affected by BAN membership.*

2.2 Co-investment, activism, monitoring and investment decisions

Among the many options available to business angels when valuing a given investment opportunity, there is the possibility to make the deal either as an individual

investor – the "solo angel" – or co-investing with other angel investors. The latter strategy can be implemented through different degrees of formal structures ranging from formal angel syndicates to informal so-called "club deals" and, more importantly, can significantly affect the amount of capital provided by each investor. On the one hand, by co-investing in a given deal, investors can reduce their individual equity stake in the target company while maintaining active involvement and providing value-added contributions. In fact, the sum of the single equity positions of all of the co-investors in a given deal increases the possibility of playing an active role in investee companies, which can require larger contributions than those available to solo angels (Paul and Whittam, 2010). On the other hand, consistent with modern portfolio theory (Elton and Gruber, 2005), the co-investment option is a completely rational diversification strategy aimed at reducing the risk from a given equity investment opportunity. As a direct implication, business angels choosing to share the risk of a given deal by co-investing with other ones, assuming that the share of their personal wealth devoted to the asset class of private equity investments in early-stage companies remains constant, can leverage wider and better diversified investment portfolios (Mason, Botelho and Harrison, 2013), as well as on the possibility of gaining access to risk-reducing information (Aernoudt, 2005).

This leads to the following research hypothesis:

H2:   *Business angels' capital allocation investment decisions are negatively affected by the possibility of co-investing in a given deal.*

As previously discussed, business angels often exhibit interest in seeking active involvement with their portfolio, to support them in the value creation process through a hands-on approach. Politis (2008) identifies four different types of value-added contributions coming from angel investors: a "sounding board" role, a "monitoring" role,

a "resource acquisition" role and a "mentoring" role. However, a number of surveys disclosed on a yearly basis by research centers (EIF, OECD) and country federations of angel associations (IBAN, EBAN) report the existence of investors not willing and/or able to play such an active role in the investee companies. Rather, they are more attracted by potential capital gains and by the portfolio diversification benefits associated with investing in such an uncorrelated asset class. Such "passive" investors may leverage the benefits offered by participating in a BAN and consequently exhibit a structurally different investment pattern. We expect a negative relationship between passive investors and the amount invested for non-BAN members. In fact, for BAN members, the possibility of either co-investing or benefiting from trust, information and experience shared inside the network could generate the opposite outcome. This leads to the following research hypothesis:

H3: *Business angels' capital allocation investment decisions are affected by the expected active/passive role to be played in a given deal.*

The finance literature extensively investigated the role of monitoring as a way to reduce asymmetric information and moral hazard problems stemming from any type of securities investment (Jensen and Meckling, 1976; Diamond, 1984; Aghion and Bolton, 1992).

As far as private equity investments are concerned, many authors have investigated how venture capital organizations monitor investee companies and the major contingent contracts, clauses and mechanisms used to reduce potential conflicts and incentives for opportunistic behavior by entrepreneurs (Sahlman, 1990; Triantis, 2001; Kaplan and Stromberg, 2003; Gompers and Lerner, 2004; Chemmanur et al., 2008; Cumming, 2008; Wong et al., 2009; Cumming and Johan, 2013).

Dealing with business angels, specific contributions showed that they seldom adopt the typical control and governance provisions of venture capital investors (Van Osnabrugge, 2000; Wiltbank and Boecker, 2007; Goldfarb et al., 2012; Bonini and Capizzi, 2016), implementing monitoring mechanisms "*non aggressive and striking in their informality*" (Ibrahim, 2008). The major substitutes for contractual monitoring are represented by angels' knowledge of the industry from previous investments or managerial experience, existing interactions with entrepreneurs and geographical proximity with the investee company (Wong et al. 2009).

Consistent with the above-mentioned arguments, we believe that the type of monitoring taking place in the informal venture capital market is "soft" one, not based mainly on contractual mechanisms but on high involvement in the relevant company through company visits, interactions with entrepreneurs and other control techniques based on trust. We argue that the higher the soft monitoring effort, the lower the investment risk perception by business angels in their investment decision-making process.

Given the possibility to investigate the impact of soft monitoring for both of our sub-samples of business angels – BAN members and non-BAN members – we expect different causal relationships between monitoring and angel investments. BAN members benefit from the screening support provided by BANs to their members as well as from the information and knowledge sharing effects stemming from inside BANs, leaving the need for higher monitoring effort to investments that are perceived as riskier. This leads to less informationally opaque investments when compared to those realized by non-BAN member business angels, who do not benefit from the soft information produced inside the angel community and must compensate for the greater information

asymmetry by imposing a higher level of monitoring. In this case, higher monitoring should not necessarily be associated with higher investment risk.

We therefore hypothesize the following:

H4:   *Business angels' capital allocation investment decisions are positively affected by the monitoring effort of non-BAN members and negatively affected by the monitoring effort of BAN members.*

2.3 Controls

Following the extant literature, we will test our hypotheses introducing a set of control variables that are known to have a causal effect on the investment decisions of business angels. Mason and Harrison (2000), Van Osnabrugge (2000) and Macht (2011) explained the role of experience, whereas Shane (2000) and Paul et al. (2007) showed the effect of age, education, and previous background, which could be managerial, entrepreneurial or financial in nature (Maula et al., 2005; Sudek, 2008; Morrissette, 2007; Collewaert and Manigart, 2016). As far as age is concerned, consistent with studies dealing with investors' utility functions in an intertemporal portfolio choice model (Samuelson, 1997; Forsfalt, 1999), it is possible to assume an increase in the risk aversion profile of business angels, leading to a decrease in the share of their wealth available to the riskiest asset classes, such as entrepreneurial ventures. In contrast, experience gained through past investments, a high degree of education and the amount of business angels' personal wealth could act as counteracting factors on their capital allocation investment decisions.

Additionally, we expect that the equity stake in the target company acquired by a business angel is negatively affected by the size of the company itself (Mason and

Harrison, 2000; Van Osnabrugge, 2000), as well as by its stage in the life cycle (Wiltbank et al., 2006) and its location (Sudek, 2006).

Finally, consistently with the above-mentioned contributions investigating the determinants of investments taking place in both formal and informal venture capital markets, we consider in our model some industry (market capitalization, performance and capital intensity) and macroeconomic (market interest rates) variables expected to play a statistically significant role in the investment decision-making process. In fact, it is reasonable to assume that the amount of capital invested depends, among other things, on industry-specific drivers as well as on the expected return from alternative asset class investments.

Table 1 summarizes our research hypotheses and the predicted signs of both the explanatory and control variables for each of the proxies used as a measure of business angels' capital allocation process.

INSERT TABLE 1 HERE

3. Sample data and variables

Our data are obtained from sequential surveys administered by the Italian Business Angels Association (IBAN) to its associates and other unaffiliated BAs. The surveys have been conducted during the period of January – March each year beginning in 2008. Each survey was designed to collect information on the previous year's operations. Each survey is completed in a four-step process: at the beginning of January, IBAN forwards the survey's website link to its associates and other known BAs.[3] By the first week of March, the data are collected (step 1). Non-responding BAs are contacted by email and phone to solicit survey completion (step 2) while an IBAN team reviews

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[3] See the IBAN website (www.iban.it) for the survey questionnaire.

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the data to identify incomplete, wrong or unverifiable answers (step 3), which are further checked through direct follow-up calls (step 4). This process is a fairly common survey technique called sequential mixed mode (Snjikers et al., 2013), a particular methodology that employs different survey modes in a sequential way (e.g., the non-respondents to a mail survey are subsequently contacted and asked to answer the questionnaire through a different mode, such as a phone interview). Evidence shows that a mixed mode survey approach significantly improves the response rate (De Leeuw, 2005 and Dillman et al., 2009).

IBAN received 625 full responses from 330 unique investors who performed at least one investment, for a total of 810 investments in 619 unique companies during the 2008 – 2014 time period. A total of 35% of the respondents stated that they were affiliated with a BAN/AG at the time of the survey, which suggests the existence of possible measurable effects stemming from membership in an angel community.

Research on BAs shares the key difficulty of finding reliable data given that investments are not publicly recorded and most investors strive for anonymity, whereas others do not even know they are business angels (Mason and Harrison, 2008; Capizzi, 2015). We acknowledge this potential limitation in our data; however, the rigorous survey method, the panel nature of the survey continuously conducted for 7 years and the granularity of the survey outreach effort appear to be strong mitigating factors, and we believe that the final sample is a reliable estimate of the visible market of informal venture capital in Italy.

In Table 2, we present the temporal and industry distribution of the final sample data distinguishing BAN members from non-BAN through a dummy variable (*BAN_MEMBERSHIP*) taking a value of 1 for BAN members.

INSERT TABLE 2 HERE

Investments are fairly evenly distributed across years, peaking in 2012. Similarly, the fraction of investments performed by BAN/AG members is relatively stable, between 50 and 60%. Apparently, there is a large drop in the last two years of the sample. This figure is the result of a change in the procedure through which the survey is administered by IBAN, requiring survey addressees to pass through an additional layer of screening. This generated a reduction in the response rate. Although this problem is certainly a potential concern, we believe that the validity of our results will be only limitedly affected because in all of our regressions, we introduce year fixed effects, which absorb a significant portion of such heterogeneity.

Looking at the industry distribution of investments, deals are spread out across several industries, with a not surprising dominance of "traditional" sectors for early stage investments, such as ICT, electronics and biotech, which collectively attract approximately half of the aggregate investments. Interestingly, a meaningful 13% of the investment is directed at cleantech-related ventures, consistent with a rising global trend of activity in this market. Non-BAN members seem to invest less in ICT, devoting more resources to biotech- and media-related investments. This difference may be explained by the high level of specific skills required in these industries, which may attract investments by seasoned and experienced professionals with a preference to go solo. Data reported in Panel C show that investors have portfolio sizes ranging from one single investment to more than 10, without a clear prevalence of any cluster. Interestingly though, there is a strong difference when controlling for BAN membership. Whereas almost 50% of BAN members have portfolios in excess of 5 companies, this is true for only 18% of non-BAN members. This evidence provides preliminary support for

our argument about the existence of structural effects of BAN membership on the investment behavior of business angels.

Table 3 reports summary statistics on participation in groups and networks and the conditional distribution of the two dependent variables *PARTICIPATION%,* which is computed as the amount invested in a venture as a share of the investee net-asset-value, and *WEALTH%,* which is the share of a BA's financial wealth invested in a venture.

INSERT TABLE 3 HERE

Business angels joining an angel community (herein after "BAN members") constitute almost 54% of the sample, giving us the possibility of splitting our whole sample into two sub-samples and empirically investigating the role of the business angel networks in the investment decision-making process.

The descriptive statistics related to the dependent variables show that the relative incidence of BAs' investments varies widely in the sample in terms of both participation in the venture and the personal wealth of the BAs. Looking at the percentage of wealth invested, we noticed a significant difference conditional on BAN membership. BAN members, on average, invest 22% more of their disposable wealth in new ventures than their non-BAN peers. Remarkably, this figure is affected by large values observed in the non-BAN member subsample, as shown by the staggering difference in medians (14 vs. 8). This difference becomes much less robust when testing the second dependent variable. BAN members seem to invest more in each single venture, but the means are not significantly different from zero. The medians are weakly significant but similarly large in magnitude.

Table 4 describes the proxies used to operationalize the main dependent variables and controls and presents the summary statistics.

Co-investor data are winsorized at the 95% level due to the presence of extreme observations that are most likely due to data entry errors. The figures show that co-investments are very frequent, with an average number of co-investors of 4.3, which yields an unconditional number of investors on any deal equal to 5 or more. Unreported percentiles show that more than 70% of the investments have at least one co-investor and 25% of the deals are backed by 9 or more investors. This behavior is sharply different from that exhibited by formal venture capitalists, which on average syndicate their deals with only one additional investor (Lerner, 1994).

Leveraging on a specific question in the survey, we address and test our third research hypothesis by modeling a dummy variable (*PASSIVE INVESTOR*) that takes a value of 1 if the respondent states that the investment decision was driven exclusively by a capital gain motivation and not by other private benefit reasons.

The survey also offers interesting evidence regarding the role played by BAs in the monitoring of the investee firms, allowing us to test the last research hypothesis (H4). We built an ordinal variable *MONITORING* that graduates the frequency of the visits a BA made to an investee venture, from 1 to 5, where 1 means very limited involvement (no or very few visits) and 5 means very high involvement (a constant presence in the firm). Although the survey collects this information ex post, asking about the effective involvement in the investee firms by BAs, we believe that they already know the future degree of involvement in a venture at the time that the investment decision is made. Moreover, it is likely that it influences the choices concerning the amount to invest. In particular, a higher degree of monitoring is expected to decrease the investment risk perceived by a BA. As a consequence, we are reasonably confident that the variable *MONITORING* successfully captures the degree of monitoring

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effort estimated when the investment decision was made. Following our hypothesis, we expect a positive sign for BAN members and negative sign for non-BAN members.

Turning to angel-specific control variables, *Age*, *Low Education*, and *Wealth* are self-reported demographic items obtained from specific survey items. An additional survey item required angels to identify his/her prevalent prior background, discriminating between managerial and entrepreneurial as opposed to a coarse group of other jobs. We have accordingly modeled three dummies: *Entrepreneur*, *Manager* and *Other*. In all of our tests, we will assume Other as the baseline to highlight the differential effect of a specific background on the investment behavior of business angels. *Experience* is modeled as the number of investments made in the past, consistent with Hsu et al. (2014) and Capizzi (2015). More experienced BAs should exhibit greater investment selection skills identifying superior investment opportunities. Their successful track record can induce greater self-confidence, thereby increasing the size of their investments relative to less experienced angels. We expect to observe this effect for both *Participation%* and *Wealth%*.

Looking at firm-specific control variables, we obtain *Net_Asset_Value* from a survey item. Firms fit in the profile of newly funded companies with average assets of approximately 1.4 m/euro. The minimum value and more generally the (unreported) lowest decile asset values indicate that business angels invest in a non-negligible number of cases in companies that most likely are paper companies or newly formed shell vehicles with essentially no assets. This evidence supports the view that business angels provide much needed funding to companies in stages of their life cycle that would hardly elicit interest from formal VC. This view is corroborated by the standard deviation and maximum value figures, which return a view of the angel-backed companies being very

small and young. Given the existence of a few, very large outliers, we winsorized the data at the 95% level.

Approximately 36% of the investments mapped in the dataset are directed to projects in the *SEED* phase. In the other cases, the target firms are start-ups or later stage investments. Because investing in a seed enterprise is likely to be riskier than investing in a well-established entrepreneurial project, the expected relationship between the dummy *SEED* and the dependent variables *PARTICIPATION%* and *WEALTH%* is negative.

Dealing with the geographical location of the investee companies, foreign ventures represent only 12% of the financed projects. Cumming and Dai (2010) show that venture capitalists have a preference for investments that are close to them. Distance is measured from a geographical perspective but is argued to also be a proxy for cultural and social differences. Following these arguments, we expect a negative sign for the survey dummy *FOREIGN*, which identifies investments by an angel in a country other than his/her country of residence.

Looking at the financial wealth of BAs, the minimum reported value is 250,000. This figure is smaller than the level adopted in the US to identify accredited investors, almost invariably a condition of operating as a business angel. However, this is not of particular concern because there is no specific reference to financial wealth in Italian – and, to a similar extent, European – regulation. Additionally, the mean wealth is approximately 1.5 million, with the (unreported) median just slightly below the mean at 1.25 million and the highest decile in excess of 3.5 million. Altogether, these figures support the representativeness of the sample.

Because our data are collected annually and there is no disclosure about the month of investment, we account for economic conditions and the equity-market performance through year fixed effects. Finally, we add a set of industry that have been shown to drive the overall volume of investments. In particular, we control for industry-specific characteristics through the industry price-to-book value ratio ($INDUSTRYPBV$) and the industry capital intensity ($CAPITAL\ INTENSITY$), measured as the ratio of capital expenditures to sales.

4. Methodology and Results

4.1 BAN membership and investment decisions

The first analysis investigates the determinants of the share of personal wealth invested in a venture by a BA. To this end, we run a battery of OLS regressions between the dependent variable $WEALTH\%$ and a set of explanatory variables related to the venture, the investor and the investment decision. We also add to some model specification time and industry fixed effects. We address potential heteroskedasticity concerns in two ways: first because our dependent variable and the main continuous independent variables cannot assume negative values, we perform a logarithmic transformation of the dependent variable and of the explanatory variables $NET\_ASSET\_VALUE, WEALTH$ and $EXPERIENCE$[4]; second, we compute the Huber-White heteroskedasticity-consistent standard errors.

Our baseline equation (1) is a fully balanced model with time fixed effects.

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[4] Because experience may take a value of 0, the transformation is done as ln(experience+1). We also perform an alternative transformation taking the cube root of experience and using it in a set of robustness regressions, obtaining qualitatively similar results.

$$WEALTH\% = f\ (BAN\_\text{MEMBERSHIP},\ CO\text{-}\text{INVESTORS},\ NET\_\text{ASSET}\_\text{VALUE},\ SEED,$$
$$FOREIGN,\ INDUSTRY\ PBV,\ NET\ CAPEX/SALES,\ YEAR_{t;},\ INDUSTRY_{i}) \tag{1}$$

Equation (2) adds to the previous model investor-level explanatory variables.

$$WEALTH\% = f\ (BAN\_\text{MEMBERSHIP},\ CO\text{-}\text{INVESTORS},\ PASSIVE\_\text{INVESTOR},\ SOFT\text{-}$$
$$MONITORING,\ AGE,\ EDUCATION,\ WEALTH,\ ENTREPRENEUR,\ MANAGER,\ EXPERIENCE,$$
$$NET\_\text{ASSET}\_\text{VALUE},\ SEED,\ FOREIGN,\ INDUSTRY\ PBV,\ NET\ CAPEX/SALES,\ YEAR_{t;},$$
$$INDUSTRY_{i}) \tag{2}$$

Because the two-group mean comparison test on the dependent variable *WEALTH%,* presented in Table 3, shows that being a member of an angel community affects the share of wealth invested in a venture, we also run equation (2) for the sub-samples of BAN members and non-BAN members separately.

Table 5 presents the results of the analysis. The model is significant in all of the specifications and shows an R-squared of 14% for the base model in column (1) and above 35% for the BAN membership sub-samples, reported in columns 4 and 5.

INSERT TABLE 5 HERE

The results show that being member of an angel community increases the share of wealth invested by approximately 16%, which provides support to our first research hypothesis. Other conditions being equal, a one-unit increase in the number of co-investors reduces the amount of money invested in a venture by 2%. However, by comparing BAN members with non-BAN members, we observe some interesting differences, highlighting the differential role played by co-investing in investment decisions. More specifically, the invested amount is affected by the presence of co-investors only for the sub-sample of the BAN members, implying that there could be a

positive effect played by trust inside a given angel community. We interpret the absence of an effect for BAN members as the result of a lack of knowledge of other investors' profiles and characteristics. Such opaqueness may lead investors to avoid or reduce the co-investments because of potential free-riding and/or opportunistic behavior risks. These results confirm our second hypothesis for an angel member of a network/group and provide interesting novel evidence of the differential investment practices of business angels within and outside of a BAN or AG.

Confirming our third hypothesis, we find a negative relationship with capital invested for business angels acting as passive investors. Such a relationship, however, is statistically significant only for non-BAN member angels. We argue that, in the case of BAN members, the possibility of benefitting from co-investing with other angels, the possibility of leveraging other angels' experience and the mentoring and information provided by the BAN gatekeepers may provide incentives that ultimately positively affect the investment decisions of passive angels interested mainly in capital gain arguments, as highlighted by industry and association surveys (OECD, EBAN, IBAN).

The *SOFT MONITORING* variable shows a positive significant sign for the group of BAs not affiliated with an angel community and a negative sign for the BAN members, though the parameter is not significant. This evidence is consistent with hypothesis 4 and seems to be further proof of the quality of the contribution in terms of the deal flow and screening provided by BA networks to their members. In fact, it is likely that BAN members impose a higher level of monitoring only on ventures that are more opaque. If this is true, the negative sign is related to the perceived investment risk (which requires more monitoring). In contrast, because non-BAN members do not benefit from the soft information given by angel communities, they probably compensate for this greater information asymmetry by imposing a high level of monitoring more extensively. In this

case, higher monitoring is not necessarily associated with higher risk. In fact, looking at the preferred asset class chosen, the earlier is the stage in the life cycle of the investee firms –emerging by considering the significance of the control variable $SEED$ – the lower the amount invested by non-BAN members, who arguably tend to invest more in ventures with lower time to market.

Looking at the set of control variables, the amount of capital invested in a single venture depends on the personal characteristics of BAs, whereas it is not influenced by the firms' characteristics. Background plays an opposite role conditional on BAN membership: former managers are keener to invest more if they participate in a BAN group, whereas entrepreneurs tend to invest more when going solo. This is not inconsistent with anecdotal evidence on a generally more independent investment profile of former, successful entrepreneurs, as opposed to high-caliber managers used to acting within organizations.

Interestingly, we observe different investment behaviors between BAN members and non-BAN members as far as the education of the investor is considered. Non-BAN members invest substantially less than similarly educated but affiliated angel investors. We interpret this evidence as an indication that the information and knowledge sharing effect taking place inside a community can compensate for the limited education of a given angel investor who otherwise would have been prevented from investing more capital.

4.2 BAN features and investment decisions

The second part of the empirical analysis explores the factors affecting the amount invested in a venture by BAs. For this purpose, we estimate the relationship

between the dependent variable *PARTICIPATION%* and the same set of explanatory variables previously used by running a new set of OLS regressions.

Similarly to the approach used for the dependent variable *WEALTH%*, we manage heteroskedasticity by computing the natural logarithm of the dependent variable and of the explanatory variables *PARTICIPATION%, NET_ASSET_VALUE AND WEALTH* and *EXPERIENCE*. As done with the first dependent variable, we perform a logarithmic transformation of the variables *PARTICIPATION%, NET_ASSET_VALUE, WEALTH* and *EXPERIENCE,* to control for possible heteroskedasticity, and we also estimate Huber-White heteroskedasticity-consistent standard errors.

Therefore, we run the following models

$PARTICIPATION\%$ = f (BAN_MEMBERSHIP, CO-INVESTORS, NET_ASSET_VALUE, SEED, FOREIGN, INDUSTRY PBV, NET CAPEX/SALES, YEAR$_{t;}$, INDUSTRY$_i$) (1)

Equation (2) adds to the previous model investor-level explanatory variables.

$PARTICIPATION\%$ = f (BAN_MEMBERSHIP, CO-INVESTORS, PASSIVE_INVESTOR, SOFT-MONITORING, AGE, EDUCATION, WEALTH, ENTREPRENEUR, MANAGER, EXPERIENCE, NET_ASSET_VALUE, SEED, FOREIGN, INDUSTRY PBV, NET CAPEX/SALES, YEAR$_{t;}$, INDUSTRY$_i$)

Table 6 presents the results of the model. The analysis shows a high explanatory power: the adjusted R^2 is 50% or more in all specifications.

INSERT TABLE 6 HERE

Differently from the univariate tests in Table 3, when controlling for a number of covariates, BAN membership returns significant parameter estimates, indicating that it is a material factor affecting the capital allocation decisions of business angels. BAs are conscious of the risks of their investments, and because of that, they rationally manage their risk exposures by also taking part in the benefit of the risk-reduction, co-investment and monitoring effort advantages arising from membership in an angel community.

Our tests also provide support for hypothesis 2: investing alongside another angel decreases the individual participation by an economically significant 7%; therefore, co-investing appears to be an effective way to pursue risk-minimizing investment decisions while enjoying portfolio diversification upsides.

On the other side, when the main motivation appears to be capital gain (i.e., when the dummy *PASSIVE_INVESTOR* is equal to 1), the dependent variable shows an 18% reduction, consistent with hypothesis 3.

Dealing with hypothesis 4, the data show that the share of participation in a given investee company increases by more than 20% as the degree of soft monitoring increases, once again confirming the relevance of monitoring mechanisms, even if non-contractual based, as is usually agreed upon between entrepreneurs and business angels (Ibrahim, 2008). This effect is markedly different across the two groups. The parameter for BAN members is 0.116, whereas that for unaffiliated angels is 0.287. This difference is significant at the 1% level, as computed through a (unreported) standardized Z-test.

Looking at angel-specific control variables, the model results display a progressive reduction in the amount invested in a venture as the age of the investor increases. It also emerges that less-educated BAs show a greater risk exposure. The parameter

estimate for the degree of experience in BA investments is positive, as expected, although the statistical significance of the estimates is very low or null. The absolute level of financial wealth is not significantly different from zero. On the contrary, we obtain strongly significant estimates supporting the impact of prior experience as an entrepreneur or a manager on the magnitude of the stake acquired by the angel. This effect is quantitatively similar across the two groups for angels showing prior experience as entrepreneurs but is significantly larger for BAN members with a managerial background.

Looking at firm-specific controls, not surprisingly, we find a significant inverse relationship between the size of the company measured through the Net Asset Value metric and the share of participation in a venture. Similarly, participation diminishes by more than 30% if the target company is located abroad.

5. Conclusive remarks and suggestions for future research

In this paper, we provide novel evidence on the effects of business angels' participation in a business angel network (BAN) or angel group (AG) on their investment decisions. Looking at a unique dataset that contains qualitative and quantitative information on over 800 investments by 490 business angels from 2008 to 2014, we contribute to the extant literature by providing preliminary evidence of the existence of significantly different investment practices determined by BAN/AG membership. Affiliation with an angel group generates valuable information and risk reduction effects that ultimately increase the amount of capital that angels invest in new ventures. Similarly, BAN members enjoy significant diversification benefits, larger deal flows and access to network screening and monitoring skills. These factors causally affect angels' portfolios by reducing the individual stake in each company while

expanding the absolute size of the portfolio, thereby implementing a classical diversification strategy. In an extensive set of multivariate tests, we also show that the possibility to co-invest appears to be a factor that significantly affects their investment decisions, giving them the possibility, on the one hand, to benefit from risk-reduction effects and, on the other hand, to continue to play an active role in the investee company.

The unique characteristics of the dataset allow us to control for novel factors such as the stated willingness to play an active/passive role and to closely monitor the company. The results are markedly different conditional on participation in an informal investor organization: non-BAN members invest less capital if they plan to play a passive role, but angels counterbalance this effect through a stronger monitoring effort. Differently, BAN members can reduce direct, individual monitoring efforts through superior networking skills and shared monitoring of portfolio companies. Angel communities thus seem to be able to decrease and distribute the need for individual monitoring while increasing members' confidence in the investments.

Interestingly, past experience as an entrepreneur or a manager has strong effects on angels' capital allocation choices conditional on being affiliated with a group. Past managers who are also BAN members invest 30% more capital and acquire almost twice the stake in a portfolio company than non-BAN members. However, BAN membership has no effect on entrepreneurs who exhibit a preference to invest alone.

Policymakers, increasingly focused on stimulating entrepreneurship as a crucial driver of economic growth, have been actively supporting the development of the angel community through dedicated government-sponsored programs. Our results provide valuable information to further such development - which has proven to be one of the major enablers of new ventures and a crucial precursor to formal venture capital

(Baldock and Mason, 2015; Kraemer-Eis *et al.*, 2016) – by improving the economic efficiency of the policy design and ultimately stimulating social welfare.

References

Aernoudt, R. (2005), Business Angels: The Smartest Money for Starters? Plea for a Renewed Policy Focus on Business Angels. *International Journal of Business*, Vol. 19, No. 5.

Aghion, P., and Bolton, P. (1992), *An Incomplete Contracts Approach to Financial Contracting*. Review of Economic Studies, Vol. 59, No. 3, 473-494.

Baldock, R., and Mason, C. (2015), Establishing a new UK finance escalator for innovative SMEs: The roles of the enterprise capital funds and angel co-investment fund. *Venture Capital: An International Journal of Entrepreneurial Finance,* Vol. *17*, No. 1-2, 59-86.

Bonini, S., and Capizzi, V. (2016), The effects of private equity investors on the governance of companies. In Gabrielsson J. (ed.), *Handbook of Research on Entrepreneurship and Corporate Governance*, Edward Elgar Publishing, Camberley, UK, 2016 (forthcoming).

Brush, C. G., Edelman, L. F., & Manolova, T. S. (2012). Ready for funding? entrepreneurial ventures and the pursuit of angel financing. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 14, No. 2-3, 111-129.

Capizzi, V., (2015), The returns of business angel investments and their major determinants. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 17, No. 4, 271-298.

Carpenter, R.E., and Petersen, B.C. (2002), Capital Market Imperfection, High-Tech Investment and New Equity Financing. *The Economic Journal*, Vol. 112, No. 477, F54-F72.

Chemmanur, T. J., Krishnan, K and Nandy, D. K. (2008), How Does Venture Capital Financing Improve Efficiency in Private Firms? A Look Beneath the Surface. *Review of Financial Studies*, Vol. 24, No. 12, 4037-4090.

Collewaert, V., and Manigart, S. (2016), Valuation of Angel-Backed Companies: The Role of Investor Human Capital. *Journal of Small Business Management*, Vol. 54, No. 1, 356-372.

Croce, A., Tenca, F. and Ughetto, E. (2016), How business angel groups work: rejection criteria in investment evaluation. *International Small Business Journal*, forthcoming.

Cumming, D. (2008), Contracts and exits in venture capital finance. *The Review of Financial Studies*, Vol. 21, No. 5, 1947-1982.

Cumming, D. and Dai N. (2010), Local bias in venture capital investments. *The Journal of Empirical Finance*, Vol. 17, No. 3, 362-380.

Cumming, D., and Johan, S. (2013), *Venture Capital and Private Equity Contracting: An International Perspective*, 2nd Edition. Amsterdam, The Netherlands: Elsevier Science Academic Press.

De Leeuw, E.D. 2005. To mix or not to mix data collection modes in surveys. *Journal of Official Statistics*, Vol. 21, 233–255.

Diamond, D.W. (1984), Financial Intermediation and Delegated Monitoring. *The Review of Economic Studies*, Vol. 51, No. 3, 393-414.

Dillman, D. A., Smyth, J. D., Christian, L. M., & Dillman, D. A. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method.* Hoboken, N.J: Wiley & Sons.

Elton, E.J., and Gruber, M.J. (2005), *Modern Portfolio Theory and Investment Analysis.* Fifth Edition. Hoboken, N.J: Wiley & Sons.

EBAN (2015), *Activity Report 2015.* Available at: www.eban.org.

EVCA (2014), *EVCA Report 2014*, Available at: www.evca.eu.

Forsfält, T. (1999), The Effects of Risk Aversion and Age on Investments in New Firms. *Research Papers in Economics*, Stockholm University, Department of Economics No 1999:18.

Freear, J., Sohl, J. E., and Wetzel, W. E. (1992), The investment attitudes, behavior and characteristics of high net worth individuals. In Churchill, N. C, Birley, S., Bygrave, W. D., Muzyka, D. E., Wahlbin, C., and Wetzel, W. E., Jr. (eds.), *Frontiers of Entrepreneurship Research 1992.* Babson Park, MA: Babson College, 374-387.

Goldfarb, B., Hoberg, G., Kisch, D., and Triantis, A. (2012), *Does Angel Participation Matter? An Analysis of Early Venture Financing.* Robert H. Smith School of Business Research Paper Series, No. 06-072, May 2012.

Gompers, P., and Lerner, J. (2004), *The Venture Capital Cycle.* Cambridge, MA: The MIT Press.

Gregson, G., Mann, S., & Harrison, R. (2013). Business angel syndication and the evolution of risk capital in a small market economy: Evidence from Scotland. *Managerial and Decision Economics,* Vol. 34, No. 2, 95-107.

Harrison, R. T., and Mason, C. M. (1992), International perspectives on the supply of informal venture capital. *Journal of Business Venturing*, Vol. 7, No. 6, 459-475

Harrison, R. T., and Mason, C. M. (eds.) (1996a), *Informal Venture Capital: Evaluating the Impact of Business Introduction Services.* Hertfordshire, UK: Prentice Hall.

Harrison, R. T., Mason, C. M., and Robson, P. J. A. (2010), Determinants of long-distance investing by business angels in the UK. *Entrepreneurship and Regional Development*, Vol. 22, No. 2, 113-137.

Hsu, D. K., Haynie, J. M, Simmons, S. A., and McKelvie, A, (2014), What matters, matters differently: A conjoint analysis of the decision policies of angel and venture capital investors. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 16, No. 1, 1-25.

IBAN, *Annual Survey* (years 2007-2014). Available at: *www.iban.it*.

Ibrahim, D. M. (2008), The (not so) puzzling behavior of angel investors. *Vanderbilt Law Review*, Vol. 61, No. 5, 1405-1452.

Jeng, L. A., and Wells, P. C. (2000), The determinants of venture capital funding: evidence across countries. *Journal of Corporate Finance*, Vol. 6, No. 3, 241-289.

Jensen, M. C. and Meckling, W.H. (1976), Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, No. 3, 305-360.

Johnson, W. C., and Sohl, J. (2012), Angels and venture capitalists in the initial public offering market. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 14, No. 1, 27-42.

Kaplan, S. and Stromberg, P. (2003), Financial contracting theory meets the real world: Evidence from venture capital contracts. *Review of Economic Studies*, Vol. 7, No. 2, 281-315.

Kerr, William R., Josh Lerner, and Antoinette Schoar (2014), The Consequences of Entrepreneurial Finance: A Regression Discontinuity Analysis. *Review of Financial Studies*, Vol. 27, 20-55.

Kraemer-Eis, H., Signore, S., and Prencipe, D. (2016), The European venture capital landscape: an EIF prespective. *EIF Research & Market Analysis*, working paper, No. 2016/34.

Kraemer-Eis, H., Lang, F., Torfs, W., and Gvetadze, S. (2015), European Small Business Finance Outlook. *EIF Research & Market Analysis*, working paper, No. 2015/32.

Landström, H. (1993), Informal risk capital in Sweden and some international comparisons. *Journal of Business Venturing*, Vol. 8, No. 6, 525-540.

Lerner, J. (1998), "Angel" financing and public policy: An overview. *Journal of Banking & Finance,* Vol. 22, Nos. 6-8, 773-783.

Macht, S. A. (2011b), Inexpert business angels: How even investors with 'nothing to add'can add value. *Strategic Change*, Vol. 20, Nos.7-8, 269-278.

Madill, J. J., Haines, G. H., Jr., and Riding, A. L. (2005), The role of angels in technology SMEs: A link to venture capital. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 7, No. 2, 107-129.

Mason, C. M. (2006), Informal sources of venture finance. In Parker, S. C. (ed.), *The Life Cycle of Entrepreneurial Ventures*. New York, NY: Springer, 259-299

Mason, C. M. (2008), *The Real Venture Capitalists: A Review of Research on Business Angels*. Working Paper WP08-06, Hunter Center for Entrepreneurship, University of Strathclyde, September 2008, 1-55.

Mason, C. M. (2009), Public policy support for the informal venture capital market in Europe: A critical review. *International Small Business Journal*, Vol. 27, No. 5, 536-556.

Mason, C. M., Botelho, T., and Harrison, R. T. (2013), The Transformation of the Business Angel Market: Evidence from Scotland. Available at: http://dx.doi.org/10.2139/ssrn.2306653.

Mason, C. M., and Harrison, R. T. (2000), The size of the informal venture capital market in the United Kingdom. *Small Business Economics*, Vol. 15, 137-148.

Maula, M., Autio, E., and Arenius, P. (2005), What drives micro-angel investments? *Small Business Economics*, Vol. 25, No. 5, 459-475.

Morrisette, S. G. (2007), A profile of angel investors. *The Journal of Private Equity*, Vol. 10, No. 3, 52-66.

OECD, (2016), Business and Finance Outlook. OECD Publishing. Available at http://www.oecd.org.

OECD, (2012), Financing High-Growth Firms: The Role of Angel Investors. OECD Publishing. Available at: http://dx.doi.org/10.1787/9789264118782-en.

Paul, S., Whittam, G., and Wyper, J. (2007), Towards a model of the business angel investment process. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 9, No. 2, 107-125

Paul, S., and Whittam, G. (2010), Business angel syndicates: An exploratory study of gatekeepers. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 12, No. 3, 241-256.

Payne, W. H. and Mccarty, M. J. (2002), The Anatomy Of An Angel Investing Network: Tech Coast Angels. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 4, No. 31-336.

Politis, D. (2008). Business angels and value added: What do we know and where do we go? *Venture Capital: An International Journal of Entrepreneurial Finance,* Vol. 10, No. 2, 127-147.

Sahlman, W.A. (1990), The structure and governance of venture capital organizations. *Journal of Financial Economics*, Vol. 27, 473-524.

Samuelson, P. A, (1997), How Best to Flip-Flop If You Must: Integer Dynamic Stochastic Programming for Either-Or. *Journal of Risk and Uncertainty*, Vol. 15, No. 3, 183-90.

Shane, S. (2000), Prior Knowledge and the Discovery of Entrepreneurial Opportunities. *Organization Science*, Vol. 11, 448–469.

Snijkers G., Haraldsen G. , Jones J., Willimack D., (2013), Designing and Conducting Business Surveys*,* John Wiley and Sons, Hoboken, NY, USA.

Sohl, J. E. (2007), The organisation of the informal venture capital market*.* In Landström, H. (ed.), *Handbook of Research on Venture Capital.* Cheltenham, UK: Edward Elgar, 347-368.

Sudek, R., Mitteness, C., and Baucus, M. (2008), Betting on the horse or the jockey: The impact of expertise on angel investing. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 14, No. 4, 241-267.

Triantis, G. G. (2001), Financial Contract Design in the World of Venture Capital, *University of Chicago Law Review*, Vol., 68, 305-312.

US Angel Capital Association, (2015), Introducing Angel Investing as an asset class for all investors. *The Go Beyond Investor Report.* Available at: http://www.angelcapitalassociation.org

Van Osnabrugge, M. (2000), A comparison of business angel and venture capitalist investment procedures: An agency theory-based analysis. *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 2, No. 2, 91-109.

Wetzel, W. E. (1986), *Entrepreneurs, Angels and Economic Renaissance.* Lexington, MA: Lexington Books.

Wiltbank, R., Dew, N., Read, S., and Sarasvathy, S. D. (2006), What to do next? The case for non-predictive strategy. *Strategic Management Journal*, Vol. 27, No. 10, 981-998.

Wiltbank, R. and Boeker, W. (2007), *Returns to angel investors in groups.* Report, Ewing Marion Kauffman Foundation and Angel Capital Education Foundation, November.

Wong, A., Bhatia, M., and Freeman, Z. (2009), Angel finance: The other venture capital. *Strategic Change*, Vol. 18, Nos. 7-8, 221-230.

Table 1

Dependent, independent and control variables predicted signs

This table reports predicted signs for two dependent variables - Wealth% measured as the amount of capital invested as a share of a single business angel's personal wealth and Participation% measured as the amount of capital invested as a share of the equity capital of the investee company - the main independent variables and three sets of Angel-specific, firm-specific and market-wide controls.

| | Explanatory Variables | | | |
| | *Participation%* | *Wealth%* | | |
	Whole sample	Whole sample	BAN members	Non-BAN members
BAN_membership	-	+		
Co-investors	-	-	-	-
Passive_Investor	-	-	-	-
Soft-Monitoring	+	+	-	+
Firm Specific Controls				
Size	-	+		
Life Cycle	-	-		
Foreign Location	-	-		
Angel Specific Controls				
Age	-	-		
Personal Wealth	+/-	+/-		
Education	+/-	+/-		
Entrepreneurial Background	+/-	+/-		
Managerial Background	+/-	+/-		
Experience	+	+		
Market and Industry Specific Controls				
Market Industry Capitalization	+/-	+/-		
Market Interest Rates		+/-		
Industry performance	-			
Industry Capital Intensity	+			

Table 2

Sample distribution

Year	Investments	Percentage	
	Whole sample	BAN members	Non-BAN members
2008	95	62.11%	37.89%
2009	142	59.86%	40.14%
2010	137	62.04%	37.96%
2011	159	63.52%	36.48%
2012	162	30.25%	69.75%
2013	58	63.79%	36.21%
2014	57	38.60%	61.40%
Total	810	54.07%	45.93%

PANEL B – Industry distribution

Industry	Percentage		
	Whole sample	BAN members	Non-BAN members
Biotech	17.06%	15.44%	18.97%
Cleantech	13.08%	12.90%	13.28%
Commerce and distribution	10.09%	12.44%	7.32%
Electronics	9.34%	12.90%	5.15%
Financial services	3.36%	4.15%	2.44%
Food & Beverage	2.86%	3.00%	2.71%
ICT (SW and HW, App Web and Mobile)	20.80%	17.05%	25.20%
Mechanical engineering	7.47%	8.53%	6.23%
Media & Entertainment	9.96%	8.76%	11.38%
Telecommunications & similar services	2.86%	2.53%	3.25%
Textile & apparel	3.11%	2.30%	4.07%

PANEL C – Angels investment intensity

Business angel total deals	Percentage		
	Whole sample	BAN members	Non-BAN members
>10	17.90%	18.26%	9.13%
6-10	26.05%	28.32%	9.14%
2-5	33.46%	35.16%	51.34%
1	22.59%	18.26%	20.38%

Table 3

Dependent variables: summary statistics

This table reports summary statistics for two dependent variables: Wealth% is measured as the amount of capital invested as a share of a single business angel's personal wealth; Participation% is the amount of capital invested as a share of the equity capital of the investee company. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively for one-tailed t-test for means and Wilcoxon ranksum z-test for medians.

Dependent variable = *Wealth%*	Total sample	BAN members	Non-BAN members
Mean	15.48	17.09	13.67
Median	14	14***	8
Maximum	60	60	60
Minimum	5	5	5
Standard deviation	11.8	13.13	9.8
No. observation	669	354	315
Dependent variable = *Participation%*			
Mean	14.74	14.87	14.59
Median	8	8*	4
Maximum	100	100	100
Minimum	1	1	1
Standard deviation	19.54	18.3	20.93
No. observation	808	436	372

Table 4

Independent variables: descriptive statistics

This table reports descriptive statistics of the main independent variables and three sets of Angel-specific, firm-specific and market-wide controls

	Description	Obs.	Mean	Std.Dev.	Min	Max	Dummy=1 percentage
BAN_membership	Dummy =1 if the BA is a BAN member	810	-	-	-	-	54.1
Co-investors	Number of co-investors	809	4.3	4.99	0	15	-
Passive Investor	Dummy =1 if the investment is exclusively driven by capital gain motivations	668	-	-	-	-	22
Monitoring	Ordinal variable ranging from 1 to 5, where 1 means monitoring very low or absent and 5 means monitoring very high, with a constant presence in the firm	668	2.75	1.25	1	5	-
Angel specific controls							
Age	Age of the BA	668	48.32	9.4	28	71	-
Low-Education	Dummy = 1 if the BA holds a high school diploma or a lower educational qualification	668	-	-	-	-	6.7
Wealth (in euro)	BAs' financial wealth in the year of the investment	669	1,480,682	1,515,290	250,000	7,500,000	-
Entrepreneur	Dummy =1 in case of prevalent working occupation as entrepreneur	668	-	-	-	-	37.7
Manager	Dummy =1 in case of prevalent working occupation as manager	668	-	-	-	-	16.8
Experience	Number of BA' investments in lifetime	668	6.36	4.01	0	26	-
Firm specific controls							
Net_Asset_Value (in euro)	Enterprises' net asset value in the year of the	806	1389.67	2281.66	1,430	8,928,570	-
Seed	Dummy = 1 if the BA has invested in a seed enterprise	810	-	-	-	-	35.7
Foreign	Dummy = 1 if the BA has invested in a foreign enterprise	711	-	-	-	-	12.1
Industry controls							
Industry PBV	Industry price-to-book value, in the investment year	810	3.05	1.36	0.71	8.62	-
Net capex/Sales	Industry net capital assets to sales, in the investment year	810	0.8	3.18	-4.47	22.96	-

Table 5

Regression Results (dependent variable: *Wealth%*)

This table reports OLS regressions on the effects of BAN membership on angels' asset allocation decisions. The dependent variable, Wealth%, is the share of one angel's wealth invested in each BA-backd company. Equation (1) estimates a fully balanced model with time and industry fixed-effect. Equation (2) includes all the explanatory variables described in Table 2. We also run equation (2) for the two sub-samples originated by grouping BAs on the basis of the BAN_membership dummy (Models 3 and 4). Standard errors are Huber-White heteroskedasticity-consistent standard errors. t-stat are reported in parentheses s under each coefficient. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Independent Variables	Whole Sample		BAN Member	Non-BAN Member
	(1)	(2)	(3)	(4)
BAN_membership	0.125**	0.155***		
	(2.54)	(3.29)		
Co-investors	-0.021***	-0.017***	-0.035***	-0.007
	(4.86)	(3.15)	(4.50)	(1.20)
Passive Investor		-0.064	-0.023	-0.163**
		(1.08)	(0.25)	(2.08)
Soft-Monitoring		0.054*	-0.053	0.154***
		(1.92)	(1.62)	(4.60)
Age		-0.015***	-0.011***	-0.018***
		(5.70)	(3.02)	(3.91)
Low-Education		0.031	0.19	-0.213**
		(0.40)	(1.56)	(2.02)
Wealth		-0.062**	-0.044	-0.114***
		(2.09)	(1.00)	(3.21)
Experience		0.041***	0.059***	0.030***
		(6.57)	(5.82)	(3.51)
Entrepreneur		0.098*	0.053	0.158**
		(1.90)	(0.72)	(2.37)
Manager		0.071	0.300***	-0.098
		(1.17)	(2.81)	(1.36)
Net_Asset_Value	0.000	0.004	-0.013	0.031
	(0.02)	(0.23)	(0.45)	(1.28)
Seed	0.021	-0.074	-0.038	-0.170**
	(0.38)	(1.36)	(0.54)	(2.10)
Foreign	-0.009	-0.007	0.018	0.041
	(0.11)	(0.10)	(0.15)	(0.46)
Industry P/BV	0.039	0.028	0.037	-0.004
	(0.92)	(0.73)	(0.85)	(0.07)
Capital Intensity	0.006	0.011	-0.001	0.028
	(0.44)	(0.86)	(0.08)	(1.30)
Intercept	1.966***	2.826***	2.846***	3.234***
	(7.36)	(8.31)	(4.95)	(7.45)
YEAR F.E	YES	YES	YES	YES
INDUSTRY F.E.	YES	YES	YES	YES
R^2	0.14	0.27	0.35	0.37
Observations	570	569	292	277

Table 6

Regression Results (dependent variable: *Participation%*)

This table reports OLS regressions on the effects of BAN membership on angels' asset allocation decisions. The dependent variable, Percentage%, is the amount invested in a venture as a share of the investee net-asset-value. Equation (1) estimates a fully balanced model with time and industry fixed-effect. Equation (2) includes all the explanatory variables described in Table 2. We also run equation (2) for the two sub-samples originated by grouping BAs on the basis of the BAN_membership dummy (Model 3 and 4). Standard errors are Huber-White heteroskedasticity-consistent standard errors. t-stat are reported in parentheses s under each coefficient. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Independent Variables	Whole Sample		BAN Member	Non-BAN Member
	(1)	(2)	(3)	(4)
BAN_membership	-0.163**	-0.139*		
	(2.42)	(1.95)		
Co-investors	-0.089***	-0.067***	-0.075***	-0.069***
	(14.72)	(9.10)	(6.14)	(6.83)
Passive Investor		-0.186**	-0.262**	-0.264***
		(2.46)	(2.09)	(2.82)
Soft-Monitoring		0.214***	0.116**	0.287***
		(5.64)	(2.23)	(5.06)
Age		-0.009**	-0.007	-0.014*
		(2.12)	(1.27)	(1.95)
Low-Education		0.340**	0.536***	0.136
		(2.56)	(2.88)	(0.76)
Wealth		0.044	0.053	0.084
		(1.16)	(1.07)	(1.36)
Experience		0.019**	0.032**	0.017
		(2.03)	(2.36)	(1.12)
Entrepreneur		0.356***	0.350***	0.348***
		(4.70)	(3.44)	(3.12)
Manager		0.335***	0.547***	0.228*
		(3.40)	(3.27)	(1.82)
Net_Asset_Value	-0.226***	-0.250***	-0.268***	-0.211***
	(8.69)	(10.28)	(7.06)	(6.48)
Seed	-0.060	-0.135*	-0.058	-0.212*
	(0.81)	(1.69)	(0.54)	(1.80)
Foreign	-0.342***	-0.321***	-0.292*	-0.398**
	(3.54)	(3.05)	(1.72)	(2.59)
Industry P/BV	-0.042	-0.052	-0.033	-0.098
	(0.72)	(0.87)	(0.46)	(1.03)
Capital Intensity	0.023	0.024	0.047*	0.000
	(1.37)	(1.36)	(1.89)	(0.02)
Intercept	4.203***	3.675***	4.036***	3.373***
	(12.66)	(8.19)	(6.14)	(5.27)
YEAR F.E	YES	YES	YES	YES
INDUSTRY F.E.	YES	YES	YES	YES
R²	0.49	0.56	0.51	0.67
Observations	700	569	292	277