

# Groups, networks and the business angels' investment practices

Stefano Bonini  
Stevens Institute of Technology  
School of Business  
1 Castle Point Terrace, Hoboken, NJ 07030, USA

Vincenzo Capizzi \*  
Department of Economics and Business Studies  
Università del Piemonte Orientale  
Via E. Perrone, 18, 28100, Novara, Italy

Mario Valletta  
Department of Economics and Business Studies  
Università del Piemonte Orientale  
Via E. Perrone, 18, 28100, Novara, Italy

Paola Zocchi  
Department of Economics and Business Studies  
Università del Piemonte Orientale  
Via E. Perrone, 18, 28100, Novara, Italy

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\* Corresponding Author. Tel.: +39 0321 375.438. Email: [vincenzo.capizzi@uniupo.it](mailto:vincenzo.capizzi@uniupo.it)

## **Abstract**

This paper provides preliminary evidence on the effects of membership in an angel group or network (AG/BAN) on the investment choices of business angels. Using a proprietary dataset containing qualitative and quantitative information on 810 angel or angel-group backed investments on 619 companies by 330 unique 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 personal capital committed by each angel investor and their equity stake in the investee companies. These results extend our knowledge of the investing behavior and characteristics of business angels, a funding source that is 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 show that business angels<sup>1</sup> 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 (US ACA, 2015; EVCA, 2014; EBAN, 2015; Kraemer-Eis et al., 2015; OECD, 2016). As such, BAs have become crucial enablers of the development of new firms and a driving force of growth (Lahti, T. and Keinonen, H., 2016; OECD, 2016, Mason, 2009). Despite this recent attention, our understanding of the features of business angel investments is still limited. In particular, little is known about the investment practices of business angels when they join semi-formal organizations, such as angel groups (AG) and business angel networks (BAN). 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, 2008). 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). 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 because of the relatively high costs of due diligence, contracting and monitoring associated with very early-stage businesses (Jeng and Wells, 2000; Carpenter and Peterson, 2002; Mason, 2009). Second, alongside capital injection, business angels provide valuable non-monetary resources such as industrial

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<sup>1</sup> Also called “informal investors” (Wetzel, 1986; Freear et al., 1993; Landstrom, 1993; Harrison and Mason, 1996a; Van Osnabrugge, 2000), to differentiate them from venture capitalists and other financial intermediaries who invest capital raised from third parties.

knowledge, management experience, mentoring, and personal relationship networks (Harrison and Mason, 1992; Landstrom, 1993, Politis, 2008).

Over time angel investors have increasingly organized into association - also referred to as groups, networks or clubs, depending on the level of their internal structure (Mason, Botelho and Harrison, 2013) - usually on a territorial or industrial basis. BAN. The objectives of such organizations range from increasing the deal flow by sharing presentation pitches from potential entrepreneurs to performing joint due-diligence work over potential investment opportunities, ultimately reducing transaction costs (Mason, 2006; Sohl, 2007; Paul and Whittam, 2010; Gregson et al., 2013; Lahti and Keinonen, 2016). These associations 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) increasingly differentiating among each other in terms of rules of engagement, internal structure, quality, variety and cost of the services provided. 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; Cumming and Zhang, 2016).

Despite their growing sophistication and importance as capital providers, there is very little evidence on the impact of BANs on the investment process of business angels. Most existing research is 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 on investment practices by BAN or group membership. In particular, we investigate whether and how being members of a semi-formal organization affects 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 810 investments, on 619 unique companies by 330 unique Italian 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. We find that being part of an angel network increases 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.

Given the possible endogenous nature of the choice of joining an angel group or network we perform a set of two-stage instrumental variable regressions. Results are qualitatively unchanged.

Our findings 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 derives the research hypothesis to be tested from the literature dealing with business angels and informal venture capital. The third section presents the dataset and specifies the variables used to perform the empirical analysis, the results of which are shown and discussed in the fourth section. The final section addresses 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 individual business angels. Prior literature on both venture capitalists (Lerner, 1998; Jeng and Wells, 2000; Cumming and Johan, 2006) and informal investors has commonly operationalized this measure as either the overall amount of capital invested investors (Maula *et al.*, 2005; Wiltbank and Boecker, 2007; Lahti, 2001; Collewaert and Manigart, 2016) or the amount invested in a single deal as

a share of a given business angel’s personal wealth (Harrison and Mason, 2002; Mansson and Landstrom, 2006; Sohl, 2006; De Gennaro and Dwyer, 2014).

These metrics try to capture the extent of the commitment of business angel to financing new ventures.

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

Building on these 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**

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; Lahti and Keinonen, 2016).

Despite such heterogeneity, the forms of association have converged towards two main forms: Business Angels Networks and Business Angels Groups. The main difference between these two forms are in the less stringent obligations and engagement rules to their members, such as limited or no fees, no minimum participation requirement, no obligation to share due diligence costs (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.

In this paper, we collect data obtained from a BAN. While we acknowledge the above differences between BAN and AG, we believe that our results extend to more structured and formal organizations, such as AGs.

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 (2008) 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 capital allocation decisions more focused on angel investments. In other words, because of the services and contributions provided by BANs to their members, we hypothesize that BAN members, once they have selected an investment opportunity and undertaken the investment

decision-making process, will invest in early stage companies more of their personal wealth than non-BAN members.

We accordingly formulate our first research hypothesis:

H1a: *BAN membership has a positive impact on the share of Business Angels' personal wealth invested in each deal.*

However, given that the impact of BAN membership on BAs' investments should not necessarily lead to structural changes in both their risk aversion and the historical asset allocation choices, at least in the short run, we expect BAN members, in order to maximize the benefit provided by the network in terms of both wider and better quality investment opportunities, compensate the increase in the number of deals with a decrease in the equity stake acquired in each single investee company. Furthermore, as pointed out by Sohl (2007), the deal flow process taking place inside the angel networks involves bigger sized companies due to the higher equity capital injection potentially available than that of solo angel investors.

As such, an alternative research hypothesis to test is the following.

H1b: *BAN membership has a negative impact on the size of the BAs' equity stakes acquired in a given investee company.*

## **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 to co-invest 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 stakes 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 can benefit from better diversified investment portfolios (Harrison and Mason, 2002; Mason, Botelho and Harrison, 2013), as well as from the possibility of gaining access to risk-reducing information (Aernoudt, 2005).<sup>2</sup>

This leads to the following research hypothesis:

H2: *Both the amount invested by BAs and the size of the equity stakes in the angel-backed companies 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 companies, 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

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<sup>2</sup> Assuming that the share of their personal wealth devoted to investments in early-stage companies remains constant.

members. In fact, for BAN members, the opportunity of either co-investing or benefiting from trust, information and experience shared inside the network could generate a different and possibly weaker outcome. This leads to the following research hypothesis:

H3: *The intention of Business Angels to play a passive role in a given deal has a negative impact on their investment decisions in terms of both the amount invested and the size of their equity stakes. Such effect is stronger for non-BAN members.*

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 institutional investors – and venture capital organizations among them – 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; Erenburg et al., 2016).

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. Therefore, similarly to the well-known impact of the “hard” contractual monitoring in the private equity industry, we expect 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 role of soft monitoring for both of our sub-samples of business angels – BAN members and non-BAN members – we expect different magnitude of the causal relationship 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, rather with the need for realigning the incentives of entrepreneurs and/or executive directors of the investee companies.

We therefore hypothesize the following:

H4: *BAs soft monitoring has a positive impact on their investment decisions in terms of both the amount invested and the size of their equity stakes. This effect is stronger for non-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 effects of age, education, and previous background, which could be managerial, entrepreneurial or financial in nature (Maula et al., 2005; Sudek, 2006; Morrissette, 2007; Sudek et al., 2008; Collewaert and Manigart, 2016). Following Samuelson (1997) and Forsfalt (1999) results on intertemporal portfolio choices, it is likely that business angels risk aversion increases with age, leading to a decrease in the share of their wealth allocated to early stage ventures. In contrast, experience gained through past investments, education and personal wealth could act as counteracting factors on their capital allocation investment decisions.

Additionally, we expect the equity stake in the target company acquired by a business angel to be 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 proximity (Sudek, 2006).

Finally, consistently with the above-mentioned contributions, we consider in our model industry fixed effects as well as time fixed effects in order to take into account the role of both industry-specific features and time-varying macroeconomic variables that may affect the angels' investment practices.

Table 1 summarizes our research hypotheses and the predicted signs of both the explanatory and control variables.

INSERT TABLE 1 HERE

### 3. Sample data and variables

Our data are obtained from sequential surveys administered by the Italian Business Angels Network Association (IBAN) to its associates and other unaffiliated BAs. IBAN is the national trade association for angels and angel groups/networks.

A known problem in business angel research is estimating the “true” population. Some investors in fact, strive for anonymity creating an “invisible market” that is difficult to detect using simple survey techniques (Mason and Harrison, 2008; Landström and Mason, 2016). To circumvent this issue, IBAN adopted a strategy of integrating the “visible market” – represented by BAs and networks/groups affiliated to IBAN – with an estimation of the “invisible” component. The estimation is done by supplementing a traditional “snowball sampling” (Schuessler, 1979) – based upon the identification on people believed to be business angels through their connections with the surveyed BAN-members – with an inferential approach based on the results of a domestic research program (Private Equity Monitor PEM) aimed at identifying and analyzing private equity and venture capital investors activity. PEM collects information on PE and VC-backed companies. Focusing on the segment of venture capital-backed companies investments, IBAN researchers collected complete ownership data<sup>3</sup> from Bureau Van Dijk-AIDA and identified individual shareholders whose investment pattern was consistent with that of a business angel (Mason 2006). In particular, researchers classified as business angels shareholders that exhibited the following characteristics: repeated investor in companies new companies; non-executive role; non-majority ownership.

While acknowledging possible sample biases in the survey data, the rigorous sampling method and the repeated nature of the survey over a 7 years period appear to be strong mitigating factors that justify confidence in the sample representativeness.

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<sup>3</sup> Italy as numerous European countries, require a relatively high level of disclosure of financial and ownership information that is publicly available through government and third-parties sources such as BVD-Aida.

The survey structure is designed to collect information on the previous year's operations and is conducted through a four-steps process: at the beginning of January, IBAN forwards the survey's website link to its associates and other known or estimated BAs.<sup>4</sup> Responses are collected by the first week of March (step 1). Non-responding BAs are contacted by email and phone to solicit survey completion (step 2) while an IBAN team reviews 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 common survey technique called sequential mixed mode (Snijkers et al., 2013). Evidence shows that a mixed mode survey approach significantly improves the response rate (De Leeuw, 2005 and Dillman et al., 2009).

Survey statistics are reported in Table 2.

INSERT TABLE 2 HERE

IBAN administered 3,000 questionnaires to 929 affiliates and 2,071 non-affiliates from 2009 (2008 investment data) through 2015 (2014 investment data).

The overall response rate over the full sample period is 41.7%. The response rate is higher (about 47.2%) for the sub-sample of BAN members than for non-BAN members (39.2%) who are less likely to respond because of anonymity concerns or possible erroneous estimated identification.

Out of the 1,250 responses the researchers discarded: a) surveys with material inconsistencies and b) surveys reporting zero investments. This leads to a final sample of 439 responses reporting an aggregate of 810 deals, on 619 unique companies by 330 unique investors during the 2008 – 2014 time period. BAN membership is acceptably balanced (246 vs 209 or 56% vs. 44%), a desirable feature when conducting empirical tests on the differential role of groups and network affiliation on investment practices.

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<sup>4</sup> See the IBAN website ([www.iban.it](http://www.iban.it)) for the survey questionnaire.

In Table 3, we present the temporal and industry distribution the final sample data distinguishing BAN from non-BAN respondents through a dummy variable (*BAN\_MEMBERSHIP*) taking a value of 1 for BAN members

INSERT TABLE 3 HERE

The investments distribution is reported in Panel A. We observe a large drop in reported investments the last two years of the sample. This figure is the result of a tightening of the survey exclusion conditions highlighted above following the transition of IBAN to a new gatekeeper. 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 reported in Panel B, deals are spread out across several industries, with a not surprising dominance of “traditional” sectors for early stage investments, such as Information and Communication Technology (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. BAN membership affects industry distribution as indicated by the Pearson Chi-squared test. Non-BAN members seem to invest less in ICT companies, devoting more resources to biotech- and media-related investments.

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 portfolio 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 (Chi-squared 32.02,  $p < 0.001$ ). 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 4 reports summary statistics on participation in groups and networks and the conditional distribution of the two dependent variables: *WEALTH%*, which is the share of a BA’s financial wealth invested in all BA-like deals and *PARTICIPATION%*, which is computed as the amount invested in a venture as a share of the investee net-asset-value.

INSERT TABLE 4 HERE

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 24% ( $p < 0.01$ ) 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 significant difference in medians (14 vs. 8). This difference becomes 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 however are significant which suggests the presence of a few extremely small values in the BAN members sub-sample.

Table 5 describes the proxies used to operationalize the main dependent variables and controls, and presents the summary statistics.

INSERT TABLE 5 HERE

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 9 or more investors back 25% of the deals. This behavior is sharply different from

that exhibited by formal venture capitalists, which on average syndicate their deals with a very limited numbers of additional investors due to coordination problems and conflicts of interest characterizing large syndicates (Lerner, 1994; Manigart et al., 2006; Tian, 2012).

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 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 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 background outside the portfolio companies. Responses identify managerial and entrepreneurial backgrounds 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 dependent variables.

Looking at firm-specific control variables, we obtain *NET\_ASSET\_VALUE* from a survey item where respondents were required to indicate the net asset value at the time of (but prior to) their investment. Firms fit in the profile of newly funded companies with average assets of approximately 1.4 m/euro. Given the existence of a few, very large outliers, we winsorized the data at the 95% level. The minimum value of 20 thousand euro, 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. Our statistics are consistent with previous studies on business angels activity in Italy (Croce et al., 2016) and other countries, such as the US (DeGennaro and Wyr, 2012; Lerner et al., 2016), Belgium (Collewaert and Manigart, 2016), Canada (Carpentier and Suret, 2015), China (Li et al., 2014) and Finland (Lahti, 2011).

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 *WEALTH%* and *PARTICIPATION%* 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, a condition of operating as a business angel in the United States. However, this concern is mitigated by the fact that there is no specific minimum wealth requirement in Italian – and, to a similar extent, European – regulation. Additionally, the mean wealth is higher at 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. These figures are consistent with the reported values in individual wealth and deal size of other empirical analyses investigating BAs in different countries US (Collewaert and Manigart, 2016; De Gennaro and Dwyer, 2014; EBAN, 2015; Kerr et al., 2014; Lahti, 2011; Mason, Harrison and Botelho, 2013; Sohl, 2006; Wiltbank et al., 2009).

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 controls 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 (*INDUSTRY\_PBV*) 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*<sup>5</sup>; second, we compute the Huber-White heteroskedasticity-consistent standard errors.

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

$$WEALTH\% = f (BAN\_MEMBERSHIP, CO-INVESTORS, NET\_ASSET\_VALUE, SEED, FOREIGN, INDUSTRY\ PBV, NET\ CAPEX/SALES, YEAR_t, INDUSTRY_t) \quad (1)$$

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

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<sup>5</sup> Because experience may take a value of 0, the transformation is done as  $\ln(\text{experience}+1)$ . 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.

$$\begin{aligned}
WEALTH\% = f (BAN\_MEMBERSHIP, CO-INVESTORS, PASSIVE\_INVESTOR, SOFT- \\
MONITORING, AGE, EDUCATION, WEALTH, ENTREPRENEUR, MANAGER, EXPERIENCE, \\
NET\_ASSET\_VALUE, SEED, FOREIGN, INDUSTRY PBV, NET CAPEX/SALES, YEAR_t, \\
INDUSTRY_i)
\end{aligned}
\tag{2}$$

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

$$PARTICIPATION\% = f (BAN\_MEMBERSHIP, CO-INVESTORS, NET\_ASSET\_VALUE, SEED, FOREIGN, INDUSTRY\ PBV, NET\ CAPEX/SALES, YEAR_{i,t}, INDUSTRY_{i,t}) \quad (3)$$

Equation (4) adds to the previous model investor-level explanatory variables.

$$\begin{aligned}
PARTICIPATION\% = f ( & BAN\_MEMBERSHIP, CO-INVESTORS, PASSIVE\_INVESTOR, \\
& SOFT-MONITORING, AGE, EDUCATION, WEALTH, ENTREPRENEUR, MANAGER, \\
& EXPERIENCE, NET\_ASSET\_VALUE, SEED, FOREIGN, INDUSTRY PBV, NET CAPEX/SALES, \\
& YEAR_i, INDUSTRY_i)
\end{aligned}
\tag{4}$$

Table 6 presents the results of the model.

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.

### **4.3 Endogeneity and robustness**

Our results thus far show that BAN membership affects business angels' investment practices. These relations are robust to time and industry fixed-effects that control for any time-invariant and industry-specific variables, and to a host of controls that have been previously identified by the literature to determine capital investments by business angels. However, it is possible that our results are driven by endogeneity in the main regressor, BAN membership, in the form of both reverse causality and/or simultaneity. Given the absence of natural experiments and the survey nature of the data, the menu of possible tests to be run is somehow limited. However, we identify in the survey two additional variables that are plausibly exogenous to the amount invested, except through their relation to our variables of interest, BAN membership that therefore allow to run two-stage least square instrumental variable regressions. Specifically, we select the following variables: the presence of a given investor in

previous surveys and the and the number of investments evaluated (but not necessarily financed) by the respondent prior to the current survey.

The rationale for the two instruments is that a very active angel (i.e. one that responded to past prior surveys and one that evaluated many projects) is more likely to appreciate the benefits of BAN membership and eventually join the network. Similarly, the membership in prior years is likely exogenous to the investment decision in the current year as it is dubious that an angel decides to join a BAN in a given year anticipating a possible investment two or more years in the future.

INSERT TABLE 8 HERE

The two instruments are uncorrelated with each other ( $\rho=0.04$ ) and the first-stage regression results reported in Table 8 support the instrument choice. The two instruments are strongly and positively correlated with BAN membership. The regressors are correlated with the possibly endogenous variable as shown by the LM test that strongly reject the null of no correlation. The weak identification test shows an F-value of 31.10 which compares favorably with the Stock-Yogo 10% critical value of 19.93 suggesting that instruments are not weak.

The coefficients for the second-stage regression are consistent with the OLS results for both variables in terms of significance and sign and are larger in terms of magnitude. Interestingly enough, the Durbin-Wu-Hausman test rejects the hypothesis that BAN membership is endogenous.

Overall, these results indicate that our main results are robust and our conclusions on the effects of BAN membership plausible.

## **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 810 investments 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 have increasingly supported the role of BAs in stimulating entrepreneurship as a crucial driver of economic growth, promoting 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.

Our contribution opens up numerous avenues of additional research. First, obtaining more specific data on BAN and Groups may help in highlighting possible variations in the effect of these different forms of association on angels' investment practices. Second, a further major area of improvement is represented by the possibility to extend the analysis at an international level through worldwide-based BA samples. Third, the relative role of angels as complement or substitutes to venture capital (Hellman et al. 2015) could be tested by exploring the longer term financing history of angel, BAN and AG-backed companies.

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Table 1

Dependent, independent and control variables predicted signs

This table reports predicted signs for the two main dependent variables and the set of independent variables. The two main dependent variables are *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 .

	<b>Explanatory Variables</b>			
	<i>Participation%</i>	<i>Wealth%</i>		
	Whole sample	Whole sample	BAN members	Non-BAN members
BAN_membership	-	+		
Co-investors	-	-	-	-
Passive_Investor	-	-	+/-	-
Soft-Monitoring	+	+	+/-	+
<b>Angel Specific Controls</b>				
Age	-	-		
Education	+/-	+/-		
Wealth	+/-	+/-		
Experience	+	+		
Entrepreneurial Background	+/-	+/-		
Managerial Background	+/-	+/-		
<b>Firm Specific Controls</b>				
Size	-	+		
Life Cycle	-	-		
Foreign Location	-	-		
<b>Industry Specific Controls</b>				
Market Industry Capitalization	+/-	+/-		
Industry Capital Intensity	+			

Table 2

## IBAN Survey - Sample coverage and response rates

This table report sample coverage and response rates for our survey data. The first column reports the number of surveys administered over the period 2008-2014. The second column reports the number of surveys received after the follow-up rounds described in section 3; the third column reports the number of surveys that have been kept after discarding: a) surveys with material inconsistencies and b) surveys reporting zero investments; the fourth column indicates the number of deals reported by the survey respondents; given that the same investor can be surveyed multiple times and the same companies can be invested by more than one angel in the fifth and sixth column we finally report the number of unique investors and unique companies.

	<b>Surveys sent</b>	<b>Surveys received</b>	<b>Final surveys sample</b>	<b># of deals reported</b>	<b>Unique investors</b>	<b>Unique companies</b>
<b>Overall sample</b>	3,000	1,250 (41.7%)	439 (14.6%)	810	330	619
<b>BAN Members</b>	929	438 (47.2%)	246 (26.5%)	438	150	334
<b>Non-BAN members</b>	2,071	812 (39.2%)	209 (10.1%)	372	180	285

Table 3

## Sample distribution

This table reports summary statistics of the investment sample. Panel A reports the year distribution of the investments for the overall sample and by BAN membership status. Panel B reports the industry distribution of the investments for the overall sample and by BAN membership status. Panel C reports the portfolio size distribution of the angels included in the sample.

PANEL A – Year 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%
$\chi^2$			32.08***

  

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%
$\chi^2$ (portfolio>5)			32.02***

Table 4

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 the individual business angel's personal wealth; *Participation%* is the amount of capital invested by an individual business angel expressed 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 = <i>Wealth%</i>	<b>Total sample</b>	<b>BAN members</b>	<b>Non-BAN members</b>
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 = <i>Participation%</i>			
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 5

## 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. The variables Co-investors, Wealth and Net asset Value are winsorized at the 95% level.

	Description	Obs.	Mean	Std.Dev.	Min	Max	Dummy=1 percentage
<i>BAN_membership</i>	Dummy =1 if the BA is a BAN member	810	-	-	-	-	54.1
<i>Co-investors</i>	Number of co-investors	809	4.3	4.99	0	15	-
<i>Passive Investor</i>	Dummy =1 if the investment is exclusively driven by capital gain motivations	668	-	-	-	-	22
<i>Monitoring</i>	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	-
<b>Angel specific controls</b>							
<i>Age</i>	Age of the BA	668	48.32	9.4	28	71	-
<i>Education</i>	Dummy = 1 if the BA holds a high school diploma or a lower educational qualification	668	-	-	-	-	6.7
<i>Wealth (in euro)</i>	BAs' financial wealth in the year of the investment	669	1,480,682	1,515,290	250,000	7,500,000	-
<i>Entrepreneur</i>	Dummy =1 in case of prevalent working occupation as entrepreneur (excluding his/her involvement in the invested companies)	668	-	-	-	-	37.7
<i>Manager</i>	Dummy =1 in case of prevalent working occupation as manager (excluding his/her involvement in the invested companies)	668	-	-	-	-	16.8
<i>Experience</i>	Number of BA' investments in lifetime	668	6.36	4.01	0	26	-
<b>Firm specific controls</b>							
<i>Net_Asset_Value (in euro/th.)</i>	Enterprises' net asset value in the year of the BA's investment (pre-money)	806	1,389.67	2,281.66	20.08	8,928.57	-
<i>Seed</i>	Dummy = 1 if the BA has invested in a seed enterprise	810	-	-	-	-	35.7
<i>Foreign</i>	Dummy = 1 if the BA has invested in a foreign enterprise	711	-	-	-	-	12.1
<b>Industry controls</b>							
<i>Industry PBV</i>	Industry price-to-book value, in the investment year	810	3.05	1.36	0.71	8.62	-
<i>Net capex/Sales</i>	Industry net capital assets to sales, in the investment year	810	0.8	3.18	-4.47	22.96	-

Table 6

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-backed 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). Huber-White heteroskedasticity-consistent standard errors are reported in parentheses 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** (0.05)	0.155*** (0.05)		
Co-investors	-0.021*** (0.00)	-0.017*** (0.01)	-0.035*** (0.01)	-0.007 (0.01)
Passive Investor		-0.064 (1.08)	-0.023 (0.25)	-0.163** (2.08)
Soft-Monitoring		0.054* (1.92)	-0.053 (1.62)	0.154*** (4.60)
Age		-0.015*** (5.70)	-0.011*** (3.02)	-0.018*** (3.91)
Education		0.031 (0.40)	0.19 (1.56)	-0.213** (2.02)
Wealth		-0.062** (2.09)	-0.044 (1.00)	-0.114*** (3.21)
Experience		0.041*** (6.57)	0.059*** (5.82)	0.030*** (3.51)
Entrepreneur		0.098* (1.90)	0.053 (0.72)	0.158** (2.37)
Manager		0.071 (1.17)	0.300*** (2.81)	-0.098 (1.36)
Net_Asset_Value	0.000 (0.02)	0.004 (0.02)	-0.013 (0.03)	0.031 (0.02)
Seed	0.021 (0.06)	-0.074 (0.06)	-0.038 (0.07)	-0.170** (0.08)
Foreign	-0.009 (0.08)	-0.007 (0.07)	0.018 (0.12)	0.041 (0.09)
Industry P/BV	0.039 (0.04)	0.028 (0.04)	0.037 (0.04)	-0.004 (0.05)
Capital Intensity	0.006 (0.01)	0.011 (0.01)	-0.001 (0.01)	0.028 (0.02)
Intercept	1.966*** (0.27)	2.826*** (0.34)	2.846*** (0.57)	3.234*** (0.43)
YEAR F.E	YES	YES	YES	YES
INDUSTRY F.E.	YES	YES	YES	YES
R <sup>2</sup>	0.14	0.27	0.35	0.37
Observations	570	569	292	277

Table 7

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). Huber-White heteroskedasticity-consistent standard errors are reported in parentheses 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** (0.07)	-0.139* (0.07)		
Co-investors	-0.089*** (0.01)	-0.067*** (0.01)	-0.075*** (0.01)	-0.069*** (0.01)
Passive Investor		-0.186** (0.08)	-0.262** (0.13)	-0.264*** (0.09)
Soft-Monitoring		0.214*** (0.04)	0.116** (0.05)	0.287*** (0.06)
Age		-0.009** (0.00)	-0.007 (0.01)	-0.014* (0.01)
Education		0.340** (0.13)	0.536*** (0.19)	0.136 (0.18)
Wealth		0.044 (0.04)	0.053 (0.05)	0.084 (0.06)
Experience		0.019** (0.01)	0.032** (0.01)	0.017 (0.02)
Entrepreneur		0.356*** (0.08)	0.350*** (0.10)	0.348*** (0.11)
Manager		0.335*** (0.10)	0.547*** (0.17)	0.228* (0.13)
Net_Asset_Value	-0.226*** (0.03)	-0.250*** (0.02)	-0.268*** (0.04)	-0.211*** (0.03)
Seed	-0.06 (0.07)	-0.135* (0.08)	-0.058 (0.11)	-0.212* (0.12)
Foreign	-0.342*** (0.10)	-0.321*** (0.11)	-0.292* (0.17)	-0.398** (0.15)
Industry P/BV	-0.042 (0.06)	-0.052 (0.06)	-0.033 (0.07)	-0.098 (0.10)
Capital Intensity	0.023 (0.02)	0.024 (0.02)	0.047* (0.03)	0 (0.02)
Intercept	4.203*** (0.33)	3.675*** (0.45)	4.036*** (0.66)	3.373*** (0.64)
YEAR F.E	YES	YES	YES	YES
INDUSTRY F.E.	YES	YES	YES	YES
R <sup>2</sup>	0.49	0.56	0.51	0.67
Observations	700	569	292	277

Table 8  
Instrumental Variable regression

In this table we present results of an Instrumental Variable regression to control for endogeneity where we instrument the potentially endogenous variables BAN membership with two variables: "Past surveys" that captures the presence of a given investor in previous surveys and "Past projects" that captures the number of investments evaluated (but not necessarily financed) by the respondent prior to the current survey. Column 1 reports results for the first-stage regression, Column 2 for the Instrumental Variable regression. The dependent variable in the first stage regression is BAN membership, while the dependent variable in the IV regression are tables 6 and 7 dependent variables (Wealth % and participation%) respectively. Both first and second stage regressions include angel-specific, firm-specific and industry-specific controls described in Table 2. All regressions include year and industry fixed-effects. Heteroscedasticity-robust standard errors are reported in parentheses. Durbin-Wu-Hausman test p-values in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	Wealth %		Participation%	
	First stage regression	IV regression	First stage regression	IV regression
BAN Membership		0.362** (0.16)		-0.356* (0.20)
Past surveys	0.359*** (0.05)		0.359*** (0.05)	
Past projects	0.024** (0.01)		0.024*** (0.01)	
Coinvestor	-0.013*** (0.00)	-0.017*** (0.01)	-0.013*** (0.00)	-0.056*** 0.01
Passive Investor	-0.082 (0.05)	-0.042 (0.06)	-0.082 (0.05)	-0.307*** (0.09)
Soft-Monitoring	0.066*** (0.02)	-0.013 (0.03)	0.066*** (0.02)	0.221*** (0.04)
ANGEL-SPECIFIC CONTROLS	YES	YES	YES	YES
FIRM-SPECIFIC CONTROLS	YES	YES	YES	YES
INDUSTRY SPECIFIC CONTROLS	YES	YES	YES	YES
YEAR F.E.	YES	YES	YES	YES
INDUSTRY F.E.	YES	YES	YES	YES
N	431	431	431	431
Underidentification test				
(Kleibergen-Paap LM statistic)	57.75***		57.75***	
Weak identification test				
Cragg Donald Wald F-test	31.10		31.10	
Stock-Yogo 10% critical value	19.93		19.93	
Durbin Wu Hausman endogeneity test	(1.68)		(0.86)	