Gazelles, ponies, and the impact of business angels' characteristics on firm growth

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Abstract

This study investigates whether the individual attributes and investment approaches of business angels (BAs) affect the growth of funded companies by distinguishing between two firm types: gazelles and ponies. We draw upon an original dataset comprising 265 small Italian firms (49 that received BA financing and 216 in the propensity score matched control group). Building on insights drawn from the resource-based view and absorptive capacity theory, we find that BAs with entrepreneurial experience positively affect the sales growth of gazelles only. Moreover, the role of BAs' investment experience and coaching in the growth rates of both gazelles and ponies is insignificant. Interestingly, monitoring helps boost ponies' performance but stifles growth among gazelles.

Keywords: gazelle, business angel, firm growth

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1. Introduction

Business angels (BAs) play a key role in the provision of external finance for new ventures (Coveney and Moore, 1998; OECD, 2011; Shane, 2012). Due to their small size and early stage of development, these firms typically lack internally generated cash flows, making the receipt of external funding very important for their future prospects. Capital endowment constitutes a valuable buffer against random shocks and allows ventures to accelerate their growth and increase their chances of survival (Cooper et al., 1994), which is especially crucial for new technology-based ventures (Carpenter and Petersen, 2002).

Along with equity injection, BAs provide non-monetary contributions to invested ventures, including industry knowledge, managerial experience, mentoring, and access to personal networks (Avdeitichikova and Landström, 2016; Landström, 1993; Politis, 2008). Research on the peculiar characteristics of BAs, the rationales behind their investment decisions, and their distinctive attitudes in terms of objectives, time horizons, and screening practices has been at the heart of the BA literature (see Tenca et al. [2018] for a recent review). However, the literature has treated BAs as a homogeneous category and has done little to explore how these equity investors differ in terms of personal traits, risk attitudes, investment strategies, portfolio management, and post-investment involvement (Croce et al., 2017, 2019; Drover et al., 2017; Freear et al., 1994; Sorheim and Landström, 2001; Wallmeroth et al., 2018; White and Dumay, 2017).

Despite the central role of BAs' characteristics and abilities in nurturing new ventures, empirical research has so far fallen short of establishing a solid research base in this domain. The opacity of the market and the difficulty of accessing data on a large scale have limited the literature's exploration of the interplay between BAs' personal traits, behaviors, modus operandi, and the performance or pre-money evaluation of invested ventures (Bonnet et al., 2013; Bonini et al., 2019; Collewaert and Manigart, 2016; Croce et al., 2018; Wiltbank, 2005). Studies have also failed to scrutinize the profile of the ventures BAs invest in and the extent to which investors can boost the performances of target firms in different ways according to their different ex-ante growth patterns.

A large body of the entrepreneurship literature has explored the evolution, competition dynamics, and economic impact of a set of ventures showing distinct growth patterns, known as "gazelles." This concept was introduced by Birch et al. (1994) to identify fast-growing firms with the potential to exert a disproportionate impact on a country's economic growth (Stangler, 2010). However, there is no

formal agreement on which growth pace fast-growing firms should exhibit to be considered gazelles[2] (Acs et al., 2008; Henrekson and Johansson, 2010; Nightingale and Coad, 2013). Unicorns (companies with an estimated value in excess of $1 billion) arguably constitute a visible subset of gazelles because they exhibit steep growth paths that provide them easier and faster access to capital markets. While playing a major role in stimulating job creation and economic growth, gazelles make up only a small fraction of the start-up population.[3] Evidence has also recently emerged of a robust group of companies, referred to as "ponies," with relatively slow growth rates but high resilience, as they appear to survive for longer periods (The Economist, 2019).[4]

Using data obtained from sequential surveys administered by the Italian Business Angels Network Association (IBAN), we examine whether BAs' individual attributes and investment approaches affect the growth of funded start-ups with different growth patterns at the investment date. We contribute to the entrepreneurial finance literature in two main ways. First, we explore what drives the growth of BA-backed ventures by diving deeper into the investors' human capital characteristics (i.e., entrepreneurial and investment experience) and investment practices (i.e., monitoring and coaching). As mentioned, this aspect has received inadequate attention from the scientific literature. We draw from resource-based theory to empirically illustrate that firms' exposure to external knowledge (derived in this study from informal investors) can be instrumental in facilitating their growth.

Second, we investigate to what extent BAs may enhance the growth of their target investments considering different categories of ventures. We build on the insights of the absorptive capacity literature (Cohen and Levinthal, 1990; Kostopoulos et al., 2011; Todorova and Durisin, 2007; Zahra and George, 2002) to explore whether distinctive types of ventures engage in knowledge acquisition, assimilation, and exploitation differently. Specifically, the value and growth opportunities created by knowledge inflows from informal investors are assumed to be exploited differently by two types of firms: gazelles and ponies.

Gazelles incorporate substantial risks that may need special handling by BAs, and may require distinctive investor attributes to manage their accelerated growth. Different funding approaches and individual traits could be necessary to invest in ponies, which arguably show less risky configurations

[2] The OECD recently proposed using the term to refer to firms less than five years old and with an average employment growth rate exceeding 20% annually over a three-year period and with 10 or more employees at the beginning of the period (OECD, 2007).

[3] Pugsley et al. (2018) estimate that gazelles do not exceed 5% of new ventures, with unicorns being truly occasional outliers.

[4] See "The Trouble with Tech Unicorns," *The Economist* 4/17/2019.

but need the implementation of business practices that can be sustained over a prolonged period. We define gazelles as young ventures operating in a high-tech or knowledge-intensive sector and showing high sales growth in the years before the financing occurs. Small and young companies experiencing low sales growth over time are instead classified as ponies. The identification of gazelles and ponies relies on an ex-ante classification of sample firms based on their performance at the time of financing, a condition that, in principle, is observable by the investors. Clearly, the difficulty in disentangling the effects of selection and treatment poses a problem of endogeneity, which we try to mitigate by using a propensity score matched (PSM) control sample of non-BA backed ventures.

We use an original dataset comprising 49 companies that received, with no ambiguity, BA financing in Italy and a PSM control sample of 216 non BA-backed firms to find the presence of significant correlations between BAs' characteristics and investment approaches and the growth rates of invested companies, with diversified patterns for gazelles and ponies. Our overall findings support the intuition that BAs shape start-ups' future growth paths differently across different categories of firms based on their distinctive personal traits and investment strategies. In particular, we find that BAs with entrepreneurial experience affect the sales growth of gazelles positively but that this does not happen with ponies. We also find that the roles played by BAs' investment experience and coaching in the growth rates of both gazelles and ponies are insignificant. Finally, BA monitoring helps boost the performance of ponies but stifles the growth of gazelles.

The remainder of this paper is structured as follows. Section 2 reviews the literature on the linkage between angel investing and firm performances. Section 3 develops our research hypotheses. Section 4 describes the study's data-collection process. Section 5 explains our methodology, and section 6 presents the results. Finally, concluding remarks close the paper in section 7.

2. Performance of angel investments

It is widely acknowledged that BAs play a crucial role in the promotion of economic growth and entrepreneurship, helping to fill the "funding gap" between the demand and supply of early-stage equity capital (Harrison and Mason, 2000; Wiltbank et al., 2009). Despite the important role BAs play in the economy, little is known about the performance of their investments. One key reason for this dearth of empirical evidence is the opaqueness of the BA market (Harrison and Mason, 2008). Other reasons include the limited availability of accounting information associated with early-stage businesses and the narrow representativeness of the samples based on surveys (Bessière et al., 2019;

Bonini et al., 2019; Lerner et al., 2018). As a result, only a few recent studies have specifically investigated the performance of angel-backed companies, using different performance metrics (Bonnet et al., 2013; Bonini et al., 2019; Croce et al., 2018; Kerr et al., 2014; Levratto et al., 2018). Bonnet et al. (2013) examine the growth patterns of 222 BA-backed investments in France and find strong growth rates when BAs and professional venture capitalists (VCs) co-invest simultaneously. Bonini et al. (2019) develop a performance index that dynamically captures changes in the quality profile of angel-backed companies based on various combinations of revenues, asset values, and income. The authors find that the performance and survival of angel-backed companies are both positively affected by deal syndication and angels' involvement in the funded ventures. By contrast, non-contractual based monitoring and a fragmented equity infusion are found to exert a negative impact on the performance of funded ventures. Kerr et al. (2014) analyze data from two well-known US angel investment groups covering 2001 to 2006 and find that start-ups that receive angel financing improve their likelihood of survival and successful exit (IPO or acquisition), as well as their employment levels, while mixed results are found regarding superior subsequent follow-on financing. Levratto et al. (2018) explore a dataset comprising 432 angel-backed French companies and compare it to two selected control groups. The performance (expressed as growth in sales, employment, and tangible capital assets) of BA-backed firms is found to be superior when the comparison is done with the random sample, while it is identical or worse when compared to a sample composed of similar companies. Croce et al. (2018) examine the extent to which BAs' capabilities and investment behavior affect several measures of interim and ultimate start-up success. Their main results indicate that BA experience matters: while experience in early-stage investments positively affects follow-on rounds of financing and subsequent VC financing, experience in later-stage deals is associated with the probability of a successful exit. Moreover, the co-investment between a VC and a BA or the sequential investment of a VC after a BA leads to incremental funding amounts and an improved likelihood of ultimate success, respectively.

Other works have looked at BAs' contribution to investee ventures in comparison with that of VCs. Among these studies, Bruton et al. (2010) and Chahine et al. (2007) show that BAs have a significant value-enhancing effect on IPO firm performance relative to VC investors. Contrasting evidence is offered by Johnson and Sohl (2012), who find that BA-backed IPO firms do not perform better than non-BA-backed IPO firms but that this result does not hold if VC investments are considered.

3. Hypotheses

Motivated by the resource-based perspective, a conspicuous body of empirical entrepreneurship studies have found a clear linkage between entrepreneurs' human capital characteristics (e.g., high education attainment, experience, and social connections) and venture growth and survival (Bosma et al., 2004; Colombo and Grilli, 2005; 2010; Cooper et al., 1994; Gimeno et al., 1997). Adherents of the resource-based view agree that knowledge generation and transfer is the most strategically important resource and is essential for sustaining a firm's competitive advantage (Conner and Prahalad, 1996; Spender, 1996). The possession of valuable and distinctive capabilities at the firm level ensures superior growth because of the enhanced opportunities it can provide firms to implement value-enhancing strategies and address competitive pressures (Barney, 1991). However, the potential benefits of external knowledge inflows in terms of growth cannot be taken for granted and might diverge among different organizational forms. Of particular importance is a firm's ability to identify, assimilate, and exploit the external knowledge, known as "absorptive capacity" (Cohen and Levinthal, 1990). The presence of absorptive capacity is perceived as the essential condition for channeling external knowledge into anything of value to the firm (Kostopoulos et al., 2011; Todorova and Durisin, 2007; Zahra and George, 2002). It has not been made clear in the entrepreneurial finance literature which categories of firms receiving BA financing are more responsive to the transfer and processing of knowledge from informal investors.

In this section, we draw on the resource-based view to gain insight into the drivers of growth for BA-backed companies, allowing for differences between gazelles and ponies regarding the use of external knowledge inflows. We explore these aspects by considering BAs' distinctive human capital endowment and investment practices.

3.1. Human capital endowment

3.1.1 Investment experience

One trait that characterizes BAs' human capital endowment is the know-how they accumulate through their investments, which often reflects a non-codified knowledge of the industry, technologies, and people (Cooper et al., 1994). The BAs with investment experience are more skilled at discerning the potential of business opportunities and managing the investment process until exit (Croce et al., 2018). Accumulated investment knowledge helps to compensate for a lack of competences and other operational weaknesses of entrepreneurial ventures. Thus, BAs with

investment experience are better able to manage the overall investment process, leading to a greater capability to orientate the growth path of funded ventures (Croce et al., 2018; Van Osnabrugge, 2000).

Growth will be boosted to the extent that BAs have investment experience. However, gazelles and ponies might differ in their receptiveness to knowledge transfer from informal investors. We argue that a greater effect is foreseen for gazelles, which are in a better position to absorb new knowledge, face competition, and address technological challenges. Entrepreneurs running gazelles are better qualified to assimilate the wisdom and know-how that BAs provide. The fast growth of their businesses makes them more prone to overcome the natural tendency to rely on existing firm knowledge (Lee and Meyer-Doyle, 2017). Instead, we expect the absorption of external knowledge to be lower for ponies, which are less dynamic in identifying and capturing opportunities that are inherently uncertain. Consistent with these arguments, we propose the following:

H1. Greater BAs' investment experience favors the growth of gazelles more than that of ponies

3.1.1 Entrepreneurial experience

Entrepreneurial experience forges BAs' attitudes and mindsets, which affects how the cognition, values, and behaviors BAs have developed during their entrepreneurial past transfer to the invested start-ups. BAs with first-hand entrepreneurial experience use experience-based schemas, often based on intuitions (i.e., "gut feel"; Huang and Pearce, 2015; Huang, 2018), to interpret and make sense of reality (Croce et al., 2019). A greater amount of overconfidence and over-optimism is also found to be associated with BAs with an entrepreneurial background (Busenitz and Barney, 1997; Zhang and Cueto, 2017). The intuitive decision-making process coupled with a fair degree of overconfidence can, in turn, affect their strategic decisions and investment portfolio management (Coté, 2011; Kish-Gephart and Campbell, 2015). Entrepreneurial experience is composed mostly of tacit knowledge, rather than explicit knowledge, acquired by and stored within entrepreneurs with different appropriability and transferability dynamics.

It is reasonable to assume that BAs with entrepreneurial experience contribute more effectively to the growth path of investee companies. The fact that both investors and entrepreneurs share a common background and certain homogeneous social connections narrows their traditionally wide information gap. Entrepreneurial experience facilitates the transfer of knowledge within

entrepreneurs' minds. Again, not all entrepreneurs are predisposed to process and store such information, or to share and cause it to be referenced and used by employees.

We argue that BAs with entrepreneurial experience positively affect the growth of invested ventures, and that this effect is greater for gazelles. Gazelles are guided by a strong attitude to risk taking and opportunity capture, which dictates their approach to managing the complexity of entrepreneurial decisions. It follows that gazelles may be better positioned to take advantage of external knowledge than ponies, whose entrepreneurs may be less permeable to knowledge assimilation. We thus put forward our second hypothesis:

H2. Greater BAs' entrepreneurial experience favors the growth of gazelles more than that of ponies

3.2. Investment practices

3.2.1. Monitoring

Like VCs, BAs are concerned with agency risks that may arise when investing in small, informationally opaque and risky ventures. Therefore, they set up the appropriate monitoring mechanisms that, though less formal than those adopted by VCs, respond to the same need: to limit the incentives for entrepreneurs or management teams to pursue opportunistic behavior (Bruton et al., 2010; Van Osnabrugge 2000). Indeed, it has been suggested that BAs are even more concerned with agency risks than VCs, which attach more importance to market risk (Fiet, 1995). To manage and alleviate agency problems, BAs rely primarily on active monitoring through relational governance (Ehrlich et al., 1994) and staging (Croce et al., 2018). Relational governance involves the employment of post-investment mechanisms of control, which have been called "soft monitoring" (Bonini et al., 2019) to distinguish them from the formal and highly expensive contracts and contingent financing mechanisms adopted by formal investors (Kaplan and Stromberg, 2003). Typically, BAs monitor their funded ventures through the development of close relationships with the entrepreneur, attendance at board meetings, and the provision of value-adding services. Relational governance mechanisms imply a more patient risk management attitude (Croce et al., 2019), lengthening the timing of investment engagement and divestment strategies.

Monitoring mechanisms have been generally considered powerful tools which with to learn about the quality and potential of a venture over time, thus reducing the potential opportunistic behaviors that might lead to a suboptimal performance. However, a close monitoring might damage the relationships between the two parties, and this is especially true for angel investing, where the

"trust nexus" between investors and entrepreneurs is at the heart of investment dynamics. Chua and Wu (2012) and Bammens and Collewaert (2014) show that a tightening of the monitoring exerted by BAs on invested ventures negatively impacts their mutual relationships, in turn worsening their performance. An additional disadvantage associated with monitoring mechanisms is the risk that the entrepreneur will "window dress" to secure the next round of financing from the investor, a practice which is relevant to staging (Croce et al., 2018). These potential detrimental effects, which may affect the relationship between investors and new ventures, are deemed to negatively impact firm performance. Therefore, monitoring's effect on funded firms is not yet clear.

We argue that the impact of monitoring might differ between gazelles and ponies. High-tech and knowledge-based rapid-growth entrepreneurial firms are typically more reluctant to disclose information to investors, since this might leak out to competitors (Bhattacharya and Ritter, 1983). Monitoring is likely to be less effective in this context, where informational frictions between investors and entrepreneurs may be particularly severe. Gazelles may choose to opt for risky investment projects and follow an independent and unconstrained path in order to grasp innovative opportunities as well as those whose future revenues are difficult to predict and that may offset investors' expectations. Moreover, gazelles' greater absorptive capacity acts as a conduit for knowledge transfer within the firm; this fosters growth, so that the monitoring instrument loses its potential and might even be detrimental. It follows that tight monitoring might restrain entrepreneurial risk taking in gazelles, causing it to stifle rather than enhance firm growth. Contrariwise, in less fast-growing innovative and knowledge-based environments, monitoring may act as an effective tool for facilitating firm growth. Given ponies' weaker ability to identify, assimilate, and apply new external knowledge, tight monitoring by informal investors is deemed to have a positive effect on firms' growth patterns. Thus, we propose the following:

H3. Greater monitoring by BAs favors the growth of ponies more than that of gazelles

3.2.2. Coaching

The resource-based approach has been applied to entrepreneurial finance to explain the value-enhancing contribution of formal and informal investors to firms, which gives them access to a larger set of opportunities (e.g., Bammens and Collewaert, 2014; Colombo and Grilli, 2010). This stream of

literature posits that ventures' performance can be partially explained by their "hands on" approach to management. However, while researchers have devoted a great deal of attention to the link between mentoring/coaching and investees' growth and survival in the VC domain, few studies have dealt with these issues in the angel market (Bonini et al., 2019; Croce et al., 2018; Wirtz et al., 2019). BAs provide a number of coaching services to invested ventures, ranging from advice to networking and assistance in everyday operations. BAs perform an important coaching function in fields where funded firms typically lack internal capabilities, thus contributing to their managerial "professionalization" (Harrison and Mason, 2000; Lindsay, 2004). Their coaching leads to the reconfiguration of target firms' distinctive capabilities and facilitates their access to leading competences that are typically out of their reach (Politis, 2008; Fili and Grünberg, 2014). In principle, this should boost the growth of invested firms. However, we argue that the effects may differ between gazelles and ponies. While ponies are expected to benefit from BAs' active involvement, this could harm gazelles' firm growth. This expectation follows several lines of reasoning.

First, BAs' coaching function involves the application and integration of explicit knowledge put at the service of the firm, as well as the sharing of strategic firm-level information. While this does not appear to be a hurdle for ponies, we expect that the founders of gazelles may be reluctant to disclose sensitive information to BAs because they operate in markets characterized by rapid technological change and harsh competitive dynamics.

Second, gazelles have already shown an autonomous growth capability before the investment date and do not require hands-on intervention in their daily operations. Their greater capacity to absorb BAs' tacit knowledge means that they are less in need of the explicit knowledge that informal investors can convey through their consultancy services. They already possess the ability to assimilate and transform external tacit knowledge flows into strategic choices that will benefit the firm. Due to their limited absorptive capacity, ponies are more in need of informal investors' consultancy.

Third, the advantages of external investors' active involvement are offset by the time and resources needed to manage close relationships with them. Coordination costs are particularly severe in contexts characterized by rapid technological change, where firms need to take decisions quickly in order to seize fast-growing and innovative opportunities. We expect that these problems might be more severe for gazelles than for ponies. We thus propose the following:

H3. Greater coaching by BAs favors the growth of ponies more than that of gazelles

4. Data

Our data are obtained from sequential surveys administered by the Italian Business Angels Network Association (IBAN) to its associates and other unaffiliated BAs beginning in 2007. The IBAN is Italy's national trade association for angels and angel groups/networks. A full description of the survey procedure is reported in Bonini et al. (2019).[5]

From a starting sample of 690 deals, we excluded a number of observations because the name of the target company was not specified or was specified incorrectly, preventing an unequivocal identification. This reduced the sample to 614 deals in 419 start-ups that received BA financing beginning in 2008. We then performed a manual search on Orbis to collect data from financial statements (available from 2009 to 2016). We found 334 firms (out of 419) and obtained complete accounting information for 298 (71.12% of the initial identified companies). Since our aim was to explore the role of BAs in influencing companies' performance, we required accounting information in both the pre- and post-BA investment period. Therefore, we were left with 123 companies for which we had at least one observation before and after the entry of the BA in the equity capital.

To isolate the net differential contribution (if any) of BAs across the two samples of companies (i.e., gazelles and ponies), we needed to compare the performance of BA-backed companies with that of a matched control group. Accordingly, we constructed a control group comprising entrepreneurial ventures that did not receive BA financing. The following methodology was employed to identify the control group. First, we consulted Orbis and selected a list of 122,096 non-BA-backed companies operating in Italy. Second, we deleted from this randomly selected group those firms for which at least four consecutive years of accounting data were not available, which reduced the control group to 15,097 non-BA-backed firms. Third, we extracted a matched sample to control for the selection on observables (i.e., the differences in sample composition before the entry of the BA investors).

We used a propensity score matching (PSM) method to find, for each company that received BA investments in year t, a group of non BA-backed companies (i.e., 10 control group companies per each sample company, with replacement) that had the most similar probability of receiving capital

[5] Each survey is completed in a four-step process. At the beginning of January, the IBAN forwards the survey's website link to its associates and other known BAs. By the first week of March, the data are collected (step 1). Non-responsive 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 fairly common survey technique called "sequential mixed mode" (Snjikers et al., 2013), which significantly improves response rates (De Leeuw, 2005; Dillman et al., 2009).

resources from BAs. Matching was performed using the nearest-neighbor PSM.[6] Propensity scores were obtained by estimating, for companies receiving BA financing in year t (from 2009 to 2016), a probit model in which the dependent variable is the probability of receiving BA equity capital and the independent variables include age in logarithms, size (measured as the log of sales), growth (measured as the growth of sales, in logs, between year t and t_{+1}), as well as country, year, and industry dummies. A suitable matched group of 254 non-BA-backed pairs was found for 57 BA-backed entrepreneurial ventures. Based on data availability, we ran our models on 265 Italian companies (216 control group companies and 49 BA-backed companies). The final sample composition is reported in Table 1 by foundation year and industry.

[Insert Table 1 here]

5. Methodology and variables

This study aims to explore the performance of BA-backed companies as a function of BA characteristics and distinctive invested company types. To produce accurate estimates on this treatment effect, we combine the matching approach, described in the previous section, with a quasi-differences-in-differences (DD) method aimed at demeaning results to isolate the net effect of BA traits (Blundell and Costa Dias, 2000). While the matching approach allows the selection of a control group of companies with observable characteristics similar to those of the treated group, the DID approach is applicable when information on the outcome before the treatment is available. The idea of the DID is to compute the outcome difference between the treated and control groups after the treatment and to subtract the outcome difference already in place before the treatment had any effect (conditional on given independent variable values).

We estimate the following model (Model 1):

$$Outcome_{diff} = \beta BA_{characteristics} + controls$$

[6] For a similar procedure in the VC literature, see Brau et al. (2004), Chemmanur et al. (2011), Croce and Martí (2016), Croce et al. (2013), Croce et al. (2018), and Puri and Zarutskie (2012).

We include as controls the company's age (in logs), the amount invested by the BA in the company (in logs), and a dummy (*d_coinvestment*) indicating whether the company is co-invested by more than one BA. Finally, year and industry dummies are considered as additional controls.

We also estimate a second model (Model 2) to which we add the dummy *BA-backed,* taking a value of 1 for companies receiving BA financing and 0 for control group companies, to verify the non-significance of this coefficient, indicating the validity of our matching procedure.

Models 1 and 2 are estimated on the full sample of companies and, separately, on the subsamples of gazelles and ponies, in order to test our research hypotheses about the differential effects of BA characteristics on these two distinctive types of firms. We define a gazelle as a company operating in a high-tech or knowledge-intensive sector, young at the time of financing or in the year of the matching for control group companies (i.e., of an age lower than the median value of invested companies), and showing high sales growth in the year before the financing occurs or in the year before the matching year for control group companies (i.e., with sales growth, in logs, higher or equal to the median value of sales growth). We define a pony as a small company at the time of financing (with sales in logs lower than the median value of sales) showing a low sales growth in the year before the investment or in the year before the matching for control group companies (with sales growth in logs lower than the median value of sales growth).[7]

Finally, we also estimate the following model with interactions (Model 3):

$$Outcome_{diff} = \beta BA_{characteristics} + \gamma BA_{characteristics} * d_{gazelle} + \delta BA_{characteristics} * d_{pony} + controls$$

In this model, $d_{gazelle}$ is a dummy taking a value of 1 for gazelles, and d_{pony} is a dummy taking a value of 1 for ponies. The effect of BA characteristics on the two different subsamples, similarly to the effect measured in Model 1, can be estimated considering the linear combination of coefficients $\gamma + \beta$ and $\delta + \beta$ for gazelles and ponies, respectively. In addition, the comparison between the coefficients γ and δ, representing the differential effects of BA characteristics on gazelles and ponies, respectively, allows us to explicitly test whether there is a differential effect of BA characteristics in the two subsamples. The test on the linear combination $\gamma - \delta > 0$ allows us to

[7] We use the median value as a threshold for age and size in defining young and small companies. This approach is common in the entrepreneurial finance literature (see, for example, Colombo et al. [2013]).

evaluate whether the impact of a specific BA characteristic is greater for gazelles than for ponies. As a robustness check, we further add, as a control, the dummy *BA-backed* to control for the validity of our matching procedure (Model 4).

For the outcome variable, we use the difference between the average sales (in logs) two years after the year of BA financing (matched year for control group companies) and the average sales (in logs) in the two years before the treatment. Table 2 reports univariate analyses concerning the dependent variable used in our analysis (*sales diff*). We present figures for the overall sample, for the sample of 49 BA-backed companies (18.49% of the total sample), and for the control group of 216 companies (81.51% of the total sample).

As shown in Table 2, no statistical difference appears when comparing the BA-backed and control group companies. This suggests, on average, a non-significant role of BA financing in the group of treated companies. Descriptive statistics show that the BA-backed sample and control group present similar percentages of gazelles and ponies: Gazelles represent 22.45% of the BA-backed sample and 25.93% of the control group sample, whereas ponies represent 30.61% of the BA-backed population and 27.31% of the control group population. When comparing our performance indicator (*sales diff*) between gazelles and ponies, no significant differences emerge between BA-backed and control group companies, similarly to the finding for the overall sample.

[Insert Table 2 here]

For the independent variables, consistent with our research hypotheses, we focus on several BA characteristics, referring to the human capital and investment style domains. Table 3 describes these variables in detail. To describe BAs' human capital endowment, we include a variable proxying a BA's financial experience, measured as the number of investments in lifetime in logs (*Total past investments),* and a dummy indicating whether a BA has entrepreneurial experience as a founder (*d_entr_experience*). A further group of variables is included to describe BAs' investment styles. First, we use a dummy (*d_coaching*) indicating the willingness of the BA to play an active role after the investment by providing valuable non-monetary contributions to the funded venture. We also consider a dummy (*d_monitoring*) indicating whether the level of monitoring provided by the BA is higher than the median value of all the investors in the sample. The monitoring level is estimated, following Bonini et al. (2018), as an ordinal variable assuming a value from 1 to 5, depending on the frequency of the BAs' visits to their portfolio companies.

[Insert Table 3 here]

Table 4 provides initial evidence about these variables for the full sample and for the sub-samples of ponies and gazelles. For the full sample, the results show that 36.73% of the companies are invested by a BA with entrepreneurial experience, and an average of 1.7276 investments (in logs) are performed in a BA's lifetime. Moreover, 73.46% of the funded ventures are backed by active investors, and 22.44% receive financing from BAs who monitor their investments tightly. No statistical differences in BA characteristics are found between the two sub-samples of gazelles and ponies. The tests reported in Table 4 suggest that BAs investing in gazelles have more entrepreneurial and financial experience and a lower involvement in terms of coaching and monitoring than do those investing in ponies, but these differences are not statistically significant.

[Insert Table 4 here]

Complete descriptive statistics and a correlation matrix of all the variables used in the empirical analysis are reported in Table 5.

[Insert Table 5 here]

We next explore whether BA characteristics play roles in fostering the performance of BA-backed firms that differ between gazelles and ponies. Table 6 reports the mean values of our dependent variable (*sales diff*) by considering different BAs' human capital and investment style characteristics. We divide the results according to the presence of i) entrepreneurial experience, ii) a high level of financial experience (based on the median value of the total past investments), iii) BAs' active involvement, and iv) a strong monitoring attitude. The same statistics are reported, in the first column, for the full sample of BA-backed companies and, in the following two columns, for gazelles and ponies.

Some interesting observations can be drawn from these descriptive statistics. Entrepreneurial experience seems to have a positive effect on the performance of invested companies: The increase in the sales difference is 0.2745 for companies invested in by BAs with entrepreneurial experience, while the same increase for firms invested in by BAs without entrepreneurial experience is 0.1547. This result is valid for gazelles too. For ponies, the numbers show the opposite result: Ponies invested in by BAs with entrepreneurial experience show a lower sales growth than those invested in by BAs

without entrepreneurial experience. A similar argument can be made for financial experience, which has a positive effect for the overall sample and particularly for gazelles, while the opposite holds for ponies. This initial evidence seems to confirm hypotheses 1 and 2. Regarding investment style characteristics, the results show a generally negative effect of active involvement for the overall sample and for both gazelles and ponies. Regarding monitoring, the results highlight a difference between the two firm sub-samples: For gazelles, as for the overall sample, strong monitoring by BAs seems to reduce the performance of invested companies, while the opposite holds for ponies, for which strong monitoring has a positive effect.

[Insert Table 6 here]

6. Empirical results

We now directly test our main hypotheses by running a set of multivariate regressions. Table 7 presents the results of the estimates of Models 1 and 2, as illustrated in Section 5, on the full firm sample.

The results align with the previous univariate analyses, indicating a limited variation in sales across the sample. Consequently, the panel of independent variables captures this variation in only a limited way. Overall, the results show that older firms exhibit a fairly significantly lower growth rate, after demeaning for the control group performance. The degree of investor monitoring is inversely related to performance, indicating that an excessive influence on the management of the venture appears detrimental when considering the overall sample of BA-backed companies. Finally, we observe in Model 2 the non-significance of the coefficient of BA-backed companies, reinforcing the validity of our matching procedure.

In columns 3 to 6, we directly test our hypotheses by focusing on gazelles (columns 3 and 4) and ponies (columns 5 and 6) to capture the differential effects of BAs in supporting these companies. The results show interesting differences between the two groups. The sales growth of a gazelle is strongly linked to the investor's experience as an entrepreneur. We argue that, having already successfully built a venture, the BA has developed a set of skills useful for fostering the growth of the invested companies. This effect does not hold for ponies, for which the entrepreneurial experience of the investing BA is not significant. These results confirm our intuition that BAs with entrepreneurial experience provide a more effective contribution to the growth path of gazelles, which are better

positioned to take advantage of external knowledge than ponies, whose entrepreneurs may be less permeable to knowledge assimilation.

Regarding BAs' financial experience, the estimates do not produce a significant result for the growth of gazelles, while the effect appears to be negative for ponies (only in Model 1, at a 5% confidence level). BAs with superior investment experience do not appear to be better at managing the investment process in these companies. Because of the specificities of gazelles' growth path, accumulated knowledge in general investments does not seem to be pivotal for sustaining growth for them. Moreover, greater investment experience might even lead to a lower capability to orientate the growth path of funded ventures when they are ponies. This could be useful for differentiating among the types of previous investments in order to understand which of them may help in managing the growth of these specific types of companies. We leave this aspect for future research.

The results for the investment style-related variables suggest that the effect of coaching is negative for gazelles (though not significant at standard significance levels) but positive for ponies (significant at a 10% confidence level in Model 1), consistent with hypothesis 4.

Finally, the results concerning the monitoring activity exerted by BAs on the invested companies appear to corroborate our intuition: Monitoring maintains its negative sign only for gazelles but turns positive and significant for ponies. Consistent with the results for the overall BA-backed sample and those of previous studies (Chua and Wu, 2012; Bammens and Collewaert, 2014), our results suggest that the tightening of monitoring on gazelles negatively impacts their performance. This result confirms our intuition that monitoring is less effective in high-tech and knowledge-based rapid-growth entrepreneurial firms, which are typically more reluctant to disclose information to investors and for which tight monitoring might stifle entrepreneurial risk taking rather than enhance firm growth. By contrast, we observe a positive effect of monitoring on ponies, confirming that monitoring may act as an effective tool for facilitating firm growth in less fast-growing innovative and knowledge-based environments.

[Insert Table 7 here]

As a robustness check, we report estimates based on interactions that explicitly allow us to test the differences in BA characteristics' effects between gazelles and ponies. The estimates reported in Table 8 refer to Models 3 and 4 in the first two columns. As a further check, we report in column 3 the estimates of Model 3, restricted to the BA-backed sample and excluding control group companies.

[Insert Table 8 here]

Estimating the effect of BA characteristics on the growth of gazelles and ponies and comparing them requires that we test the linear combinations of coefficients, as explained in Section 5 (see Table 9). The results of these tests confirm what is described above regarding the estimates of Model 1: BAs' entrepreneurial experience has a positive and significant effect on the performance of gazelles, while the effect is not significant for ponies. Moreover, the test in the lower section of Table 9 comparing the coefficient for ponies and gazelles confirms that the role of BAs' entrepreneurial experience is stronger for gazelles than for ponies. Financial experience and coaching seem not to play a significant role for either gazelles or ponies (with the exception of a negative effect of financial experience, significant at a 5% confidence level, and a negative effect of coaching, significant at a 10% confidence level, in Model 3 for ponies). No significant differences are found between gazelles and ponies for these two BA characteristics. Finally, while monitoring plays a negative role in the growth of gazelles, this role is weaker for them than for ponies, as hypothesis 3 proposes.

[Insert Table 9 here]

7. Concluding remarks

BAs are the primary source of financing for new ventures and appear to be largely heterogeneous in terms of personal traits and characteristics. Besides the benefits derived from capital infusion, BA-backed firms benefit from BAs' entrepreneurial and investment experience, industry knowledge, and network of business contacts (Tenca et al., 2018). These competences are brought to the firm directly; they constitute the basis on which firms' capabilities are built and are responsible for superior performance. Thus, the joint presence of a greater availability of capital together with an additional set of non-monetary contributions are deemed to affect the growth prospects of funded ventures.

We build on a unique dataset of BA-backed companies and a PSM control group to investigate whether BAs' individual attributes and investment approaches affect the growth of funded start-ups that show different growth patterns at the investment date. In doing so, we distinguish between gazelles, high-growth firms with potentially disruptive impacts on the market, and ponies, companies with relatively slow growth rates but high resilience. While gazelles seem the obvious investment of choice for BAs, they incorporate substantial risks that may need special handling by these initial investors.

The results show interesting correlations between BAs' characteristics and investment approaches and the growth rates of invested companies, with different patterns between gazelles and

ponies. Building on insights from the resource-based view and the theory of absorptive capacity, we show that the growth of gazelles is strongly linked to the investors' experience as entrepreneurs. This effect does not hold for ponies. We argue that gazelles are better positioned to take advantage of external knowledge inflows than ponies are, whose entrepreneurs may be less permeable to knowledge assimilation. BAs' investment experience and coaching seem not to play a significant role in the growth rate of either gazelle or ponies. Finally, we find that the tightening of monitoring negatively affects gazelles' performance but positively affects ponies' growth. We argue that monitoring is less effective for high-tech and knowledge-based rapid-growth entrepreneurial firms because it stifles entrepreneurial risk taking; by contrast, it is an effective tool for facilitating firm growth in less fast-growing innovative and knowledge-based environments.

Our findings may have interesting normative implications, as they highlight how investors' distinctive personal traits and investment strategies in the early fundraising stages might shape funded firms' growth paths. Understanding the mechanisms behind the effect of investors' intervention on performance is therefore of particular importance for policy targeted at small firms.

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Tables

Table 1. Sample descriptive statistics

Foundation Year	**BA-backed**		**Control group**	
Before 2000	12	24.49%	58	26.85%
2001–2005	11	22.45%	75	34.72%
After 2006	26	53.06%	83	38.43%
Total	*49*	*100.00%*	*216*	*100.00%*

Industry	**BA-backed**		**Control group**	
C - Manufacturing	9	18.37%	69	31.94%
F - Construction	1	2.04%	1	0.46%
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	7	14.29%	14	6.48%
I - Accommodation and food service activities	1	2.04%	0	0.00%
J - Information and communication	7	14.29%	44	20.37%
K - Financial and insurance activities	2	4.08%	8	3.70%
L - Real estate activities	0	0.00%	1	0.46%
M - Professional, scientific, and technical activities	21	42.86%	76	35.19%
Q - Human health and social work activities	1	2.04%	0	0.00%
S - Other service activities	0	0.00%	3	1.39%
Total	*49*	*100.00%*	*216*	*100.00%*

Table 2. Dependent variable (sales diff): univariate analysis

		BA-backed			**Control group**		**Difference**
	n	*% of total sample*	*Sales diff (logs)*	*n*	*% of total sample*	*Sales diff (logs)*	*BA vs control group*
Total sample	49	18.49%	0.1987	216	81.51%	0.3053	-0.1066
	n	*% of BA-backed sample*	*Sales diff (logs)*	*n*	*% of control group sample*	*Sales diff (logs)*	*BA vs control group*
Gazelles	11	22.45%	0.3507	56	25.93%	0.4644	-0.1137
Ponies	15	30.61%	-0.0871	59	27.31%	0.1040	-0.1911

Table 3. Independent variables description

Category		Dependent variable	Description
Human Capital	Entrepreneurial experience	d_entr_experience	Dummy indicating whether a BA has entrepreneurial experience as a founder.
	Financial experience	Total past investments (logs)	Number of a BA's investments in lifetime (in logs).
Investment style	Coaching	d_coaching	A dummy taking a value of 1 if the BA indicated in the IBAN survey a willingness to play an active role in the invested company by providing valuable non-monetary contributions to the funded venture.
	Monitoring	d_monitoring	Dummy indicating whether the level of monitoring provided by the BA is higher than the median value of the BAs included in the sample. The level of monitoring is an ordinal variable assuming a value from 1 to 5 depending on the frequency of the visits BAs make to their portfolio companies, where 1 indicates very limited involvement (no or few company visits) and 5 indicates high involvement (a constant presence in the firm).

Table 4. Independent variables: univariate analysis

Independent variable	Total sample of BA-backed companies	Gazelles	Ponies	Difference (Gazelles vs Ponies)
d_entr_experience	0.3673	0.3636	0.2000	0.1636
Total past investments (logs)	1.7276	1.6957	1.5243	0.1714
d_coaching	0.7346	0.7273	0.8667	-0.1394
d_monitoring	0.2244	0.0909	0.2000	-0.1091

Table 5. Descriptive statistics and correlation matrix

	Variable	Mean	Median	St.dev	Min	Max	Obs	1	2	3	4	5	6	7	8
1	Sales diff (logs)	0.2856	0.0802	0.6577	-1.6586	2.8491	265	1							
2	d_entr_experience	0.0679	0	0.2521	0	1	265	-0.0045	1						
3	Total past investments (logs)	0.3195	0	0.7224	0	2.6391	265	-0.0233	0.6385***	1					
4	d_coaching	0.1358	0	0.3433	0	1	265	-0.1095	0.3307***	0.6691***	1				
5	d_monitoring	0.0415	0	0.1998	0	1	265	-0.144	0.2446***	0.4253***	0.4144***	1			
6	Capital invested (logs)	0.0355	0	0.1446	0	1.3863	265	0.0284	0.4087***	0.624***	0.2432***	0.3059***	1		
7	Company age (logs)	1.9814	2.079	0.5624	0.6931	3.3322	265	-0.1799***	0.0695	-0.0217	-0.0772	0.0079	0.0011	1	
8	d_coinvesment	0.0717	0	0.2585	0	1	265	-0.044	0.5063***	0.5876***	0.4448***	0.2355***	0.3012***	-0.0248	1

Table 6. Performance and BA characteristics: univariate analysis

		Sales diff (logs)		
	BA characteristics	**Total BA-backed sample**	**Gazelles**	**Ponies**
Human capital	d_entr_experience = 0	0.1547	0.2479	-0.0782
	d_entr_experience = 1	0.2745	0.5308	-0.1225
	Total past investments (logs) < median	0.0672	0.2668	-0.0755
	Total past investments (logs) > median	0.3741	0.4515	-0.1188
Investment style	d_coaching = 0	0.4599	0.6067	-0.0126
	d_coaching = 1	0.1044	0.2548	-0.0985
	d_monitoring = 0	0.3051	0.387	-0.1188
	d_monitoring = 1	-0.1687	-0.0117	0.0401

Table 7. Regression results. Dependent variable: sales diff (log)

		Total sample		Gazelles		Ponies	
		Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Control variables	BA-backed		-0.2329		-0.1859		0.2558
			(0.333)		(0.577)		(0.506)
	Company Age (logs)	-0.3020***	-0.3027***	-0.2959	-0.309	-0.168	-0.161
		(0.081)	(0.082)	(0.295)	(0.304)	(0.16)	(0.172)
	Capital invested (logs)	0.1982	0.2008	-1.0832	-1.1629	-3.8521	-3.7805
		(0.289)	(0.296)	(1.02)	(1.203)	(2.614)	(2.479)
	d_coinvestment	-0.0645	-0.0582	-0.1265	-0.1409	-0.0258	-0.0301
		(0.201)	(0.202)	(0.42)	(0.446)	(0.109)	(0.103)
	d_entr_experience	-0.0476	-0.0405	0.8567**	0.8638**	-0.2338	-0.1413
		(0.226)	(0.226)	(0.355)	(0.363)	(0.167)	(0.141)
Main independent variables	Total past investments (logs)	0.0787	0.1625	-0.03	0.041	-0.1711**	-0.2773
		(0.127)	(0.179)	(0.188)	(0.312)	(0.081)	(0.202)
	d_coaching	-0.2565	-0.1627	-0.3726	-0.2864	0.2776*	0.1756
		(0.205)	(0.255)	(0.257)	(0.418)	(0.144)	(0.203)
	d_monitoring	-0.5232**	-0.5190**	-1.5134***	-1.4958***	0.2848**	0.2453*
		(0.247)	(0.247)	(0.477)	(0.487)	(0.134)	(0.136)
	Const.	0.8657***	1.4089***	0.9763	0.9893	0.3926	0.3594
		(0.332)	(0.378)	(0.745)	(0.755)	(0.614)	(0.674)
	Industry dummies	YES	YES	YES	YES	YES	YES
	Year dummies	YES	YES	YES	YES	YES	YES
	N. obs	265	265	67	67	74	74

Note: Heteroscedasticity consistent standard errors are reported in parentheses. Significance at 1%, 5% and 10% is denoted by ***, ** and *, respectively.

Table 8. Regression results. Dependent variable: sales diff (log). Model with interactions.

	Total sample				Only BA-backed companies	
	Model 3		**Model 4**		**Model 3**	
BA-backed			-0.3945			
			(0.316)			
Company Age (logs)	-0.3272	***	-0.3305	***	-0.2941	
	(0.089)		(0.09)		(0.183)	
Capital invested (logs)	-0.215		-0.2287		-0.3016	
	(0.394)		(0.391)		(0.545)	
d_coinvestment	-0.0804		-0.0793		0.0598	
	(0.164)		(0.163)		(0.174)	
d_entr_experience	-0.8004	**	-0.7415	**	-0.9623	*
	(0.358)		(0.362)		(0.494)	
Total past investments (logs)	0.5397	**	0.6824	***	0.5232	
	(0.221)		(0.258)		(0.471)	
d_coaching	-0.3169		-0.1545		-0.3569	
	(0.344)		(0.347)		(0.482)	
d_monitoring	-1.265	***	-1.2803	***	-1.1975	***
	(0.376)		(0.381)		(0.406)	
d_entr_experience*d_gazelle	1.362	***	1.3248	***	1.589	***
	(0.438)		(0.45)		(0.524)	
Total past investments (logs)*d_gazelle	-0.58	***	-0.5901	***	-0.5367	
	(0.214)		(0.215)		(0.352)	
d_coaching*d_gazelle	0.1128		0.1212		0.4409	
	(0.4)		(0.388)		(0.698)	
d_monitoring*d_gazelle	0.3366		0.3606		0.5567	
	(0.502)		(0.509)		(0.614)	
d_entr_experience*d_pony	0.8971	**	0.6997	*	0.5843	
	(0.379)		(0.402)		(0.585)	
Total past investments (logs)*d_pony	-0.6827	***	-0.6783	***	-0.6286	*
	(0.223)		(0.219)		(0.325)	
d_coaching*d_pony	0.0737		0.1018		0.1964	
	(0.368)		(0.366)		(0.55)	
d_monitoring*d_pony	1.4506	***	1.5379	***	1.658	***
	(0.438)		(0.454)		(0.514)	
Const.	1.1643	***	0.9663	***	2.0937	**
	(0.437)		(0.359)		(0.868)	
Industry dummies	YES		YES		YES	
Year dummies	YES		YES		YES	
N. obs	265		265		49	

Note: Heteroscedasticity consistent standard errors are reported in parentheses. Significance at 1%, 5% and 10% is denoted by ***, ** and *, respectively.

Table 9. Test results on estimates in Table 8

	Total sample				Only BA-backed companies	
	Model 3		**Model 4**		**Model 3**	
Gazelles						
d_entr_experience	0.5616	**	0.5833	**	0.6267	**
	(0.2516)		(0.2802)		(0.2852)	
Total past investments (logs)	-0.0403		0.0923		-0.0135	
	(0.1088)		(0.1320)		(0.1702)	
d_coaching	-0.2041		-0.0333		0.084	
	(0.1867)		(0.2261)		(0.3434)	
d_monitoring	-0.9284	***	-0.9197	***	-0.6408	
	(0.3357)		(0.3378)		(0.5763)	
Ponies						
d_entr_experience	0.0967		-0.0418		-0.378	
	(0.1352)		(0.1643)		(0.2815)	
Total past investments (logs)	-0.143	**	0.0041		-0.1054	
	(0.0566)		(0.1263)		(0.2779)	
d_coaching	-0.2432	*	-0.0527		-0.1605	
	(0.1542)		(0.1975)		(0.4283)	
d_monitoring	0.1856		0.2576		0.4605	
	(0.1686)		(0.1692)		(0.4207)	
Difference Gazelles vs. Ponies						
d_entr_experience	0.4649	*	0.6251	*	1.0047	**
	(0.2851)		(0.3625)		(0.4307)	
Total past investments (logs)	0.1027		0.0882		0.0919	
	(0.1181)		(0.1206)		(0.1769)	
d_coaching	0.0391		0.0194		0.2445	
	(0.2209)		(0.1954)		(0.5159)	
d_monitoring	-1.114	***	-1.1773	***	-1.1013	***
	(0.3266)		(0.3368)		(0.3795)	