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# Entrepreneurs' human capital and the performance of angel-backed companies

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## ABSTRACT

This paper investigates the effect on startups' performance played by the joint interaction between entrepreneurs' human capital and business angels' contributions. Relying on data from the Italian Business Angels Network for 77 business angels backed companies and a counterfactual sample of non-business angel backed companies, we find that the entrepreneur's general and specific human capital is a major driver of the probability of being funded by business angels, which positively affects the venture's growth, but not its long-term financial performance. In brief, entrepreneurs' human capital is a major determinant of raising business angel funding, but it is the business angel contribution that constitutes a key driver for the startup's survival and profitability.

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## KEYWORDS

Entrepreneurs' human capital; generic and specific human capital; business angels; startups performance; non monetary contribution

## Introduction

Funding a new venture is a complex deal, implying low risk aversion and high screening capability alongside monitoring skills as far as the investment process of the capital providers is concerned. However, given the possibly relevant returns from these investments as well as the proved capability of startups to contribute to employment and value creation within an economic and social system, over time a wide and heterogeneous set of investors got progressively access to such an early-stage segment of the capital markets, giving rise to the development of what is nowadays unanimously defined as the entrepreneurial finance ecosystem (Bellavitis et al. 2017; Bessi re, St phany, and Wirtz 2020; Block et al. 2018; Bonini and Capizzi 2019; Bruton et al. 2015; Manigart and Sapienza 2017). Among the major actors, we do find private equity and venture capital funds, business angels and business angels networks, equity crowdfunding platforms, startup incubators, business accelerators or club deals made up by a mix of the previous ones. While the role, operations and contribution provided to startups by institutional investors like private equity and venture capital funds have been largely investigated by finance scholars<sup>1</sup>, it is still debated within the scientific community the role played by the above-mentioned emerging actors in the startup ecosystem. In particular, from the one hand, it is accepted they are not just pure financial investors, due to the non-monetary

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contribution that particularly business angels, incubators and accelerators might provide to their funded ventures; from the other hand it is still debated the kind of screening and investment process carried on as well as the type and effectiveness of the monitoring process implemented (Bonini et al. 2018; Collewaert and Manigart 2016; Croce et al. 2021; C. M. Mason, Botelho, and Harrison 2016; C. M. Mason, Botelho, and Zygmunt 2017; Svetek 2023). Some recent contributions show that business angels positively affect the survival of target companies but not unambiguously their growth path in terms of asset size (Bonini, Capizzi, and Zocchi 2019; Croce et al. 2021; Cumming and Zhang 2019; Lerner et al. 2018) and, further, they make the business angel backed companies unattractive for venture capital investors (Capizzi, Croce, and Tenca 2022).

In this paper, we aim at extending the extant literature on the contribution provided by Business Angels (BAs) on the performance of the funded ventures. In particular, we want to answer to the following research question: What is the joint contribution of entrepreneurs' Human capital (HC) and BA funding on startup performance? We focus on general HC, which refers to different forms of formal education, is not directly specific to job contexts, and is more easily transferrable, and specific HC, which relates to the experience garnered "on the job", is linked with the creation of "tacit knowledge", and is not easily codifiable and transferrable. Prior literature has investigated the role of founders' HC or BA funding on the survival and performance of startups as separate factors (e.g. Bonini et al. 2018; Brixy and Hessels, 2010; Campbell, Coff, and Kryscynski 2012; Choi et al., 2021; Collewaert and Manigart 2016; Colombo and Grilli 2010; Croce, Tenca, and Ughetto 2017, 2021; Linder, Lechner, and Pelzel 2020). The focus of this study is on the joint contribution of BA and entrepreneurs' HC on startup performance. If we make reference to the widely used metaphor of horse racing within entrepreneurial finance literature, what we know is that BAs do consider more entrepreneur (the jockey)'s HC rather than the company (the horse) characteristics in their investment decision-making process (C. M. Mason 2016; Harrison and Mason 2017; Mitteness, Sudek, and Cardon 2012; R. Sudek, Mitteness, and Baucus 2008; S. Sudek 2006; White and Dumay 2017; Wiltbank et al. 2009). However, it is still not clear if BA backed horses do survive, grow, and win their races over time because of their skillful jockeys or because of the BAs' contribution and, further, as for surviving horses, we need to better understand which is the major determinant for their growth and success, i.e. the entrepreneurs' HC or BA funding, or both.

To answer our research question, we analyse a sample of 77 startups backed by BAs between 2008 and 2015, for whom we hand-collected data including HC features of their founders and multiple measures of startup performance. We find that founders' generic and specific HC has a positive correlation with the probability to raise equity capital from BAs; moreover, generic and specific HC is positively associated with the growth over time of the funded ventures, but not with their survival and profitability. As a matter of fact, when considering the growth of the BA backed ventures, as measured by the increase in their revenues after the BA equity capital injection, it emerges a significant correlation with BA contributions; however, it is not correlated with the profitability of the funded ventures, as measured by their net income scaled by their total assets (ROA). These results indicate that founders' generic and specific HC even when combined with BA monetary and non-monetary contributions may not enhance the performance of ventures in terms of growth and profitability. Furthermore, our findings emphasize the role of BAs who,

unlike purely financial investors, act as “coaches” by training jockeys in managing their horses, offering non-monetary contributions in addition to their equity investments. This underscores the complex role of HC, which, while essential for selection by BAs, does not significantly drive company performance on its own.

The remainder of the paper is structured as follows: Section “Background and hypotheses development” is devoted to the theoretical development elaborating on how entrepreneurs’ HC is related to the probability of raising BA financing and, further, on how BAs might contribute to the performance of the funded ventures. Section “Methodology” describes the empirical setting used to test the hypotheses arising from the conceptual discussion as well as the methodology. Section “Results” presents the empirical results. Finally, we discuss the implications for scholars and practitioners disclosing avenues for future research in the conclusive Section “Discussion and concluding remarks”.

## Background and hypotheses development

### *Entrepreneur’s HC and the probability to raise business angel financing*

The creation of a new venture evolves around an individual (the entrepreneur) or a founding (entrepreneurial) team with an entrepreneurial idea. The entrepreneur imprints the venture (Boeker 1989; Bryant 2014; Stinchcombe 1965) and, through her ability to guide continuous opportunity evaluation and subsequent strategic choice, has a long-lasting effect on how it performs and grows (Colombo and Grilli 2005; Shane 2000; Wiklund 1999). A wide body of research has focused on identifying which founders’ HC characteristics are relevant in an entrepreneurial context. HC refers to skills and abilities individuals garner through formal education and experience (Deakins and Whittam 2000). It can be disentangled into generic and specific HC (G. S. Becker 1964). General HC refers to different forms of formal education, is not directly specific to job contexts, and is easily transferrable and usable across them. Specific HC relates to the experience garnered “on the job” and fosters the creation of what Polanyi (1967) calls “tacit knowledge”, therefore it is not easily codifiable and transferrable. The combination of generic and specific HC constitutes what Barney (1991) considers a valuable, rare, inimitable, and non-substitutable resource that contributes to the firm’s competitive advantage as it is context specific. As such, the overall stock of an individual’s HC influence firm’s growth and survival so that the higher the stock, the better the performance (Beckman and Burton 2008; Bosma et al. 2004; Davidsson 2006; Davidsson and Gordon, 2009, 2012; Ganotakis 2012).

In entrepreneurial endeavours, HC shapes the entrepreneur’s knowledge and ability to act on opportunities (Dimov 2010; Shane 2000) and exploit them (Gruber, Kim, and Brinckmann 2015; Shane and Venkataraman 2000). Founders with more HC garner abilities that facilitate the constant evaluation and re-evaluation of changing environmental conditions, improving their ability to judge the latter and learn from them. As such, the entrepreneurial HC ultimately influences the ability to continuously innovate the venture (Brixy, Sternberg, and Stüber 2012; Tzabbar and Margolis 2017), improving chances of survival (Criaco et al. 2014; Gimeno et al. 1997; Linder, Lechner, and Pelzel 2020) and growth (Colombo and Grilli 2005, 2010; Cooper, Gimeno-Cascon, and Woo 1994; Rauch and Rijdsdijk 2013; Unger et al. 2011; Wiklund and Shepherd 2005). At the same time, prior contributions show HC acts as a signal for the quality of a new venture,

particularly to external investors (Ahlers et al. 2015; Busenitz, Fiet, and Moesel 2005; Butticiè et al. 2022; Gimmon and Levie 2010; Ko and McKelvie 2018; Naiki and Ogane, 2022). The relevance and quality of signals appears to be particularly relevant when venture uncertainty on future survival and growth prospects is at its maximum, i.e. at the seed stage of development of a new venture. A traditional source of funding for seed-stage ventures are BAs. BA are outside investors, often high-net-worth individuals who invest their own wealth in new ventures. BAs may be former entrepreneurs or professionals who decide to support new entrepreneurs through the provision of both monetary and non-monetary contributions (Capizzi 2015; Fili and Grünberg 2016; Harrison and Mason 2017; Landström and Mason 2016; Lindsay 2004; C. M. Mason 2006; C. M. Mason and Harrison 2000, 2008; Politis 2008; Van Osnabrugge 2000; Wetzel 1983). Under imperfect information, the uncertain prospects for growth and survival that characterize new ventures require BAs to rely on visible signals that can help them assessing the quality of the needy venture as to minimize the likelihood of selecting low-quality ventures to fund and, consequently, losing the financial investment the BA makes in such companies (Bonini et al. 2018; Brush, Edelman, and Manolova 2012; Chemmanur and Chen 2014; Cumming and Zhang 2019; Harrison and Mason 2017; Kerr, Lerner, and Schoar 2014). This results in BA implementing a tight model of investment selection where the entrepreneur's HC constitutes one of such signals (Ebberts and Wijnberg 2012; C. M. Mason, Botelho, and Zygmunt 2017; Paul, Whittam, and Wyper 2007). In fact, due to the very nature of seed stage ventures where the entrepreneurial idea is yet to be tested and validated (hence, it is not fully fledged yet), BAs tend to invest in people more than in ideas (Collewaert and Manigart 2016; Macht 2011; C. M. Mason, Botelho, and Harrison 2016; Sudek 2006; Wiltbank et al. 2009). This results in a focus on the assessment of some quality related characteristics of the entrepreneur, more than the quality of the idea. HC is one of such characteristics as its accumulation requires an effort by the entrepreneur, is costly to obtain, and is difficult to replicate. This makes HC a credible and useful signal for external investors. Entrepreneurs with higher stocks of generic and specific HC are, therefore, considered to have better abilities and capabilities, making their ventures better apt to cope with the uncertainty surrounding them and able to achieve better performance levels (Busenitz, Fiet, and Moesel 2005; Cooper, Gimeno-Cascon, and Woo 1994; Davidsson and Gordon, 2009). Both generic and specific HC appear to be key determinants of fundraising in first-round financing (Bonini et al. 2018; Carpentier and Suret 2015; Colombo and Grilli 2010; Harrison and Mason 2017; Ko and McKelvie 2018), which is typically provided by BAs. Generic HC, such as high level and MBA education, equips entrepreneurs with essential knowledge and skills that enhance their strategic decision-making and overall management capabilities. This expertise allows them to articulate their business ideas more effectively and to navigate complex market dynamics, making them more attractive to BAs. Specific HC, which includes entrepreneurial, managerial, or technical experience acquired through direct experience, further strengthens an entrepreneur's capability to execute their business plans successfully. This hands-on experience fosters a deeper understanding of industry and operational challenges, which instils confidence in BAs regarding the entrepreneur's ability to lead their ventures toward success.

As such, the following hypothesis is formulated:

**Hypothesis 1:** The general and specific HC of entrepreneurs has a direct positive effect on the probability of receiving BA funding.

### *BA financing, entrepreneurs' HC and the performance of the BA backed startups*

Even though several studies have examined the role of founders' HC on new ventures' outcomes and its role with respect to the entrepreneur's ability to secure a capital injection by BAs, little is known about how entrepreneurs' HC and BA investment jointly influence the performance of the funded venture (Bonini et al. 2018; Brav and Gompers 1997; Chemmanur, Krishnan, and An Nandy 2011; Croce and Marti 2016; Croce et al. 2021; Cumming and Zhang 2019; Grilli and Martinu 2014; Lerner 1999; Levratto, Tessier, and Fonrouge 2018; Manigart, Baeyens, and Van Hyfte 2002; Pommet 2012; Puri and Zarutskie 2012; Timmons 1994). The literature has focused on assessing the impact of either the two aspects as stand-alone, separate possible determinants of the performance of new ventures, or by looking at the HC determinants of BAs' selection, valuation, and post-investment active involvement in the companies they back (Bonini et al. 2018; Bonnet et al. 2022; Botelho, Harrison, and Mason 2021, 2023; Collewaert and Manigart 2016; C. M. Mason, Botelho, and Zygmunt 2017). Although not engaging in an empirical analysis of the interplay between founder's HC and BA funding, Croce et al. (2021) do show that BAs play a key role in the growth of the ventures they back. While these studies have provided insights into how founder's HC and the BA capital injection influence survival and growth separately, they provide just a narrow snapshot of a much more complex relationship. A critical component of BA investment lies in the non-financial support that BAs provide to entrepreneurs, which goes beyond capital infusion (Siefkes 2024; Vigliani et al. 2024). Previous research has even demonstrated that BAs often consider the opportunity to mentor entrepreneurs as a factor in their investment decision. This mentorship is seen as a means to actively shape the venture's trajectory by transferring valuable skills, knowledge, and attitudes essential for entrepreneurial development (Bonini et al. 2018; Collewaert and Manigart 2016; C. M. Mason, Botelho, and Zygmunt 2017). Through guidance on strategic and operational issues, BAs not only aim to improve the venture's performance but also to strengthen the entrepreneur's capabilities. This value-added contribution is thus a unique aspect of BA involvement, which has a lasting impact on the venture's growth and adaptability. Thus, moving from the unquestionable argument that both general and specific HC is a source of valuable resources, consistent with the basic concepts of the Resource-based View (RBV), we argue that, beyond both initial founders' HC and BAs capital injection, in the post-investment phase takes place an interaction between entrepreneurs and BAs developing further intangible resources crucial for the future competitive advantage of the startup (Ardichvili et al. 2002; Bammens and Collewaert 2014; Barney 1991; Barney, Wright, and Ketchen 2001; Bonini et al. 2018; Bosma et al. 2004; Conner and Prahalad 1996; Cooper, Gimeno-Cascon, and Woo 1994; Croce et al. 2021; Macht 2011; Spender 1996; Steier and Greenwood 1999).

That's because educated and experienced entrepreneurs have a broader knowledge base and are generally better informed than low educated and unexperienced ones, thus being in a better condition to leverage on the non-monetary contributions, like strategic guidance and mentoring, provided by BAs. This gives rise to further stronger learning

dynamics, adaption skills, networking opportunities and negotiation power, which are crucial when managing high risky new ventures (Bonini, Capizzi, and Zocchi 2019; Collewaert and Manigart 2016; Colombo and Grilli 2005; Mudd, Pashev, and Valev 2010; Politis 2008; Shane 2000). We argue that it is the interaction between these resources – entrepreneurs' HC and BAs' non-monetary contributions (beyond monetary ones) – that drives startup performance in terms of survival, growth and profitability. Thus, BAs may play a unique role compared to other actors in the startup ecosystem, who behave primarily as financial investors. BAs act as coaches and mentors aiming to maximize the potential value in their selected jockeys and ultimately helping them ride their horses smoothly toward success. Accordingly, we formulate the following research hypotheses:

**Hypotheses 2:** The general and specific HC of entrepreneurs has a positive effect on the survival of BA-backed startups.

**Hypothesis 3:** The general and specific HC of entrepreneurs has a positive effect on the growth of BA-backed startups.

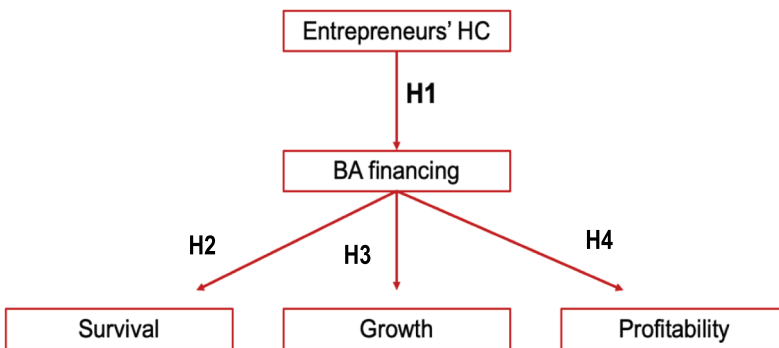
**Hypothesis 4:** The general and specific HC of entrepreneurs has a positive effect on the profitability of BA-backed startups.

Figure 1 depicts the conceptual model this paper seeks to test empirically.

## Methodology

### Data and sampling strategy

We gather data on BA-backed startups from the National Federation of Italian Business Angels (IBAN). The angel market is undergoing a fundamental shift from a previously atomistic, fragmented, and mostly invisible landscape of individuals investing alone or in small, ad hoc groups to a more structured environment. It is now increasingly characterized by prominent angel groups and networks that consolidate and direct funding from individual investors to entrepreneurial ventures (Mason and Botelho, 2014, C. M. Mason, Botelho,



**Figure 1.** Conceptual model on the relationship between entrepreneurs' HC, BA funding and firm performance.



and Harrison 2016). Starting from 2008, IBAN carries out a survey among its associated and unaffiliated BAs on annual basis, gathering information on companies invested, characteristics of deals and investment practices. The survey collects information on the previous year's investments and applies a common survey technique called sequential mixed mode (Snjikers et al. 2013), which consists in four steps. In January, IBAN forwards the survey's website link to its associates and other known or estimated BAs, and it collects responses 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).<sup>2</sup> The generalisability of studies that are based on angels from a single angel group may be problematic on account of the heterogeneity of groups, with several that focus on distinct communities and have particular investment foci (C. M. Mason, Botelho, and Harrison 2016, C. M. Mason, Botelho, and Zygmunt 2017). Nevertheless, IBAN serves as the national angel association in Italy, representing members from various regional and local BA groups and networks. Additionally, our sampling strategy includes individual investors who are not affiliated with the association, improving the representativeness of the visible segment of the Italian BA market.

For the aims of this work, we consider the first eight waves of the Survey, which offer information on 235 firms invested between 2008 and 2015. Roughly two-thirds of the target firms are startups, while the other enterprises are identified as "expansion" or "turnaround". Since the focus of the paper is on startups, we select as initial sample the 170 BA backed startups. We collect data on each sampled firm from the Italian Chamber of Commerce that gathers annual information on all Italian registered companies. For each sampled BA backed firm, we identify its founders relying on the Italian Register of Companies. We then searched for each founder's biographical information in terms of education and experience relying on the company webpage and LinkedIn as main sources of information. We excluded from our sample those BA backed firms for which we do not find biographical information. This leaves us with a sample of 134 BA-backed firms.

### Control sample

The entrepreneurial finance literature on angel and venture capital financing suggests that BA or VC backed firms may exhibit *ex-ante* better prospects for both survival and growth, thanks to the capital received and to BAs' screening and monitoring activities (Bonini, Capizzi, and Zocchi 2019; C. M. Mason and Harrison 2002; Chemmanur and Chen 2014; Croce et al. 2021; Cumming and Johan 2008; Elitzur and Gaviou 2003; Kaplan and Strömberg 2004; Lerner et al. 2018; Levratto, Tessier, and Fonrouge 2018; Wallmeroth, Wirtz, and Groh 2018; Wong, Bhatia, and Freeman 2009). At the same time, this literature suggests that BA-backed firms may be *ex-ante* riskier than the average firm. This evidence poses a problem of endogeneity because the founders' HC may produce both a direct effect on company growth and an indirect effect on the access to angel investment. To cope with this concern, we build a propensity score matched (PSM) counterfactual sample of non-BA backed ventures with similar characteristics to BA backed firms at the time of BA investment. To build the control group sample, we first downloaded a random sample of Italian firms from Orbis founded between 2006 and 2015 (the same years as BA backed firms) and performed the PSM algorithm. We matched each BA-backed firm in the year



before the BA investment (or in the year of the BA investment when accounting information in the year before was not available) on the following variables: age, total assets, sales, ROA, equity ratio (measured by total equity divided by total assets), the number of team members at foundation and their average age, industry (i.e., NACE Rev. 2 Main Section) and regional dummies (i.e., NUTS-1 level). After matching, we end up with a final sample of 77 matched BA backed firms (for 57 BA backed firms we are missing accounting information for at least one of the variables used in the matching process) and 77 control sample firms. As done for the BA backed sample, we searched for entrepreneurial team's biographical information of control sample firms relying on the Italian Register of Companies, LinkedIn and company websites.

Table 1 reports descriptive statistics for BA backed and control sample firms. Panel A of Table 1 compares the means of the variables used in the PSM after matching and does not reveal any statistically significant differences, confirming the appropriateness of the matching process. Panel B of Table 1 compares the HC of founders for BA-backed firms and control group companies. On average, BA backed firms have a significant higher number of founders with a scientific master's degree, an MBA degree, or a PhD. Moreover, BA backed firms have a higher number of founders with experience in starting a venture, experience as senior managers and technical experience (i.e., work experience in science or engineering). This suggests that BA-backed firms have a higher stock of HC, which could well influence the probability of raising BA financing.

Finally, Panel C of Table 1 shows the distribution of BA-backed firms by foundation year, sector and regional area. Most of the firms are located in Northern Italy (46.7%) and belong to the Software (44.2%) and Services (30%) sectors. Seventeen percent show revenues equal to zero in the BA investment year, while 83.1% have negative income in the BA investment year.

## Measures

### Dependent variables

To test H1, we use as dependent variable *BA funding* that is a dummy variable equal to 1 for BA backed firms and 0 for control group firms.

To test H2–H4 we use three measures of startup performance. Measuring startup performance is a debated issue in the extant entrepreneurship and entrepreneurial finance literature. Years after their constitution, startups tend to show negative Net Income, zero Revenue and, even sometimes, negative Net Asset value. This makes traditional measures based on financial variables and ratios unsuitable to appraise the performance of newly founded firms fully and unambiguously (Gompers 1995, Gompers and Lerner 2001, C. M. Mason and Harrison 2002, Landström and Mason 2016, Bonini, Capizzi, and Zocchi 2019). Thus, when applied, these measures return very dispersed and noisy results. Several contributions have tried to tackle this problem by employing non-financial metrics such as “exits” (Cumming and Zhang 2019), firm-survival (Pommet 2012; Kerr, Lerner, and Schoar 2014, Lerner et al. 2018), growth (Croce et al. 2021; Kerr, Lerner, and Schoar 2014, Levratto, Tessier, and Fonrouge 2018), a joint combination of commonly accepted financial metrics (Macht and Robinson 2009, Levratto, Tessier, and Fonrouge 2018, Bonini, Capizzi, and Zocchi 2019), or follow-on venture capital financing (Butticè, Croce, and Ughetto 2021; Capizzi, Croce, and Tenca 2022; Collewaert, Manigart, and Aernoudt 2010; Mason, Botelho,

**Table 1.** Descriptive statistics.

Variable	BA = 1				BA = 0				Mean difference		
	n firms	Mean	Std. Dev.	Min	Max	n firms	Mean	Std. Dev.		Min	Max
<b>Panel A: Matching results</b>											
Age (log)	77	0.697	0.552	0.000	2.773	77	0.663	0.721	0.000	2.303	0.034
Total assets (log)	77	5.288	1.494	1.145	8.993	77	5.132	2.067	0.073	9.838	0.156
Sales (log)	77	3.450	2.247	0.000	7.066	77	3.681	2.885	0.000	10.099	-0.231
ROA	77	-0.285	0.386	-1.656	0.191	77	-0.546	4.295	-37.605	0.495	0.261
Equity ratio	77	0.468	0.466	-2.229	0.997	77	0.325	0.502	-2.776	1.000	0.144
Average age team (log)	77	3.672	0.206	3.321	4.111	77	3.642	0.253	3.091	4.241	0.029
Number team members	77	1.857	2.076	1.000	15.000	77	2.117	1.762	1.000	12.000	-0.260
<b>Panel B: HC characteristics</b>											
Master degree	77	0.5467	0.50117	0	1	77	0.299	0.46069	0	1	0.248
MBA	77	0.0933	0.29286	0	1	77	0.013	0.11471	0	1	0.080
PhD	77	0.0933	0.29286	0	1	77	0.026	0.16114	0	1	0.067
Entr exp	77	0.7733	0.42149	0	1	77	0.197	0.40066	0	1	0.576
CXO exp	77	0.5867	0.49575	0	1	77	0.25	0.43589	0	1	0.337
Consulting exp	77	0.1733	0.38108	0	1	77	0.184	0.39023	0	1	-0.011
Technical exp	77	0.2133	0.41242	0	1	77	0.039	0.19601	0	1	0.174
<b>Panel C: Distribution of BA backed firms by foundation year, sector, and location</b>											
Revenue in the investment year=0	13	16.88									
Net income in the investment year<0	64	83.12									
<b>Foundation year</b>											
2006	2	2.6									
2007	1	1.3									
2008	2	2.6									
2009	3	3.9									
2010	7	9.09									
2011	10	12.99									
2012	13	16.88									
2013	26	33.77									
2014	7	9.09									
2015	6	7.79									
<b>Sector</b>											
Manufacturing	12	15.58									
Software	34	44.16									
Services	23	29.87									
<b>Location</b>											
North	47	46.75									
Centre	22	28.57									
South	8	10.39									
Total	77	100									

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.001$  (two-tailed).

and Harrison 2019; Werth and Boert 2013; Capizzi, Croce, and Tenca 2022). We do not use exit-based metrics, since in the investigated sample the number of exits through IPOs or M&As is very few, nor we were confident to be able to detect follow-on venture capital investment rounds performed by our sample companies; moreover, traditional performance measures, such as firm size and employees, have not or very limited predictive power. We created three distinct dependent variables to measure the different dimensions of performance in BA-backed firms. The first is survival of the firm. *Survival* is measured as a dummy variable equal to 1 if the company survived after the BA's investment and 0 otherwise. We observe survival up to the end of 2023. The second dependent variable is firm growth. We use revenue growth, calculated as the annual log difference of revenues (*Revenue growth<sub>t</sub>*). Finally, consistent with prior work in the entrepreneurial literature, we use the annual Return on Asset (*ROA<sub>t</sub>*, calculated as net income divided by total assets) to measure the profitability of startups (Dess and Lumpkin 1996; Desai 2008; Bruton et al. 2010; Collewaert et al. 2010; Wiklund, Baker, and Shepherd 2010; He and Huang 2011; Coad et al. 2016; Laitinen 2017; Cole and Sokolyk 2018; Nicotra, Schillaci, and Romano 2019; S. O. Becker and Hvide 2022; Fuertes-Callén, Cuellar-Fernández, and Serrano-Cinca 2022).

### *Independent variables*

We measure general and specific HC as education and prior work experience, respectively. We first code both general and specific HC at the individual level as dummy variables, as done by prior work in both venture capital and entrepreneurship (see, among the others, Shane and Stuart 2002, Colombo and Grilli 2005, Dimov and Shepherd 2005, Sudek 2006, Walske and Zacharakis 2009, Colombo and Grilli 2010, Zarutskie 2010, Brinckmann and Kim 2015, Capelleras et al. 2019, Lim and Busenitz 2020). Second, we aggregate the individual-level codes to obtain a team-level measure of HC.

General HC is measured considering whether at least one founder in the founding team had an MSc-level degree in science, whether at least one founder in the founding team had an MBA degree, and whether at least one founder in the founding team had a PhD. Specific HC is measured as prior work entrepreneurial, top management (CXO), consulting, or technical experience. Prior entrepreneurial experience refers to situations where at least one founder was engaged in the founding or co-founding of a company prior to starting up the one included in our sample. Prior top-management experience indicates whether at least one founder held C-level positions (e.g., Chief Executive Officer, Chief Operating Officer, Chief Information Officer, etc.) or second-tier executive positions (e.g., Senior Vice President, Executive Vice President, etc.) prior to founding the focal startup. Prior consultancy experience reflects whether at least one founder had worked for a consultancy firm before starting up the sampled venture. Last, prior technical experience indicates whether at least one founder had prior work experience in science or engineering.

### *Control variables*

We control in all our models for several control variables, including the number of founders, the average age of founders, the company age at the time of receiving BA financing and whether the company has its headquarters in the North of Italy, i.e., the geographical region where most of the Italian startup are based (Italian Minister for

**Table 2.** Firm performance, BA backed vs control sample.

Variable	BA = 1					BA = 0					Mean difference
	n firms	Mean	Std. Dev.	Min	Max	n firms	Mean	Std. Dev.	Min	Max	
Survival 3y	77	0.961	0.195	0	1	77	0.935	0.248	0	1	0.026
Survival 5y	77	0.844	0.365	0	1	77	0.792	0.408	0	1	0.052
Survival >5y	77	0.584	0.496	0	1	77	0.532	0.502	0	1	0.052
Revenue growth 3y	69	1.550	1.972	-4.028	7.967	67	1.324	1.988	-2.545	7.301	0.227
Revenue growth 5y	58	1.878	2.245	-4.032	9.163	50	1.342	2.064	-2.839	7.947	0.535
ROA 3y	70	-0.187	0.245	-0.590	0.111	67	-0.038	0.161	-0.590	0.111	-0.150
ROA 5y	59	-0.138	0.235	-0.590	0.111	51	-0.006	0.130	-0.590	0.111	-0.132

Economic Development 2021), and whether it operates in the IT sector. We also include year dummies.

In Table 2, we present preliminary statistics on the performance of BA-backed firms 3 and 5 years after BA investment, focusing on survival, growth, and profitability compared to the control group firms. It is evident that BA-backed companies have a higher survival rate than the control sample 3, 5, and more than 5 years post-investment. Specifically, 96.1% of BA-backed companies survive after 3 years, and 84.4% survive after 5 years. Additionally, BA-backed firms exhibit higher revenue growth, especially 5 years post-investment, compared to non-BA-backed firms. However, BA-backed firms show a worse ROA, for instance, 5 years after investment, the ROA is -14% for BA-backed companies versus 0.6% for the control group. Despite these observations, t-test results do not confirm that these differences are statistically significant. Finally, the correlation matrix is shown in Table 3.

### Econometric model

To test H1, we estimate the following logit regression model:

$$BA\ funding_i = \alpha_0 + \beta_s \sum General\ HC_{s,i} + \gamma_s \sum Specific\ HC_{s,i} + \delta_s \sum Controls_{s,i} + \epsilon_i,$$

where the dependent variable is *BA funding*, and the main independent variables are our set of *General* and *Specific HC* characteristics.

To test H2, we estimate the following logit regression model:

$$Survival_i = \alpha_0 + \lambda_1 BA\ funding_i + \beta_s \sum General\ HC_{s,i} + \gamma_s \sum Specific\ HC_{s,i} + \delta_s \sum Controls_{s,i} + \epsilon_i,$$

where the dependent variable is firm *Survival*, and our independent variables of interest are *BA funding* and *General* and *Specific HC* characteristics.

Finally, to test H3 and H4 regarding the growth and profitability of BA-backed companies, we estimate the following fixed-effect regressions:

$$Y_{i,t} = \alpha_0 + \alpha_1 Y_{i,t-1} + \lambda_1 BA\ funding_{i,t} + \beta_s \sum General\ HC_{s,i} + \gamma_s \sum Specific\ HC_{s,i} + \delta_s \sum Controls_{s,i} + \epsilon_i,$$

**Table 3.** Descriptives and correlation matrix

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7
1. BA funding	0.5000	0.5001	0	1	1						
2. Survival	0.5584	0.4967	0	1	0.0523	1					
3. Revenue growth(log)	0.2334	1.2378	-6.3021	6.9068	0.0552	0.283	1				
4. ROA	-0.1122	0.2171	-0.5901	0.1109	-0.3178*	0.2643*	0.0338	1			
5. Master degree	0.4156	0.4929	0	1	0.2372*	0.0334	0.0557	-0.1571*	1		
6. MBA	0.0519	0.2220	0	1	0.1756*	-0.0865*	0.032	-0.0724	0.2182*	1	
7. PhD	0.0584	0.2346	0	1	0.1384*	0.1100*	-0.0106	0.035	0.2954*	-0.0583*	1
8. Entr exp	0.4740	0.4994	0	1	0.5592*	-0.0201	0.0341	-0.1926*	0.1230*	0.0708*	-0.0148
9. CXO exp	0.4091	0.4918	0	1	0.3302*	0.0218	0.0229	-0.1491*	0.3435*	0.1028*	0.0179
10. Consulting exp	0.1753	0.3803	0	1	-0.0171	-0.0027	0.0422	-0.0175	0.4082*	-0.031	0.0307
11. Technical exp	0.1234	0.3289	0	1	0.2567*	0.0553*	-0.033	-0.0228	0.4449*	0.1791*	0.4957*
12. Average age team (log)	3.6570	0.2301	3.0910	4.2413	0.0635*	-0.2058*	-0.0181	-0.0173	0.0062	0.0591*	-0.0770*
13. Number team members	1.9870	1.9175	1	15	-0.0677*	-0.0606*	0.0285	-0.0099	0.1707*	0.0168	0.0739*
14. Age (log)	0.6803	0.6386	0	2.7726	0.0263	0.0819*	-0.0602	0.0332	-0.001	0.0101	0.0152
15. Total assets (log) (at BA/matching)	5.2104	1.7940	0.0733	9.8382	0.0435	0.1414*	-0.0541	0.0267	0.0863*	-0.0766*	-0.0235
16. Revenues (log) (at BA/matching)	3.5652	2.5722	0	10.0988	-0.0449	0.2727*	-0.1043*	0.1586*	-0.1480*	0.0106	0.0405
17. ROA (at BA/matching)	-0.4152	3.0327	-37.6053	0.4947	0.043	0.1137*	0.0108	0.1626*	-0.1030*	-0.3437*	0.0227
18. North	0.5844	0.4929	0	1	0.0527	-0.0865*	-0.0218	-0.0678	0.016	-0.1588*	-0.0708*
19. IT	0.2208	0.4149	0	1	0.4070*	-0.1257*	0.0134	-0.2265*	0.1865*	0.0870*	0.0009



where the dependent variable  $Y$  is the firm *Revenue growth<sub>t</sub>* (the annual log difference of revenues) or *ROA<sub>t</sub>* (the annual net income divided by total assets), and our independent variables of interest are *BA funding* and *General* and *Specific HC* characteristics.

## Results

### *BA funding and entrepreneurs' HC*

To test H1, stating that the entrepreneurs' HC has a direct positive effect on the probability of receiving BA funding, we resort to a logit regression model with as dependent variable *BA funding*. Table 4 shows the results. Model 1 includes only control variables, Model 2 includes the direct effect of general HC, Model 3 includes the direct effect of specific HC, and Model 4 includes the full model with both general and specific HC and controls.

Results from Model 4 show that the likelihood of receiving BA funding is higher for those startups whose founders have an MBA degree ( $\beta = 2.465$ ,  $p < .001$ ), a PhD ( $\beta = 1.182$ ,  $p < .05$ ), have prior entrepreneurial ( $\beta = 2.226$ ,  $p < .001$ ) and prior technical experience ( $\beta = 1.524$ ,  $p < .001$ ). This suggests that BA backed ventures have higher general and specific HC than non-BA backed ventures, supporting the idea that BA backed companies have a higher stock of HC than their counterparts. Thus, we find support for H1.

**Table 4.** Logit results predicting the probability of receiving BA funding.

	(1)	(2)	(3)	(4)
Age (log)	0.080 (0.132)	-0.032 (0.145)	-0.176 (0.220)	-0.225 (0.220)
Total assets (log)	0.090 (0.093)	0.134 (0.107)	0.119 (0.132)	0.188 (0.139)
North	0.336 (0.227)	0.638* (0.339)	0.081 (0.286)	0.273 (0.297)
IT	2.641*** (0.852)	2.726*** (0.921)	2.164** (1.022)	2.112** (0.850)
Average age team (log)	0.773 (1.140)	0.520 (1.021)	0.529 (1.547)	0.262 (1.446)
Number team members	-0.044 (0.037)	-0.098** (0.045)	-0.104 (0.093)	-0.168 (0.106)
Master degree		0.566 (0.361)		0.339 (0.773)
MBA		2.551** (1.074)		2.465*** (0.917)
PhD		1.617 (1.075)		1.182** (0.498)
Entr exp			2.175*** (0.672)	2.226*** (0.646)
CXO exp			0.653 (0.852)	0.671 (0.817)
Consulting exp			-0.148 (0.571)	-0.277 (0.941)
Technical exp			2.657*** (0.363)	1.524*** (0.474)
Log-Likelihood	-89.337	-82.443	-66.749	-64.303
Pseudo R-squared	0.158	0.223	0.371	0.394
N firms	154	154	154	154

\* $p < 0.10$  \*\* $p < 0.05$ , \*\*\* $p < 0.001$  (two-tailed).



**Table 5.** Logit results predicting the probability of survival after the BA investment.

	(1)	(2)	(3)	(4)	(5)
BA funding	0.767* (0.424)	0.848* (0.438)	0.845* (0.500)	0.914* (0.521)	1.610** (0.639)
Age (log)	0.096 (0.321)	0.099 (0.326)	0.109 (0.325)	0.100 (0.333)	0.115 (0.370)
Total assets (log)	0.259** (0.120)	0.263** (0.125)	0.269** (0.119)	0.276** (0.124)	0.048 (0.153)
North	-0.636 (0.437)	-0.696 (0.445)	-0.650 (0.435)	-0.727 (0.447)	-0.628 (0.470)
IT	-1.295** (0.509)	-1.241** (0.503)	-1.265** (0.532)	-1.196** (0.538)	-1.256** (0.568)
Average age team (log)	-1.771* (0.940)	-1.590* (0.946)	-1.812* (0.935)	-1.646* (0.939)	-1.432 (0.980)
Number team members	-0.112 (0.092)	-0.117 (0.105)	-0.110 (0.097)	-0.133 (0.109)	-0.141 (0.114)
Turnover (log)					0.261*** (0.097)
ROA					2.026*** (0.623)
Master degree		-0.171 (0.467)		-0.131 (0.581)	0.561 (0.723)
MBA		-1.042 (0.712)		-1.049 (0.732)	-1.672** (0.822)
PhD		0.787 (1.182)		0.969 (1.238)	0.732 (1.326)
Entr exp			-0.204 (0.548)	-0.284 (0.572)	-0.204 (0.597)
CXO exp			0.173 (0.455)	0.314 (0.463)	0.235 (0.485)
Consulting exp			-0.195 (0.545)	-0.144 (0.642)	-0.518 (0.730)
Technical exp			-0.176 (0.642)	-0.262 (0.750)	-1.102 (0.820)
Log-Likelihood	-88.515	-87.237	-88.324	-86.934	-77.686
Pseudo-R-squared	0.156	0.168	0.158	0.171	0.259
N firms	154	154	154	154	154

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.001$  (two-tailed).

### Contribution of BA funding and entrepreneurs' HC on startup performance

Table 5 reports logit regression results for the probability of survival of the startup after BA investment (H2). Model 1 includes only control variables, Model 2 includes the direct effect of general HC, Model 3 includes the direct effect of specific HC, and Model 4 includes the full model with both general and specific HC and controls. Results from Model 4 show that, conditional on receiving BA funding, HC does not seem to have any significant correlation with survival. The BA funding dummy is positive, but weakly significant ( $\beta = 0.914$ ,  $p < .1$ ). Model 5 of Table 5 further includes startup's revenues and ROA in the year of BA investment as additional controls for firm profitability, confirming previous results. Thus, we do not find support for H2. This suggests that, while BAs value both general and specific HC components when they must decide which ventures to back, these HC dimensions fail in themselves to facilitate the survival of the venture. In other words, consistent with a RBV approach, the founders' HC is a crucial resource enabling the target company to take benefit not only from the capital resources provided by BAs but also from their non-monetary contribution provided in the post-investment phase, giving rise to a further crucial, though intangible, resource stemming from the joint interaction between founders'

HC and BAs. This doesn't mean, however, HC by itself is a determinant of company performance: there is evidence of some contributions finding that excess of "overconfidence", also referred to as "self-efficacy", might lead entrepreneurs to risky decisions and eventually to company failure (Shane and Venkataraman 2000, Davidsson and Honig 2003, Hayward, Shepherd, and Griffin 2006, Koellinger, Minniti, and Schade 2007, Cassar and Friedman 2009, Pirinsky 2013, Chen et al. 2018). Coming back to our horse racing metaphor, the talent of a jockey is not in itself a guarantee he will be able to ride his horse safely and effectively towards success, however talentless jockeys have limited chance to attract those coaches crucial to succeed in horse races.

To test H3 and H4 predicting the growth and profitability of BA-backed firms, we resort to a panel setting, where firm performance is measured annually. In this analysis, *BA funding* is represented by a step dummy variable that assumes value 1 after BA investment, and it is 0 before and we control for firm performances in time  $t-1$ . Table 6 reports panel OLS regressions with firm fixed effects predicting startups growth and profitability measured, respectively, by *Revenue growth<sub>t</sub>* and *ROA<sub>t</sub>*. Models 1–4 report estimates for *Revenue growth<sub>t</sub>*, while Models 5–8 report estimates for *ROA<sub>t</sub>*. Revenues in  $t-1$  and firm age are negatively correlated with an increase in revenues, while ROA in  $t-1$  is positively

**Table 6.** Panel OLS results predicting firm profitability and revenue growth after the BA investment or matching (for the control group firms).

	Dep var: Revenue growth <sub>t</sub> (log difference)				Dep var: ROA <sub>t</sub>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BA funding	1.138*** (0.235)	1.024*** (0.201)	1.002*** (0.270)	1.204*** (0.284)	0.069 (0.069)	0.043 (0.061)	0.078 (0.067)	0.063 (0.063)
Revenues <sub>t-1</sub> (log)	-0.250*** (0.028)	-0.250*** (0.028)	-0.249*** (0.028)	-0.249*** (0.028)				
ROA <sub>t-1</sub>					0.201*** (0.050)	0.188*** (0.050)	0.201*** (0.049)	0.186*** (0.049)
Age (log)	-0.354* (0.198)	-0.357* (0.199)	-0.360* (0.198)	-0.366* (0.199)	0.060 (0.056)	0.060 (0.056)	0.061 (0.056)	0.058 (0.056)
Total assets <sub>t-1</sub> (log)	0.088*** (0.028)	0.088*** (0.028)	0.086*** (0.028)	0.087*** (0.028)	-0.003 (0.011)	-0.003 (0.011)	-0.003 (0.011)	-0.002 (0.011)
Average age team (log)	-0.320*** (0.078)	-0.352*** (0.079)	-0.293*** (0.090)	-0.272*** (0.064)	-0.011 (0.009)	-0.009 (0.009)	-0.012 (0.010)	-0.009 (0.009)
Number team members	0.610*** (0.122)	0.690*** (0.131)	0.528*** (0.135)	0.545*** (0.103)	0.012 (0.008)	0.017*** (0.006)	0.019* (0.010)	0.019** (0.009)
Master degree		-0.380 (0.271)		-0.852*** (0.308)		-0.112 (0.072)		-0.193*** (0.091)
MBA		0.919*** (0.351)		0.869*** (0.198)		0.446*** (0.106)		0.466*** (0.109)
PhD		0.000 (.)		0.000 (.)		0.078 (0.069)		0.038 (0.073)
Entr exp			0.085 (0.300)	-0.243 (0.284)			-0.030 (0.075)	-0.062 (0.054)
CXO exp			-0.084 (0.204)	0.097 (0.282)			0.050 (0.093)	0.074 (0.065)
Consulting exp			0.000 (.)	0.000 (.)			-0.132 (0.117)	0.042 (0.119)
Technical exp			0.776** (0.306)	0.780*** (0.219)			0.008 (0.105)	0.083 (0.116)
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes
Log-Likelihood	-600.672	-598.859	-599.148	-597.405	530.070	538.292	531.652	539.107
R-quadro	0.358	0.361	0.360	0.363	0.067	0.082	0.070	0.083
N firms	989	989	989	989	1031	1031	1031	1031

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.001$  (two-tailed).

correlated with follow-on ROA (i.e., firm profitability). This is in line with expectations. Also, larger firms grew more in revenues, while there was no association between firm size and ROA. Turning to our variables of interest, we find a positive significant correlation between *BA funding* and *Revenue growth<sub>t</sub>*. As far as founders' HC, we find a positive and significant correlation with growth in revenues and entrepreneurs' MBA degree and prior technical experience. In other words, controlling for BA funding, which is positive related to revenue growth, some features of general and specific HC of entrepreneurs still show a positive association with revenue growth. Thus, we find support for H3. Considering instead firm profitability measured by ROA, we find no significant correlation either for BA funding or HC variables (except for MBA degree). Opposite to our expectations, BA backed firms do not exhibit a higher profitability than control sample firms and the HC characteristics do not help explaining long-term profitability. Thus, we do not find support for H4.

Overall, our results suggest that HC does matter particularly at the very early stages of the BA–entrepreneur relationship when entrepreneurs' HC is a major driver of the selection process leading BAs to invest in a new venture, but after receiving BA funding HC is not the main driver of either startup survival or profitability.

### **Robustness checks**

First, we check whether results change according to different model specifications and different measurements of variables, both dependent and independent ones. For the dependent variables, we measure performance using Revenue growth 3 or 5 years after BA investment. Alternatively, we measured growth with the ratio between Revenues and Total Asset. We also checked if results change using ROA growth instead of the annual level of ROA. As for independent variables, we measure specific HC using the number of years of experience instead of a dummy. All these robustness checks lead to qualitatively similar results.

Second, to account for sample selection bias that could affect our estimates regarding firm growth and profitability, due to companies that failed after BA investment, we run a Heckman correction model. Results are reported in [Table 7](#). In the first step (Model 3), we estimate the probability of survival on all our independent and control variables adding as exclusionary restriction the average failure rate in the region where the focal firm is based (in the year of BA investment); then, we predict the inverse mills ratio from this first-stage regression and add it to the second-stage regressions for the probability of revenue growth (Model 1) and profitability (ROA) (Model 2). Being located in a region with a higher average startup failure rate is likely to correlate with a firm's probability of survival, but it does not directly affect its performance once all other confounding factors are controlled for. We find consistent results with our main estimates.

### **Discussion and concluding remarks**

New venture founders' HC and capital injection by BAs are key drivers of both firm survival and growth. On the one hand, entrepreneurs with high stocks of HC are better able to judge opportunities and act upon them; on the other hand, BAs provide new ventures with both the financial capital needed to fund growth and the competencies needed to help them to survive and thrive in the marketplace (Gimeno et al. 1997, Colombo and Grilli 2005, Rauch and Rijdsdijk 2013, Unger et al. 2011, Criaco et al. 2014, Lerner et al. 2018,

**Table 7.** Panel OLS results predicting firm profitability and revenue growth after the BA investment or matching (for the control group firms), Heckman correction model.

	Revenue growth <sub>t</sub> (1)	ROA <sub>t</sub> (2)	Survival – first step (3)
BA funding	1.155*** (0.355)	-0.011 (0.085)	0.359*** (0.083)
Revenues <sub>t-1</sub> (log)	-0.249*** (0.028)		
ROA <sub>t-1</sub>		0.188*** (0.049)	
Age (log)	-0.322 (0.276)	0.124 (0.076)	-0.352*** (0.073)
Total assets <sub>t-1</sub> (log)	0.087*** (0.028)	-0.002 (0.011)	0.148*** (0.017)
Average age team (log)	-0.257*** (0.089)	0.021 (0.026)	-0.147*** (0.036)
Number team members	0.568*** (0.145)	0.041** (0.019)	-0.111*** (0.019)
Master degree	-0.859*** (0.315)	-0.216** (0.092)	0.137 (0.092)
MBA	0.952** (0.421)	0.590*** (0.149)	-0.678*** (0.149)
PhD	0.000 (.)	-0.083 (0.126)	0.568*** (0.190)
Entr exp	-0.227 (0.292)	-0.063 (0.053)	-0.058 (0.089)
CXO exp	0.071 (0.298)	0.054 (0.064)	0.188** (0.081)
Consulting exp	0.000 (.)	0.043 (0.116)	-0.038 (0.097)
Technical exp	0.803*** (0.233)	0.112 (0.119)	-0.137 (0.131)
Inverse mills ratio	-0.235 (1.026)	-0.348 (0.286)	
Regional failure rate			-0.087** (0.035)
Firm FE	yes	yes	no
Log-Likelihood	-597.385	539.655	-1432.084
R-squared	0.363	0.084	0.097
N firms	989	1031	1031

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.001$  (two-tailed).

Bonini, Capizzi, and Zocchi 2019, Linder, Lechner, and Pelzel 2020, Croce et al. 2021). Although both entrepreneurs' HC and BA capital injection are determinants of survival and growth, the literature has overlooked the extent to which they jointly influence the performance of the funded young ventures.

Relying on data from Italian BA backed ventures and a PSM control group of non-BA backed companies, we investigate a) which entrepreneurs' HC characteristics, disentangled into general and specific HC, are associated with BA financing, and b) whether, after receiving BA financing, entrepreneurs' HC is correlated with the performance of funded startups, in terms of survival, growth and profitability.

The results show interesting insights into the mechanisms that generate a relationship among our variables and have important implications both for the academic debate and practice. First, our work adds to the entrepreneurship literature (El Shoubaki, Laguir, and den Besten 2020, Linder, Lechner, and Pelzel 2020) by showing the extent to which internal attributes of new ventures, i.e., the entrepreneurs' HC, influence both the ability of the venture

to raise funding from seed-stage investors and its performance. Our empirical evidence suggests that some entrepreneurs' general and specific HC features matter for attracting BA funding. Regarding specific HC, we find that technical and entrepreneurial experience are associated with a higher probability of receiving BA funding. The tacit knowledge and the information achieved through experience with specific tasks and jobs help successful opportunity recognition, re-evaluation, and exploitation, which are all key determinants of success in nascent ventures (Shane 2000) and act as a legitimate signal for the quality of the venture for BA investors (Busenitz, Fiet, and Moesel 2005; Gimmon and Levie 2010; Ahlers et al. 2015; Harrison and Mason 2017; Ko and McKelvie 2018; Buttice, Croce, and Ughetto 2021; Naiki and Ogane, 2022). This is in line with Unger et al. (2011) meta-analytic results indicating that investments in garnering experience that foster the accumulation of skills and tacit knowledge do contribute to increasing the quality of the venture possessing those skills. Additionally, entrepreneurs who engaged with the process of starting a company prior to starting the BA backed venture have more skills and social connections with the BA ecosystem than novice entrepreneurs, are more confident about the prospects of their new venture and know how to play the fundraising game (Paik 2013, Harrison and Mason 2017, Zhang 2019). Our evidence also shows that graduate-level degrees such as MBAs are more likely to attract BA funding, which may act, again, as a quality signal for early-stage investors. Instead, we find that prior experience as a manager or consultant does not appear to influence the likelihood of attracting BA funding. One possible interpretation is that BAs may prioritize entrepreneurial or industry-specific experience over general management or consulting backgrounds when deciding to invest. While managerial and consulting roles may cultivate transferable skills, they may not demonstrate the entrepreneurial mindset, risk tolerance, and industry insights that BAs might view as essential for startup long-term success.

Turning to our results on startup performance, we find a positive association of entrepreneurs' MBA degree and technical experience with venture performance, after controlling for BA funding. This relationship, however, holds only for startup growth – not for survival or profitability. Given that BA-backed firms are high-risk projects lacking sufficient track records to predict survival and profitability, one possible interpretation is that MBA and technical backgrounds may equip entrepreneurs with knowledge and skills conducive to scaling operations or increasing revenue, driving initial growth. However, these skills, even combined with the BA non-monetary contributions, are not enough to directly influence the long-term resilience (survival) and efficient management (profitability) of the venture.

As a major economic implication, our work offers a novel view both to entrepreneurs and BAs on what drives survival and what drives growth. For entrepreneurs, we extend the view that HC is a key determinant of BA investors' funding decision when uncertainty is very high (Maxwell, Jeffrey, and Lévesque 2011, Lerner et al. 2018) and, under such conditions, a signal of the quality of the venture. This suggests that entrepreneurs should pay close attention to pitching their HC skills and knowledge to BA investors, emphasizing the abilities garnered through MBA education at general HC level and downplaying their prior experiences with starting other ventures.

Our paper adds to the literature on the nature of the relationship between the HC resources available to new ventures and external resources available through investors, especially in the case of BAs who provide both monetary and non-monetary resources. Although we made our best effort in the empirical design to address endogeneity concerns by building a reliable control group of non-BA backed firms,

we cannot completely exclude endogeneity issues, due to the challenge of capturing new venture quality and HC relying only on publicly available information. We acknowledge this as a limitation of the study, and we do not claim to establish any causal relationships in our empirical analysis, but only to present correlational results. A further limitation of our analysis deals with the homogeneity of the role played by BAs, whereas in the startup ecosystem we do observe different BA business models (solo angels, structured business angel networks, low structured club deals) and different levels of HC associated to BAs (experienced vs. low experienced, high vs. low educated, entrepreneurial vs. managerial background) implying a more complex set of possible combination with entrepreneurs' HC and, hence, multiple growth path associated to the funded ventures.

Despite these limitations, we have strived to offer a novel perspective on the determinants of BA funding and new venture's survival and growth. As we were not able to detect a direct effect of BA funding or HC on firm profitability, an interesting avenue for future research disclosed by our paper would be the analysis of the performance of BA backed ventures associated with the risk-adjusted return of these investments for angel investors. This might shed light over the true efficiency and growth potential of such early-stage segment of the capital markets and disclose possible areas of intervention for policy-makers and regulators.

Also, we leave to future research another interesting issue opened by our contribution: the analysis, within a resource-based view framework, of the dynamic interaction between founders' HC and BAs' HC in the post-investment phase and, further, the possible role played by "homophily" (Venugopal 2017, Qin, Mickiewicz, and Estrin 2022), that is the homogeneity in terms of education, social connections, cognitive models between entrepreneurs and BAs and the estimation of its impact on the performance of the BA backed ventures.

## Notes

1. See, among the others, Sahlman (1990); Fried and Hishrich (1994); Lerner (1994, 1995); Wright, Robbie, and Ennew (1997); Wright and Robbie (1998); Black and Gilson (1998); Gompers and Lerner (1999); Lockett and Wright (2001); Zacharakis and Shepherd (2001); Manigart, Baeyens, and Van Hyfte (2002); Hsu (2004); Kaplan and Strömberg (2004); Cumming (2005, 2008); Manigart et al. (2006); Filatotchev, Wright, and Arberk (2006); Colombo and Grilli (2010); Chemmanur, Krishnan, and An Nandy (2011); Tian (2011); Puri and Zarutskie (2012); Croce, Marti, and Murtinu (2013); Da Rin, Hellmann, and Puri (2013); Cumming and Johan (2013); Bernstein, Giroud, and Townsend (2016); Cumming, Grilli, and Murtinu (2017); Lerner and Nanda (2020).
2. For more detailed descriptions of the survey procedure run by IBAN, see Bonini et al. (2018, 2019); Croce et al. (2021); Capizzi, Croce, and Tenca (2022).

## Disclosure statement

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