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**Article**

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# Contribution of business angel investments: evidence from Estonia

Business angel  
investments

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## Abstract

**Purpose** – This study aims to analyze the contribution of business angels (BAs), defined as wealthy individuals who provide risk capital to entrepreneurial firms without family connections, in Estonia, an emerging country in Eastern Europe.

**Design/methodology/approach** – This study compared the data of the financial and non-financial performance of BA-backed firms with that of “twin” non-BA-backed firms, extracted from all Estonian unlisted firms using propensity score matching.

**Findings** – The results of the comparative analysis showed that BAs were patient enough to allow their investees to spend for future growth rather than squeezing profit from increased sales. This is not patience without options for a BA in a situation in which the investee's sales are deteriorating, but rather deliberate patience in the presence of options for a BA where the investee's sales growth is increasing, contrary to conventional investor behavioral principles. It also showed that BAs' post-investment involvement did not make a direct contribution to their investees' sales, although BAs contributed to the sales increase through BA funding itself.

**Originality/value** – This study has two unique research contributions. First, it shows that the patience of BAs was not a by-product but was intentional, and adds to the debate on whether BAs are patient investors. Second, there are only a few studies on the contribution of BAs to their investees in emerging countries; this study aims to help fill this research gap using the case of Estonia.

**Keywords** Business angels, Risk capital, Comparative analysis, Propensity score matching, Estonia, Emerging countries

**Paper type** Research paper

## 1. Introduction

Business angels (BAs) are wealthy individuals who provide risk capital to entrepreneurial firms without family connections (Mason and Harrison, 1995; Duxbury *et al.*, 1996). According to prior research, BAs have two major characteristics. First, BAs mainly invest in start-ups that do not have enough money for growth (Wetzel, 1981, 1983). The phenomenon whereby start-ups do not have sufficient growth funds is called the financial gap. It is considered one of the most critical issues in entrepreneurial finance policies around the world (Mason and Harrison, 1995; Block and Sandner, 2009; Kiriha, 2018). Venture capital (VC)

**JEL Classification** — G23, G32, L26, M13

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became a source of growth capital for start-ups in 1946, which was the founding year of the American Research and Development Corporation, the world's first organized VC (Jacobs, 1969; Bygrave and Timmons, 1992). However, in the early 1990s, VC shifted from start-up investment to later-stage investment (Wilson, 1995; Sohl, 1999, 2003; Hindle and Lee, 2002), owing to higher risks for start-up investments and longer holding time before their exit (Sapienza *et al.*, 1996; Kirihata, 2009).

The second characteristic is that BAs adopt a different stance to VC-related investments in start-ups (Stedler and Peters, 2003; Mason and Stark, 2004; Tenca *et al.*, 2018), as outlined in detail in the next paragraph. As a result, BAs in developed countries have become the primary source of funding for start-ups, which leads to the closing of the financial gap (Landström, 1993; Reitan and Sorheim, 2000; Morrisette, 2007). Studies on BAs in emerging countries indicate that they play a positive role in closing the financial gap among start-ups (Jones and Mlambo, 2013). Studies in China (Tingchi and Chang, 2007), Southeast Asia (Scheela *et al.*, 2015) and Chile (Romaní *et al.*, 2018) also show that BAs tend to invest in local start-ups.

The second characteristic is that BAs are considered investors who do not merely seek personal financial returns. BAs are usually former entrepreneurs or professionals involved with their investees based on their experience, networks and expertise. They are eager to support an investee's growth (Van Osnabrugge, 2000; Mason and Harrison, 2002; Mason and Stark, 2004; Morrisette, 2007). BAs also enjoy the challenges in a new venture (Morrisette, 2007; Harrison *et al.*, 2016). BAs value their compatibility with their investees and position themselves as co-creators, not merely as investors (Landström, 1998; Mason and Stark, 2004; Drover *et al.*, 2017). In terms of their pre-investment activities, BAs with a higher level of human capital, having higher education and a longer entrepreneurial experience, present a higher firm valuation to their potential investees, contrary to conventional investor behavioral principles (Collewaert and Manigart, 2016). For their post-investment activities, many BAs participate in the decision-making process of their investees, usually as members of the board of directors. They provide hands-on assistance to their investees in areas of human resource management, finance, sales and marketing (Van Osnabrugge, 2000; Brettel, 2003; Madill *et al.*, 2005).

Even though prior research has shown that BAs invest in start-ups and do not just seek personal financial returns, the results of previous studies on the contribution of BAs to investees are not conclusive, as explained in detail in Section 2. Moreover, most previous studies have focused on developed countries; there are only a few studies on the contribution of BAs toward their investees in emerging countries.

The lack of empirical research on BAs in emerging countries has been the discussion subject in several research papers (Landström, 1993; Bruton *et al.*, 2004; Klonowski, 2007; Ding *et al.*, 2014). Moreover, identifying and studying BAs in emerging countries is difficult because they tend to rely on personal connections to find investments, making sampling challenging for researchers. BA research in emerging countries tends to have small and non-random samples (Avdeitchikova *et al.*, 2008; Mason and Harrison, 2008; Tenca *et al.*, 2018) [1]. In summary, research on the contribution of BAs to their investees is still in the process of being theorized, even in developed countries, while in emerging countries, empirical research has only just started.

The following is the research question in this study: how do BAs contribute to their investees? This study focuses on BA-backed firms in Estonia, an emerging country in Eastern Europe, and compares them with non-BA-backed firms. By using propensity score matching, this study extracts "twin" non-BA-backed firms demonstrating similar performance to BA-backed firms at the start of the comparison. The only difference between the BA-backed firms and the twin non-BA-backed firms is whether or not they received BA funding in the starting year of the comparison. This study analyzes the

contribution of BAs to their investees by focusing on the difference in the subsequent performance of the BA-backed firms and the twin non-BA-backed firms over a period of five years from the starting year of the comparison.

The period covered in this study is from 2006 to 2015 because the research focuses on the beginning stage of the Estonian BA industry, which kicked off around 2006. This study period may have valuable implications for emerging countries that have not introduced BA industry promotion measures. Estonia successfully created a number of fast-growing information and communication technology (ICT) start-ups (Kitsing, 2019; Owen and Mason, 2019) in this period. The reasons for this are that, despite only beginning around 2006, the BA industry in Estonia became the most active in Northern and Eastern Europe in the late 2010s (Prohorovs and Fainglozs, 2019; Prohorovs *et al.*, 2019). Furthermore, the aggressive implementation of ICT, such as through e-government policy and entrepreneurship promotion measures, contributed (Nauwelaers *et al.*, 2013; Kirihata, 2016a, b, 2022; Kitsing, 2019) [2].

## 2. Theoretical background

Start-ups, which start new businesses with a new technology or idea, are considered to play an important role not only in the creation of innovative technologies but also in economic growth, employment and the competitiveness of the economic system (Jacobs, 1969; Audretsch, 1995). VCs have contributed to the development of start-ups by encouraging specialization of their investees through their involvement and support (Gorman and Sahlman, 1989; Bygrave and Timmons, 1992; Gompers and Lerner, 1999; Hellmann and Puri, 2002; Manigart *et al.*, 2002).

Since the 1990s, as VCs have shifted to investing in late-stage firms, academia has been interested in the function of BAs to foster start-ups. That is because BAs are different from VCs, in that BAs invest in start-ups and are eager to support the growth of their investees rather than pursuing personal financial returns (Wetzel, 1981, 1983; Van Osnabrugge, 2000; Mason and Harrison, 2002; Mason and Stark, 2004; Morrisette, 2007). However, the results of previous studies on the contribution of BAs to their investees are not conclusive.

According to previous studies, there are three main research results on the contribution of BAs to investees. The first identifies the positive effects of BAs on their investees, the second shows that the contribution of BAs is inferior to that of VC and the third is that BAs' contribution to investees depends on the individual BAs and cannot be generalized. This section further discusses these findings in the relevant literature.

The first group of studies highlights the positive effects of BAs on their investees. Kerr *et al.* (2014) found that BA-backed firms in the USA had a higher survival rate, more employees and website traffic than firms rejected by BAs. Roach (2010) showed that the internal rate of return (IRR) of a BA group in the USA was higher than that of index funds. Bonini *et al.* (2019) showed that the performance and probability of survival of BA-backed firms were positively affected by the presence of hands-on involvement by BAs. According to Levratto *et al.* (2018), BA-backed firms tend to benefit from BAs' support when they have higher employment growth rates.

The second group of studies shows that the contribution of BAs to their investees is not higher than that of VC. BAs in the USA contributed less to innovation and exit of their investees than VC (Dutta and Folta, 2016). Choi and Kim (2018) concluded that the survival rate of BA-backed firms was inferior to that of VC-backed firms based on an international private equity database.

The third group of studies indicates that the contribution of BAs to their investees cannot be generalized and depends on the individual competence of a BA. In a study based in the UK, Mason and Harrison (2002) pointed out that 34% of BA investments were complete losses,

and 13% were break-even, while 23% of them achieved an IRR of more than 50%, indicating that the BAs' IRR did not follow a normal distribution. In Canada, BAs' IRR was higher than their investors, who mainly invest in firms for friendship and family ties (Riding, 2008). BAs' IRR was correlated with individual BAs' past business experience and their pre- and post-investment activities, such as their due diligence, the rejection rate of investment proposals, involvement with their investees and period of holding time in the USA (Wiltbank, 2005) and Italy (Capizzi, 2015). Even in studies in developed countries, where the BA industry and the sample size is larger than in emerging countries, their theory has not kept up with practice.

In emerging countries, the number of studies on the contribution of BAs to their investees is itself inadequate. The lack of empirical research on BAs in emerging countries has been the subject of discussion in several research papers (Landström, 1993; Bruton *et al.*, 2004; Klonowski, 2007; Ding *et al.*, 2014). There is a certain degree of difficulty in identifying and studying BAs in emerging countries because they tend to rely on personal connections to find investments, making sampling challenging for researchers. For these reasons, BA research in emerging countries tends to have small and non-random samples (Avdeitchikova *et al.*, 2008; Mason and Harrison, 2008; Tenca *et al.*, 2018).

Previous literature on emerging countries has the following limitations. BAs in China tend to be more passively involved in their investees than those in developed countries (Li *et al.*, 2014). BAs in Malaysia and Vietnam have high returns on investment by developing informal networking and co-investment skills (Scheela and Jittrapanun, 2012; Harrison *et al.*, 2018). According to prior research, only a few studies have considered the case of emerging countries.

### 3. Materials and methods

#### 3.1 Methodology

The research question of this study is as follows: How do BAs contribute to investees? One method is to compare the pre- and post-investment performance of BA-backed firms widely used in management research. However, this approach was not adopted in this study because there is very little performance data of pre-BA investment compared to post-BA investment data. As mentioned in the introduction, this is because BAs mainly invest in start-ups. For this reason, this study compared the post-investment financial and non-financial performance of BA-backed firms with that of non-BA-backed firms.

For a proper comparison, the only difference required between BA-backed firms (the treatment group) and the extracted non-BA-backed firms (the control group) is whether they received BAs in the starting year of the comparison. This study used propensity score matching to extract the control group from 1,099,068 yearly panel data of 186,999 Estonian unlisted firms and compared the two groups. Then, the treatment and control groups were compared in terms of profit/loss and sales as financial performance indicators, profit/loss and sales per employee and the number of employees as a non-financial performance indicator during five years from the starting year of the comparison. The comparison method is based on a *t*-test for the means of the treatment and control groups.

This study analyzed profit/loss, sales, profit/loss and sales per employee as financial performance indicators and the number of employees as a non-financial performance indicator. The rationale for analyzing the profit/loss and sales and the profit/loss and sales per employee is to distinguish the contribution of the increase in firm size through BA funding from that of BAs' involvement with and support for investees. The performance of profit/loss and sales are affected by the BAs' involvement with and support for investees and the increase of firm size through BA funding.

Meanwhile, the performance of profit/loss and sales per employee can more appropriately indicate the contribution of BAs' involvement and support to the investee by controlling the

number of employees as a proxy variable of firm size. The number of employees is not the only proxy variable for the firm size of investees. A variety of variables is possible, such as assets, capital and liabilities. However, this study chose the number of employees because it is a stable variable and reflects the firm size in a timelier manner than assets, capital or liabilities.

### 3.2 Data

The dataset used in this study contains information on the performance of all unlisted firms and BA funding in Estonia. All performance data on unlisted firms in Estonia were obtained from the business registry of the Estonian Ministry of Economic Affairs and Communications. The dataset consists of 1,099,068 yearly data from 2006 to 2015 for 186,999 unlisted firms registered in the Estonian business registry. Data on BA funding were obtained from multiple sources: the Estonian Private Equity and Estonian VC Associations, the Estonian Business Angels Network and a database made by Start-up Estonia, an affiliate organization of the Estonian Ministry of Economic Affairs and Communications.

After consolidating all the data gathered on BA financing from these organizations, individual BAs and their investees were contacted by phone and e-mail to verify the exact year of BA funding and the investee's acceptance.

### 3.3 Variables

Definitions of all variables are explained in [Table 1](#). In this study, the natural logarithms (ln) were taken for all continuous variables. That is because of the skewed distribution of the variables and the appropriateness of this technique for dealing with non-linearity in the relationship between the dependent and independent variables. It also reduces the effect of outliers ([Armstrong et al., 2006](#); [Collewaert and Manigart, 2016](#)).

The variables converted to the natural logarithm are profit/loss, sales, profit/loss and sales per employee, number of employees and age. Profit/loss and sales were adjusted for

#### *Continuous variables*

ln_profit/loss	Natural logarithm of profit/loss before taxation of a firm in a year after adjusting for inflation (base year 2015)
ln_sales	Natural logarithm of sales of a firm in a year after adjusting for inflation (base year 2015)
ln_employees	Natural logarithm of the number of employees of a firm in a year
ln_age	Natural logarithm of the age of a firm in a year
ln_sales per employee	Natural logarithm of sales per employee of a firm in a year after adjustment for inflation (base year 2015)
ln_profit/loss per employee	Natural logarithm of profit/loss per employee of a firm in a year after adjustment for inflation (base year 2015)

#### *Dummy variables*

Headquarters dummy	A dummy variable equal to 1 if a firm's headquarters are in Harju County in a year (and 0 otherwise)
ICT	A dummy variable equal to 1 if a firm's industry is ICT in a year (and 0 otherwise)
Professional	A dummy variable equal to 1 if a firm's industry is professional, scientific and technical activities in a year (and 0 otherwise)
Manufacturing	A dummy variable equal to 1 if a firm's industry is manufacturing in a year (and 0 otherwise)
Transportation	A dummy variable equal to 1 if a firm's industry is transportation in a year (and 0 otherwise)

**Table 1.**  
Variable definitions

inflation using the gross domestic product deflator, with the base year as 2015. Profit/loss and sales per employee were calculated based on the inflation-adjusted profit/loss and sales. Then, they were converted to the natural logarithm. The headquarters dummy is a dummy variable, indicating the headquarters of a firm in a year in Harju County located in the northern part of Estonia (North); it is the largest county and includes Tallinn, the capital of Estonia. For the industry dummies, the industries in which BAs invested were used (ICT, professional, manufacturing and transportation). The classification is based on the Estonian Classification of Economic Activities, the Estonian equivalent to the Nomenclature of Economic Activities codes, Europe’s statistical classification of economic activities.

3.4 Treatment group

The treatment group is the group of firms that received funding from BAs. This study focuses on firms that received BA funding in their first round. Firms that received BA funding in their second or later rounds were excluded from this study. As a result, the number of BA-backed firms in the analysis was reduced from 48 to 36. Firms that received BA funding in their second or later rounds tend to be more influenced by their first- or former-round investors with a higher percentage of shares. The reason that this study focused on firms that received BA funding in their first round is to eliminate the influence of these other lead investors on the performance of the investees. Then, the five BA-backed firms with missing data of the starting year of the comparison (the year of receiving BA funding) were excluded. This is because it is impossible to extract the corresponding control group owing to the missing data. As a result, the treatment group finally included 31 firms. Of the 31 treatment groups, 61% are headquartered in the country’s largest county, Harju County, which includes the capital of Tallinn. By industry, ICT accounts for 45%, professional for 29%, manufacturing for 21% and transportation for 5% (Table 2).

3.5 Control group

The control group is the group of non-BA-backed firms and is compared to the treatment group. The only difference between the treatment and the control group is whether the treatment group received BAs in the starting year of the comparison. In extracting the control group, this study first removed the 440 yearly panel data of firms that had already raised funds from other investors, such as VCs, corporate VCs and business accelerators, to

**Table 2.**  
Comparison of means  
of variables between  
the treatment and  
control groups in the  
starting year of the  
comparison

	Treatment group	Control group	Standardized difference	t-value (p-value)
ln_profit/loss	−5.23	−5.75	0.066	0.3436 (0.7315)
ln_profit/loss per employee	−4.85	−5.36	0.072	0.3782 (0.7057)
ln_sales	7.49	7.67	−0.036	−0.1837 (0.8545)
ln_sales per employee	6.93	7.06	−0.029	−0.1483 (0.8823)
ln_employees	0.85	0.83	0.016	0.0731 (0.9418)
ln_age	0.37	0.32	0.084	0.4413 (0.6596)
North	0.61	0.65	−0.070	−0.3519 (0.7253)
ICT	0.45	0.48	−0.064	−0.3275 (0.7437)
Liberal professions	0.29	0.26	0.075	0.3737 (0.7091)
Manufacturing	0.21	0.23	−0.042	−0.2149 (0.8301)
Transportation	0.05	0.03	0.082	0.3933 (0.6945)

**Note(s):** This table compares the means of 11 variables of annual data of 31 treatment group firms and 144 control group firms in the starting year



eliminate the firms influenced by investors other than BAs. After completing these steps, propensity score matching was utilized to extract the control group. Specifically, this study first estimated the probability of receiving BAs for all the panel data by using a logit model (Lerner, 2000; Guerini and Quas, 2016).

The independent variables used in the estimation are profit/loss, sales, profit/loss and sales per employee, number of employees, age, location of headquarters and industry dummies. Further, the propensity score was calculated based on the predicted probability estimated by the logit model. Next, the five-year panel data, closest to those of the treatment group in the year of receiving BA funding, were extracted from the remaining all yearly panel data (Guerini and Quas, 2016). The Mahalanobis distance was used for the extraction. Thus, this study finally extracted 144 yearly panel data for the control group.

### 3.6 Comparison between the treatment and control groups in the starting year of the comparison

Table 2 compares the 31 yearly panel data of the treatment group in the year of receiving BA funding and the 144 yearly panel data of the control group in the starting year of the comparison. This indicates the comparison of the means of profit/loss, sales, profit/loss and sales per employee, number of employees, age, location of headquarters and industry dummies between the treatment and control groups. None of the mean differences between the treatment and control groups was statistically significant. The *t*-values ranged from 0.3519 to  $-0.4413$  (*p*-values: from 0.9418 to 0.6596); all the standardized differences were less than 0.084, which is less than 0.1 of the recommended values in propensity score matching analysis (Normand *et al.*, 2001; Austin, 2011). In the starting year of the comparison, the treatment and control groups are not statistically different in terms of profit/loss, sales, profit/loss and sales per employee, number of employees, age, location of headquarters and industry dummies. In other words, the only difference between the treatment and control groups is whether they receive BA funding in the starting year of the comparison.

## 4. Results

Table 3 and Figure 1 show the movement of profit/loss of the treatment and control group over the five years since the starting year of the comparison. The mean of profit/loss of the treatment group is lower than that of the control group in all five years. In the second year, the mean profit/loss of the treatment group was lower than that of the control group, with a statistically significant difference at the 1% level. In the first, third, and fourth years from the starting year of the comparison, the mean of profit/loss of the treatment group was lower than that of the control group with a statistically significant difference at the 5% level.

Table 4 and Figure 2 compare the movement of profit/loss per employee of the treatment and control groups. The mean of profit/loss per employee of the treatment group was lower than that of the control group in all five years. The mean of the treatment group was lower

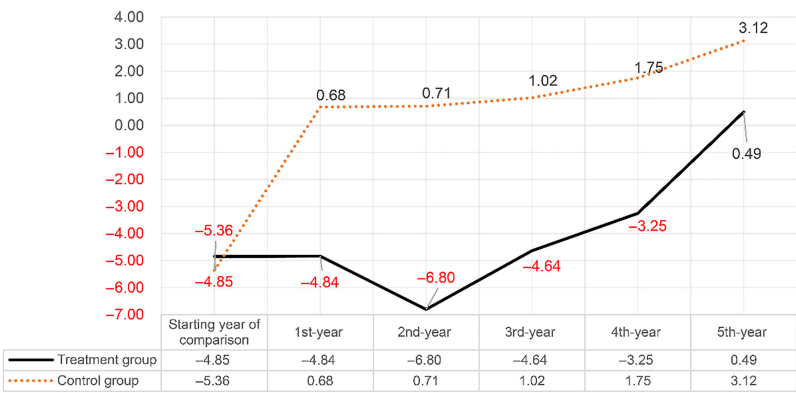
	Treatment group	Control group	<i>t</i> -value	No. of treatment group	No. of control group
1st year	−4.84	0.68	−2.8613***	21	92
2nd year	−6.80	0.71	−3.2015***	15	73
3rd year	−4.64	1.02	−2.4683**	18	58
4th year	−3.25	1.75	−1.8236*	11	44
5th year	0.49	3.12	−0.8576	9	35

**Note(s):** \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level

**Table 3.**  
Annual comparison of  
profit/loss per  
employee between the  
treatment and control  
groups



**Figure 1.**  
Annual comparison of  
profit/loss per  
employee between the  
treatment and control  
groups

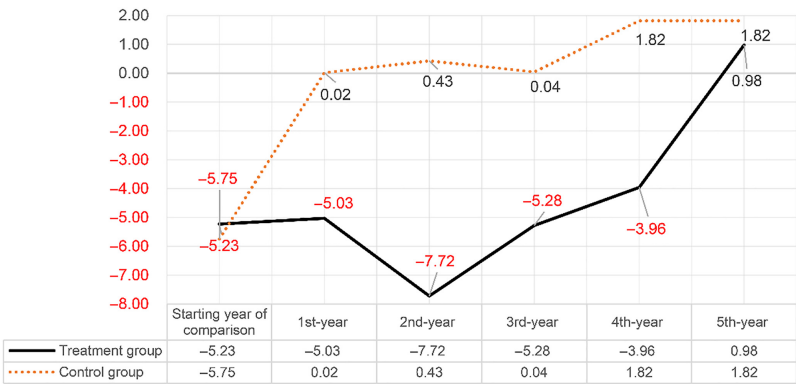


**Table 4.**  
Annual comparison of  
profit/loss between the  
treatment and control  
groups

	Treatment group	Control group	t-value	No. of treatment group	No. of control group
1st year	-5.03	0.02	-2.4012**	22	120
2nd year	-7.72	0.43	-3.3324***	16	104
3rd year	-5.28	0.04	-2.2861**	18	93
4th year	-3.96	1.82	-2.0263**	11	73
5th year	0.98	1.82	-0.2535	9	62

**Note(s):** \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level

**Figure 2.**  
Annual comparison of  
profit/loss between the  
treatment and control  
groups



than that of the control group, with a statistically significant difference at the 1% level in the first and second years. In the third year, the mean of the treatment group was lower than that of the control group, with a statistically significant difference at the 5% level. In the fourth year, the mean of the treatment group was lower than that of the control group, with a statistically significant difference at the 10% level.

Table 5 and Figure 3 compare the mean sales of the treatment and control groups. The mean sales of the treatment group were higher than those of the control group for all five years. The mean of the treatment group was higher than that of the control group, with a

statistically significant difference at the 5% level in the third and fourth years from the starting year of the comparison.

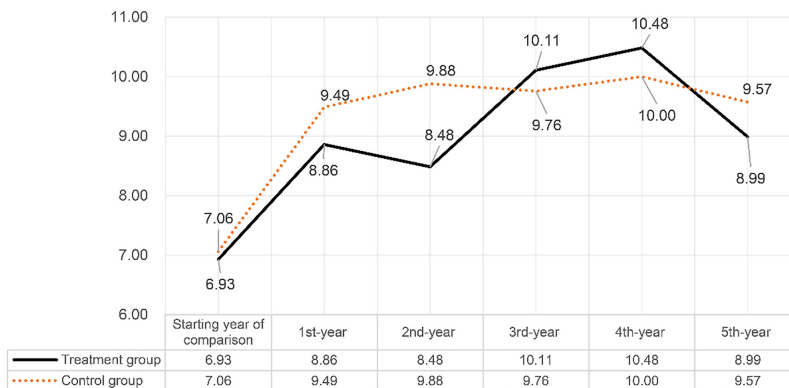
Table 6 and Figure 4 compare the means of sales per employee of the treatment and control groups. The mean sales per employee of the treatment group was higher than that of the control group in the third and fourth years but was lower than that of the control group in the first, second and fifth years from the starting year of the comparison. In the second year, the mean of the treatment group was lower than that of the control group, with a statistically significant difference at the 5% level.

Finally, Table 7 and Figure 5 compare the number of employees between the treatment and control groups. The mean number of employees in the treatment group was higher than that of the control group for all five years. In the first, third and fourth years from the starting year of the comparison, the mean of the treatment group was higher than those of the control group, with a statistically significant difference at the 1% level. In the second year, the treatment group was higher than the control group, with a statistically significant difference at the 5% level.

	Treatment group	Control group	<i>t</i> -value	No. of treatment group	No. of control group
1st year	10.30	9.91	0.4848	20	117
2nd year	10.12	9.60	0.5057	15	102
3rd year	11.81	9.10	2.5658**	16	88
4th year	12.39	9.72	2.0469**	9	64
5th year	10.12	9.40	0.4945	10	59

**Note(s):** \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level

**Table 5.**  
Annual comparison of  
sales between the  
treatment and control  
groups



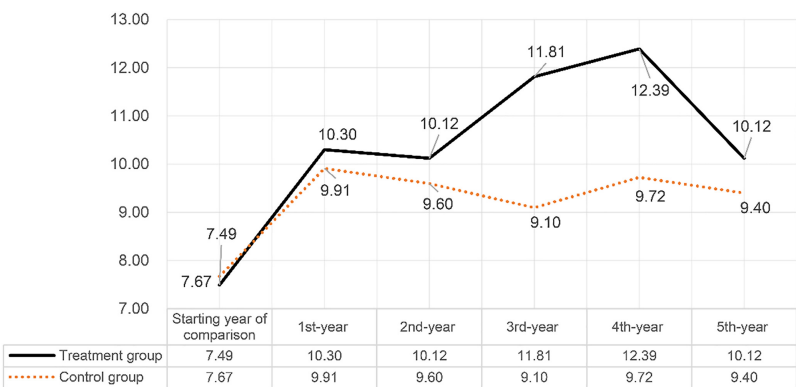
**Figure 3.**  
Annual comparison of  
sales per employee  
between the treatment  
and control groups

	Treatment group	Control group	<i>t</i> -value	No. of treatment group	No. of control group
1st year	8.86	9.49	-0.9090	19	91
2nd year	8.48	9.88	-2.1860**	14	73
3rd year	10.11	9.76	0.5910	16	58
4th year	10.48	10.00	0.6757	9	43
5th year	8.99	9.57	-0.5171	10	36

**Note(s):** \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level

**Table 6.**  
Annual comparison of  
sales per employee  
between the treatment  
and control groups

**Figure 4.**  
Annual comparison of  
sales between the  
treatment and control  
groups

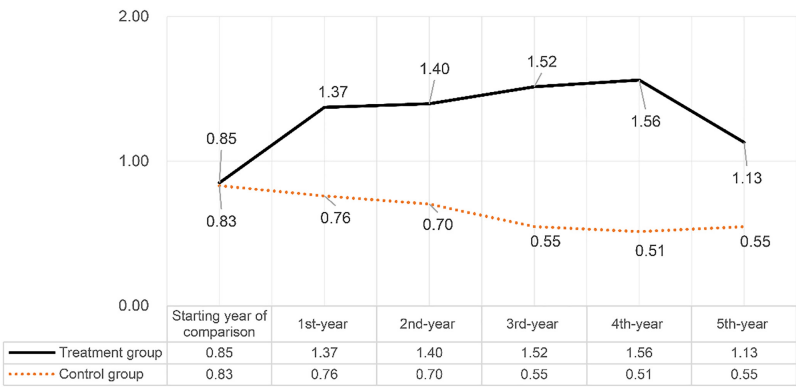


**Table 7.**  
Annual comparison of  
the number of  
employees between the  
treatment and control  
groups

	Treatment group	Control group	t-value	No. of treatment group	No. of control group
1st year	1.37	0.76	2.6132***	21	111
2nd year	1.40	0.70	2.5292**	16	98
3rd year	1.52	0.55	3.5901***	18	87
4th year	1.56	0.51	3.1086***	11	76
5th year	1.13	0.55	1.5500	10	62

**Note(s):** \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level

**Figure 5.**  
Annual comparison of  
number of employees  
between the treatment  
and control groups



In summary, in terms of the profit/loss and profit/loss per employee between the treatment and control groups, the treatment group was consistently lower than the control group with a statistically significant difference from the first to the fourth year. There was no significant difference between increases in the factor of firm size when accounted through BA funding and when it was not. Meanwhile, the number of employees in the treatment group was higher than that of the control group for all years, indicating that the BA funding increased the firm size of the treatment group. The mean sales of the treatment group were also higher than that of the control group for all years, indicating that the sales of the treatment group increased

with the expansion in firm size. These results show that BAs displayed patience in tolerating investees' losses even when sales increased.

Meanwhile, the mean sales per employee was higher or lower in each year than that in the control group. From the results of sales per employee, which take into account the number of employees as a proxy variable for firm size, it is assumed that the contribution of BAs' involvement with and support for their investees is not clearly confirmed. Therefore, the finding indicates that the increase in sales is due to the expansion of firm size through BA funding, rather than the contribution of BAs' involvement with and support for their investees.

## 5. Discussion

This study compared the financial and non-financial performance of BA-backed firms with that of twin non-BA-backed firms extracted from all Estonian unlisted firms by propensity score matching. The results of the comparative analysis revealed that BAs displayed patience in tolerating investees' losses even when sales increased. The results also found that BA-backed firms increased their sales and the number of employees compared to twin non-BA-backed firms. However, the results for sales per employee suggest that the increase in sales of BA-backed firms was due to the expansion of firm size through the provision of BA funding, rather than their involvement with and support for their investees.

These results indicate that BAs contribute to their investees not only by increasing the firm size of their investees through providing funds, but also by enabling expenditure for the future growth of the firm rather than requiring firms to squeeze profit from increased sales. This is not patience without options for a BA in a situation where the investee's sales are deteriorating, but rather deliberate patience in the presence of BA options where the investee's sales growth is increasing; this finding is contrary to conventional investor behavioral principles.

In general, investors expect investees to increase profit and maximize a firm's wealth. Deeg and Hardie (2016) defined investors' patience based on the following three questions: (1) What is the initial intended investment term? (2) Is voice motivated by short-term performance? (3) Is the likelihood of exit motivated by poor short-term performance? Deeg and Hardie (2016) suggested that how investors react to the short-term performance of their investees is one of the indicators of their patience. Regarding the BAs' patience, Harrison *et al.* (2016) found that the majority of BAs were not intentionally patient concerning their exit strategies, but rather as a result of the deteriorating performance of their investees.

However, BAs in this study did not require their investees to improve their profit/loss either in the short-term immediately after the investment or in the medium term of 4–5 years, contrary to conventional investor behavioral principles. Notably, BAs intentionally tolerated the deterioration in profit/loss while firms' sales were increasing. This is not patience without options for a BA in a situation where the investee's sales are deteriorating, but deliberate patience in the presence of options for a BA where the investee's sales growth is increasing.

Interviews with leading Estonian BAs confirmed their patience, as revealed in this study. According to Heidi Kakko, founding board member of Estonian Business Angels Network in Estonia, BAs do not have a sell-by date; therefore, they can adopt a long-term investment strategy; conversely, with VC, one is obliged to sell their investments usually in ten years to refund their investors' money. Jaan Tallinn, co-founder of Ambient Sound Investments and Skype, in an interview with the author, says that he invests in young entrepreneurs when their products or services excite him. He is even willing to participate in all-night meetings with them and continue to provide the necessary funding. He prefers that his investees re-invest their income for future growth ahead of profit/loss generation. Indrek Jaaska, an

entrepreneur and former investment manager of Ambient Sound Investments, says that he always cares about his investees' long-term potential but is not concerned about their short-term profit/loss as some of his investees exited just before they became profitable.

The interview results specifically showed that BAs enjoyed being involved with and supporting their investees from a long-term perspective. The results of this study showed that the patience of BAs was not a by-product but was intentional. This study adds to the debate on whether BAs are patient investors.

## 6. Limitations and further research

This study has the following three limitations. It could not identify any direct contribution of BAs' post-investment involvement with and support for their investees. Previous research on VC shows that VC is not just a financial intermediary but also adds non-monetary value to investees, thus contributing to their growth (Gorman and Sahlman, 1989; Bygrave and Timmons, 1992; Manigart *et al.*, 2002). The analysis results of this study showed that BAs have the patience to tolerate spending for the future growth of their investees. They are also willing to participate in all-night meetings. However, unlike VC, this study could not reveal that BAs provided more than monetary value to investees. This is in line with the results of previous studies, showing that the contribution of BAs to their investees has been controversial. What is the reason for the difference between BAs and VCs? This study focuses only on BAs, and thus, could not clarify this point. A comparative study of the differences between BAs and VCs in terms of their contribution to their investees would be a promising research area.

Second, this study relies on the Business Registry of the Estonian Ministry of Economic Affairs and Communications for the independent variables, such as profit/loss, sales and the number of employees of all samples. The government data are reliable. However, there are some issues, as follows. First, for both the treatment and control groups, this study could not analyze the subsequent growth of firms that have successfully exited and sold their businesses to others. It also could not follow the subsequent business growth of firms that relocated their headquarters overseas. Furthermore, it could not solve the problem of bankrupted firms, i.e. the problem of survival bias. In this study, the researchers considered the possibility of conducting follow-up research on the growth of treatment and control groups post-sale of their businesses, including their performance overseas; however, a fair and reliable measure to merge data from different sources was not found; this is an issue for future research.

Lastly, there are issues arising from the BA research. According to previous studies, BA research in emerging countries tends to have a small research sample with difficulty ensuring random sampling (Avdeitchikova *et al.*, 2008; Mason and Harrison, 2008; Tenca *et al.*, 2018). Nonetheless, this study focused only on first-round investments to analyze the contribution of BAs to investees to exclude the influence of other investors. Second, the period from 2006 to 2015 was chosen for this study based on the beginning stage of the BA industry in Estonia, which started around 2006. Focus on only the beginning stage of the BA industry from the perspective of implications for emerging countries resulted in a limited sample. Furthermore, exit issues, overseas headquarters relocation, and bankruptcies also contributed to the small sample size. As a result, the sample size was finally reduced to 31. In previous studies of BAs in emerging countries with small-sized economies, case studies have been the mainstream, and even in the few empirical analyses, the same issues have been found. It is necessary to develop research methods, such as targeting multiple emerging countries across national borders. In addition, following the research on the beginning stage of the BA industry, research on BAs in Estonia over a longer span of time after 2016 should be conducted.

## 7. Conclusion and implications

This study analyzed the contribution of BAs to their investees in Estonia. The results of the comparative analysis showed that BAs were patient enough to allow their investees to spend for future growth rather than requiring them to squeeze profit from increased sales, which is contrary to conventional investor behavioral principles. This is not patience without options for a BA in a situation where the investee's sales are deteriorating, but deliberate patience in the options available for a BA where the investee's sales growth is increasing.

BA patience suggests that this might be an effective function for fostering start-ups in emerging economies. Start-ups are recognized to play an important role in the creation of innovation, and also in economic growth, employment and strengthening the competitiveness of the economic system (Jacobs, 1969; Audretsch, 1995). BAs could patiently take on the responsibility of providing longer-term funding for startups.

In the analysis of this study, BAs' post-investment involvement and support did not make a direct contribution to their investee's sales, although BAs contributed to the sales increase of their investees through the BA funding itself. That may be a challenge for Estonian BAs or BAs in emerging economies. In previous studies, VCs have been recognized to contribute to the start-ups' development through their involvement with and support for their investees, such as encouraging their investees' professionalization (Hellmann and Puri, 2002). For BAs to take over the function of start-up investors from VCs in emerging economies, it will be essential to improve their quality of post-investment involvement and support.

Finally, this study focused on the beginning stage of the BA industry in Estonia, from 2006 to 2015. The results of this study have implications for what functions BAs can and cannot provide in the beginning stage of the BA industry. Policymakers in emerging economies that have not yet introduced BA industry promotion measures could take advantage of the patience of BAs and help the BA industry improve the quality of individual BA's post-investment involvement and support.

## Notes

1. This problem would also have arisen in Estonia if not for Start-up Estonia, an affiliate organization of the Estonian Ministry of Economic Affairs and Communications, which has been given the task of collecting the data of start-up investments since 2006 through their network of start-ups and investors.
2. Skype founders Toivo Annus, Priit Kasesalu, Ahti Heinla and Jaan Tallinn began investing in 2006 through Ambient Sound Investment, the first organized and biggest ever BA in Estonia (Kirihaata, 2016b).

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