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**FIRST-ROUND VALUATION OF ANGEL-BACKED COMPANIES: THE ROLE OF
INVESTOR HUMAN CAPITAL**

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ABSTRACT

This paper investigates how angel investors' human capital affects the valuation of their portfolio companies at initial investment, based on the pre-money valuation of 59 investments in young Belgian companies. We show that entrepreneurs are able to negotiate higher valuations with angel investors who have a business degree, more entrepreneurial experience or previous professional law experience. As such, this result is in contrast with the behavior of venture capital investors. Angel investors with financial experience, however, value their investments lower: their financial background leads them to stress the financial side of the deal more.

JEL codes: G24, M13, L26

Keywords: risk capital, business angels, angel investors, human capital, valuation

INTRODUCTION

Financing is a critical resource for entrepreneurial companies due to their lack of track record, profit generation and tangible assets, all of which result in high uncertainty for potential investors. After having depleted their own resources, including those of family and friends, entrepreneurs may turn to external sources of private financing such as angel investors or venture capitalists. As venture capitalists increasingly shift their attention towards larger and older investments, it has become even more difficult to obtain the crucially needed funds for young companies or ventures that only need small amounts of financing (European Commission 2003; Mason and Harrison 2000). As such, there is a large gap for angel investors to fill between, on the one hand, whatever maximum amount entrepreneurs can secure from their family and friends and, on the other hand, the minimum amount venture capitalists are willing to invest. In the U.S.A., for instance, this gap is estimated to range between \$ US 100 000 and \$ US 5.0 million (Freear et al. 2002; Sohl 2003). The importance of angel investors for entrepreneurial companies hence cannot be underestimated. Within this paper, angel investors are defined as individuals who invest some of their own wealth in unlisted companies in exchange for shares and who have no family or friend connection to the entrepreneur (Mason and Harrison 1995; Mason 2006).

As is the case for venture capital, angel money comes at a cost, which is reflected in the venture's valuation. Valuation is a critical part of the angel investment process, as it determines the percentage of shares the investor gets in return for the investment. A higher initial valuation lowers the return potential for the investor, everything else equal. Conversely, the valuation drives the dilution the entrepreneur faces. For entrepreneurs the valuation hence determines their cost of capital and their retained equity stake, whereas for risk capitalists it can be seen as their assessment of the venture's quality and potential (Hsu 2004). Despite its key role in the risk capital decision-making process, the little valuation research that exists to date in the entrepreneurial finance literature has exclusively focused on venture capital financing and hence ignored angel financing (e.g. Armstrong et al. 2006; Hsu 2004; 2007). Furthermore, most attention has been paid to how portfolio company characteristics drive these venture capital-backed companies' valuations. More specifically, research has shown that more experienced entrepreneurs and higher-quality companies receive higher valuations (Armstrong et al. 2006; Hand 2005; Hsu 2007). Relatively no attention has been paid to the impact of investor characteristics, with an important exception being Hsu (2004) who showed that more experienced and reputable venture capitalists are able to negotiate lower valuations.

With this paper, we aim to extend this stream of research by examining the impact of angel investors' human capital on their portfolio companies' first-round valuations. Building on Hsu (2004), we hence recognize the importance of heterogeneity in the investor population, a feature which is even more pronounced in the angel investor world compared to the professional venture capital world (Harrison and Mason 1999). As their education and experience differs, so will their human capital (Cohen and Levinthal 1990). Moreover, some specific types of education and experience may be more valuable in the context of risk capital financing than others (Dimov and Shepherd 2005), leading to different effects on valuation.

As such, this study contributes to the entrepreneurship literature by addressing two specific gaps: (1) the neglect of studying the effect of investor features in valuation negotiations between external investors and entrepreneurs, and (2) the scarcity of theory-grounded research on angel investors. Despite angel financing increasing in importance – especially in these harder economic times (EBAN 2009) - it is still a relatively underresearched area. Furthermore, the research that does exist has not yet quite outgrown its “Cinderella status” (Mason 2006, p.3; Maula et al. 2005). This study therefore addresses these gaps in the literature by providing an insight into the determinants of angel-backed companies' valuations. Furthermore, by building on venture capital literature it also allows us to compare the valuation practices of venture capitalists and angel investors.

The remainder of this paper proceeds as follows. First, hypotheses are developed regarding the impact of the angel investors' human capital on their portfolio companies' valuation. Following Dimov and Shepherd (2005), a distinction is made between the investors' general human capital, represented by their education level and entrepreneurial experience, and their specific human capital, represented by their business education and professional finance or law experience. Finally, we describe the research method, present the findings and discuss the results, contributions and limitations.

THEORETICAL FRAMEWORK

In negotiating a venture's valuation, entrepreneurs and external investors are generally assumed to be driven by opposite incentives. On the one hand entrepreneurs aim to maximize valuation as that implies giving up a minimum of equity in return for the investment (Vance 2005). Risk capitalists on the other hand are likely to prefer a minimum valuation as this determines the price paid for the equity obtained at investment and hence also the return potential at exit (Hsu 2007; Mason and Harrison 2002). Although angel investors and venture capitalists are two distinct categories of risk capitalists, recent research has indicated that both investors' expected returns are comparable, namely 58 percent annually (DeGennaro and Dwyer 2009).

Tying into that traditional view, one could therefore expect a negative relationship between an angel investor's human capital and portfolio company valuation. More specifically, just like venture capitalists, angel investors are considered value-adding investors or a type of 'smart money' (Mason 2006; Sapienza et al. 1996). The more experienced and better educated these investors are, the more value-adding potential they hence represent to their potential portfolio companies as the latter can benefit more from the investors' education and experience (Hsu 2004). Furthermore, better educated and more experienced angel investors might also have a better reputation in this market (Kelly and Hay 2000) and might therefore serve as certifiers of the ventures' value to the outside world (Hsu 2004). Both reputation and value-adding services could provide angel investors with leverage when negotiating with entrepreneurs, hence resulting in lower valuations. Entrepreneurs might be willing to pay for affiliation with investors with high levels of human capital.

However, arguments can also be made the other way around, as angel investors are known to not solely invest for financial reasons, but also for, among others, personal satisfaction, opportunities to influence the development of a new venture and job creation (Harrison and Mason 1992; Landström 1993). This more altruistic side of the relationship between angel investors and entrepreneurs is also illustrated by the fact that, compared to venture capital contracts, angel contracts are more entrepreneur-friendly, have weaker control rights, use less contractual provisions and are used more from a transactional than a control point of view (Goldfarb et al. 2008; Ibrahim 2008; Kelly and Hay 2003; Landström et al. 1998; Wong 2002). As an individual's general education level increases, so will his or her wealth (Astebro and Bernhardt 2005; Colombo and Grilli 2005; Holtz-Eaking et al. 1994).

As such, non-financial motivations to make angel investments will only gain in importance, resulting in less emphasis on the financial (and hence valuation) side of the equation. Furthermore, having benefited from a high-level education should also increase investors' confidence in their own capabilities and hence increase their perceived behavior control (Maula et al. 2005). These increased feelings of control will reduce the investor's risk perception, which could bias their evaluation of investment opportunities upwards, resulting in higher valuations. This leads to:

H1: Receiving financing from angel investors with a higher-level education will result in higher valuations for the portfolio company concerned.

Next to education level, we argue that an investor's general experience as an entrepreneur will have an impact on valuations. First, experienced angel investors should be able to conduct a more thorough, insightful due diligence, which may result in lower uncertainty and more confidence in the venture's success and hence an inclination towards higher company valuations (Batjargal and Liu 2004; Wiltbank 2005). Further, more entrepreneurial experience is likely to result in several biases on the investor's part. Similar to high-level education, it should also increase an investor's perceived behavior control (Maula et al. 2005). Familiarity – which, in the angel investment context, is induced by entrepreneurial experience – has been shown to lead to more favorable assessments of potential investments (Huberman 2001), which in this particular setting could thus lead to higher valuations. Research has also shown experienced angel investors to be less concerned with agency risk than their less experienced counterparts (Van Osnabrugge 1998). Therefore, more experienced angel investors should behave even more as partners (Kelly and Hay 2003; Van Osnabrugge 1998). These relationships, characterized by more trust and lower perceived risk, could also positively bias investors' assessments of potential investments (Batjargal and Liu 2004; Dimov and Shepherd 2005), which in turn may result in higher valuations. Angel investors with entrepreneurial experience will also be able to sympathize more towards these 'wannabe entrepreneurs'. This increased empathy will in turn enhance their tendency to behave more as helping partners towards these entrepreneurs (Batson and Coke 1981) and less as return-maximizing investors. Again this should therefore result in higher valuations. Hence, the second hypothesis is:

H2: Receiving financing from angel investors with more entrepreneurial experience will result in higher valuations for the portfolio company concerned.

So far, we have only considered the effect of the angel investors' general human capital, developed through their level of education and their experience as entrepreneurs. Equally important to study though is the nature of their human capital (Colombo and Grilli 2005). Even more so than general education and experience, specific education and experience can be considered as proxies for the investor's competences or capabilities for the tasks at hand (Colombo and Grilli 2005). Within this paper, the focus is on business education and professional experience in finance and law positions as these have generally been mentioned as the most relevant types of specific human capital for risk capitalists (Dimov and Shepherd 2005).

The ability to accumulate new knowledge is positively related to an individual's existing stock of knowledge (Cohen and Levinthal 1990). The more this stock of knowledge specifically relates to the task at hand, the more efficient individuals are in accumulating and interpreting new knowledge related to that task (Dimov and Shepherd 2005). A business education typically focuses on building and managing companies. Investors with a business education should hence be more productive and efficient in recognizing and evaluating new opportunities presented to them by entrepreneurs, which is especially valuable in the due diligence phase. A business education hence enables investors to have a more in-depth understanding of the opportunities presented to them, leading to higher valuations. We therefore propose:

H3: Receiving financing from angel investors with a business degree will result in higher valuations for the portfolio company concerned.

Individuals do not only formally acquire knowledge through education, but also tacitly acquire relevant knowledge while accumulating experience in a particular domain (Lam 2000; Nonaka 1994). Specific human capital in the form of professional experience in finance or law should increase an investor's expertise in the valuation, negotiation and deal structuring phase of the investment decision process thanks to learning effects (Dimov and Shepherd 2005; Hsu 2007).

Previous finance and law experience will have confronted angel investors with different valuation and deal structuring problems, enabling them to have a deeper understanding of value drivers and of the impact of deal structure on valuation and value distribution. In contrast, negotiating an equity investment is often a once-in-a-lifetime experience for an entrepreneur. Hence, investors with finance or law experience should be more skilled than entrepreneurs in valuing and structuring deals, putting them in a more advantageous negotiation position compared to entrepreneurs. Further, their professional experience should increase their focus on the financials of their investment. Whereas entrepreneurship is mainly about opportunity recognition and exploitation, finance and law experts are typically more concerned with risk and risk management (Dimov et al. 2007; Shane and Venkataraman 2000). We therefore expect investors with a professional finance or law experience to negotiate as low valuations as possible, so as to maximise the expected returns for a given level of risk. As such, we hypothesize:

H4a: Receiving financing from angel investors with more finance experience will result in lower valuations for the portfolio company concerned.

H4b: Receiving financing from angel investors with more law experience will result in lower valuations for the portfolio company concerned.

DATA AND METHODS

Data

The hypotheses are tested based on a dataset of Belgian angel-backed companies. In order to reduce sample selection bias and obtain the most representative sample possible, 20 different data sources were used to identify angel-backed companies, including a random directory of start-ups, deal lists of angel networks, Global Entrepreneurship Monitor data (from the Belgian chapter), directories of high-technology companies, media articles, incubators and snowballing. After having contacted all companies by phone to ensure they had indeed received angel financing, this resulted in a sample of 102 angel-backed companies. Due to data unavailability, the sample size was however further reduced to 59, representing 45 angel investors.

Data for this study were gathered through three instruments. More specifically, (1) valuation and investment information was retrieved from the Belgian Law Gazette¹; (2) human capital variables from questionnaires sent to and interviews conducted with the angel investors of these companies, (3) information on patent applications from the European Patent Office and (4) the remaining variables from the companies' financial accounts which all Belgian companies are obliged to file with the National Bank of Belgium. The latter were retrieved from the Bel-first database by Bureau Van Dijk.

Dependent variable

The analyses focus on the *pre-money valuation* of angel-backed companies. Following Hsu (2004), pre-money valuation is defined as the product of the number of shares outstanding prior to the initial angel investment and the offered per-unit share price. As such, any potential changes in the value of the venture introduced by the angel investment itself are excluded. All numbers are inflation-adjusted. The mean pre-money valuation of the firms in the sample is 1 016 405 EUR, ranging from a minimum valuation of 22 925 EUR up to a maximum valuation of 5 746 459 EUR in a biotech company (see Table 1).

Independent variables

Five variables were included in the model to measure the angel investors' human capital (Colombo and Grilli 2005). When more than one angel invested in the same venture through a syndicate, the characteristics of the lead investor were used as the lead investor typically steers the negotiations (Wright and Lockett 2003). The lead investor was defined as the individual investing the largest amount of money. *Entrepreneurial experience* was measured as a dummy variable, representing high (value 1) versus low (value 0) levels of experience. This was the result of a median split of the sample based on the number of years work experience as a founder and/or entrepreneur (median was 10 years of entrepreneurial experience). *Education level* was also measured as a dummy variable for high (value 1- high being a Master's or PhD degree) versus low (value 0) levels. The nature of the angel investor's human capital was measured by a dummy variable representing whether or not the angel investor had a *business degree* (1 if (s)he had, 0 if (s)he had not) and two other variables representing the number of years work experience in a *finance* and/or *law* position.

Control variables

Previous research has shown valuations of risk-capital backed companies to be significantly affected by company characteristics (Armstrong et al. 2006; Hand 2005). As the studies by Hsu (2004; 2007) represent our main point of comparison, it was deemed appropriate to include similar control variables as the ones used in those two studies. Therefore, controls are added for *company age* at time of investment², *industry*, *patents*, *period of investment* and *amount injected by the angel investor*. Industry was represented by a dummy variable taking the value 1 if the company is active in the software and internet (ICT) industry and 0 otherwise³. As the number of patent applications was generally low, a dummy variable was included taking on the value 1 if the company had applied for patents prior to investment and 0 if it had not. Valuations of unquoted ventures are affected by valuations in the stock markets (Hand 2005), hence period of the angel investment is controlled for by another dummy variable taking on the value 1 if the investment took place during the bubble period, i.e. 1999 up to 2001, and 0 otherwise.

RESULTS

Descriptive statistics

Table 1 reveals that companies in our database are, on average, three years old at the time of first investment, with over 50 percent of the sample being start-up investments. Almost half of the companies (26, or 44%) operate in internet and software-related industries, with the other half mainly being active in the service and consumer goods industries. Roughly one fourth of the investments were made during the internet bubble period, i.e. between 1999 and 2001, indicating a nice spread in terms of time of investments. Finally, only six companies (10 percent) had applied for patents prior to receiving angel money. Most companies have been successful as supported by their ability to raise follow-on financing (64 percent have had follow-on rounds) and their relatively low failure rate to date (24 percent have failed in the meantime⁴).

Insert Table 1 About Here

The average angel investor in this sample was 45 years old at time of investment, predominantly male (only one female investor), had 11 years of entrepreneurial experience, 14 years of managerial experience, 3 years of working experience in a finance position and half a year in a law position. Half of the angel investors have a Master's degree or higher, with most of these degrees being in business. Angel investors take up a seat on the Board of Directors in the vast majority of the portfolio companies (81 percent). The angel investors' investment behaviour and characteristics are hence consistent with those of angel investors in other countries (e.g. Mason 2006), supporting the external validity of this study.

Hypotheses tests

Hypotheses are tested using log-linear OLS regression (Hand 2003; Hsu 2007), with cluster-robust standard errors. The log-transformation was deemed appropriate due to the skewed distribution of the valuation numbers and the aptness of this technique for dealing with non-linearities in the relationship between the dependent and independent variables (Armstrong et al. 2006; Hand 2003). Furthermore, it should also lessen the impact of outliers. Cluster-robust standard errors were used to control for multiple investments by the same angel investor (Wooldridge 2002). Table 2 includes the results of the hypotheses tests.

Insert Table 2 About Here

Model 1 includes the control variables only; the model is significant and explains 31 percent of the variation in angel backed companies' valuation in this sample. The results are consistent with previous valuation research (such as Hsu 2004 and Hsu 2007) in that both the number of patents applied for prior to investment and the amount invested by the angel investor are significant, positive indicators of angel-backed companies' valuation. This is consistent with the notion that patents are considered a signal of venture quality and hence should be positively reflected in the venture's valuation. The finding that the amount invested by the investor is positively related to valuation supports the argument that larger funding amounts can provide liquidity benefits to the entrepreneurial company or that they are a signal of higher growth opportunities. Interestingly, valuations in the bubble period were only slightly higher than in the pre- or post-bubble periods, an effect which disappears in the full model.

This seems to be in contrast with valuations negotiated by venture capitalists in the same period or, put differently, angel investors seem to be less influenced by stock market valuations than venture capitalists.

The hypothesized effects of the angel investor's human capital are tested in model 2. Adding human capital variables to the valuation model adds significant explanatory power, as indicated by the statistically significant change in R^2 ($p < .05$). The results show that education level does not have a significant effect on venture valuation and hence provide no support for hypothesis 1. Hypotheses 2 and 3 are supported in that entrepreneurs receive a higher valuation when their angel investors have more entrepreneurial experience ($p < .05$) or have a business degree ($p < .01$). These results are also economically significant. Having an investor with experience as an entrepreneur is associated with a 148% premium on the pre-money valuation. If the investor has a business degree, the pre-money value is 166% higher.

Hypothesis 4 is partially supported. More specifically, the results show that valuations are lower when angel investors have more working experience in a finance position ($p < .10$), while law experience has a significant, positive effect. Hence, while hypothesis 4a is supported, hypothesis 4b is not as the effect of law experience is in the opposite direction of what was hypothesized. Both results are however economically significant, with the finance experience coefficient suggesting that as this variable doubles – holding all other variables constant – pre-money valuation will decrease by 12 %. Having an investor with law experience should result in a 24 % premium on the pre-money valuation.

As having entrepreneurial experience and a business degree are the most important human capital predictors of angel-backed companies' valuation (respectively, $p = 0.03$ and $p = 0.01$), it was deemed appropriate to further investigate their underlying mechanisms. For each of these two variables, the sample was split into two subsamples, i.e. angel investors with a business degree versus those without one and angel investors with high versus low entrepreneurial experience. The results of comparing these subsamples are summarized in Table 3.

Insert Table 3 About Here

Comparisons between the subsamples divided based on angel investors having a business degree or not indicate that its positive effect on valuation might be the result of these angel investors having a tendency to select riskier investments. This is illustrated by their substantially higher proportion of biotechnology investments, a higher proportion of investments made during the bubble period as well as the higher failure rate of their investments.

Differences between angel investors with high versus low entrepreneurial experience seem to be more driven by their investor characteristics rather than by their portfolio company characteristics. More experienced angel investors are namely also older, less educated and more science-oriented (as reflected by both their education and working experience). In terms of the companies they invest in, these investors do not invest in biotech companies, but they do provide substantially larger funding amounts to their portfolio companies. As such, this could be an indication of more experienced angel investors merely selecting better companies with more growth potential. However, table 3 also reveals that there are no differences between the failure rates of the portfolio companies of the experienced versus inexperienced angel investors. Other variables not included in the table further indicate that there are no substantial post-investment performance differences between these subsamples either.

As funding amounts also play a significant role in predicting the valuation of angel-backed companies (see Table 2), it was deemed appropriate to further investigate this alternative explanation of experienced investors selecting better companies. We therefore ran an additional test to check for a potential mediation effect of amount invested by the angel investor. In order to do so, we use the bootstrapping method (using 5 000 resamples) with bias-corrected confidence intervals as previous research indicated its superiority to the traditional products-of-coefficients analysis strategy in small samples and as it also allows for the inclusion of our control variables as covariates (Preacher and Hayes 2008; Williams and MacKinnon 2008). However, for reasons of exhaustiveness, traditional Sobel tests were also conducted and provided the same results.

Insert Figure 1 About Here

As shown in Figure 1, the total effect of the angel investor's entrepreneurial experience on the company's valuation is significant ($c = 1.34, p < .001$). Once adjusted for the potential mediating effect of the investor's funding amount, its direct effect is still significant, albeit to a lesser extent ($c' = 0.90, p < .01$). This result indicates that the effect of the angel investor's entrepreneurial experience on valuation is partially mediated by the magnitude of funding. This interpretation is also supported by the fact that the indirect effect of entrepreneurial experience on valuation through amount invested is still significantly different from zero as suggested by its point estimate (0.43) and the 95 percent bias-corrected and accelerated confidence interval of 0.09 to 0.98 (which hence does not contain zero). Taken together, this supports the notion that angel investors' entrepreneurial experience has a direct effect on valuation above and beyond its indirect effect through amount invested.

DISCUSSION

Despite valuation playing a crucial role for both entrepreneurs and investors, relatively little is known as to how investor characteristics impact company valuations (Hsu 2004). The goal of this paper was to study the effect of angel investors' general and specific human capital on the first-round valuations of their portfolio companies. The findings reveal a significant, positive effect of the angel investor's entrepreneurial experience (both direct and indirect), business education and law experience on the portfolio company's valuation. Angel investor's finance experience negatively affects company valuation, while education level has no effect. As such, this paper contributes to the entrepreneurship literature in two ways. Firstly, it contributes to this literature by focusing on angel investors who despite their importance to entrepreneurial ventures are still largely neglected by entrepreneurship researchers. Secondly, it also contributes to the entrepreneurship literature by studying the effect of investor human capital on company valuation, as valuation studies so far have generally exclusively focused on the effect of company characteristics (with Hsu 2004 being a notable exception).

More specifically, the positive effect of angel investors' entrepreneurial experience on venture valuation supports the argument that this experience reduces uncertainty and risk perception, both of which would result in more positive evaluations of potential portfolio companies. Further, experienced investors might relate more to the entrepreneurs' side of the story (having been there themselves before), making them less inclined to stress the financial side of the equation.

Additional analyses also provided partial support for an alternative explanation, namely a selection effect. This refers to more experienced angel investors investing larger amounts in their portfolio companies and these larger amounts, in turn, leading to higher valuations. This would be in line with more experienced angel investors being able to select higher-quality deals with more growth potential (Kelly and Hay 2000), hence receiving higher valuations as a reward (as previously suggested by Armstrong et al. 2006; Hsu 2007). The partial mediation effect is essential as it shows that entrepreneurial experience also has a direct effect on company valuation. In other words, there is more to this story than experienced investors just selecting better companies. This would also be supported by the fact that the limited post-investment data at our disposal do not indicate any significant performance differences between portfolio companies of experienced and inexperienced angel investors. Finally, interesting to note is that these results are hence in contrast with findings from the venture capital industry that experienced investors are able to attract better quality deals at lower valuations (Hsu 2004). A similar result as for entrepreneurial experience was also expected for education level, but was not found. This is consistent with previous entrepreneurship research, which found that previous entrepreneurial experience, rather than general education, is the most important aspect of human capital in predicting entrepreneurial success: the skills and knowledge relevant in successfully managing and operating a business are mainly experiential in nature, rather than educational (Politis, 2005). This finding is hence supported in our business angel setting.

The results further corroborate the notion that angel investors with a business degree also provide higher valuations. This would be in line with these investors having a more apt skill set for opportunity recognition and evaluation, reducing the risk involved, which could in turn result in higher valuations. Further exploration of the data would also support this argument as business degree-investors tend to select riskier investments with higher growth potential.

The negative significant effect of the angel investors' finance experience is consistent with the argument that this is expertise directly related to the core of the decision-making investment process, namely negotiation and deal structuring. Furthermore, investors with more finance expertise are likely to emphasize the financial side of the investment more than investors with no finance experience. A similar effect was expected for law experience, but was not found. More specifically, the results revealed a significant, positive effect for previous law experience. As we previously argued, investors with more law experience will probably be more able to put together watertight contracts.

Even though this might increase the focus on the financials of the deal, it might also reduce the risk associated with entering the relationship of interest. This reduced risk perception might in turn then lead to more positive evaluations of potential investments, resulting in a positive effect on venture valuation.

In addition to contributing to the academic literature, our research also has an important lesson to teach entrepreneurs: if you want a high valuation, pick an experienced angel investor, preferably with an MBA but without finance experience!

LIMITATIONS AND AREAS OF FUTURE RESEARCH

This study is not without its limitations. First, all data are collected from Belgian angel-backed companies, which may limit the generalizability of the findings. This might be particularly true for the U.K. and U.S.A. as the angel financing market in those countries is more developed than it is in Continental Europe (EBAN 2005). However, the Belgian angel setting is quite similar to other continental European countries where results are thus more likely to hold. Further, Belgian socio-economic indicators as income distribution, employment rate, social security fees and trade balance are also similar to indicators in other European countries such as Germany, the Netherlands, France, Austria, Spain and Italy (Stroobandt et al. 2005). Second, hypotheses were tested based on a rather small sample. Relative to the number of predictors used in the model, this is however similar to other valuation studies of risk-capital backed companies (such as Hsu 2007). Furthermore, additional analysis techniques well-fit to dealing with small samples such as bootstrapping were used. Regardless, this does preclude the possibility of testing a more complete model including for instance financial statement information. Finally, we did not test for the impact of specific industry experience of the angel investor. One could argue that working experience in the same sector as the portfolio company could increase the investor's expertise in that sector, which could then in turn also influence the venture's valuation (either negatively through a reputation effect or positively through a more biased evaluation of the company). Unfortunately, these data were unavailable to us so this could not be included in the final model.

Based on the results and limitations of the study, there are several avenues for future research. First, it would be interesting to understand which underlying mechanisms explain the effect of angel investor human capital on company valuation. More specifically, we offered several potential explanations such as a selection, wealth and empathy effect. In order to test which of these effects is actually occurring or which is strongest, one would need (more) data on the post-investment performance of these companies, the personal wealth of the angel investors involved and feelings of these investors towards the entrepreneur and his or her company. Second, it would also be valuable to gather valuation data on the follow-on rounds of financing of these companies. As companies evolve through time, it is not unlikely that an angel investor's role in these companies also changes and hence a different effect of their human capital could occur. Thirdly, considering the different effects that were found for angel investors' human capital compared to what venture capital studies have found so far, it would also be interesting to see what the results would be in cases where both angel investors and venture capitalists co-invest and hence participate in valuation negotiations. Finally, as scholars have suggested similarity between investors and entrepreneurs to play a significant role in the investment process (e.g. Franke et al., 2006; Bruns et al., 2008), another interesting avenue for future research would be to look into the effects of fit between investor and entrepreneur human capital. In other words, would investor-entrepreneur pairs with similar human capital perform better than those with complementary human capital?

To conclude, the results of this study show that investor heterogeneity matters and provides evidence for the widely accepted notion that angel investors are indeed very different creatures compared to venture capitalists. For the latter more human capital is seen as an economic good, which can then be traded against a higher price. For angel investors on the other hand more human capital allows them to let their non-rational (from a traditional finance theory point of view) side take over and sympathize more with entrepreneurs. However, it does not – as sometimes claimed – lead them to make unprofessional decisions. Whereas previous studies have tried estimating returns to angel investors (e.g. DeGennaro and Dwyer 2009; Mason and Harrison 2002; Wiltbank and Boeker 2007), this study is the first to look into valuations of angel-backed companies and, as such, contributes to the entrepreneurship literature. We hope that our study will stimulate future research in this area.

FOOTNOTES

1: All Belgian firms have the legal obligation to publish capital increases in the official Belgian Law Gazette, ensuring a reliable and unbiased account of equity investments in the portfolio companies.

2: As a robustness check, analyses were also run including a dummy variable for start-up stage investments as a control variable instead of company age. Results remain the same.

3: Hsu (2007) also added controls for the biotechnology and communications sector. These were not included in this model as there were relatively few companies in our sample active in those industries.

4: Mason and Harrison (2002) report that 39% of U.K. angel investments exited as write-offs, while Goldfarb et al. (2008) report a 28% failure rate among U.S. angel investments.

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TABLE 1: DESCRIPTIVE STATISTICS

Variables	Mean	s.d.	Min	Max
1. Company age	3.29	5.14	0.00	23.32
2. Patents	0.10	0.30	0.00	1.00
3. ICT industry	0.44	0.50	0.00	1.00
4. Bubble	0.27	0.45	0.00	1.00
5. Amount invested by angel investor (000 EUR)	203.74	295.89	2.50	1,914.98
6. Education level (high/low)	0.62	0.49	0.00	1.00
7. Entrepreneurial experience (high/low)	0.44	0.50	0.00	1.00
8. Economics/ Business education	0.55	0.50	0.00	1.00
9. Finance experience	3.44	6.87	0.00	22.00
10. Law experience	0.51	2.60	0.00	16.00
11. Pre-money valuation (000 EUR)	1,016.41	1,404.91	22.92	5,746.46

N = 59 for company characteristics, N = 45 for investor characteristics

TABLE 2: LOG-LINEAR OLS REGRESSION RESULTS WITH CLUSTER-ROBUST STANDARD ERRORS TESTING THE ANGEL INVESTOR'S HUMAN CAPITAL – VALUATION RELATIONSHIP

	Model 1	Model 2
Control variables		
Company age (ln)	0.16	0.30†
ICT industry	-0.21	-0.07
Patents	0.73*	0.61
Bubble period investment	0.48†	0.34
Angel investor amount invested (ln)	0.61***	0.53***
Angel investor human capital variables		
Education level (high/low)		0.43
Entrepreneurial experience (high/low)		0.91*
Business education		0.98**
Finance experience (ln)		-0.19†
Law experience (ln)		0.31*
R ²	0.31	0.47
Change in R ²		0.16
Change in F		2.45*

† $p \leq .10$

* $p \leq .05$

** $p \leq .01$

*** $p \leq .001$ (one-tailed tests for hypothesized effects)

**TABLE 3: UNIVARIATE COMPARISONS (BASED ON MANN-WHITNEY TESTS)
BETWEEN ANGEL INVESTORS (1) WITH HIGH VERSUS LOW
ENTREPRENEURIAL EXPERIENCE AND (2) WITH A BUSINESS DEGREE**

Variables	Entrepreneurial experience		Business degree	
	High	Low	With	Without
Portfolio company characteristics				
Company age	3.19	3.84	3.23	3.90
Patents	0.12	0.10	0.10	0.12
ICT industry	0.50	0.34	0.30	0.56*
Biotech industry	0.00	0.10*	0.10	0.00*
Bubble period investments	0.19	0.31	0.33	0.12*
Amount invested by angel investor (000 EUR)	310.06	108.99***	181.52	232.11
Board of Directors seat	0.85	0.79	0.70	1.00**
Proportion failed investments	0.19	0.21	0.33	0.08**
Angel investor characteristics				
Investor age	48.00	42.22**	44.69	45.72
Bachelor degree	0.54	0.36†	0.43	0.44
Master degree	0.23	0.64**	0.57	0.32*
Business degree	0.35	0.71**	1.00	0.00
Finance experience	1.85	4.07†	4.69	1.04*
Law experience	0.62	0.18	0.00	0.84†
R&D experience	3.96	3.57†	2.52	5.20***

† $p \leq .10$

* $p \leq .05$

** $p \leq .01$

*** $p \leq .001$

FIGURE 1: MEDIATION MODEL FOR ANGEL INVESTOR ENTREPRENEURIAL EXPERIENCE ON PORTFOLIO COMPANY VALUATION

