Academic Network in Entrepreneurship, Innovation and Finance

Proceedings

of the

First Specialized Research Workshop

on

Managing Growth: The Role of Private Equity

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Table of Contents

Foreword and introduction

A presentation of the network

The Gate2Growth Academic Network in Entrepreneurship, Innovation and Finance was launched in the summer of 2002 by the contracting parties: the European Institute for Advanced Studies in Management (www.eiasm.org) and the Vlerick Leuven Ghent Management School (www.vlerick.be). At the time of the Specialized Research Workshop (November 2004) the network counted 170 members representing around 75 academic institutions (i.e. university and business school department and other research centres). Under the SME and Innovation programme (FP5) the network is a part of the Gate2Growth Initiative. This initiative is supported and funded by the European Commission's DG Enterprise, Innovation Policy Unit, in principle with the intention to allow the network to become self-sustainable.

The main objective of the G2G Academic Network is to foster the development of the academic profession in entrepreneurship, innovation and finance and to support the exchange and integration of research and teaching expertise on a pan-European scale. The network's central activities and events are the annual doctoral seminar series, the specialized research workshops, the financing of short-term research visits and long-term exchange programmes, the case writing and a yearly best paper award competition.

Since the start of the project these activities have made the network an important reference for the support, generation and dissemination of top-level academic research expertise at the earliest possible stage and of good teaching practice in the three central subject areas. As more fundamental research results are translated into more practical insights and the development of specific training formats (toolkit), the findings and other deliverables are dissemination to a wider research, policy and business audience. In an effort to centralise and share the pan-European (largely fragmented) knowledge and expertise, the network aims to become a prime partner for the EC to actively help formulate policy guidelines to stimulate entrepreneurial activity, to detect better ways of supporting and financing innovative start-ups or research-based and high-tech ventures. The network intends to increase the number and educational impact of courses in entrepreneurship, innovation and finance around Europe and to deliver proper tools and methodologies from which the very diverse communities of business-owners, politicians, investors, academics and other experts can benefit.

An introduction to the book

Somewhat proudful we here present the first of a series of G2G Academic Network yearly policy reports. The articles here-included have been submitted for the *First Specialized Research Workshop* (12 November 2004) that was hosted by the IESE Business School (University of Navarra, Barcelona, Spain) and sponsored by the network. In total 53 members attended the workshop.

The objective of a specialized research workshop is to collect the insights of leading academics and researchers on a specific topic in the field of entrepreneurship, innovation and finance. The purpose of the yearly policy report is to translate this body of scientific and fundamental knowledge into more practice-oriented findings, useful for the entire Gate2Growth public including investors, entrepreneurs, business-owners and policy-makers.

The paper selection process

The central theme for this research workshop was '*Managing growth: the role of private equity*'. The objective of the workshop was to promote a better understanding of the role of private equity providers in the development of growth-oriented start-ups and the management of growth processes. The selection of the papers was done through a three stage selection and review process. Firstly, the organising committee invited a short list of less than fifteen well-known European experts in the field to contribute to the workshop. Almost in parallel a general 'call for papers' was sent to all the members of the network. The submissions were selected first on basis of a two-page abstracts and in a later stage on a 2000 word summary of the paper. In total over 40 proposals have been submitted. Authors of selected papers were invited to present their research at the workshop.

Twelve papers were presented in three different streams, each one of the streams illuminating a different perspectives on the role and relevance of private equity for starting and growing new ventures. In the morning sessions "the venture capitalist's perspective" and "the entrepreneur's perspective" were explored. In the afternoon "the role of government" in stimulating the influx of private equity into the entrepreneurial process was presented. At the end of the workshop, three best papers were given a *European Best Paper Award*. The selection of the best papers was based on a profound review including more than twenty different parameters - the most important ones being the level of contribution to the already existing body of knowledge, the methodological soundness and newness of the research, and the relevance of the research findings for the entire G2G community and the EC, i.e. the European dimension of the research. One other important requirement is that the research is post-doctoral and that one of the authors obtained a PhD degree not longer than five years ago. Also the paper should not be published or accepted for publication by any journal or book publisher. This said, the celebrated papers for the G2G Academic Network European Best Paper Award competition for the year 2004 are: Clarysse, B., Knockaert, M. & Lockett A., "*How do early stage high technology investors select their investments?*" (First Rank), Murray, G. & Dimov, D., "*Through a glass darkly: new perspectives on the equity gap*" (Second Rank), and Lockett A. & Wright M., "*Resources, capabilities, risk capital and the creation of university spin-out companies*" (Thirs Rank). We once more congratulate the authors for their excellent contribution to the workshop.

The outline of the book

The introduction highlights the importance of the topic and gives amore general description of the evolution of the venture capital industry. The main argument is that in the early nineties, practitioners in the industry pointed out screening and analysis of opportunities as their main competitive advantage. Today, they see themselves as hands on investors capable to deliver value added. But do they really add value?

This proceedings has three main parts, each part representing new research findings relating to one specific perspective on the role of private equity in managing start-ups and firm growth.

PART 1: THE FINANCIAL COMMUNITY'S PERSPECTIVE. The first chapter of the book tries to understand which investment managers are more open to make seed capital investments. Especially the experience and the background of these managers are investigated as a determinant of their decisions. The following chapter highlights the role of business angels as a source of private equity. It discusses the problem of organising this rather informal capital market. The third chapter focuses on VC funds investing in private equity today complaining about the difficulty to raise funds. An important element is the understanding how investments in venture capital funds are decided upon. The last chapter of this part deals with private equity and especially seed capital often seen as unprofitable investments. But are they really?

PART 2: THE ENTREPRENEUR'S PERSPECTIVE. Part two first contribution intends to understand the motivations of an entrepreneur to look for private equity. It explores why entrepreneurs could be interested in attracting venture capital. The next chapter looks at a population of software entrepreneurs, split into a group of entrepreneurs that have received external financing and those that have not. In

following chapter, it is shown how cross-border venture capitalists can provide substantial internationalization support for portfolio companies that need to expand across national borders from a country with limited domestic markets. The last two chapters focus on the reliability of company information prior, during and after the private equity investment. First there is a paper on how venture capital firms can more effectively add value to their portfolio companies through their *communication* both with the PFC and internally within the venture capital firm and their *commitment* to the portfolio companies. The last paper of this part discusses the issue of the quality of financial statements reported by private equity backed companies in the years around the initial private equity investment.

PART 3: THE ROLE OF GOVERNMENT. The third part opens with a discussion the commercialization of university research in general and the creation of spin-off companies in particular. The next chapter of this part describes the different sorts of early stage venture capital firms in Europe. The following chapter examines the monitoring and control of private equity investors and its impact on corporate governance and the professionalization of their portfolio companies. The last chapter deals with the interaction between the support and policy environment and the business development process for spin-out companies.

Part 1: The Financial Community's Perspective on the Role of Private Equity

Part 1: The Financial Community's Perspective on the Role of Private Equity

Investment into Venture Capital Funds in Europe: An Exploratory Study

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Summary

Insight into the processes that underpin the flow of capital into venture capital (VC) funds is fundamental to our understanding of the overall flow of capital into new ventures. To understand the processes and criteria utilised by investors in the selection of VC funds we have studied 21 firms of professional investors in VC funds in Europe. We have demonstrated that such investors utilise structured selection processes and criteria that are comparable to those used by VCs, but with important differences. Notably, we found that investors build early consensus within the investment team via a stage we have termed ratification. We also found that investors may pre-allocate capital to VCs with whom a relationship exists already. In selecting VCs, quantitative measures of "reputation" via historical performance are important, consistent with previous findings, but we found that "reputation" also captures subjective opinions from entrepreneurs, other investors and other VCs. We found that nurturing informal relationships between investors and VCs outside the formal investment agreement is an important component of the investors decision to invest, and is therefore a crucial activity for the VC. Moreover, investors perceive such relationships as a route to new business opportunities and direct co-investments alongside leading VCs.

Introduction

The creation of new ventures is often critically dependent on a supply of VC finance, and there is a wealth of research examining the decision processes and criteria applied by VC firms in the selection of new ventures. As illustrated in Figure 1, however, VC firms do not sit at the beginning of the capital supply chain and instead act as intermediaries who provide an interface between their investors who provide capital (e.g. pension funds, insurance companies and banks) and entrepreneurs who utilise such capital in an attempt to create successful new ventures. The role of VCs as intermediaries, who screen, monitor, advise and assist in investments into new ventures has been well documented in the literature (Sahlman, 1990; Berger and Udell, 1998). VCs filter information for the investor, decreasing adverse selection and moral hazard problems, and are able to provide sector specific expertise in sourcing and assessing new ventures, allowing them to invest profitably in projects that uninformed outsiders would reject (Amit et al., 1998). In summary, VCs manage information asymmetry and decrease agency costs, providing their investors with access to investment opportunities they would not normally be equipped to undertake.

A great deal of research has focused on the processes by which VCs select and monitor new ventures. This has been expressed as a decision process model identifying five sequential steps: deal origination, screening, evaluation, structuring and post investment activities (e.g. Tyebjee and Bruno, 1984). Fried and Hisrich (1994) also developed a six-stage screening process model and found that VCs focus attention differentially across these criteria at different phases of their evaluation. Therefore, although the number of stages may differ, past research suggests VCs follow a clear process. Authors have highlighted a range of criteria at each stage of the process such as the size of the investment (Robinson and Pearce, 1984), the technology or product (Murray, 1995; Norton and Tenenbaum, 1993), the industry sector (Barry, 1994; Gupta and Sapienza, 1992), geographic location (Gupta and Sapienza, 1992) and the investment stage (Macmillan et al, 1985; Barry, 1994; Sahlman, 1990). Other authors have examined the value added dimension of the VC's involvement in new ventures (Fried and Hisrich, 1995; Manigart and Sapienza, 2000) or the VC's monitoring role (Admati and Pfleiderer, 1994; Sweeting and Wong, 1997; Steier and Greenwood, 1995).

Whilst VC decision-making has been explored in some detail, there is less research examining the decision processes and criteria of investors in VC funds themselves, and hence how VCs raise funds to invest in new ventures. At the macroeconomic level, several authors have examined the overall supply and demand for VC finance and its impact on VC fundraising. Building upon the work of Poterba (1987) and Black and Gilson (1998), Gompers and Lerner (1998) analysed the flow of capital into US VC funds and showed that increased GDP growth and R&D spending led to increased investment into VC funds. The authors concluded this is likely to be a result of increased demand for VC finance. They also showed that decreases in capital gains tax and changes to the rules governing US pension funds increased overall investment into VC funds.

A number of authors have also examined the competitive environment within which VCs operate and have highlighted the increasing competition between VCs to raise funds from investors (Sapienza, 1992; Murray, 1995; Van Osnabrugge and Robinson, 2001). Within such a competitive environment it is likely that investors have developed selection procedures to identify and assess VCs. Indeed, Fried and Hisrich (1989) carried out an exploratory study of US investors' attitudes to investing in VC funds and their post-investment roles in the fund. They concluded that criteria such as experience, teamwork, the performance of previous funds, and strategy for investing the current fund are all important factors in selecting VCs for possible investment. The aim of the current study is to examine in detail the decision processes and criteria utilised by professional investors in Europe for the selection of VC funds. Although the study is exploratory we have utilised the existing research in VC decision-making to develop research propositions and guide data collection. Since the literature has established that VCs utilise rational processes and criteria, we may expect that investors in VC funds also utilise a rational process, leading us to formulate proposition 1:

Proposition 1: Professional investors in VC funds in Europe have established processes and criteria for identifying and selecting VCs in which to invest, and these processes and criteria are comparable to those utilised by VCs in the selection of new ventures.

Gompers and Lerner (1999b) suggested that the ability of VCs to attract investment is related to previous fund performance and "reputation", measured in their paper as VC firm age and fund size. This work is consistent with previous findings that the principal route for a VC firm to raise capital over its competitors is via achieving a better reputation (Norton, 1995), and that the size of a VC fund is often a function of past success and reputation (Gupta and Sapienza, 1988; Zacharakis and Meyer, 1995). The notion of VC reputation has been explored further by Van Osnabrugge and Robinson (2001) who stated that VC reputation is the aggregate culmination of many small procedures, conduct and performance levels which the VC firm maintains. They suggest that VCs who are dependent on raising external capital behave more diligently and play a greater monitoring role than "captive" VCs, employed by large financial institutions, in order to signal their responsible investment skills to investors and maximise their chances of raising subsequent funds.

The literature has demonstrated, therefore, that a VCs ability to raise funds is related to multiple measures of the VC's reputation and that VCs signal such reputation to potential investors. It is likely, therefore, that investors have developed a wide range of criteria and utilise a range of industry sources to assess a VC's reputation leading us to proposition 2:

Proposition 2: Investors assess historical financial performance but also rely on other less tangible measures of VC "reputation" and have developed appropriate mechanisms for gathering such information.

The aim of this paper, therefore, is to explore the decision processes and criteria utilised by investors in VC funds. In particular, we aimed to examine investors' perceptions of VC "reputation" and how they operationalise decisions to invest by drawing parallels with frameworks proposed in the literature on new venture selection by VCs. On a practical level the research is intended to provide useful guidance for the VC industry in seeking to navigate the challenge of raising capital from investors in an increasingly competitive fund raising environment.

Methods

Selection of investors

The authors of this paper both possess considerable practitioner experience within the VC industry. One is currently a Vice President at DresdnerKleinwort Capital with responsibilities for raising and structuring VC funds. The other is an academic who worked previously as a VC with a leading international firm. This experience played a key role in the design of our study and was helpful in gaining access to investment firms in our sample.

We selected our sample of investment firms by utilising the "Initiative Europe" public database to identify the universe of European-based investors in VC. We were able to identify investors with funds under management between ?150 Million and ?5000 Million. In this paper we define investors in "venture capital" as investors in a broad range of private equity funds including early stage VC funds, management buyout funds and other leveraged buyout funds. We avoided selecting firms that focused entirely on one sector of VC, or a single country to ensure that our results are applicable in a broad context. We also did not include high net worth individuals in our research as preliminary investigations indicated that their decision criteria are often dominated by tax motives, limited availability of funds, or opportunistic attitudes to investing. We restricted our analysis to European-based investment firms, or non-European firms that have established a strong presence in Europe. This was intended to minimise the impact of US-centric attitudes of fund managers toward European VC funds that were revealed in our preliminary investigations for this paper. In addition, by restricting our samples to Europe we were able to generate high quality data via 40 hours of largely face-to-face interviews with senior fund managers.

Of the 24 investment firms we identified from the database, we received an 88% acceptance to our request for an interview with senior fund managers. We therefore finalised interview arrangements with 21 investment firms, 17 of which were European, with the remaining 4 non-European firms that had established a strong presence in Europe.

Data collection methods

To explore the decision processes and criteria of investors in VC funds we have adopted a qualitative approach (Miles and Huberman, 1994; Denzin and Lincoln, 1998). Since professional investors in VC funds are busy people we also decided the best way to gather rich data in a timely manner was to conduct face-to-face or telephone interviews rather than mailing questionnaires. Experience has shown us that senior executives within such firms are unlikely to complete mailed questionnaires and often pass them to more junior executives. These results may be flawed, as (1) junior executives do not have direct knowledge or experience of the issues being examined and (2) the replies given are more generic and address what should be done as opposed to what actually occurs. Therefore, the respondents were always senior VC investment managers and were interviewed between June and October 2001. Interviews were of approximately 90 min in duration. The rationale and structure of the interview was explained to investors prior to the meeting. A semi-structured open-ended approach was utilised, providing respondents with an opportunity to make comments on the topics raised without feeling under pressure to depict appropriate or desirable responses but rather "in use" criteria.

Results

Our results represent the findings of 40 hours of interviews with senior management at investment firms throughout Europe conducted from June to October 2001. The 21 investment firms in our sample represented a mix of pension funds, insurance companies, banks and other professional organisations investing in VC funds as well as other "asset classes" such as public stocks, property, bonds and money markets.

Overall, our findings suggest that investors have developed structured processes for the selection of VC funds and that decision-making can be divided into two categories, (1) the overall budget allocation of capital to VC versus public stocks or other asset classes and (2) the selection of individual VC funds in which to invest the allocated capital.

Sources of capital may be internal or external to investment firms

It became clear early in the interview process that just as VCs may be classified based on their sources of capital, whether internal or external to the firm (Van Osnabrugge and Robinson, 2001), investors in our sample also exhibited a variety of sources of capital. Since Van Osnabrugge and Robinson suggested a link between sources of capital and VC behaviour toward investors, this led us to modify our approach to examine possible relationships between sources of capital and decision-making. Specifically, we wished to understand whether the sources of an investor's capital (whether internal or external to the firm)

influenced the overall budget allocation to venture capital, or the processes and criteria applied to the selection of individual VC funds.

Balance Sheet Investors: 9 respondents in our sample operated within large financial institutions and invested their parent organisation's capital, i.e. from the balance sheet of the institution. The budget allocation to venture capital represented 2-6% of the institution's total funds under management. For the most part, investment teams operated as distinct units with dedicated in-house fund managers for investments in venture capital, similar to the "captive" VCs described by Van Osnabrugge and Robinson (2001) who stated that such VCs enjoyed considerable operating autonomy, despite their dependence on the parent institution for capital.

Hybrid Investors: 6 respondents in our sample operated within large financial institutions and invested from the balance sheet of their parent institution and on behalf of third party external investors, i.e. they managed external capital. Examples included investment teams within banks that invested the banks own capital as well as managing funds from external investors (e.g. from pension funds and insurance companies)

Specialist Investors: 3 respondents in our sample were Specialist Investors who managed third party capital only, and hence were entirely dependent on raising external capital to survive. We have avoided referring to these investors as "independent" as the management company of one firm was owned by a parent organisation from which it had spun out.

Gatekeepers: 3 respondents in our sample were professionals who advised clients (such as pension funds and insurance companies) on investment in VC funds for a fee, but did not invest their own capital. Gatekeepers have been described by previous authors and play a key role in structuring investment vehicles specifically to their clients' individual requirements. In our study, gatekeepers appeared to recommend 3-5 year strategies for their clients' investments into VC funds but we were not able to define the fee structures they negotiated with clients.

Table 1 shows the range of investment firms in our sample with respect to funds under management, size of investment team, years since formation of the business unit or firm and source of capital. Table 2 summarises the data and shows that for the investment teams operating within large financial institutions, Hybrid Investor business units had been in existence for longer periods of time (7.8 years on average) than business units that were Balance Sheet Investors (3.4 years on average). This suggests, perhaps, that investing purely from the balance sheet is a recent phenomenon, or alternatively, as business units mature they evolve to raise external capital. When respondents were questioned about this point, they stated that as investment teams became more experienced and established a reputation they are able to attract external capital. Respondents associated the raising of external capital with greater decision-making power within the team and the perception of greater remuneration packages for the investment teams.

Respondents suggested that investment teams themselves are the driving force for such transitions, implying that they follow an evolutionary pathway, illustrated in Figure 2, toward the creations of Specialist, and ultimately independent investment firms as they gain experience and track record in the sector.

Allocation to venture capital and team structure within investment firms

For the majority of investors in our sample the decision to invest in venture capital funds for the first time had been taken at least two years prior to the date of this study. We focused, therefore on the processes by which capital is allocated to venture capital on an ongoing basis. The study highlighted that differences in an investor's own source of capital were indeed associated with different processes and criteria for the annual budget allocation to venture capital.

For Balance Sheet Investors the budget allocation to venture capital was normally built around a two-tier structure with operational investment teams, responsible for assessing VCs, reporting to an investment board that controlled strategy. The board relied heavily on recommendations from the investment team but ultimately decided the overall annual allocation to venture capital. For 67% of respondents this

decision was based on an annual business plan, which was submitted to the board detailing the investment team's strategy for investing capital, the amount invested to date in venture capital, outstanding commitments to existing investments, and requests for additional capital from existing investments. The remaining 33% of respondents had such reviews every three years.

Balance Sheet Investors highlighted some advantages of this structure, suggesting that the allocation to venture capital is flexible and can be increased at relatively short notice. Investment teams also appeared under less pressure to harvest rapid returns from investments, generally expecting returns from VC funds within 5 years. This may reflect the fact that they are under no obligation to achieve returns within a specific contractual period in contrast to investors who manage external third party funds.

Respondents also highlighted several drawbacks within this structure from the perspective of the investment team. As one respondent stated, the board occasionally required the investment team to plug a profit gap on the institutions' P&L by realising an investment at a time felt by the investment team to be sub-optimal. This is consistent with the suggestions of Van Osnabrugge and Robinson (2001) that managers within such investment institutions have 3-4 year job horizons and, therefore, may choose to focus on short-term gains to the detriment of long term potential. Another respondent highlighted the insecurity of budget allocation limiting the scope of the investment team to plan ahead, particularly where they wished to pre-allocate investments to high performing VC funds that operated on regular 2-3 year fundraising cycles. Finally, these units, albeit distinct, did not for the most part possess a separate P&L and did not receive management fees from their parent institution. Several respondents highlighted this as a demotivating factor for the investment team.

Hybrid Investors employed a similar capital allocation strategy, with an annual strategic review by the board determining the allocation to, and overall strategy of, the institution to investing in venture capital. This also included commitments by the institution to any new funds being raised by the investment teams that would contain external capital. A number of the investment teams within the Hybrid Investor group charged management fees to their parent institution and were also more likely to receive carried interest payments on internal investments, mirroring arrangements on third party funds they managed, and the structure of venture capital funds in which they invest (Gompers and Lerner, 1999a).

Hybrid Investors, therefore, appeared to have a more predictable capital allocation based on longer term commitments to third party funds coupled with the security of capital from the parent institution when fundraising proved difficult. In addition, some respondents felt that the board was less likely to decrease the institution's venture capital allocations in difficult fund raising climates, as this would affect their investment team's ability to raise external capital

The Hybrid approach also appeared to enable institutions to benefit from investments in venture capital without incurring the cost. The optimal structure described by Hybrid Investors was to have third party management fees cover the cost of the teams whilst the institution benefited from a percentage of the carried interest. It may be argued, however, that this approach divides the loyalty of investment teams and creates conflicts of interest; ultimately they are employees of the parent institution and yet their first priority, perhaps set out in fund documentation, is to their third party investors.

For Specialist Investors, the allocation of capital was driven by the senior management within the firm and was largely dependent upon the fund raising climate. The funding cycle implied that at any one time investment teams might be raising capital whilst simultaneously investing capital raised previously. The investment teams in general raised capital in 2-3 year cycles, similar to the VC funds in which they invested. It is tempting to speculate that positive fund raising climates may give rise to opportunistic attempts by the investment teams to raise additional capital similar to that displayed by VC firms (Gompers and Lerner, 1999a). In addition, like VC firms who "grandstand" in order to signal their reputation to potential investors (Gompers, 1996), Specialist Investors might act against the interests of their own providers of capital in order to maximise their ability to raise additional capital.

Motives and underlying philosophy toward investing in VC funds

We sought to understand the general, underlying philosophy that investors in VC funds adopt when identifying and selecting VC funds in which to invest. First, we examined whether the motives of investors in our sample group were, as might be expected, solely financial returns, or whether there were other subtler motives for investing in VC funds. Second, we examined whether there were underlying philosophies guiding the investors' selection processes and criteria, namely did they apply objective performance measures as a basis of the decision to invest, or was the decision more subjective and reliant on experience for sensing the components of a good deal?

The motives of the vast majority of investors in our sample group were indeed solely financial, their goal being to maximise financial returns from the investment. A minority of investors, however, also indicated more subtle, strategic motives for investing in particular VC funds, such as forging links with particular VCs with a view to establishing direct deal presence themselves in a sector or region, or focusing on large leveraged buyout funds (LBO) with the intention of providing a debt facility to the fund or to the new ventures that the VC invested in.

Whether the motives of investors were financial or strategic, or indeed the sources of capital internal or external, the underlying principles for the selection of VC funds could be grouped broadly into objective and subjective criteria. At one extreme we were able to identify investors who were primarily objective in their investment philosophy being methodical and process driven, and relying heavily on benchmarking of VC funds and ensuring that minimum quantifiable performance hurdles were met. VCs were often graded using a matrix system, allocating weighted scores to required criteria. At the other extreme, we were also able to identify investors who were more subjective in their approach, and who viewed the investment process as more qualitative. Such investors tended to have longer investing track records than those who took a more objective approach, and like more experienced VCs relied more on intuition and experience (MacMillan et al., 1987). The majority of investors, however, applied both objective and subjective approaches to VC selection, and we were unable to identify a clear relationship between objective versus subjective approach and source of capital or motive for investing.

The processes and criteria utilised in the selection of individual VC funds

We asked respondents to describe how they identify potential VC funds in which they may invest (i.e. their source of deals) and how they subsequently select which of these funds they will invest in. We used the frameworks proposed by Tyebjee and Bruno (1984) and others as a basis for analysing the processes they described in more detail, but tried to avoid bias that would be caused by identifying specific stages of the selection process explicitly.

The responses from investors suggested they adopt a structured process through which VC funds are identified and subjected to increasing levels of scrutiny. We termed these stages; illustrated in Figure 4, origination, screening and evaluation following the terminology of authors studying VC processes. It emerged, however, that "screening" in this instance was comprised of a number of specific, and separate activities that warranted designation as sub-stages of the screening activity. We have defined these screening stages as "screening I" in which the fund documentation is vetted; "screening II" in which investors conducted introductory meetings with VCs but did not embark upon detailed assessment, and "ratification" in which the investment team agrees formally to proceed to a more costly and laborious evaluation stage in which detailed due diligence is carried out.

Deal Origination: The investors in our study originated on average 194 VC fund opportunities each year. Hybrid and Specialist Investors typically reviewed greater numbers of opportunities than Balance Sheet Investors, sometimes up to 300, indicating either a higher profile in the VC fundraising market, or a more pro-active approach to seeking investment opportunities than Balance Sheet Investors. Deals were originated via active searches, which included the investors' existing relationships with VCs, direct approaches from VCs in the fundraising process, referrals from other investors in VC, and finally via direct approaches from corporate financing intermediaries retained by VCs to conduct the fundraising process. This is comparable to the deal origination processes utilised by VCs themselves (Steier & Greenwood, 1995; Timmons & Bygrave, 1986; Tyebjee & Bruno, 1984). The more established investors

placed less emphasis on placing agents and direct approaches from VCs. Instead, they identified a core group of VCs whose performance they tracked, irrespective of whether they were current investors in the VCs' funds, again as a source of market intelligence and potential future opportunities to invest. This highlighted that investors begin to form opinions and make decisions regarding VCs well before VCs begin a fund raising process, and may pre-allocate capital to those VCs they have targeted for investment.

Screening: The majority of Investment teams in our study comprised on average 6 executives. In order assess the 194 opportunities originated each year; investors appeared to have developed a number of screening processes and criteria, in an attempt to ensure that VC funds are selected in an efficient manner. The first stage of screening for all investors consisted of reviewing the VC fund documentation, usually in the form of a private placement memorandum. As Figure 3 illustrates, 77% of funds were discarded at this sub-stage, which we have termed screening I. It became clear, however, that the majority of investors, particularly those that adopted a more subjective approach to selecting VCs employed a further level of screening. Whereas investors who adopted a more objective, quantitative approach to investing did not meet VCs until they were regarded as having entered an evaluation stage, 80% of investors in our sample attempted to meet as many VCs as possible at the screening stage regardless of the private placement memorandum, a sub-stage we have referred to as screening II. As shown in Figure 3, a further 10% of fund proposals received were rejected at this sub-stage of the screening process. Investors who utilized meetings with VCs at the screening stage claimed that this was a more effective means of screening deals and forming early relationships with VCs they may choose to invest in at future dates

Although we observed differences between the screening processes employed by some investors we did not, however, observe clear differences in screening criteria between investors, regardless of whether they employed a more subjective or objective approach to investing. Investors were asked to outline the screening criteria they actively adopted to assess funds. Whilst they stated that criteria such as size of the proposed VC fund to be raised, sector focus, geographic focus and investment stage focus (i.e. criteria that mirror those applied by VCs when screening new ventures for possible evaluation) were useful, none of these criteria appeared to be a priority for investors in VC funds themselves. This would, perhaps, argue against our earlier proposal that the screening criteria of VCs are the direct result of criteria applied by their own investors. The criteria that investors stated most commonly were:

(1) Magnitude and consistency of historic returns of previous funds (43% of investors)
(2) Rating of the VCs previous returns within the top quartile of returns as reported by specialist databases such as Venture Economics (14% of investors)
(3) The diversification strategy of the investors' own institution (19% of investors)
(4) The perception of the VC as "hands on" and "adding value" to the portfolio companies in which they invest (10% of investors)

Criteria (1) and (2) are consistent with previous findings relating to the impact of VC reputation on fund raising ability (Gompers and Lerner, 1999b; Gupta and Sapienza, 1988; Zacharakis and Meyer, 1995), but criteria (3) and (4) are more intriguing.

First, criterion (3) indicates that return and reputation are necessary but not sufficient for VCs to raise capital from investors and that investors follow a portfolio management approach that impacts on their decision to invest or not.

Second, criterion (4) demonstrates that investors do not rely on historical return as an indicator of future performance. The perception that VCs are "hands on" and play a significant role in the strategy and management of the companies in which they invest is a highly subjective criterion, relying on the investment team's perceptions of the VC. There is a great deal of literature on the post investment role of VCs in their portfolio companies, particularly with regard to their role in under-performing portfolio companies. It has been shown previously that VC-backed firms perform better in financial markets after executing an IPO compared to firms that have not received VC funding. It is less certain, however, whether pro-active "hands on" VCs improve the financial performance of companies in which they invest beyond the more laissez faire VC investors described by (Macmillan et al., 1989).

Regardless of whether VCs really do add value to the portfolio companies in which they invest, it is clear that investors perceive this as an important screening criterion for investing, suggesting that VCs should act as "hands on" investors to maximise their chances of raising capital. It is, perhaps, surprising that investors in VC funds address the issue of whether VCs are "hands on" so early in the selection process. This may indicate that investors are focused on the relatively high management fees that VCs command (usually in the range of 2-3% per year) and, in order to justify such fees, demand that VCs should be pro-active. The market for VCs raising capital from investors has become more competitive in recent years (Murray, 1995; Van Osnabrugge and Robinson, 2001) and VCs are under increasing pressure to provide more value for the management fees they command. One respondent commented that for VCs to justify the annual management fee they command, "they have to demonstrate that they can make more money than we would". Our data supports the view, therefore, that VCs who remain passive in their approach to monitoring investments will find it increasingly difficult to raise future capital from investors.

Ratification: Following screening of investment opportunities either via the fund documentation, published data or meetings with the VC, 66% of investors in our sample employed a ratification stage at which consensus was reached to proceed to evaluation of the opportunity. Ratification consisted either of a formal investment review or a discussion within the team to build consensus at an early stage in the selection process. These findings suggest that consensus building, either the formal endorsement of fellow team members or an investment committee, is seen as a priority by investment teams at early stages of the VC selection process.

Evaluation: Following deal origination, screening, and ratification, investors moved on to a more detailed analysis of the investment opportunity during an evaluation stage. On average, 16% of deals originated were progressed to evaluation, of which investors finally invested in an average of 32% utilising a final structuring stage in which investment agreements were executed (see Figures 3 and 4). Investors were asked to place the key criteria used in the evaluation stage in order of importance and responses were scored relative to their ranking (1st = 10, 2nd = 9, 3rd = 8). The majority of investors appeared to focus on four key criteria: The team (score 9.6), track record (score 7.1), fund investment strategy (score 7.1), and the terms for investing in the fund (score 3.1).

(1) The team: 95% of investors considered VCs to be expert selectors of new ventures and 48% regarded VCs as managers who could take operational control of portfolio companies in the event that companies encounter serious problems. Only 29% of investors regarded VCs as passive intermediaries, again suggesting that investors expect VCs in which they invest to play active roles in maximising the value of their investments by providing a "one stop shop" for the entrepreneurs that the investors are backing ultimately. Investors evaluated the mix and balance of relevant experience and the stability and homogeneity of the team. Notably, respondents in our sample group did not highlight individual qualifications as a priority in contrast to the findings of Fried and Hisrich (1989). They were more concerned with the extent to which the existing team had worked together rather than the performance of one or two key individuals, suggesting a focus on consistency and continuity within the team rather than dependence on individuals.

Investors highlighted work allocation and incentivisation within the team, supporting previous findings that incentivisation of younger VCs within the team is seen as an important motivating factor to drive their performance (Gompers and Lerner, 1999a), in other words investors were not attracted to VC firms where the wealthiest managing partners took "the lion's share" of carried interest in new funds but were less active operationally. Investors also focused on the VC's reputation amongst entrepreneurs they have backed and existing investors in their funds. In order to assess these issues, 95% of investors utilized discussions with investors in the VC's previous funds and entrepreneurs or senior managers within existing portfolio companies. 71% of respondents stated that they utilized discussions with other VC's to assess the standing or reputation of the VC within the industry sector, suggesting that reputation is assessed from multiple perspectives.

(2) Track record: Whereas VCs investing in a new venture rarely have the opportunity to assess the entrepreneur's performance in similar previous ventures, investors in VC funds are often able to assess, quantitatively, the performance of previous funds the VC firm has managed. Investors in our sample looked at a range of quantitative measures of historical fund performance including net internal rate of

return (IRR), the return multiple, and percentage of investments realised versus unrealised over the life of the fund. A key issue was whether significant gains on investments could be assigned to "luck" i.e. isolated exit events at unpredictable market peaks, versus the team genuinely and consistently adding value to investments. Investors in our sample focused on consistency of performance by examining holding periods for investments and subsequent return multiples rather than IRR which may be impacted by short-term gains and grandstanding.

(3) Strategy: The key issue assessed by investors appeared to be whether the VC had executed the strategy proposed in previous funds and whether the same strategy would be successful again. Consistency appeared to be the key question for the majority of investors, specifically whether previous funds had been invested according to plan. The majority of investors in our survey approached investors in the VC's previous funds to assess whether previous strategies had been delivered.

(4) Fund terms and completion: One respondent summarised the general attitude toward fund terms by stating "what is the point of negotiating good terms on the investment if the management teams are no good and the fund loses money – you just have good terms on nothing". Investors stated that investment agreements adhered to standard market terms, which most claimed to be familiar with. Investors were prepared to negotiate and reject terms they considered "out of market" but perceived the investment agreement as being of little consequence in their decisions. Such standardisation of agreements appeared to have encouraged a number of investors in our sample to nurture informal relationships with VC's outside the contractual relationship of the investment agreement. For example it was rare for an investor to secure a contractual right to co-invest with the VC in selected new ventures but they perceived that a close non-contractual relationship provided a favoured status for access to potential deals.

Conclusion

Our research has focused on the processes and criteria utilised by investors in the selection of VC funds. We aimed to explore the relationship between VCs and their investors in detail, paying particular attention to the notion of VC "reputation" and its impact on the VCs ability to raise additional capital in subsequent funds. In order to investigate these questions we formulated 2 research propositions as a basis for our study:

Proposition 1: Professional investors in VC funds have established processes and criteria for identifying and selecting VCs in which to invest, and these processes and criteria are comparable to those utilised by VCs in the selection of new ventures.

Proposition 2: Investors assess historical financial performance but also rely on other less tangible measures of VC "reputation" and have developed appropriate mechanisms for gathering such information.

With regard to proposition 1 we found that investors in VC funds utilize a structured process when originating and selecting VCs in which to invest. In general, they do not invest ad hoc in VC firms that approach them or when the opportunity arises. Investors follow clear procedures for managing the annual allocation of capital to VC as an asset class, often seeking formal budget approval from an investment board.

Our model for investment into VC funds is shown in Figure 4. The model is divided into two levels of decision-making – a budget allocation process for venture capital as an asset class followed by a decision process for investing in individual VC funds or in some cases direct investment into private companies, the decision processes for which were not addressed in this study.

Investors follow a procedure for selecting VCs that is similar to the processes that VCs themselves utilise for selecting new ventures, and which have been studied in detail by previous authors. We found that like the VC funds in which they invest, investors follow a sequence of deal origination, screening, evaluation and finally completion with a range of criteria being applied at each decision point prior to completion of the investment agreement. There are, however, important differences to the processes reported for VCs.

Perhaps most notable is the observation that investors build consensus within the investment team very early in the selection process, via a stage we have referred to as Ratification. Ratification represents a formal decision to proceed, either via a presentation to an investment committee or a meeting within the investment team. It is not surprising that investment decisions are made via consensus building, but that consensus building occurs so early in the process indicates that investors place a heavy emphasis on gaining the support of their colleagues before progressing. The opportunity costs for progressing VC firms to later evaluation stages are presumably high, with limited resources within the investment team being diverted away from more promising opportunities. It is likely that investment institutions perceive these opportunity costs and follow procedures to minimize them, perhaps utilising the input of senior team members or an investment committee to guide less experienced investment managers away from evaluating unlikely deals.

It is tempting to speculate that a ratification stage exists within the selection procedures utilized by VCs themselves, and certainly within larger firms that are more likely to employ sophisticated procedures. Previous authors studying the selection processes of VCs, however, have not highlighted the existence of early consensus building within the VC team. If a ratification stage does not already exist at the screening stage of new venture selection then VCs should consider incorporating such a stage to signal to investors in their fund that their selection process is efficient with regard to rejecting inappropriate ventures, or "non-deals", early in the process. This approach would be consistent with Van Osnabrugge and Robinson's (2001) suggestion that VCs signal their reputation to investors via the management processes they employ. By adopting a ratification stage early in the process, drawing the more experienced VCs or even a formal investment committee into the decision to evaluate deals further, they would to signal to investors that they are utilising the management fee that investors pay in a manner that avoids costly evaluations of non-deals by inexperienced members of the firm. Finally, that the selection process utilised by VCs mirrors the investors' own procedures as closely as possible is in line with the general notion of the principal-agent relationship existing between investor and VC (Sahlman, 1990). If VCs are proxies for investors in originating, selecting and monitoring new ventures then it is perhaps logical that VCs should follow procedures that reflect the actions of the investors themselves.

With regard to proposition 2 our research supports the view that investors examine broad, and often intangible, indicators of VC reputation in an attempt to assess future performance. It has been known for some time that the past performance of VCs is a crucial component of their reputation and hence their chances of raising subsequent funds. The impact of past performance on cash inflows into funds has been studied in detail within the US mutual fund sector, for example, Sirri and Tufano (1998) showed that of 690 funds examined, the top performing funds in any particular class receive substantially more commitments in the following year. Within the VC sector, Gompers and Lerner (1999b) showed that older and larger VC firms have higher probabilities of raising funds and are more successful in raising larger funds. Other authors have also studies the impact of past performance on the ability of VCs to raise new funds (Norton, 1995; Gupta and Sapienza, 1988; Zacharakis and Meyer, 1995) and have highlighted that past fund performance and fund size are useful measures of VC reputation. We have attempted, however, to explore in detail the notion of VC reputation from the perspective of investors, and have examined the processes and criteria that such investors apply in the selection of VC funds and hence in their assessment of VC reputation. In other words, what do investors perceive as useful measures of the reputation of VCs and the likelihood that VCs will perform well in future investments?

Investors appear to look beyond the financial performance of previous funds and, perhaps appreciating that past success does not reflect future potential, examine other aspect of VC reputation in an attempt to assess potential future performance. They approach entrepreneurs, other VCs and other investors to assess VC reputation from different viewpoints. This is consistent with the findings of Fried and Hisrich (1989) who showed that US investors talked to a wide range of contacts in assessing VCs, concluding that entrepreneurs in fact play a role in the investor-VC relationship. It is noticeable, however, that respondents in our survey did not highlight the qualifications of VCs as an important criterion in the assessment of the team in contrast to Fried and Hisrich (1989). Investors do, however, rate the perception of VCs as "hands on" as an important screening criterion necessary even to progress a VC to the evaluation stage of the selection process. That VCs' reputations as "hands on" is a priority for investors indicates that investors wish to ensure the entrepreneurs they invest in ultimately, receive more than money from VCs whom they regard as intermediaries. Investors appear to regard the VCs whom they

back as value adding intermediaries who must earn their relatively large management fees by providing a one stop shop for entrepreneurs to maximise the value of the investor's investment.

That investors look beyond historic performance may also be particularly relevant within the context of business ethics and the robustness of financial reporting. The historical financial performance of VC firms has long been opaque and investors may be seeking alternate ways of reassuring themselves that potential returns are indeed as high as the VCs suggest.

The uncertainty of assessing VCs in which to invest may explain why investors appear to track and then back a core group of VCs whom they develop relationships with over a period of time. Respondents in our survey relied heavily on continued investments into VC firms they have backed previously, pre-allocating capital from their VC budget in anticipation of future fund raising activities of their favourite VCs. This indicates that a VCs fate may be sealed before he/ she walks through the investor's door. If they are among the core group of VCs favoured by the investor they may find themselves in the fortunate position of fast tracking through the selection process. This finding has highlighted an important issue: Investors utilise different processes and criteria for VCs they have backed previously compared to VCs they have not invested in before. Thus our model for investment into VC funds incorporates pre-allocation to favoured VCs with whom a relationship exists. Whether investors select such VCs utilising the same screening, ratification and evaluation stages was unclear from our study. It is tempting to speculate, however, that investors may introduce VCs with whom a relationship exists already into the process at the ratification stage, followed by detailed evaluation and completion as indicated in Figure 4.

This finding illustrates the difficulties faced by new VC firms in breaking into a fund raising market where decisions to invest may have been made, at least in part, even before VCs approach investors. The pre-allocation of capital to tried and tested VCs raises significant barriers to entry to new VCs but also highlights an issue for investors. By investing further capital into VCs they have already backed, investors expose themselves to diversification risk – placing their faith in a limited number of VCs. Just as VCs may overlook a fundamentally flawed opportunity due to the reputation of a previously successful entrepreneur (Zacharakis and Meyer, 1998) investors may place too much faith in the reputation and relationship they have built with previously successful VCs. In addition, VCs who raise a new fund whilst simultaneously investing a previous fund are able to spend proportionately less time investing the new fund and may even create conflicts of interest between successive funds through their decisions on where to focus their time and efforts.

A notable finding in our study is that investors in VC funds place a heavy emphasis on the development of a strong informal relationship with VCs outside the formal terms of the investment agreement. The relationship is perceived as an important means of accessing the best VC funds in which to invest and making direct co-investments into new ventures. The relationship between VCs themselves has been studied by a number of authors with a particular focus on why VCs syndicate investments with each other. Beyond reasons of portfolio diversification and access to deal flow, Lockett and Wright (1999) have highlighted the importance of relationship building in the choice of syndicate partners, showing that such choices are dependent on past interactions, reputation and investment style of potential syndicate partners. Thus, the informal relationship between VCs and their investors may play a similar role in creating co-investment opportunities for investors as direct members of a syndicate group.

This illustrates that investors in VC funds face pressures to maximise their chances of continuing to invest in the leading VC funds and investing directly in selected new ventures. Gompers and Lerner (1999c) have discussed the shifting power balance between VC and investor within the economic cycle and highlight that changes in the supply and demand for VC finance can impact the terms of the formal investment agreement. Our paper highlights that although the formal investment agreement is a necessity, the informal relationship is a key mechanism for stabilising the investor-VC relationship throughout the cycle of shifting supply and demand, i.e. both parties appear to remain committed to each other beyond the formal terms of their agreement. In a recent paper, Baron and Markman (2002) showed that an entrepreneur's social competence (such as their accuracy in perceiving others) is positively related to their financial success. Similarly, it is tempting to speculate that the social competence of both investor and VC in perceiving each other may be an important component of a long and successful financial relationship.

The importance of maintaining a strong informal relationship also highlights a strategic element to the decisions of investors to invest in particular VC funds. We were able to identify a group of investors in our survey whose primary motive for investing in VC funds appeared to be strategic, either to gain access to new geographic or technology markets in which to invest directly, or to leverage their investments to providing loan facilities to firms backed by the VCs in which they invested.

Summary and future research

Our paper has attempted to explore the criteria and processes utilised by professional investors in VC funds. Our findings are summarised in Figure 4 as a model for the decision-making processes and criteria of investors in venture capital. We have emphasised the role of the VC as a financial intermediary, subject to the pressures of raising funds in order to ensure their continued ability to invest in new ventures. By exploring the processes and criteria employed by investors, it is hoped that this paper will provide useful findings for investors in VC in establishing benchmark criteria and processes, and for new VC firms attempting to negotiate the difficulties of raising funds.

For VCs the delicate art of courting investment from Europe's leading investors must begin early, and perhaps be maintained through a series of funds before investors will commit. The relationship between investor and VC is, however, perceived as critical from both the VC and investor perspective. This is hardly a surprise for anyone with experience of the VC fundraising cycle but there are subtleties to the conclusion that warrant further exploration. We observed that many investors pre-allocate capital to VC firms they have already backed in anticipation of repeat fundraisings. Such a recurring commitment to tried and tested VCs may enable investors to place a greater amount of capital with minimal effort, and at a perceived lower risk. There is a note of caution for investors, however, in that repeated commitments to the same group of trusted VCs creates a diversification risk. It would be interesting to investigate whether investors who repeatedly commit to the same core group of VCs experience decreased returns in the long term.

This paper serves as an exploratory study of decision making upstream from the VC and extends our understanding of the relationship between investor and VC, and hence the overall flow of capital into new ventures. We have raised a number of questions relating to the development of relationships within the VC cycle and we intend to explore these issues further by focusing our attention on the power balance between investor, VC and entrepreneur.

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Tables, charts and graphs

Table 1: Sample Selection: Investor Profiles and Background

Investor	Funds Under Management (€ '000)	Team Size	Years Since Formation*	Source of Funds
A	1,850	10	3	Balance Sheet
B	1,374	5	4	Hybrid
C	2,200	12	>10	Hybrid
D	1,000	5	>10	Hybrid
E	2,800	6	7	Specialist
F	4,200	9	3	Balance Sheet
G	3,000	5	5	Balance Sheet
H	400	2	6	Balance Sheet
I	1,700	3	>10	Hybrid
J	1,200	6	>10	Hybrid
K	700	4	>10	Specialist
L	150	3	2	Balance Sheet
M	2,000	17	2	Balance Sheet
N	5,000	12	>10	Specialist
O	200	2	1	Balance Sheet
P	2,000	2	7	Balance Sheet
Q	1,458	7	3	Hybrid
R	320	3	2	Balance Sheet

* Years since formation of firm or business unit for investing in VC

Table 2: Source of Funds and Allocation Process

Investor Class	Number	Source of Funs	Years Investing (mean)	Allocation Process
Balance Sheet	9	Internal	3.4	Annual Budget
Hybrid	6	Internal/External	7.8	Annual Budget & Fundraising Cycle
Specialist	3	External	9.0	Fundraising Cycle

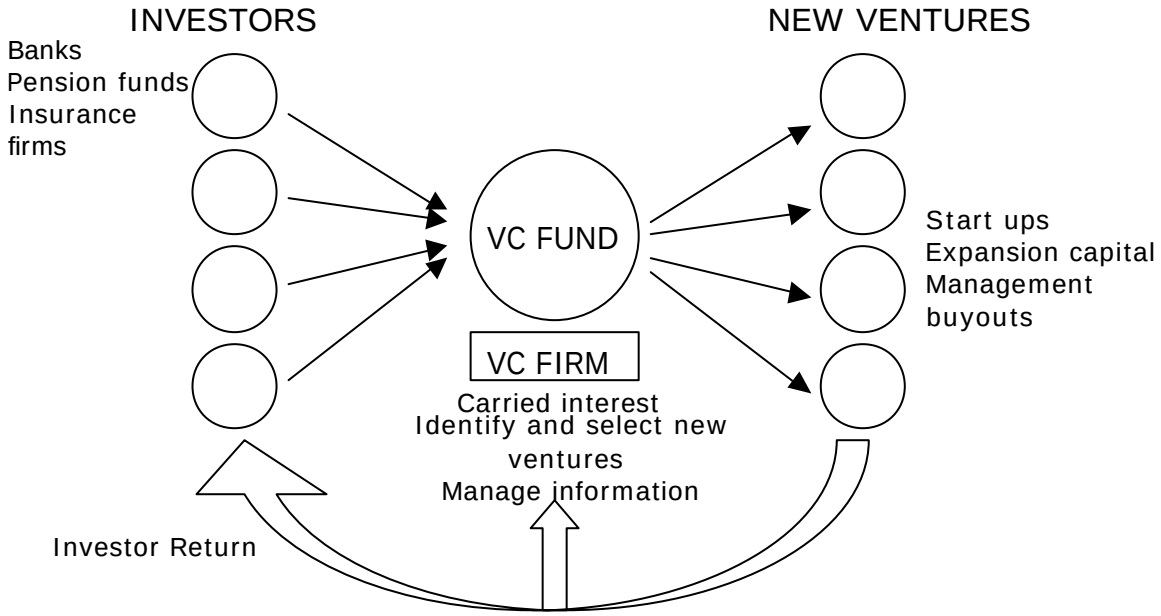

Figure 1: The role of the venture capitalist

VC firms raise funds from investors such as banks, pension funds and insurance companies to invest in new ventures such as start ups and management buyouts. The VC selects and monitors investments in new ventures and distributes returns to investors in shares or cash, with the VC receiving a proportion of the gain as “carried interest”.

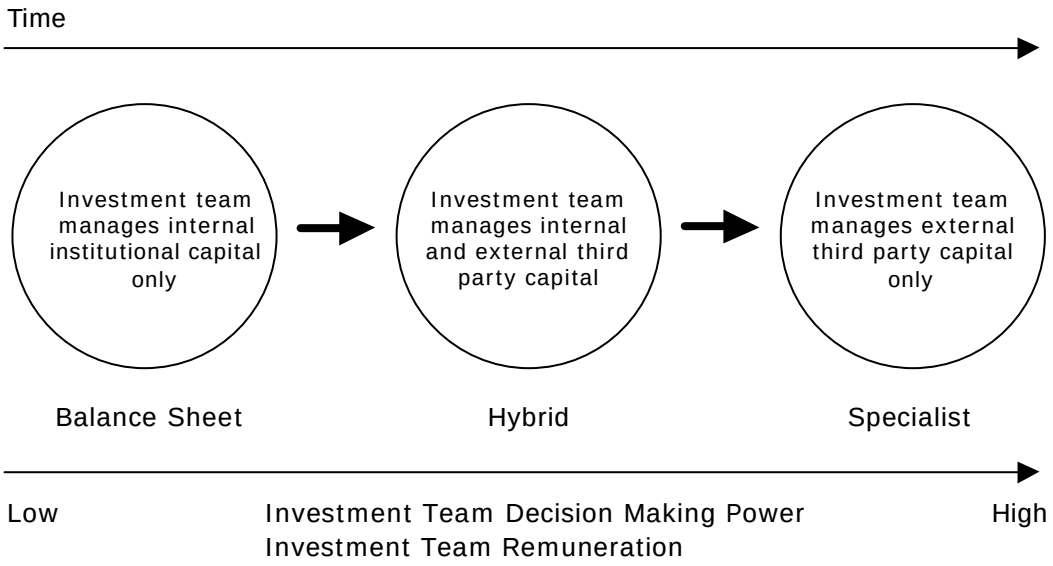

Figure 2: Evolution of investors in VC

The results shown in table 2 demonstrated that Hybrid and Specialist Investor business units had existed for longer periods of time than Balance Sheet Investors. This suggests an evolutionary pathway may exist for individuals or teams within the private equity investment business from being "captive" investors relying on the balance sheet of the parent institution for capital to Specialist investors who rely on externally raised funds. Interviewees perceived this evolution to be associated with increased decision making power for the team and increased remuneration.

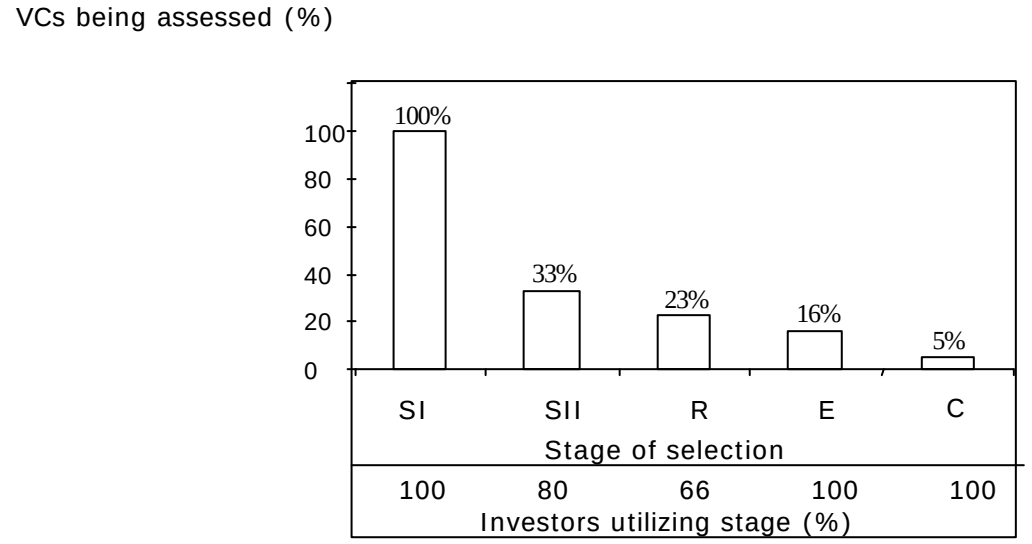

Figure 3: Attrition rate for VCs progressing through selection process

The first stage of screening (SI) in which fund documentation is reviewed is the stage at which the greatest proportion of VC funds are rejected. Screening II (SII) serves partly as a scouting mechanism for future investments, whilst ratification (R) is a consensus-building stage that serves as a check before VCs are subjected to more costly and time-consuming evaluations (E) prior to completion (C).

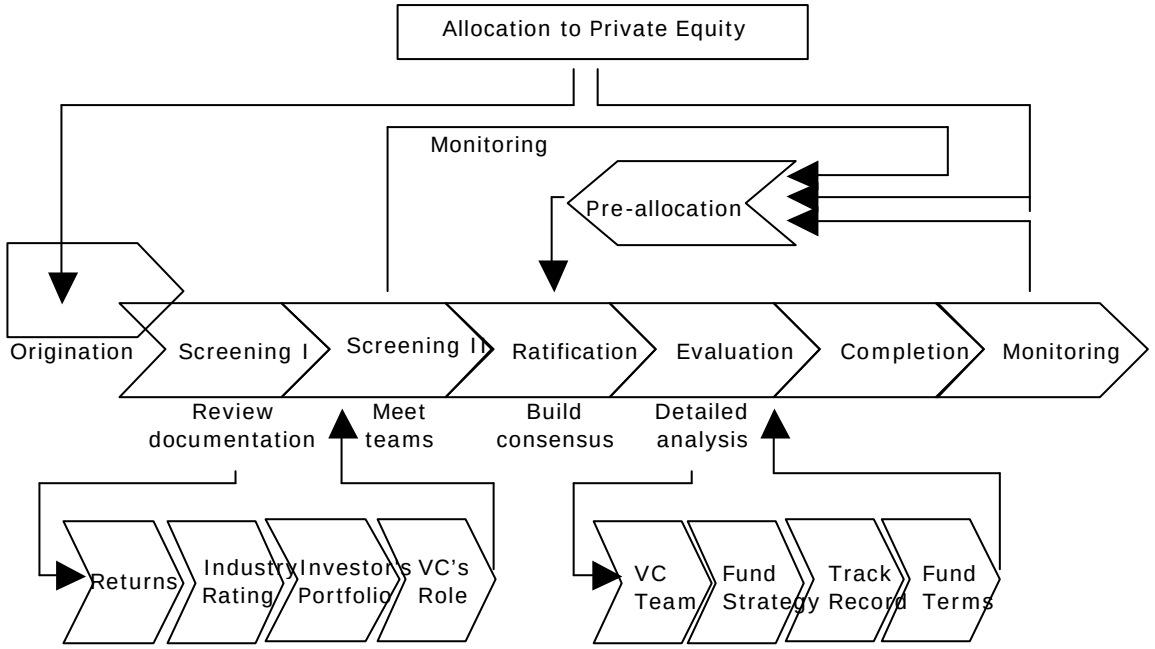

Figure 4: Processes utilized by investors in our sample for investment into venture capital funds.

Investors originate VC fund opportunities through a variety of sources and progress funds to a screening stage where documentation is reviewed and criteria including historical returns, industry ratings within published reports, the investor's portfolio diversification strategy, and notably whether the VC is "hands on" or not. A large % of investors also utilize a stage we have referred to as screening II when investors old meetings with VCs, perhaps for consideration for future investments. A majority of investors build consensus early in the selection process by utilizing a gate keeping stage we have referred to as ratification. Ratification appears to serve the purpose of minimising the opportunity cost of evaluating VC funds that the VC investor rejects at later stages. Evaluation consists of detailed analysis of numerous criteria, the most important of which are the VC's team, the strategy for investing the fund, track record of previous funds (including whether the team delivered the original strategy) and finally fund investment terms. The pre-allocation of capital to VC funds that the investor has backed previously or VC funds the investor may have tracked via screening II and monitoring emphasises the difficulty faced by new VC firms raising a first fund. If a portion of investors' annual capital allocation to private equity is pre-allocated to existing funds then the barriers to entry for raising a new fund are significant.

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Business Angels Academies: Unleashing the Potential for Business Angel Investment

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Abstract

Earlier research has highlighted that business angels endure an information problem (information gap) mainly due to their desire to keep a low public profile and to the informal character of the market. In this context, the creation of business angels' networks was promoted to deal with this gap. This, however, only partly succeeded in converting the stock of virgin angels into active informal investors. From the study of a sample of investors attending a business angels' academy, this paper argues that such a conversion can only be significant if one approaches the problem from the hurdle represented by the lack of understanding of the investment process. An important source of difficulties to the development and establishment of informal investment is the fact that many angels (especially potential angels) lack an adequate understanding of the investment process. They are therefore e impaired from taking advantage of arising investment opportunities. The implication is that there is a need for intervention in a new area of the informal market: the creation of business angel schools or academies conceived as frameworks for exchange of experiences and close cooperation.

Informal market: underdeveloped potential

In order to realise the full potential of the informal market different voices plead for a second generation of BAN which is able to target reluctant potential investors and entrepreneurs in need of finance but who do not consider raising external capital. This second generation of BANs should focus on 'educating' the market place. In this context emerged the idea of a business angel academy or business angel school that could fulfil that role and whereby angels would progress along a learning curve throughout all the phases of the angel investment procedure (Mason and Harrison 2002).

It is widely accepted that the informal venture capital market is largely undeveloped in Europe as compared to the USA (EBAN, 1998), though studies measuring its size are hampered by the lack of transparency and the informal character of the market. The Global Entrepreneurship Monitor (Reynolds et al 2004) reported a total amount of informal investment in nations surveyed of almost 1% of their combined GDPs, while the prevalence of informal investors was 2.9% of the population (18 years of age and older). In almost all European countries the informal VC (including all informal sources of finance) market is much more developed than the formal, or institutional, venture capital and its relevance as a source of finance for start-ups is clearly superior to its formal counterpart. However, the GEM definition of informal investors cannot be reconciled with the definition of 'business angels' found in many other academic studies and business environments. Of the private investors in the 2003 GEM study, 52.6% provided personal funds close family members and relatives, 29.2% invested funds in business proposals from neighbours or friends, 8.9% in a work colleague's, and only 9.3% of individuals in the study reported to have provided finance to strangers' projects (Reynolds et al 2004). Hence, this family, friends, fools approach is much larger than the business angel concept more usually found in the literature (Aernoudt 2001).

Nevertheless, the number of individuals that are potential investors, often referred to as virgin business angels (Aernoudt 1999), has been estimated at 850,000 individuals in Europe and 1,750,000 in the USA. That is, individuals who fulfil all the conditions to become a business angel but have never invested. Moreover, there is evidence that the pool of non-active investors is increasing as compared to the investment figures (CVR 2003). Research on business angels in Denmark shows that 45 percent have invested less than 10 percent of the capital which they had allocated to investment in unquoted companies (Napier 2002). And despite the increase in angel groups' membership, 41 percent of angels in those groups in the USA were not active. This represents a steady increase over the last three years (32 percent in 1998) (Sohl and Sommer 2003). This increase in latent investors over time indicates that while many high-net-worth individuals may be attracted to the early stage equity market, they have not converted this interest into direct participation. Clearly, cyclical market downturns might play a role in this non-activity. Nevertheless, it is clear that it is not the lack of funds to invest that is impeding activity. The inefficiency is linked to non-tangible factors.

Against this background, the aim of this paper is to identify differences between active and passive business angels, to understand the training needs of business angels and to discern between the training

needs of active and passive business angels. Finally the paper aims at exploring the potential role of nascent business angel academies as converters of latent angels and promoters of the informal market. In Europe today only two examples of organised business angel academies exist (Aernoudt 2003). The survey will be focused on one of those countries.

Business angel networks are not the panacea

Inefficiencies in the informal market have been explained (Mason and Harrison 1995, OECD 1996, Aernoudt 1999a, Harding 2002) by the existence of information asymmetries, which comprise a knowledge gap where there is risk aversion on the supply side and uncertainty and resistance to venture capital on the demand side. Lawton explain the inefficiencies as a the mismatch between the perceived risk and the perceived return on the part of the investors and also by a knowledge gap which is the result of imperfect information on both sides: on the part of SMEs by ignoring the benefits of venture capital investment and on the part of investors by not finding access to investment opportunities (Lawton 2002).

Entrepreneurs have also difficulties finding potential investors who prefer to keep a low public profile concerning their willingness/capability to invest. This situation is described as an information gap in the market. Inadequate flow of good ideas from the demand to the supply side of the market can explain some of the inefficiencies. The lack of information about the market - that is, data on investment statistics, exits or returns to be analysed and contrasted by researchers or experts - hampers the external assessment of the real opportunity represented by this market, hence, contributing to the inefficiency of the market (Esposito and Prats 2003).

The basic assumption was that the majority of business angels needed neither advice nor technical assistance on how to select projects (although an exception was admitted in the analysis of technology ventures). Therefore Business Angel Networks (BANs), or introduction services approaching investors with investment opportunities, were considered as the best approach for dealing with those efficiencies and to help to overcome the information gap (Aernoudt 1999b).

BANs were conceived to respond to information efficiency in the market. They provide a channel of communication between investors and entrepreneurs in order to minimize the cost of the entrepreneur's search for capital and to enable investors to examine a larger number of investment opportunities and hence facilitate the access to proposals that meet their investment criteria. Business angel networks are also important instruments for raising awareness about the market in both sides, between entrepreneurs seeking external capital and potential investors. These networks have been organised in various ways, as public or private organisations, regional, local or national, based on direct contact, magazines, or internet. Different BAN models responded to different needs in their markets of operation.

Business Angel Networks can be considered as the first attempt to create a true mechanism to increase the efficiency of the market and consequent deal flow (Sohl 1999). Mason and Harrison (1995) consider the underwriting of operation costs of BANs by public authorities the most cost effective measure to overcome the equity gap. Attempts to improve the supply of informal venture capital through business angel networks has not always been successful, and certain criteria have been established in terms of geographic coverage, public / private nature or sector approach (Aernoudt 1999a). The relative success of BANs has been both widely endorsed an strongly contended (Mason and Harrison 2002): there is no universal agreement on their effectiveness.

Besides the lack of a communication instrument, demand or supply deficiencies, framework conditions are also very relevant to the development of the informal venture capital market (taxes, entrepreneurial culture, administrative constraints…) (EBAN 1998, Mason and Harrison 1999, Mc Glue 2002, European Commission 2003).

The concentration of efforts on improving framework conditions such as taxes and legal aspects and the promotion of business angels networks has not been efficient in bringing business angels' activity to the desired level. Despite imperfections they have been successful in many aspects (Sorheim 2003), and part of the inefficiencies can be related regional track records and specific industry experiences. Business

angel networks have succeeded in creating awareness and in drawing the mutual attention of potential investees and investors to the possibilities of the market but have not yet succeeded in mobilising a significant number of business angels. BANs have not as a general rule, with the exception of the 'band of angels', invigorated the syndication phenomena, which is considered underdeveloped in Europe as compared to the USA. Therefore, further analysis of the informal investment market is deemed indispensable in order to explore new ways to cope with the underdevelopment of the angel market.

In search of new approaches

Besides the classical factors such as investors not seeing enough deals that meet their investment criteria, the poor quality of the investment proposals that they receive, Mason and Harrison (2002) add other constraints to angels' ability to invest. This transfers inefficiencies to the demand side of the market. Indeed, investors claim they are often unable to negotiate acceptable investment terms and conditions with entrepreneurs.

Sorheim and Landstrom (2001) argue that the lack of competency amongst investors might be relevant to the underdevelopment of the informal market. Their work classifies investors into four groups of which only one can be considered composed of classical business angels. The rest would lack either competency or investment activity. Sohl and Sommer (2003) also point to investor education as a factor inducing a person to move from potential to active investor. Considering angel investment as a specialised risky asset class in households' portfolios, Maula et al. (2003) claim that educative policy measures could be targeted to the informal market in order to increase the propensity of individuals to invest, where social psychology theory of planned behaviour explains the role of education in creating a supportive culture for informal investment.

The capacity of investors to assess certain types of ventures appears to be also an issue within the early stage venture capital market for innovative ventures (Aernoudt 2000, European Commission 2001). The measures to mobilise angel investors should be adequate to the target group. For instance, investors not investing intensively and who are not highly competent would be encouraged to invest with the provision of advisory services, to syndicate with business angels and to exchange experiences with more sophisticated investors (Sorheim and Landstrom 2001).

Angel investment is a process rather influenced by the personality of the angel. Only few people have accumulated sufficient experience and capabilities to participate, or even to facilitate, this type of investment. Business angel investment is an activity marked by increasing complexity of businesses and the environments in which they operate.

The 'lonely' entrepreneur is more and more a rarity and new high potential businesses require a broad range of capacities, hence, those businesses are often initiated by a team of entrepreneurial individuals. Business angels bring to the team of entrepreneurs the human and financial capital attributes that the team might be lacking, that is, past entrepreneurial activity, management know-how, industry specific know-how, financial and other networks and capital. Business angels must also be able to assess risk opportunities. This resource is not necessarily acquired alongside the skills mentioned. Education, as well as experience, can provide this resource.

We can argue that an important contributor to this knowledge gap is caused by the lack of an adequate understanding of the investment process, and therefore business angels are impaired from taking advantage of arising opportunity investments. While entrepreneurs are often trained to elaborate and present their business plan to investors and are advised on what to expect from investors, their only training for business angels is experience.

Lack of training of investors is a factor whose importance is not unknown to the formal venture capital market. One of the obstacles to the development of the early stage venture capital market in Europe is the lack of capacity of mainstream venture capitalists to assess the potential of early stage ventures, in particular, of innovative projects. Most investment analysts hold a finance or economic degree, whereas only one-fifth hold an engineering or other technical degree, however, according to surveys in the venture

capital industry, the ideal recruit for this role has a technical degree plus an MBA (European Commission 2003b). Different actions of the European Commission have been addressed to support the long-term recruitment of additional investment managers in order to build within the venture capital industry a lasting capability to appraise and manage those early stage projects in technologically innovative small and medium-sized enterprises. An evaluation of one of those initiatives concluded that the venture capital industry benefited from a long-term increase in capacity resulting from the engagement and training of new staff (European Commission 2003a).

The angel investment process similarly requires the synchronisation of the different components, whose objective is to achieve overall success. From this point of view, the process implies the participation of entrepreneurs, advisers, intermediaries and angels, all with different characteristics and personalities. For capital-seeking companies, the investor is a 'stranger' and for the investor the company is a 'risk'. Hence, an important success factor is the management of the investment process, whereby the entrepreneurial and interpersonal skills are elements as decisive as the provision of capital.

According to the above, business angels are, (subject to possession of requisite financial capacity) individuals who have access to investment opportunities, are skilled to discern the potential of those investment opportunities and eventually capable of managing the complete investment flow to exit. Hence, two resources important to a business angel's investment activity can be identified, networks, whether informal or formal, provide the investor with investment opportunities or allow for the sprouting of co-investment operations, and skills which will provide the investors with capabilities to assess the risk of investment opportunities and manage the process.

Business angel education: building investment capability

In order to increase investment activity of potential investors, and complementary to the business angel networks, upgrading of investment assessment skills could be a real issue. Freear et al. (2002) propose to look into investment activity as a function of angel's felt level of confidence and competence in their ability to deal intelligently with the 'central mysteries'' of venture investment, namely, pricing, structuring and exiting. Indeed, a potential investor who is not able to properly assess the risk or potential of a venture at the screening stage will certainly not progress into further stages of investment.

The design of such a business school has to be made recognising the difficulties of narrowing down the profile of investors, their individuality and their tendency to operate beyond official programmes. It can be argued that teaching business angels might have some similarities with teaching entrepreneurship. It is believed that entrepreneurship should be taught offering a combination of theory and practical applications that offers students the basis of their decisions (Fiet 2001). In the same line, informal investment theory should help to understand better how to create wealth.

However, despite entrepreneurs being at the other end of the informal market, business angel schools should depart from the premise that most business angels have accumulated considerable experience as entrepreneurs and / or managers, consistent with the fact that not only wealth makes an individuals a business angel.

As can be seen from the figure, the academy should enable investors to increase their activity given a deal flow emerging through the business angel network. It should not only mobilise virgin angels and increase the activity of the existing angels, but should be a tool for promoting syndication. Especially in Europe, a greater syndication is a must in order to cope with the smaller equity gap problem, as the average amount invested by a business angel in a project does not enable the investee to survive until the company is ready receive formal venture capital.

[Insert figure 1 about here]

Methodological issues

Research on the informal market is in general hampered by the lack of data on business angels and on the overall market. The information on business angels' profile comes from very few sources, the most representative are Mason and Harrison in the UK, (yearly investment activity report and 1992,1995, 1999 and more), Stedler and Peters (2002) in Germany, Napier (2002) in Demark, Sorheim (2001) in Norway, Hindle and Lee (2002) in Singapore, Visser and Williams (2001) in the Netherlands, Osnabrugge (1997), Sohl (1999), and Freear et all (1994) in the USA (see also Hindle, K. G., and Rushworth, S. 2001 for an overview of different studies).

The information presented here is derived from two different samples. The first survey was carried out prior to the beginning of IESE's School of Business Angels programme. IESE is one of the European leading schools in the field of entrepreneurship located in Barcelona. Although the IESE offers resource to a dedicated venture capital fund to his students and alumni there was no prior initiative on the field of business angels. The questionnaires supporting the afore-mentioned research, although seeking similar objectives, are not always fully comparable, and therefore, certain defining characteristics of business angels in a particular region or area have to be presented isolated.

The survey was distributed to the 53 participants in the programme and 27 responses were received. The second survey, carried out after the completion of the programme was intended to measure perception of possible changes regarding investment skills. Thirty-eight responses were received for this second questionnaire. The analysis of responses were complemented with notes taken by the research team during the working sessions held as part of the programme, with interviews to a reduced number of angels, and with researchers' observations during the meetings held with a special group of angels constituted as a brainstorming committee for the establishment of a business angel network associated with the school.

Due to the lack of business angel schools in Europe, this paper cannot present a comparative evaluation of the programme as regards the experience of participants, the improvement of their investment skills or the mobilisation of informal capital. The identification of the characteristics of this community of angels, who recognise the room for improvement of their own investment capabilities, will contribute to the implementation of better targeted public policy measures to activate the informal investment market.

The profile of student business angels

The results of the survey show that individuals attending to the business angels Academyl (BAA), including active and passive business angels, have similar characteristics as those reflected in other research, namely, they are male, between 35-55 years old, with an entrepreneurial past, financial capacity to invest and the desire to be involved in the venture (Harrison and Mason 1992, Landstrom 1993, Freer, Sohl and Wetzel 1994, Osnabrugge 1997, Coveney et al. 1997, EBAN 1998, Feeney et al. 1999, Aernoudt 1999b, Hindle and Lee 2002, Hindle, K. G., & Wenban, R. 1999, Stedler H. and Peters H. H. 2002).

The wealth and risk profile of the angels enrolled in the programme also reflects similar results to existing research. Business angels have on average 470000 euros available for investment. The median is very similar and only very few investors declare to be able to allocate 2 million euros to investments. Most of the angels have an investment capability varying between 60,000 euros and 300,000 euros. Angels would invest ideally 100,000 euros on average in a single project.

Regarding how business angels approach risk in relation to the impact of losses in their wealth most of the investors declare to be prepared to assume the total loss of their investments (65 percent). A loss amounting to 50,000 euros would affect the family wealth of five percent of the angels; this figure rises to 36 percent if the loss amounts to 150,000 euros. However, it has to be noted the existence of wealthier (or riskier) investors (23 percent), who will not be affected by losing amounts superior to one million euros.

The contribution to the management of the company, whether occasionally or on a daily basis, is one of the most valuable characteristics of business angels. At early stages, when they mainly invest, financial and technology assets are not a guarantee for success, new companies lack of managerial skills and need help on the marketability of the product. The strong commitment of angels is also present in the size of the stakes they subscribe. Although not seeking control, their stake might depend either on the perception of the risk of the project or the market. Respondents to the survey reported their preference to be involved with the firm as coaches or advisors (see below), and they expressed willingness to dedicate an average of 26 hours per month.

Coach _____ 50%
Member of the board _____ 35%
Minority shareholder (no involvement) _____10%
Variable, depending on the investment _____ 5%

Business angels might, as widely reported in research, have time to dedicate to the new venture because their accumulated wealth and their professional capacity is largely proved, and they therefore do not feel the pressure that (younger maybe) professionals or entrepreneurs feel in earlier stages of their career. But business angels rarely are retired or have idle time. A few as 8 percent work part-time and they are involved (on average) with more than three institutions, boards or foundations.

Regardless of their investment experience, participants the school programme have significant entrepreneurial experience. As many as 69 percent have started a new business at least once and most of them can be deemed to be serial entrepreneurs, since the average number of enterprises created by each investor is three (mean two). Nearly half of angels (46 percent) currently own an enterprise (the questionnaire does not specify if they were initial entrepreneurs on that business or bought in at a later stage). Hence, many of these angels are already in the third career phase, and have been through the corporate career phase, the entrepreneurial learning phase, and the integrated investment career phase; the understanding of their career choices may prove helpful in directing efforts to locate and attract potential and existing informal investors (Politis and Landstrom 2002). Certainly these informal investors are 'entrepreneurial learners' who continue to develop their entrepreneurial skills throughout their careers, resulting in a valuable competence that they can share as informal investors with less experienced entrepreneurs (Erikson and Nerdrum 2001).

[Insert table 1 about here]

Traditional sectors are the most frequently cited as source of professional experience, namely, manufacturing (the region of Catalonia – where IESE is based - has a strong tradition in textile manufacturing), financial services, construction and distribution (either retail or wholesale). Since experience determines future investment of business angels, who normally invest in the sectors they know best, it seems that business angels are not a panacea when dealing with technology-driven new ventures. In fact, during the working sessions held with attendants to the school they expressed a certain suspicion of high-tech ventures.

This is consistent with the approach of other European angels. For instance, British business angels only invest 30 percent of the total amount in high-tech sector, while manufacturing and services represent 64 percent. Also NEBIB, the Dutch BAN, reports that most angels in the Netherlands 'have earned their money' in enterprises that offer a mixture of services and sales. The view that 'venture building' skills are widely applicable to any number of industry settings (Kelly and Hay 1996) is confirmed by research carried on German business angels, who no matter what previous experience they have (only 40 percent had previous experience in the sector they invested) show a clear preference for diversification to technology sectors instead of remaining in the sector where they gathered that experience. For instance, German business angels with experience in the trade sector dedicated 52 percent of their investments to IT, 21 percent to life sciences and 20% to the services sector (Fachhochschule Institute).

As it has been mentioned, the participants in the school were not only virgin or latent business angels. On the contrary, the majority of them (69 percent) reported that they already had experience as a business angel. Many of these are already experienced or serial business angels, since the average number of

investments carried out by them is two. Some of them were closing their first investment deal at the time of joining the school (shown in chart 1 as 'in process').

[Insert chart 1 about here]

Angels mention returns and the need to pursue personal challenge as the main reasons to invest. Equally business angels are aware of the opportunities offered by their personal and business networks and want to materialise these opportunities using their own and their families' wealth. The social component, although it does not appear amongst the most important reasons to invest, is also present together with the perception of social responsibility to coach the next generation of entrepreneurs.

Business angels, categorised as the fools within the 'three Fs', friends, family and fools, can also act as 'love money' investors by financing the ventures of family members and friends. Nevertheless, this criterion ranks amongst the lowest they take into account. Lastly, business angels are not tax-driven investors, although they take into consideration the fiscal framework of investment, in this survey fiscal incentives appear as one of the least important reasons for investment.

In common with other surveys carried out in Europe, we observe that returns are always among the top three reasons to invest, together with personal challenge or satisfaction and the willingness to pass knowledge on to new entrepreneurs. In general, taxes do not play a relevant role (see chart 2). However, a survey in the UK reported low rates of capital gains as the main factor to encourage investment, equally high rates were the main discouraging factor (Mason and Harrison 1999).

[Insert chart 2 about here]

Catalan business angels invest amounts between 30,000 euros to 120,000 euros, a similar figure to business angels in other regions of Europe (see table 2).

[Insert table 2 about here]

Differences seem to exist between European angels in terms of stage of the venture in which they invest. Spanish business angels are much more prone to invest in the seed stage than their British counterparts and resemble German business angels more in this respect (we assume that the pre-start-up seed category in the German survey is included in the seed category for the Spanish survey) (see table 3). The similar distribution of amounts invested in the UK and Spain, does not allow explaining or understanding the different stage investment pattern exposed.

[Insert table 3 about here]

Active and passive business angels possess, as seen before, similar characteristics. However, there might be certain differences that contribute to the lack of investment activity among virgin angels. The identification of these differences is essential to the attempt to mobilise passive capital, the diagnosis should be prior to the treatment.

Indeed, the result of the survey sent to participants' shows that a highly likely reason for non-investment by business angels, is that they did not find the opportunity to do so. This is reflected in the fact that the main factor driving attendance at the business angel school is the desire to acquire the skills of search, identification and evaluation of opportunities (see chart 3).

[Insert chart 3 about here]

However, while this is clearly the main motivation for virgin angels, it is less the case for already active angels (a slightly higher number of respondents marked the valuation of new business as the main motivation) (See Table 4).

Potential business angels

As many as 30 percent of participants in the school have no investment experience, from the point of view of the informal market they can be considered virgin business angels, who are conscious of their angel potential and take steps to turn themselves into active angels. They would be therefore an intermediary category between a population of high net worth individuals but not interested in investing on one side, and active angels on the other.

Their main reason for not investing is the 'lack of information on opportunities arising and poor knowledge of the sectors of opportunities received' (75 percent), followed by 'not knowing adequately the investment procedure' (37.5 percent) and, third, 'lack of attractive projects' (25 percent) and 'high risk' (25 percent). Only one of them claimed illiquidity as a reason for not investing.

Investment capacity of passive angels is slightly lower than for active angels. Passive angels would dedicate 100,000 euros (300,000 euros active angels) to investment, investing 70,000 euros (150,000 euros active angels) per project, which reflects a higher risk perception. The proportion of enterprise owners is higher amongst active angels as it is the case for entrepreneurs (80 percent of active angels vs. 37 percent of passive angels).

Motivations of passive business angels to invest are 'expected returns' followed by 'social benefit'and 'support to the new generation of entrepreneurs' (see chart 4). While the main reason, return, is shared by active angels, this group ranks personal challenge and taking advantage of its social network as the second and third reasons. It seems that passive angels also attribute higher importance to social contribution, either in the form of direct knowledge transmission and support to young entrepreneurs or through direct and indirect benefits to society of fostering entrepreneurship.

[Insert chart 4 about here]

Passive and active angels have a range of similar and different expectations from attending the school (see table 4). Given the investment experience of active angels (two operations on average) their interest in the school moves forward into more advanced stages of the investment process. Despite placing considerable importance on the research, identification and evaluation of opportunities, active angels would like to improve their business valuation skills, a problem with which many passive angels have not been confronted, since they did not invest due to lack of information on opportunities arising and sectors (only one of the passive angels had analyses business proposals, four). The results also show that active angels are more aware of the relevance of the exit procedure than virgin angels, again less relevant for those who have never reached that stage. In the different working sessions organised with angels, a large part of them pointed out that planning the exit strategy while discussing the deal was essential.

[Insert table 4 about here]

For both groups, the focus on financial forecast analysis is the least important aspect of the teaching to be provided by the school. MBO and MBI investments are also not interesting for them (at least in the framework of business angel investment and the school).

The informal venture capital market is apparently considered to be inefficient by both groups of angels, passive and active, since their difficulty in finding projects is similar. Relationship with other investors is also essential for both groups. Throughout all the work sessions organised by the school, it was clear that angels, especially those with less experience, considered it essential to establish a platform that allows for the exchange of experiences, provides access to the advice of experts or more sophisticated investors and facilitates the occurrence of syndication. When it comes to the matter of establishing arenas where investors and entrepreneurs can meet, it seems obvious that the kind of business angel networks that offer only matchmaking services would not be sufficient to push them into investing. Generating opportunities for experienced business angels to act as mentors and catalysts for the other groups of investors and to establish varying social encounters in order to further foster interrelationships between the different types of investors could be very beneficial.

Following the completion of the school, all passive angels, without exception, felt more qualified to invest thereafter.

Conclusions

We have shown that angels, whether active or passive, feel the need to improve their investment skills. The survey carried out amongst participants at the business angel Academy provides strong support for the proposition that there are potentially different training lacunae between active and passive investors. Virgin business angels are affected by this lack of knowledge in the first and decisive stages of investment: the recognition and evaluation of opportunities. Therefore, they are hampered in carrying the process further. Active angels value primarily training in the area of new business valuation. Indeed, it is reasonable to think that virgin angels have not been able to overcome initial difficulties of the investment process, the identification of opportunities, while active angels recognise their main difficulty once they are involved in the investment.

Passive business angels would initially invest in the lower amount range of investments, which reflects their higher risk perception. In line, they demand more comprehensive services from the business angel networks they join. Co-investment with other angels is also one of the reasons that would trigger their first investment.

Those angels, active and passive, who acknowledge the existence of training lacunae, are prepared to follow academic-type courses. The large majority of student angels surveyed value most, in-depth study of topics, organisation of working groups to analyse cases and a broad framework for exchange of experiences. Despite time constraints, angels value continuous education and are willing to follow structured and longer programmes than the majority of those available in the market.

The programme available at the Angel Academy provides an entry route for virgin angels. There is a significant learning curve associated with appraising and managing investment opportunities, and angel syndication provides a means for virgin angels to gain experience while taking less risk than if investing alone. As a consequence of some important characteristics - namely, the long academic period, frequent working sessions with rotating small groups, and required regular attendance - the first iteration of the programme promoted the creation of a very cohesive group. Eventually participants discussed jointly participation in several investment opportunities.

Implications for public policy alternatives

Several alternatives are available to public policy makers to activate the potential of the informal market as a source of finance for early stage ventures. Actions could address improving the environment conditions such as taxes, cultural attitudes to entrepreneurship and risk taking. Action can also target the demand side of the market: entrepreneurs. Demand side factors include: entrepreneurs' perceptions of equity finance; the readiness of business plan; and their ability to present ideas and projects in an adequate manner to investors. Initiatives in support of the establishment of matchmaking mechanisms and information flow instruments such as business angels were initially developed at pan-European level and adopted by most national governments.

Given the relevant role that syndication plays for investors, in particular for novice angels, governments should consider facilitating, from the legal and fiscal point of view, the establishment of 'angel structured groups' common in the USA.

As a result of the findings of this study, we propose an innovative alternative targeting the reduction of information asymmetries from the supply side through the provision of investment education to business angels. The training of business angels would improve their knowledge of the investment process, hence reducing risk and stimulating investment.

Furthermore, the different actors in the market should be coordinated to lower inefficiencies. In such a framework the development of an equity seeking mindset, the so called 'equity culture' between entrepreneurs, can be fulfilled by the education system and the public bodies which the entrepreneur addresses in the first place when looking for help in establishing a business. Educational organisations, such as business schools offering structured programmes with a combination of academics and practitioners, are best placed to provide the tools that potential angels need to complete their first investment and start progressing within the learning curve. European institutions could play an active role by integrating the business angel academy concept into their benchmarking exercise.

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Tables, charts and graphs

Figure 1. Role of business angels schools and BAN in the market

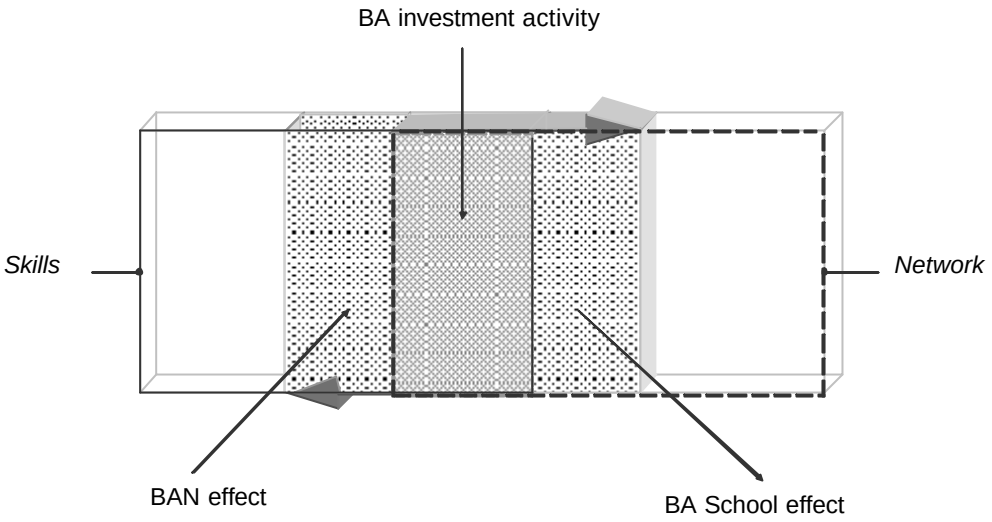

Table 1. Main current occupation of business angels

	Spain	UK	Germany
Head of own company	46%	36%	55%
Employed as head of company / director		28%	18%
Management team	50%		
Retired / semi-retired	4%	6%	
Independent means			15%
Other		34%	22%

Chart 1. Business angel experience of school participants

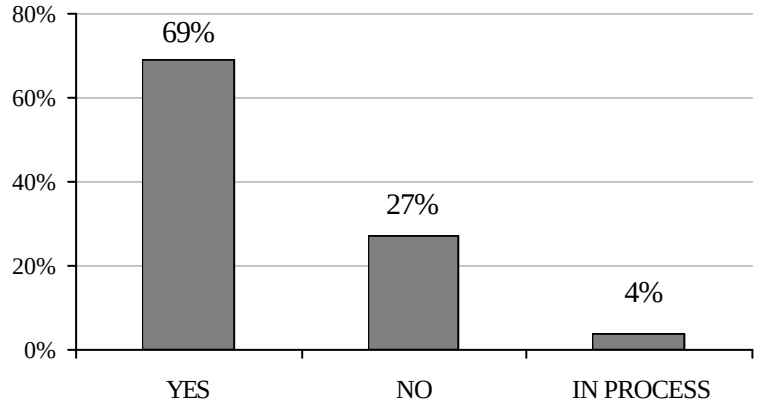

Chart 2. Reasons to invest of *student* business angels (4=very important, 0=not important)

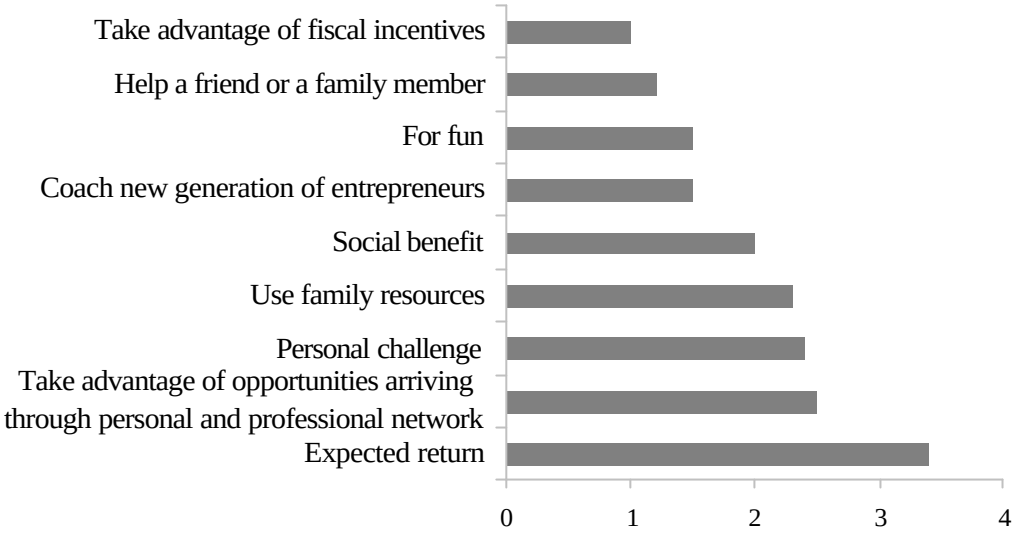

Table 2. Amount invested

Spain		United Kingdom		Germany	
Amount (K euros)	Frequency	Amount (K euros)	Frequency	Amount (K euros)	Frequency
<15	11%	<160	78%	<500	75%
15-30	2%				
30-60	24%				
60-120	33%				
120-250	6%	160-400€	12%		
>250	22%	>400€	10	500-1000	15%
				>1000	10%

Table 3. Investment stage

	Spain	UK	Germany
Seed	61%	8%	25%
Pre start-up seed			38%
Start-up	17%	25%	45%
Other early		32%	
Development	22%	28%	16%

Chart 3. Expectations of the business angels attending the programme (Scale from zero to five)

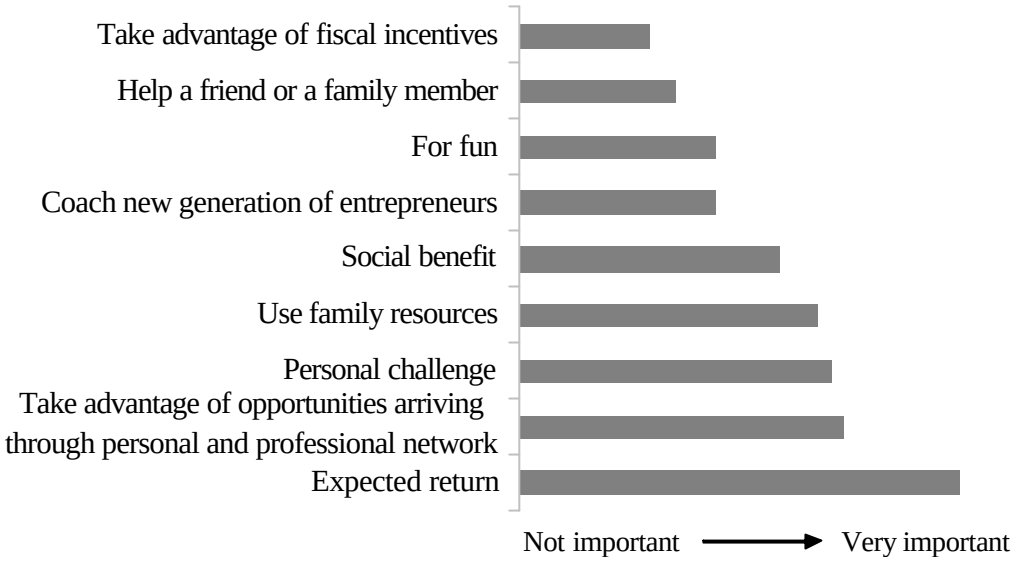

Chart 4. Motivations to invest (Scale form zero to five)

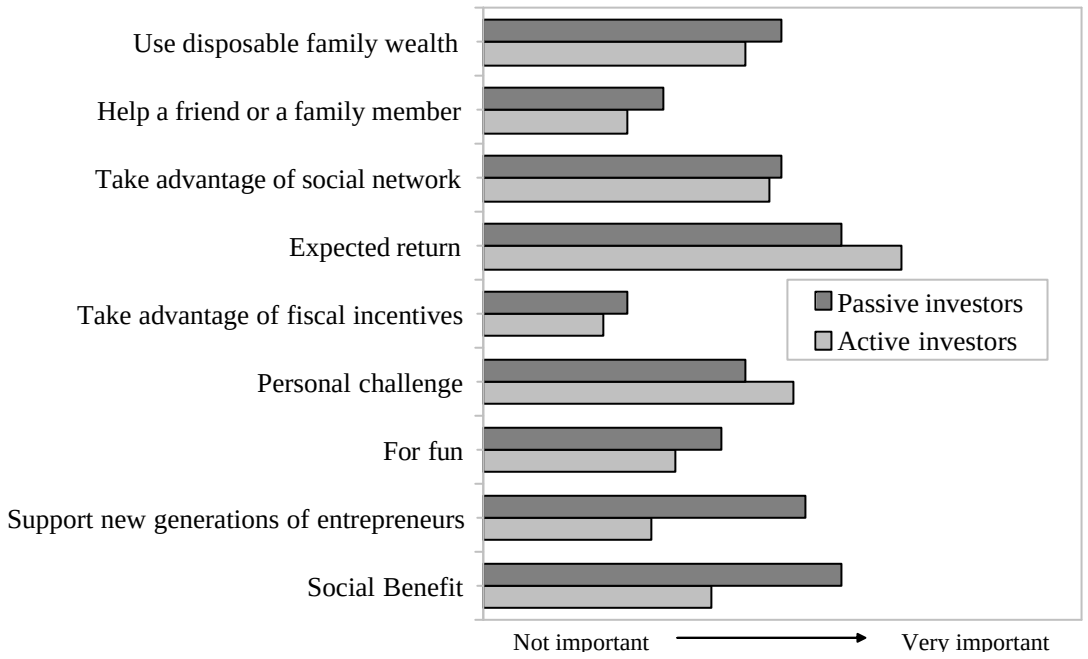

Table 4. Expectations of attending the school

	Importance ranking		Importance ranking
Active angels		Passive angels	
New business valuation	1	Research, identification and evaluation of opportunities	1
Research identification and evaluation of opportunities	2	Relations with other investors and exchange of experiences	2
Growth strategies	3	Growth strategies	3
Business plan analysis	3	Business plan analysis	4
Team management	3	New business valuation	4
Deal negotiation	3	Deal negotiation	4
Relations with other investors and exchange of experiences	3	Divestment process	5
Divestment process	4	Team management	5
Financial forecast analysis	5	Legal aspects of investments	5
MBO-MBI	5	MBO-MBI	6
Legal aspects of investment	5	Financial forecast analysis	6

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Through a Glass Darkly: New Perspectives on the Equity Gap

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Abstract

This paper revisits the debate on the effectiveness of the supply of seed capital to nascent and early-stage new technology-based firms in Europe. Empirical investigations on the level and nature of seed investing are carried out at three hierarchical levels of aggregation: the fund, the top management team, and the individual investment executive. The results challenge orthodox interpretations of investment decision making. The relationships between fund size (funds under management and portfolio numbers) and the incidence of seed investment activity is shown to be curvi-linear (U shaped and inverse U shaped, respectively) indicating the existence of minimum and maximum scale effects. Management teams are not neutral to seed investments and specific professional experience does condition their attitudes. This subjectivity is further corroborated in the importance of experience and learning style to individual investment executives. The results indicate that, in order to understand the investment decision under conditions of high uncertainty, it is also necessary to make the seed investor endogenous to the model. These findings have important implications for both theory and practice.

Introduction

The supply of seed capital is universally perceived as problematic. It is, and has remained, the venture capital industry's 'skeleton in the cupboard'(Murray, 1991). The widespread availability of sources of risk finance from informed, value-adding and patient investors in order to support speculative but high potential new enterprises is seen as a critical attribute of an advanced innovation system (Gilson 1997; Williams, 1998; Gill et al, 2000; European Commission, 2003). Yet, there appears little substantive evidence that such early-stage investment activity can consistently reward investors adequately for the very substantial risks that they incur (Cressy, 2002, SBS/HM Treasury, 2003). Accordingly, seed capital is noted more by its absence than its presence in many investment communities (Murray and Lott, 1995; Locket et al, 2002). The singular exception to this rule appears to be the dense technology clusters of California and Massachusetts with their array of both formal and informal early-stage investors (Kenney and von Burg. 1998). In Europe, the small amounts of seed finance that are made available very often come via public programmes rather than from commercial providers. Government is often obliged to become the investor of last resort (Lerner, 1999).

Despite intractable problems regarding the underlying financial logic of seed capital investment, there is little question that its ready supply is seen as extremely important. Its availability is perceived as particularly critical to ensure the exploratory commercialisation of new technologies (Gompers and Lerner, 1999). Policy makers interested in optimising the effective economic exploitation of national knowledge assets are especially concerned that appropriate funding should be readily available for the initial stages of financing and testing of novel concepts from intellectual providers including universities, government laboratories etc. (European Commission, 1998; Lambert, 2003). The ready supply of small sums of risk capital has repeatedly been seen as a major comparative strength of the US economy in relation to Europe (Florida and Kenney, 1988; E.C., 1998; Edwards, 1999, NVCA, 2002). The parlous availability of seed capital in Europe may be one explanation for the contradiction between the region's frequently world class science base and its relatively poorer record of profitable commercialisation. Multi-billion dollar companies founded in Europe in the last 25 years and growing to global prominence from the science research base are notable for their absence. Apart from a few exceptions or outliers, examples including Vodaphone and SAP, the rankings are dominated by US companies. This imbalance has been termed by concerned policy makers as – *the European Paradox*. This term defines a European failure in its ability to extract domestic or international, economic advantage from the ownership and exploitation of the region's world class intellectual capital.

Any student of seed capital investment processes must appreciate the continued existence of several paradoxes. For example, there exists a persistent belief among owner-managers of new technology based firms (Burgel et al, 2004) that formal venture capital markets are highly reluctant to deliver small sums of seed (risk) capital to nascent but high potential enterprises (Westhead and Storey, 1997). Venture capitalists are virtually unanimous in their response to these oft repeated criticisms arguing that there is a

dearth of "investment ready" businesses[2] that can offer investors attractive returns at acceptable levels of risk (HM Treasury/Small Business Service, 2001; Queen, 2002). There is less disagreement as to the consequences of a dearth of appropriate funding. Supply-side constraints will result in low levels of national innovation and productivity (European Commission, 1997; Cressy, 2002). Such a spectre of declining national innovation and competitiveness exacerbated by ineffective financing mechanisms remains of systemic concern to virtually all governments in developed economies and regions including Europe (Christofidis and Debande, 2001). Thus, there continues both a practitioner and an academic debate as to whether or not market mechanisms can function effectively to price and allocate finance within the context of very immature enterprises (HM Treasury/SBS, 2003). However, a clear and unequivocal proof of the existence of supply-side equity gaps and their importance in relation to demand-side failure remains highly problematic (Hughes 1997; Aston Business School, 1990; Cressy, 2002).

The purpose of this paper is to ascertain, on the empirical evidence available, whether or not this popular view as to the impossibility of seed capital investment as a commercial activity represents an accurate reflection of contemporary early-stage investment activity. The paper is structured as follows. We first provide an overview of the dominant thinking, both in research and practice, on the issues of risk finance and investing in early-stage ventures. Then, we discuss the findings from a contemporary research program on the topic spanning three different but contiguous levels of analysis of seed capital activity. By using multiple but inter-related perspectives, we seek to triangulate the phenomenon prior to both description and prognosis. Finally, on the basis of our analyses, we suggest a new framework for re-conceptualizing the economics of seed investing.

The peculiar nature of sedd capital

Seed capital may be defined as equity investment at that stage in the innovation cycle where significant time and money has to be invested *prior* to the creation of a commercially viable product or service. Given the immaturity of the technology, which often extends to the immaturity of related markets, there is little guarantee that such an investment will result in a commercially attractive product or service. The US National Venture Capital Association somewhat prosaically describes seed capital on its website (www.nvca.org, 2004) as the finance provided "before there is a real product or company organized." This definition, while correct, hardly does justice to the extraordinarily unpredictable nature of this important investment activity. We know that the prognosis for the survival and success of newly formed companies is poor at best. Storey and Wynarczyk (1996) conclude that we are likely to be looking in single percentage figures (4%) when estimating the number of UK firms that survive and grown substantially over the first ten years of their existence[3]. However, evidence from Roberts (1991) and Agarwal (1998) suggest that the survival rate of technology-based new enterprises is higher than for equivalent, non-technology firms. This is despite such new enterprises having to manage a diverse range of risks and uncertainty stemming from the technology, the market acceptance, competitor reaction, and managerial capabilities (Storey and Tether, 1998). This counter-intuitive finding may be explained by the nature of the competitive environment and the young technology firms' ability to adapt rapidly to their circumstances (Audretsch, 1995).

Yet, enterprise survival statistics refer to extant firms that have already successfully marshalled sufficient resources to start trading a product or service. Seed capital investors have to deal with enterprises that are almost invariably pre-formation, and sometimes little more than an idea. It is therefore not uncommon for an application for external seed finance to be made before the creation of any separate legal identity for the host enterprise. In these circumstances, the potential investor will often face very considerable problems in ascertaining either the riskiness or the attractiveness of such an investment. The term 'information asymmetry' is used in transaction cost analysis (Williamson, 1985) to distinguish the imbalance of information between the investor and the investee company recipient. The term implies that that information is available but not fully shared between the principal and agent to the investment given only a partial alignment of their interests (Sahlman, 1990; Amit, Glosten and Muller, 1990; Reid, 1999).

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[2] See, for example, UK government's policy response to this aspect of insufficient demand from SMEs (http://www.sbs.gov.uk/content/consultations/investmentreadiness.pdf)

[3] Storey and Wynarczyk 's findings relate to new firm starts in the North-East of England, i.e. primarily non-technology enterprises.

In the context of seed investments, the situation is even less clear cut. Both the entrepreneurs and the investors alike may be investing in the absence of appropriate and sufficient information for the construction of a robust business case. In the absence of tangible and credible sources of data, the investment decision *per force* contains a large element of subjective appraisal.

Because these circumstances are laden with uncertainty of a *Knightian* nature (Knight, 1921), the effective use of quantification approaches is nullified. Unlike data-rich situations that lend themselves to CAPM-based modelling, e.g. acquisitions of publicly traded corporations, there is no credible sense in which the future 'volatility' of returns of the nascent company may be accurately computed. Consequently, it is very difficult to develop a normative theory on the relationship between uncertainty and investment returns. The dialectical opposition between uncertainty and the need for quantitative models in investment decision making is not easily reconciled. Thus, a discussion of the role and importance of seed investment in innovation financing has to immediately address the question of whether or not seed investment activity can credibly be conceived as a finance activity with knowable rules and heuristics. An alternative view could be that this activity is a 'random walk'. Nothing is truly known or knowable that might make the process of selecting attractive investment propositions meaningfully more predictable. In such circumstances, a market based solution to the allocation problem remains illusory.

If this alternative and dissident view is correct, by disengaging the accepted positive relationship between risk and reward, a profound problem is created. Modern financial theory is founded on the constancy of this relationship. A known correlation is necessary, for example, to price and allocate the supply of capital to a project, or to optimise future returns given an acceptable level of risk. Such computations are made on the basis of the availability of statistical data which describe, albeit imperfectly, the nature of risk/reward patterns. If the patterns themselves are illusory, so is the predictive value of these instruments. In such circumstances, the provision of adequate supplies of risk capital available to unproven and very early-stage enterprises appears little more than a guess or a gambler's hazard. However, to the extent that there exist other non-financial patterns in the provision of seed investments, these relationships may provide the basis of a new paradigm describing the nature and logic of seed investing. Such a paradigm could establish a connection between mainstream economics and finance theories, with their focus on *what* decisions *should* be made (and which currently dominate the thinking on equity finance) and the "softer" areas within both management and psychology that have focused on *how* decisions are actually made. In the following section, we discuss our search for such patterns, employing theoretical frameworks and methodologies that are new to the topic and subject area.

Findings taken from an ordered and hierarchical perspective

In this section, we provide an overview of a research program at London Business School and the University of Exeter that has sought to understand seed capital activity afresh without uncritically accepting 'received wisdom' from either industry or academe as to what generic investment activities are and are not commercially possible. We have eschewed industry paradigms (Johnson, 1992) that pre-condition and constrain both our thinking and our understanding. For example, it is very commonly accepted that given the high fixed costs of a venture fund, it is uneconomic for a large fund to pursue small and speculative seed deals (HM Treasury/SBS, 2003).

Accordingly, we have sought to understand the seed capital investment process by first understanding the actions of investors. Only then have we turned to the cognitive processes that give meaning to these actions. In seeking to understand investor behaviour, we draw from theories that have been developed outside the domains of economics and finance. Further, in our analysis, we compare the actual decision environment that potential seed investors face against the normative premise and information requirements concerning the relationship between risk and return that has under-pinned accepted investment practice. As a result, we highlight important differences among individual VC firms both in their motivations and perceived ability to make seed investments. These actions challenge the dogmatism of the accepted risk/reward trade-offs of orthodox financial theory. Similarly, we also question the actions of professional investors and the nostrums that are publicly espoused in justifying their behaviours.

The research employs an eclectic set of methodologies appropriate to the differing contexts pertaining in each tier of the *ordered* and *hierarchical* analysis. The research questions posed and the modes of analysis employed are contingent on the degree of aggregation and, thus, the unit of analysis under investigation. Consecutively, we explore the actions and behaviour of:

Tier 1: Venture Capital Funds - using secondary data sources from an established industry database
Tier 2: Top Management Teams in Venture Capital firms – using empirical observation prior to collecting secondary data including archival materials
Tier 3: Individual Investment Executives in Venture Capital firms – using the results of findings from an experiment on business school participants

In the sections that follow, we provide a brief summary of the theoretical rationale and methodology for each study before discussing the summary research findings.[4] We conclude the paper with a number of observations as to the policy and practitioner implications of our research.

Tier 1: a Fund Level Perspective

At the most aggregated level, we explore the actions of venture capital funds that have demonstrated a minimum threshold level of interest in seed investments. Our analysis reviews the portfolio compositions of nearly 3,000 funds worldwide between 1962 and 2002 – a period which represents virtually the totality of VC investment activity to date[5]. We only focus on funds that have made at least 10 portfolio investments, thereby reducing the bias that may emerge from including less active funds. We have also excluded venture backed, internet-based investment from our analysis to remove the 'bubble effect' of the dot.com era. We are interested in determining the characteristics and behaviour of VC funds which have repeatedly invested in seed capital despite the obvious challenges of this activity. In our theoretical reasoning, we have drawn on the managerial perspective on risk taking (March and Shapira, 1987), which suggests that, rather than being driven by the optimisation of hard-cut 'objective' decision parameters, risky choice is underpinned by the decision makers' self-perceived expertise in the domain of the decision. Thus, an appraisal of risk constitutes a subjective and individualist perception rather than objective estimation. One consequence of such an understanding of the investment process is that it cannot easily transferred across actors or technology sectors. In the absence of easily accessible and objective heuristics, seed investment becomes a highly personalised and thus idiosyncratic activity.

There are two parts to our analysis: i) identifying the factors that distinguish the funds that *have* made seed investment from those that have not, and ii), for those funds that have made seed investments, identifying the factors that contribute to a higher intensity of such investment. Based on our knowledge of the industry, we have eliminated (i.e. by partialling out their effects in our regression analyses) the most trivial explanations for the occurrence and intensity of seed investing. Not surprisingly, specialist seed and early stage funds, particularly in the US and above all California, were significantly and positively associated with both the willingness to undertake seed investments, and their subsequent level of seed activity. Similarly, financial investors including corporate venture capital subsidiaries did not commonly invest in seed capital preferring to come into deals at a later investment stage.

After eliminating these obvious explanations, our results highlight several important associations and interactions. In particular, the longer the VC fund has been in existence, the more prepared its managers are to make seed investments. Cumulative experience appears to matter. The study discovered that some of the largest and most established funds, particularly, in the US, had also made the most seed investments (see Table 1). However, the relationships between scale and seed activity was not linear. An "inverse U" shaped curve exists indicating that, as a fund increases its portfolio numbers, it also invests in more seed deal until an inversion point when increased portfolio size becomes associated with an overall decline in seed activity. Conversely, the relationship between total invested capital and seed activity was a "U" shape. As funds get larger they do less seed deals but this relationship changes and the very largest

[4] Detailed findings and the analyses on which they are based for each of the three described studies may be obtained from the authors on request.
[5] A more detailed treatment of this analysis is currently going through the review process for the *Journal of Business Venturing* and is available from the authors.

funds are, once again, active seed investors. However, given the scale of these very large funds, their seed activity frequently remains largely hidden. These non-linear relationships suggest that there exists both a maximum and a minimum scale efficiency in making seed investments. This finding has significant policy implications for a state funder of seed capital. It also corresponds well to the notion of 'exploration' in the strategic management literature (March, 1991), whereby firms experiment with new ideas in order to ensure that their knowledge does not become outdated. In fact, the simulation analysis conducted by March suggested that the optimum updating of one's knowledge occurs when the degree of exploration is around 10%. Thus, when viewed in this context, our results suggest that seed investing may be an important mechanism for investors to stay at the forefront of industry developments. In essence, for the larger funds with substantial technology interests, seed capital investment may be justified as much as an *advanced intelligence* activity as by any capital gain consequent on the monies invested.

Tier 2: a Top Management Team Perspective

While the unit of initial analysis was the fund, this is essentially an intangible construct. The fund is a legal envelope that defines the rights and responsibilities of a number of investors or limited partners regarding the husbandry of a fixed sum of money for investment, and any returns flowing from that investment. Funds *per se* can neither invest nor disinvest. Executive decision making, including the crafting of fund strategies and subsequent investment allocations or exits, is the responsibility of the professional staff, i.e. the general managing partners of the VC firm. In order to gain a deeper understanding as to why professional investors who adopt certain strategies may be more or less open to making seed investments, we report on work conducted at the *top management team* level of VC firms.

The data for this second study embraced the investment history of 112 US venture capital firms over a 6-year period and included a detailed account of the prior experience (education and industry experience) of the firms' top decision makers. Our dependent variables of interest were both the type of investments that these firms had made and the performance outcomes of these investments. Again, the theoretical perspectives driving this research effort pertained to the differential priming and awareness building that prior knowledge and experience afforded the decision maker. In addition, we sought to distinguish between different areas of expertise among investors and their consequent effects on the selection and success of their portfolio companies. Our taxonomy of expertise was as follows:

> *specific human capital* or *requisite expertise* pertained to knowledge and skills related to financial risk appraisal and management,
>
> *general human capital* pertained to knowledge and skills that are more detached from the context of portfolio management.

Finally, we examined the degree to which the social network characteristics of the VC firm, in terms of its status and reputation, facilitated or deterred seed investing.

We found that the type of experience (i.e. human capital) of the top management team members affected both the focus of the portfolio in terms of i) the selected development stages and ii) the relative success of the portfolio investments. More specifically, we found that an executive background in finance-related industries was negatively associated with the proportion of early-stage (i.e. including seed) investments accepted by the funds, and positively associated with prevention of bankruptcies (rather than with the achievement of successful exits) among their portfolio firms. These results, given the lack of detailed predictions of existing human capital theory, led us to speculate that prior experience mattered in terms of how risky investment were perceived, chosen and managed. Thus, although investment analysis and selection is popularly conceived as a set of *learned* skills that are both objective and quantitatively verifiable, our results can be seen to challenge this simplified logic. They indicate that the VC firms' investment executives are rather less objectively rational and rather more subjectively *conditioned* that would at first be expected.

The national VC industry associations go to great lengths to publicise the professional and objective nature of the decision processes which determine how their members allocate scarce funds to excessive numbers of claimants. Venture capitalists' processes are sometimes held up as exemplars of

professionalism for other groups of investors. Business angels are sometimes criticised for not being so objectively rigorous in their analyses and selection processes as formal venture capital firms (Van Osnabrugge, 2000; Mason and Harrison, 1994). Our findings, consistent with the managerial perspective on risk outlined in the previous section, would suggest that venture capitalists' claims may be aspirational rather than necessarily factual.

In addition to highlighting the importance of the educational and professional backgrounds of the managing partners for explaining the intensity of seed investing, we also found that a VC firm's social network position further moderated its pattern of seed investing. We found both positive and negative moderation. On one hand, for high-status firms, the negative relationship between finance-industry backgrounds and investments in early-stage companies was even stronger. On the other hand, for VC firms with strong reputations built upon previous successes, this relationship was weaker. This suggests that two opposing forces may be in play: namely, a VC firm's high social position may restrain its willingness to invest in unproven industries or companies, while its past successes (and thus accumulated slack resources) may propel it towards experimentation.

Our empirical results and subsequent reflection have also led us to identify two archetype investment strategies that were associated with the knowledge and skill composition of the VC team, – i.e. maximizing success or minimizing risk. We have built upon previous research that has similarly distinguished between the different approaches to risk that entrepreneurs and bankers employed (Sarasvathy, Simon, and Lave, 1998). Indeed, we reason that investors when evaluating potential deals may be usefully classified as either wearing an entrepreneur's or a banker's hat. This insight then served to inform our next study which looks at the decision processes of the individual team members.

Tier 3: Individual Investment Executive Level Perspective

Just as funds are actually managed by investment teams, these teams are similarly composed of *individual* investment professionals. Whether or not an opportunity is recognised and enacted initially requires the direct engagement and commitment of an analyst (Kaplan and Stromberg, 2000). The analyst's recommendation will subsequently be sanctioned or rejected by an investment team or committee in a standardised investment process (Tyebjee and Bruno, 1984; Hall and Hofer, 1993). The committtee's decision necessarily requires the prologue of individual action. Therefore, because the relationship between prior experience, risk perception and management action cannot be fully inferred from a group-level study, our third study involves experimental work at the individual investor level. It elaborates specifically on the key issue of the relationship between prior experience (of the investor) and the origination of seed deals.

In particular, we examine the screening of potential venture capital deals and relate the outcomes to the prior experience of the investor. Our focus on deal screening decisions was motivated by the fact that over 90% of incoming investment proposals to a VC firms are eliminated within a very short time. There is a 'two tier' selection process and investors do not waste valuable time, experience and the cost of expert opinions on pursuing due diligence for all but a minority of deals that are perceived as potentially attractive (Schultz, Murray and Degraeve, 2003). This suggests that there might be a strong relationship between the characteristics of the deals that do make it through the 'first cut' and some stable predispositions of the individual investor. We start from the assumption that the screening decision elicits a stable cognitive representation by the investor, which in turn triggers one of two generic approaches: maximizing success (upside focus) or minimizing risk (downside focus).

We further link this representation to the investment executive's prior knowledge and experience by focusing on two aspects of prior experience – domain specific knowledge and learning style. While the former reflects the investor's existing knowledge of the deal domain, i.e. the nature of the technology and the stage of funding, the latter captures the way in which the investor integrates and responds to the new information contained in the deal. In elaborating on the latter, we draw from experiential learning theory (Kolb, 1984), which suggests that one's previous experience creates stable patterns (i.e. a learning style) for processing current experience. In judging whether or not a potential business represents a viable opportunity, there is an interplay between two fundamental approaches to perceiving and processing such information. These approaches are termed respectively *assimilation* and *accommodation*. An assimilative

approach focuses on risk minimization, i.e. on identifying all the possible downsides to a deal. For example, in a highly uncertain environment with very imperfect information, it may be more rational for investment executives to seek a sufficient number of reasons to reject a deal rather than for reasons to accept it. On the other hand, an accommodative approach focuses on success maximization, i.e. on identifying the ways that, and reasons why, a particular deal could work out. The dialectical nature of experiential learning and the notion of stable learning style, as conditioned by prior experience, suggest that in deal screening situations an individual investment executive's behavior will be inclined towards either an assimilation or an accommodation approach.

In order to capture the interplay on the selection process between the characteristics of potential deals and the influence of investor's prior knowledge and experience, we conducted a specially designed experiment. 93 MBA students, members of the Private Equity Club in a major international business school, were invited to respond to three deal scenarios representing varying degrees of uncertainty. Our theoretical rationale was that the uncertainty involved in a deal made a risk minimization *or* success maximization rational a requisite for the deal's successful screening. Thus, for low uncertainty deals, given the relatively known upside, one needed to identify the possible downside. Alternatively, for high uncertainty deals, given the known downside, one needed to identify the potential upside. When coupled with the investor's preference for assimilation or accommodation selection processes, the requisite strategy for a particular deal type may represent a match or mis-match with the investor's preference. This in turn determines the nature of the relationship between the investor's domain specific knowledge and deal screening.

The results showed that positively responding to uncertain deals depended on: i) the level of deal uncertainty and ii) a particular combination of domain specific knowledge and learning style (see Figure 1). In high-uncertainty deals, the effect of domain specific knowledge on deal screening is negative regardless of the investor's learning style, with a steeper slope for investors with accommodative learning styles. While this provides partial support for our theoretical logic, it also suggests that high-uncertainty situations may be quite overwhelming with risk concerns becoming paramount. This is consistent with a managerial perspective of risk, i.e. stressing the need to avoid losses (March and Shapira, 1987) as well as a risk aversion in the domain of gains (Kahneman and Tversky, 1979).

Nevertheless, the differential slopes for the two learning style groups suggest that individual differences may provide complementary explanations.

For low-uncertainty deals, we found support for a predicted 'crossover effect'. The effect of domain specific knowledge on deal screening was positive for investors with assimilative learning styles and negative for investors with accommodative learning styles. However, we also found that for a particular type of low-uncertainty deals, the effects of domain specific knowledge were similar to the high-uncertainty deals. This elicited two possible speculative explanations. The first pertains to a possible curvi-linear relationship between deal uncertainty and cognitive representations. It is possible that, in their effects on decision making, contexts of high and low uncertainty are more similar to one another than they are to contexts of medium uncertainty. The second pertains to the importance of dealing with a new market of unproven demand. Our results suggested that the market-based evidence for a deal's feasibility may be the watershed factor determining the deal's selection or rejection. This is consistent with Shane's (2000) observations on the importance of knowledge about markets and customer problems.

Reflection on the contours of a new paradigm of seed investing

Our three related studies on seed capital activity employ theoretical insights from a number of fields including Management as well as related areas of Economics and Psychology. Both survey and experimental research designs were used to test a set of questions on opportunity recognition of important for both theory and practice. The findings collectively challenge the assumption that seed capital investment activity is random and cannot be managed by a market mediated approach. There are clear and consistent patterns of investment behaviour evident at the individual, team and fund levels of aggregation. However, relationships are not invariably linear nor are the results necessarily intuitive. It is evident that a

much more fine-grained understanding of the nature of seed investing is required if we are to devise meaningful prescriptions to deal with systemic levels of uncertainty.

There are two particular areas that we feel form the foundations for a new paradigm of seed investing. The first pertains to the *endogenous role* that investors play in the process of allocating financial resources to new projects. The second pertains to the vital roles of *exploration* and *experimentation* in harnessing technological discontinuity and in keeping one's investment skills current. The two strands in our argument are invariably intertwined. We will now focus on each of these in some detail.

Making the investor 'part of the picture'

In the currently dominating theories from Economics and Finance, the need for modelling the investment decisions has essentially led to a framework in which the outcome space for a decision is equalized across agents. Thus, the only variation allowed in decisions is in regard to risk preferences and private information. Investor as sentient individuals, and thus their peculiar histories (experience) and characteristics, are thus exogenous to the model. They cannot influence the outcome space. What our empirical studies suggest is that, in practice, investors do actively shape the outcome space by conceiving and pursuing possibilities (i.e. opportunities) within it. Making them endogenous to the investment decision allows for the inclusion of a diversity of beliefs among possible investors about what might (or might not) happen in the future. In addition, different propensities to act on a deal are not simply the result of different risk preferences. Rather, different prior knowledge and experience as well as different social positions (re the status of the VC firm) create different beliefs (or interests) in the feasibility of a particular outcome.

More specifically to the context of seed capital investing, the important question to ask is not whether equity investors simply do or do not invest in seed companies. Rather, it is whether existing investors have the experience and skills appropriate to recognizing opportunities in uncharted territories. Just as entrepreneurs exert creative power in enacting novel opportunities, investors exert similar power in recognising and supporting such opportunities. What complicates the picture even further is the duality of innovation and efficiency that is painfully familiar in large organizations. While organizations recognize the need to be innovative, their administrative routines often stifle any fledgling innovation efforts. The conflicts and consequences of this duality are only too visible in the disastrous record of many corporations when they have embarked on a program of corporate venturing (Fast, 1978; Gompers and Lerner, 1998). The seminal model by Burgelman (1983) views the resolution of this duality in the interplay between structural and strategic context. The reader will notice that the notions of *structural* and *strategic* as elaborated by Burgelman are very similar to the notions of assimilation and accommodation, respectively, that we have explored in the previous section. Both structural context and an assimilation approach are driven by existing paradigms of what should be done and how it should be managed. Conversely, the strategic context and the accommodation approach each focus on identifying the new possibilities that the external environment affords.

To the extent that a VC industry is homogeneous in what its members consider to be the 'correct' investment approach, innovation-oriented investments may be few and far apart. Such homogeneity, given the prime importance of prior knowledge and experience that we have highlighted, is in part created by the existence of dominant career paths into the VC industry typically from accountancy or investment banking. (This sameness of an industry is further reinforced in the UK/Europe by the success of later stage investments into management buy-out type enterprises and the poor performance of early-stage technology investments (BVCA, 2004). Later stage, restructuring investments require financial engineering skills rather than technology or market foresight.) In this context, it is in stark contrast that the main pioneering VC firms in the US have been founded and driven by previously successful entrepreneurs who have been trained and employed in the economy's science base.

Seed investing as 'exploration' (experimentation)

Innovation gurus have often professed that organizations need to experiment and then latch on the successful experimental efforts in fuelling future growth (e.g. Hamel and Getz, 2004). The analogy to the VC industry, when viewed in the context of our current discussion, is strikingly apposite. We have shown

that it is large VC firms that have exerted the most significant seed investing efforts (see Table 1). This is very consistent with the notion of experimentation. However, this empiricism in new technologies and new product/service markets it is afforded, and to a certain extent conditional on these firms' large size and resources. It is the large firm that can utilize scale and scope advantages to ensure its continued readiness to both recognise and exploit new technological 'gales' that come through the investment space. The need to have multiple antennae attuned to new opportunities and innovative disruptions is an absolute strategic imperative (Moore, 1995; Christensen, 1997).

The lower limit to experimentation stems from the firm's limited ability to afford losses from experimentation effort. The upper limit to experimentation comes from the necessity to satisfy current stakeholders (limited partner investors) by providing them with appropriate and expected returns of the asset class. Thus, the balance between exploration and exploitation to which Levinthal and March refer (1981) is highly consistent with our empirical observations on the sources and scope of seed investments.

The notions of investor endogeneity and experimentation also go hand in hand. For creative efforts to be exerted, there needs to be a philosophy of experimentation. Similarly, for a philosophy of experimentation to be implemented, there needs to be a sufficient pool of creative (i.e. opportunity recognition) skills. Experimentation is much less consistent with 'follow-on' investment strategies adopted by a majority of European venture capitalists. In later, syndicated rounds of investment much of the uncertainty has been removed. Experimentation is about being the first investor. In technology, the first mover (other than the entrepreneur) is often the seed investor. While the paradigm that we have highlighted does not have the quantitative rigour and thus normative power of existing decision models, it nevertheless provides a new lens through which to view, comprehend and (possibly) influence seed investment activity.

Limitations of the research

To suggest that our work could contribute to a new, or at least revised, paradigm of early-stage, venture capital decision making makes it incumbent on the authors to also acknowledge any limitations in the research design. Our seed investment data are taken over a forty year period. They encompass both European and US data over at least three cycles of venture capital activity. The legal environment in which venture capital industries have developed has changed markedly with legislation influencing, for example, both the legal structure of firms and the freedom given to institutional investors and their trustees. Governments have also played an active interventionist role at the early stage of venture capital. These trends have a marked influence on the national context. A more fine grained analysis may include these important environmental factors within a supply-side model. The top management team study concentrated on US venture capitalists. Again, generalisations based on US studies given the importance of national characteristics need to be given with caution. The provenance of European venture capitalists may result in different behavioural profiles. (However, it is the authors' opinion that, if anything, a study of European venture capitalist teams would lead to even an more conditioned bias against seed investments by traditionally finance trained, investment teams.) Finally, experimentation within the context of venture capital studies is still within its infancy. The use of MBAs as a surrogate for the decision making preferences of investment executives is legitimate given that venture capital firms widely recruit from such groups. Yet, they remain a substitute. It may be that the recruitment of such persons into the venture capital firm has an effect on their subsequent actions as they are socialised into the dominant culture and practices of the firm. In short, the reality of the workplace may have an influence as may the School at which the experiment was conducted[6]. These caveats to our studies are given to urge a proper caution to our findings and our conclusions, and to encourage further research.

Implications and future research

In summary, we can observe that increasing fund size is not necessarily a barrier to seed capital investment. Our results provide evidence towards a minimum scale efficiency. Thus, there are strong

[6] Dimo Dimov is currently replicating this experiment at Madrid.

arguments that governments should redirect their activities to supporting not only new specialist early-stage funds but also to encouraging the incremental seed activity of large established VC firms.

In order to understand the nature of seed investment, and perhaps influence its supply, it is also important to understand the behaviour and background (education and industry experience) of the VC firms' top management teams. The histories of the team members influence both their preferences and their investment behaviour. Their experience also influences the degree to which they can affect the successful outcomes of the enterprises into which they have invested (Barry 1994). Given the two prevailing strategies of maximising success or minimising failures, the investors in VC funds faces a dilemma. Investment executives from a finance industry background prefer to avoid risky, seed stage investments. They have neither the industry skills nor the aptitude for such an investment activity. These investors are not likely to be the initial sponsors or backers of the next generation of global winners comparable to Microsoft, Cisco or Amgen. However, just as they are less likely to see very successful investment exits, they are also less likely to have their portfolio companies go bankrupt.

Our results show that two personal experience factors, i.e. specific human capital and learning style, are crucial for effectively responding to potential deals containing a high degree of uncertainty. These insights may help in the design of effective seed capital investment activities. Support for early-stage activities by the state may need to allocate as much resource to deepening the human capital of the early-stage investment community as providing a large part of the total funds which they hazard on new enterprises in this peculiarly challenging investment activity. We can offer no easy solutions. Seed capital is, and will remain in the foreseeable future, a hard and stony road to travel for both investors and governments alike.

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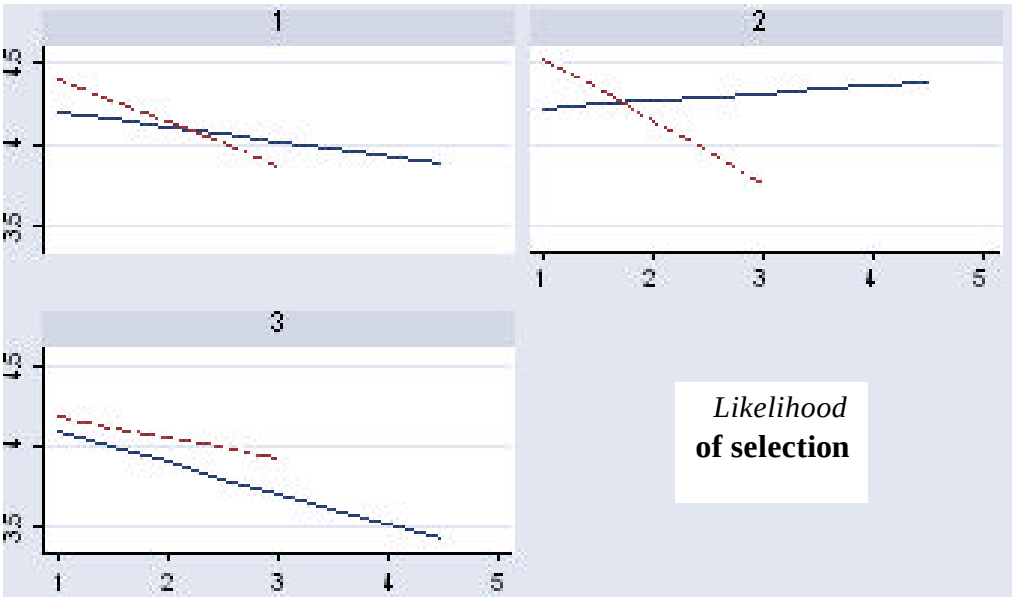
Tables, charts and graphs

Table 1. Twenty-five Most Active VC Firms Investing in Seed Capital 1962-2002

Name of VC Firm	No. Seed Investments	No. Portfolio Companies	%Seed in Portfolio	Invested Capital ($000)	Nationality VC Firm	Year Founded
Crosspoint Venture Partners	109	233	46.8%	1,575,698	United States	1978
New Enterprise Associates	104	662	15.7%	4,009,177	United States	1975
Kleiner Perkins Caufield & Byers	100	488	20.5%	2,732,371	United States	1973
Mayfield Fund	74	433	17.1%	2,220,803	United States	1970
J.P. Morgan Partners (FKA: Chase Capital Partners)	72	1352	5.3%	8,685,709	United States	1967
Sequoia Capital	50	469	10.7%	2,160,099	United States	1975
U.S. Venture Partners	49	322	15.2%	1,747,813	United States	1980
Domain Associates, L.L.C.	46	175	26.3%	902,362	United States	1981
Institutional Venture Partners	45	304	14.8%	1,592,411	United States	1960
Ben Franklin Technology Partners, The	41	70	58.6%	21,963	United States	1995
Draper Fisher Jurvetson (FKA: Draper Associates)	38	191	19.9%	833,224	United States	1983
Oak Investment Partners	38	403	9.4%	2,944,157	United States	1960
Mohr Davidow Ventures	36	168	21.4%	818,542	United States	1983
St. Paul Venture Capital, Inc.	36	209	17.2%	1,009,378	United States	1988
Sevin Rosen Funds (AKA: Sevin Rosen Management Co.)	35	200	17.5%	1,052,892	United States	1981
Asset Management Company Venture Capital	34	190	17.9%	278,385	United States	1974
Accel Partners	33	307	10.7%	2,040,098	United States	1983
Venrock Associates	33	331	10.0%	1,318,561	United States	1968
Bay Partners	32	163	19.6%	501,221	United States	1976
Bessemer Venture Partners	32	405	7.9%	1,623,480	United States	1961

Sitra (AKA: Finnish National Fund for Research and Dev.)	32	90	35.6%	17,169	Finland	1987
Sutter Hill Ventures	32	227	14.1%	630,548	United States	1965
Alpha Capital Venture Partners, L.P.	31	50	62.0%	73,667	United States	1982
Centennial Ventures	31	178	17.4%	1,020,368	United States	1980
Greylock	29	340	8.5%	1,172,839	United States	1968

FIGURE 1. Graphic Illustration of the experimental results (Tier 3)



The Impact of Capital Inflows and Management Skills on the Performance of Private Equity Funds

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Introduction

In this article we address two important topics concerning the performance of European private equity funds. First, we discuss briefly how the performance of a private equity fund should be measured. On that basis we offer some performance data for mature European private equity funds. Secondly, we raise the question what factors have an impact on these returns. In this regard we put special emphasis on two specific issues, known in the literature as the persistence and money chasing deals phenomena. In this article we present strong evidence in favour of the existence of both of these phenomena. Evidently, this has important consequences for investors allocating a part of their wealth under management towards the private equity industry.

It is well known that there are many different ways to measure returns of private equity funds. First, the industry itself mostly relies on an IRR-approach or, even simpler, on a multiple-approach. An important argument against using the IRR as a return measure relates to the fact that in this approach it is assumed that the opportunity cost of capital invested in the fund is equal to the IRR. As the investment opportunities of a private equity fund may be rather singular, this makes not too much sense. Moreover, in this way any comparison with other asset classes is subject to distortion. Due to these shortcomings another performance measure has been proposed, the public market equivalent-approach (PME). Basically, under this approach the simplifying assumption is made that the opportunity cost of a private equity investment is equal to the rate of return of a public market benchmark.[7]

An even more interesting question relates to factors explaining the performance of an investment in a private equity fund. In frictionless and perfectly competitive capital markets we would expect returns of private equity funds to be determined by systematic risk only. Neither personal skills of the management team, i.e. the general partner (GP), nor the inflow of money into private equity funds should have an impact on the performance of these funds. This is because of rational expectations and perfect competitiveness governing the pricing in financing rounds, i.e. the valuation of all the potential investment projects. The assumption of perfect capital markets is, of course, very far-reaching, and there is ample evidence that even on organized and liquid stock markets pricing phenomena arise that are not completely in line with this assumption. One might therefore expect that with respect to private equity markets the assumption of perfect capital markets is rather heroic. This is due to the specific characteristics of the private equity asset class, e.g. the illiquidity of an investment, the stickiness of fund flows, the restricted number of target companies and the segmentation from other asset classes. That is why the market may be far away from being frictionless and perfectly competitive, at least in the short run.

A very important finding in this regard has been presented by Gompers and Lerner (2000)[8], who show that inflows into venture funds and target companies valuations correlate positively. If real-life private equity markets adopt the above described characteristics, we would expect that realized returns of private equity funds are also affected by total capital inflows in the industry. More specifically, the money chasing deals phenomenon would suggest that there should be a negative correlation between a fund's performance and the amount of capital directed towards the private equity industry. This however would only be true to the extent that fund inflows are not matched by an improvement in economic perspectives of ultimate target companies. In this article we propose a test for the money chasing deals phenomenon that basically relies on the fact that we make a distinction between absolute and relative cash inflows into private equity funds.

We can show that for a given absolute fund inflow an increase in the allocation of money towards a particular fund type has a significant negative impact on the performance of this fund type. This finding strongly supports the money chasing deals phenomenon.

Additionally, we analyze if the skills of a fund management team have an impact on the return of this particular fund. If this persistence phenomenon exists, returns of all funds managed by the same team

[7] Cf. Kaserer/Diller (2004b): Beyond IRR once more.
[8] Cf. Gompers/Lerner (2000): Money Chasing deals? The Impact of Fund Inflows on Private Equity Valuations.

should have a positive correlation. In our empirical study, we find returns to be positively associated with GP's skills.

Description of the Data Set Used in Our Empirical Study

The empirical results of this article are based on a large dataset provided by the European Venture Capital and Private Equity Association (EVCA) and Thomson Venture Economics (TVE). It consists of 777 European private equity funds with vintage years from 1980 to 2003. The idea in the empirical part of our approach is to get rid off the net asset value (NAV) bias by inferring the performance of the private equity fund only on basis of realized cash flows. In a very strict sense, this would allow us to analyze liquidated funds only. However, only 95 funds in the data set have already been liquidated and have an average age of about 12.6 years. As we observed that more recently founded funds have an above average return, looking at liquidated funds only would clearly cause a negative selection bias because more recent vintage years would be underrepresented in our sample.[9] Hence, we increase the dataset by adding mature funds, i.e. funds with a relatively small NAV because for those funds valuation biases should have a small impact on performance recordings. The restriction was that the residual NAV of such a fund is not higher than 10% (sample I) resp. 20% (sample II) of the undiscounted absolute sum of all previously accrued cash flows. Formally, we integrated a non liquidated fund in sample I resp. II, if it met the following condition:

$$\frac{RNAV_N}{\sum_{t=0}^{N}\left|CF_t\right|} \le q \Leftrightarrow \frac{1+DPI_N}{RVPI_N} \ge \frac{1}{q}.$$

This ratio could be interpreted as the cash flow determined age of the fund.[10] For these funds the residual NAV is treated as a fictive distribution accruing at the end of June 2003. Using these criteria we get two new samples with 200 (sample I) resp. 262 funds (sample II). Although this approach may suffer from a selection bias as well, it should be noted that we pick out those funds that either already paid very high cash flows (positive selection) or those that had to reduce their NAV considerably (negative selection). The distribution of the vintage years of our funds is described in figure 1.

< Insert Figure 1 here >

Performance Measures for European Private Equity Funds

In this section we present the results with respect to the return distribution of European private equity funds. It should be noted here first, that there is an ongoing debate on how to measure the return distribution of an illiquid investment. This is especially important if one is interested in asset allocation decisions. The IRR is the common performance measure in the private equity industry.

However, as the shortcomings of the IRR are well-known we use an alternative performance measure in our study: the public market equivalent (PME).

IRRs of European Private Equity Funds

Using this European dataset we get the results presented in table 1. The pooled average IRR, i.e. the average of all funds in our data sample, is 10% for liquidated funds, while the IRRs for our extended samples I and II are on a perceivably higher level of 13% resp. 14%. This result has to be compared with the result reported by Kaplan/Schoar (2003) for US-funds, where they found an average IRR of 17%.[11] The distribution of the IRR is heavily skewed as can be seen from the relatively low medians as well as from the very high first quartile levels. In fact, 25% of the funds in sample I generated an IRR which was

[9] We document a significant positive correlation between the vintage year and the PME or the IRR, respectively. Cf. Kaserer/Diller (2004a): European Private Equity Funds – A Cash Flow Based Performance Analysis.
[10] A similar idea can be found in Meyer/Weidig (2003): Modelling Venture Capital Funds.
[11] Cf. Kaplan/Schoar (2003): Private Equity Performance. They report an IRR of 17% for VC funds and 18% for BO funds.

not lower than 17%. Moreover, table 1 corroborates the view that in terms of IRR European BO-funds performed considerably better than European VC-funds. Finally, it should be noted that the variability of the IRR increases when the data set is enlarged. This is in accordance with our presumption that our method picks out well performing as well as bad performing funds.

< Insert Table 1 here >

Benchmarking Returns by Using the PME-Approach

In order to benchmark IRRs it is often proposed to use an excess-IRR, defined as the IRR of a single fund minus the return on a benchmark index over the fund's lifetime. The average excess-IRR for European private equity funds in contrast to the MSCI Europe is about 4.45% for our sample I.[12]

The PME-approach addresses the question of how much money a private equity investor would need in order to generate a cash flow stream with a public market investment equal to the cash flow stream generated by the private equity investment. A PME of 1.2 informs the investor that for every Euro invested in the private equity fund he needs 1.2 Euros to be invested in the benchmark index in order to generate the same cash flow stream. This is equivalent to the comparison of the following two investment strategies. Under strategy 1 the investor starts with a given amount of Euros that is exactly sufficient for financing all take downs under the assumption that the money not used for immediate take downs is invested in the benchmark index until it is called by the GP. Simultaneously, the distributions paid to the investor are immediately invested in the index. In this way the investor is left with a final wealth at the maturity of the fund. Under strategy 2 the same amount of Euros is immediately invested in the benchmark index with a maturity equal to the funds lifetime. The PME is nothing else than the ratio of the final wealth under the first strategy to the final wealth under the second strategy. More formally, the PME is defined as follows:

$$PME = \frac{\sum_{t=1}^{T} cf_t \prod_{i=t+1}^{T} (1 + R_{Ii})}{\prod_{t=1}^{T} (1 + R_{It})}$$

Here, R_{It} is the net return on a public benchmark index in period t, while cf_t is the normalized distribution (positive cash flow) of a private equity fund in period t. The distributions are normalized by dividing them with the present value of all investments, i.e. the present value of all take downs (negative cash flows). In this way the cash flows are normalized to an initial investment with a present value of €1, where the benchmark index return is used as the discount rate.

Evidently, the PME-approach can be used for an ex-post benchmarking. In this case the known cash flows of a fund as well as the known benchmark returns are used for calculating the PME according to the above formula. By using the MSCI Europe as well as the JPM European Government Bond Index[13] as benchmark, we get the results for our pooled sample presented in table 2.[14] Two results should be emphasized here. First, when using the MSCI Europe as the benchmark we find a PME smaller than 1 for the sample of liquidated funds as well as for sample I. This is in evident contrast to the positive result of the excess-IRR. Evidently, the excess-IRR and the IRR of a fund is not a suitable method for benchmarking returns. Second, by comparing returns of VC and BO funds table 2 indicates that the ranking depends on the sub sample as well as on the benchmark used. This is again in clear contrast to the results derived on the basis of the IRR in table 1, where BO funds always outperformed VC funds. This raises serious doubts on the appropriateness of the IRR for comparing different funds or groups of funds.

12 Detailed results for the excess-IRR and payback period for our data samples can be found in Kaserer/Diller (2004a).

13 This index is only available back to 1993. As we need a longer index history we use the German REXP index for periods from 1993 backwards. The REXP is a performance index of German treasury bonds over the whole maturity range.

14 One remark to the comparison of the private equity returns calculated on cash flows basis (net of management fees) with the returns of the indices. As we can only observe the returns on a market index that are gross of management fees, we will make the following correction in this empirical study: For an equity index we assume management fees to be equal to 50 bp per year, while for a bond index these fees are assumed to be equal to 20 bp. Hence, the net yearly return is equal the gross yearly return, as indicated by the index performance, times 0.995 and times 0.998, respectively. In this paper the MSCI Europe is used as an equity index and the JP Morgan Government as a bond index.

Hence, for benchmarking the track record of a GP the PME approach will be by far more suitable than an IRR-based approach.

In our empirical analysis, we find PMEs of 0.86 for liquidated funds, 0.96 for sample I and a PME of 1.03 which is larger than one for the extended sample II. All these results are in accordance with the results of Kaplan/Schoar (2003) for the US market; for instance, they report an average PME of 0.96 when using the S&P500 as benchmark index. Using the J.P. Morgan European Government Bond Index as benchmark index, private equity funds reach an overall outperformance in all sub samples. In all cases the value weighted average PME is higher than the equally weighted average, indicating that larger funds tend to have a higher PME.[15]

Which Factors Determine European Private Equity Funds Returns?

After having presented the results for various performance measures, now we are going to raise two much more interesting question: What are the factors determining these returns? If such factors can be identified, what are the consequences for the investment strategy of an institutional investor? According to the theoretical reasoning presented in the introduction and taking into account some findings documented in the literature, we focus on two important return drivers. First, we analyse to what extent returns are triggered by fund inflows into the private equity industry, i.e. we address the so called money chasing deals phenomenon. Second, we discuss whether final performance is a matter of luck or rather determined by skills of the management team of a fund.

Does Money Inflow into the Private Equity Industry Have an Impact on the Performance?

Due to different research studies, we start with the presumption that the private equity market is not frictionless and perfectly competitive due to specific characteristics: segmentation, stickiness and illiquidity. If this is true, we would expect that money inflows into the private equity industry as well as management skills of the GP can affect the performance of private equity funds.

Gompers and Lerner (2000) show that inflows of capital into venture funds increase the valuation of these funds' new investments. They argue that private equity is an asset class segmented from other asset classes.

Although it is an open question, whether increased valuations are triggered by money pouring into the private equity industry or whether this money flow is triggered by improved expectations with respect to future investment opportunities, and hence by increased valuations, Gompers and Lerner (2000) present some evidence that is more consistent with the first hypothesis. They basically argue that there is a limited number of favourable investments in the private equity industry giving way to the so called money chasing deals phenomenon. It is important to note that the soundness of this argument is linked with special features of the private equity asset class, as has been shown in the context of a purely theoretical analysis by Inderst and Müller (2004).[16]

This segmentation argument might be especially important for private equity funds because they are normally not allowed to invest the committed capital in any other asset class as well as in another type of the private equity industry. Even if the GPs would be aware of an overvaluation in the industry or in a specific part of the industry, they hardly would be able to redirect their money towards other investment projects.

[15] It should be noted, nevertheless, that although the correlation between size of the fund and PME is positive, it is statistically not significant in this sample. Cf. Kaserer/Diller (2004a).

[16] Cf. Inderst/Müller(2004): The effect of capital market characteristics on the value of start-up firms.

In this regard, Ljungqvist and Richardson (2003b) point out that capital flows between GPs and LPs tend to be sticky, i.e. it takes a longer time in order to adjust the capital invested in the industry to changed expectations or valuations.[17]

In case of increasing expectations of the investors, due to improved economic prospects, the money inflow arises and the fund management is able to finance more companies. Though the question is: how good are these companies and have these investment projects a positive net present value or haven't they. If private equity funds invest the additional money in projects with a negative NPV or in projects that have only a positive NPV due to overestimations of future private equity cash flows, the average expected return of the private equity industry decreases.

But if the number of attractive target companies is limited in the short run, the valuation of potential companies increase substantially because there is much more capital supply in the private equity market than demand from attractive portfolio companies. Additionally, Ljungqvist and Richardson (2003b) argue that competitions for deals becomes the tougher, the more money is pouring into private equity funds, because the number of attractive investment targets is limited in the short run.

Finally, due to illiquidity and absence of a continuous secondary market activity, additional money cannot directly be reflected in increasing asset prices as it would be the case in the public market. Hence, the additional money attracted due to improved economic prospects must entirely be absorbed on primary markets, i.e. by an adjustment of deal pricing. This effect will be reinforced, if it is taken into account that the largest part of money invested in private equity is allocated through private equity funds.

Our basic idea for setting up an empirical test of the money chasing deals phenomenon is to distinguish between the absolute and the relative fund inflow. We assume that the total inflow into the private equity industry is, basically, triggered by economic prospects of the industry as a whole. Hence, the absolute fund inflow in a specific year can be regarded as a measure for the perception of investment opportunities. Under rational expectations these perceptions might turn out to be wrong, but they should not be wrong in any systematic sense. However, as mentioned before, in the short run there might be a mismatch of capital offered and demanded. The impact of such a mismatch would be the harder, the more money is directed towards a specific part of the private equity industry and the more segmented the private equity industry is in itself.

A simple example should be given in order to explain this idea. Assume that total fund inflow increases by 10 percent in a particular year. If positive NPV investment opportunities do not increase by the same size, deal competition might become more intense. However, the impact on the intensity of deal competition might even be more dramatic, if simultaneously the relative size of funds allocated towards venture funds and towards buy-out funds changes significantly. In this situation, deal competition increases substantially for the fund type attracting the larger share of fund inflows, while it may even decrease for the other fund types. This is why we assume that the relative share of funds allocated towards a particular fund type can be regarded as a measure for the intensity of deal competition.

Now, if we assume an overshooting of capital in a specific part of the private equity market, the search costs for private equity funds to get a favourable investment target increase. Additionally the bargaining power of entrepreneurs increases in such situations.[18] Because of that ownership shares of the private equity fund decrease and deal valuations on primary markets raise in that particular year. Hence we expect a negative impact on fund returns for funds which are closed in a year with high relative cash inflows. On the contrary, if we imagine a situation with more capital demand than capital supply in a specific part of the industry – while the absolute cash inflow into the industry is high due to increased economic prospects - private equity funds can chose favourable investment targets from many possible candidates. Because of this selection mechanism and because of the lower intensity of deal competition, the bargaining power of private equity funds increases while the valuations for entrepreneurs stay at a normal level. Hence we expect higher returns for private equity funds closed in years with low relative inflows.

[17] Cf. Ljungqvist/Richardson(2003b): The investment behaviour of private equity fund managers.
[18] Cf. Inderst/Müller(2004).

In order to check the money chasing deals phenomenon, we use the Euro denominated cash inflow into the European private equity industry which is annually published by EVCA. Furthermore we calculate the relative inflow into the venture capital or the buy out market, i.e. the share of capital that is allocated in that particular fund type. For simplicity, we split the sample in just two different fund types, venture funds and buy-out funds. Moreover, we split all the vintage years in years with high and with low absolute inflows as well as with high and low relative inflows, by using the median absolute or relative inflow as the separating parameter.

If the money chasing deals phenomenon drives returns, funds closed in periods of

1. high absolute inflows (AI_H) and low relative inflows (RI_H) should have relatively high return measures;
2. high relative inflows (RI_H) as well as low absolute inflows (AI_L) should have lower return measures than others.

According to this hypothesis we can split up the whole sample in four different groups and calculate the average IRR, excess-IRR or PME for each group. The results are presented in table 3. There, we report the average and median of the return measures as well as the 95% confidence interval of the average return measures.

< Insert Table 3 here >

Table 3 visualizes that funds founded in years with high absolute inflows have statistically higher returns (IRR=18%) than funds founded in years with low absolute inflows (IRR=9%). Taking into account that the absolute fund inflows increases from € 4.2bn in 1992 to over €48bn in 2000, this result corroborates the findings of a previous paper, where we documented that funds with a vintage year in the 90s have higher returns than funds with a vintage year in the 80s.[19] Additionally, we can show that funds founded in periods of high relative inflows tend to have lower IRRs and excess-IRRs than funds in times of high inflows. This is also true for the median PME but not for the average PME.

Taking a closer look to the groups of funds in table 3, one can see that funds founded in a phase of high absolute and high relative inflow outperform funds closed in times of low absolute and relative inflows due to the relative strong absolute inflow effect. Concerning the money chasing deals phenomenon the remaining two groups of funds are most interesting. In fact, funds which are founded in periods with high absolute cash inflows (AI_H) as well as low relative cash inflows (RI_L) have the highest returns measured in terms of IRR (20%) and excess IRR (13%). In contrast, funds founded in years with low absolute inflow (AI_L) and high relative inflow (RI_H) have only an average IRR of 4% and a negative excess IRR to the MSCI Europe equity index of -5%. The returns of these two groups are different also in a statistical sense, using a significance level of 1%. These findings strongly corroborate the money chasing deals phenomenon.

To sum up: our findings are completely in line with the perception that an overshooting (undershooting) of capital investments in a specific part of the private equity industry is due to some kind of herding behaviour, where investment opportunities on primary markets are systematically overestimated (underestimated) by investors. This fits nicely with another result, namely the sentiment effect, i.e. that funds raised in vintage years with high stock market returns have lower returns than funds raised in years with low stock market returns.[20] Hence, putting these findings together one might argue that there is a behavioural explanation for the money chasing deals phenomenon in private equity markets.

Of course, private equity investors should be aware of the existence of these phenomena. Hence, a contrarian investment strategy, i.e. investing in private equity funds in times of relative low capital inflows into this specific segment of the private equity industry, might be a superior choice. However, as investment flows in private equity are sticky, such a strategy might be hard to implement. In this case the

[19] Cf. Kaserer/Diller(2004a)

[20] We showed that the sentiment effect has a statistically significant influence on the performance of European private equity funds. Cf. Kaserer/Diller(2004c): What Drives Cash Flow Based European Private Equity Returns?

investor should at least follow an investment strategy that diversifies over different vintage years and within every vintage year over different fund types.

Do Management Skills Affect the Performance of Private Equity Funds?

From the specific characteristics of the private equity market it follows that skills of the management team could have a more significant impact on fund returns than it is the case for funds investing in public market securities. In efficient public markets a great deal of information, public or private, is incorporated in asset prices. Hence, the ultimate outcome of an investment strategy should be almost the same, regardless whether the investor undertakes informational activities or not. In fact, there is no clear evidence from the mutual fund performance literature that fund returns may be driven by fund managers' skills, like selection or timing abilities.

We would expect fund management skills to be much more important in private equity funds than in public mutual funds. Knowledge about investment opportunities in the private equity industry may be distributed very unequally and, due to the lack of a secondary market for these assets, it may take a long time until this information is disseminated. Now, if there is a systematic difference in knowledge about private equity investment opportunities among different management teams we would expect that good deals are concentrated in a small number of fund portfolios, i.e. the portfolios of the skilled management teams. The first consequence of this idea is that deal returns should have a much more skewed distribution than public stock market prices. In fact, as indicated in table 1 and 2 private equity funds' returns distributions are heavily skewed.

Finally, if skills are unequally distributed at a given point in time it may well be that their distribution is not independent over time. Hence, we would expect that returns of subsequent funds run by the same management team are correlated. This gives way to the so called persistence phenomenon in private equity funds' returns. It has been documented by Kaplan/Schoar (2003), Ljungqvist and Richardson (2003b) for US funds and also by Gottschalg et al (2004) for an international funds sample.

To test the persistence phenomenon in our empirical study for European private equity funds we use different approaches which are known from the mutual fund industry. The assessment of performance persistence is focused on the contingency table methodology of repeated winners and losers. Moreover, financial tests, such as Malkiel's (1995) Z-statistic, Brown's and Goetzmann's (1995) odds ratio and Kahn/Ruud's (1995) χ^2 - statistic, are applied to analyze the robustness of this phenomenon. Concerning the contingency tables methodology, the technique involves comparison of performance rankings in two or more different funds of the same management team. Thus we rank all funds which have a follow-on fund on the basis of their IRRs. In order to define two subsets of 'winners' (W) and 'losers' (L) portfolios, we use the median of the IRR of all funds to differentiate the funds. The better performing half of the funds will form the subset of 'winners' and the worse performing half that of 'losers'. This method is repeated in each sequence. The two-way contingency tables are created by successively comparing the two sub-periods. These tables are thus 2x2 matrices reflected WW funds (winner in both sequences), WP funds (winner in the first sequence and loser in the second), LW funds (loser in the first sequence and winner in the second) and LL funds (loser in both sequences). In the following table, the descriptive results of this methodology are visualized in table 4.

< Insert table 4 here >

Based on results obtained in this table, the existence of the persistence phenomenon may be affirmed because the number of funds maintaining their status as winners or losers is substantially higher than the number of funds that change their status. 52 funds stay in their half while 30 funds change their status. By applying the various statistical methods mentioned above, we find clear evidence for the persistence phenomenon in European private equity funds. Using Malkiel's Z-statistic, Brown's and Goetzmann's odds ratio and a χ^2 - statistics (p-value = 0.016) yields statistically significant results on the 5% level for our data sample I. Hence, it seems that better performing GPs tend to get also a good performance in the follow-on funds. This is also true for bad performing funds due to the fact that management skills matters. Only 18% of the follow-on funds reach the group of the winner funds in the following sequence, if the

proceeding fund was ranked as a loser fund. As it has been explained, this result fits nicely into the picture of a sticky and segmented asset class.

The practical consequence of this result can somehow be summarized in the formula "never change a winning team". In fact, once it turns out that an investment team is successful, the private equity investor should stick to this team. From this perspective, it makes completely good sense to use the track record of an investment team as an important piece of information in the investment decision process. However, as the track record is almost public information, an investment strategy based on historical performance only cannot be implemented. In fact, funds managed by teams with a successful track record often have the luxury of selecting among investors that will be 'permitted' to invest in the fund. In this respect, the evidence presented here cannot directly be transformed into an investment strategy.

However, there is a more indirect consequence coming out of these results. Once it is accepted that the skills of the management teams are unequally distributed and taking into account that it is very hard to enter into a fund run by a historically successful management team, it becomes evident, that identifying the good teams right at the moment when they start to act as GPs is very crucial. Of course, this article does not offer any help how this selection takes place, but it gives a clear support why team selection is crucial for becoming a successful private equity investor.

Conclusion

In this article a comprehensive data set of European private equity funds provided by TVE was analyzed. Starting with calculating the IRR distribution of a sample of mature European private equity funds, we introduced the PME-approach, which we defined as a wealth multiple. A PME of 1.2 tells the investor that for every Euro that he invests in a specific private equity fund he needs to invest 1.2 Euros in a public market benchmark in order to generate an identical cash flow stream. Most interestingly, we were able to show that benchmarking on an IRR-basis could lead to substantially distorted results. Moreover, even a ranking of different funds on basis of the IRR could generate a pitfall. Hence, LPs should not benchmark the track record of a GP on basis of the IRR; they should use instead the PME. For a sample of 200 mature European private equity funds raised in the years 1980 to 2003 we calculated an average IRR of 13% and a PME of about one.

The main focus of this article, however, was to give new insights into the determinants of funds' returns. For that purpose we started from the presumption that the private equity asset class is characterized by illiquidity, stickiness, and segmentation. It has been argued in theoretical and empirical papers that these characteristics can cause an over- or undershooting of private equity asset prices, at least in the short run. Most importantly, Gompers and Lerner (2000) have shown that venture deal valuations are driven by overall fund inflows into the industry giving way to the so called money chasing deals phenomenon. We document that funds founded in a phase with high absolute and low relative cash inflows have significantly higher returns than funds founded in periods of low absolute as well as high relative capital inflows. Hence, the so called money chasing deals phenomenon is an important factor explaining European private equity funds' returns. From a practical perspective, this result has two implications. First, a private equity investor should implement a contrarian investment strategy, in the sense that he invests in those fund types that get a relatively small share of total funds invested in the private equity sector. Second, diversifying invested funds over different vintage years as well as different fund types seems to be very important in order to reduce the risk of being exposed to the money chasing deal phenomenon.

Apart from the importance of fund flows the paper also shows that GPs' skills have a significant impact on fund returns. More precisely, returns of subsequent funds run by the same management team are correlated. So, we present evidence in favor of the persistence phenomenon governing the returns of European private equity funds. These results underline the stickiness and segmentation of this asset class. From a practical perspective it is, however, rather difficult to derive an investment strategy from this result. Although the result is a justification why track records are very important for inferring the abilities of a management team, it is of little help as this information is almost public. Nevertheless, the result indicates that the selection of a management team is a key success factor for private equity investments.

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Tables, charts and graphs

Figure 1: Vintage Year Distribution of Our Three Samples

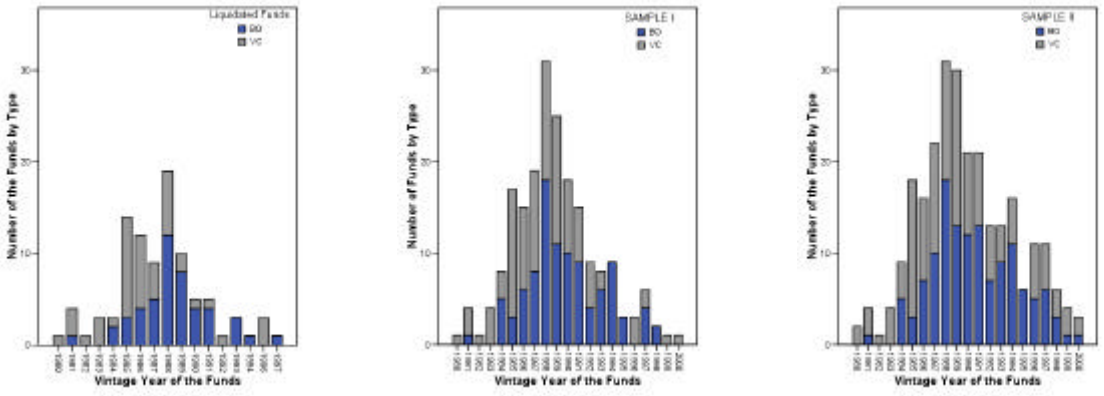

Table 1: Pooled Sample Distribution of IRRs of European Private Equity Funds

IRR (CF)	VC	BO	Total
Liquidated Funds			
Average	7.32%	12.64%	10.01%
Median	4.77%	9.79%	7.28%
75th Percentile	12.98%	18.67%	14.24%
25th Percentile	-4.00%	8.23%	0.00%
Stdev	17.82%	17.67%	17.85%
Sample I			
Average	12.00%	13.39%	12.69%
Median	8.05%	10.80%	9.14%
75th Percentile	15.65%	18.76%	17.13%
25th Percentile	1.90%	9.00%	4.45%
Stdev	22.06%	16.18%	19.34%
Sample II			
Average	12.50%	15.63%	14.07%
Median	7.40%	11.00%	9.56%
75th Percentile	16.31%	19.95%	18.17%
25th Percentile	0.00%	1.69%	0.05%
Stdev	24.95%	20.59%	22.89%

Table 2: Pooled Sample Distribution of PE Funds' PMEs

	PME (MSCI Europe)			BME (JPM European Govt. Bond)		
	VC	BO	Total	VC	BO	Total
Liquidated Funds						
Average	0.82	0.90	0.86	1.11	1.07	1.09
Median	0.68	0.89	0.80	0.81	1.09	0.99
75th percentile	0.97	1.24	1.10	1.38	1.37	1.38
25th percentile	0.33	0.51	0.42	0.54	0.64	0.58
Stdev	1.01	0.53	0.81	1.51	0.60	1.14
value-weighted PME			0.94			1.21
Sample I						
Average	0.98	0.94	0.96	1.14	1.24	1.20
Median	0.75	0.86	0.82	1.06	1.02	1.03
75th percentile	1.17	1.24	1.23	1.44	1.43	1.43
25th percentile	0.40	0.59	0.51	0.66	0.63	0.66
Stdev	1.15	0.51	0.89	1.02	0.59	1.11
value-weighted PME			1.04			1.27
Sample II						
Average	1.01	1.06	1.03	1.25	1.06	1.23
Median	0.76	0.92	0.88	0.99	1.13	1.07
75th percentile	1.22	1.35	1.27	1.27	1.42	1.45
25th percentile	0.44	0.61	0.55	0.60	0.77	0.66
Stdev	1.15	0.70	0.95	1.38	0.74	1.10
value-weighted PME			1.16			1.30

Table 3: Empirical Results for Analysing the Money Chasing Deals Phenomenon

IRR		RI_L	RI_H	Total
AI_L	Average	11.62%	3.92%	8.83%
	Median	9.24%	2.79%	7.26%
	95%ConfInt	[7.83%; 15.41%]	[1.17%; 6.68%]	[6.14%; 11.51]
AI_H	Average	20.31%	16.64%	17.89%
	Median	14.44%	10.99%	11.70%
	95%ConfInt	[12.80%; 27.81%]	[9.78%; 23.50%]	[12.77%; 23.01%]
Total	Average	14.36%	11.69%	12.69%
	Median	10.80%	8.22%	9.14%
	95%ConfInt	[10.83%; 17.89%]	[7.24%; 16.14%]	[9.99%; 15.39%]
ExcessIRR				
AI_L	Average	2.64%	-5.12%	-0.18%
	Median	-0.02%	-5.47%	-2.44%
	95%ConfInt	[-1.41%; 6.68%]	[-7.99%; -2.25%]	[-3.02%; 2.66%]
AI_H	Average	13.26%	9.70%	10.91%
	Median	6.06%	2.75%	3.30%
	95%ConfInt	[5.04%; 21.48%]	[2.30%; 17.10]	[5.37%; 16.45%]
Total	Average	5.99%	3.93%	4.45%
	Median	1.57%	-0.02%	0.61%
	95%ConfInt	[2.15%; 9.83%]	[-0.90%; 8.75%]	[1.52%; 7.38%]
PME				
AI_L	Average	0.89	0.66	0.81
	Median	0.86	0.68	0.76
	95%ConfInt	[0.77; 1.01]	[0.54; 0.79]	[0.72; 0.90]
AI_H	Average	1.10	1.22	1.18
	Median	0.99	0.82	1.00
	95%ConfInt	[0.87; 1.32]	[0.85; 1.60]	[0.93; 1.44]
Total	Average	0.95	1.01	0.96
	Median	0.86	0.76	0.82
	95%ConfInt	[0.85; 1.06]	[0.77; 1.24]	[0.83; 1.08]

Table 4: Empirical Results for Analysing the Persistence Phenomenon

Funds sequence	WW	WL	LW	LL
1-2	11	9	9	10
2-3	7	2	2	6
3-4	5	2	2	5
4-5	2	1	1	1
following	3	1	1	2
Total	**28**	**15**	**15**	**24**

Part 2: The Entrepreneur’s Perspective on the Role of Private Equity

Part 2: The Entrepreneur's Perspective on the Role of Private Equity

The Hierarchical Cognitive Structure of Entrepreneur Motivation toward Private Equity Financing

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Introduction

The purpose of this paper is to contribute to our understanding of entrepreneurs' motivations to engage in private equity financing. This topic has important theoretical, methodological and practical implications that we will elaborate upon below. In addition, the subject is timely in the light of debate on the consequences of the rate of growth of firms and on the governance model of the firm. Guiso, Sapienza and Zingales (2004a) claim that "local financial development has a positive and statistically significant effect on firm's growth" (p. 958). At the same time Baum and Locke (2004) confirm the importance of entrepreneurial skill and motivation to venture growth, giving important implications in this regard. The topic of private equity financing has been traditionally studied from financial or business strategy perspectives, but analysis is generally lacking with respect to the reasons for or explanations of private equity financing that considers cognitive, motivational and cultural forces on decision making when the opportunities offered by advanced financial markets are absent. This is also a relevant theme from the point of view of political economy, as the limited knowledge of institutional investors and their modality of intervention represent the main obstacles for the use of innovative instruments able to support the firm's growth and economic development. In addition to these factors, affective or emotional responses could induce mistrust and counterproductive reactions among entrepreneurs having to make joint decisions. The firm's refusal of operators that are not strictly familiar turns in most cases into a refusal of the managerial culture and of the opportunities of growth offered by markets. An important step needed to remove these stereotypes resides in entrepreneurs' motivation towards private equity financing, which this paper intends to study, thereby encouraging an empirically grounded cognitive and motivational prospective in entrepreneurial studies (Baron, 1998).

Theoretical background

Empirical studies on motivation have traditionally relied on long checklists of general motives (e.g. Ford & Nichols, 1987). But the motives on such checklists are often too general, overlap, and neglect relationships between motives (e.g., the possibility that motive x leads to motive y which promotes risk taking). Moreover, the theoretical basis for the motives on such checklists is often lacking, and the fit to a particular decision context is typically strained. A more specific approach is needed to uncover motives that decision makers actually have and how these motives guide, influence, or interfere with actual decision making.

An approach that recently has attracted scholarly attention is *Means-End Chain Theory* (MEC theory; Gutman, 1982; Bagozzi & Dabholkar, 2000), a model first proposed and formalized in marketing but recently applied with success to relevant individual decision making in the psychology literature as well (Bagozzi, Bergami & Leone, 2003).

The basic assumption of the model defines motives not so much with reference to internal stimuli per se, but in terms of goals (Murray, 1938). In the original version of MEC theory, "means" are construed as instruments, procedures, or activities in which people engage, while "ends" are valued states of being; a means-end chain is a model that seeks to explain how a decision to choose a product or activity facilities the achievement of desired end-states; in other words, some motivations (*means*) are functional in achieving goals (*ends*) that occur at different and deeper levels of an individual's motivational structure.

This theory seems particularly suited for the present study, because entrepreneurs choose to share their equity with an institutional fund for the purpose of reaching goals, which are not solely connected to financial motives. In addition MEC theory can be used to discover entrepreneurs' mental images and frameworks about institutional investors, people toward whom entrepreneurs are often diffident yet dependent.

MEC theory supposes that a decision maker's individual knowledge is hierarchically organized such that concrete thoughts are linked to more abstract thoughts in paths that proceed from means to focal ends (Olson & Reynolds, 1995). The knowledge structure of a person with regard to a situation is represented by *cognitive schemas*, defined as "learned, internalized patterns of thought-feeling that mediate both the interpretation of on-going experience and the reconstruction of memories" and in particular influence

decisions (Strauss, 1992). The basic units of cognitive schemas consist of two kinds. The first is *declarative knowledge*, which consists in individual motives to which the focal end is linked directly or indirectly through chains of motives. Declarative knowledge, which is connected to knowledge of a focal issue, refers to specific concepts and characteristics that serve as a basis for decision making. MECs, starting from concrete decision criteria or motives and reaching to more abstract criteria, constitute the building blocks of individual decision makers' cognitive schemas. Connections among declarative knowledge units (i.e. motives) are termed, *procedural knowledge*, and function in thinking processes like if-then propositions (e.g., if lower level motive x is satisfied, then it will bring higher order motive y into play as a more proximal determinant of a decision).

MECs in the form of interconnected motives and hierarchically organized represent modalities that people use implicitly in decision making. A person's knowledge structure and motives (i.e. organized declarative and procedural knowledge) become the basis for decision making. In this way schemas provide motivational force, in fact schemas "have the potential of instigating action –that is, they can function as goals" (D'Andrade, 1992, p. 29). It should be noted that declarative and procedural knowledge occur in cognitive schemas where conscious, deliberative decision making happens. For cognitive schemas that represent associative, non-conscious memory networks, the knowledge so entailed is neither declarative or procedural but can harbour some minimal levels of awareness or senses of experience.

In other words, to realize why someone behaves the way they do it is not enough to know the discourses, objects, and events to which they have been exposed; these dimensions have to be integrated into the psychic structures that assimilate those things and turn them into a basis for decision making and meaningful action (Spiro, 1987).

On the basis of Bagozzi, Bergami and Leone's (2003) framework, we propose that any focal goal can be related to reasons for acting and depicted through a three-tiered hierarchy. "One's focal goal can be considered at the centre of the hierarchy and answers the question, *What* is it for which I strive? Subordinate goals constitute the means for achieving the focal goal and answer the question, *How* can I achieve that for which I strive? Subordinate goals have been treated as concrete actions in what some researchers call the *program level* in control theory (see Carver & Scheir, 1998). At the top of the hierarchy are superordinate motives, which answer the question, *Why* do I want to achieve that for which I strive?" (p. 917). The motives in a hierarchical schema are connected through means–ends linkages at each level of the hierarchy, and at the superordinate level in particular many motives typically exist in complex relationships. It is the superordinate level that we focus upon in this study.

MEC theory also can be termed a "model of meaning" (Olson, 1995, p.189). A basic assumption is that the full meaning of a concept is given by the other concepts with which it is associated. Thus, a single concept such as "innovation" or a price of "$100" has little or no explicative meaning by itself. To understand what "innovation" or "$100" means to a person, we must identify the other concepts to which it is connected. For example, the meaning of innovation (for a firm) is determined by its association with other concepts like investments, R&D, new products, and revenue. The network of perceived connections to the "innovation" concept determine its fuller meaning for that person. Using procedures such as laddering, that will be introduced in the next section of the paper, these linkages reveal the true meaning of each important concept a person has.

In summary, the advantage of discerning cognitive schemas is that it leads to testable hypotheses concerning how new information is represented in memory, as well as the ability to trace the inferential processes involved in judgment and choice for existing sets of information, and to suggest target thoughts and inferences for change by means of persuasive communication.

Moreover treating goal-schemas as motives or, more precisely, as 'having motivational force', allows us to overcome limitations in traditional motivational studies (D'Andrade, 1995). First, the question of identifying which reasons are associated to which behaviors can be answered by analyzing MEC linkages. Second, the fallacy of relying on a list of general and universal motives is avoided in the sense that it is clear that there is no one list of motives and that there are at least as many types of master motives as there are types of goal-schemas. Third, situational variance becomes more explicable: schemas are

context-dependent and thus yield a deeper, more valid comprehension of specific situations. Finally, one of the most important advantages of considering reasons for acting or decision making as schemas with embedded goals is that it not only connects cognition and decision making to behavior, but it also shows how goals are patterned at different levels of abstractness and thus become pathways for influencing decision makers, as it will become clearer below.

Methodology

Scholars of *MEC theory* have developed a methodological approach, termed *laddering* (Reynolds & Gutman, 1988), to uncover the hierarchical structure of the superordinate motives that provide reasons for pursuing a particular focal goal.

The original laddering technique depended upon an in-depth, one-on-one interviewing technique that was used to develop an understanding of how people translate the perceived attributes of products into meaningful associations with respect to one's self as a consumer and to develop an understanding of the motivational and cognitive processes that induce people to purchase a product or adopt a service. Laddering involves use of a tailored interviewing format consisting primarily of a series of directed probes, typified by the "Why is that important to you?" question, with the express goal of determining sets of linkages between the key perceptual elements across the range of attributes, consequences, and values that constitute a cognitive schema for products or services. The general outline of such schemas consists of a perceived attributes ? felt psycho-social consequences ? experienced value hierarchy of interlinked thoughts.

Following Bagozzi and Dabholkar (1994) and more recently Bagozzi, Bergami and Leone (2003), our adaptation of the laddering technique involves use of ideas proposed by Toulmin (1958) on argumentation and rhetoric. According to Toulmin, arguments can be considered as a series of claims that an arguer provides supporting an argument; each claim, in turn, can be challenged on the basis of its justification; justifications, in turn, rest on evidence and can also be challenged or explained. We adapted this framework to discover chains of reasons and reasoning for analyzing.

The laddering interview can be summarized as follows. First, respondents are asked to list their personal reasons for choosing a focal goal. After listing their reasons, respondents are asked to return to the first reason they gave and then to express why that reason was important to them. Next, respondents are to explain further why is the explanation was so important to them. Finally, the above procedure for providing justifications and explanations is repeated for the remaining reasons on the original list one at a time until deeper levels of justification are expressed.

In our case, we first asked entrepreneurs to list up to five reasons why they would allow institutional investors to participate in the firm's equity decisions. Then for each reason listed, one at a time, entrepreneurs were asked to answer two sequences of questions concerning why the motivation was important for the person, in the sense of explaining their reasons, and then giving a justification for each of their explanations. Figure 1 presents the questionnaire format.

The data derived from the laddering procedure permits the application of a content analysis (illustrated below) so as to develop an understanding of how consumers translate their motives or reasons for acting into meaningful associations with respect to personal goals and values. The aim is to disclose key decision criteria and linkages among the most important decision criteria that decision makers implicitly follow in their decision making and which influence their actual choices and action. This technique used to identify cognitive schema can be employed to identify motivational goals (Gallistel, 1985); the basic idea is that cognitive schemas function as goals, and so have motivational force.

The laddering technique was applied to a sample of 91 entrepreneurs from the Emilia Romagna region of Italy who were in a position consider private equity financing. The sample was selected in such a way as to obtain an equal geographical distribution across the region. The interest in "local" financial development is also an important theme for its impact on the economic success of an economic area (Guiso, Sapienza & Zingales, 2004a).

< Insert Figure 1 here >

Analysis and interpretation

The content analysis of all ladders given by the 91 entrepreneurs was carried out by two independent judges and produced nearly 906 distinct reasons in total (with a mean of 9,96 motives per entrepreneur) and 520 linkages among motives (mean of 5,71). Because the responses obtained in a laddering interview are typically rather idiosyncratic, it is necessary to classify the raw data into a limited number of response categories (Reynolds & Gutman, 1988). In our case this meant assigning responses of entrepreneurs in the laddering interview to a small, yet comprehensive, set of goal categories. The final encryption based on a semantic analysis of all reasons and using the recommended coding procedure from the literature (e.g., Bagozzi, Bergami & Leone, 2003) identified 37 unique motivations, which in turn can be classified into three general categories, as presented in Table 1. One category is linked to market and business dimensions, including aspects associated with the competitive environment and opportunities following the entrance of the investor in an equity relationship; a second category is linked to firm variables, including managerial and organizational efficiency issues; and the third dimension is linked to the entrepreneur, per se, with aspects reflecting personal goals and one's family. It is important to point out that the dividing line between reasons belonging to the first two categories is a fine one, and some reasons (e.g., *firm growth*) could possibly have been assigned to either category. In other words, the boundary between firm motives and market/business motives is fuzzy. This is not a limitation of the procedure or findings because the categorization procedure is done merely for presentations purposes (see Figure 2 below).

< Insert Table 1 here >

The frequencies observed suggest something about the content of entrepreneurs' cognitive schemas. The motivations with higher frequencies belong to the categories of firm and market; *firm growth, competitiveness* and *managerial competencies* are in fact the most frequently mentioned motivations, each with frequencies above 60; but note also that *new capital* and *organizational efficiency* have high frequencies as well. Regarding personal motives of entrepreneurs, we observe that lower frequencies occur; the highest personal values occur for *personal satisfaction* and *succession*, where both were mentioned 22 times.

Now that the salient goals for motivating institutional investors to participate in the firm's equity have been identified, we next examine the relationships among these goals. In this way we can discover the hierarchical relations among the goals, and by organizing goals from the concrete to the abstract, we hope to gain insight into the entrepreneurs' cognitive schemas related to their decision making with respect to private equity financing. The first step is to construct an "implication matrix", which contains the observed links among different motives. The implication matrix is a square matrix Z whose element (z_{ij}) reflect how often goal *i* leads to goal *j*. Table 2 shows the implication matrix for the 37 goals identified in the content analysis. Notice that each goal is mentioned twice, once in the rows and once in the columns. To take an example, notice that 11 entrepreneurs concluded that *innovation* leads to *competitiveness*.

In order to arrange the goals in a meaningful way, following Pieters, Baumgartner and Allen (1995), we computed an index of the level of abstractness for each goal as the ratio of in-degrees to the sum of in-degrees plus out-degrees. In-degrees show how often a motive is the object or the end of a relation, whereas out-degrees indicate how often a motive is a source or origin. The abstractness ratio measures the proportion of times a motive serves as a destination in a cognitive schema, as opposed to a source. The assumption is that the more abstract the motive, the more likely it will be an end. The first column in Table 2 presents these ratios for the goals, where the range of values is from 0.158 (for *succession*), the most concrete goal, to 0.800 (for the *sales* reason) which is the most abstract goal.

< Insert Table 2 here >

It can be seen in Table 2 that only a small proportion of all possible relations between goals are actually manifested. There are a total of 1332 possible relations[21], but only 295 cells contain direct paths of one incidence or more, yielding a proportion of about 22% of all possible paths. The 91 respondents mentioned a total of 590 direct linkages among goals.

The information provided in the implication matrix can be simplified by developing a visual map of the main "goal chains" (Pieters, Baumgartner & Allen, 1995), which are aggregated sequences of goals that are formed both over respondents and specific goals within categories.

To construct a goal map, it is necessary to select a cutoff value for linkages among goals. Table 3 can be used in this regard.

< Insert Table 3 here >

Column two in Table 3 shows the number of cells that contain linkages for cutoff values of 1-5. For example, 48 cells in Table 2 contain linkages mentioned three or more times by respondents. The third column displays the number of active cells as a proportion of all cells, while column fourth shows the number of active cells as a proportion of all cells mentioned at least once. Column five indicates the number of active linkages at each cutoff level, and column six presents these as a proportion of all linkages. Reynolds and Gutman (1988) propose two criteria for selecting a cutoff. The first suggests choosing the cutoff that leads to the most informative solution. The second asserts to considers the number of active linkages as a proportion of all linkages (column 6) and says to select the cutoff that achieves maximum completeness combined with ease of interpretability. Pieters, Baumgartner and Allen (1995) recommend also comparing the proportion of active cells in the implication matrix to the proportion of total linkages accounted for at a given cutoff level. This entails a trade-off between parsimony and goodness-of-fit.

A cutoff was chosen based on linkages occurring four or more times following the above criteria. As shown in Table 3, a cutoff level of 4 allows us to account for 26% of all relations between goals made by entrepreneurs (column 6) using only 2% of all possible cells (column 3) in the implication matrix and only 9% of the cells that contain a nonzero entry (column 4).

With this information, it is possible to construct a mental map for entrepreneurial motivational. See Figure 2 below. This map is derived directly from Table 2 but only selecting linkages mentioned 4 or more times.

< Insert Figure 2 here >

Arrows in Figure 2 reveal the direction of linkages among motivations, while numbers placed by their side represent the frequency with which the relation has been observed in the sample.

The vertical dimension of the map represents the degree of abstractness; motivations with lower degrees of abstractness are at the bottom, while motivations with higher degrees of abstractness are placed above these.

By analyzing jointly the frequencies with which motivations appear and the cognitive map as a whole, it is possible to conclude that entrepreneurs give more attention to firm consequences. In particular *firm growth*, besides being cited most frequently by entrepreneurs (67 citations), shows also the highest number of links with other reasons or motives (both as a destination or source), displaying a high degree of centrality in entrepreneurs' cognitive schemas. Located among motivations at the bottom of the map, *growth* is a source or influence of such important goals as *competitiveness* and *market share*.

The link from *growth* to *competitiveness*, in particular, is important for three reasons: First of all, it is the second most frequently mentioned link in the schema with 11; secondly, *competitiveness* also was cited frequently by entrepreneurs (64 times); and third, *competitiveness* is the motive with the highest centrality

[21] $1332 = N^2 - N$, where N = 37 goals

value (centrality is an index measuring the transformative role of motives and is computed with a formula discussed below).

The relation of *growth* to *market share* is also relevant thanks to its observed frequency of occurrence (8), but also because it shows the linking directly of a concrete motivation with an abstract one (research shows that abstract motives are the most proximal determinants of decisions, yet must be "reached" or influenced with change strategies aimed at concrete motives, see Bagozzi et al., 2003).

Note that the most abstract goals in Figure 2 are *market share, personal satisfaction, tradition,* and *family connection*. This would be expected to be the strongest predictors of actual decision making but would be themselves vulnerable to influence by targeting their direct antecedents. For example, market share is directly dependent on organizational efficiency and growth. These, in turn, may be influenced by persuasive messages targeted at their lower level antecedents. Another channel of influence particularly interesting is the one that connects *managerial competence* with *organizational efficiency*. *Managerial competence*, located in the centre of the map, is a relevant node thanks to its relatively high frequency cited by entrepreneurs (61). Moreover, the observed strength with which *managerial competence* connects with *organizational efficiency* (13) suggests its importance.

It may be concluded that the most meaningful links among motives begin with firm criteria and end with motivations directly connected to such market and business opportunities in the competitive environment as *competitiveness* and *market share*. With respect to motives concerning entrepreneur characteristics, two links are noteworthy. One goes from *succession,* the most concrete motivation in the map, to *corporate survivorship* and in turn to the motive of *tradition*; the other goes from *succession* to *family connections*. The resort to private equity financing with this finality could be therefore seen as an attempt to overcome all too familiar dynamics that risk slowing down, complicating or even compromising the delicate process of succession. Finally it is important to observe, as all motivations are widely linked among themselves in complex patterns, many other motives and their interconnections play potential roles in decision making as well.

To gain an indication of the importance of the different goals for the sample of respondents, it is informative to examine the property of goal prominence from the literature on network analysis. Knoke and Burt (1982) proposed two measures of prominence, where prominence might be conceived as an indication of the degree or magnitude that a goal serves as a source or object in the goal hierarchy. More formally, "centrality" is a measure of how frequently a particular goal is involved in relationships with other goals and can be computed as $p_i^{(1)} = \text{sum}_i(z_{ij}+z_{ji}) \; / \; \text{sum}_{ij} \; (z_{ij})$. That is, centrality indicates how frequently a particular motive is involved in linkages with other motives. The second measure of prominence is termed, "prestige", and can be computed as $p_j^{(2)} = \text{sum}_i(z_{ij}) \; / \; \text{sum}_{ij} \; (z_{ij})$. Prestige measures the extent to which a particular motive is the target of other motives.

Table 4 shows the results for the prominence indices applied to the goals that are in the cognitive map.

< Insert Table here >

With respect to centrality *competitiveness* is the most important goal based on linkages, in the sense that is the source of the most linkages. *Firm growth* and *managerial competencies* are also central goals. *Liquidate investments* and *tradition* are somewhat less central. Also, with respect to prestige, *competitiveness* is the most important object of other goals, followed by *managerial competencies* and *corporate image*. These results reinforce the previous analysis and interpretation of the cognitive map and give more importance to market and business reasons as much as material and immaterial reasons.

Conclusion

This paper presents a novel approach to private equity financing by entrepreneurs, as it combines ideas from behavioural research (i.e., psychology and organization studies) with ideas from business (i.e., finance and economics). The research also employs a unique methodology (a second-generation MEC theory and laddering technique to a rare data set of entrepreneurs and their judgements.

The main contribution of this study is to apply the new MEC theory and the laddering technique to decisions to engage in private equity financing by entrepreneurs. The threefold category of decision criteria we identified are somewhat similar to those found in previous studies (Baum, Locke & Smith, 2001) for venture growth, but we deepen the foundation of what specifically are the constituents of the categories and how they function, as expressed in cognitive schemas. We thus provide a more detailed, yet holistic, framework for how decisions are made.

The identification of a motivational map (cognitive schemas) represents a starting point for studying relation among motivations and other consequences of decisions by entrepreneurs to share the equity of the firm. To validate any cognitive schema, the motives and linkages among motives can be used as independent variables in multiple regressions to predict decisions, attitudes, and other outcomes.

For future research, the results of this study suggest criteria (i.e. specific motives and linkages between motives, where the latter constitute if-then propositions) to include on survey questionnaires in order to verify the decision criteria discovered in this research.

On the practical side, this study contributes to our understanding of why entrepreneurs (and firms) make the decisions they do, bringing out the entrepreneurs' desire for firm growth, so to maintain the competitiveness of their firms in the market and improving market share or the viability of a market niche. In addition, this research potentially provides practical suggestions to institutional investors and policy makers with regard to the bases of decision making that entrepreneurs exhibit. Finally, whereas personal traits and inclinations can be modified only with great effort and difficulty, considerable research findings suggest that patterns of thought and errors arising from them are often more amenable to learning (e.g. O'Donohue & Krasner, 1996). Thus, not only does our research offer the possibility of new conceptual tools useful in entrepreneurship research, but it also suggests routes to effective interventions for encouraging entrepreneurs' training and education.

In sum, we believe we have taken a big step in reducing the asymmetry in information between local entrepreneurs and institutional funds, encouraging at the same time the development of forms of social capital (i.e. trust, see Guiso, Sapienza & Zingales, 2004b; Nahapiet & Ghoshal, 1998) among these relevant actors.

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Tables, charts and graphs

Figure 1. Elicitation of motives questionnaire

We would like you to express your personal reasons for allowing institutional investors to participate in the firm's equity.
For the questions below, please follow this sequence: *1.* List five reasons you have for wanting to allow institutional investors to participate in the firm's equity and place these in the boxes in column #1 under REASONS. *2.* Then take your first reason and think of why this is important to you. Place your answer in the box adjacent to your first reason in column #2. *3.* After answering why your first reason is important, think about why the answer given is, in turn, important, and put your response in the box in column #3. *4.* Repeat Steps 2 and 3 for each remaining reason in column #1. We have placed numbers in the upper left corners of each box to remind you of the sequence to follow.

REASONS Reasons for allowing institutional investors to participate in the firm's equity	**WHY - 1** Why is it important?	**WHY - 2** Why is it important?
1	6	11
2	7	12
3	8	13
4	9	14
5	10	15

Table 1. Three main categories and relative frequencies of motives mentioned by entrepreneurs

Firm motives	Frequency	Market and business motives	Frequency	Personal motives	Frequency
Productive capacity	16	Acquisition	23	Personal growth	14
Managerial competencies	61	Strategic alliances	25	Disagreement among partners	13
Firm growth	67	Competitiveness	64	Liquidate investments	16
Organizational efficiency	41	Share risk	11	Personal satisfaction	22
Sales	15	Environmental factors	23	Way of life	7
Products range	13	Corporate image	34	Succession	22
Ideas	16	Leadership	17	Tradition	11
Innovation	36	Network	10	Family connections	21
Investments	33	New capital	57	Vision	14
Lower costs	15	New markets	19		
Shakedown	16	New partners	24		
Financial solidity	38	Bargaining power	28		
Corporate survivorship	23	Quoted on the stock exchange	7		
		Market share	31		
		Corporate market value	3		

Table 2. Implication matrix for entrepreneurs

Abstract ratio			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	In deg
0,800	1	Sales		*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*3*	*0*	*0*	*1*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*2*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	12
0,792	2	Personal satisfaction	*0*		*2*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*1*	*4*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*2*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	19
0,750	3	Way of life	*0*	*3*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	6
0,730	4	Market share	*0*	*0*	*0*		*0*	*0*	*1*	*0*	*5*	*3*	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*3*	*0*	*0*	*1*	*0*	*0*	*8*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	27
0,684	5	Leadership	*1*	*1*	*0*	*1*		*0*	*0*	*0*	*1*	*2*	*1*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*2*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	13
0,667	6	Disagreement partners	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*3*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*3*	10
0,647	7	Products range	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*2*	*0*	*1*	*2*	*0*	*1*	*0*	*0*	*0*	*3*	*0*	*1*	*0*	*0*	11
0,643	8	Tradition	*0*	*0*	*0*	*0*	*1*	*0*	*0*		*0*	*0*	*0*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	9
0,635	9	Organizational efficiency	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*1*	*0*	*1*	*1*	*1*	*0*	*0*	*0*	*0*	*2*	*1*	*3*	*0*	*0*	*1*	*13*	*2*	*0*	*2*	*1*	*0*	*1*	*2*	*0*	*1*	*0*	*0*	33
0,627	10	Competitiveness	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*0*	*3*		*1*	*1*	*0*	*1*	*0*	*2*	*1*	*3*	*0*	*0*	*3*	*0*	*0*	*1*	*0*	*1*	*6*	*0*	*4*	*11*	*0*	*1*	*2*	*3*	*0*	*0*	*0*	47
0,625	11	Family connections	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*3*	*0*	*0*		*2*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*5*	15
0,621	12	Corporate survivorship	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	*2*		*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*4*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*5*	18
0,619	13	Corporate image	*0*	*0*	*0*	*3*	*2*	*0*	*2*	*0*	*0*	*1*	*0*	*0*		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*2*	*1*	*2*	*2*	*1*	*3*	*0*	*0*	*1*	*1*	*0*	*0*	*2*	*1*	*0*	*0*	26
0,611	14	Productive capacity	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*2*	*4*	*0*	*3*	*0*	*0*	*0*	*0*	*0*	11
0,611	15	Lower costs	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*0*	*1*	*0*	*1*	*2*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	11
0,600	16	Environmental factors	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*4*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*2*	*0*	*0*	*0*	*2*	*1*	*0*	*1*	*0*	*2*	*4*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	18
0,586	17	New partners	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*2*	*0*	*1*	*0*	*1*	*0*	*0*	*1*		*2*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*2*	*0*	*3*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	17
0,579	18	Bargaining power	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*3*	*0*	*0*	*5*	*0*	*2*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*5*	*0*	*0*	*0*	22
0,571	19	Vision	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	8
0,500	20	Personal growth	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*		*1*	*0*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	10
0,500	21	Ideas	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*		*0*	*0*	*0*	*0*	*1*	*3*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*1*	*0*	*0*	10
0,500	22	Shakedown	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*		*0*	*0*	*0*	*2*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	10
0,500	23	Corporate market value	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	2
0,480	24	New markets	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*0*		*0*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*2*	*2*	*1*	*0*	*0*	12
0,478	25	Financial solidity	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*0*	*0*	*0*	*0*	*0*	*0*		*2*	*0*	*2*	*1*	*1*	*0*	*1*	*0*	*4*	*0*	*2*	*0*	22
0,418	26	Managerial competencies	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*2*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*5*	*0*	*0*	*2*	*0*	*1*	*1*	*0*	*2*		*2*	*0*	*0*	*2*	*1*	*1*	*2*	*0*	*1*	*1*	*1*	28
0,400	27	Innovation	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*2*	*1*		*0*	*3*	*0*	*0*	*0*	*0*	*5*	*0*	*0*	*0*	16
0,364	28	Share risk	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*1*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	4
0,350	29	Investments	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*		*1*	*0*	*0*	*1*	*8*	*0*	*0*	*0*	14
0,315	30	Firm growth	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*5*		*0*	*4*	*0*	*6*	*0*	*0*	*0*	23

0,308	31	Liquidate investments	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*1*	*0*	4
0,292	32	Acquisitions	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*		*0*	*2*	*0*	*0*	*0*	7
0,259	33	Strategic alliances	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*2*		*2*	*0*	*0*	*0*	7
0,211	34	New capital	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*4*	*0*	*0*	*0*		*0*	*1*	*0*	12
0,200	35	Network	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	2
0,167	36	Quoted on the Stock Exch.	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	1
0,158	37	Succession	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		3
	Out degrees		3	5	2	10	6	5	6	5	19	28	9	11	16	7	7	12	12	16	6	10	10	10	2	13	24	39	24	7	26	50	9	17	20	45	8	5	16	520

Table 3. Statistics on linkages among goals for different cutoff levels

Cutoff	Number of active cells	Number of active cells as a proportion of all cells	Number of active cells as a proportion of all cells mentioned at least once	Number of active linkages	Number of active linkages as a proportion of all linkages
1	295	0.22	1.00	520	1.00
2	116	0.09	0.41	341	0.66
3	48	0.04	0.18	205	0.39
4	25	0.02	0.09	136	0.26
5	14	0.01	0.05	92	0.18

Figure 2. The entrepreneur motivational map showing key motives and their linkages and arranged hierarchically according to degree of abstractness.

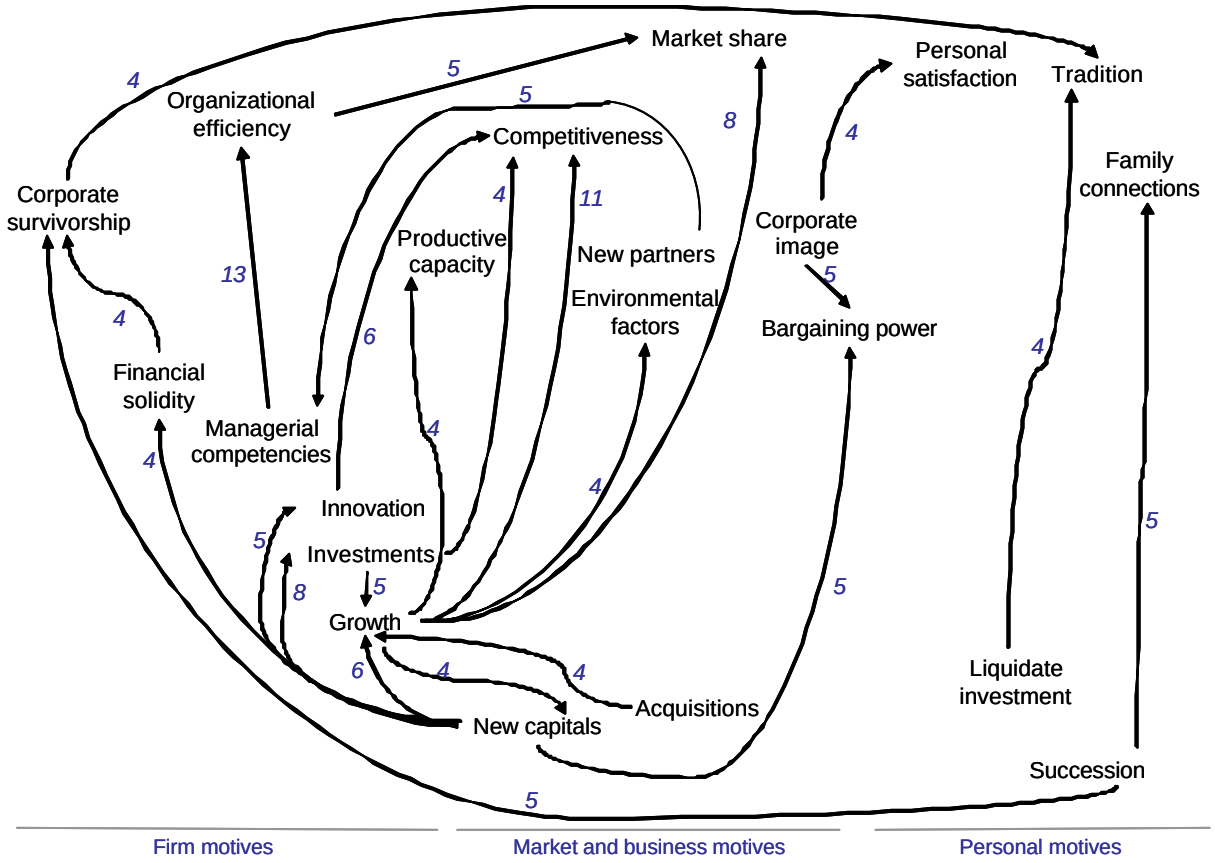

Table 4. Prominence indices derived from goal structure

	Centrality	Prestige
Productive capacity	0,014	0,008
Managerial competencies	0,050	0,021
Competitiveness	0,056	0,035
Firm growth	0,055	0,017
Organizational efficiency	0,039	0,016
Environmental factors	0,023	0,014
Corporate image	0,032	0,020
Innovation	0,030	0,012
Investments	0,030	0,011
Liquidate the investment	0,010	0,003
New capitals	0,043	0,008
New partners	0,022	0,013
Bargaining power	0,029	0,017
Market share	0,028	0,020
Personal satisfaction	0,018	0,014
Financial solidity	0,035	0,017
Corporate survivorship	0,022	0,014
Succession	0,014	0,002
Tradition	0,011	0,007
Family connections	0,018	0,011

Note. The three highest indexes for each group are in bold.

What Factors determine the Use of Venture Capital? Evidence from the Irish Software Sector.

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Abstract

We address the venture capital financing issue from the firm's perspective. Using survey data for 110 new technology-based firms (NTBFs) in the Irish software sector, we assess the extent to which 5 human capital and 3 other variables determine the firm's use of venture capital. Education of the lead founder to degree level is the only significant human capital variable, and it is directly related to the likelihood of being venture capital-backed. Venture capital-backed firms have significantly higher start-up costs, and their founders are less averse to loss of control than non-venture capital-backed firms. We conclude that the use of venture capital is dictated largely by the willingness of founders to relinquish control.

Introduction

It is widely agreed that technology-based small and medium-sized enterprises (SMEs) are becoming increasingly important sources of employment generation and economic growth. These new technology-based firms (NTBFs)[1] are major conduits for translating scientific knowledge into commercial products and processes, and play a vital role in the development and diffusion of innovation. In order for such firms to be established and to grow, it is crucial that they receive appropriate finance at start-up, through to commercialisation and growth.

Academics and practitioners agree that venture capital is the most appropriate source of finance for NTBFs. The venture capital appraisal and selection process is reasonably well understood. Venture capitalists tend to favour firms with competent, experienced management teams in growth industries. In contrast, there is little evidence on the demand side in the venture capital equation. Using survey data for 110 privately held indigenous Irish software companies,[1] of which 54 are venture capital-backed and 56 are not, we investigate what factors determine the use of venture capital in NTBFs. The venture capital literature suggests that variations in human capital are critical determinants of equity investment in high technology ventures. Similarly, the entrepreneurship literature places human capital factors, such as the educational background and management experience of founders, at the centre of its analysis of the foundation, survival and growth of new ventures. We use 5 human capital variables as potential explanatory variables in our model. Four relate to traits of the lead founder: education to degree level and to post-graduate level, prior start-up experience, and management experience in the software sector. The fifth human capital variable is the size of the founding team.

Three additional factors complete our set of explanatory variables. It is well understood in the NTBF literature that the longer the product lead time, the greater the necessary initial capital injection, and therefore the more likely that the firm will require external funding (Oakey, 1984 and 1995; Roberts, 1991; Bank of England 2001). We include product lead time and start-up costs as explanatory variables in our model. The final variable measures the extent to which NTBF owner-managers are prepared to cede control of their businesses. One of the truisms of entrepreneurship theory and evidence is the goal of independence (Bolton, 1971). To obtain venture capital backing, owner-managers must relinquish considerable independence in decision-making and control of their businesses.

Our study yields three particularly interesting findings. *First*, we find that venture capital-backed firms have higher start-up costs than firms that are not venture capital-backed. However, this cannot be explained by longer product lead times requiring greater initial capital, because we find no relation between venture capital backing and product lead times. The software sector may be unique amongst high-technology sectors in this respect because software products have rather short lead times (the median lead time in our sample is 12 months). The most plausible explanation for the positive relation between start-up costs and venture capital backing amongst our sample of software firms is that venture capitalists tend to avoid smaller start-ups.

Second, only one human capital factor – education of the lead founder to degree level – is significantly related to venture capital backing. This may be explained by superior education enabling founders to better negotiate with potential financiers (Oakey, 1984). Alternatively, educated founders may be keener to see their businesses grow, in which case it is likely that external funding will be required to support this

growth. Growth firms tend to be more highly geared than non-growth firms (Chittenden, Hall and Hutchinson, 1996), and external equity is more likely to feature as a source of financing in fast-growth firms (Cosh and Hughes, 1994). The explanatory variables relating to founders' work background – prior start-up experience and management experience in the software sector – are not significant determinants of venture capital use. We investigate and reject one possible explanation for this finding; that founders with prior experience bring sufficient accumulated wealth to the business that they do not need to seek outside finance.

Third, the most important determinant of venture capital backing for our sample of Irish software firms is the owner-manager's willingness to relinquish control. The 'control' variable is a measure of the extent to which founders express a preference to maintain ownership of 50 percent or more of their firm's equity. Consistent with prior findings for SMEs, this shows that NTBF owner-managers' motivations and goals play a key role in the financing decision. While venture capital finance may be the most appropriate source of finance for high technology firms, it is clear that many NTBF founders do not seek venture capital finance because they are unwilling to relinquish control.

The remainder of our paper is structured as follows. The next section presents hypotheses for the relation between our eight independent variables and venture capital funding. Section 3 discusses our survey methodology and presents summary data on the characteristics of the sample firms and on the explanatory variables. Section 4 contains a univariate analysis of each explanatory variable with respect to venture capital funding, and section 5 presents the results of our multivariate analysis. Section 6 summarises and concludes.

Hypotheses

Empirical studies of the venture capital selection process stress the importance of human capital variables in investment appraisal (Tyebjee and Bruno, 1981 and 1984; MacMillan, Siegel and SubbaNarasimha, 1985; Zackarakis and Meyer, 1998; Muzyka, Birley and Leleux, 1996; Manigart et al, 1997). Similarly, human capital variables have been found to be important determinants of the foundation, survival and growth of new ventures. Human capital variables can be divided into three main categories: educational background, prior work experience, and the size and composition of the founding team. In addition to 5 human capital variables, we include 3 additional explanatory variables drawn from the SME and high-technology firm literature: initial start-up costs, product lead time, and a measure of the extent to which founders are willing to cede control of their businesses. The NTBF literature demonstrates that product lead time and start-up costs are positively related to external financing, and the 'willingness to cede control' variable is included because there is very strong evidence from the SME literature that independence and control are the most important objectives of owner-managers.

Educational background

Academic qualifications are not seen as an important venture capital selection criterion. In contrast, education is often used as a potential explanatory variable in research on the performance and growth of small firms. In a review of 18 studies looking at the determinants of SME growth, Storey (1994) concluded that education and growth are directly related. In high-technology industries, education to degree level has a positive effect on both growth (Van der Ven and Schroeder, 1984; Roberts, 1991; Jo and Lee, 1996; Almus and Nerlinger, 1999; Wilbon, 1999) and firm performance (Van der Ven and Schroeder, 1984; Jo and Lee, 1996). This significantly positive relation, however, does not hold for education beyond degree level (Almus and Nerlinger, 1999; Roberts, 1991).

How might educational background impact on the founders' demand for funds? Poutziouris, Chittenden and Michaelas (1998) found a positive relation between education and gearing in SMEs generally. Insofar as founders with degrees are keen to see their businesses grow, it is likely that such firms will require external funding in order to support this growth. Growth firms tend to be more highly geared than non-growth firms (Chittenden, Hall and Hutchinson, 1996), and external equity is more likely to feature as a source of financing in fast-growth firms (Cosh and Hughes, 1994; Storey et al, 1989). Oakey (1984)

argued that the superior educational background of technology entrepreneurs gives them advantages over their blue-collar counterparts because they are better equipped to prepare loan applications and to negotiate with professional agencies. Some researchers have postulated that educational attainment may be an important factor in contributing to lower levels of failure reported in high technology new firms (Roberts 1991; Storey and Tether, 1998; Almus and Nerlinger, 1999), in which case firms with highly educated founders may find it easier to obtain finance. We therefore hypothesise that education to degree level will be directly related to venture capital backing, and as education beyond degree level appears to have no impact on the performance of high technology firms, education beyond degree level will be unrelated to venture capital financing.

Hypothesis 1: Human capital, as measured by education to degree level, is positively related to the firm's probability of being venture capital-backed.

Hypothesis 2: Human capital, as measured by education beyond degree level, does not impact on the firm's probability of being venture capital-backed.

Prior work experience

The prior industry experience of the lead entrepreneur is critical in the venture capital selection process. MacMillan, Siegel and SubbaNarasimha (1985) found that amongst the most important selection criteria used by venture capitalists, the lead entrepreneur's track record and knowledge of the market were ranked eighth and second respectively. Similarly, Muzyka, Birley and Leleux (1996) found the management team's industry experience, track record, sales experience and administrative capabilities among the top 10 selection criteria. These findings support the received wisdom that venture capitalists like to back 'strong teams.'

Stinchcombe (1965) argued that new organisations have high failure rates because founders can encounter problems adjusting to new roles and working relationships, and because they lack a track record. Prior start-up experience should therefore improve the firm's chance of survival. Stuart and Abetti (1990) found a strong positive relation between entrepreneurial experience and performance. Consistent with Stinchcombe's (1965) *liability of newness* argument, founders who have previously started a business should have a greater knowledge of financing issues and familiarity in dealing with potential providers of finance.

Hypothesis 3: Prior experience in starting a business is positively related to the software product firm's probability of being venture capital-backed.

Studies of the venture capital appraisal process show that venture capitalists tend to favour firms founded by people with relevant experience in the industry (MacMillan, Siegel and SubbaNarasimha, 1985; Muzyka, Birley, and Leleux, 1996). Cooper and Bruno (1977), Feeser and Willard (1990), Jo and Lee (1996) and Wilbon (1999) reported a positive relation between prior experience in a similar industrial sector and the performance of the new venture. In contrast, Van der Ven and Schroeder (1984) and Stuart and Abetti (1990) found no relation. Stinchcombe (1965) argued that it is not merely industry experience that is important in improving the chance of success of a new business, but that experience as a supervisor and coordinator of co-workers and employees is critical. We therefore hypothesise that prior management experience in the software sector will be positively related to being venture capital-backed.

Hypothesis 4: Human capital, as measured by the number of years of management experience in the software sector, is positively related to the software product firm's probability of being venture capital-backed.

Size of the founding team

The venture capital literature is unanimous in its support for venture teams. There is a strong intuitive argument for the benefits of multi-founder businesses, in that 'many hands make light work'. A few studies have examined the relation between the size of the founding team and small business

performance, but there is little consistency in these findings. Two studies reported no impact (Stuart and Abetti, 1990; Almus and Nerlinger, 1999), one reported a negative relation (Van de Ven and Schroeder, 1984), and two reported a positive relation (Cooper and Bruno, 1977; Roberts, 1991).

Because starting a business is a complex and multi-tasking process, a founding team ought to increase the new venture's chances of survival and subsequent growth (Roure and Maidique, 1986; Roure and Keeley, 1990; Eisenhardt and Schoonhoven, 1990). Insofar as firms with founding teams are more likely to grow, it might be expected that teams would have a greater propensity to seek outside financing in order to support the anticipated growth. While the 'team' variable in explanatory models has been operationalised in several different ways, we follow Cooper and Bruno (1977), Van der Ven and Schroeder (1984), Roberts (1991) and Almus and Nerlinger (1999), and used the number of founders as an independent variable.

Hypothesis 5: Human capital, as measured by size of founding team, is positively related to the firm's probability of being venture capital-backed.

Product lead time and start-up costs

NTBFs differ from the general population of start-ups in that they are characterised by an intensive period of research and development early in their life cycle. There is considerable evidence that the longer the product lead time, the more likely it is that the firm will require external funding (Oakey, 1984 and 1995; Roberts, 1991; Bank of England 2001). NTBFs in the biotechnology sector, for example, are more likely to require venture capital funding than firms in other high-tech industries because they face longer product lead times and take longer to reach break-even point than their counterparts in the electronic and software sectors (Oakey, 1995).

Hypothesis 6: The longer the lead time, the more likely it is that the firm is venture capital-backed.

As a corollary to this hypothesis, firms with longer product lead times will have higher start-up costs. Biotechnology start-ups are less likely than other NTBFs to be fully funded by their founders in the early stages. Oakey (1995) found that 76 percent of software companies were totally internally funded in their first year of operation, compared to 45 percent of biotechnology firms. We test the hypothesis that founders facing higher start-up costs will be more likely to be venture capital-backed.

Hypothesis 7: The higher the start-up costs, the more likely it is that the firm will be venture capital-backed.

The non-financial objectives of founders

One of the strongest stylised facts from the entrepreneurship literature is that independence is the primary objective of owner-managers in small firms (Boyer and Roth, 1978; Cooley and Edwards, 1983; Ang, 1991 and 1992; Mac Mahon et al, 1993; LeCornu et al, 1996). The unwillingness of owner-managers to relinquish control will predispose them to self-funding (Cosh and Hughes, 1994; Poutziouris, Chittenden and Michaelas, 1998; Berger and Udell, 1998). LeCornu et al (1996) demonstrated the significance of this motivation by testing the importance of a series of non-financial objectives to small firm owner-managers, based on their willingness to sacrifice financial return on investment. While various non-financial objectives were considered important, owner-managers were unwilling to give up financial reward to achieve these objectives, with the exception of independence and control. Owner-managers must give up a substantial equity stake in return for venture capital support – typically 50 percent (Kaplan and Stromberg, 2003). Founders in venture capital-backed firms must therefore be willing to cede control of their businesses.

Hypothesis 8: The willingness of NTBF founders to cede control of their businesses is positively related to venture capital backing.

Survey and sample characteristics

The software sector is sub-divided into 'products' and 'services'. Software products refer to packaged software that is generally produced in large volumes for mass markets,[22] while software services include consulting, implementation, support services, operations management and training. We define software product companies as those that are primarily involved in the development and commercialisation of their own products. There is no comprehensive database of independent software firms in Ireland. Our sample population was therefore compiled using a variety of information sources, including lists provided by the Irish Software Association (now the National Informatics Directorate), lists of occupants of innovation parks, lists of participants in a national technology entrepreneurship award program, and firms cited in specialist journals. At the end of 2001 there were 257 indigenous software product SMEs in Ireland.

We based our survey design on self-administered questionnaires using the tailored design method (Dillman, 1976 and 2000). The survey was administered by mail and addressed to named CEOs or managing directors. A covering letter requested that the surveys be completed by the founder, or by the lead founder if the company had been founded by a team. Respondents were given the choice of completing either a paper or web version of the questionnaire. The first follow-up contact was also by mail, and the second follow-up was by telephone. The final contact was via e-mail, and it contained a link to the web version of the questionnaire. The number of valid questionnaire returns was 117, giving an impressive response rate of just under 46 percent.[23] The number of venture capital-backed and non-venture capital-backed firms in the study is similar: 56 of the 110 firms (51 percent) for which data is available have not received venture capital backing, and 54 (49 percent) were funded by venture capitalists.[24]

The survey was successful in targeting the lead founders of indigenous software companies. Most respondents described their position as either founder and CEO (54 percent), or founder, technical director and CEO (28 percent). The remaining 18 percent held other key positions in the company. Seven percent described their roles as founder and technical director, 6 percent said they were founder and sales/marketing director and 2 percent were founder and chief operations officer. 'Other' included two founders who were chairpersons and two founders who described their role as joint CEO.

A summary of the eight independent variables used in our analysis, together with a brief description of how they have been operationalised and their predicted relation to venture capital backing, is presented in Table 1. Table 2 provides summary information on the sources of finance for current investment requirements (as at the time of the survey) for the 96 firms in the sample that provided detailed funding information. The figures for the full sample show a 50/50 divide between internal and external sources. A mere 4 percent of financing was sourced from banks, and the remaining outside finance (46 percent of the total financing requirement) was equity (39 percent) and grants (7 percent). Venture capital comprised an average of 28 percent of financing for the sample firms, with the largest representation amongst firms 2-4 years old. This figure is considerably higher than the 10 percent found by Moore (1994) for British high technology firms.

Human capital variables

Table 3 summarises the human capital characteristics of the sample respondents. Panel A relates to first degree qualifications, and Panel B presents the proportion of the lead founders with post-graduate qualifications. Panels C and D summarise the findings on prior experience; the former relating to prior start-up experience and the latter reports whether or not the lead founder had had prior management experience in the software sector. Panel E, presents the data on team size – that is, the number of founders.

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[22] This can be distinguished from 'bespoke' software, which is provided on a client-by-client basis.

[23] Response rates of 10 percent and less are commonly reported in small business mail surveys (Curran and Blackburn, 2001).

[24] Seven firms were excluded on the basis that they provided insufficient information on whether or not they had received venture capital funding.

Software firm founders in Ireland are highly educated. Eighty-five percent are educated to degree level, and close to half (48 percent) have post-graduate qualifications. These proportions are slightly higher but comparable to those reported by Westhead and Storey (1994), who found that 78 percent of high technology entrepreneurs had a primary degree and 44 percent had a higher degree. As well as being highly educated, the sample firm founders have considerable experience. Almost half (44 percent) are 'serial founders' (Panel C). This is higher than the comparable finding by Westhead and Storey (1994) that 31 percent of founders in high technology manufacturing and services had previously been involved in starting a business. Panel D shows that the majority of founders – 61 percent – have at least 3 years prior management, of which two-fifths have more than 5 years software management experience. One-quarter of the sample have no previous management experience.

Panel E shows that a rather high three-quarters of sample firms were founded by teams. This is consistent with prior research showing that NTBFs are more likely to be started with teams rather than single founders (Cooper 1971, and Roberts, 1991). A popular way of starting a business is with a pair of founders (one-third), but the sample is dominated by teams of 3 or more (more than 40 percent).

Other variables

Table 4 reports the summary findings on product lead time (panel A), which is the time it took the firm to produce its first product beta, start-up costs (panel B) and the responses for the survey question relating to control (panel C). Panel A shows that the software products produced by the sample firms have relatively short lead times. In 5 percent of cases, a fully developed product beta was available at start-up, and over half had a product beta available by the end of their first year in business. Ninety percent had their first product beta ready by the third year after formation. Panel B of Table 4 shows that almost half had very low start-up costs of less than €63,500. However, while most businesses – almost 60 percent – began with less than €63,500, 10 percent had large initial capital injections of over €1.27 million.

Panel C reports the responses to the statement "Prefer to retain a majority stakeholding (50% or more) in the business for founder(s)." Founders were asked to respond on a scale from 1 to 5, where 1 is 'not at all' and 5 is 'to a large extent,' implying that the higher the response number, the more control-oriented is the founder, and the less willing he or she is to relinquish control of the business. Unlike entrepreneurs in general, many of the sample software founders were not concerned about retaining control. In fact, the sample is split very close to 50/50 between those who were very concerned about retaining control (points 4 and 5, totalling 32.2 percent) and those who were clearly willing to relinquish control (points 1 and 2, totalling 29.6 percent).

Univariate analysis

Education

Figure 1 shows that lead founders with venture capital backing are more likely to be educated to degree level than founders without first degrees. Only 3 out of 54 firms with venture capital backing have founders who are not educated to degree level, compared with 15 out of 56 founders in firms without venture capital backing. This difference is significant at the 1 percent level ($p = 0.00$) using a z-test for difference in proportions, providing support for hypothesis 1. Figure 2 is the equivalent graph for post-graduate qualifications. Consistent with hypothesis 2, there does not appear to be a significant difference between the venture capital-backed and non-venture capital-backed founders in their post-graduate qualifications. Thirty-one out of 54 venture capital-backed (57 percent) founders and 34 out of 56 (61 percent) non venture capital-backed founders have post-graduate qualifications. A z-test for difference in proportions confirms no significant difference ($p = 0.72$).

Previous experience in start-ups

Figure 3 depicts the relation between the respondents' previous experience in starting a business and venture capital backing. Perhaps surprisingly, and contrary to hypothesis 3, venture capital backing

appears to be more likely when the founder has not previously been involved in a start-up. Twenty-seven out of 56 (48 percent) non venture capital-backed firm founders had previously been involved in a start-up, whereas only 21 out of 54 (39 percent) venture capital-backed founders had started a business in the past. This difference, however, is not significant using a z-test for difference in proportions ($p = 0.32$).

Prior management experience in the software industry

Figure 4 depicts our findings on prior management experience in the software sector, separated into venture capital and non venture capital-backed. Contrary to hypothesis 4, the figure shows that in each 'years of experience' category there is very little difference between the proportion that is venture capital-backed and non-venture capital-backed. In contrast to the evidence from the venture capital industry – for whom management experience is a crucial variable in the appraisal process – it would appear that this variable has little impact on the founder's decision to use venture capital funding.

Size of the founding team

Similarly to the prior experience variable, there appears to be a difference in team size between firms that are venture capital-backed and those that are not. Figure 5 depicts the relation between team size and venture capital funding. Eleven out of 26 (42 percent) single founder firms, and 43 out of 84 (51 percent) firms founded by teams of 2 or more, were venture capital-backed. The difference in proportions venture capital-backed is not significant ($p = 0.43$). This finding is inconsistent with hypothesis 5, which suggests a positive relation between venture capital backing and team size.

Product lead-time

Figure 6 depicts the sample firms by lead time. Contrary to the prediction of hypothesis 6, there appears to be little difference in lead times for venture capital-backed versus non-venture capital-backed firms. This is confirmed by a two-tailed Wilcoxon test, which found that there is no significant difference between the median lead times of the two groups ($p = .23$).

Start-up costs

Although venture capital-backed firms do not have longer product lead times than non-venture capital-backed firms, consistent with hypothesis 7, they do appear to have higher start-up costs. The median non-venture capital-backed firm had start-up costs in the lowest range of less than €63,500, while the median venture capital-backed firm is in the range €127,000 to €317,000. Figure 7 shows that the difference in start-up costs between venture capital-backed and non-venture capital-backed firms is most dramatic in the smallest cost category (<€63,500), and in the largest (>€1,270,000). Of the 49 firms in the lowest start-up cost category, 63 percent were not venture capital-backed; and of the 10 firms with start-up costs greater than €1,270,000, only 2 were not venture capital-backed. The difference in median start-up costs between venture capital and non venture capital-backed firms is significant at the 1 percent level using a two-tailed Wilcoxon test ($p = .01$).

Control

Hypothesis 8 predicts that founders' willingness to cede control is positively related to venture capital funding. The variable *control* measures the extent to which the founders expressed a preference to maintain ownership of 50 percent or more of the shares of their companies. This variable is measured using a relational scale, where 1 denotes that the respondent is 'not at all' in agreement with the statement and 5 denotes that the respondent is in agreement 'to a large extent', so that higher values for the response to this question imply less willingness to relinquish control. Figure 8 depicts the response for the variable *control*, separated into venture capital-backed and non-venture capital-backed firms. Consistent with hypothesis 8, the figure shows a very strong relation between the founders' willingness to relinquish control and venture capital backing. The mean (median) response to this question for the non-venture capital-backed firms is 3.4 (3.5), and the equivalent statistics for the venture capital-backed firms is 2.7 (3.0). This difference is significant using a one-tailed Wilcoxon test ($p = 0.00$).

Multivariate analysis

In our univariate analysis, we find that only 3 of the 8 variables – education to degree level, start-up costs and willingness to relinquish control – are significantly related to venture capital backing. In addition to providing a more complete investigation of the relative strengths of the extent to which the independent variables influence the likelihood of venture capital use, our multivariate analysis also acts as a robustness check on the univariate findings.

The dependent variable in the multivariate analysis is binary, with zero denoting non venture capital-backed and one denoting venture capital-backed firms. We use the logistic regression (logit model) approach, because the independent variables (see Table 1) comprise a mix of continuous and categorical variables. Usefully, the logit model makes no assumptions about the distribution of the independent variables.[25]

The standard logistic regression model takes the following form:

$$p = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k)}} \qquad [1]$$

or alternatively, in semi-log format it is conveniently written as

$$\ln \frac{p}{1-p} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k \qquad [2]$$

Here, p is the probability of observing a 'success' given a particular value for each independent variable, $X_i \ldots X_k$ denote the independent variables, and the βs are the coefficients to be estimated.

The model we estimate is as follows:

$$\ln \frac{p}{1-p} = constant + \beta_1 degree + \beta_2 posgrad + \beta_3 startup + \beta_4 team + \beta_5 experience + \beta_6 leadtime + \beta_7 costs + \beta_8 control + e \qquad [3]$$

where p is the probability of observing a venture capital-backed firm.

Using the logit model, a positive coefficient indicates that an increase in the value of the particular independent variable is associated with a higher probability of the event occurring. Thus a variable that displays a positive coefficient implies a direct relation between its value and the likelihood of venture capital funding, and a negative coefficient implies an inverse relation. In estimating our logit models, we maximise the log likelihood function using the Newton-Raphson iterative procedure, together with robust standard errors to allow for any non-spherical disturbances. We begin with the most general specification, including all the independent variables in equation [3]. We then sequentially restrict the model by eliminating the variable of least significance, and re-estimating until we arrive at our parsimonious model. In all iterations convergence was achieved rapidly, occurring after 5 iterations.

The results are presented in Table 5. The first equation includes all 8 independent variables: *degree*, *postgrad*, *startup*, *experience*, *team*, *leadtime*, *costs*, and *control*. Looking at the unrestricted model (Model 1), one explanatory variable is significant at the 1 percent level (*control*), and two are significant at the 6 percent level (*degree* and *costs*). All three have the expected sign. The rest of the variables – *postgrad*, *startup*, *experience*, *team* and *leadtime* are clearly not significant. These findings are completely consistent with those for the univariate analysis.

As can be seen in the results for models 1 to 6, the signs and magnitudes of the coefficients remain robust in the face of this re-specification. Our final parsimonious model is model 6, and it is clear that the same

[25] The best-known alternative for modelling binary variables is discriminant analysis, but this is inappropriate because it assumes that the independent variables are multivariate normally distributed (Sharma, 1996).

variables that are significant in Model 1 remain significant in Model 6, in which venture capital use is explained by *costs*, *degree* and *control.* These variables have retained their relative coefficient magnitudes and relative significance throughout the sequential restricting of our general model, giving us considerable faith in the robustness of our final result. The variable *control* remained significant at the 1 percent level throughout, but *degree* went from being significant only at the 10 percent level in model 1 to being significant at the 1 percent level in model 6. The variable *costs* remained significant at the 10 percent level, with a p-value of between 0.06 and 0.07.

Human capital variables

Consistent with the results from the univariate analysis, the variable *degree* is the only significant human capital variable the model, and it has the predicted positive sign. The founder having a primary degree is positively related to the firm being venture capital-backed. This finding is consistent with Poutziouris, Chittenden and Michaelas (1998), who found a positive relation between education and gearing in small private and public limited companies.

The education variable *postgrad* was not found to be significant, and was dropped out of the estimation after Model 3. This insignificance supports hypothesis 2, and is consistent with prior research on the relation between a higher degree qualification and NTBF performance (Roberts, 1991, and Almus and Nerlinger, 1999). In the software industry, it is probably true to say that a first degree gives the programmer or engineer a sufficient start in knowledge and confidence for success in business, and more advanced formal education yields little marginal benefit.

Consistent with the findings from the univariate analysis, the three other human capital variables – start-up experience, prior management experience and team size – are not significant. Hypotheses 3, 4 and 5 cannot, therefore, be accepted.

Prior start-up experience

The argument behind hypothesis 3 is that businesses started by founders with previous start-up experience are less likely to fail, and will therefore have greater success in attracting venture capital. In addition, founders with previous experience in running their own business would have experience in business financing and negotiating with potential financiers. The insignificant finding for *startup* is perhaps not surprising given that prior research using this variable provides mixed evidence. Stuart and Abetti (1990) found that prior experience as an owner-manager was the most important determinant of performance in NTBFs, but Jo and Lee (1996) found a negative relation between these two variables. Storey (1994) found no significant relation between experience as an owner and the use of bank finance at start-up.

One possible explanation for the insignificant finding for *startup* is that founders previously involved in start-ups have considerable wealth to bring to the new business, earned perhaps from accumulated retained earnings or from the proceeds of a trade sale. If the 'serial starter' founder brings more wealth to the new venture, this would, *ceteris paribus*, reduce the need for external funding. To examine this possibility, we test whether 'serial starter' firms had greater initial start-up costs than firms with founders who had no start-up experience. The median start-up cost for both was in the band €63,500 to €127,000, and a paired Wilcoxon test confirms that this difference is not significant ($p = 0.73$).

In conducting this test, we are assuming that the total funding requirement at start-up was provided purely by the personal resources of the founders. Our capital structure data, however, comprise information on current funding requirements, rather than financing at start-up. We do, however, have information for 89 sample firms on when they received their first external finance. As might be expected, few sample firms started with significant external sources of finance. Only 11 (12 percent) claimed to have external financing at start up. The start-up cost data, therefore, is reasonably representative of the quantity of savings brought into the firms by founders.

Prior management experience in the software sector

Our findings for the management experience variable run contrary to the received wisdom of the venture capital industry, which promotes the importance of experienced management teams. It is also inconsistent with the evidence on venture capital selection criteria, in which the lead entrepreneur's industry experience is consistently found to be very important (MacMillan, Siegel and SubbaNarasimha, 1985, Muzyka, Birley and Leleux, 1996). As for the findings regarding prior start-up experience, this suggests that the factors considered important pre-requisites for venture capital support are not the same as those affecting the founder's demand for venture capital.

This finding of no significant explanatory power for the variable *experience* may be explained in the same way as for the variable *startup*, because it is possible that these two variables are related. A z-test for difference in proportions confirms that they are. A higher proportion of the firms whose founders had prior start-up experience also had management experience (18/52 or 35 percent), than firms whose founders had management experience but not start-up experience (10/65 or 15 percent). These proportions are significantly different at the 1 percent level ($p = 0.01$).

Size of the founding team

The variable *team* is negatively signed, indicating (contrary to hypothesis 5) that as team size increases, there is less likelihood that the firm is venture capital-backed. It is, however, not significant in any of the 4 iterations in which it appears. The most likely explanation for this finding is that teams of founders have greater combined financial resources, and are less likely to need external finance. Roberts (1991) reports that teams start with significantly more initial capital than single-founder firms. Dividing the sample into small (less than €63,500 initial capital) and large firms (greater than €63,500 initial capital), we can conclude that team size is positively related to initial capital. The median team size for firms starting with less than €63,500 is 2, and for those with more than €63,500, median team size is 3. This difference is significant at the 1 percent level ($p = 0.01$) using a Wilcoxon test. However, while teams appear to bring more money into the business, this does not imply that firms with greater start-up capital are less likely to be venture capital-backed – the *cost* variable being positively rather than negatively signed, and significant at the 10 percent level in all the multivariate models.

Lead time and start-up costs

The assumption behind hypothesis 6 is that firms with longer product lead times require a greater investment in research and development, and consequently need greater initial capital and therefore outside financing in the form of venture capital. Figure 9 plots mean and median product lead times against the start-up cost categories. The figure clearly shows very little variability in lead time across the start-up cost categories. The mean (median) product lead time for small firms with start-up costs of less than €63,500 of 21.5 (13.5) months is slightly higher than that for larger firms (start-up costs greater than €63,500) of 18.4 (10) months lead time. A paired Wilcoxon test confirms that this difference is not significant ($p = .28$).

The evidence from the NTBF literature is that the longer the product lead time, the more likely it is that the firm will require external funding (Oakey, 1984 and 1995; Roberts, 1991; Bank of England, 2001). Oakey (1984) found that biotechnology firms are more likely to have venture capital funding because they face longer product lead times and take longer to reach break-even point than their counterparts in the electronic and software sectors. Our results indicate that this finding does not hold in the software product sector. Perhaps we can conclude that the positive relation between lead time and external finance holds across rather than within NTBF sectors.

The significance of the cost variable provides support for hypothesis 7 – that firms with higher start-up costs are more likely to be financed by venture capital. Clearly this finding is not due to longer product lead times requiring greater initial capital injections. Rather, it can probably be explained by the fact that the venture capital industry tends to avoid very small new firms. Gompers (1995), for example, found

that between 1961 and 1992 the mean venture capital investment was $2.2 million. Gompers and Lerner (2003) argue that venture capital investments tend to be relatively large, because the venture capitalist is under pressure to raise large fund pools:

Because each firm in his portfolio must be closely scrutinized, the typical venture capitalist is typically responsible for no more than a dozen investments. Venture organizations are consequently unwilling to invest in very young firms that only require small capital infusions (Gompers and Lerner, 2003: 291).

This is confirmed for our sample of indigenous Irish software firms using a z-test for difference in proportion of firms using venture capital, separated into small firms (less than €63,500 initial capital) and large firms (greater than €63,500 initial capital). The proportion of large firms using venture capital – 36/61 or 59 percent – is significantly greater than the proportion of small venture capital recipients (18/48 or 38 percent), with a p-value of 0.03.

Control

The variable *control* is highly significant in all models (p = 0.00), confirming hypothesis 8. Founders who are willing to cede control are clearly more likely to use venture capital funding. In order to obtain outside equity, owner-managers must cede some control and considerable freedom in decision-making. In the SME literature, independence is usually cited as the main motive for starting a business, and it is well established that the owner-manager's desire to remain independent affects the decision-making process (Boyer and Roth, 1978; Cooley and Edwards, 1983; Ang, 1991 and 1992; Mac Mahon et al, 1992; LeCornu et al, 1996).

In summary, the multivariate analysis confirms our univariate findings. The only human capital variable that has a significant effect on venture capital use is whether or not the lead founder is degree qualified, and the strongest effect comes from the variable *control.*

Summary and conclusions

Using survey data for 110 Irish indigenous software product firms, of which 54 are venture capital-backed and 56 of which are not, we examine the extent to which 8 firm-specific factors affect the use of venture capital finance. The only human capital variable that has a significant effect on venture capital use is whether or not the lead founder is degree qualified. This finding is at variance with the venture capital literature, which demonstrates that venture capitalists tend to downplay formal qualifications, and emphasise 'track record' variables such as the strength of the team and prior experience in the industry. Education may not be considered important by venture capitalists, but it appears to be an important demand-side determinant of venture capital backing. There are several potential explanations for this finding. Owner-managers educated to degree level are more likely to grow their businesses, and to support this growth there would be a greater need for external funding (Cosh and Hughes, 1994). Alternatively, well-educated founders are better equipped to negotiate with potential providers of finance (Oakey, 1984), and degree qualified founders may be better able to understand the tradeoffs involved in accepting venture capital finance.

Our other human capital variables – prior start-up experience, management experience in the software sector, and size of the founding team – are not significant determinants of venture capital backing. This is a rather curious result because it appears to be contrary to the findings in the venture capital appraisal literature. While venture capitalists claim to favour firms with strong, experienced teams, it would appear that many experienced teams eschew venture capitalists. Our findings question whether venture capitalists actually follow their own advice in appraising management teams, or whether they rely on more subjective approaches to appraisal – like 'gut instinct.'

We find a significantly positive relation between start-up costs and venture capital backing. But longer product lead times do not imply that venture capital use is more likely, suggesting that product lead time is not the main driver of start-up costs in software product companies. This is contrary to the evidence

from the NTBF literature that the longer the product lead time, the greater the initial capital required, and the more likely it is that the firm will require external funding. However, prior studies compared lead times across industries, whereas we look at the issue within the software sector. Our findings that lead time is very short, and that external financing is at it maximum for 2 to 4 year-old firms – when it comprises 68 percent of total funding – suggest that the greatest demand for finance in software product firms is during the commercialisation phase.

The most significant explanatory variable in our modelling is the willingness of the founders to relinquish control of their businesses. Consistent with one of the best-understood stylised facts from the entrepreneurship literature, a substantial proportion of Irish indigenous software firm founders view independence and control as critical motivators. If independence is the most important factor behind NTBF financing decisions, perhaps we can conclude that founders bring in venture capital partners reluctantly, or at least after very carefully weighing up the costs and benefits of venture capital finance. Our findings also suggest that founders may initiate ventures with others in order to reduce the requirement for external funding. We find that the bigger firms – those with start-up capital of more than €63,500 – had been started with significantly larger teams than the start-ups with less than €63,500. Not only does starting a business with a team increase access to 'internal' resources at start-up. Because software development is a labour-intensive rather than a capital-intensive activity, it can be undertaken by the founding team, allowing the reduction or postponement of labour expense. Software firm founders may thus have considerably more financial flexibility than their counterparts in other NTBF sectors.

It is clear that the factors affecting the demand for venture capital financing differ from those affecting the supply. Venture capitalists minimise the risk of their portfolio of investments by choosing firms that they perceive are likely to prosper and grow. This manifests as client firms with teams of founders who have strong experience in the industry and in starting small businesses. However, it is clear from our findings that many NTBFs that may well meet venture capitalists' requirements do not make themselves available for venture capital funding. The implication for investors in venture capital funds is that they do not have access to the full population of young, high technology firms.

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Tables, charts and graphs

Table 1 - Variable definitions

		Expected sign if VC-backed
Panel A: Human capital variables		
Degree	Whether or not the founder had a bachelors degree; yes = 1, no = 0.	+
Startup	Whether or not the founder was previously involved in starting a business; yes = 1, no = 0.	+
Team	Number of founders.	+
Experience	Number of years of management experience the founder had in the software sector prior to start-up: mid points derived from management experience ranges.	+
Panel B: Other variables		
Leadtime	Time to production of first beta in months.	+
Costs	The start-up costs: mid points derived from start-up cost ranges.	+
Control	The extent to which founders expressed a preference to maintain 50 percent or more of the shares of the business in the hands of the founders; 1 = not all; 5 = to a large extent.	–

Table 2 - Sources of finance for current investment requirements

Stage	Internal sources (%)			External sources			
	savings	other internal	total internal	bank loans	venture capital	other external	total external
Start-up (<2 years)	43.0	29.5	72.5	0.0	13.0	14.5	27.5
Commercialisation (2-4 years)	10.0	22.0	32.0	3.0	38.0	27.0	68.0
Growth (5-10 years)	9.5	46.0	55.5	6.5	28.0	10.0	44.5
Mature (>10 years)	10.0	66.0	76.0	5.0	11.0	8.0	24.0
Full sample	14.0	36.0	50.0	4.0	28.0	18.0	50.0

Table 3 - Human capital variables

Panel A: degree qualifications	count	%
Yes	99	84.6
No	18	15.4
Total	117	100.0
Panel B: post-graduate degree qualifications		
Yes	48	48.5
No	51	51.5
Total	99	100.0
Panel C: Start-up experience		
Yes	52	44.4
No	65	56.4
Total	117	100.0
Panel D: management experience in the software sector		
No experience	28	24.0
0 – 1 years	7	6.0
1 – 2 years	11	9.0
3 – 4 years	24	21.0
6 – 10 years	20	17.0
10 + years	27	23.0
Total	117	100.0
Panel E: Number of founders		
Sole founder	28	24.0
Two	40	34.0
Three	32	27.5
Four or more	17	14.5
Total	117	100.0

Table 4 - Other variables

	count	%
Panel A: Product lead-time (n = 109)		
zero	5	4.6
1-6 months	30	27.5
7-12 months	23	21.1
1-2 years	25	22.9
2-3 years	15	13.8
3-5 years	5	4.6
> 5 years	6	5.5
Panel B: Start-up costs (n = 115)		
< €63,500	53	46.1
€63,500 - €127,000	15	13.0
€127,000 - €317,500	16	13.9
€317,500 - €635,000	11	9.6
€635,000 - €1,270,000	9	7.8
> €1,270,000	11	9.6
Panel C: Control (n = 115)		
not at all	11	9.6
2	23	20.0
3	44	38.3
4	21	18.3
to a large extent	16	13.9

Notes. Start-up cost figures were requested in Irish punts because the questionnaire was sent out just after the full introduction of the Euro in early 2002. They have been converted into euro (Panel B) at the €/£ exchange rate of 1.27. Panel C reports the response to the statement "(prefer to) retain a majority stakeholding (50% or more) in the business for the founders," separated into venture capital-backed and non-venture capital-backed firms. Survey participants were asked to respond on a scale from 1 to 5, where 1 is 'not at all' and 5 is 'to a large extent,' implying that the higher the response number, the less willing is the respondent to relinquish control of the business.

Figure 1 - Degree qualifications

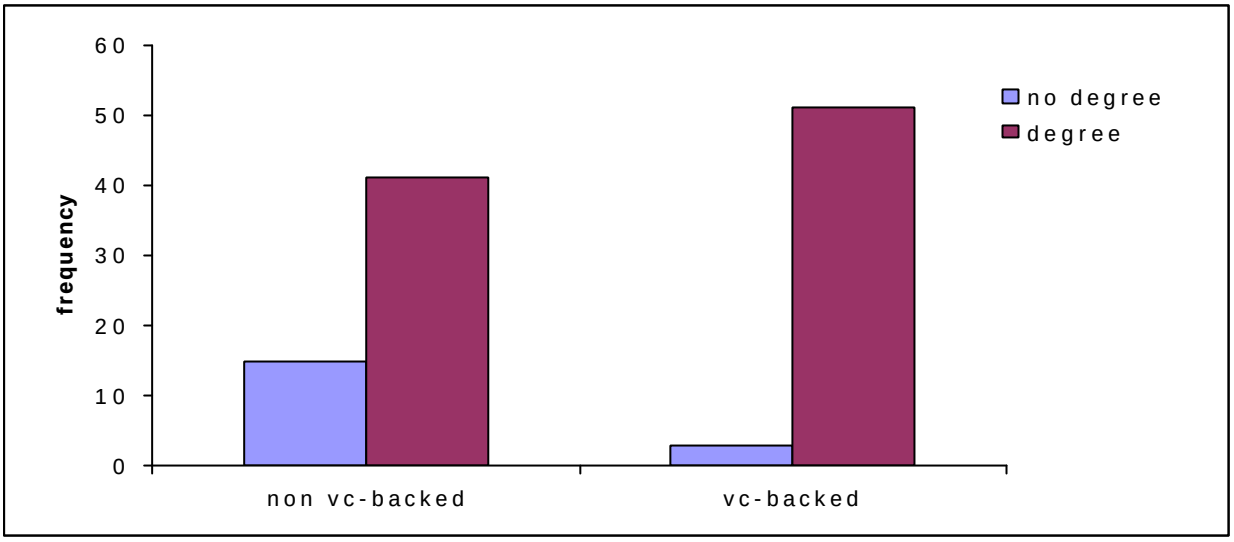


Figure 2 - Post-graduate qualifications

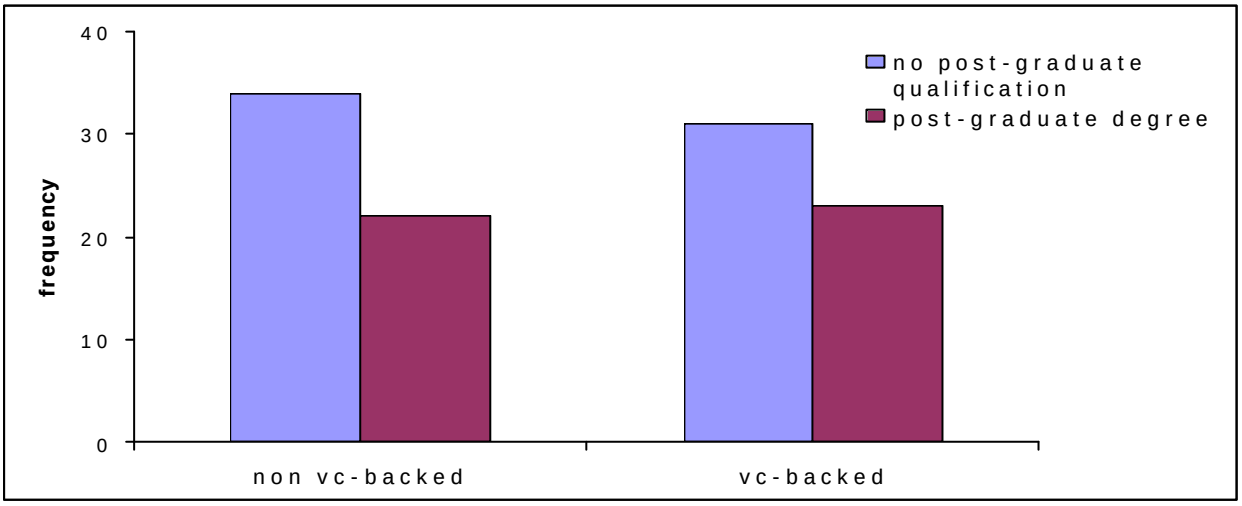


Figure 3 - Experience in prior start-ups

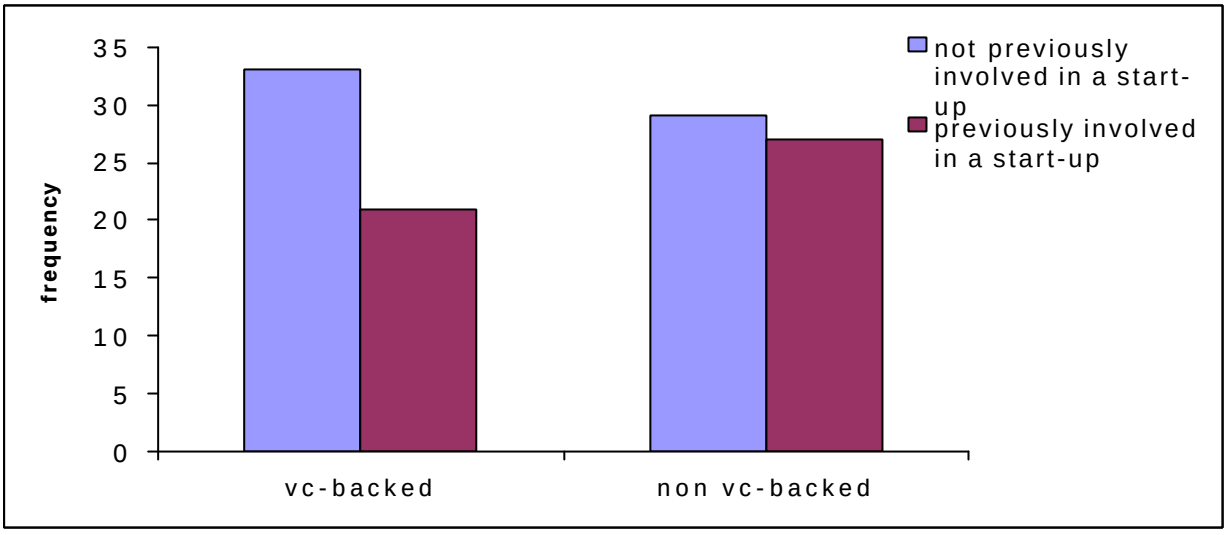


Figure 4 - Prior management experience in the software industry

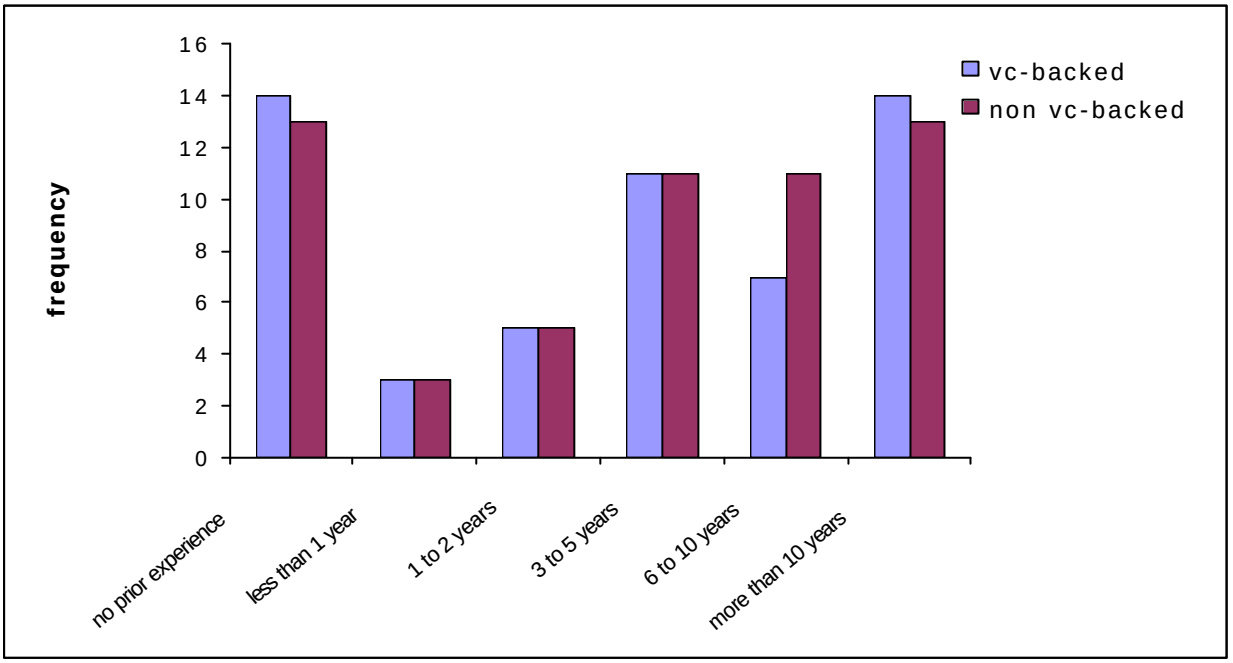


Figure 5 - Size of the founding team

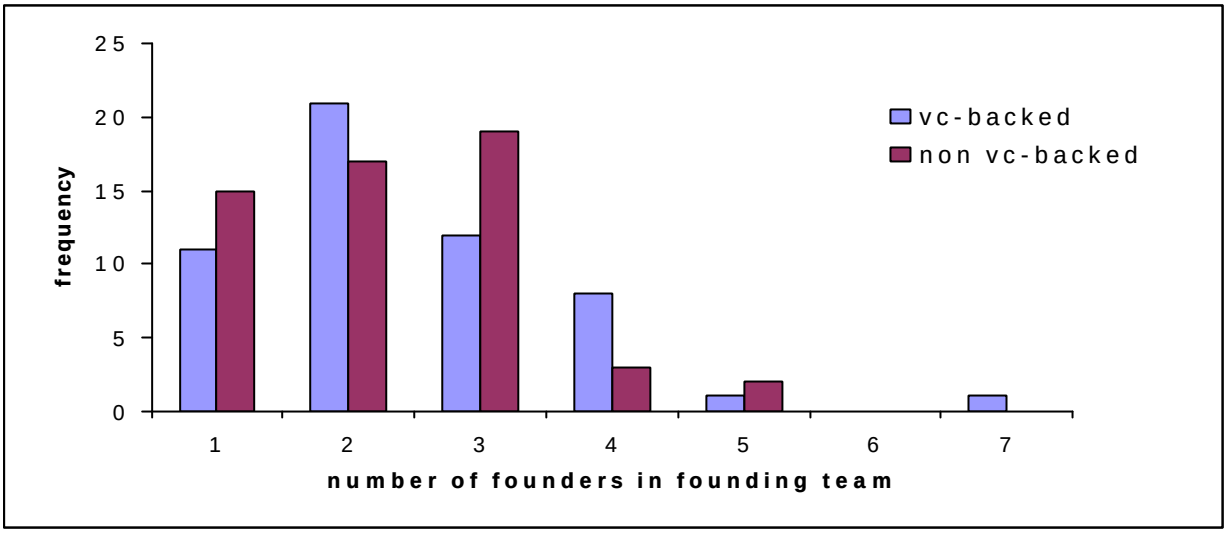


Figure 6 - Product lead time

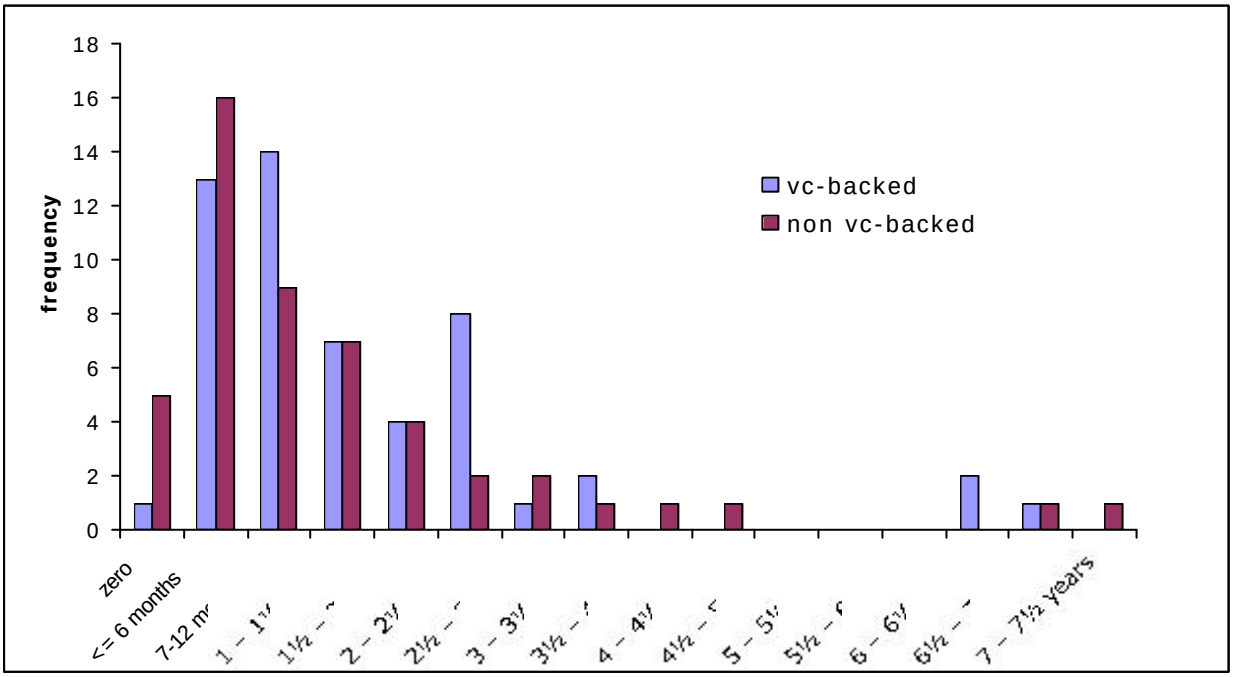


Figure 7 - Start-up costs

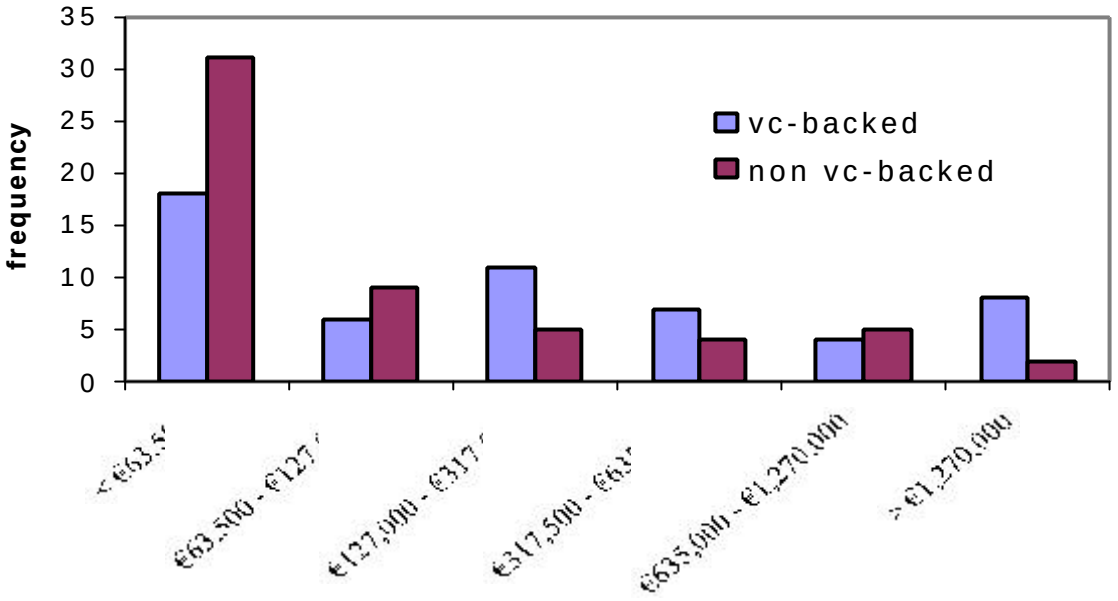
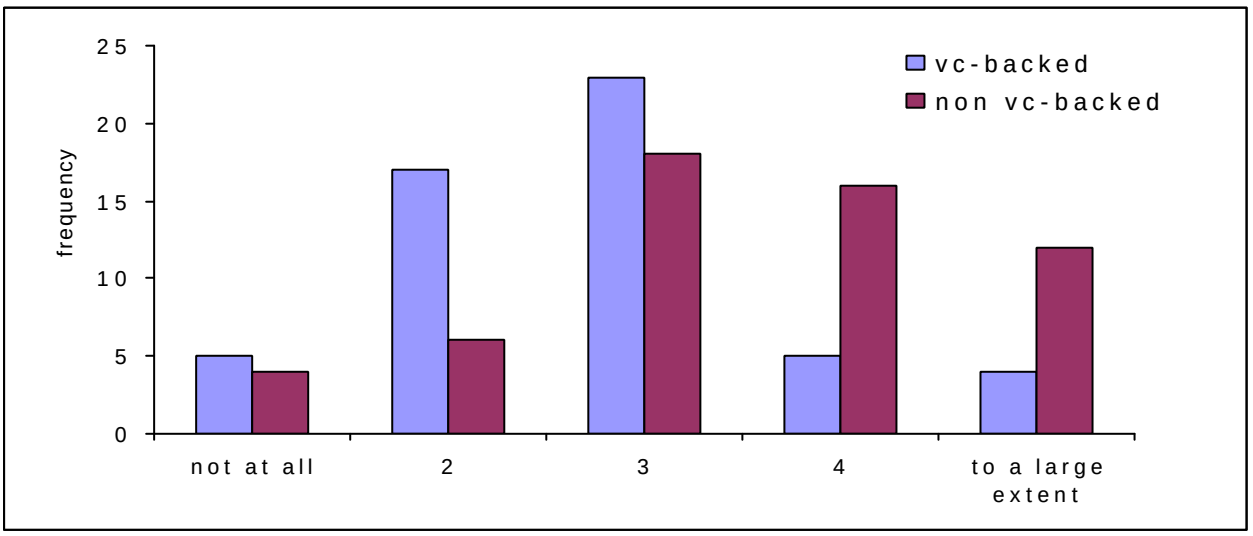


Figure 8 - Willingness of founders to cede control



Notes. This figure reports the response to the statement "(prefer to) retain a majority stakeholding (50% or more) in the business for the founders," separated into venture capital-backed and non-venture capital-backed firms. Survey participants were asked to respond on a scale from 1 to 5, where 1 is 'not at all' and 5 is 'to a large extent,' implying that the higher the response number, the less willing is the respondent to relinquish control of the business.

Figure 9 - Product lead times versus start-up costs

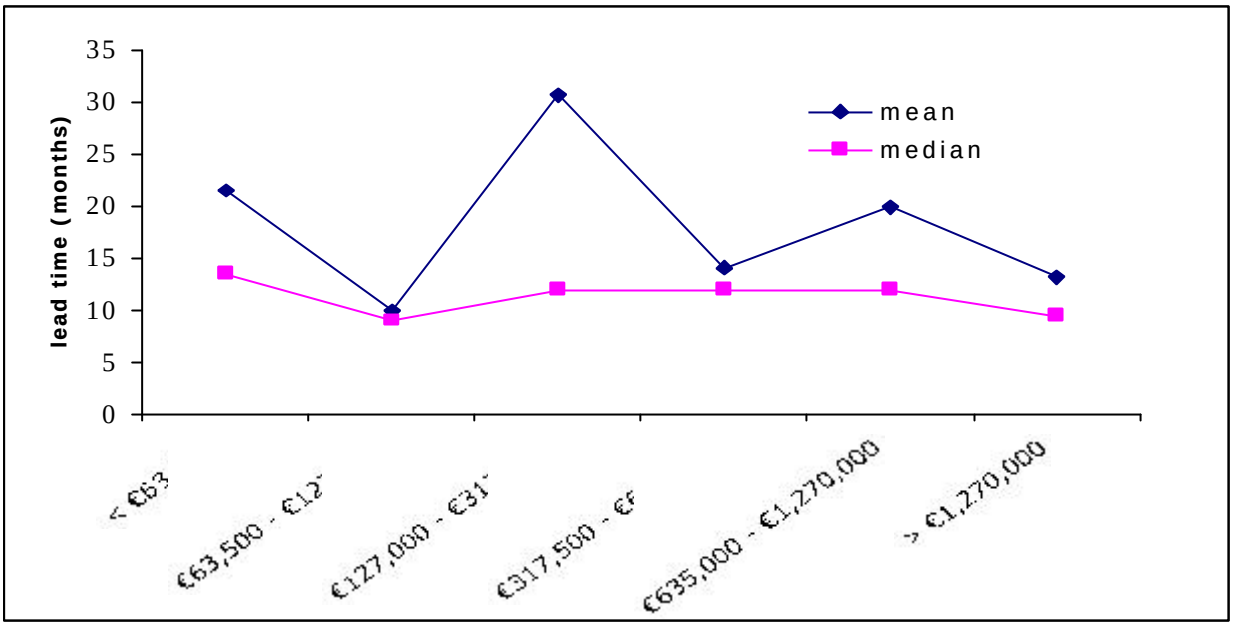


Table 5 - Results for the logit modelling

	Coefficients for independent variables								
	Startup $?_3$	Experience $?_5$	Postgrad $?_2$	Team $?_4$	Leadtime $?_6$	Degree $?_1$	Costs $?_7$	Control $?_8$	Pseudo-R^2
Model 1	0.167 (0.77)	0.031 (0.61)	-0.261 (0.61)	-0.183 (0.36)	0.024 (0.26)	2.484 (0.06)	0.000 (0.06)	-0.819 (0.00)	0.21
Model 2		0.026 (0.65)	-0.259 (0.61)	-0.186 (0.36)	0.022 (0.23)	2.567 (0.05)	0.000 (0.06)	-0.806 (0.00)	0.21
Model 3			-0.297 (0.55)	-0.175 (0.39)	0.021 (0.27)	2.718 (0.03)	0.000 (0.06)	-0.814 (0.00)	0.20
Model 4				-0.173 (0.41)	0.018 (0.30)	2.611 (0.03)	0.000 (0.06)	-0.817 (0.00)	0.20
Model 5					0.017 (0.36)	2.093 (0.03)	0.000 (0.07)	-0.776 (0.00)	0.19
Model 6						2.307 (0.01)	0.000 (0.07)	-0.747 (0.00)	0.18

Notes. This table reports the coefficients for the 8 independent variables in estimating the logit model in equation [3]:

In brackets under the coefficients are the p-values for each variable. The model in equation [3] was first estimated in full (Model 1). It was then re-estimated using the general-to-specific modelling strategy, whereby the least significant variable is sequentially removed, leading to the parsimonious model (Model 6).

Cross-Border Venture Capital and New Venture Internationalization: An Isomorphism Perspective

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Abstract

Many of the fastest-growing global ventures are backed by cross-border venture capitalists. However, the role of foreign investors in internationalization has not been examined in prior research. To address this gap, we carried out a multiple-case study to produce a grounded theory of the effects of foreign investors in new venture internationalization. Our findings suggest that foreign venture capitalists located in a venture's target market of internationalization can be valuable for the venture by legitimizing the unknown new venture in that market. However, foreign investors tend to drive portfolio companies towards their home markets, and the benefits may turn into disadvantages if the target market differs from the home markets of the foreign investors.

Introduction

Many of the fastest-growing born global ventures in small open economies such as Finland, Sweden and Israel have attracted cross-border venture capitalists to support their internationalization. Foreign venture capital investors have been suggested to provide valuable internationalization support for their portfolio companies. Practitioners have also acknowledged, however, that these potential benefits do not always materialize. Despite venture capitalists' increasing practical importance to rapidly internationalizing new ventures, little scholarly attention has been paid to the role of foreign venture capitalists in supporting the internationalization process of their portfolio companies. To address this gap, this paper explores the roles that *cross-border venture capitalists* play in internationalizing new ventures that have their primary markets in a foreign country. In this paper we define cross-border venture capitalists as venture capital investors that are foreign to the new venture. More specifically, we study venture capitalists that manage their investment from a country other than the one in which the venture started its operations.

Our research question is, 'What roles do cross-border venture capitalists play regarding the internationalization of new ventures that have their primary markets in a foreign country'? The benefits that cross-border venture capitalists can bring regarding the internationalization of new ventures have not received attention in prior venture capital literature (cf. Gorman and Sahlman 1989, MacMillan et al. 1989, Rosenstein et al. 1993, Sapienza 1992, Sapienza et al. 1996).

In our study we adopt a focus on ventures with primary markets in foreign locations because we feel that the phenomenon there may be significantly different from that faced by other companies. Internationalization support may be notably less crucial for companies with large domestic markets. Moreover, while the countries with the most notable venture capital markets also have large markets for technology firms' products and services (e.g. the United States and the United Kingdom), companies starting from these countries may have venture capitalists in close vicinity that have a strong global presence and network, and thus, the effects of cross-border venture capitalists on internationalization may remain different and less significant.

We have divided the investigated effects of venture capitalists into advantages and disadvantages, and we examine circumstances under which they are likely to occur. The paper investigates syndicates in which there is at least one investor managing its investments from a country that is foreign to the investee firm. For the purposes of the present study, only these investments are labelled as 'international'. For clarity, the term 'cross-border investments' is used in order to emphasize the geographical separation of the firms. In accordance with the above definition of a cross-border venture capitalist, investments managed from the domestic country by multinational investors are not considered cross-border investments. The study has been carefully focused to allow important mechanisms of interaction to be revealed in venture capital syndication.

Constructs and interconnections that are relevant for this phenomenon have not been explored to date, and existing literature does not seem to provide an adequate framework for answering the research question. In this kind of situation, the grounded theory approach is more likely to yield accurate and novel insights than reliance on past research or theoretical studies without data (Glaser and Strauss 1967). Following the procedures suggested by Eisenhardt (1989), Strauss and Corbin (1998), and Yin (1994), grounded theory

building is selected as the methodological approach. Accordingly, insights are derived from extensive processing of case-based field data. An in-depth view of the factors involved finally resulted in a model with three explicit propositions. The data originate from investor-investee relationships around nine case ventures in Finland. These data are collected primarily by means of interviews of entrepreneurs and venture capitalists and secondarily from the firms' web pages, press releases, www news services, newspapers, and other documents.

The main finding of the paper is that the existence of cross-border investors is likely to lead to an *isomorphic* transformation process (DiMaggio and Powell 1983), where the portfolio company is lead to occupy an institutionalized position in the cross-border investor's geographical area of operation. Within the context of the paper, it appears that the effect of investors is typically *coercive isomorphism.* Coercive isomorphism occurs when a choice made by one organization results from more or less explicit pressures exerted by another organization from which its resources depend (DiMaggio and Powell 1983). We find that when the cross-border venture capitalists are located in the internationalization target markets (cf. Johanson and Vahlne 1990, Kwok and Reeb 2000) of their portfolio companies, these investors are beneficial to the investee firm, since they will then drive ventures to conform to a market that is among those target markets. In this case, the cross-border investors' presence and actions will decrease the investee firms' liabilities of foreignness.

By location, we refer to the place from where the focal investment is managed. Liabilities of foreignness (cf. Zaheer 1995, Zaheer and Mosakowski 1997, Lu and Beamish, 2001, Mezias 2002) refer to a variety of costs that international business scholars have long hypothesized multinational companies face in conducting business abroad (Hymer 1976 [1960]). These include costs that can stem from unfamiliarity of the environment, and from political, cultural, and economic differences (Zaheer 1995).

Our findings suggest that venture capitalists can and do help ventures in several ways. The most notable forms are help in recruiting, bringing customers, opening doors to business partners, knowledge of the legal environment, and providing contacts to financiers. Much of these effects are about providing 'foreign organizing knowledge' (Johanson and Vahlne 1990). In terms of venture capitalists' effects, our results support the account of McDougall et al. (1994) that direct personal contacts of a venture's key individuals in foreign markets can be used to identify new opportunities, obtain business advice, obtain assistance in negotiations, and open doors in foreign markets. Backing this, Yli-Renko et al. (2002) showed that a venture can achieve benefits for its international growth by fostering social capital within its relationships. (Social capital, in essence, refers to resources created by contacts between people, companies, or other actors (Nahapiet and Ghoshal 1998). As noted below, the important role of knowledge is already an established ingredient in dominant theories on the internationalization of businesses. This study illuminates ways through which internationalizing ventures may acquire knowledge from venture capitalists. At the least, cross-border investors bring endorsement by their presence, especially in markets proximate to the investors. Endorsement refers to positive reputation-related effects that stem from the association of an actor with a prominent party, such as the association of a venture with more established business network partners (Stuart et al. 1999).

The paper also examines the negative effects of isomorphism for the internationalization of new ventures. In the propositions, it is argued that when cross-border venture capitalists actively participate in the management of portfolio firms and do not operate from a geographic area that is central to the internationalization strategy, the portfolio firms are likely to encounter costs that may outweigh the benefits. As a standard effect, cross-border venture capitalists bring about costs from communication, management participation, and other interaction across large distances and cultural boundaries – this effect is clearly present in all cases. In other words, interacting with foreign venture capitalists brings about relatively high transaction costs (Williamson 1975, 1979). Moreover, cross-border venture capital investors tend to drive their portfolio companies towards their home markets, and the benefits may turn into disadvantages if the internationalization target market differs from the home markets of the cross-border investors. At the least, cross-border investors can bring endorsement by their presence and create relatively high costs from transacting with them.

Next, we briefly review the most relevant literature. Then, following a typical sequence in reporting inductive research, this paper first discusses the selected methodology, which is theory building using

multiple case studies. A description of data follows, after which the presentation proceeds to extracting insights and tying the view into an integrated model of propositions. Finally, suggestions for further research are presented.

Prior literature

Internationalization

The network perspective on new venture internationalization represents the study of the effects of companies' network affiliations on the selection of internationalization location (cf. Johanson and Mattsson 1988, Andersen and Buvik 2002). The basis of this approach is in the resource dependence view (Pfeffer and Salancik 1978), which assumes that firms are dependent on externally controlled resources for their survival. To gain access to resources and to, for instance, sell goods, firms need to establish relationships. According to the network model of internationalization, the force driving internationalization is the desire to use and develop resources so as to serve the long-term economic objectives of firms, including ensuring survival. This model describes industrial markets as networks of relationships that span firms. Internationalization is taken to mean the building of new relationships and restructuring or exiting old ones so that the firm can associate with partners located in foreign markets (Johanson and Mattsson 1988).

Networks can help internationalizing firms by exposing them to opportunities, learning, and enabling the benefits of pooling resources (Chetty and Holm 2000). For instance, Chen and Chen (1998) showed that network linkages are important in determining the choice of location of foreign direct investment, and Banerji and Sambharya's (1996) results showed that keiretsu affiliation affects internationalization patterns of Japanese automobile ancillary manufacturers. The network approach is relevant to this work because we are studying the effects of ventures' investors on internationalization.

Research on social capital that discusses network-related issues (Coleman 1990) is relevant. Researchers have found that the personal contact networks of founders and employees are the basis for developing a young firm's exchange relationships (Birley 1985, Aldrich and Zimmer 1986, Steier and Greenwood 1995). Managers' external ties promote conformity between firms (Geletkanycz and Hambrick 1997) and can thus be used to obtain information about what behaviour is acceptable in foreign markets.

Research has showed that growing ventures exploit their managers' social capital (cf. Coleman 1990, Nahapiet and Ghoshal 1998) in forming alliances (Eisenhardt and Schoonhoven 1996). This pattern may be considered within the realm of internationalization as well. As stated above, McDougall et al. (1994) argued that direct personal contacts in foreign markets could be used to obtain advice, identify new business opportunities, obtain assistance in foreign negotiations, and open doors in new markets. Yli-Renko et al. (2002), for their part, hypothesized that social capital promotes the acquisition and creation of knowledge, and that knowledge is a key resource that drives the international growth of technology-based new firms. Several scholars have identified knowledge as a key component of businesses' internationalization (cf. Johanson and Vahlne 1977, McDougall et al. 1994, Eriksson et al. 1997, Hadjikhani 1997, Oviatt and McDougall 1997). (Knowledge can be *experiential knowledge*, which can only be acquired through personal experience or *objective knowledge*, which can be taught (see Penrose 1959). Knowledge on how to operate in foreign markets has been sometimes discussed as 'foreign organizing knowledge' (cf. Johanson and Vahlne 1990). Moreover, the studies imply that social capital is an important attribute to be considered when explaining the internationalization behaviour of firms.

Venture capitalists provide important value-added to their portfolio ventures (cf. MacMillan et al. 1989, Sapienza et al. 1996). One can presume that they may also provide valuable internationalization support. Still, the stream of internationalization that focuses on firms that are international from, or nearly from, inception – which could be called a stream on 'international new ventures' (cf. McDougall et al. 1994, Oviatt and McDougall 1994, McDougall and Oviatt 1996, Oviatt and McDougall 1997, Reuber and Fischer 1997, Shrader et al. 2000, Zahra et al. 2000) – does not notably touch upon the question of venture capitalists' influence on internationalization.

Institutional theory

According to the institutional theory, an actor transforms to be similar to its counterparts within the corresponding context – that is, companies become *isomorphic* to their peer companies. In the case of this study, the effect refers to becoming similar with firms that operate in the same geographical market. This homogenization is an institutionalizing process called isomorphic change (Nohria and Gulati 1994). Institutional theorists have viewed *legitimacy* as a fundamental part of the explanation for why some organizational forms are more prevalent than others (Suchman 1995). A common definition for legitimacy is a 'generalized perception or assumption' that certain forms or practices are suitable or appropriate (Strang and Sine 2002).

DiMaggio and Powell (1983) delineated the coercive type of isomorphism that was introduced above, as well as two other isomorphic processes: *mimetic and normative* isomorphism. Mimetic isomorphism refers to a response that the focal actor takes on its own behalf, driven by no pressure from an external authority. The company mimics actors of a similar reference group to lower its risks when faced with uncertainties. Normative isomorphism refers to a phenomenon that is largely driven by professionalisation. DiMaggio and Powell wrote, 'we interpret professionalisation as the collective struggle of members of an occupation to define the conditions and methods of their work' (p. 152). It needs to be noted that the existence of these two types of isomorphism may account for some of the institutionalization that was present in the data, even though coercive isomorphism seems to account for the majority of the total effect.

Institutional theory has been a key lens for studies exploring the conformational processes of organizations (Scott 1995, Pfeffer 1997). In the institutional view, firms operate embedded in a social framework of norms, values, and assumptions about what is appropriate economic behaviour. Economic choices are constrained, among others, by the socially constructed limits stemming from a human origin (Granovetter 1985). A central thesis of the institutional view is that the motivations for human behaviour include not only economic optimization but also social obligation and justification.

Conformity to social expectations affects the success of organizations (Scott 1987). In the domain of the institutional theory, legitimacy refers to the extent of approval an actor receives from other actors. At the interorganizational level of analysis, conformity pressures emerging from industry alliances and similar configurations define what is socially appropriate conduct for a firm (cf. Meyer and Rowan 1977, Zucker, 1977, 1987, DiMaggio and Powell 1983, Scott 1987, Baum and Oliver 1991, Oliver 1997).

In a paper that also lies at the intersection of internationalization and institutional theory, Davis et al. (2000) addressed the pressures exerted on a strategic business unit regarding its choice of entry mode. The paper argued that the institutional environment of the host country and the internal institutional environment of the parent organization affect the entry mode of a strategic business unit through an isomorphic process.

One type of cost faced by internationalizing firms is the relatively low legitimacy stemming from operational obstacles in foreign countries. As iterated above, these obstacles that multinational companies face at the beginning of conducting business abroad are called liabilities of foreignness (cf. Zaheer 1995). The label of 'liability' stems from Stinchcombe's (1965) apt term 'liability of newness' used to refer to the problems of new firms. Since his work, several tracks of liabilities literature have emerged, including one on foreignness. In our results, we discuss decreased liabilities of foreignness enabled by cross-border venture capitalists.

Methods

Research setting

The grounded theory approach is a feasible selection as a research method in cases where little is known about the studied subject (Eisenhardt 1989). The method could also bring a new perspective to a topic that has already received attention in empirical work (Hitt, Harrison, Ireland and Best 1998). It also allows researchers to benefit from the quality of rich, qualitative data (Birkinshaw 1997). To enable the 'replication' logic and thus better chances for generalizations (Yin 1994), this study is based on multiple cases (Eisenhardt 1989). According to this approach, cases are first studied as independent 'experiments' and then compared across cases.

Data was collected regarding the financings and other events of such ventures that had received cross-border venture capital investments. We had data from 10 ventures and their financings, but one of them is not included here because it is out of the scope of the paper, having no cross-border venture capitalists. Convenience sampling was a part of our case selection algorithm in that all case ventures of the study had begun to run business in a single country, Finland. The sample, however, still enables us to 'generalize to theory,' which comprises an essential quality in the grounded theory method (Eisenhardt 1989, Yin 1994, Strauss and Corbin 1998). We also believe that generalization possibilities in the other, 'statistical' sense of generalizing as used in theory-testing research (see Yin 1994: 30-32) can be suggested for many areas. As typical in case research, we leave it for theory-testing studies to determine more specifically the domain to which the results can be generalized.

Since the effects of the presence and actions of cross-border venture capitalists are the focus of the study, the relevant unit of analysis is that of the internationalization process of a portfolio company. Table 1 describes the cases and corresponding interviews.

< Insert Table 1 here >

Advantageously for this study, during data collection there was variation in the cases in the existence of a cross-border venture capitalist in the target foreign market, and the way investors affected the internationalization of their investee firms. The effects and influence of each venture capitalist was considered in the analysis.

Vega's investors could not be interviewed due to considerable secrecy surrounding its operations. However, an effort was made to interview the CEO thoroughly. While triangulation by using multiple informants was not possible, a concern remains that the answers are biased. It is our understanding, however, that there was no motivation for giving biased answers, particularly since we agreed to keep the firm's identity anonymous (we only use pseudonyms for firms in this paper). There were no other individuals other than the CEO that would have had sufficient knowledge of the firm's management.

To support the purpose of the study, the internationalization patterns and the most important business regions of the case companies are illuminated in Table 2. To connect these data with venture capital investments, the table also describes rounds of venture capital investments, including their dates and an important detail about the investors – the geographic area from which they have managed their investment. Considering the purpose of the paper, it is not straightforward to determine which investors are foreign and which proportion of sales is foreign in the case of companies that have moved their headquarters abroad. Because these companies have started off in Finland with an essentially Finnish entrepreneurial team, all countries other than Finland are considered as 'foreign countries' in this study.

< Insert Table 2 here >

Data collection

Several sources of data were used, helping to improve the construct validity of the study (Yin 1994). Interviews, observations, and several secondary sources were used as data collection methods, interviews being the primary source. The interviews were semi-structured so that the conversation could develop freely according to the answers of the informants, and to allow in-depth inquiry into the nature of the subject issues. As documented by Table 1, all entrepreneurial respondents were members of the venture's management team, often CEOs. Nearly all venture capitalist informants were the representatives of their employers in the ventures' governance. In some cases, several venture capitalists from the same firm were interviewed for the same portfolio firm.

Fifty-eight interviews were made from June to August 2002, of which the first 12 were used as a pilot study, and after which revisions were made to the interview template. Subsequently, however, the interviews became partly distinct due to additional questions that were drafted specifically for each interview after the eighteenth interview. These questions dealt with issues raised in the previous interviews concerning the case at hand. The interviews were tape recorded and transcribed with one exception where the informant declined taping.

Triangulation (Jick 1979, Eisenhardt 1989, Miles and Huberman 1994) was the rationale for adding elements to the template. The objectivity of the data could be verified by discussing a particular phenomenon with virtually every respondent in each case. Thus, potential biases in the data, such as those caused by potential post hoc rationalization, could be reduced. There were only a few answers with misaligned responses, and we are rather confident that the depth of knowledge is sufficient to reveal the true states of things in this research.

Additional questions were a result of preliminary data analysis. This overlap of phases is a key feature of theory-building studies using cases, enabling adjustments during the study's data collection phase. Adjustments allow the researchers, among others, to more efficiently probe emergent themes (Eisenhardt 1989). According to Eisenhardt, this flexibility enables the quality of the results to be improved, due to 'controlled opportunism in which researchers take advantage of the uniqueness of a specific case and the emergence of new themes' (1989: 539). In some instances, further viewpoints on the subject matter were obtained.

Field notes were used as another form of recording interview data. Field notes facilitate conducting data analysis simultaneously with data collection (Eisenhardt 1989). These notes were written during each interview directly on a laptop computer. These documents include notes of two categories. First, there are brief remarks of the interviewer's insights obtained during the interviews, followed by syntheses. Second, there are notes on the content of virtually every answer of the respondent, except parts that were irrelevant to the studied phenomenon. Thus, the field notes comprise both observation and analysis (Eisenhardt 1989). To these field notes, comprising altogether more than 300 pages for the 58 interviews, necessary supplements were written in the hours following the interview, so that the procedure complied with the '24-hour-rule' (Miles and Huberman 1994).

The average interview lasted for just over an hour. The shortest took forty minutes, and some ran for two and a half hours. In addition to the actual interviews, about 20 informants were called later to supplement the data.

The secondary sources included company websites, press releases, news from the most important newspapers, magazines, web services, and financing data from the VentureXpert database produced by Securities Data Company. In some cases, this material provided an effective means for data triangulation and thus helped to increase the reliability and validity of the data (Miles and Huberman 1994). Before the first interview concerning a specific case, the interviewer familiarized himself with the secondary data by drawing an initial version of the venture's timeline of events based on secondary sources. This initial version supported the interview process: when asking about the history of the company, refreshers could be given from the secondary data, and vice versa, the accuracy of the secondary sources could sometimes be checked.

Data analysis

In analyzing the data, several powerful procedures suggested by Eisenhardt (1989), Miles and Huberman (1994), and Yin (1994) were used. A within-case analysis (Eisenhardt 1989) was conducted first. This phase was started by reviewing and supplementing the timelines that had been built for the cases, and by comparing them with other data records and the analyses and syntheses made by the interviewer in his notes. Concepts were identified by handwriting notes in our detailed interview memoranda and other review and analysis papers. This process involved several discussions with other researchers and reviewing text and various forms of tabular material, giving a detailed view of each case and potentially mitigating the difficulty posed by the large volume of data in the ensuing cross-case analysis (Eisenhardt 1989).

As the next step, a cross-case comparison was made. This included the search of similarities and differences between two or more cases. Cases that appeared to be similar were also compared to discover patterns that might have gone un-noted previously. As noted by Eisenhardt, 'the juxtaposition of seemingly similar cases by a researcher looking for differences can break simplistic frames' (1989: 541). Among other things, contradictions with earlier results of syntheses were sought.

The analysis involved continuous rotating among data, literature, and emergent themes that is, in essence, called for by Eisenhardt (1989), Strauss and Corbin (1998), and Yin (1994). Comments were obtained from colleagues to supplement and test the insights. We used various displays (Miles and Huberman 1994) to reduce the data. Existing literature was consulted often, particularly in the phase following data collection, and we generally made use of our knowledge of earlier literature, following the current understanding of grounded theory (Eisenhardt 1989) that runs counter to the traditional understanding (Glaser and Strauss 1967) in this respect. The iterative process of comparing materials and findings is important in improving the internal validity of the study (Yin 1994). Earlier literature of various fields provided a basis on which to build a model and a basis for comparison. However, no a priori hypotheses were formed at any stage. The analysis finally led to the model that is introduced in Figures 1 and 2 below.

Cross-border investors and new venture internationalization

The key thesis that emerged from the data was that the existence of cross-border investors is likely to lead to a conforming process in which the investee firm, to some extent, becomes more like similar companies in the geographic areas from which the investor manages the investment, or other areas in which the investor has a physical presence. This corresponds to an isomorphic process. Investors can exert pressure to conform to an isomorphic form, and cross-border investors have much power in exerting pressure on ventures.

Several of the cross-border venture capitalists in the data have exercised some form of persuasion or coercion. Often, this occurred in decisions pertaining to where the company should internationalize its operations. In ventures that internationalized to locations that were planned target markets, significant benefits were obtained from cross-border investors. Significant conformational pressure was present in Antares, Betelgeuse, Fomalhaut, Pollux, and Vega, while Altair, Capella, Rigel, and Procyon experienced less pressure. Towards the end of the paper, we also discuss potential roles of mimetic and normative isomorphism. The subsections below detail how the effects in question were divided into positive and negative effects for the ventures.

Positive effects of isomorphism

At least for ventures that start off in locations other than their most important market, there can be notable benefits stemming from the participation of cross-border venture capitalists that local venture capitalists typically cannot provide. According to our findings, cross-border investors bring, at the minimum, enhanced endorsement for the prospects of the venture. The results imply that this endorsement is most

significant in the vicinity of the investor. At best, cross-border investors can significantly lower the liabilities of foreignness experienced by the venture in the new market by providing contacts and market and other knowledge, that is, 'foreign organizing knowledge.' The positive effects are likely to occur when the investor firm has a close match with the venture's target internationalization market, either operating in that market or originating from there. An instance of the latter case is a U.S. venture capital firm that manages a European investment from a European office and can help the portfolio firm internationalize to the U.S. markets.

A comment from a Finnish entrepreneur illustrates the need for cross-border investors that is often present in firms that are about to start internationalizing to their most important markets.

> *Finnish venture capitalists should consider what value-added they can bring to an internationalizing company – especially to one whose markets are abroad and there is a multicultural personnel with language proficiency – if a Finnish investor lacks competence related to internationalization, a foreign investor will be a respectable option.*

To summarize, it appears that all cross-border venture capitalists provide some form of endorsement for a venture (potentially excluding some investors with a generally adverse reputation; such investors are not present in our data). In our data, all cross-border investors induced both increased transaction costs and enhanced endorsement. Endorsement was not global, and our data imply that it often concentrates in the market vicinity of the investor. The investors' fit with the target market was associated with the outcome of either endorsement or transaction costs having a dominant effect over the other. (By an investor's fit with the target market of internationalization, we refer to its degree of establishment and recognition in that market.)

An investor stationed in the correct market can also induce the abovementioned benefits with a greater effect than those stemming from endorsement. That is, the investor can drive an institutionalizing process in which the venture achieves yet a greater level of legitimacy in the focal market. Later, Table 3 illustrates that the help of cross-border venture capitalists was typically viewed as being very beneficial in the cases, and that this help appears to be pivotal in decreasing the liabilities of foreignness experienced in internationalizing ventures.

The case firms of this study were from Finland, and they all needed to conduct a broad internationalization program to achieve their growth objectives. According to the paper's scope, ventures that begin their operations in the most important market areas are not studied. It is our contention, however, that such ventures can also crucially benefit from the contributions of cross-border venture capitalists in their internationalization, even though international operations may be less important for the growth of the business, and investors that are local to these ventures may have high prestige in the global business environment.
Our data support the intuitive notion that cross-border investors are likely to possess far better information on the business environment in their location than the venture that is about to internationalize there. Venture capitalists' knowledge of legal issues is a special domain that several interview respondents raised as an important contribution. We thus integrate legal knowledge into our proposition on 'foreign organizing knowledge' provided by cross-border venture capitalists.

Foreign market contacts – a form of international social capital (Yli-Renko et al. 2002) – represent an important resource that was often present in the informants' accounts: it appears that the existence of a cross-border venture capitalist in the selected internationalization target market is associated with the investee firm having better social capital, including social capital connecting them to potential new investors. Here, our results support prior literature in the observation that obtaining more financiers is one of the key activities of venture capitalists (Gorman and Sahlman 1989, MacMillan et al. 1989). The appearance of a venture as more attractive to investors operating in a certain location is also a phenomenon that may result from the conformity resulting from the isomorphic processes. To summarize, venture capitalists may have several positive influences for venture internationalization: they can increase the venture's legitimacy by providing endorsement, knowledge of the business and legal environment, and international social capital. These effects will decrease the liabilities of foreignness faced by the venture in the new market.

Events in the cases illustrate how cross-border investors have provided benefits to portfolio companies when they operate in the correct target markets or originate from them. For instance, in the case of Antares, an American investor with fit on the U.S. market that was not in this case expected to provide as much active contribution as the Finnish investors actively influenced and helped the firm in planning for its U.S. office, providing market knowledge and important contacts. In this process, pressure was involved. Limited help was needed, though, because the entrepreneurial team possessed substantial prior experience in international business. Still, Antares gained significant benefits. In Fomalhaut, the U.S. investor Spindle, having good fit in the U.S. market, exhibited 'clear aspiration,' including exerting pressure, to bring the company into the U.S. market. Investors have been able to provide crucial support, especially in recruiting and providing customer contacts. These benefits were realized even though the management of Fomalhaut viewed the contact individuals assigned by the two cross-border investors to have a less-than-desirable background for managing the investment, having limited industry experience only.

In the cases of Capella and Rigel, the cross-border investors had fit on internationalization target markets and could have exerted strong influence on internationalization, but have nevertheless not done so. In Capella, the U.S. investor's presence brought about major endorsement benefits, and endorsement has been enjoyed by Rigel as well. In Rigel, a part of the cross-border investors' inactivity may be due to the fact that the venture has a very experienced management and may thus need less advice. The management, however, is slightly of the view that their venture capitalists do not have the best possible expertise in internationalization. This could potentially be a factor that makes investors less willing to exert conformational pressure.

It appears that the good fit of the cross-border investor with a market that has been recognized as a target market is important in enabling the realization of endorsement's best benefits. This, supposedly, is due to the fact that while these investors may have international as well as global prestige, they are still the most known among industry actors in their geographical vicinity. Future research is important in more detailed studies of the generalisability of this finding from our data.

In the cases of both Betelgeuse and Pollux, a U.S. investor provided much support in internationalization to the United States, including a high degree of pressure. These investors had fit with the U.S. market but the market was not the target internationalization market at the time of first entry, and according to our analysis, going in the U.S. markets did not appear to be useful for the firm at the time. We will mention below that the U.S. market has subsequently become a target market for these companies. This points to the importance of the passage of time (cf. Hurmerinta-Peltomäki 2003) and of trying to reach a view to a firm's situation that is valid on the long term. Betelgeuse and Pollux are situated in our model in both Quadrants 1 and 3 of the model that we present towards the end of the paper in Figure 1. A more detailed review on them is presented in the next subsection.

To summarize, the cases provide several examples of investors' significant support for internationalization and its planning. The most common business contributions relate to bringing customer contacts and knowledge of the legal environment, opening doors to other parties such as business partners, and support in recruiting managers from the foreign location. Other important benefits are investor contacts. Table 3 presents a summary and illustrations from our data of the contributions of cross-border venture capitalists.

< Insert Table 3 here >

Negative effects of isomorphism

In addition to benefits, our data indicates that there are costs stemming from the participation of a cross-border venture capitalist. These costs arise because communication and travel from distant locations require more time, and because some venture capitalists drive portfolio companies in wrong directions as detailed in this section. Costs induced by cross-border venture capitalists can be expected to outweigh the above-reviewed benefits in cases where the venture is pushed to internationalize to 'incorrect' markets,

that is, areas that are not optimal for its growth. The more minor cost stemming from cross-border transacting may also outweigh the associated benefit from the existence of a cross-border investor – endorsement.

Regarding the target area of internationalization, the data holds that investors are likely to exert pressure to internationalize to the geographical location in which the venture capitalists manage the investment or have presence. If this location does not host a market that is optimal as a target market of internationalization for the venture, it is naturally likely that significant disadvantages to the development of the venture are induced.

Negative effects are dominant in Vega, Altair, and Procyon. In addition, Betelgeuse and Pollux have both negative and positive effects and a high degree of conformational pressure. In Pollux, a cross-border investor first exerted pressure to the choice of the internationalization target market: Pollux founded an office in Munich 'because [the key investor] was from there'. Later on, a well-known venture capital investor from the United States joined Pollux' financiers and was the lead investor in the round. The German investor lost its interest and became passive. The new investor, on its turn, wanted Pollux to move its headquarters to the United States. An informant from Pollux stated that '[the new lead investor] required that the new CEO would be stationed in the USA – the [U.S.] office was established [at that time] due to their demands.' Multinational management was then hired and an American person was recruited as the CEO. According to the founding entrepreneurs' view, this move to the United States was too quick, and the data back the notion that the firm's maturity for this significant of an expansion was not fully developed.

Our discussion section introduces Figure 1, which locates the cases in our model. It is, however, beneficial to briefly discuss Pollux's position in the figure now. Pollux has received investor pressure and negative effects of entering the U.S. market too early, but the U.S. market simultaneously has been a reasonable objective market at some stage, and the U.S. investor has significantly helped Pollux there. Thus, Pollux has been positioned in both Quadrant 1 and Quadrant 3 in the model. To summarize, Pollux's location choices were twice significantly affected by investors, and some of that influence was damaging. However, the cross-border investor also significantly supported the U.S. expansion by decreasing the firm's liabilities of foreignness. The investor provided, for example, social capital for obtaining customers. The case also provides a good example of the significant power that investors can exert.

In Betelgeuse, a U.S. investor wanted the firm to establish offices in several locations, and special emphasis was placed on internationalizing to the United States, even though the country had not yet been identified as a target market for internationalization. However, while the investor exerted premature pressure to internationalize there, it also provided legitimization in the U.S. market by enabling market access and providing contacts. The cases of Pollux and Betelgeuse exemplify how their key cross-border investor did not have good enough fit initially with the portfolio firms' target internationalization market, but the benefits from decreased liabilities of foreignness were perceived as useful in time, when the firms felt that their U.S. presence was beneficial. Thus, they discovered that the market, where their cross-border investors had driven them, *had become* a target market, as stated in the above section. A cross-border investor or other factors can influence a firm's situation so that new markets will be identified as targets in internationalization strategy.

Vega, Altair, and Procyon are not on the borderline of negative and positive effects in Figure 1. Negative effects dominate. Vega had a secondary office in Silicon Valley from the start. The investors then actively exerted pressure to move everything to the United States. The entrepreneurs felt that it would probably not be wise to move research and development functions or headquarters there. Later on, a more formal decision was made to keep at least the research and development operations in Finland, but investors have still put on 'sporadic pressure' to move functions to the United States. A vignette from the CEO is illustrative:

> *In the beginning, there was quite a lot of pressure to move everything to the States. When we decided to continue here, there has still been sporadic pressure: 'Have you considered this and what is the situation and so on, if you should focus more on the U.S.'*

Some of Vega's investors are very prestigious and have provided significant help in opening doors in the United States. However, at this stage, the help does not concern internationalization of business in terms of sales but contacts regarding product development work. The United States is not a target market of internationalization as we refer to the term in this paper. Accordingly, Vega is positioned in Quadrant 1 in the model.

Vega crucially differs from the other case firms. During the time of the research, Vega was not yet selling any products, they only had Finland and U.S. offices, and they had both of the offices prior to obtaining venture capital investors. Due to schedule and the operating logic of the industry, further internationalization was not needed and was not evident which markets would be key targets. The U.S. market is an important candidate for the future, however, and the investors would have fit there. In that case Vega, with its history, could become positioned in both Quadrants 1 and 3 of the model. Finally, it needs to be stressed that Vega has one very prestigious investor. Correspondingly, Vega has enjoyed endorsement in some interactions, and when it has, the benefit has been large. However, the maximum amount of endorsement from the investor cannot be enjoyed, because the firm runs very low-profile operations due to its development of a new technology and quest not to attract competitors to its market.
In Altair, investors did not exert much pressure, but many of them were generally of some trouble. Because some of them were mutual competitors, board work became troublesome. Additionally, Altair illustrates the increased transaction costs that cross-border investors bring with them due to requirements of communicating to distant locations and potentially culturally distant people. The investors did not have a notably good fit with internationalization target markets. In Procyon, investors have not exerted strong pressures for guiding the internationalization in certain directions. This is not surprising, however, due to the fact that Procyon only has Finnish and Swedish investors. Similarly to Altair, the major effect of cross-border investors appears to lie in the increased costs of communication, meeting, and decision-making. The cross-border investor cannot significantly help internationalization via endorsement or providing 'foreign organizing knowledge' in markets that are key internationalization target markets of the company.

Table 4 presents a summary and illustrations of the potential disadvantages that cross-border investors may bring with them. Note that in the table, we do not detail the negative effect of transaction costs. This effect is homogenous across cases, and as intuition would suggest, present in all of them.

< Insert Table 4 here >

Finally, we introduce a closely related phenomenon that also concerns the effects of cross-border venture capitalists, that of investors' abandoning active participation in management and steering. Most managers and venture capitalists believed that investors might act according to the interest of their portfolio as a whole, 'playing for their portfolio,' also when it conflicts with the interests of individual portfolio firms. Some informants deemed this sort of act as unethical, and some merely considered it business reasoning. A comment from a venture CEO illustrates the potential problems:

> *A merger that is not optimal [for the investee firm is possible] – investors can do some non-optimal deals [for the investee firm] by themselves. They may have their own interests. Moral and reputations keep [some of] them from playing for the portfolio [instead of objectively pursuing the interests of each portfolio company separately]. [The key investor of the CEO's firm] is a guardian of morality. Their reputation is extremely good and they may fear that their deal-flow will diminish [otherwise].*

Cross-border venture capitalists may often be less dependent on the investee firm, and foreign investors have been found to be especially susceptible to significantly lowering their active participation in investee firms' management. Due to this independence, they may also be more likely to 'play for their portfolio,' as the CEO succinctly put it, instead of playing for the benefit of each investee firm separately.

To summarize, the key thesis of the section is that when there are cross-border venture capitalists that actively participate in the management of the portfolio firms and do not operate from a geographic area central to the internationalization target market of the portfolio company, the portfolio company will

encounter significant costs from cross-border investors that outweigh the benefits. These costs arise from cross-border venture capitalists driving the firms to internationalization to 'incorrect' markets, that is, markets that are not included in the optimal set of internationalization target markets. At the least, cross-border investors generate relatively high costs from transacting. These costs are markedly present in each case of this study.

Discussion

Based on the findings presented above, we have formed three explicit propositions from our findings. Their content is also described in Figures 1 and 2. Figure 1 also presents the distribution of the cases in the four key categories, into which the cases fall rather evenly, providing also replication for the division into categories. The categories emerged from the identification of the two focal dimensions presented in the figure.

Proposition 1: By their existence, cross-border venture capitalists

(a) exert costs for ventures via transaction costs (it is more difficult and time-consuming to maintain contact with a distant location and person) and

(b) provide benefits in the form of endorsement for the venture (high quality ventures can attract cross-border venture capital), decreasing the venture's liabilities of foreignness and increasing its legitimacy in a new market.

In our use below, 'target market' refers to a market into which the venture should optimally be able to internationalize it operations.

Proposition 2:

(a) Cross-border venture capitalists can use much power if they exert isomorphic pressures on an investee venture.

(b) If they exert isomorphic pressure, they can

(i) convey increased legitimacy and decreased liabilities of foreignness by providing international social capital and relaying business and legal knowledge in the target market or

(ii) drive the venture to internationalize to an 'incorrect', non-target-market, depending on their fit with the internationalization target market of the investee.

Below, by an investor's fit with the selected target market of internationalization of the venture, we refer to its degree of establishment and recognition in a market; in the cases of this study, investors have been mostly fit in markets that are geographically close to the offices of the firm. For instance, U.S. investors appear to have good fit in the United States even if they manage the investment from Europe. Thus, an additional indication of the research is that investors would in general appear to be most evidently fit in locations where they operate. However, only little trouble could be caused by this selection at most, because nearly all cases only have one cross-border venture investor.

Proposition 3:

(a) If a cross-border venture capitalist has good market fit, it can

(i) provide general endorsement and, in some cases,

(ii) convey increased legitimacy and decreased liabilities of foreignness by providing international social capital and relaying business and legal

knowledge in the target market, depending on if it exerts isomorphic pressures to the investee.

(b) If a cross-border venture capitalist does not have good market fit, then, depending on if it exerts isomorphic pressures on the investee,

(i) its presence may just show as increased costs or

(ii) it can drive the venture to internationalize to an 'incorrect,' non-target-market.

< Insert Figure 1 here >

First, the model holds that all cross-border investors introduce relatively high transaction costs because it is more expensive to communicate, make decisions, and travel between distant locations and people. In Quadrant 2, this is the only effect that cross-border investors bring. In Quadrant 4, investors have a good fit with the *target market of internationalization* of the venture. In this scenario, they bring about not just transaction costs but also endorsement benefits from just being present with their name or by providing minor support. According to the simplified presentation inherent and sought in models, the benefit outweighs the trouble stemming from high transaction costs.

In Quadrant 2 and Quadrant 4, investors do not actively exert pressure to ventures for conforming to an isomorphic format. Once they do, cases fall into Quadrants 1 and 3. Investors may have significant power in exerting conformational pressures. For Quadrant 1, the key investor's fit with the target market is not good, and the model proposes that the cross-border venture capitalist exerts isomorphic pressure driving the portfolio firm to internationalize to 'incorrect' markets. In Quadrant 3, the investor both exerts institutionalizing pressure and has good fit. Under these circumstances, it can well provide international social capital and business and legal knowledge in the market (cf. Johanson and Vahlne 1990), effectively decreasing the venture's liabilities of foreignness and legitimating it in the new market. Our more coincidental-like observations offer a larger number of ways in which venture capitalists can support portfolio firm internationalization, such as providing help in recruiting, scanning potential customers, and opening doors to technology partners and potential new financiers.

Figure 2 introduces the model in a standard box representation. The moderating effect of target market fit is presented for the two separate cases of high and low fit. The upsides and downsides of the existence of a cross-border venture capitalist are depicted as two primary effects of the model. Target market fit swings the pendulum of the main effects to either the domination of internationalization support or the domination of internationalization disadvantages. Conformational pressure exerted by investors then increases internationalization support or internationalization disadvantages. Descriptions in the section 'Cross-border Investors and New Venture Internationalization' and in Tables 2, 3, and 4 provide a detailed account of the distribution of the cases in the Quadrants of Figure 1 and of the associated effects that are illustrated in Figures 1 and 2.

< Insert Figure 2 here >

The model, as all models, is a simplified presentation. One assumption that is embedded in the discussion in this paper is that the cross-border investor stays. Furthermore, we refer here to internationalization target market as a market that currently has been identified by the venture as an objective. This consideration points to the relevance of time for internationalization decisions, as mentioned earlier. Even if the investor was in the correct market and actively participates in the management of the portfolio firm, steering towards starting internationalization may be seen by the entrepreneurs as a premature step, as our case descriptions illustrate.

The paper points to several directions for further inquiry. One obvious avenue for future research is conducting a large-scale survey study to examine the domain of the model's external validity by means of statistical testing. In the present study, all case ventures started their operations in Finland, which may have induced a bias in the results. Despite the fact that preceding comparative research suggests that venture investors operate rather similarly in different locations (Sapienza et al. 1996, Manigart et al. 2002a, b), country-specific differences in their behaviour certainly cannot be ruled out altogether.

Now that our analysis has lead us to view these findings as isomorphism, an interesting question that arises regarding institutional theory is which of the three isomorphism types delineated by DiMaggio and Powell (1983) does the discussed institutionalization represent. Certainly, there seems to be coercive isomorphism, but other forms can still account for part of the findings. In fact, as DiMaggio and Powell implied, the three types of isomorphism may not lie along a single dimension, and thus several types can be significantly present at the same time.

Conclusions

In this paper, we have examined the internationalization of investee firms that have their primary markets in foreign locations. The data came from nine ventures that have started in Finland and that have been financed by at least one cross-border investor, and were obtained primarily by conducting 58 interviews. The grounded theory method was used, resulting in three propositions and a two-dimensional model to depict key findings.

Our main findings were that a cross-border investor's projection of conformational pressure and its fit with the venture's selected internationalization target market are important drivers of the outcome of the investor's general effect on internationalization. At best, the investor may powerfully legitimize the investee, and at worst, can pull the investee into an 'incorrect' market.

An important practical insight that results from the paper is that prior to agreeing on cross-border investment rounds, entrepreneurial teams and local investors should carefully examine the internationalization objectives of the company, especially in terms of the target locations of internationalization and whether their new candidates for investors are both willing and able to help them there. In addition to financial capital, new investors should be able to provide endorsement, international social capital, and knowledge. Investors, for their part, should search for portfolio companies whose business objectives can be reconciled to be reasonable by both the investor and the investee.

Perhaps the most notable implication for further research of this paper is the support for using institutional theory in explaining the internationalization behaviour of new ventures. In line with Davis et al. (2000), who found support for the institutional arguments in the context of the choice of international entry modes, we believe that the approach is a fertile one for future research efforts. Generally, studies in the field of cross-border venture capital should examine questions of tie formation in building cross-border syndicates and the management of these collaborative relationships. Regarding internationalization, future research should also attempt to build models that provide a more detailed account of the characteristics of software firm internationalization. Our cases are mostly software industry firms, and such firms' business networks may be unusually complex (Messerschmitt and Szyperski 2003). This may induce special behaviours in their internationalization activity. However, academic discussion on such specialties is scarce, and while we have data from the companies on their internationalization target markets and patterns, including the investors' views on the matter, we believe that the potential special behaviours did not create any significant bias in this study.

As noted above, there is not much prior research in the field of internationalization that would explore the roles of venture capitalists with regard to the internationalization of their portfolio firms. On an abstract level, insights from our paper hold that ties to cross-border actors may offer important support or disadvantage for the expansion efforts of the focal actor to new geographic locations. Ties to cross-border, or put more abstractly, distant, actors may endorse the quality of the focal actor and produce high costs from transacting across geographical and cultural boundaries. Strong cross-border network partners may induce conformational pressure, leading to increased legitimacy in their vicinity when this location is optimal for internationalization, and to costs if not. Theory-testing research should also examine the domains of external validity of these suggestions across topical boundaries.

The results of this paper provide support for the use of network-based approaches to internationalization (Johanson and Mattsson 1988, Andersen and Buvik 2002), especially with regard to questions related to

the selection of internationalization target markets. However, the research is differentiated from most 'network theory of internationalization' research in that we focus on the support and disadvantages for internationalization produced by the cross-border network, and do not begin with the starting point that companies need to build a cross-border network to secure resources necessary for survival (Pfeffer and Salancik 1978).

Finally, our results support the use of institutional theory to complement current theorizing in internationalization behaviour. It is our contention that the above approaches will be prevalent in the future.

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Tables, charts and graphs

Table 1 - Descriptive data on the cases and the interviews

Case Venture	Industry	Management Team	Investor Firms[a]
Altair	Software	CEO, VP Business Development (2)	6 of 8
Antares	Software	CEO, CTO	3 of 3
Betelgeuse	Software	Deputy CEO (2), CFO	3 of 3
Capella	Software	CEO, CTO (2)	2 of 2
Fomalhaut	Communications devices	Ex-CEO, another ex-CEO, CTO	3 of 3
Pollux	Software	CTO, VP R&D, ex-VP Mktg	3 of 3
Procyon	Software and related services	CEO (3)	3 of 3
Rigel	Software	CEO, CTO	2 of 4
Vega	Materials for Hardware	CEO (2)	0 of 4
		Total Number of Interviews: 58	

[a] Small investors that cannot be considered as venture capitalists or are otherwise negligible for the purposes of the study have been excluded. One interview was conducted in an investor firm per a venture; however, in nine investor-investee dyads, two investor interviews were performed.

Table 2 - Description of investment rounds and internationalization patterns of investee firms

		Rounds[a]			Internationalization		
Name of Firm	Year of Founding	#1	#2	#3	Most Important Geographical Markets[b]	Entry Modes	Level of Foreign Sales[c] and Key Countries Currently
Altair	1997	Summer 1999 Finland, Finland	Fall 2000 Northern Europe, Finland, Finland, Central Europe, four other firms		Initially Europe most important. Then, Asia, Eastern Europe, and Scandinavia.	Export sales from Helsinki headquarters. Collaborative agreements with major partners that operate globally. In 2001, there was a sales function in the UK, operating in another firm's premises. Technical training is given to foreign firms.	About 20%. Developed countries in Asia, Eastern Europe, and Scandinavia.
Antares	2000	Winter 2000 Finland, Finland, about ten very minor investors	Summer 2000 Finland, California, Finland, about twenty minor investors		Initially Finland and Scandinavia, then Europe, then North America. In 2001, North America became less important.	Export sales. Foreign sales personnel without office. Collaborative agreements. Offices: Germany (2000); US East Coast (2000; has been running a low profile since 2001); Quebec (2000; closed down in 2001).	50-75%. UK, Germany, Italy.
Betelgeuse	1999	Winter 2001 Finland	Fall 2001 Finland, Finland, Northern Europe		Germany, Sweden, UK, and to some extent also the Netherlands.	Export sales. Foreign sales without offices. Offices: Netherlands (2000); Germany (2000); UK (2001); Sweden (2002).	About 50%. Germany, Sweden, UK.
Capella	1997	Summer 2000 Finland	Summer 2001 Finland, UK		Initially Finland. Then Europe, especially the UK. Asia and Middle East are gaining importance.	Export sales. Foreign sales personnel without office. Collaborative agreements in Spain, Portugal, and Germany, and with multinational corporations. Sales offices: Singapore (2001); UK (2001).	50-75%. UK, Hong Kong, Singapore.
Fomalhaut	1999	Winter 2000 Finland	Winter 2001 UK, Finland	Summer 2001 UK, Finland, UK	Initially USA. From late 2001, UK.	Export sales. Collaborative agreements in Asia (2000) and the Middle East (2000). Sales offices: Denmark (2000; closed down in 2002); Southeast Asia (2000; closed down in 2001); US Midwest (2000; closed down in 2002).	50-75% Norway, UK, Arab Emirates.

Pollux [HQ on US East Coast since Winter 2001]	1997	Summer 1999 Central Europe	Summer 2000 Central Europe, US East Coast	Winter 2002 US East Coast, US West Coast	Initially Finland, then Germany, then USA and Norway, then southeast Asia.	Export sales. Collaborative agreements. Offices abroad: sales office in the UK (1999); European marketing operations office in Germany (1999; this office does not have any regular personnel anymore, but exists); office and headquarters in US East Coast (2000); sales office in Sweden (2002).	Over 90%. USA, Southeast Asia, Denmark.
Procyon	1999	Spring 2000 Finland, Finland, additional-ly an angel from Finland	September 2001 Finland, Finland, Northern Europe		Up to 2001, Finland, then Europe. The focus may shift to Asia in the near future.	Export sales from the headquarters. Collaboration with large partners. Recent collaborative agreements in Spain (2002) and Austria (2002).	About 100%. UK, Switzerland, Italy.
Rigel [HQ on US West Coast since 1999]	1992	Fall 1997 Finland, Finland	Fall 2000 California, London, Munich, Finland, seven other investors		Key customers are global, but the home base is considered important for establishing operations.	Export sales. Foreign sales without offices. Distribution agreement to China (2001); 17 offices, the most important being Netherlands (1995); US West Coast (1998); US East Coast (2000); France (2000); Japan (2000).	About 80%. Key customers are global.
Vega	2000	Winter 2001 California, California, a few others.	Spring 2002 California, California, California, a few others.		The expected customers are global.	No sales to date. A foreign office in US West Coast from the start of operations (2000).	No sales to date. The expected customers are global.

[a] Of the investors, only those relevant for this study are included. The columns present the dates and for each investor firm, the location from where it managed its investment. All names are pseudonyms. The firms' headquarters (HQ) are located in Finland – two exceptions are marked in the Firms-column. To avoid confusion, 'winter' refers only to the first months of a year and December is here considered a part of fall.

[b] Estimated. 'Initially' refers to the time when the company initiated sales and current accounts refer to the time of our primary data collection in June–August 2002.

[c] Estimated. Foreign sales refers here to sales outside the country of *founding* of the firm.

Table 3 - Summary and illustrations of contributions of cross-border venture capitalists on the internationalization of the start-ups ('+' and '++' in Figure 1)

Firm	Summary	Illustrations
Altair	Several of the investors took an active role in devising the internationalization plan of the firm in Summer 2001, when the firm underwent a major reorganization, but they did not actively exert pressure.	'Naturally it helps a lot to have local contacts. -- especially in recruiting [they are valuable] -- naturally the expertise of VCs could be better utilized if we decided to internationalize to a place where they have expertise.'
Antares	The investors have helped in internationalization. However, because the management team is uncommonly experienced for a Finnish start-up, not very much advice has been needed. The American investor has given substantial help in the USA in the form of market knowledge and social capital.	'[The U.S. investor] have provided information from the financial markets – and of customers and the state [of markets]. [They have given] information on competitors and financial situation. [They have also given] information on potential partners and customers.'
Betelgeuse	Support to internationalization has been focused in creating business cases and contacts. The support has been of help.	'We [an investor] have introduced Betelgeuse to partner candidates, and we have searched people [contacts]. We have brought in [name; a board member], who has build a European-wide retail chain --'
Capella	The cross-border investor has provided significant endorsement benefits.	'The most important benefit [that the existence of the cross-border investor has given] by far is their name. -- We are taken seriously, people are writing about us, and they are interested in meeting us.'
Fomalhaut	The expertise of cross-border investors has been used especially in recruiting. They have also provided contacts to potential customers and business partners.	'When the U.S. office was being founded, we used [the managing director of a cross-border investor] to interview the candidates.' 'They keep commercialization and marketing aspects on the foreground. They follow the market very carefully, spot competitors and so forth.'
Pollux	Investors provided their expertise in internationalization, helping for instance to obtain customers.	'With [the fund], we got contacts to [the CVC investor firm managing the fund].' 'They may have helped us with [a customer] and [another customer], but they were not critical. To [a customer], we got with their help.'
Procyon	The cross-border investor actively participates the planning of establishing offices abroad. This investor has also given contacts, and with those contacts, Procyon has discussed matters relating to internationalization and common technology area. However, the foreign investor cannot provide significantly added endorsement, contacts to a large market, or proprietary-like business knowledge therein.	'The contacts [that the cross-border investor has provided] are useful. We have met many of them [other firms].' 'It was positive to get [the cross-border investor] involved. They provide contacts to Scandinavian [businesses relevant to Procyon] and some other contacts as well. And, they give us new insights.'
Rigel	The Finnish investor had contacts to international venture capitalists, some of which then participated as investors.	'[The local investor] had a lot of contacts] to second round investors.' '[An investor] has brought us on the surface

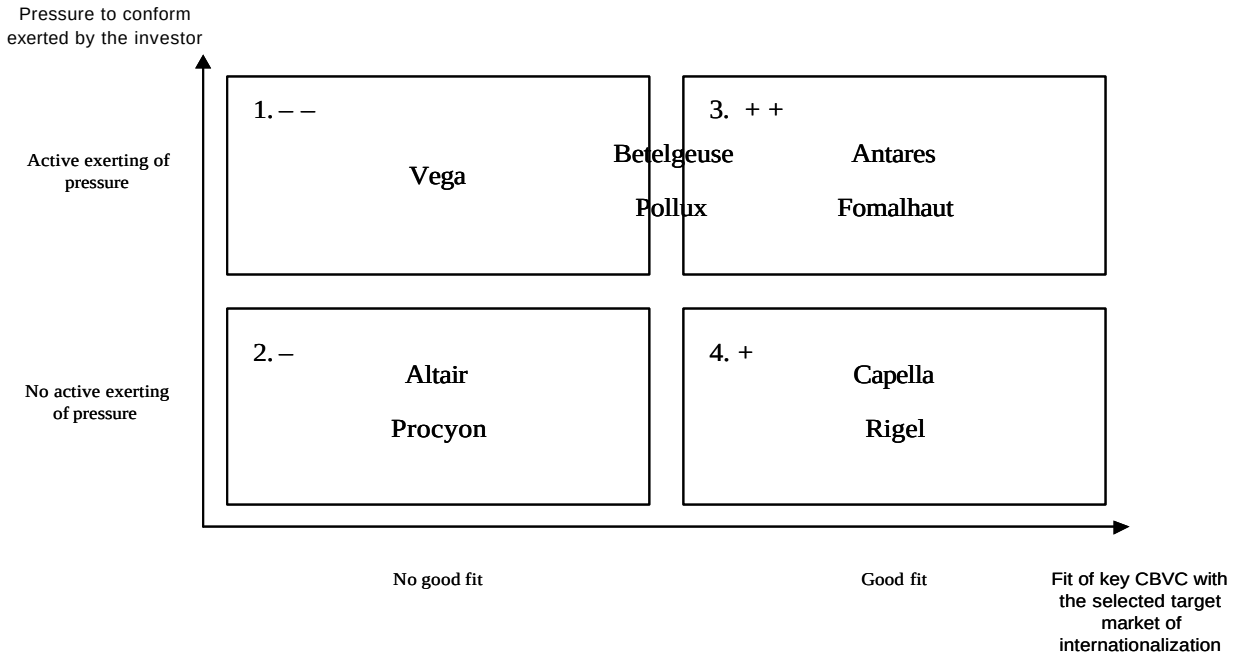
	Investors have knowledge on financial matters that has benefited the firm, and they have provided a fair amount of endorsement.	of the Earth in some things.'
Vega	The investors have opened many important doors and are interested in further financing. Due to the phase of operations of the company (no sales yet), they have not been able to help internationalization much.	'They monitor our competitors.' 'They have a very good knowledge of business.' 'The most important one [benefit from investors] is that we can talk to nearly anyone.'

Table 4 - Summary and illustrations of potential disadvantages arising from the participation of a cross-border venture capitalist ('– ' and '– –' in Figure 1)

Firm	Summary	Illustrations
Altair	Most cross-border investors have been active in absorbing information but not in contributing to the management as they were expected, creating transaction costs. Among the interest groups of the firm, there are companies that are competitors to each other, and this often makes board work troublesome.	'They have different sort of interests.' 'The relationship between [an investor] and [another interest group firm] cannot be very natural.'
Antares	No visible problems except transaction costs.	
Betelgeuse	The cross-border investor has announced that it will give up venture capital investing. There is some uncertainty on what will be done to the investments. There was also pressure to expand to the USA prior to the USA becoming identified in the firm as a key expansion target market.	'That [an investor] will quit [investing], will surely have an effect on some companies.'
Capella	After a key person at an investor firm left his employer, this firm has remained rather passive and seemingly uninterested.	'We don't know, what they want. We and [another investor] think that they might want to withdraw.'
Fomalhaut	Even though significant help has been received, the amount of contribution of cross-border investors to the management of the company has been lower than what was expected. At Fomalhaut, it is believed that the representatives of the investors should be more experienced.	'[A representative] came straight from school. [Representative of another venture capital firm] has a banker background. Fomalhaut was a bit unlucky. Our hopes for better managerial help could have come true [with the predecessor]. When we negotiated with investors, we did not discuss the matter that who would represent them.'
Pollux	The location for an office was chosen due to the location of offices of a cross-border investor. The investor later chose to support a competitor's technology and abandoned Pollux. Another cross-border investor took a very powerful role in steering the company, and demanded that the headquarters was quickly moved near its own offices. Some felt that after this the contribution of this investor declined sharply. Generally, the entrepreneurs were rather dissatisfied with the investors.	'The Munich office was founded because [an investor] was from there.' '[The investor] chose to no longer use Pollux' [technology] platform in their portfolio.' '[The other investor] took a strong role. -- The office [near to this investor's offices, to which the headquarters was moved] was established [already at that time] due to their demands. Pollux would have needed a more mature organization – [the investor] was in a terrible hurry.' 'After the beginning, their guidance has remained at a rather low level.'
Procyon	No visible problems except transaction costs.	
Rigel	The contribution of the key cross-border investors has remained clearly lower than what was expected.	'The benefit to us is not as great as one could have hoped for.'
Vega	Investors have tried hard to influence to the location of facilities by trying to	'In the beginning, there was quite a lot of pressure to move everything to the States.

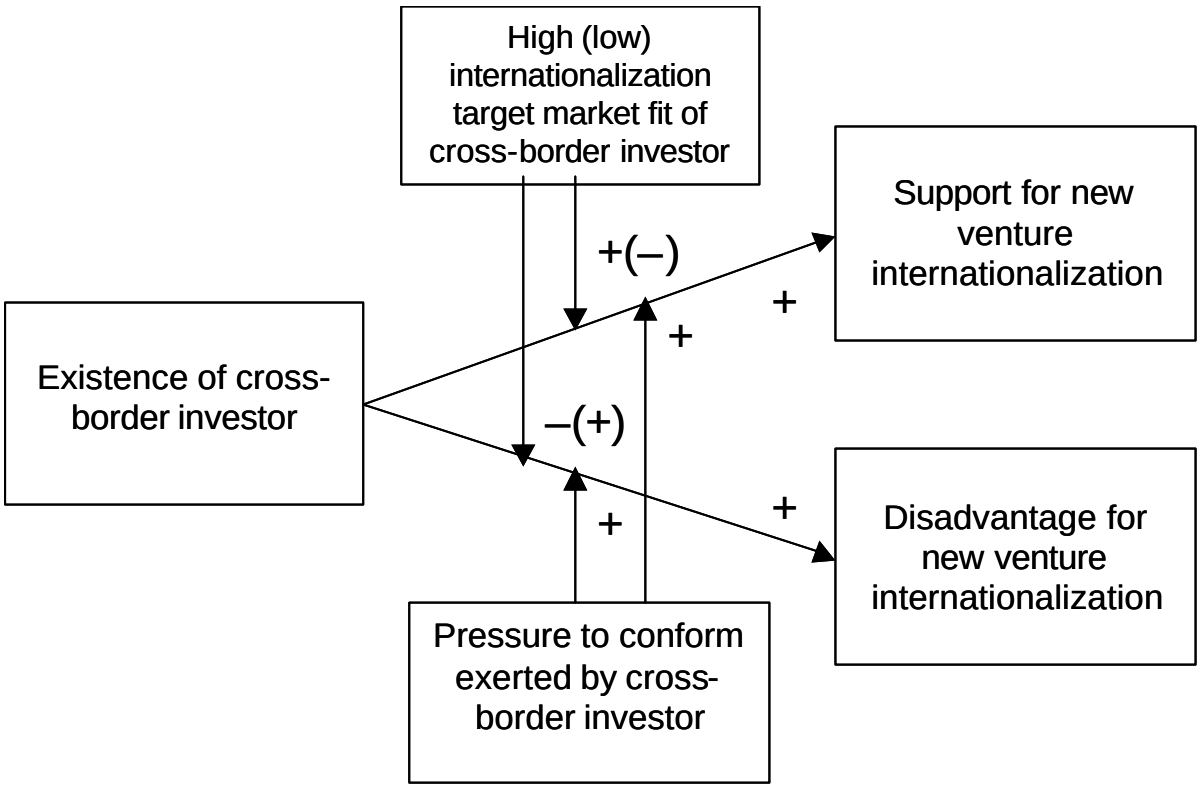
	get the firm to move near themselves. This far, there have been advantages in keeping to the location in Finland, which has been increasingly recognized by the investors as well.	When we decided to continue here, there has still been occasional pressure: 'have you considered this and what is the situation and so on, if you should focus more on the U.S.'.

Figure 1 - A model of factors influencing the effect of a cross-border venture capitalist (CBVC) on the internationalization of a start-up



Note: For Quadrant 1, the model proposes an effect in which the cross-border venture capitalist exerts isomorphic pressure driving the portfolio firm to internationalize to 'incorrect' markets. In Quadrant 2, the presence of the cross-border investor merely brings about additional transaction costs (an effect present in all quadrants to some degree). In Quadrant 3, the investor provides international social capital and business and legal knowledge in the local market. In Quadrant 4, the investor merely brings endorsement benefits via association to its name (an effect present in all quadrants to some degree). The position of Betelgeuse and Pollux denotes them having attributes from both Quadrant 1 and Quadrant 3. The pluses and minuses illustrate the magnitude of the negative or positive effect.

Figure 2 - A model of the effects of cross-border venture capitalists on new venture internationalization



In the model, the relation of the effects to the paper's propositions is as follows. The primary effect of *disadvantage* relates to Proposition 1a (P1a), and the primary effect of *support* to P1b. Via the moderators, the primary effects also relate to P2b and P3. P2 discusses *pressure to conform.* Pressure increases the effects of the two primary relationships. P3 discusses the effects of *target market fit of the cross-border investor*. If the fit is good, the primary effect of *support* is enhanced and that of *disadvantage* mitigated. If the fit is not good, the primary effect of *support* is mitigated and that of *disadvantage* enhanced.

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Effects of Relational Capital and Commitment on Venture Capitalists' Perception of Portfolio Company Performance

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Abstract

In this study we examine how relational capital and commitment affect a venture capital firm's (i.e., VCF's) perception of the performance of its portfolio companies (i.e., PFCs). That ship between the VCF and PFC. The study's hypotheses are tested by applying quantitative analyses to survey data collected from 298 venture capital firms. The data from the survey are complemented with additional information drawn from secondary data sources and interviews with several venture capitalists. We found that the amount of relational capital embedded in the VCF-PFC dyad and the extent to which the VCF is committed to the PFC are strongly related to perceived performance. We speculate that relational capital and commitment enhance learning, an effect that improves performance and subsequently VCFs' perceptions of performance. Further, these perceptions are likely amplified by the positive affect generated by relational capital and commitment. We discuss the limitations and contributions of our findings and provide directions for future research.

Introduction

In this paper we explain how the nature of the relationship between a venture capital firm (i.e., VCF) and its portfolio companies (i.e., PFCs) affects the VCF's perception of PFC performance. We focus on perceived, rather than actual, performance because it is VCFs' perceptions of performance that directly determines the nature of the ongoing relationship and the VCFs' willingness to reinvest in the PFC. Specifically, we examine how perceived performance is affected by the social nature of the VCF-PFC relationship. At a basic level, we anticipate that the nature of the relationship will have a direct impact on how well the firm functions, and we believe that venture capitalists' perceptions of PFCs' performance is largely a product of this actual performance. However, we go further to suggest that VCFs' perceptions of performance are also colored by the nature of the relationship. This theoretical contention, if borne out, also has important practical implications for entrepreneurs and venture capitalists alike.

We draw on social exchange theory (Granovetter 1985) and learning theory (Cohen & Levinthal 1990; Yli-Renko et al. 2001) to explain the link between relational capital, VCF commitment, and actual performance. We also draw on procedural justice theory, an off shoot of social exchange theory, (e.g., Busenitz et al. 1997; Sapienza & Korsgaard, 1996) to explain why VCFs' perception of performance might be influenced not only by actual performance but by these relational dimensions as well.

In short, our hypotheses predict that higher levels of three relational capital dimensions (trust embedded in the VCF-PFC dyad, the amount of social interaction in the VCF-PFC dyad, and the amount of goal congruence in the dyad) will lead VCFs to perceive higher levels of performance on the part of the PFC. Similarly, we predict that the greater the VCFs' commitment to the PFC, the greater will be the perceived performance. Our arguments for these expectations involve two primary, unmeasured mechanisms. First, and most importantly, we expect that greater relational capital and commitment on the part of the VCF will facilitate VCFs' ability to aid the venture through improved understanding of the venture's operations and needs. This understanding and aid (what we will call 'learning effects') then improves the *actual* performance of the venture. Greater actual performance outcomes will lead to higher perceptions of performance. Secondly, we also posit that these relational dimensions and commitment on the part of the VCF may create a positive affect for the VCF vis-à-vis the PFC, and consequently positively color perceptions of performance; by the same token, the absence of commitment and relational bonds may negatively color perceptions of performance. Learning effects on actual performance are the most potent force because of VCFs' personal and fiduciary motivations to remain objective in performance assessment; therefore, it is unlikely that their judgment of performance will be based primarily on whether or not they 'like' the PFC. Nevertheless, these judgments are likely to be shaded by their personal relationships with the leadership of the ventures.

The study's hypotheses are tested on survey data collected from 298 venture capital firms. The data from the survey are complemented with additional information drawn from secondary data sources and interviews with several venture capitalists. Overall, we found support for our hypotheses. Specifically, the amount of relational capital embedded in the VCF-PFC relationship as well as the extent to which the VCF is committed to the PFC were strongly related to perceived performance.

Our study contributes to the existing literature on venture capital by explaining how the nature of the VCF-PFC relationship affects perceived performance. First, we examine a combination of two relational components as drivers for perceived performance, i.e., relational capital and commitment. Both components are drawn from social exchange theory, and pertain to the importance of the social embeddedness of the relationship between economic actors (Granovetter 1985). Commitment reflects the relational 'intensity' of the co-operation between two parties (Morgan & Hunt 1994) and hence represents a dimension 'deeper' than relational capital. Second, we provide empirical support for speculations that have been made in the literature in terms of *whether* the nature of the relationship between the VCF and PFC matters in terms of performance outcomes. More specifically, we extend the literature that suggested, but did not empirically test, that relational factors such as trust and commitment influence perceptions of venture performance (e.g., Busenitz et al. 1997; Sapienza & Korsgaard 1996). Third, we extend the literature on VCF-PFC relationships by using a learning perspective to explain the primary mechanisms that link relational capital and commitment with perceived performance: good relationships lead to richer communication between the two parties, and therefore to better actual and perceived PFC performance. Finally, our results also speak to theories of interfirm relationships: differences among VCFs in terms of their success in partner relationships may be in part explained by a difference in their ability to build relational capital or their willingness to make a strong commitment to their PFCs.

An implication of this study is that entrepreneurs may increase their reputation in the venture capital community by engaging in open communication with their investors in a manner that affects the VCF's perception of PFC performance. Such an effect may be critical to the PFC's access to follow-up investments. Another implication is that when the VCF is highly committed to a PFC, the latter may become more co-operative and provide better and richer information. Finally, VCFs should be aware that their assessments of PFC performance could be colored (positively or negatively) by their relationships with their investees.

Research focus

Over the years, venture capitalists have invested substantial amounts in high-potential companies. Although companies in high-tech industries such as computer software, medical care equipment, biotechnology, and communications are popular targets of venture capital, any company with extraordinary growth prospects has the potential to attract venture capital. Given the importance of high-growth companies for the economy, there is an increasing need to understand how venture capital firms can better assist their portfolio companies.

In this study we focus on how relational factors affect venture capital firms' (i.e., VCFs') perception of the performance of their portfolio companies (i.e., PFCs). Our central aim is to explain variations in *perceived* performance. A central assumption we make is that perceived performance primarily represents venture capitalists' objective assessment of PFCs' actual performance. We argue that relational capital and commitment enhance the amount and quality of knowledge exchange, enhancing performance. Performance assessment is then colored more positively (or negatively if the relationship is poor) by the relationship between VCF and PFC.

Thus, we assume that perceived performance tracks actual performance but is also influenced to some extent by the quality of the relationship. One might argue that perceptions of performance represent, at times, a 'biased' view of the venture, yet to our knowledge no single measure nor index of start-up company performance has been found that can accurately and objectively compare PFCs across stages and industries. Furthermore, perceptions of PFC performance are crucial because ultimately VCFs' judgment of PFC performance determines whether VCFs will continue to support, refinance, or abandon their investments. Further, the validity of the assessment of PFC performance by the lead investors is counted upon by other investors (e.g., the syndicate members) and by VCFs' limited partners to determine the provision or withholding of huge investment amounts of follow-on investments in the PFC. Therefore, both VCFs and PFCs can benefit from better understanding the factors that influence impressions of performance.

We draw on social exchange (Granovetter 1985) and learning theories (Cohen & Levinthal 1990; Yli-Renko et al. 2001) to explain the link between relational capital, VCF commitment, and actual performance. We also draw on procedural justice theory, an off-shoot of social exchange theory, (e.g., Busenitz et al. 1997; Sapienza & Korsgaard 1996; Shepherd & Zacharakis 2000) to explain why VCFs' perception of performance might be influenced not only by actual performance but by these relational dimensions as well. As such, our study extends prior research that has examined the VCF-PFC relationship .

Whereas our arguments focus on how social aspects of the VCF-PFC dyad affect performance, effects may also occur in the opposite direction. For instance, the quality of the relationship between VCF and PFC could increase *as a result of* VCFs perception of PFC performance. However, in the hypotheses section we will use sound theoretical reasoning to support the causal direction implied in our hypotheses. Furthermore, the interviews we undertook with venture capitalists support the notion that the nature of the relationship affects the quality of communication and, therefore, the outcomes of the relationship. As an example, one venture capitalist said:

> *'When we have a good social relationship, the PFC's management may be more open to talk about their problems; that is why the social relationship is very important. So, do we talk about different things when there is a strong social relationship? We are more open, I would say. We don't have to say things in a diplomatic way, we can talk to each other in a very blunt way.'*

Contribution

This study contributes to the broader organizational literature and to work on VCF-PFC relations. We extend learning studies by examining how relational elements facilitate effective interorganizational exchange (e.g., Lane and Lubatkin 1998; Yli-Renko et al. 2001). We also contribute to more narrowly focused literature on *how* VCFs add value to PFCs (Busenitz et al. 1997; Gifford 1997; Sapienza 1992). Further, our focus on factors that affect VCFs' *perception* of PFC performance addresses key questions in the governance literature about how external parties assess top management's performance (Walsh and Seward 1990).

< Insert Figure 1 here >

We also contribute by examining two distinct relational components of social exchange theory (Cook & Emerson 1978; Granovetter 1985). Social exchange theory holds that economic action is embedded in social relations; this embeddedness means that firms' motivations involve both the search for self-interested gain and the development of sustainable relationships (Granovetter 1985). Relational capital has been posited to have instrumental and relationship-sustaining benefits (Burt 1992; Nahapiet & Ghoshal 1998). We explicitly include commitment in this work because the emotional mechanisms inherent in relationships are often overlooked in favor of efficiency interpretations (Saparito et al. 2004). Commitment reflects the relational 'intensity' of the co-operation between two parties (Morgan & Hunt 1994) and hence represents a dimension 'deeper' than relational capital.

We extend the literature on VCF-PFC relationships by exploring the mechanisms through which close cooperation between VCF and PFC affects perceived performance (Cable and Shane 1997). We posit that relational capital and commitment influence VCFs' perceptions via two primary, unmeasured mechanisms. First, and most importantly, we expect that relational capital and commitment facilitate VCFs' ability to aid the venture through improved understanding of the venture's operations and needs (Cohen & Levinthal, 1990; Yli-Renko et al., 2001). The level of understanding then affects the *actual* performance of the venture. The level of actual performance drives perceptions of performance. Secondly, we also posit that relational capital and commitment influence attitudes of the VCFs and consequently color their perceptions of PFCs' actual performance.[26] Our reasoning for the second

[26] In our view, circumstances are so widely different across seed, start-up, growth, and later stage investments that even if they were available (and they are not), no objective measures of performance could adequately account for the non-systematic differences across ventures and settings; therefore, we do not attempt to examine the rather complex mediating relationship (relational capital->performance->perceived performance) we conceptually propose.

mechanism is consistent with procedural justice theory as we contend that relational factors such as trust and commitment may influence the link between actual and perceived performance (Busenitz et al. 1997; Sapienza & Korsgaard 1996). We expect that effects on actual performance – i.e., the first mechanism – are the more potent because VCFs have the fiduciary responsibility to remain objective in performance assessments; therefore, it is unlikely that their judgment of venture performance will be based primarily on whether or not they 'like' the PFC. Nevertheless, we expect that judgments are shaded by their personal relationships with the ventures (see Figure 1).

Theory and hypotheses

Relational Capital and Perceived Performance

A central notion in the social exchange literature is that economic transactions between different parties are embedded in a social context. Embedded relationships involve the presence of close social connections, mutual trust and reciprocity, which may be beneficial for the outcomes of the exchange relationship (Cook & Emerson 1978; Granovetter 1985). Based on the social exchange perspective, researchers have examined how the development of 'social capital' in networks of relationships may be resources that can be used for the good of the individual or the collective (Nahapiet & Ghoshal 1998; Tsai & Ghoshal 1998; Yli-Renko et al. 2001).

Social capital refers to the structural, relational, and cognitive dimensions of the network of social relationships or links that comprise a given firm's set of transactions or possible transactions (Nahapiet & Ghoshal 1998). Both the pattern of these linkages and the relationships built through the linkages are assumed to be the basis for social capital. In this study, we focus on the relational dimension within a key dyadic connection for entrepreneurial firms, i.e., their relationship with a primary provider of financial resources. More specifically, we define relational capital as the extent to which exchange involves trust, social interaction, and shared norms or goals; together these constitute what Yli-Renko et al. (2001) labeled the *quality* of the relationship. Trust involves each party's confidence in the goodwill of the other (Ring & Van de Ven 1994). Social interaction reflects the *strength* or closeness of social relationships between the VCF and PFC. And goal congruence pertains to the extent to which VCF and PFC share similar goals and values regarding their relationship (Lane & Lubatkin 1998). What these dimensions have in common is that each can serve as a substitute for more formal, restrictive governance of interorganizational exchanges. Our premise is that the three dimensions of relational capital primarily enhance actual performance (and ultimately perceived performance) by increasing the *amount* as well as the *quality* of communication between the VCF and PFC (Figure 1). The underlying rationale is that the breadth and depth of knowledge exchange between the two parties improves the VCF's understandings of the PFC's operations and needs (Cohen & Levinthal 1990; Lane & Lubatkin 1998).

Trust and Perceived Performance

Prior research has identified trust both with the confidence in the other's *goodwill* and in the *predictability* of the other's behavior (Zaheer et al., 1998). Goodwill is the belief that a partner will act benevolently even when the possibility for opportunism exists. Predictability is the extent to which one is confident s/he can predict what the other's behavior will be. In this study we focus on the *goodwill* dimension of trust because it is most associated with the beneficial relational components of trust (Saparito et al. 2004). The willingness to be dependent and vulnerable reflects one's faith in the other's goodwill and increases performance primarily through the enhancement of fruitful communications between the parties (see Figure 1).

Trust has at times been considered an essential determinant of the performance of exchange relationships (Blau 1964). The theoretical arguments for the relationship between trust and performance pertain to both the *amount* of knowledge exchange as well as the *quality* of this exchange. First, when a relationship is based upon a belief in each other's goodwill, the use of monitoring mechanisms becomes less relevant (Shepherd & Zacharakis 2000). The freeing of resources from investments in monitoring devices can then increase the potential for more *extensive* communication (Zaheer et al. 1998). Second, deep trust may facilitate the exchange of *confidential* information as the perceived risk of opportunism diminishes (Yli-

Renko et al. 2001). Thus, trust facilitates both efficient exchange of information by reducing the need for time consuming and costly monitoring and the effective exchange of information by removing the perceived need to veil or hide sensitive information.

In summary, we argue that high levels of trust between VCF and PFC increase both the flow of and insights into information exchanged. The presence of trust creates a context in which both parties engage in broad and deep communication. Ultimately, this exchange improves the PFC's actual performance, and therefore the VCF's perception of performance. We also contend that trust causes positive feelings, or 'affect,' which then further positively color perceptions of performance (Sapienza & Korsgaard 1996). Thus, we hypothesize

Hypothesis 1: VCFs' trust in the PFC is positively related to VCFs' perception of PFC performance.

Social Interaction and Perceived Performance

Social interaction refers to contact between parties for other than explicitly instrumental purposes. We argue that the informal character of social interaction between VCF and PFC affects perceived performance through enhancing the amount and the quality of the knowledge exchange; it also has the secondary effect of coloring the relationship between actual and perceived performance.

The social nature of interaction creates an environment in which one is willing to freely share new ideas and, therefore, gives exchange partners access to a *broader* range of information (Zaheer et al., 1998). For instance, Tsai & Ghoshal (1998) found that social interaction among business units facilitated resource exchange among these units by diminishing the importance of boundaries between the units and encouraging close cooperation among the units towards the firm's goals. Second, social interaction may also expand the nature of knowledge exchanged in the relationship. For instance, it has been suggested that social interaction among a firm's business units facilitates innovation via the exchange of new ideas not typically relayed via formal mechanisms (Ghoshal et al., 1994). Nonaka (1994) argued that social interaction increases the transfer of complex, tacit knowledge. Tacit knowledge may be necessary to acquire a deep *understanding* about an exchange partner's activities since the tacit component of one's knowledge base may include hidden motivations for these activities (Nonaka, 1994). Tacit knowledge is difficult to codify and communicate and is often acquired only through deep involvement or interaction (Nonaka, 1994). As deep involvement characterizes personal rather than impersonal relationships, the likelihood that tacit knowledge can be brought to the surface is higher when one holds a close, social relationship rather than a formal relationship.

In short, social interaction between VCF and PFC exposes both parties to a broad and deep set of information that is not otherwise readily available. Thus, decisions are better informed, more timely, and lead to better performance. Furthermore, as was the case for trust, we reason that social interaction also colors perceptions of actual performance by influencing VCFs' attributions regarding their PFCs (Sapienza & Korsgaard 1996). Thus, we hypothesize:

Hypothesis 2: Social interaction between VCFs and PFCs is positively related to VCFs' perception of PFC performance.

Goal Congruence and Perceived Performance

Organizational goals of VCFs and PFCs can diverge greatly (Sapienza & Gupta 1994). Goal congruence refers to the degree to which exchange partners' goals and values converge (Nahapiet & Ghoshal 1998). Prior research has looked at the presence of shared goals and, at times, its effects on performance (Cohen & Levinthal 1990; Lane & Lubatkin 1998).

We argue that the amount and quality of information exchange increases with increases in goal congruence. Larsson et al. (1998) reasoned that when parties share similar goals, they are motivated to provide their exchange partner with wider *access* to their knowledge base; however, when goals are at odds, partners may fear that such knowledge may be used against them and keep critical information to themselves. Similarly, prior research has argued that goal conflicts between VCF and PFC may diminish

the willingness of the PFC to share information with the VCF (Busenitz et al. 1997; Cable & Shane 1997; Gifford 1997). Amason and Sapienza (1997) argued that even within organizational settings top managers share information among one another more readily when there is a 'mutuality' of goals; this, they reasoned, decreases destructive conflict and makes decision making more effective. The empirical findings of several studies appear to corroborate this logic (e.g., Amason & Sapienza 1997; Busenitz et al. 1997; Larsson et al. 1998).

Lane and Lubatkin (1998) provided a further theoretical basis to expect goal congruence between exchange partners to enhance performance. They argued that interfirm relationships are more effective when partners have similar commercial goals because such goals would induce a common 'dominant logic,' i.e., a preference for how to process information and how to solve problems. Such logic creates a high level of *understanding* about which information is most important in a given context and how to apply this information to profitable ends. In our context this implies that when VCF and PFC share the same goals and expectations, they achieve insight into acquiring and delivering information useful to the effective functioning of one another.

In short, when the VCF and PFC share preferences and goals, the relationship will be characterized by a wider and deeper level of communication which enhances PFC performance through mutual learning. Fundamental to social exchange theory is the idea that mutual goals lead also to positive attributions of the other (Blau 1964). Therefore, as was the case for trust and social interaction, the positive influence of goal congruence on actual performance will be amplified in VCFs' perceptions of performance (Sapienza & Korsgaard 1996). Thus, we hypothesize:

Hypothesis 3: Goal congruence between VCFs and PFCs is positively related to VCFs' perception of PFC performance.

Commitment and Perceived Performance

Trust, social interaction, and goal congruence are relatively passive manifestations of the quality of the relationship between the VCF and the PFC. As a matter of course, VCFs may calculate that trusting makes more sense than not trusting, that social interaction is a benign way of maintaining a relationship, and that seeking to maximize the venture's goals makes good sense. However, in order to unlock the potential of the exchange, the VCF may have to demonstrate an intensity of commitment. Commitment reflects an emotional dimension not always present in relational capital. Both pertain to social aspects of the relationship between two parties (Granovetter 1985), the difference being the proactive effort required in commitment.

Interorganizational commitment has been depicted as central in social exchange (Cook & Emerson 1978). It reflects a firm's willingness to exert effort on behalf of an outside relationship (Mohr & Spekman 1994; Morgan & Hunt 1994) and involves the presence of emotional bonds, caring about the fate of the other party (Mowday et al. 1979), or a willingness to make short-term sacrifices in order to realize long-term benefits for the relationship (Anderson & Weitz 1992). Like relational capital, commitment primarily affects perceived performance through its positive effect on both the amount and quality of the knowledge exchange between VCF and PFC.

Commitment results in extensive knowledge exchange as it involves repeated efforts to exchange information with the other (Blankenburg, Eriksson & Johanson 1999). Prior research has highlighted the various roles executed by VCFs such as providers of strategic advice and external contacts (Sapienza 1992). The more VCFs are committed to the relationship, the more vigorously they will undertake these roles. Such increased *amount* of effort enhances PFC performance. Further, commitment also positively affects performance through the *insights* that are gained from intense involvement. Learning theory suggests that a firm's learning capacity is enhanced when it devotes significant intensity of effort in processing new external knowledge (Cohen & Levinthal 1990). The reasoning is that intensive efforts provide insights into how disparate pieces of information are related to one another. Further, deep commitment on the part of the VCF also increases the quality and effectiveness of the information exchange because higher commitment leads to greater receptivity by the PFC for the VCF's advice (Busenitz et al. 1997).

In summary, commitment increases perceived performance through the creation of a wider and deeper knowledge exchange between the two parties. These effects on actual performance lead to greater perceived performance. The positive relationship between actual performance and perceived performance will be further amplified because truly committed VCFs are likely to look particularly favorably upon positive outcomes (Sapienza & Korsgaard 1996). Thus, we hypothesize:

Hypothesis 4: VCFs' commitment to a PFC is positively related to VCFs' perception of PFC performance.

Methodology

Data Collection

We used Venture Economics' VentureXpert database as the primary source for the selection of venture capital firms. In order to control for differences among VCFs in terms of the environment in which they operate, only U.S.-based VCFs from the category 'private firms investing own capital' were considered. We further used the following criteria: (1) the database indicated that the VCF had undertaken an investment in the period 1995-2001 *or* (2) the VCF's website was still active. Data was collected via a survey sent out in the Spring of 2002 and supplemented by the VentureXpert database. In order to pre-test the survey and to gather additional insights helpful for the interpretation of the data, we also undertook semi-structured interviews with several venture capitalists.

Despite the study's focus on the U.S. market, we have no reason to believe that the principles upon which the theory for our findings are based should operate substantially different compared to the European context. That is, our results are relevant to European as well as U.S.-based entrepreneurs and venture capitalists who aim to increase the effectiveness of their relationships.

The survey instrument was sent to a randomly selected member of the top management team of the VCFs. In the survey, the respondents were asked to choose one PFC that met the following criteria: (1) the initial investment in the focal PFC was made in the period 1998-2000, *and* (2) the respondent was actively involved in the post-investment relationship with that PFC. To maximize randomness, we asked the respondents to select the venture that met the above criteria and came first alphabetically. We used the total design method suggested by Dillman (1978) for the mailing process. The final number of complete surveys was 298, which represented a response rate of 24%, one of the largest scientific surveys of venture capital firms. Analyses showed that there were no substantial differences between the respondents and non-respondents, nor between the early and late respondents (Armstrong & Overton 1977).

Since most of the variables used in the analyses came from the answers provided by a single respondent, we carefully checked the possibility that the relationships among the variables could be the result of common method variance (Podsakoff & Organ, 1986). More specifically, we examined the possibility of common method variance by conducting Harman's one-factor test, as suggested by Podsakoff and Organ (1986). A substantial amount of common method variance would be shown if one factor accounted for the majority of covariance in the variables. However, exploratory factor analysis resulted in eight factors with Eigenvalues greater than one, with the first factor accounting for only 29% of the total variance, and the second and third factor each accounting for 9% of the total variance.

Our key constructs are latent in that they are not directly observable. Therefore, we used confirmatory factor analysis to check for construct validity. We found that for all variables in our study, the goodness-of-fit indices (GFI, NFI) were higher than the often suggested minimum value of .80; in other words, the items indeed represent 'valid measures' for their corresponding construct (Sharma, 1995). The fit indices as well as the standardized factor loadings for each of the individual items of our latent constructs are included in Appendix A. We also tested for the validity (and intra-respondent reliability) of key constructs by sending out a follow-up survey after an eight-month time lag. In the follow-up survey we used a shortened format of the original questionnaire: as proxy for the original measure, for each construct we chose one item from the original survey we believed best represented the overall construct

(Yli-Renko et al. 2001).[27] We received 129 responses to the follow-up survey (a 43% response rate) and found that all validation items had positive and significant correlations with the original measures.

We tested hypotheses using two techniques, hierarchical regression analysis and structural equation modeling. Hierarchical regression analysis examines variation of 'perceived performance' by estimating the influence of the relational capital and commitment variables beyond the effect of the control variables. That is, we ran two regression equations: one with only the control variables, and a second with the controls and the independent variables. In order to look at the structure of our variables and overall fit of our model, we also used a second statistical technique, structural equation modeling (through the CALIS procedure in SAS). This provided both a double-check on our regression results and the validity of our measures.

Dependent and Independent Measures

Perceived performance: Following Higashide & Birley (2002), we adapted our perception of performance from Sapienza (1992); it was measured by combining (1) a multi-criterion *satisfaction with performance* scale and (2) an *overall performance rating*. First, for the multi-criterion performance scale, venture capitalists were asked to assess how satisfied they were with the PFC's performance along six subdimensions of overall performance, such as 'sales' and 'market share.' Second, they were also asked to assess four items in terms of the PFC's overall performance. Both sets of items used five-point Likert scales (see Appendix A). In order to test whether the individual subdimensions and the overall performance ratings represent two dimensions of perceived performance, we conducted a confirmatory factor analyses on a two-factor model. The good statistical fit of this model (i.e., NFI = .91) showed that it was meaningful to combine the satisfaction and performance ratings into one measure for 'perceived performance.' The mean value of the final measure was 3.24 with a standard deviation of 1.02 and alpha of .88. The single-item measure in the follow-up survey correlated strongly with our perceived performance measure ($r = .672$ [$p < .001$]), suggesting construct validity.[3]

Trust: Drawing on the literature on interpersonal trust (Rempel et al. 1985) and interfirm trust (Morgan & Hunt 1994; Yli-Renko et al. 2001), we developed seven items to measure, on a five-point scale, the level of goodwill trust of the VCF in PFC representatives (e.g., 'The TMT members are perfectly honest and truthful with us'). A composite measure was then calculated by averaging the scores across the seven items. The mean value of the composite measure across all respondents was 4.09 with a standard deviation of .77 and alpha of .91. The single-item measure from the follow-up survey correlated strongly with our measure of *trust* ($r = .603$ [$p < .001$]), suggesting construct validity.

Social interaction: We developed four items for social interaction based on Yli-Renko et al. (2001) (e.g., 'We maintain close social relationships with the TMT members'). The mean of the composite measure across all respondents was 2.81 with a standard deviation of .90 and alpha of .83. A single-item measure in the follow-up survey correlated strongly with our measure of *social interaction* ($r = .509$ [$p < .001$]), suggesting construct validity.

Goal congruence: Goal congruence refers to the degree to which two exchange partners hold common goals and values for the PFC. Similar to Sapienza (1992) and Tsai and Ghoshal (1998), goal congruence was measured using four items (e.g., 'The TMT members and my firm share the same vision regarding the venture's future'). The mean value of the composite measure across all respondents was 3.96 with a standard deviation of .78 and alpha of .90. The single-item measure from the follow-up survey correlated

[27] We used one item in order to decrease consistency bias and to increase the response rate. We sent the follow-up survey to the same venture capitalist (VC) who had filled-out the original survey since only that VC knew relationship particulars.

[3] In order to further compare our subjective measure with more 'objective' measures, we collected data on PFC sales and employee growth (available only for a limited set of PFCs – Dun & Bradstreet database). We found a positive correlation of $r = .176$ [$p < .05$] between our perceptual performance measure and PFC sales ($n = 163$), and a correlation of $r = .205$ [$p < .10$] between our performance measure and the PFC's change in number of employees in the 1999-2002 period ($n = 78$). The positive but relatively low correlations indicate that while perceived and actual performance are not independent from each other, their relationship may be colored by other factors, such as the presence of positive feelings by the VCF vis-à-vis the PFC.

strongly with our *goal congruence* measure from the original survey (r = .667 [p < .001]), suggesting construct validity.

In order to assess whether trust, social interaction, and goal congruence were *distinct* dimensions of the level of 'relational capital' between the VCF and PFC, a factor analysis with VARIMAX rotation was undertaken. The analyses retained three factors with eigenvalue greater than one; no significant off-loadings were detected. The results are shown in Appendix B.

Commitment: We employed measures of commitment from prior research on commitment in supplier-customer relationships (Morgan & Hunt, 1994) and employees' commitment to their organization (Mowday et al., 1979), and we adapted the items to better reflect the nature of the VCF-PFC relationship. The detailed items can be found in the Appendix A. The mean value of the composite measure across all respondents was 4.39 with a standard deviation of .57 and alpha of .79. The single-item measure in the follow-up survey correlated strongly with our measure of *commitment* (r = .444 [p < .001]), suggesting construct validity.

Control Variable Measures

Because actual and perceived performance could be affected by the length of the relationship, we controlled for *number of years in the portfolio*; its mean was 2.75 with a standard deviation of .96. Further, the effectiveness of VCF-PFC relationship may decrease when the PFC's CEO lacks experience in dealing with outside equity investors since this inexperience may hamper the quality of the interaction (Sapienza & Gupta 1994). Therefore, we controlled for *CEO experience*; we used a categorical variable that indicated whether the PFC's CEO (1) had never been previously involved in a new venture, (2) had worked in a new venture before, but not as a founder, or (3) had previous experience as a founder or CEO of a startup.

Because perceived performance may vary according to growth stage, we also controlled for *PFC stage of development.* PFC stage of development (at the time of the VCF's initial investment) was assigned by the VCF to one of six financing stages; it was also used as a categorical variable in regression equations. Finally, we controlled for *industry* sector since certain industries may have been more or less profitable at the time of the survey. PFCs were assigned to one of seven industries (see Table 1).

Results

Table 1 shows significant positive correlations of the four independent variables with perceived performance. Thus, the correlations provide some preliminary evidence that relational capital and commitment are positively related to the effectiveness of the VCF-PFC relationship. We also observe positive correlations between commitment and the three dimensions of relational capital. In other words, the extent to which the VCF is committed to the PFC is higher when the VCF has confidence in the PFC's trustworthiness (r = .23 [p < .01]), when there is strong social interaction between the VCF and PFC (r = .14 [p < .05]), and when there is a strong agreement between the two parties in terms of the PFC's goals (r = .32 [p < .01]).

< Insert Table 1 here >

Table 2 shows the results of the regression analyses. The first column shows the results when only the control variables are included in the model; the second column shows the results when the independent and control variables are included. It can be seen that our independent variables (relational capital and commitment) explain 28% *additional* variance in the level of VCF perception of performance. The results in the second column of Table 2 indicate support for all four of our hypotheses. That is, trust (b = .29; p < .01), social interaction (b = .13; p< .05), goal congruence (b = .21; p < .01), and commitment (b= .14; p <

.01) all positively affect perceived performance.[4] None of the control variables are significantly related to the VCF's perception of performance.

< Insert Table 2 here >

Table 3 shows the results of the structural equation modeling (without control variables). The results are very similar to the results from the regression analysis: we found support for each of our four hypotheses. The fit indices indicate that the hypothesized model provides a reasonable fit to the data (GFI = .80; NFI = .81). In order to make a more direct assessment of the model fit, we compared the fit of two nested models, i.e., (1) the null model, whereby no relationships are assumed between the variables, and (2) the hypothesized model in which the hypothesized relationships are included. As can be seen from Table 3, the hypothesized model provides a fit superior to that of the null model ($p < .001$).

< Insert Table 3 here >

Discussion

Venture capitalists' perception of the performance of their portfolio ventures is critical to the development of those ventures. Such assessments may influence the nature of ongoing VCF-PFC interactions, the willingness of the VCF to provide follow-on funding, and the ability of the PFC to obtain alternative funding. From a theoretical perspective, social exchange theory suggests that relational capital and commitment are important aspects of the relationships between the broad set of economic actors, both in terms of the dynamics and the outcomes of these relationships (Granovetter 1985). Our results speak specifically to VCF-PFC relationships but also to broader issues in inter-firm relationships.

Our results show that relational capital and commitment contribute to VCFs' perceptions of PFC performance. It is worth noting that although commitment and the three dimensions of relational capital are clearly related to one another, all provide unique and significant contribution to perceived performance. We argued that these variables would have a direct effect on how well the VCF-PFC relationship functions, increasing the performance of PFCs in accordance with the value-added efforts of VCFs (Sapienza 1992; Shepherd & Zacharakis 2000). The contribution of our approach is that we are able to bring insight into *how* some venture capitalists are able to assist their PFCs effectively.

Our observations also appear apropos to a broader range of interorganizational relations. Consistent with Lane and Lubatkin (1998), our results suggest that investment in relation-specific effort can pay off via increased learning and more effective relationships. Yli-Renko et al. (2001) showed that social capital is useful in promoting learning in relationships between startups and their key customers. In particular, they found positive effects of relational capital on subdimensions of overall performance: new product introductions and acquisition of knowledge. We extend these findings to venture performance itself. Further, within the specific arena of VCF-PFC relations, Cable and Shane (1997) argued in favor of the value of cooperation; our results provide empirical support for this view. In summary, our results support social exchange and learning theories, both of which suggest that inter-firm relationships influence the creation of knowledge and, potentially, performance (Cohen & Levinthal 1990; Yli-Renko et al. 2001).

As a secondary argument, we posited that the quality of the relationship and the depth of VCF commitment would work in another way as well. When relationships are bad, poor performance will look worse to the VCF; when the relationships are good, VCFs are likely to give poor performers the benefit of the doubt and to judge good performers as even better. It would be naive to think that venture capitalists, whose livelihood depends upon tough-minded assessment, would be excessively swayed by their personal feelings about the PFC. Nonetheless, given the difficulty of assessing the causes of performance in highly complex and uncertain situations, it is not unlikely that outside board directors and investors will be at

[4] We also tested for multicollinearity because high correlations among the independent variables may mask the individual variables' explanatory power. Examination of the variation inflation factors showed that multicollinearity did not hamper the interpretation of the regression results; that is, all variation inflation factors were much lower than ten, the limit suggested by Neter et al. (1996). The highest variation inflation factors were found for trust (1.99) and goal congruence (2.03).

least modestly influenced by their personal involvement with the venture (Walsh & Seward 1990). Procedural justice theory suggests that firm's perceptions about others' performance may be influenced not only by actual performance but also by relational factors (Sapienza & Korsgaard 1996). The possibility that positive affect moderates the influence of actual performance on perceived performance may shed light on one anomalous finding of Yli-Renko et al. (2001): they observed a *negative* relationship between goodwill trust and knowledge acquisition for startups in their key customer relationships. They speculated that some relationships may become over-embedded and limit productive knowledge exchange. Our results suggest that if performance drops, parties that get along well with one another are still likely to judge performance in a somewhat positive light. Still, we must offer a caution. Our evidence is consistent with this possibility, but the absence of valid objective performance measures prevent us from directly testing this idea. Nonetheless, we believe that the principles we suggest are applicable in a broader set of inter-firm relations, and we note that this idea could be tested in environments in which such measures are available and valid.

Our research extends prior research in the domain of venture capital that has used agency theory, procedural justice theory or game theory as the underlying framework to examine VCF-PFC relationships. Since MacMillan et al. (1988) noticed the wide variation in VCF involvement in PFCs, theorists have tried to uncover systematic causes and effects of this variation. For instance, Barney et al. (1994) argued that that PFC performance would be negatively related to the use of monitoring mechanisms (such as board membership), whereas Sapienza et al. (1996) argued that VCF involvement would be positively related to venture performance. These contradictory views have led some to critique the agency view as a framework to explain VCF-PFC dyads by pointing out that these dyads are not unambiguously a principal-agent relationship; at times, either one or the other can be conceived as agent (e.g., Cable & Shane 1997; Gifford 1997). However, a more fundamental problem may exist: devices used to limit agency risk may influence the relationships and their governance themselves (Sapienza & Korsgaard 1996; Walsh & Seward 1990). For instance, Busenitz et al. (1997) showed that excessive use of formal governance devices undermines PFCs' belief in the fairness of the VCF and may make PFCs less receptive to VCF advice. Further, Sapienza & Korsgaard (1996) showed that VCFs' perception of procedural justice influences their trust in and commitment to their PFCs. Consistent with Cable and Shane's (1997) prisoner's dilemma view that cooperation is essential to PFC performance, several theorists have speculated that the quality of the relationship between VCF and PFC ultimately influences both the performance of the PFC and the attitudes of the parties toward one another (e.g., Busenitz et al. 1997; Shepherd & Zacharakis 2000). Our results provide empirical support for this positive influence of social aspects of the VCF-PFC relationship on the outcomes of the relationship.

At a more general level, our arguments were consistent with Yli-Renko et al.'s (2001) study on the effects of social capital on the outcomes of entrepreneur-*customer* relationships. Like Saparito et al. (2004), however, we went a step further to suggest that the emotional dimension of a relationship might also matter; that is, whether an exchange partner *cares* about the other may make a substantive difference in economic outcomes. By examining the commitment dimension, we included an emotional dimension that is rarely studied in business organizational works.

Our empirical results showed that despite their intercorrelations with one another, trust, social interaction, goal congruence and VCF commitment all contribute uniquely to perceptions of PFC performance. In the following paragraphs, we offer some further interpretations of and reflections on each dimension as well as the reflections of some investors themselves.

Trust

It can be seen from Table 1 that the mean value for the trust score was high (i.e., a score of 4.09 on a five-point scale). Exploratory interviews showed that VCFs, a priori, only want to invest capital in CEOs in which they have high trust. Many interviewees indicated that when the CEO does not behave in a trustworthy manner after the investment has been made, the VCF may decide to replace him or her, or opt not to make any further investment in the venture. Interestingly, the replacement of the CEO may occur even when PFC performance is not disappointing. In other words, the interviews indicated that although venture capitalists often emphasize the financial 'bottom-line' as being critical for their decision making,

in some cases the quality of the relationship between VCF and PFC may also be an important driver for the VCF's decisions.

> *'In terms of the trust, I would not invest in someone, no matter how good the venture's technology is, if I don't have trust in that person. After the investment has been done, there may be misunderstandings, and then I confront the CEO directly with his previously made promises. Most likely, if no solution can be found, we either decide to get rid of the existing CEO, or to just put no more money in that company even if they have reached their milestones.'*

This quote indicates that although some reverse causality undoubtedly does occur (i.e., it is easier to trust a CEO when the venture performs well), there is also good reason to believe that the trustworthiness of the CEO is viewed as a key determinant of perceptions of the value of future venture performance. Despite the rather small variation in the trust variable, the variations nonetheless were significantly related to perceived performance, a fact consistent with this interpretation. The trustworthiness of the PFC's CEO may also have indirect associations with perceived performance in that it may indicate the quality of relations that the PFC is able to establish with vendors, customers, and other important external constituents. Alternatively, it may reflect the VCFs' general quality of relationships and their ability to positively shape venture performance. In short, the trust evident in the PFC-VCF relationship may be a proxy for a broader level of social capital available to the PFC.

Social interaction

The positive relationship of social interaction with perceived performance may indicate that when entrepreneurs and investors know each other on a personal, informal level, there may be more opportunity for fruitful communication and learning. Several interviewees referred to the investor-investee relationship as being a marriage in that there needs to be some chemistry in order for the relationship to work. Such chemistry may help the VCF then to better detect the PFC's needs or eventual struggles.

Interestingly, some interviewees mentioned that too much of a social relationship can potentially harm the outcomes of the relationship, in that one becomes blind to the other's weaknesses. The VCF-PFC relationship may potentially include 'too much' relational capital, in that the investor may not be critical enough about the PFC's decisions and actions (Nahapiet & Ghoshal, 1998). Such a view would be consistent with the findings of Yli-Renko et al. (2001) who found lower knowledge acquisition outcomes in high quality relationships between entrepreneurs and their customers. Nonetheless, our results indicate that, on average, a strong social relationship positively influences the VCF's perception about the PFC's accomplishments.

Goal congruence

Our exploratory interviews also indicated that goal congruence is critical to performance, especially in terms of the discussions that take place at the board meetings. More specifically, consistent with Sapienza and Gupta (1994), major disagreements among board members about the PFC's future direction may lead to non-productive discussions about personal rather than business issues. Affective conflict may evolve out of cognitive conflict and undermine strategic decision making in VCF-PCF pairs (Amason & Sapienza, 1997). In such cases, a cycle of recrimination or obstruction can destroy the functioning of the board and the venture itself.

Commitment

Finally, our findings regarding commitment are interesting in light of past studies in the literature. MacMillan et al. (1988) depicted VCFs as more or less dispassionately choosing to have high, medium, or low involvement as a matter of personal taste. Gifford (1997) argued that these choices are likely based on optimization of VCF portfolio outcomes and may not be in the best interest of any particular PFC. That is, a VCF will pick and choose how to allocate time so as to optimize its own outcomes, possibly at the expense (or benefit) of a given PFC. Our results suggest that it indeed does matter where VCFs put their effort. The relatively high mean score for the commitment measure (i.e., 4.39 on a five-point scale) belies the general dispassionate characterization of VCF involvement. This high score also indicates that

venture capitalists may have a more difficult time in trading-off their efforts or emotional commitment than suggested by Gifford (1997). As one interviewee put it:

> *'One of the tricky aspects about our business is that once you have made a commitment, it is really a commitment. That means that you have to be prepared to do whatever it takes to help that company, if it is in your power. If the company gets in trouble, or it starts to grow very fast, we try to be responsive and to be involved as much as we can. There have been times that I spent as much as half my time on a single company, almost a daily activity.'*

Control variables

Interestingly, we found no significant effects for our control variables: perceived performance was not affected by the time the PFC had been in the VCF's portfolio, the experience of the PFC's CEO, the PFC's stage of development, or PFC's industry. This is somewhat surprising in that these variables might be expected to affect business risk and therefore the performance of PFCs. A possible explanation for the lack of an effect of the control variables is that the responding VCFs had already taken factors such as stage of development and industry conditions into account when assessing satisfaction with the performance of their PFCs.

Limitations, Implications, and Future Research

This study has some limitations that should be taken into account when interpreting the results. First, given the lack of public data sources for most of the key variables in the model and the challenge in having venture capitalists co-operate with survey research, we relied mostly on self-reported, single-respondent data. In order to guard against some of these limitations, whenever possible we used previously validated scales and took extra steps to validate variables with additional data sources. Second, since we collected data from only venture capitalists, we have only one perspective. It would indeed have been interesting to examine whether there was an alignment between the VCF and PFC in terms of the key variables of this study, such as trust, commitment or performance. Third, as mentioned earlier, the cross-sectional nature of our data requires caution in drawing causal inferences, in that relationships may be susceptible to reverse causality. For instance, the positive effect of trust on perceived performance may also indicate that individual investors have more trust in a management team of a particular PFC *because* the PFC is performing well. Similarly, high levels of perceived performance may drive VCFs to further commit themselves to the PFC. Although the study's hypotheses were based on solid theory, future research efforts should also seek to collect data on perceived performance over time in order to clarify causality.

Our results also hold several practical implications. First, an important implication of this study is that a PFC's attitude towards its VCF may affect the former's standing within the venture capital community. That is, our results suggest entrepreneurs may increase their reputation in the venture capital community and access to additional needed funding by building an internal competency in fostering open and fruitful communication with their investors. Our results also suggest that when entrepreneurs seek to maximally benefit from their venture capital provider (i.e., when they expect more than the mere provision of capital), they need to be willing to build strong inter-personal relationships with representatives of the venture capital firm. Second, the results suggest that when the VCF shows its commitment to the PFC (e.g., by showing loyalty and devoted attention to the PFC), the latter may provide the VCF with richer and more abundant information (Busenitz et al., 1997). Venture capitalists may also therefore benefit from convincing CEOs that the VCF is 'in the game' for the long run and is willing to function as committed insiders. Third, we reasoned that high-quality relationships between VCF and PFC may not only enhance relational outcomes through learning effects, but also because positive feelings may *color* perceptions of performance. Investors should therefore be wary to remain objective in their performance assessments when the relationship is excessively close or excessively distant.

Several suggestions can be given in terms of how future research can further enhance our understanding of how VCFs perceive the performance of their PFCs. First, future research efforts could focus on collecting performance perceptions over time in order to clarify the causal direction of the hypothesized relationships. Moreover, an examination of performance perceptions across *multiple* PFCs for a single

VCF could shed more light on whether VCFs are able to effectively manage (and trade-off) investments in relationship development within their portfolio (Gifford, 1997). Also, in this study we examined the *consequences* of how committed the VCF is to one particular PFC. Future research could explore how VCF divide their (behavioral and emotional) involvement across multiple PFCs based on their perception of how well the PFCs have performed. Finally, our arguments for the link between relational capital and commitment on the one hand and perceived performance on the other involved two unmeasured mechanisms (i.e., 'learning' and 'positive affect'). Future researchers should attempt to develop measures that assess the importance of these intermediary mechanisms.

We contend that VCFs' perception of performance is more important to the VCF-PFC relationship than actual performance itself, especially in very early stage ventures. We hold that venture capitalists' judgment is generally good but is also subject to mistakes. For example, some early backers of Federal Express bailed out of that investment before it took off and made millions for the later investors. We have proposed a plausible model of how perceived performance emanates from actual performance through learning and from the indirect effects of the quality of the relationship. Greater insight into these processes and mechanisms may help future investors to avoid the type I and type II errors that appear so unavoidable at present.

In conclusion, this study contributes to the broad literature on inter-firm relations by highlighting the role of relational variables in performance and perceptions of performance. We also extended the venture capital literature by highlighting how relationships shape the ability to add value and to judge the value of new ventures. Yet much remains to be learned. We hope that this study can serve as a stepping stone to further investigation of the relational bases of successful interfirm relationships in general, and the creation of successful ventures in particular.

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Appendices

Appendix A: Constructs and measurement items
(standardized factor loadings in parentheses)

"Perceived performance" (GFI = .85; NFI = .89)
Please indicate on a scale from 1 to 5 how satisfied you are with the venture's progress over the last year on the following criteria.
'Sales' (.74)
'Market share' (.66)
'Gross margin' (.55)
'Return on investment' (.81)
'New product development' (.47)
'Market development' (.60)
Please rate on a scale from 1 to 5 your agreement or disagreement with each of the following statements:
'We are very satisfied with the progress of this venture.' (.95)
'So far, I would rate this venture's performance as very poor.' (.84)
'Considering this venture's stage of development, it has done very well.' (.91)
'Market conditions aside, the value of our investment in this venture has greatly increased.' (.81)

"Trust" (GFI = .96; NFI = .96)
Please indicate on a scale from 1 to 5 your agreement or disagreement with each of the following statements:

‘The Top Management Team (TMT) members are perfectly honest and truthful with us.’ (.84)
‘The TMT members are truly sincere in their promises.’ (.83)
‘The TMT members treat us fairly and justly.’ (.89)
‘The TMT members cannot be trusted at all times.’ (.65)
‘The TMT members can be counted on to do what is right.’ (.70)
‘The TMT members have high integrity.’ (.82)
‘The TMT members would not take advantage of us even if the opportunity arose.’ (.67)

“Social interaction” (GFI = .96; NFI = .94)
Please indicate on a scale from 1 to 5 your agreement or disagreement with each of the following statements:
‘We maintain close social relationships with the TMT members.’ (.83)
‘We know the TMT members on a personal level.’ (.73)
‘Our relationship with the TMT members is strictly formal.’ (.63)
‘We spend significant time together with the TMT members in social occasions.’ (.78)

“Goal congruence” (GFI = .94; NFI = .96)
Please indicate on a scale from 1 to 5 your agreement or disagreement with each of the following statements:
‘The TMT members and my firm share the same vision regarding the venture’s future.’ (.85)
‘Both parties are enthusiastic about pursuing the same goals.’ (.93)
‘The TMT members and my firm think alike on most issues.’ (.74)
‘My firm’s goals are fully aligned with the TMT’s.’ (.77)

“Commitment” (GFI = .93; NFI = .89)
Please indicate on a scale from 1 to 5 your agreement or disagreement with each of the following statements:
‘We are willing to put in a great deal of effort in this venture beyond what is expected from the contractual agreement.’ (.65)
‘We devote considerable time and energy to this venture.’ (.60)
‘We feel very little loyalty to this venture.’ (.15)
‘We go out our way to help this venture.’ (.65)
‘This venture deserves our firm’s maximum effort.’ (.79)
‘We are very committed to the relationship with this venture.’ (.88)
‘We really care about the fate of this venture.’ (.64)

Appendix B: Exploratory factor analysis for relational capital items

Items	*Factor 1 'Trust'*	*Factor 2 'Social interaction'*	*Factor 3 'Goal congruence'*
The Top Management Team (TMT) members are perfectly honest and truthful with us.	*.855*	.048	.186
The TMT members are truly sincere in their promises.	*.793*	.075	.277
The TMT members treat us fairly and justly.	*.828*	.110	.321
The TMT members cannot be trusted at all times.	*.679*	.013	.216
The TMT members can be counted on to do what is right.	*.693*	.006	.340
The TMT members have high integrity.	*.842*	.026	.188
The TMT members would not take advantage of us even if the opportunity arose.	*.628*	.050	.362
We maintain close social relationships with the TMT members.	-.005	*.850*	.128
We know the TMT members on a personal level.	.054	*.824*	.063
Our relationship with the TMT members is strictly formal.	.075	*.759*	.031
We spend significant time together with the TMT members in social occasions.	.044	*.824*	-.007
The TMT members and my firm share the same vision regarding the venture's future.	.260	.021	*.846*
Both parties are enthusiastic about pursuing the same goals.	.367	.037	*.841*
The TMT members and my firm think alike on most issues.	.371	.128	*.740*
My firm's goals are fully aligned with the TMT's.	.372	.104	*.769*
Eigenvalue	*6.583*	*1.236*	*2.590*

Figure 1: Conceptual model

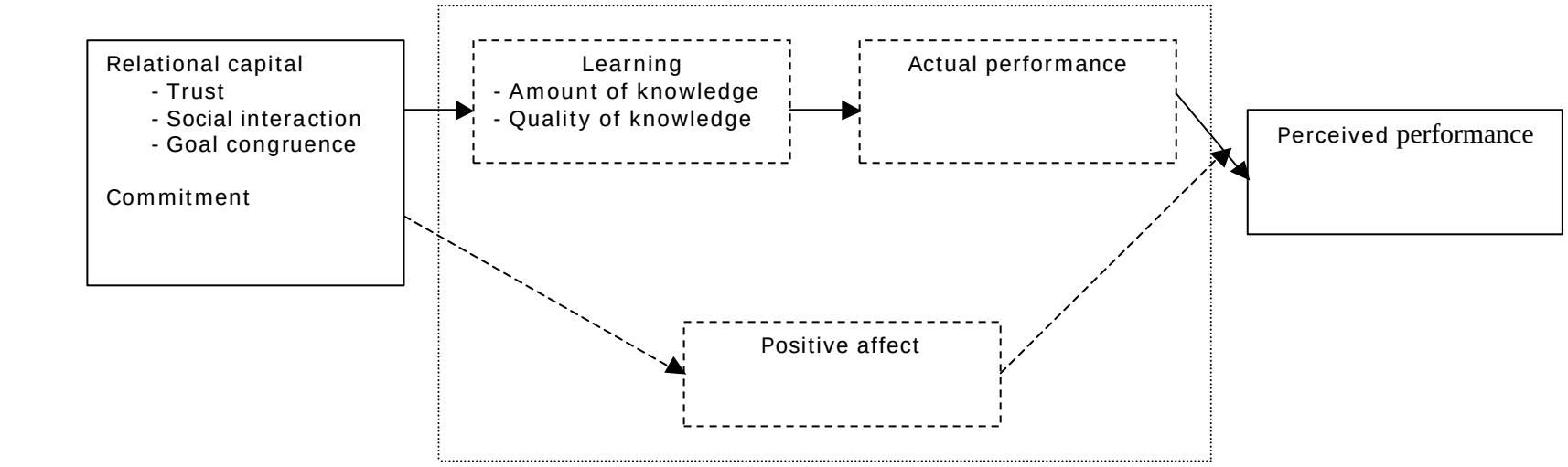

Table 1: Correlation matrix *(N = 298)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Perceived performance																						
2. Trust	.49**																					
3: Social interaction	.21**	.13*																				
4: Goal congruence	.48**	.68**	.17**																			
5: Commitment	.30**	.23**	.14*	.32**																		
6. Years in portfolio	-.06	-.04	.05	-.03	.02																	
7. No new venture experience	-.06	.02	.01	-.03	-.02	.05																
8. New venture exper. but not as founder	-.06	-.02	-.01	-.03	-.02	.07	-.40**															
9. Founder experience.	.11	.00	.00	.06	.03	-.10	-.60**	-.50**														
10. Seed stage	.10	.02	.05	.03	.07	.02	.03	-.10	.06													
11. Start-up stage	-.08	.01	.03	-.01	-.11	.00	-.08	.09	.00	-.34**												
12. Early stage	-.05	-.15**	-.09	-.04	-.05	-.06	.01	.00	-.01	-.29**	-.29**											
13. Expansion stage	.01	.01	-.10	-.06	-.04	-.01	-.08	.14	-.04	-.26**	-.26**	-.23**										
14. Buy-in/buy-out stage	.03	.13*	.09	.10	.14**	.07	.15**	-.15**	-.02	-.20**	-.20**	-.18**	-.16**									
15. Turnaround stage	.00	.02	.08	.01	.04	.01	.02	-.01	-.01	-.08	-.08	-.07	-.06	-.05								
16. Communications	.02	.09	-.07	-.04	-.05	-.10	-.05	-.04	.08	.12*	-.03	-.07	.11	-.14*	-.07							
17. Computer & Electronics	-.08	-.09	-.03	-.04	-.01	.00	-.04	.06	-.02	.00	.04	.06	-.08	-.03	.00	-.26**						
18. Biotech & Medical	.15**	.06	-.02	.09	.09	.12*	-.13*	.09	.04	.10	.01	.03	-.01	-.15**	-.07	-.27**	-.25**					
19. Resources	-.02	-.09	.09	-.05	.08	-.01	.05	-.05	.00	-.13*	-.06	.09	.11	.02	-.03	-.12*	-.11	-.11*				
20. Services	-.10	-.07	.04	-.04	-.07	.01	.15**	-.03	-.12*	-.10	.00	.07	-.07	.15**	-.03	-.13*	-.11*	-.12*	-.05			
21. Consumer	.06	.04	.05	.04	-.01	.03	.02	0.04	-.06	-.02	-.09	-.06	.07	.13*	.07	-.14*	-.13*	-.13*	-.06	-.06		
22. Other	-.08	.01	.02	.02	-.02	-.02	.09	-.10	.00	-.09	.06	-.07	-.09	.17**	.12*	-.28**	-.24**	-.27**	-.12*	-.13*	-.14*	
Mean	3.24	4.09	2.81	3.96	4.39	2.75	.32	.25	.43	.25	.25	.20	.17	.11	.02	.22	.19	.21	.05	.05	.06	.22
Standard deviation	1.02	.77	.90	.78	.57	.96	.47	.43	.50	.43	.43	.40	.37	.31	.13	.42	.39	.41	.21	.23	.24	.42
Minimum	1.00	1.00	1.00	1.00	2.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Alpha	.88	.91	.83	.90	.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Zero-order correlation coefficients; ** p [two-tailed] = .01; * p [two-tailed] = .05

Table 2: Regression results *(N = 298)*

Dependent variable →	*Perceived performance*	
H1: Trust		0.285**
H2: Social interaction		0.126*
H3: Goal congruence		0.209**
H4: Commitment		0.136**
Years in portfolio	-.072	-0.049
CEO experience: new venture but not as founder[1]	-.013	-0.016
CEO experience: founder	.076	0.068
PFC stage: start-up[2]	-.103	-0.083
PFC stage: early	-.087	-0.021
PFC stage: expansion	-.045	-0.003
PFC stage: buy-in/buy-out	.033	-0.053
PFC stage: turnaround	-.002	-0.025
Industry: computer & electronics[3]	-.069	-0.033
Industry: biotech & medical	.116	0.072
Industry: resources	-.021	-0.012
Industry: services	-.096	-0.054
Industry: consumer	.037	0.029
Industry: other	-.086	-0.066
F-value (degrees of freedom)	1.487 (14; 283)	8.284 (18; 279) (one-tailed $p < .001$)
R^2	.069	.348
Adjusted R^2	.022	.306
Difference in adjusted R^2		.284

Standardized regression coefficients; ** p [two-tailed] = .01; * p [two-tailed] = .05;
[1] 'No new venture experience' used as base case
[2] 'Seed stage' used as base case
[3] Industry category 'communications' used as base case

Table 3: Results of structural equation model *(N = 298)*

Paths	*Path coefficients*
Trust → Perceived performance	0.307**
Social interaction → Perceived performance	0.152*
Goal congruence → Perceived performance	0.219**
Commitment → Perceived performance	0.220**
Model fit	
GFI	.80
NFI	.81
Chi square (Hypothesized model)	1215 (d.f. = 460)
Chi square (Null model)	6426 (d.f. = 496)
Chi square difference	5211** (d.f. = 36)

** p [two-tailed] = .01; * p [two-tailed] = .05

Venture Capital, Private Equity and Earnings Quality

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Abstract

This paper examines the quality of financial statements reported by private equity (PE) backed companies in the years around the initial PE investment. We study both pre- and post-investment earnings characteristics of a unique hand-collected sample of 556 Belgian unlisted companies, receiving PE financing between 1985 & 1999, and a matched non-PE backed sample. We find strong evidence of upward earnings management in the PE backed sample prior to the investment year, consistent with the hypothesis that entrepreneurs which apply for PE manage earnings upward to catch PE investors' interest. Further, PE backed companies show a significantly higher extent of earnings conservatism compared to matched companies from the investment year on, indicating a governance impact of PE investors on the financial reporting discipline. Finally, we find a marginally higher degree of earnings conservatism for companies receiving PE from non-government related investors compared to companies backed by government-related PE investors. We interpret this stricter financial reporting discipline as being the reflection of a more slack governance by government-related PE investors compared to non-government-related investors. Our results have implications for PE investors as well as for all other stakeholders of PE backed firms.

Introduction

A substantial theoretical and empirical literature has explored how private equity (PE) investors screen, select, finance and monitor their portfolio companies (e.g. Gompers, 1995; Hellman & Puri, 2000 & 2002; Kaplan & Strömberg, 2001 & 2002; Lerner, 1995). Most of these studies focus on the dynamics of the relationship and the contractual arrangements between PE investors and entrepreneurs. One aspect which received only minor attention so far is the use of financial accounting information both in the pre-investment screening and the post-investment monitoring period.

There exists questionnaire evidence indicating that PE investors rank, next to entrepreneurial characteristics and market opportunities, both financial performance and general accounting information as leading elements in screening and selecting potential ventures (Fried & Hisrich, 1994; MacMillan et al., 1987; Wright & Robbie, 1998). Falconer et al. (1995) report that PE investors are heavy users of financial statement information and more specifically, that this information is a key component to evaluate the firm ex post. Kaplan & Strömberg (2002) also stress the importance of financial and accounting measures in the design of financial contracts between entrepreneurs and PE investors. Furthermore, Manigart et al. (2000) show that when PE investors have a more financial or banking background, they emphasize accounting and financial statement information even more as well in the screening stage as in the monitoring ex post.

Given the key importance of financial accounting information in as well the screening as the governance of PE portfolio firms, this raises the questions (i) whether entrepreneurs actively manage reported earnings upward to attract PE investors and (ii) whether PE investors' governance affects the ex post financial reporting behavior of their companies under portfolio. In this paper, we address these issues by studying pre- and post-investment financial reporting characteristics of PE investors' portfolio companies.

Empirical and anecdotal evidence indicates that accounting information is sometimes used to mislead potential investors or to influence contract terms. For example, traditional earnings management studies typically examine earnings behavior around specific corporate events like initial public offerings (IPOs), seasoned equity offerings (SEOs), (convertible) debt issues and debt covenant violations (for an extended literature overview, we refer to Healy and Wahlen, 1999). Around these events, corporate incentives to manage earnings are
likely to be high. In all above-mentioned situations, a company is better off with reporting higher earnings figures before the event. IPOs and SEOs will have more chance of succeeding, debt issues can be done at more favorable rates and debt covenant violations can be avoided if companies are able to meet or beat a priori financial benchmarks. The empirical literature provides evidence of intensified earnings management levels prior to the analyzed event (e.g. DeFond & Jiambalvo, 1994; Perry & Williams, 1994; Teoh et al., 1998a & b) .

In the case of PE financing, one can question whether entrepreneurs act in a similar way and manage earnings upward when applying for PE. Given that PE investors pay attention to the financial accounts of their portfolio companies, entrepreneurs might try to present a better picture of their company to increase their chances of getting money. Our empirical results are consistent with this prediction and show that earnings management indeed is positively related to receiving PE financing.

Additionally, there is ample evidence that investments by professional PE investors result in a substantial change in the corporate governance system in place to reduce information asymmetry and moral hazard problems (e.g. Gompers, 1995; Kaplan & Strömberg, 2003; Lerner, 1995; Sahlman, 1990; Sapienza et al., 1996). PE investors become intensively involved in the management of their portfolio firms after the investment, providing substantial support in their day-to-day activities and monitoring them rigorously (e.g. Gompers, 1995; Kaplan & Strömberg, 2002). Hellman & Puri (2002) document that the change in governance coming from the PE investors' involvement eventually affects the professionalism by which portfolio companies operate. Here, we study one component of the impact of tighter corporate governance rules, namely how the financial reporting discipline of PE portfolio companies is affected. Consistent with findings of Falconer et al. (1995), we expect losses in the post-investment period to be disclosed promptly, since these authors report that PE investors' main concern with respect to financial reporting is a timely recognition of bad news. Following Basu's (1997) definition, timely loss recognition reflects a higher degree of earnings conservatism and can be seen as a direct result of the higher legitimate demand for timely information (Ball & Shivakumar, 2002). Our findings are in line with this proposition and highlight the substantial impact of PE investors on the financial reporting discipline of their portfolio companies.

Finally, we study the impact of investor type on the post-investment financial reporting discipline. Leleux & Surlemont (2003) have provided evidence that government-related PE investors are worse monitors of their portfolio companies compared to non-government PE investors. We argue that the tighter governance by non-government PE investors will result in a more conservative financial reporting discipline for their portfolio companies compared to companies backed by government-related PE institutions. Results are marginally significant suggesting that PE investors' governance impact is not only manifest in their financial reporting conservatism as a whole but that it is also partly determined by investor type.

Our analyses are based on a unique hand-collected dataset of 556 Belgian PE backed companies between 1985 and 1999, and a matched sample of non-PE backed companies. In Belgium, both listed and unlisted companies have to report yearly financial statements. Hence, we exploit a unique opportunity to study financial accounting data of unlisted companies applying for and receiving PE financing in a longitudinal framework. By doing so, we are able to study both entrepreneurial pre-investment earnings management behavior and post-investment governance impact of PE investors on the financial reporting discipline simultaneously.

We use multiple approaches to empirically analyze both earnings management and earnings conservatism around the PE investment. First, earnings distributions as in Burgstahler and Dichev (1997) and Degeorge et al. (1999) are examined to get a view of the entrepreneurs' attempts to record positive earnings, respectively earnings growth prior to the PE financing date. We find that one year prior to PE financing, small earnings growth is pursued. This finding is in contrast to previous years where small earnings declines are not avoided. Second, cross-sectional regression analyses as in Teoh et al. (1998a & b) allow to determine the magnitude of discretionary current accruals (a quantifiable measure for earnings management) and to explore the difference over time between companies with and without PE. Results are in line with expectations: we find substantial earnings management prior to PE financing date and a more restrained earnings management behavior post-investment. The matched sample results do not show systematic earnings management patterns in any of the observed years. Third, we apply time-series measures on different sub-samples as in Basu (1997) and Ball & Shivakumar (2002) to study post-investment earnings conservatism patterns. Results are in line with the prediction that PE backed companies report losses more timely than non-PE backed companies after the investment date, suggesting a higher degree of earnings conservatism for PE backed companies. With respect to investor type, we find indications that earnings conservatism tendencies are lower for

companies backed by government-related PE institutions compared to non-government PE backed companies, although to a weaker extent.

This study contributes to the growing literature on earnings characteristics of PE backed companies (Jain & Kini, 1995; Teoh et al, 1998a & b; Hochberg, 2002). These studies, however, are limited to the period surrounding the IPO largely because of data unavailability before going public. However, it has been shown that PE presence is most imperative at earlier stages of a company's lifetime or when companies are not publicly listed (Hellman & Puri, 2002). Bearing this in mind, we specifically choose to study data of unlisted companies receiving PE. By doing so, we are not only able to unravel earnings management attempts of entrepreneurs in the pre-PE financing period but also to study PE investors' monitoring impact on one aspect of the corporate governance of their portfolio companies, namely their financial reporting discipline. This study also builds on recent advances in the corporate governance literature on the role of PE investors as monitors in the professionalization process of a firm (Gompers, 1995; Hellman & Puri, 2002). We show that the increased governance stemming from PE investors endogenously determines financial reporting quality.

In this study, we specifically prefer to use the term PE rather than venture capital. This designation is driven by the specific characteristics of our sample firms. According to the European Venture Capital Association (EVCA) definition, 'venture capital' is defined as a "subset of private equity and refers to equity investments made for the launch, early development, or expansion of a business." PE is broader in meaning and is also used to define external equity capital that is raised to strengthen a company's balance sheet, to make acquisitions or to finance a management buy-out or buy-in (EVCA Glossary). Since a considerable number of observations refer to later stage deals and hence do not satisfy the exact definition of venture capital, we use the term PE to label all our equity financed deals.

The remainder of this paper goes as follows. In section 2, hypotheses are developed. In section 3, we describe our sample and the specific Belgian institutional context and provide descriptive statistics. Empirical tests and results are presented in section 4. Section 5 concludes and discusses the study.

Hypotheses

Applying for and receiving outside equity financing is an important corporate event that has impact beyond receiving additional financial resources. It affects the professionalization of an individual firm (e.g. Hellman & Puri, 2002). Before the deal, firms applying for PE financing have to advertise themselves to catch the interest of potential investors. Once PE investors decide to invest in the company, its governance system typically is reshaped to reduce information-asymmetry and moral hazard problems (Gompers, 1995; Lerner, 1995; Kaplan & Strömberg, 2002). In the following section, we argue how both pre-investment screening and post-investment intensified governance may affect a company's financial reporting process, alternatively with respect to earnings management and earnings conservatism.

PE investments and earnings management

Pre-investment

One major concern of firms which seek to raise PE financing is to showcase themselves to potential investors. Typically, the search for capital is facilitated when firms are able to show excellent market opportunities, competitive advantages or when a qualified and dedicated entrepreneurial team is managing the company (e.g. Wright & Robbie, 1998).

However, next to these elements, financial figures are also key elements in the screening process of investment opportunities. MacMillan et al. (1987) and Wright & Robbie (1998) show that PE investors rank financial performance and general accounting information next to entrepreneurial characteristics and market opportunities as leading elements in screening and selecting possible investees. Fried & Hisrich (1994) report that over 80% of their sample of US-based PE investors conduct an in-depth study of company financials before taking on an investment deal. This figure is even higher for later stage

deals. Furthermore, Manigart et al. (2000) find that investors with a financial or banking background emphasize accounting and financial statement information even more.

One might expect that companies looking for PE use all means available to present their company in the best possible way. Given that financial statements are an important determinant on which PE investors ground their investment decision, entrepreneurs might manage earnings levels upward opportunistically prior to the deal. Moreover, we know that a typical PE screening process is executed in multiple stages. In a first stage, PE investors screen investment opportunities rather roughly, focusing only on some important benchmarks such as market opportunities, business potential and financial profitability (Fried & Hisrich, 1994; Hall & Hofer, 1993). This first-round screening usually is executed by junior team members and generally takes only a limited amount of time (Fried & Hisrich, 1994; Hall & Hofer, 1993). Only a small number of business proposals pass through the first screening stage and detailed due diligence is performed on a limited number of potential deals in a second evaluation round. Hence, it is important for PE seeking companies to survive the first screening round and to be considered for a more intensive due diligence, which eventually opens up the door to receiving PE funding. As a result, entrepreneurs who are well aware of the way PE financiers screen their investment opportunities might focus specifically on providing an excellent first impression by exploiting financial reporting flexibility maximally. Although past financial performance is only one element in the PE decision making process, we argue that PE seeking companies will use all means available to present theirselves as favorably as possible to the outside world.

Based on these arguments, our first hypothesis states that entrepreneurs actively try to influence PE financiers' financing decisions positively by managing earnings figures upward:

H1: *"PE seeking companies manage earnings upward prior to the investment year"*

However, it has empirically been shown that PE investors are professional parties who cannot be fooled easily. Wright & Robbie (1998) find that PE investors have fairly complicated screening and evaluation techniques to underpin their investment decision. Moreover, since their selection is based on consecutive screening rounds and a thorough due diligence process is executed to uncover both opportunities and potential threats of the investment, one might wonder whether this earnings management behavior is not redundant. PE investors often negotiate complex control rights at the time of their investment and incorporate extensive governance and monitoring mechanisms (Kaplan & Strömberg, 2002), suggesting that potential earnings management attempts may be uncovered easily.

Even if earnings management attempts would not be unraveled prior to the deal, the close monitoring after the investment suggests they can be detected in a later stage anyway. As a result, it is unclear whether entrepreneurs would still try to manage their earnings upward to catch the interest of PE investors even knowing that, once discovered, it might harm the long-term mutual trust relationship between both parties. Given these conflicting views, it is relevant to study whether entrepreneurs actively manage reported earnings upward prior to the deal since this indeed may help them to attract the attention of PE investors but it is very likely to be uncovered in further, more thorough due diligence screening.

Post-investment

Once the PE deal is done, the entrepreneur is no longer the exclusive owner of the firm. The specific investor/investee relationship results in a typical principal-agent problem, as described in Jensen & Meckling (1976). An entrepreneur's private benefits are not always perfectly aligned with outside investors' returns (Gompers, 1995; Kaplan & Strömberg, 2002). Entrepreneurs could invest in projects with high personal benefits but low monetary returns for investors, with the only goal to maximize personal wealth (Gompers, 1995).

As a result, PE investors typically include monitoring devices in the investment contract. E.g. arrangements between entrepreneurs and PE investors are typically negotiated in financial contracts, describing control rights between both parties (Kaplan & Strömberg, 2002). PE investors monitor their investment firms by periodic evaluations of the project's status, incorporating options to abandon

subsequent financing and putting VC representatives in the board of directors (Lerner, 1995; Wright & Robbie, 1998). Other examples are periodical check-ups of the day-to-day activities and prerequisite periodical financial reports (e.g. Gompers, 1995). Furthermore, PE investors play a substantial role in shaping the management team, developing a business plan, providing essential assistance in take-over matters or in designing the executive compensation (Kaplan & Strömberg, 2002; Sapienza et al., 1996).

This intensified governance system put into place by the external investors results in tight post-investment relationships between investors and entrepreneurs. We argue that this enhanced monitoring and close involvement of the PE investor with the company itself reduces post-investment financial reporting flexibility and, as such, reduces earnings management possibilities. Consequently, the hypothesized upward earnings management pattern prior to the investment date is expected to fade out after the investment date, resulting in our second hypothesis:

H2: *"After the investment, PE backed companies manage earnings substantially less compared to before the investment"*

However, the suggested upward earnings management behavior prior to the investment has consequences for the observed earnings management in the following periods and could potentially distort the interpretation of our second hypothesis. Dechow (1994), amongst others, shows that artificially inflated earnings are most commonly realized by aggressively recognizing unrealized accounting accruals.[28] Advocates argue that accrual accounting helps investors better in assessing firm values and true operating performance than operating cash flows do (e.g. Watts & Zimmerman, 1990; Dechow, 1994). However, when applied opportunistically, accrual systems also allow managers to manage earnings figures aggressively in certain time periods by shifting income between consecutive periods (Dechow, 1994).

Given that hypothesis 1 predicts upward earnings management prior to the investment deal and that this is most likely to be done by opportunistically overestimating accruals, the natural behavior of accruals automatically results in a backlash after the objective has been met (i.e. after the actual investment date). Consequently, if hypothesis 1 finds confirmation, the natural behavior of accruals itself partly explains declining accruals in the post-investment years. Hence, focusing solely on the earnings management behavior pre- and post-investment date in isolation does not provide a uniform indication of a PE investor's monitoring impact on the company's financial reporting process, and specifically so, since lower earnings management levels ex post might be driven by intense pre-investment earnings management attempts. Hence, we acknowledge the intertemporal dependence of our earnings management measure and explore an additional attribute of earnings quality, namely earnings conservatism. This extra measure allows us to study PE investors' governance impact on their portfolio companies' financial reporting more unambiguously.

PE investments and earnings conservatism

As documented in the previous section, PE investors put in place a more intense governance and monitoring system and this, in turn, is expected to influence a company's financial reporting discipline. In addition to earnings management, which shows the reliability of a company's financial statements and is generally seen as an important attribute of earnings quality, we explore a second component of earnings quality, namely earnings conservatism.

We define earnings conservatism as in Basu (1997): "*…earnings reflecting 'bad news' more quickly than 'good news'* ". In other words, earnings are of a more conservative nature if accounting losses are reported more quickly than profits (Basu, 1997; Watts, 2002). Ball and Shivakumar (2002) note that timely loss recognition is an important attribute of earnings quality which increases the efficiency of financial statements use, especially with respect to governance issues. Corporate governance is affected

[28] National GAAP generally allow managers to report accounting earnings in an accrual accounting based system. This accounting system is more flexible than the traditional cash accounting reporting and allows managers to shift revenues and expenses into the period they are actually incurred. Hence, accrual accounting systems have the advantage of better matching revenues and expenses, hereby allowing entrepreneurs to generate more value relevant accounting figures than cash accounting would do (Ball & Brown, 1968; Dechow, 1994).

since timely loss recognition gives managers less flexibility to undertake negative NPV projects and hereby aligns the interests of both the entrepreneur and the other stakeholders, among which PE investors.

We argue that, in this research context, intensified PE investors' governance may lead to a more strict financial reporting discipline, specifically since Kaplan & Strömberg (2002) have shown that PE investors make control rights contingent upon financial as well as non-financial measures. Consequently, it is likely that PE investors monitor their portfolio company's financial reporting process and apply quality standards to it, in order to receive high quality accounting information. One imperative element for PE investors is receiving a timely indication of difficulties, specifically since the distribution of control rights between entrepreneurs and PE investors is often made contingent upon financial risk. Moreover, Falconer et al. (1995) found in a UK questionnaire study that PE investors are primarily concerned with receiving reliable and timely financial information from their investee firms. This suggests that PE investors affect the financial reporting discipline by requiring their investee firms to report losses timely to identify difficulties instantly, rather than leaving them unidentified or carrying them forward to future periods.

Further, although the observed companies are private in nature and consequently are expected to have a fairly low tendency to report earnings conservatively compared to public companies (Ball & Shivakumar, 2002), we expect that PE investors' governance positively influences the extent of earnings conservatism. A higher earnings conservatism propensity makes financial statements more useful for contracting, monitoring and valuation matters and is expected to be more prevalent for PE backed compared to independently ran firms. Additional evidence for this reasoning is that PE investors generally want to exit after a number of years realizing a substantial surplus value on their investment (e.g. Gompers, 1995; Kaplan & Strömberg, 2002). Therefore, PE investors typically prepare their portfolio firms for a future sale which is made easier by presenting professional and reliable financial statements. Hence, also this higher demand for high quality financial reporting by external parties after the PE financing suggests a more predisposed conservatism in earnings reporting.

As a consequence, we expect to find more conservative earnings reporting in PE backed firms compared to non-PE backed firms. This higher conservatism then would be a direct result of the higher legitimate demand for financial reporting quality by the PE investors. This leads to our third hypothesis:

H3: *"PE backed companies report accounting losses more timely (i.e. report more conservative earnings) compared to non-PE backed companies"*

Finally, we argue that different types of PE investors have different governance skills and incentives, which endogenously determine the earnings quality of their portfolio companies. We therefore study whether the degree of earnings conservatism depends on the type of PE investor. More specifically, we study differences in earnings conservatism between non-government and government-related PE investors.[29]

Managers of government-related PE investment companies are often civil servants and as such may not have the experience nor the drive to select or support entrepreneurial companies (Leleux & Surlemont, 2003; Manigart et al., 2002). Also fee-based incentive packages of government-related PE houses typically create lower incentives to monitor their investments tightly compared to profit-oriented incentive packages of non-government PE firms (Leleux & Surlemont, 2003). In general, government-related PE houses are less pressured to earn financial returns, as they do not have to raise new funds from the market and may have other goals than value maximization for their shareholders. Moreover, government-related PE investors encounter less pressure to exit firms with a substantial surplus value in the shortest possible time and may therefore be typically less dedicated to professionalize their portfolio company without delay.

[29] Non-government related PE investors are (1) firms investing funds from third parties and (2) captive funds, i.e. funds in which the main shareholder of the management company contributes most of the capital from its own internal sources and reinvests realized capital gains into the fund. Government-related PE firms invest government funds either directly or indirectly in portfolio companies (EVCA Glossary).

Taking the specific characteristics of government-related PE investors into account, their investment decisions might be driven more by a social point of view instead of a profit maximization standpoint (Lerner, 1999). These arguments imply, directly and indirectly, that companies backed by independent PE investors may be governed more rigorously and adequately than those receiving PE from government-related agencies. Therefore, we expect differences in governance to be reflected in the financial reporting discipline. Hence, we expect higher earnings conservatism for companies funded by non-government-related PE investors compared to those receiving government-related PE:

H4: *"Companies backed by non-government-related PE investors report accounting losses more timely (i.e. report more conservative earnings) compared to companies backed by government-related PE investors"*

In the next section, we describe the setting of our sample, namely the Belgian PE context. We further illustrate the selection of the sample and report descriptive statistics.

Research Setting and Sample Description

We hand-collected financial and non-financial data of PE backed Belgian companies that received PE financing between 1985 and 1999. PE deals were identified by financial databases, PE investment reports and press releases. There are two reasons why we restricted ourselves to the Belgian context.

First, all Belgian companies (both listed and non-listed) are obligated to file their financial statement annually to the National Bank of Belgium in compliance with the Royal Decree of 8 October 1976. This creates an excellent opportunity to study financial accounting reporting behavior of unlisted companies. Using these data, we build a longitudinal database containing financial accounting data of privately-held, unlisted companies receiving PE for the first time. This provides us with a unique dataset which cannot be retrieved in a typical research context – like the US – where this kind of financial data is unavailable for unlisted companies. Although unlisted companies typically experience a lower demand for high quality financial accounting compared to listed companies (e.g. Ball & Shivakumar, 2002), their financial reporting discipline might be impacted by additional monitoring pressure from the PE investors' increased governance.

Second, the Belgian PE industry differs substantially from Anglo-Saxon and even from other Continental European countries since nearly half of all PE investments come from government-related PE firms (EVCA, various yearbooks). Therefore, by exploiting this dataset we are able to explore differences in the financial reporting behavior between companies that are backed by non-government and government-related PE investors.

The Belgian PE industry

Before the 1980s, Europe as a whole and the US were two different continents as regards PE. The absence of a supportive entrepreneurial spirit combined with poor exit alternatives offered by the stock market at that time, resulted in a substantial underdevelopment of the European PE industry compared to the US. The European situation was also observed in Belgium, where PE only gained importance after the 1980s. Evidence of this juvenile character of the Belgian PE industry is clearly illustrated when comparing the importance of the industry with respect to the size of the economy. During our observation period 1985-1999, average Belgian PE investments totaled 0.06% of GDP. US figures are substantially higher, reaching values of 3 to 4 times that size during the same period (Manigart et al., 2002). Consistent with worldwide tendencies, the Belgian PE industry grew sharply, especially during the late 1990s' bubble years to a maximum of 0.22% of GDP in 2000. Over the last two years, again following worldwide tendencies, total PE investments nearly halved to 0.12% of GDP in 2002.

The vast majority (58%) of PE during the observation period went to expansion investments. Seed and start-up investments, replacement capital and buy-outs accounted for respectively 26%, 9% and 7%. The most popular investment sector was high-tech related (47%), according to EVCA definitions,

"communications, computer and other electronics related, biotech and medical or health related". Industrial-related and consumer-related sectors accounted for respectively 17% and 10% of all investments during that period.

With respect to investor type, the Belgian PE industry is further characterized by a large number of small independent PE companies and a few large PE investment companies (EVCA, various years). It is noteworthy that more than half of total investments made during our observation period come from government-related PE investors. Both the Flemish GIMV (*Gewestelijke InvesteringsMaatschappij voor Vlaanderen*) and the Walloon SRIW (*Société Régionale d'Investissement de Wallonie*) account for a substantial part of these government-related PE investments. Independent and captive investors both account for a mere 25% of total investments.

Description of the sample

In order to construct a comprehensive sample of PE-backed companies, we used existing databases and secondary sources such as yearly financial accounts, PE investment reports and press releases. To be included in the sample, portfolio companies' financial statements have to be recorded on a regular basis in the database of the National Bank of Belgium. Moreover, we excluded financial and holding companies because of the highly specific nature of these firms. This resulted in a final sample of 556 companies, representing nearly 40% of all PE investments in Belgium between 1985 and 1999.

To provide a basis for comparison, we selected a comparable sample of companies that did not receive PE. Following Megginson & Weiss (1991), Jain & Kini (1995) and Lerner (1999), each PE backed company is matched with a non-PE backed company on three criteria in the year before investment: (*i*) activity – measured by a two-digit sector code – , (*ii*) size – proxied by total assets – , and (*iii*) age. For firms receiving PE in the start-up year, the matching year was set equal to the first year in which the financial statement data became available, typically being the investment year. Descriptive statistics of both samples are given in table 1.

< Insert Table 1 about here >

37% of the companies in the sample receive PE financing within 2 years following their founding date ('start-ups'), 18% when they are between 2 and 5 years ('early stage') and 45% after more than 5 years ('later stage'). According to EVCA definitions, about half of the sample companies can therefore be considered as having received pure venture capital financing while the rest received PE of a more broader sense. Government-related investors backed over 70% of the sample companies causing an overrepresentation compared to their market share, which was slightly above 50% (EVCA statistics). Although government-related as well as non-government-related PE investors finance a proportionally equal number of early stage deals (for both about 18%), there is a considerable difference in the proportion of start-up and later stage investments between both investor types. Government-related PE investors finance approximately an equal percentage of start-up and later stage deals (41% versus 43%). Non-government PE investors, by contrast, favor later stage deals above start-up deals by far (53% versus 28%).

Panel B provides descriptive statistics of age and some basic accounting figures for both samples under analysis, i.e. PE backed and non-PE backed over all observation years. PE backed companies are on average 12.33 years old in the investment year, with a median age of 7 years and the oldest firm in the sample being 74 years. Average (median) total assets are EUR 11,786,642 (2,717,136) and vary between EUR 10,833 and 811,072,065 showing the substantial variation in size of PE backed companies. Median growth in total assets equals 6.39% and the average (median) leverage figure is 69.88% (71.35%). Results of the non-PE backed sample are rather similar. The average (median) non-PE backed company age is 14.38 (8.00) years, with a maximum of 91. Average (median) total assets equal EUR 7,257,799 (1,611,394) and vary between EUR 13,585 and 876,034,348. Median growth for non-PE backed firms is somewhat lower compared to PE backed matches and equals 4.13%. Finally, average (median) leverage is 66.73% (70.31%).

Panel C reports information on the industry classification of sample companies (one and two-digit). PE investors typically invest in a limited number of industries. In accordance with the investment sector profile of the entire Belgian PE industry, computer services (16.91%), wholesale distribution (12.77%) and metal manufacturing (7.73%) are the most important sectors in our sample.

Research Methods & Empirical Results

Earnings Management Tests

Distribution tests

First, our study builds on distribution-based earnings management research as applied in Burgstahler and Dichev (1997) and Degeorge et al. (1999). In cross-sectional distributions of scaled earnings and earnings changes of US companies, forementioned authors find compelling evidence of discontinuously distributed earnings, showing abnormally high frequencies of small profits and small earnings increases. Small losses and earnings decreases are typically avoided. One main advantage of this research method is that it allows to detect earnings management to achieve certain earnings targets, combining a visualization and a statistical test on the magnitude of the discontinuity (McNichols, 2001). However, we acknowledge that we have to proceed with the necessary caution when interpreting the number of small profits versus small losses, especially since it is not clear what the relationship in the absence of earnings management should be (Dechow et al., 2003).

We study whether PE backed companies report more small earnings, respectively earnings increases, compared to matched non-PE backed companies and whether there is a clearer earnings management pattern in pre-investment years compared to other years. Consistent with Burgstahler & Dichev (1997), we measure the statistical significance of small loss avoidance and small profit pursuance by calculating a standardized smoothness measure. Under the null hypothesis, the earnings distribution is thought to be relatively smooth where the expected number of observations in any given interval is the average of the number of observations in the two immediately adjacent intervals (Burgstahler & Dichev, 1997).[30] This statistical test measure is defined as follows:

$$\frac{\left\lfloor N_{\text{actual}} - N_{\text{expected}} \right\rfloor}{s}, \text{ where} \qquad (1)$$

N_{actual} = actual number of observations in a given interval
N_{expected} = expected number of observations, based on the average of the two adjacent intervals
σ = standard deviation of the difference between n° of observed and n° of expected observations
[31]

Table 2 confronts deflated profit after taxes levels of PE backed companies one year before the PE investment with these of 2 or 3 year before the investment. Additionally, non-PE backed profit after taxes levels from 1 to 3 years before participation are calculated to provide a basis for comparison. Consistent with hypothesis 1, we argue that the closer a company gets to its PE deal, the higher the probability will be to detect a more observable upward earnings management pattern. More specifically, for our PE backed sample we expect to find unusually few small losses and earnings declines one year before participation compared to earlier years. Additionally, earnings distributions of our control sample

[30] In constructing empirical histograms, researchers face the problem of choosing an optimal bin width that balances (*i*) the need for a precise density estimate and (*ii*) the need for a fine resolution. Scott (1992) recommends a bin width that is positively related to the variability in the data and negatively to the number of observations. High variation in the data calls for wider bins and the number of observations determines the size of bin widths adversely. To calculate the optimal bin width, we use a measure similar to the one used in Degeorge et al. (1999) and Plummer & Mest (2001). Bin width = $2.IQR.n^{-1/3}$, with IQR = interquartile range, a measure for variability in the data and n = total number of observations.

[31] The standardized difference is based the following formula (Burgstahler & Dichev, 1997): $s^2 = N.p_i.(1 - p_i) + ¼.N.(p_{i-1} + p_{i+1}).(1 - p_{i-1} - p_{i+1})$, where N = number of observations, p_i = the probability that an observation falls in interval i, p_{i-1} = the probability that an observation falls in interval *(i-1)* and p_{i+1} = the probability that an observation falls in interval *(i+1)*.

are not subject to similar earnings management incentives in any observation year, suggesting less systematic earnings management over all observation years. Therefore, we pool all matched pre-investment earnings levels from year –3 to –1 and consider these as normal, expected earnings levels. Any substantial difference for the PE backed earnings sample from these 'benchmark' earnings distribution then again could be an indication of earnings management.

Tests statistics with respect to loss avoidance for both our PE backed and non-PE backed sample are presented in table 2. Results show significantly more than expected small profits and abnormally few small losses for all observation years. These quasi-identical earnings distribution patterns for both our PE backed and matched sample suggest that, although there exist clear loss avoidance behavior for the PE backed sample, this is not systematically more intense closer the PE financing event nor compared to control sample earnings.

< Insert Table 2 about here >

Analyses of earnings changes, however, show more clear evidence of earnings management behavior close to PE investment date. Both table 3 and figure 1 show that while PE backed companies still incur significantly more than expected small earnings declines two and three years before participation, this pattern changes considerably one year prior to participation into significantly more than expected small earnings growth observations. This shift from abnormally many small earnings decreases to an unusually high number of small earnings increases close to approaching the participation date is a first indication that, at that time, managers might use earnings management techniques to achieve small improvements in reported profit.

< Insert Table 3 and Figure 1 about here >

In summary, earnings distribution results provide only limited evidence of upward earnings management of PE backed companies close to PE investment date, specifically since loss avoidance behavior is similar over all observation years for as well the PE backed as the control sample. Further, the tendency of PE applying companies to report small increases in earnings does indicate that entrepreneurs attempt to record improvements in earnings performance one year prior to the PE investment. However, given the limitations of this research method and the caution by which it has to be interpreted, we consider these distribution tests more as tentative indications of earnings management and evaluate earnings management behavior more in-depth by running accrual regressions hereafter.[32]

Accruals modeling

In a second step, we apply the most commonly used earnings management measure and study unexpected discretionary accruals as an indicator of earnings management.[33] Discretionary accruals are a commonly used proxy for measuring the degree of earnings management in a company's financial figures. Companies use accruals as accounting adjustments to distinguish reported earnings from cash flow from operations. Part of these accruals are inherent to the business activities of the company and part come from discretionary decisions of managers (e.g. Jones, 1991; Dechow, 1994). Accrual-based research intends to unveil this discretionary component of accruals and considers it as an indicator for earnings management. Although this kind of research has been criticized because of its underlying assumptions, no superior research method has been introduced yet. As a consequence, we rely on the discretionary accruals modeling together with the distributional tests to provide us with the best estimate available of the earnings management incidence.

We apply a cross-sectional regression model as in Teoh et al. (1998a & b), which is an extension of the most widely used earnings management model, the Jones (1991) model. Although the original Jones model studies short term as well as long term discretionary accruals, we focus on short-term working

[32] For the sake of brevity we do not report earnings distributions post PE investment date. Specifically since these distributions do not show significant discrepancies between both samples.

[33] McNichols (2001) reports that up to 1999, over 45% of all earnings management studies published in leading accounting journals were developed by using a variant of the accruals model.

capital accruals since managers have greater flexibility and control over current versus long term accruals (Teoh et al., 1998a & b). More specifically, current accruals are computed as follows:

$$\text{Current accruals} = \Delta(\textit{accounts receivable} + \textit{inventory} + \textit{other current assets}) - \Delta(\textit{accounts payable} + \textit{tax payable} + \textit{other current liabilitie} \quad (2)$$

Since accruals by itself are not necessarily evidence of earnings management, these current accruals have to be modeled into (*1*) non-discretionary accruals, which inherently result from the natural changes in business activities and (*2*) discretionary accruals, which are made at the discretion of management. Expected non-discretionary current accruals are estimated by running cross-sectional regressions of current accruals on the change in net added value of all available sector peers for the accruals decomposition.[34] We require that every company under investigation is present in the sample at year –2 and calculate the level of discretionary current accruals from two years before until two years after the PE investment (i.e. 5 consecutive years). Sector peers are selected on a two-digit sector specification. We used a one-digit sector specification if less than 7 individual peer companies were available for the industry-specific regression. Furthermore, data of a sector peer member are only included in the accruals estimation when it (*1*) did not receive PE financing or (*2*) did receive PE financing but only for years outside the 5 year time scope around the PE investment. We follow Teoh et al. (1998a & b), amongst others, and winsorize the top and bottom 1% of discretionary current accruals observations to minimize the impact of outliers.

Since these accruals estimations are executed over a 5-year time frame from two years before until two years after the PE investment, the number of observations both in the PE backed and the non-PE backed sample are limited. Descriptives showed that 205 companies are younger than 2 years, reducing the number of available companies to 361. Further, a substantial number of companies had missing data on parts of the added value measure, making it impossible to calculate this measure. As a result, we have 166 remaining observations for the PE backed sample and 160 for the non-PE backed sample. Further specifications on these accruals estimations can be found in Appendix 1.

< Insert Table 4 about here >

Table 4 presents median discretionary current accruals levels for both our PE backed and our matched sample in a time frame of 2 years before until 2 years after the participation. Median discretionary current accruals levels of PE backed companies are significantly positive around the investment year. From one year before until one year after the investment, we find a significantly higher earnings management level in our PE backed sample compared to the non-PE backed sample. Discretionary accruals grow from +2.13% two years before the investment date to a maximum value of +4.05% in the participation year, before dropping off to an insignificant average of +1.15% two years after the investment. The non-PE backed sample has lower median discretionary accruals values overall, being insignificantly different from zero for all observation years. Moreover, *p*-values measuring the difference in median discretionary current accruals between both samples are highly significant in the years around the PE financing.

Consistent with the findings of Teoh et al. (1998a & b), earnings figures seem to be massaged upward prior to the event and discretionary current accruals are commonly used to achieve this goal. This finding is consistent with our first hypothesis. Discretionary current accruals become significantly positive one year before the PE investment, reach a maximum in the event year and remain significantly positive until one year after the event. In contrast to Teoh et al. (1998a & b) we do not find significantly

[34] This estimation is a variant on the normally used model which uses sales growth as an explanatory factor instead of growth in net added value. The reason for this change is that Belgian SMEs are allowed to report abbreviated financial statements when they comply with the following requirements. A company should (*1*) employ less than 100 employees on average per year registered or (*2*) not meet two or more of the following criteria: (*i*) annual turnover > 6,250,000 euro, (*ii*) balance sheet total > 3,125,000 euro and (*iii*) average number of employees > 50. One major difference between abbreviated and complete financial statements is that sales levels only have to be disclosed in complete financial statements. In abbreviated formats, only a net added value is reported. This value equals (Operating Income [*financial statement item 70/74*] – Raw Materials and Consumables *[item 60*] – Services and Other Goods [*item 61*]). Given that over 60% of our sample firms report an abbreviated statement, we use net added value figures to avoid ample missing data in our estimations.

positive discretionary current accruals two years after the PE investment date. This is in line with our second hypothesis. Increased PE investors' governance may affect a company's financial reporting discipline, since discretionary current accruals decrease substantially and become insignificantly different from zero two years after the investment year on.

However, there are a number of factors which might make some firms more likely to manage earnings than others. To disentangle the importance of potential omitted variable bias, we model discretionary current accruals as a function of some additional control variables:

$$DCA_i = a_i + b_{PE} PE_i + b_{size} \ln(size)_i + b_{age} \ln(age)_i + b_{IBX} \Delta(IBX)_i + b_{LEV} Leverage_i + \Theta' IND_i + e_i \quad (3)$$

where *DCA* equals the level of discretionary current accruals for the firm in a specific observation year.

PE is a dummy variable taking the value of 1 when a firm is PE backed and 0 otherwise to edge out the effect of receiving PE financing. *Ln(size)* is the natural logarithm of total assets while *ln(age)* is the natural logarithm of the firms' age. We do not predict any specific sign for both our size and age variable. On the one hand, larger firms typically may have more complex financial accounting techniques available to manage earnings. On the other hand, larger firms are typically more politically visible than smaller firms, suggesting a lower proportion of earnings management (e.g. Watts & Zimmerman, 1990). Equally, older firms may on the one hand have more expertise to exploit flexibility in accounting mechanisms but, conversely, have a longer track record making it less easy to disguise accounting irregularities. *D(IBX)* measures change in income before extraordinary items from the previous fiscal year to this year, scaled by the lagged total assets. This variable is included to control for any misspecification resulting from potential correlation between discretionary accruals and operating performance (Dechow et al., 1995). *Leverage* equals (1 – BV Equity/TA), with 'BV Equity' being the book value of equity and 'TA' is total assets. The higher a firm's leverage, the less own resources a firm uses to finance its business activities and/or the higher the level of outstanding debt. Consistent with the debt covenant hypothesis, we expect a positive relation between the leverage ratio and the extent of earnings management (DeFond & Jiambalvo, 1994). Finally, *IND* controls for industry fixed effects (one-digit sector codes). We run yearly control regressions over all observation years from (t–2) to (t+2).

We further control for potential endogeneity problems that might result from the selection bias inherent in receiving PE. Even if PE has no effect on discretionary accruals, the PE coefficient might still be significant if PE backed firms are those that were less likely to have high discretionary accruals a priori. As a result, the coefficients in model (3) might be biased, unless we adjust for this endogeneity problem. We therefore extend our model (3) with a selection model based on the Heckman two-step regression (1979), as also applied in Hellman & Puri (2002) and Hochberg (2002). More details on the Heckman selection model are given in Appendix 2.

< Insert Table 5 about here >

Table 5 reports coefficients and *t*-statistics of the Heckman 2 step regression model, controlling for firm-specific characteristics and selection biases. We find a strong positive relation between being PE-backed and the level of discretionary accruals around the investment year.[35] Although discretionary accruals and PE are unrelated two years before the investment year, the link becomes highly significant from the pre-investment year on. We find further evidence in line with hypothesis 1: entrepreneurs report higher discretionary accruals shortly before the PE investment. Also one year before the PE investment, we find that discretionary current accruals are positively related to age: younger firms report higher accruals. No other significant relations are detected in the pre-investment year.

In the investment as well as in post-investment years, the coefficient on PE remains positive although it is declining both in magnitude and significance. This suggests that the PE investor's governance impact

[35] Unreported coefficients of the standard OLS regression show that both the coefficient and the significance of the PE variable is lower in all observation years, suggesting that selection bias is driving the uncorrected results and underestimates the impact of receiving PE.

restrains a portfolio firm's ex post earnings management behavior. Although this provides evidence for our second hypothesis, we acknowledge that the reversal of accruals might partly drive our results. Furthermore, the relation between age and the level of discretionary accruals becomes less clear: while younger firms typically report higher discretionary accruals in the investment year, this relation is reversed in year +2. Finally, both one and two years after the PE investment, a higher leverage coincides with lower discretionary accruals. This evidence contradicts the debt covenant hypothesis but might be explained by the higher monitoring taking place both by the PE investor and other creditors (such as banks). This tighter monitoring may actually limit a portfolio firm's financial reporting flexibility leading to a lower level of reported accruals. No further significant relations are detected.

The result of the two-step regression, controlling for selection bias, is remarkable in that it shows that PE investors actually select companies with a higher level of discretionary accruals. This is similar to the findings in Hochberg (2002) and shows that PE investors are more willing to invest in firms which are likely to report earnings with some aggression or even over-confidence (Hochberg, 2002). This finding can be interpreted in two different ways. One explanation is that PE investors are potentially unable to detect aggressive accruers and therefore, aggressive accruers have higher chances of being selected than conservative accruers. Another plausible explanation is that PE investors do observe the level of earnings management a priori but that they simply do not mind the high accruals. Given their professionalism and the thoroughness of the due diligence screening, it is likely that they indeed see through this earnings management and take it into account in the valuation of the company.[36]

In summary, all analyses are consistent with our first hypothesis that PE backed firms manage earnings prior to participation date. Firms which receive PE backing have, on average, high discretionary accruals both in the fiscal years before and even in the PE investment year itself. Hypothesis 2, suggesting a lower level of earnings management after PE investment date also finds confirmation. We observe a decline in median discretionary accruals from 2 years after the PE investment although additional tests show that this result may, at least partly, be driven by firm-specific factors. Although these findings might partly be driven by reversing accruals, this evidence also suggests that PE investors' governance limits portfolio company's earnings management behavior ex post.

Earnings Conservativeness Tests

We investigate an additional component of earnings quality by focusing on earnings conservatism to unravel the governance impact of PE investors' on a company's financial reporting behavior. Strictly spoken, earnings are of a more conservative nature if losses are recognized timely instead of being spread over several periods (Basu, 1997). To some extent, a higher degree of earnings conservatism coincides with a higher earnings quality since conservative financial statements are more relevant for creditors, shareholders, managers and other external parties (Ball et al., 2000; Watts, 2002).

To estimate differences in earnings conservatism we apply a variant of the Ball & Shivakumar model (2002), based on the conservatism principle of Basu (1997). Earnings conservatism generally is seen as an important attribute of the overall earnings quality and implies that bad news is recognized more timely than good news (Ball et al., 2000; Ball & Shivakumar, 2002). Hence, earnings are thought to be of a higher quality if bad news events reflected in current earnings level appear as transitory shocks or one-time dips and good news events appear as persistent shocks to the earnings stream (Basu, 1997). As in Ball & Shivakumar (2002), we measure timely loss incorporation in accounting income by focusing on the tendency for income decreases to reverse. Therefore, the first-order serial dependence in earnings changes is allowed to be dependent on the conditional sign of the prior earnings change (Ball & Shivakumar, 2002). This method allows us to separately identify transitory gain and loss components. If prior-period decreases exhibit a higher tendency to reverse than prior-period earnings increases, this provides evidence of a higher willingness to recognize losses timely and signals a higher earnings conservatism. Detecting a higher degree of earnings conservatism for PE backed companies then would

[36] However, since we do not have data on the exact pricing of the deals we cannot examine this relationship further. Hence, it remains an open question whether and if so, to what extent, PE investors are fooled by this accruals management or take it into account in the valuation of the firm.

provide additional evidence of disciplining PE investors' governance impact on the financial reporting process.

We analyze conservatism tendencies in (*1*) current profits before taxes, but after financial income (CP), (*2*) profit before taxes and after extraordinary income (PBT) and (*3*) profit after taxes (PAT). We focus on various earnings levels for two reasons. First, it gives us a more complete picture of the earnings conservatism tendency in reported earnings then focusing on one earnings line in isolation. Second, by differentiating between subsequent earnings levels, we are able to study the use of extraordinary items in an attempt to report conservative bottom line earnings. Transitory gain and loss components are estimated by running the following regression model:

$$\Delta NI_t = b_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t, \quad (4)$$

with: DNI_t = income level change at time *t*, scaled by beginning-of-the-year book value of total assets
DNI_{t-1} = income level change at time *t-1*, scaled by beginning-of-the-year book value of total assets
$NEG(DNI)_{t-1}$ = dummy variable taking the value of 1 when prior-period earnings changes are negative

By making the estimation model dependent on prior period earnings decreases, we are able to study the reversion tendency of losses and gains separately. Timely recognition of losses implies a statistically negative slope coefficient for ($b_2 + b_3$). Further, losses are recognized in a more timely way than gains if $b_3 < 0$. Finally, untimely recognition of gains implies smooth earnings patterns, where gains are incorporated in income only if the underlying cash flows are realized. Hence, gains tend to show up as being permanent, implying that the slope coefficient on prior period positive earnings changes (b_2) is positive, i.e. non-reversing in nature.

Consistent with other earnings conservatism studies (Ball et al., 2000; Ball & Shivakumar, 2002; Basu, 1997), model properties are defined at earnings changes and not its level to correctly identifying the transitory components in income. However, working with earnings levels requires 3 subsequent earnings levels to estimate model (4). Therefore, we are unable to study differences in earnings conservatism pre- and post-investment date since we generally have only 2 years of earnings data available before the PE financing date. Hence, we focus specifically on differences in earnings conservatism between different subsamples in the post-investment year.[37] By means of introduction, we report fairly detailed descriptives of our observed sample in Table 6.

< Insert Table 6 about here >

Table 6, panel A reports descriptives for the entire sample, i.e. all available observations from the investment year on, for PE backed as well as non-PE backed firms. Mean (median) total assets are EUR 11,811,194 (2,815,549). Although we winsorized the top and bottom 1% of outliers, we still have rather high values in the sample resulting in a right-skewed distribution.[38] Sales levels are only available for 2,952 out of the 4,202 observations in the analyzed sample. Average (median) sales on total assets are 102.25% (83.04%). For all observed income levels, approximately 70% of the income levels are positive and 30% have negative values. Median income levels vary between 2.56% (PBT) and 1.39% (PAT) of total assets. Table 6, panel B contains values for PE backed firms only. All descriptives are relatively similar to descriptives of the entire sample in panel A.

PE backed versus non-PE backed firms

To test our third hypothesis, we supplement model (4) with a dummy to allow for differences between PE backed and non-PE backed companies. Algebraically, this results in the following model (5):

[37] Although we are limited to analyzing earnings figures in the post-financing period, we are still able to include sufficient observations in our research since earnings levels are available for all sample companies. Hence, unlike the accruals estimation in the previous section, we are not limited to study only those companies which report added value.

[38] We additionally winsorized the top 2 and 2.5% and our results of the transitory earnings models (cfr. infra) remained stable.

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 PE + b_5 PE * NEG(\Delta NI)_{t-1} + b_6 PE * \Delta NI_{t-1} + b_7 PE * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t \quad (5)$$

with: ΔNI_t = income level change at time *t*, scaled by beginning-of-the-year total assets
ΔNI_{t-1} = income level change at time *t-1*, scaled by beginning-of-the-year total assets
$NEG(\Delta NI)_{t-1}$ = dummy for prior-period negative income level change
PE = dummy for receiving PE, taking the value 1 if the company is PE backed

When interpreting the coefficients, we are mainly interested in differences in earnings conservatism between PE backed and non-PE backed firms. Therefore, our discussion will primarily focus on (b_6+b_7) which measures the compound effect for differences in timely loss reporting between both samples. Table 7 gives an overview of the expected sign of individual and compound coefficients' signs.

< Insert Table 7 and 8 about here >

Table 8 reports regression results of running model (4) and (5) on all available observations, in the post-financing years (n=4,062). First, panel A shows that the explanatory power of model (4) is negligible for the CP level but reaches 6.48% for PBT and 6.83% for PAT. Furthermore, the slope coefficient for b_3 is significantly negative indicating that for PE backed and for non-PE backed firms losses are, on average, recognized more timely than gains. Further, the compound effect (b_2 + b_3) is significantly negative for all three earnings levels suggesting timely loss recognition in general. We also find a significantly positive slope coefficient for b_2 for as well PBT as PAT. This indicates that positive earnings are not only smoothed over time but also have a tendency to grow year-on-year.

Table 8, panel B reports regression coefficients and *t*-statistics of model (5) and shows an increase in adjusted R^2 both for PBT (8.46%) and PAT (8.43%). As hypothesized, we find significant differences between both sub-samples. The compound coefficient for (b_6+b_7) is significantly negative for both PBT (–0.541) and for PAT (–0.825), suggesting that PE backed companies report losses more timely compared to non-PE backed companies, consistent with our third hypothesis. Further, slope coefficients for b_2 and b_3 become insignificantly different from zero, suggesting that non-PE backed companies do not have a tendency to report losses timely. Generally, these regression results provide clear evidence in line with our third hypothesis.

Government versus non-government PE backed firms

We additionally expand model (4) by adding a dummy to control for differences in earnings conservatism between companies that received PE financing from non-government PE investors versus companies backed by government-related PE investors. Therefore, model (6) goes as follows:

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 GOV + b_5 GOV * NEG(\Delta NI)_{t-1} + b_6 GOV * \Delta NI_{t-1} + b_7 GOV * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t, \quad (6)$$

with: ΔNI_t = income level change at time *t*, scaled by beginning-of-the-year total assets
ΔNI_{t-1} = income level change at time *t-1*, scaled by beginning-of-the-year total assets
$NEG(\Delta NI)_{t-1}$ = dummy for prior-period negative income level change
GOV = dummy taking the value of 1 when PE investor = government-related backer

< Insert Table 9 about here >

Similar to the results of (5), we are primarily interested in differences in timely loss reporting between our two subsamples under analysis, namely government PE backed versus non-government PE backed firms. First, Table 9, panel A reports regression coefficients and *t*-statistics of model (4) on the PE backed sample only (n=2,062). The explanatory power of the model is negligible for the CP level and has only low power for both PBT and PAT levels. Nevertheless, results are in line with the findings of

the regressions above. PE backed companies report losses in a timely fashion since slope coefficients for (b_2+b_3) are significantly negative for all three income levels.

Table 9, Panel B shows differences in timely loss reporting between companies financed by government PE backed versus non-government PE backed companies. Here, coefficient (b_2+b_3) indicates the tendency of firms backed by non-government related PE investors to report losses timely. For both PBT and PAT earnings levels, we find a statistically significant negative coefficient, suggesting that the earlier found relation of timely loss reporting persists for the non-government PE backed subsample. Further, (b_6+b_7) is marginally significantly positive. This indicates that firms which are backed by government-related PE investors recognize losses less timely compared to non-government PE backed firms and provides evidence for our fourth hypothesis. This could be interpreted as evidence that the specific characteristics of the government-related PE investors and its accompanied weaker governance is reflected in a somewhat less conservative financial reporting discipline compared to financial reporting of non-government related PE investors.

We apply several robustness checks on the data by adjusting the winsorizing percentage and by constructing different sub-samples (e.g. non-government PE backed versus non-PE backed, government PE backed versus non-PE backed) and all results remain qualitatively equal. The general observation that CP levels, in contrast to PBT and PAT, do not show tendencies of timely loss reporting denotes the importance of extra-ordinary income as an instrument to achieve timeliness in financial reporting. We leave this finding to further assessment in future studies.

Conclusion

In this paper, we examine both entrepreneurial tendencies to manage earnings upward prior to receiving PE and the governance impact of PE investors on the portfolio companies' financial reporting discipline ex post. To our knowledge, this study is the first to examine financial statement information of companies receiving PE financing around their initial financing year. Results are obtained by running both earnings management and earnings conservatism tests.

We hand-collected a dataset of 556 Belgian companies receiving PE financing between 1985 and 1999, next to a matched set of non-PE backed firms. Belgian accounting legislation requires all firms (listed and unlisted) to file their financial statements annually and therefore provides us with an excellent research design to explore financial reporting trends of unlisted companies, both before as after the PE investment year. The characteristics of this dataset enable us not only to study entrepreneurial earnings management behavior around the investment date but also to observe the PE investor's governance impact on the quality of the financial reporting process ex post.

First, this paper deals with the information content of financial statements in the PE investor's screening process. We evaluate earnings management behavior in a previously unexplored research setting, namely around the PE investment date. Prior evidence on earnings management behavior of PE backed companies was merely situated around the IPO event. This study extends the traditional research context, by analyzing entrepreneurial earnings management attempts to catch PE investors' interest. Results clearly indicate that entrepreneurs manage earnings prior to the PE financing. We interpret this as evidence that entrepreneurs try to catch PE investors' attention by showing their increasing profitability. It remains, however, an open question to what extent PE investors see through this earnings management and take it into account when valuing the firm.

Second, this paper contributes to the growing literature on the governance role played by PE investors in the professionalization process of their portfolio companies. We show that PE investors indeed play a value-added role in influencing portfolio companies' financial reporting discipline. Not only do we find a less noticeable earnings management behavior after the financing year, PE backed firms also report earnings in a more conservative way compared to non-PE backed firms. Although the lower earnings management measure might partly be driven by the reversal behavior of accounting accruals, the higher conservatism clearly points at a more mature and reliable financial reporting discipline. Furthermore, financial reporting governance is also determined by investor type. The lower degree of earnings

conservatism in government-related PE backed firms is interpreted as evidence in line with the arguments of Leleux & Surlemont (2003) and Lerner (1999) that government-related PE investors are less professional compared to non-government PE investors in monitoring their portfolio firms.

Our findings are subject to some caveats. First, we measure earnings quality by focusing on two aspects of it, namely earnings management and earnings conservatism. These instruments cover only partly a company's financial reporting quality. However, Ball & Shivakumar (2002) argue that earnings quality is an abstract concept and that measuring one single attribute of it is already indicative of the overall earnings quality. Hence, this multi-method research design allows to understand more of a company's financial reporting quality than by applying only one research method in isolation. Second, we acknowledge that companies which are able to attract PE financing have highly specific individual characteristics potentially leading to biased results. Specifically, the selection of matched non-PE backed companies raises concerns about endogeneity bias. We try to tackle this potential distortion in our data by applying a two-step regression as per Heckman (1979) leading to even stronger results. However, since it is difficult to control for all potential differences between both samples, we acknowledge that omitted firm-specific characteristics might still drive the accruals estimations partly.

Our results are important for several parties. First, our results are important for PE investors since we show that entrepreneurs manage earnings upward when applying for PE and that reported accounting figures have to be interpreted with the necessary caution. However, it remains an open question to what extent PE investors are fooled by this earnings management or simply see through it, given their professionalism they are operating with. Second, our results are important for all stakeholders that use financial statement information of PE backed companies. Although PE backed and non-PE backed companies are subject to similar legal reporting requirements, earnings of PE backed companies are reported in a substantially more conservative way. This conservatism tendency is even higher for non-government-related PE backed firms, suggesting the more stringent governance of this kind of PE investors to be reflected in their financial reporting discipline. Further research with respect to the governance impact on PE portfolio firms' financial reporting discipline is required to explore the generalization of our results.

Appendices

Appendix 1: Accruals Estimation

To estimate the expected (i.e. non-discretionary) current accruals of a firm at a specific time, we run the following cross-sectional OLS regressions on the peer group.

$$\frac{CA_{j,t}}{TA_{j,t-1}} = \alpha_0\left(\frac{1}{TA_{j,t-1}}\right) + \alpha_1\left(\frac{\Delta NAV_{j,t} - \Delta TR_{j,t}}{TA_{j,t-1}}\right) + \varepsilon_t \ , \qquad (i)$$

with: $CA_{j,t}$ = current accruals for sector j at time t
$\Delta NAV_{j,t}$ = change in net added value for sector j at time t
$\Delta TR_{j,t}$ = trade receivables growth for sector j at time t
$TA_{j,t-1}$ = beginning of the year total assets for sector j at time t

This estimation is a variant on the modified Jones model (by Dechow et al., 1995) with sales growth as an explanatory factor instead of growth in net added value. The reason for this modification is that Belgian SMEs are allowed to report abbreviated financial statements when they comply with the following requirements. A company should (*1*) employ less than 100 employees on average per year registered or (*2*) not meet two or more of the following criteria: (*i*) annual turnover > 6,250,000 euro, (*ii*) balance sheet total > 3,125,000 euro and (*iii*) average number of employees > 50. One major difference between abbreviated and complete financial statements is that sales levels are only compulsory in complete financial statements. In abbreviated formats, a net added value is reported. This value equals (Operating Income – Raw Materials and Consumables– Services and Other Goods). Given

that over 60% of the sample reports an abbreviated statement, we use net added value figures to avoid ample missing data.

Further, we calculate the level of non-discretionary current accruals for an individual firm *i* for each observation year *t* by using the estimated coefficients, $\hat{a}_0$ and $\hat{a}_1$ of model (*i*) estimated for each 2-digit sector peer group (respectively 1-digit if less than 7 companies were available):

$$NDCA_{i,t} = \hat{a}_0\left(\frac{1}{TA_{i,t-1}}\right) + \hat{a}_1\left(\frac{\Delta NAV_{i,t} - \Delta TR_{i,t}}{TA_{i,t-1}}\right), \qquad (ii)$$

with: $NDCA_{i,t}$ = non-discretionary current accruals for firm *i* at time *t*
$\Delta NAV_{i,t}$ = change in net added value for firm *i* at time *t*
$\Delta TR_{i,t}$ = trade receivables growth for firm *i* at time *t*
$TA_{i,t-1}$ = beginning of the year total assets of firm *i* at time *t*

Finally, the discretionary current accrual component for firm *i* at time *t* is the difference between the firm-year observed current accruals and the expected, non-discretionary accruals:

$$DCA_{i,t} = \frac{CA_{i,t}}{TA_{i,t-1}} - NDCA_{i,t} \qquad (iii)$$

Appendix 2: Two-step Heckman Correction Test

The two step Heckman correction test employs a two-equation model in an attempt to control for potential selection bias in the data. Heckman (1979) showed that regression results might be contaminated by selection bias but that one can simply correct for it by running a two-step equation model.

In our setting, the first equation is a probit regression which models the probability of receiving PE as a function of intrinsic characteristics of the observed companies. We identified 5 characteristics which might distinct PE backed firms significantly from non-PE backed firms:

$$PE\begin{bmatrix}1\\0\end{bmatrix} = b_0 + b_1(\Delta TA) + b_2(Gearing) + b_3\left(\frac{Accprofit}{TA}\right) + b_4\left(\frac{Investments}{TA}\right) + b_5\left(\frac{Cash}{TA}\right) + e \qquad (iv)$$

'Change in total assets' (=Δ*TA*) measures the growth characteristics of all sample companies and controls for potential differences in growth characteristics between our PE backed and non-PE backed sample. '*Gearing*' quantifies the solvency situation of a company. We expect the gearing ratio to differ substantially between both groups since PE backed firms have higher financing needs than non-PE backed matched equivalents prior to the PE investment date. 'Accumulated profit' (=*Accprofit*) deflated by total assets measures the internal profitability of a firm. Again, given their high need for financing, we expect PE backed firms to have lower internally generated profits. *Investments*, deflated by total assets measures the investment profile of both samples. We incorporate this measure since anecdotal evidence shows that PE backed companies typically have a higher investment rate compared to non-PE applicants. Finally, *Cash* relative to assets measures cash available. Specifically in the pre-investment period, this figure is expected to differ substantially between both sets.

The estimates of this probit model are used to compose the inverse Mills ratio. This ratio is set equal to the hazard function of being selected for receiving PE. Algebraically: $\lambda(Z) = \phi(Z)/T(Z)$, with $\phi(Z)$ = the standard normal probability distribution function and $T(Z)$ = the standard normal cumulative distribution function. If selection bias is driving the results, the error terms of the probit regression and the original test model are typically correlated.

The second equation is based on the original OLS model, taking into account the effect of the inverse Mills ratio: i.e. the effect of being selected. By estimating both equations simultaneously, we can retrieve the unbiased estimate of the coefficient on the PE variable and isolate the effect of selection.

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Tables, charts and graphs

Table 1: Sample Characteristics of PE Backed and non-PE backed Companies

Panel A: PE Investor Origin and Stage of Financing *				
Investor type	*Start-up stage*	*Early stage*	Later stage	*Total*
Non-government related	43	29	81	153 (28%)
Government related	162	71	170	403 (72%)
Total	205 (37%)	100 (18%)	251 (45%)	556 (100%)

* *Note: We split the sample in non-government related private equity (PE) backed firms and government-related PE backed firms since the Belgian PE industry is typically known as being government-driven. Non-government PE investors are (1) private firms investing funds from third parties as well as (2) captive funds, i.e. funds in which the main shareholder of the management company contributes most of the capital from its own internal sources and reinvests realized capital gains into the fund. Government-related PE firms invest government funds either directly or indirectly in PE applicants (source: EVCA Glossary). Further, companies are defined as start-ups when they are younger than two years at the time of participation. Early stage companies are between 3 and 5 years old and later stage companies are older than 5 years.*

Panel B: Descriptives of Age, Total Assets , Growth in Assets and Leverage *					
PE backed sample	N	Mean	Median	Min.	Max.
Age	4435	12.33	7	0	74
Total Assets	4435	11,786,642	2,717,136	10,833	811,072,065
Asset Growth	4435	19.26%	6.39%	-80.33%	465.17%
Leverage	4435	69.88%	72.35%	3.53%	308.59%
Non-PE backed sample	n	Mean	Median	Min.	Max.
Age	4784	14.38	9	0	91
Total Assets	4784	7,257,799	1,611,394	13,585	876,034,348
Asset Growth	4784	12.52%	4.13%	-69.98%	379.89%
Leverage	4784	66.73%	70.31%	1.93%	193.36%

* *Note: Descriptives come from the PE backed and non-PE backed sample separately and contain values of all specific observation years. We filtered the top and bottom 1% outliers to avoid distorting impact of outliers. 'Age' corresponds to the average age in the PE investment year. Next to total assets, also asset growth is calculated to denote the growth characteristics of both samples. Asset growth is measured as (Total Assets$_t$ – Total Assets$_{t-1}$)/(Total Assets$_{t-1}$). Leverage shows the solvency situation of a company and is computed as follows: (1- BV Equity/Total Assets), with BV of Equity being the Book Value of Equity.*

Panel C: Sector Distribution *				
Sector code	Industry	Frequency	%	Cum. %
01	Agriculture and hunting	2	0.36	0.36
02	Forestry	1	0.18	0.54
03	Fishing	3	0.54	1.08
14	Mineral Oil refining	1	0.18	1.26
10-19	Energy and water	1	0.18	1.26
21	Extraction and preparation of metal sources	1	0.18	1.44
22	Production and preliminary processing of metals	5	0.90	2.34
23	Extraction of minerals (other than metallic and energetic)	2	0.36	2.70
24	Manufacture of non-metallic minerals	12	2.16	4.86
25	Chemical industry	13	2.34	7.20
20-29	Chemical industry	33	5.94	7.20
31	Manufacture of metal articles	43	7.73	14.93
32	Mechanical engineering	17	3.06	17.99
33	Electrical engineering	4	0.72	18.71
34	Manufacturing of motor vehicles/parts	34	6.12	24.82
35	Manufacturing of other means of transport	5	0.90	25.72
36	Instrument engineering	2	0.36	26.08
37	Manufacturing of fine metals	4	0.72	26.80
30-39	Metal manufacture: mechanical, electrical and instrument engineering	109	19.60	26.80
41	Food, drink and tobacco industries	19	3.42	30.22
43	Textile industry	4	0.72	30.94
44	Leather industry	1	0.18	31.12
45	Footwear and clothing industry	9	1.62	32.73
46	Timber and wooden furniture industries	23	4.14	36.87
47	Manufacturing of paper and paper products	21	3.78	40.65
48	Processing of rubber and plastics	8	1.44	42.09
49	Other manufacturing industries	2	0.36	42.45
40-49	Other manufacturing industries	87	15.65	42.45
50	Building constructs	30	5.40	47.84
50-59	Building and civil engineering industry	30	5.40	47.84
61	Wholesale distribution	71	12.77	60.61
62	Scrap and waste materials handling	4	0.72	61.33
63	Wholesale agents	11	1.98	63.31
64	Retail distribution	13	2.34	65.65
66	Hotels and catering	6	1.08	66.73
67	Repair of consumer goods and vehicles	3	0.54	67.27
60-69	Distributive trades, hotels, caters and repairs	108	19.43	67.27
72	Land transport	8	1.44	68.71
75	Air transport	3	0.54	69.24
76	Supporting transport services	4	0.72	69.96
77	Travel agents	3	0.54	70.50
79	Communication services	4	0.72	71.22
70-79	Transport and communication	22	3.96	71.22
81	Credit transactions institutes	15	2.70	73.92
83	Computer services	94	16.91	90.83
84	Renting and leasing activities	6	1.08	91.91
80-89	Business services	115	20.69	91.91
92	Sanitary services	3	0.54	92.45
93	Educational services	1	0.18	92.63
94	Research and Development	4	0.72	93.35
97	Recreational services	27	4.86	98.20
98	Personal services	4	0.72	98.92
99	Domestical services	6	1.08	100
90-99	Other services	45	8.10	100
TOTAL	All sectors	556	100	100

Table 2: Descriptives and *t*-statistics of Deflated Earnings Levels [*]

	Interval	Real observations	Expected observations	Variance	Stdev.	*t*-statistics
PE Backed, 2 and 3 years before participation	[-0.01, 0.00]	23.00	38.00	36.88	6.07	-2.47***
	[0.00, 0.01]	59.00	32.50	63.46	7.97	3.33***
PE Backed, 1 year before participation	[-0.01, 0.00]	11.00	25.50	20.88	4.57	-3.17***
	[0.00, 0.01]	40.00	17.50	41.66	6.45	3.49***
Non-PE Backed, 3 to 1 year before participation	[-0.01, 0.00]	38.00	55.00	59.19	7.69	-2.21***
	[0.00, 0.01]	95.00	50.00	103.72	10.18	4.42***

[*] *Deflated earnings levels consist of profit after taxes (PAT) and are measured by deflating current year's PAT by lagged total assets. Interval widths are determined by the following formula: $(2IQR).n^{-1/3}$, with IQR = interquartile range and n = total number of observations. This formula optimizes the interval width, given (i) the variability of the data and (ii) the total number of observations (Scott, 1992). The expected number of observations is the average number of the two adjacent intervals. Variances (s^2) are equal to $N . p_i . (1 – p_i) + ¼ . N . (p_{i-1} + p_{i+1}).(1 – p_{i-1} – p_{i+1})$ and t-statistics are measured as: (n° of actual observation – n° of observed observations)/s . Note: * = statistically significant at 10% level, ** = stat. significant at 5% level, *** = stat. significant at 1% level*

Table 3: Descriptives and *t*-statistics of Deflated Earnings Changes [*]

Sample	Interval	Real observations	Expected observations	Variance	Stdev.	*t*-statistics
PE Backed, 2 and 3 years before participation	[-0.01, 0.00]	41.00	28.00	47.39	6.88	1.89**
	[0.00, 0.01]	31.00	27.00	39.61	6.29	0.64
PE Backed, 1 year before participation	[-0.01, 0.00]	21.00	23.00	28.41	5.33	-0.38
	[0.00, 0.01]	32.00	20.00	65.99	6.00	2.00***
Non-PE Backed, 3 to 1 year before participation	[-0.01, 0.00]	57.00	59.50	75.34	8.68	-0.29
	[0.00, 0.01]	66.00	49.00	49.14	8.90	1.91**

[*] *Deflated changes in profit after taxes (?PAT) are measured by deflating the change in PAT figures ($PAT_t – PAT_{t-1}$) by lagged total assets. Interval widths are determined by the following formula: $(2IQR).n^{-1/3}$, with IQR = interquartile range and n = total number of observations. This formula optimizes the interval width, given (i) the variability of the data and (ii) the total number of observations (Scott, 1992). The expected number of observations is the average number of the two adjacent intervals. Variances (s^2) are equal to $N . p_i . (1 – p_i) + ¼ . N . (p_{i-1} + p_{i+1}).(1 – p_{i-1} – p_{i+1})$ and t-statistics are measured as: (n° of actual observation – n° of observed observations)/s . Note: * = statistically significant at 10% level, ** = statistically significant at 5% level, *** = statistically significant at 1% level*

Table 4: Time-Series Distribution of Discretionary Accruals (Expressed as % of lagged Total Assets) [*]

	Year - 2	Year - 1	Year 0	Year 1	Year 2
Median DCA – PE backed	2.13%	2.96%	4.05%	2.50%	1.15%
N° of observations	166	151	138	137	127
P within	(0.016)	(0.000)	(0.000)	(0.013)	(0.541)
Median DCA – Non-PE backed	1.25%	1.01%	0.13%	0.04%	-0.52%
N° of observations	160	156	146	143	133
P within	(0.101)	(0.106)	(0.152)	(0.629)	(0.819)
P (between)	(0.186)	(0.028)	(0.035)	(0.031)	(0.493)

[*] This table contains median discretionary current accruals for both the PE backed and the non-PE backed sample. *The initial sample consisted of 556 private equity backed firms and 556 control firms, matched on (i) size, (ii) age and (iii) sector code in the year before the PE investment. We only included companies with available data in a time frame of 2 years before until 2 years after the participation date to evaluate the time-series discretionary accruals trend over this period. As a result, only companies of more than 2 years old could be incorporated in this calculation. Further, a substantial number of companies had missing data on parts of the NAV (net added value) measure. Eventually, this resulted in 166 observations for the PE backed sample and 160 for the non-PE backed sample in (t-2). Remaining differences in number of observations between both samples are a result of lacking data in a specific year. Current accruals consist of the change in non-cash current assets and the change in current liabilities. Non-discretionary current accruals (NDCAs) are current accruals by a within two-digit (respectively one-digit) NACE industry cross-sectional modified Jones model (cfr. Teoh et al., 1998a & b: see appendix 1 for more details). DCAs are scaled by lagged total assets and measure the direction and the average amount of earnings management at each specific observation year. P values (within) are calculated by running a simple t-test and measure whether median DCA levels are significantly different from zero for each observation year separately. P-values (between) come from a two-tailed Wilcoxon signed rank test and measure differences between sample means.*

Table 5: Level of Earnings Management in all Observed Years (Heckman 2 Step Regression Model) *

Variable	Year –2 Coeff.	*t-stat.*	Year –1 Coeff.	*t-stat.*	Year 0 Coeff.	*t-stat.*	Year +1 Coeff.	*t-stat.*	Year +2 Coeff.	*t-stat.*
Intercept	0.079	*0.46*	0.043	*0.19*	0.069	*0.36*	0.065	*0.40*	-0.026	*-0.16*
PE backing dummy	0.176	*1.09*	0.914	*4.79****	0.723	*6.19****	0.363	*4.72****	0.182	*1.87**
Ln(size)	-0.007	*0.70*	-0.021	*1.46*	-0.021	*1.86*	-0.016	*1.55*	-0.006	*-0.64*
Ln(age)	-0.029	*1.62*	-0.043	*1.74**	-0.054	*2.66****	-0.009	*0.61*	0.035	*2.21****
Change in earnings	0.006	*0.62*	-0.003	*0.28*	0.005	*0.47*	0.002	*0.25*	-0.005	*-0.61*
Leverage	-0.059	*1.52*	-0.083	*1.26*	-0.012	*0.20*	-0.058	*4.57****	-0.086	*-2.63****
Sector dummies included	-	-	-	-	-	-	-	-	-	-
# of observations		326		307		284		280		260
Adjusted R^2		4.2%		10.0%		18.7%		13.6%		6.6%
Selection Equation: probit model		*c²*		*c²*		*c²*		*c²*		*c²*
Intercept	0.051	*0.24*	0.004	*0.00*	-0.126	*1.14*	0.241	*3.78**	0.102	*0.83*
Change in total assets	0.476	*4.37****	0.312	*3.16**	0.663	*9.16****	0.773	*7.57****	0.822	*5.75***
Gearing	-0.001	*0.23*	0.007	*0.51*	0.001	*0.00*	-0.011	*1.68*	0.013	*1.35*
Accumulated Profit/TA	-0.160	*1.32*	-0.176	*0.81*	-0.561	*1.72*	-0.005	*0.01*	-0.252	*1.90*
Investments/ TA	0.349	*0.36*	0.690	*1.13*	0.662	*0.86*	-0.217	*0.09*	-1.330	*2.80**
Cash available/TA	-2.039	*3.72***	-1.957	*3.51**	-1.432	*1.90*	-5.216	*12.76****	-1.827	*5.07****

* *This table presents the results of 5 yearly regression analyses of the level of earnings management, proxied by discretionary current accruals, on a number of firm-specific control variables:*

$$DCA_i = a_i + b_{PE} PE_i + b_{size} \ln(size)_i + b_{age} \ln(age)_i + b_{IBX} \Delta(IBX)_i + b_{LEV} Leverage_i + \Theta' IND_i + e_i$$

PE backing is an interaction variable taking the value of 1 if the firm received PE financing and 0 otherwise. This variable allows to test for the differences in earnings management between PE backed and non-PE backed firms. Ln(size) and Ln(age) are the natural logarithms of total assets and age expressed in number of in years, respectively. Change in earnings is the year-on-year change in income before extraordinary items, deflated by lagged income before extraordinary items (ΔIBX). Leverage equals (1 – BV Equity/TA), with BV Equity being the book value of equity and TA = total assets. This variable measures the extent of leverage, i.e. a solvency measure, of a firm. The higher a firm's leverage, the less own resources a firm uses to finance its business activities and/or the higher the level of outstanding debt is. We included sector dummies at a one-digit NACE level. The coefficient are not reported for the sake of brevity. We mention that NACE sector 3 & 4 report accruals more aggressively compared to other sectors over most of the years. The coefficients in the standard OLS regression model are not reported for the sake of brevity. All test-statistics are White (1980) corrected for heteroscedasticity. The Heckman 2 Step Regression model controls for endogeneity in our sample, possibly resulting from a selection bias. More details are provided in Appendix 2. There are 5 independent variables in our first selection equation to test the hazard of receiving PE financing. Change in total assets measures the firm's growth and equals $[(TA_t)-(TA_{t-1}]/(TA_{t-1})$. Gearing is the level of a firm's outstanding debt on the level of equity and controls for the firm's solvency situation. Accumulated profit shows a firm's past profitability and measures the internal financing capacity of companies under

investigation. Investments measure a company's investment intensity while cash available controls for the liquidity position of a company. Accumulated profit, Investments and Cash Available are all deflated by total assets to avoid heteroscedasticity problems.

Note: [***] = significance at the 1% confidence level, [**] = significance at the 5% confidence level, [*] = significance at the 10% confidence level.

Table 6: Descriptives of Transitory Earnings Sample (Post-Investment Only) [*]

Panel A: All	Total Assets	Sales /TA (%)	CP/TA (%)	PBT/TA (%)	PAT/TA (%)
Number obs.	4,202	2,952	4,202	4,202	4,202
Mean	11,811,194	102.25	–0.48	–0.51	–0.53
% > 0	100	100	68	71	70
% < 0	0	0	32	29	30
25% percentile	956,416	16.54	–1.05	–0.54	–0.75
Median	2,815,550	83.04	1.87	2.06	1.39
75% percentile	7,874,784	153.14	6.79	7.21	5.21

Panel B: PE backed sample	Total Assets	Sales /TA (%)	CP/TA (%)	PBT/TA (%)	PAT/TA (%)
Number obs.	2,062	1,555	2,062	2,062	2,062
Mean	15,482,927	92.14	–1.01	–1.08	–1.09
% > 0	100	100	67	69	68
% < 0	0	0	33	31	32
25% percentile	1,409,262	10.34	–1.47	-1.23	–1.31
Median	4,033,302	81.37	1.54	1.53	1.09
75% percentile	11,337,600	134.49	5.78	6.12	4.62

[*] Note: this table presents descriptive values for total assets (TA), sales, current profit (CP), profit before taxes (PBT) and profit after taxes (PAT) with all variables (except for total assets itself), deflated by total assets in the year of investment and post-investment years. This sample is used for the transitory earnings regressions as in model (4) to (6). Panel A contains values for all available observations, i.e. PE backed and non-PE backed. Panel B shows descriptives of the subsample of PE-backed companies only.

Table 7: Coefficients and Expected Signs in Interaction Regressions

Model (5): differences in earnings conservatism between PE backed and non-PE backed companies:

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 PE + b_5 PE * NEG(\Delta NI)_{t-1} + b_6 PE * \Delta NI_{t-1} + b_7 PE * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t$$

SAMPLE	ACTION	EXPECTED SIGN
Non-PE backed	Timely recognition of losses	$(b_2+b_3) < 0$
	Losses are recognized more timely than gains	$(b_3) < 0$
PE backed	Timely recognition of losses	$(b_2+b_3) + (b_6+b_7) < 0$
	Losses are recognized more timely than gains	$(b_3+b_7) < 0$
PE backed versus non-PE backed	PEB recognize losses more timely compared to non-PEB companies	$(b_6+b_7) < 0$
	PEB recognize losses more timely than gains compared to non-PEB companies	$(b_7) < 0$

Model (6): differences in earnings conservatism between government PE backed and non-government PE backed companies:

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 GOV + b_5 GOV * NEG(\Delta NI)_{t-1} + b_6 GOV * \Delta NI_{t-1} + b_7 GOV * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t$$

SAMPLE	ACTION	EXPECTED SIGN
Non-government PE backed	Timely recognition of losses	$(b_2+b_3) < 0$
	Losses are recognized more timely than gains	$(b_3) < 0$
Government PE backed	Timely recognition of losses	$(b_2+b_3) + (b_6+b_7) < 0$
	Losses are recognized more timely than gains	$(b_3+b_7) < 0$
Non-government versus government PE backed	Non-government PE backed firms recognize losses more timely compared to government PE backed companies	$(b_6+b_7) > 0$
	Non-government PE backed recognize losses more timely than gains compared to government PE backed companies	$(b_7) > 0$

Table 8: Transitory Earnings Regression 1*

Model 1: Basic model (4) _ (2) Model inclusive PE indicator variables (model 5)						
Variable	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value
(1) Basic model	Current profit/loss after financial income		Profit before taxes, after extraordinary income		Profit after taxes (bottom line results)	
Intercept (b_0)	0.024	0.88	-0.256	-4.79***	-0.226	-4.22***
$NEG(?NI)_{t-1}$ (b_1)	-0.031	-0.74	0.225	2.70***	0.163	1.99***
$?NI_{t-1}$ (b_2)	0.029	-0.33	2.541	17.00***	2.682	17.47***
$NEG(?NI)_{t-1} * ?NI_{t-1}$ (b_3)	-0.523	-1.88**	-3.571	-7.24***	-3.835	-7.64***
Adjusted R^2		0.22%		6.48%		6.83%
N° observations		4202		4202		4202
(2) PE dummies						
Intercept (b_0)	-0.001	-0.02	0.001	0.01	-0.004	-0.06
$NEG(?NI)_{t-1}$ (b_1)	-0.001	-0.03	-0.014	-0.12	-0.004	-0.03
$?NI_{t-1}$ (b_2)	-0.083	-0.42	-0.120	-0.39	-0.112	-0.31
$NEG(?NI)_{t-1} * ?NI_{t-1}$ (b_3)	-0.352	-0.78	-0.584	-0.73	-0.492	-0.58
PE (b_4)	0.054	0.99	-0.361	-3.37***	-0.287	-2.66***
$PE * NEG(?NI)_{t-1}$ (b_5)	-0.062	-0.73	0.330	1.99**	0.178	1.09
$PE * ?NI_{t-1}$ (b_6)	0.061	0.28	3.441	9.73***	3.425	8.71***
$PE * NEG(?NI)_{t-1} * ?NI_{t-1}$ (b_7)	-0.262	-0.45	-3.982	-3.93***	-4.350	-4.13***
Adjusted R^2		0.20%		8.46%		8.43%
N		4202		4202		4202

* *This regression using time-series relations estimates the impact of changes in past year's earnings changes on current year's earnings changes controlling for (1) previous negative earnings change and (2) receiving PE financing. DNI_{t-1} is the change in earnings from the previous period, $NEG(DNI)_{t-1}$ is a dummy variable taking the value of 1 when previous year's earnings are negative and VC is a dummy variable taking the value 1 when the firm received PE:*

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 PE + b_5 PE * NEG(\Delta NI)_{t-1} + b_6 PE * \Delta NI_{t-1} + b_7 PE * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t$$

Test-statistics are White-corrected to control for heteroscedasticity and Durbin-Watson statistics suggest no autocorrelation (DW close to 2). Variance Inflation Factors and Eigenvalues (not reported here) denote a substantial amount of multicollinearity between some dependent variables. However, this finding does not lead to biased estimates and hence is not harmful for the interpretation of our regression results (Blanchard, 1967; Hamilton, 1994).

*Note: ***: statistically significant at 1% confidence level, ** : statistically significant at 5% confidence level, * : statistically significant at 10% confidence level.*

Table 9: Transitory Earnings Regression 2 *

Model 2: (1) Basic model (4) (2) Model inclusive government PE backing dummies (model 6)						
Variable	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value
(1) Basic model	Current profit/loss after financial income		Profit before taxes, after extraordinary income		Profit after taxes (bottom line results)	
Intercept(b_0)	0.037	0.70	-0.063	-0.58	-0.008	-0.08
NEG(?NI)$_{t-1}$ (b_1)	-0.047	-0.56	0.018	0.11	-0.108	-0.64
?NI$_{t-1}$ (b_2)	0.135	2.40***	0.820	7.28***	0.814	7.23***
*NEG(?NI)$_{t-1}$ * ?NI$_{t-1}$(b_3)*	-0.771	-1.55*	-2.066	-2.31***	-2.343	-2.60***
Adjusted R²		0.22%		2.46%		2.49%
N° observations		2062		2062		2062
(2) Government-related PE dummies						
Intercept(b_0)	-0.089	-0.90	0.052	0.26	0.248	1.21
NEG(?NI)$_{t-1}$ (b_1)	0.121	0.73	-0.134	-0.40	-0.636	-1.91*
?NI$_{t-1}$ (b_2)	0.154	2.52***	0.982	7.97***	0.967	7.85***
*NEG(?NI)$_{t-1}$ * ?NI$_{t-1}$(b_3)*	-0.319	-0.37	-2.852	-1.93*	-3.884	-2.58***
GOV(b_4)	0.180	1.52	-0.074	-0.31	-0.279	-1.17
GOV NEG(?NI)$_{t-1}$(b_5)*	-0.237	-1.23	0.130	0.33	0.644	1.67*
GOV ?NI$_{t-1}$(b_6)*	-0.095	-0.61	-1.011	-3.34***	-0.922	-7.03***
GOV NEG(?NI)$_{t-1}$ *?NI$_{t-1}$ (b_7)*	-0.619	-0.58	2.011	1.07	2.982	1.65*
Adjusted R²		0.50%		2.85%		3.07%
N		2062		2062		2062

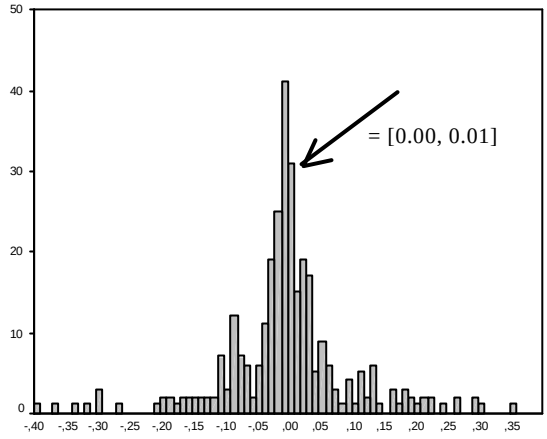
* *This regression uses time-series estimates to study the impact of changes in past years' earnings changes on current years' earnings changes and controls for (1) previous negative earnings change and (2) PE investor origin (government-related versus independent). DNI_{t-1} is the change in earnings from the previous period, $NEG(DNI)_{t-1}$ is a dummy variable taking the value of 1 when previous years' earnings are negative and GOV ('Government dummy') is a dummy variable taking the value 1 when the firm is backed by a government-related PE firm.*

$$\Delta NI_t = a_0 + b_1 NEG(\Delta NI)_{t-1} + b_2 \Delta NI_{t-1} + b_3 NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + b_4 GOV + b_5 GOV * NEG(\Delta NI)_{t-1} + b_6 GOV * \Delta NI_{t-1} + b_7 GOV * NEG(\Delta NI)_{t-1} * \Delta NI_{t-1} + e_t$$

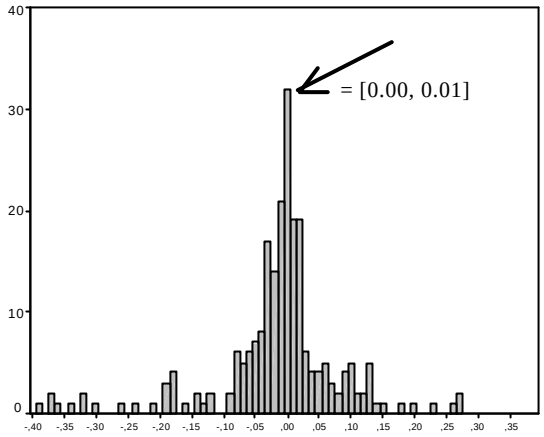
Test-statistics are White-corrected to control for heteroscedasticity and Durbin-Watson statistics suggest no autocorrelation (DW close to 2). Variance Inflation Factors and Eigenvalues (not reported here) denote a substantial amount of multicollinearity between some dependent variables. However, this finding does not lead to biased estimates and hence is not harmful for the interpretation of our regression results (Blanchard, 1967; Hamilton, 1994).

*Note: *** statistically significant at 1% confidence level, ** : statistically significant at 5% confidence level, * : statistically significant at 10% confidence level.*

Figure 1: Deflated Changes in Profit After Taxes for PE Backed Sample, 1 Year Before Participation (Right-Hand Graph) Versus 2 & 3 Years Before Participation (Left-Hand Graph)



Earnings changes of PE backed companies, 2 & 3 years prior to participation



Earnings changes of PE backed companies, 1 year prior to participation

Part 3: The Role of Government

Part 3: The Role of Government

Resources, Capabilities, Risk Capital and the Creation of University Spin-Out Companies

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Abstract

The commercialization of University research has become an increasingly important issue for academics as well as practitioners as a result of the problems associated with licensing and the desire to maximize the returns to intellectual property (IP). The novel contribution of this paper is to examine how universities' inputs and routines/capabilities affect the creation of both spin-out companies and external equity backed start-up companies. We find that the number of spin-out companies created is significantly positively associated with total research expenditure, the number of employees engaged in spin-out activities, expenditure on IP protection and the business development capabilities of technology transfer offices. Second, we also find that equity investments in spin-out companies are positively associated with a university's investment in IP protection, the experience of the university and its business development capabilities. These results highlight the importance not just of resources but also the skills of the technology transfer officers in spinning-out companies. Also, the results show differences in the drivers of spinning-out companies and companies that are able to attract external equity investment. In particular, expenditure on IP protection and the experience of the TT staff are more important for attracting equity investments in spin-out companies than just forming the companies.

Introduction

Public policy has become increasingly interested in the role universities may play in economic development. Universities have come to be seen as "engines for economic growth". In particular, there is increasing focus on universities' ability to become more adept at exploiting their own science base and transferring their scientific knowledge to the private sector. The dominant way in which technology has been traditionally transferred from the university sector to the private sector is through technology licensing (Siegel *et al.*, 1999). This system has the advantage that the academic and the university are able to capitalize on the technology, and the academic is able to pursue his/her research without having to commit large amounts of time to commercial matters. The downsides to this approach are two-fold. First, the nature of the new technology may not be easily patented and transacted via a license agreement. Second, universities may not be able to capture the full value of their technology through a licensing arrangement and therefore may seek a more direct involvement in the commercialization of new technology through spinning-out a company (Franklin, Wright and Lockett, 2001).

As a result, there is growing interest in the role that university spin-out/off companies (USOs) may play in the commercialization process. This increased interest is being observed in North America, the UK, Australia and Continental Europe (DiGregorio and Shane, 2003; Shane and Stuart, 2002; Wright, Vohora and Lockett, 2002). There is a perception that ownership of equity in a USO may increase the potential up-side gain and thus appear an attractive option to universities. Small sample survey evidence indicates that taking equity in a USO company produces a greater average return in the long run compared to the average return available from the average license (Bray and Lee, 2000).

Many USOs that are created may not generate significant wealth. For example, the UK Treasury-sponsored Lambert Review of business-university collaboration published at the end of 2003 considered that too many USOs were being created and that greater focus should be placed on identifying whether a USO was the most appropriate means to exploit technological inventions produced in universities (Lambert, 2003). While it is relatively straightforward to create a legal entity, the act of creating a company does not necessarily mean that it will go on to generate wealth. A key constraint on the development of spin-outs is reported by TTOs to be access to venture capital finance (Wright, et al., 2003). At the same time, venture capital firms lament the lack of sufficient investment propositions with attractive prospects for future wealth generation (Lockett, Murray and Wright, 2002; Bank of England, 2002). A central issue, therefore, is the need to distinguish between the factors influencing the creation of USOs as such and those influencing the creation of USOs that are more likely to generate wealth, as indicated by those ventures that are able to attract external equity financing.

Some research attention has been addressed towards the inputs associated with the number of USOs created by US universities (DiGregorio and Shane, 2003) and the survivability of start-ups that exploit academic knowledge (Nerkar and Shane, 2003). Case based research on USOs has examined the phases

in their development (Vohora, Wright and Lockett, 2004) and the strategies adopted by research institutions to develop different types of spin-offs (Clarysse, Wright, Lockett, van de Velde and Vohora, 2004). A key omission from this literature concerns any systematic analysis of the role of the resources and capabilities of universities and their TTOs in the creation of spin-outs and in particular their role in establishing spin-outs that are more likely to generate wealth. The importance of inter-organizational differences with respect to resources and capabilities, and their impact on firm behaviour and performance, is central to the RBV. In particular, issues relate to the presence of sufficient experience and expertise within what are historically non-commercial environments to generate gains from spin-out ventures (Lambert, 2003). There is then a need to examine the extent to which the capabilities of TTOs are important influences on the generation of USOs that are likely to create wealth within the context of universities' resources and environments. Specifically, we seek to fill this important research gap by exploring two research questions:

Q1. What are the most important resource inputs and capabilities in the creation of USOs?

Q2. What are the most important resource inputs and capabilities for creating USOs that are likely to generate wealth gains, specifically those USOs that attract external private equity investment?

In this paper we seek to address the above questions in two ways. First, we identify the different resource inputs and capabilities required by universities to spin –out companies and hypothesize their relationships with universities' creation of spin-out companies. Second, we empirically test our model using novel data from two surveys of UK universities' commercial exploitation of their intellectual property through the creation of USOs conducted in 2002 and 2003. The structure of this paper is as follows. Section 2 outlines the theoretical background of the model, which involves the relationship between licensing and USO activity, different measures of USO activity, universities different resource inputs into the commercialization process and their capabilities. We outline the hypothesized nature of the relationships in this section. Section 3 outlines the methodology. Section 4 outlines the results. Section 5 concludes, comments on potential limitations of the research and comments on implications to policy makers and practitioners.

What is a USO?

For the purpose of this paper we narrowly define USOs as *businesses that are dependent upon licensing or assignment of the institution's technology for initiation*. This definition is consistent with that used by AUTM in the US. In some cases, where permitted, the university may own equity in the USO in exchange for patent rights it has assigned or in lieu of licence for fees. The need for such a precise definition of USOs arises since a wide range of companies originate from universities. Hence, we exclude all companies not based on technology assigned/licensed from the university, such as companies that may be established by graduates or university researchers that are not directly related to intellectual assets created from research funded by government or industry.

We also distinguish between external equity backed USOs and those that do not receive such financial support. External equity backing is early stage funding from either large corporations or financial intermediaries such as business angels and venture capitalists. This distinction provides an important indicator of performance. Receipt of external equity finance can be viewed as a signal of quality as such ventures have successfully passed scrutinization by professional investors to assess their ability to generate significant future returns (Lockett, Murray and Wright, 2002). Hence external equity backed USOs may be qualitatively different from non-equity backed USOs (Lockett et al, 2003).

Theortical development

The majority of existing research on the performance of university technology transfer has emphasized the licensing activities of US universities (see, for example, Thursby and Thursby, 2002; Thursby and Kemp, 2002; Siegel, Waldman and Link, 2003; Sine, Shane and DiGregorio, forthcoming). Research into universities' effectiveness at licensing has traditionally focused on a production function type approach

employing an inefficiency model (e.g. Siegel, et al., 2003). The production functions have focused on basic resource inputs into the process – e.g. some measure of research input (research expenditure or invention disclosures), human resources (staffing of the TTO), expenditure on IP. The inefficiency models have also tended to focus on relatively simple determinants of efficiency such as whether or not the university has a medical school.

The process of spinning-out companies is – arguably – much more complex than licensing. DiGregorio and Shane (2003), in their examination of why some universities generate more start-ups than others, focus on university level factors, including a university's propensity to undertake industry sponsored research, intellectual eminence and policy towards IP commercialization; and external factors such as the availability of venture capital in a region. They also control for the number of TTOs, the amount of sponsored research expenditure and the number of inventions. We build on this approach by arguing that the availability of relevant expertise and processes may be important, particularly for those USOs that are expected to generate more wealth as indicated by their ability to attract external equity finance. For example, Clarysse et al (2004) examined the relationship between a university's resources, its strategy and its ability to spin out companies. They identified three distinct models of managing the spin-out process which require very different resources and capabilities on behalf of the university. In order to model the resource inputs and skills of the TTO we employ an RBV framework. The RBV focuses on the role of each firm's unique experience in accumulating resources and capabilities that shape its opportunities to earn rents. This approach encompasses a wide range of developments that have taken the theory in a number of different directions. In particular, authors have drawn a distinction between the equilibrium (or static) conceptualization of the RBV (e.g. Rumelt, 1984; Barney, 1986 & 1991; Peteraf, 1993) and the dynamic view of the RBV in terms of capabilities and routines (e.g. Collis, 1994; Teece, Pisano and Shuen, 1997). We follow this tradition by drawing a simple distinction between a resource as a stock and a capability or routine as a flow or activity. This is consistent with Penrose (1959) who identified resources and also the "productive services" that different collections of resources – deployed together – can create.

Thus, our overall framework consists of three broad elements. First, we build on existing research by hypothesizing that there are a number of basic resource inputs into the commercialization process that will have a positive impact on the creation of USOs. Second, the stock of experience of the university in TTO activities may be expected to be a resource that facilitates the creation of USOs and the attraction of external equity investments into USOs. Third, we consider the capabilities and routines possessed and developed by universities that may be expected to enable them to generate USOs that are more likely to create wealth. These capabilities can be identified in terms of business development capabilities, incentives to commercialize the technology and the ability to develop close links with external resource providers such as financiers may also be important (Lockett et al, 2003). We expand on these arguments below.

Resource Inputs into the USO Process

The stock of technology in a university provides a key resource input into the spin-out process. The higher the stock of technology, the greater the scope for the transfer of that technology. US research has suggested that the number of invention disclosures received by a TTO is a measure of the stock of technology at a particular time. This follows from the Bayh-Dole Act which stipulates that once a scientific discovery has been made during research sponsored by government funding, scientists must file an invention disclosure with the TTO. Recent research conducted on US universities by Siegel et al (2003) shows that in practice, TTO personnel must typically devote substantial effort to encourage faculty members to disclose inventions. Furthermore, using invention disclosures as a proxy for the stock of technology is very context specific. Unlike US institutions, there is no legislation in the UK that creates the incentive for institutions to collect invention disclosures from their research departments. Policies and practices in UK universities do not stipulate that new scientific discoveries must be disclosed, leaving a large quantity of a university's exploitable intellectual assets unobservable. In the UK, therefore, a better measure of the technology available for commercialization may be the total research expenditure of each institution. Hence:

H1a: There is a positive relationship between a university's stock of technology to commercialize (as measured by total research expenditure) and the creation of USOs.

H1b: There is a positive relationship between a university's stock of technology to commercialize (as measured by total research expenditure) and attraction of external equity investments into USOs.

After a new scientific discovery has been brought to the attention of the TTO the invention is evaluated for its technological and commercial potential to decide whether there is sufficient value to be gained from patenting the invention (Vohora, Wright and Lockett, 2004). This scrutiny requires the resource of specific skills relating to the technology and its potential market. This decision process may be constrained by limitations in funding and the availability of qualified human resources. Universities can to some extent address this problem by seeking external advice on the protection of IP. The requirement for technical and market evaluation of invention disclosures is expensive and inevitably limited by the level of expenditure on external IP legal services. Universities may be willing to spend more on these services where they recognize that a particular invention has strong growth prospects and is a likely candidate to receive external equity backing. We argue that there is a positive relationship between expenditure on IP and the creation of USOs. Hence:

H2a: There is a positive relationship between a university's expenditure on external IP advice and the creation of USOs.

H2b: There is a positive relationship between a university's expenditure on external IP advice and the attraction of external equity investments into USOs.

The availability of skilled staff, with the requisite commercial (and in particular business venturing skills), may be an important resource input into the creation of USOs (Lockett, Wright and Franklin, 2003; Clarysse et al., 2004). The role of the TTO staff may be particularly important given the traditionally non-commercial nature of university environments. The TTO staff may have an important role to play both in terms of "business coaching" and in stimulating entrepreneurial activity and hence the creation of USOs. Academic inventors may not necessarily be the best individual to recognise an opportunity (Lockett et al, 2003). TTO staff may be more alert to, and thus more able to notice, opportunities (Kirzner, 1973) and also to promote interest in commercialization activities in the university. TTO staff as insiders with close contacts with science departments may be better placed than outsiders to identify opportunities for the creation of USOs. Hence:

H3a: There is a positive relationship between the availability of TTO staff and the creation of USOs.

H3b: There is a positive relationship between the availability of TTO staff and the attraction of external equity investments into USOs.

Stock of Experience Resource

Experience of spinning out companies is an important resource that may increase the efficiency of a university in spinning-out companies. Through being actively involved in technology transfer activities, universities may become better able to create USOs, and perhaps more importantly, USOs that others will want to invest in – i.e. equity backed USOs. This argument is based on the notion that the more experience the university has in spinning-out companies the more effective managers will become. This will lead to a generation of excess managerial resources that can be used to further facilitate the process (Penrose, 1959). Experience may be positively associated with the length of time a university has been actively involved in TT activities. This leads us to hypothesize that:

H4a: There is a positive relationship between a university's experience of technology transfer activities and the creation of USOs

H4b: There is a positive relationship between a university's experience of technology transfer activities and the attraction of external equity investments into USOs.

Business Development Capabilities

We also examine the extent to which the university has developed relevant capabilities to spin-out companies since a strategy of commercializing technology through USOs places a number of additional requirements on the routines/capabilities possessed by universities, beyond those skills required for licensing. By routines/capabilities we mean some form of ability to perform a productive activity (Eisenhardt and Martin, 2000). These routines/capabilities are likely to be unequally distributed across universities and are as yet rather embryonic for the vast majority of institutions. These routines/capabilities involve processes for assessing intellectual property rights (IPR), processes for spinning-out companies, and skills embodied in university staff in terms of both managing the commercialization process and specific technical and marketing skills. First, whether technology is exploited through licensing or spin-out, universities may employ clear processes for conducting IP evaluation and due diligence to ensure intellectual property rights (IPR) are identified and fully evaluated before commercialization can commence (Vohora et al, 2004). Unless new IP is shown to be exempt from potential infringements of existing patent rights and there is exclusive 'freedom to operate', the commercial exploitation process cannot proceed without great difficulties. If it is not possible to secure a patent there are likely to be major problems in marketing and generating rents from the technology.

Second, there is also a strong requirement for clear policies, processes and routines for creating and developing USOs. The creation of a legal entity is relatively straightforward. However, the creation of a USO that includes legally protected IP, and the managerial and marketing skills, premises and financial resources to enable it to develop, is more complex. These routines take time to develop and their development is also dependent on individual university contexts (Teece et al, 1997).

Third, the development of these routines/capabilities relies heavily upon the experience and expertise of TTO personnel. Clear processes and organizational routines in themselves do not enable the technology transfer process to function productively. There is a requirement for individuals to develop and implement these routines. The availability of skilled TTO staff to manage the commercialization process is thus vital to the creation of USOs. The quality of the TTO staff is important in terms of their marketing, technical, negotiating skills.

More developed routines and capabilities may be associated with the selection of inventions with greater commercialization prospects. In addition, these skills may bring a greater ability to prepare the invention to a state where it is ready to attract external finance. Universities may thus develop different strategies towards the development of USOs depending on the extent to which they are selective in terms of offering assistance to potential USOs (Clarysse et al, 2003). Universities with greater business development capabilities may be able to focus attention on those USOs, which they perceive are going to make the greatest return. Hence:

H5a: There is a positive relationship between a university's business development capabilities and the creation of USOs

H5b: There is a positive relationship between a university's business development capabilities and the attraction of external equity investments into USOs.

Incentives and rewards

Organizations require incentives and rewards to encourage people to perform particular productive activities (Holmstrom, 1979; Jensen, 1993). For most universities, commercialization of research requires radical changes in the way they have traditionally exploited scientific discoveries (Etzkowitz, 1998). The institutional incentive and reward mechanisms that operate within universities can preserve and reinforce existing cultures, organizational norms, policies and procedures. There may be a need to modify procedures to align rewards with commercialization goals, taking into account the characteristics, actions

and motives of key stakeholders. Siegel et al (2002) revealed palpable differences in these areas that can potentially impede technology transfer.

The norms, standards and values of academic scientists reflect an organizational culture that values creativity, innovation, and especially, the individual's contribution to advances in knowledge – or basic research (Siegel et al, 2002). The primary motivation for university scientists is recognition within the scientific community. Promotion is almost always based upon an assessment of researchers' contributions to the progress of science measured by refereed publications. Universities typically do not reward activities such as commercializing research and creating new spin-offs, in their promotion and tenure decisions (Siegel et al, 2003). The performance evaluation process and publishing-orientation of researchers thus act as barriers to these activities (Ndonzuau et al, 2002).

US universities benefit from the clarity of the Bayh-Dole Act, which reduces the conflict of interest and puts the onus on the university commercially to exploit inventions that result from scientific research. However, we conjecture that in the UK environment an important and overlooked impediment to the commercialization of university IP is the unavailability of sufficient incentives and rewards for university staff to spend time on spinouts (Lockett, Wright and Franklin, 2003). Lower royalty rates may be an incentive to start a venture to exploit a technology rather than license it (DiGregorio and Shane, 2003). In contrast, the ability for academics to take significant equity stakes in USOs may be a greater incentive for them to create USOs (Lockett, et al, 2003). For USOs to develop commercially may require the attraction of external equity finance. To do so may require the presence of commercially experienced managers, who in turn are likely to require appropriate incentives. Hence:

> H6a: There is a positive relationship between an incentive and reward system that promotes commercialization and the creation of USOs
>
> H6b: There is a positive relationship between an incentive and reward system that promotes commercialization and the attraction of external equity investments into USOs.

Access to external finance

Universities' working relationships with external organizations may also be crucial to the successful implementation of USO strategies. Networking allows entrepreneurs to enlarge their knowledge of opportunities, to gain access to critical resources such as finance (Manigart, Sapienza and Vermeir, 1996). External networks with the financial and commercial sector may be especially important for the development of USOs given the traditionally non-commercial environment of universities. DiGregorio and Shane (2003) argue that proximity to local venture capital firms provides an important means to overcoming capital market barriers to the development of technology-based spin-outs; proximity also lowers monitoring costs and helps development of networks of contacts. However, their empirical evidence did not support this conjecture. They suggest that this finding may indicate that venture capital firms distribute finance efficiently over geographic space and may only become more involved in USOs at a later stage.

Therefore, TTOs need to focus on their ability to access early stage external finance. The sources of external equity finance available to a USO are either a venture capitalist, business angel or industrial partner. The availability of seed funding can help the commercialization process in a number of ways - financing access to managerial skills, by securing or enhancing intellectual property; by supporting additional R&D; construction of a prototype; preparation of a business plan; covering legal costs; etc. In effect, this seed money is intended to facilitate the USOs in getting themselves "investor ready" for next stage equity financing. An ability to access resources, capabilities and expertise that can be provided by external sources of finance leads to comparatively faster professionalization of a new venture into a growing business (Hellmann and Puri, 2001).

In addition to providing finance, business angels may be able to take on the role of surrogate entrepreneur, that is providing close commercial managerial involvement in helping the business to develop to become ready for the next stage of financial input (Franklin, et al, 2001). This may be especially important during the earlier stages of development where managerial inputs are required but

the firm does not have the revenue stream to support significant salary costs. Through their networks of contacts, both venture capital firms and industrial partners can provide links to potential suppliers and customers, as well as advice and monitoring (Florida and Kenney, 1988). The formation of a joint venture between the university and an established firm, in particular, can be a mechanism for gaining access to resources, exchanging information, developing inter-organizational commitments and establishing legitimacy. JVSOs may be adept in providing a clear route to market by building on their stock of social capital derived from long-standing relationships established through previous business transactions (Vohora et al, 2003). Hence:

> H7a: There is a positive relationship between a university's external relational capabilities and the creation of USOs
>
> H7b: There is a positive relationship between a university's external relational capabilities and the attraction of external equity investments into USOs.

Methodology

The Sample

The sample used in the study is derived from a mail questionnaire survey conducted over a two year period. In March 2002, a survey on university technology transfer activities comprising of quantitative and qualitative questionnaires was sent to the top 122 universities in the UK as ranked by research income. These institutions were identified using the Higher Education Statistics Agency (HESA) publication entitled *Resources of Higher Education Institutions (2000/2001)*. The remaining 45 universities accounted for just 0.2% (or £3.9 million) of total research grants and contract expenditures by UK universities in financial year 2001.

We received information from 110 of these top 122 universities. This included a number of nil responses where the university was not active in the field of technology transfer and so only provided us with some basic information. The sample of universities we employ in our analysis only includes those institutions that provided us with full information. In total we obtained full disclosure for all variables from 50 universities, however, we were able to obtain partial data from another 60 universities in order to test the representativeness of our sample.

We returned to these institutions in the spring of 2003 and obtained full data on the level of their USO activity in financial year 2002. Therefore, we are able to specify our regression model with inputs (including capabilities) to the process in the financial year 2001 and the creation of USOs in 2002.

In order to test the representativeness of our sample of universities we examined the differences between the 50 universities in our sample of full respondents against the remaining 60 universities. The results of this analysis are presented in Table 2 and indicate that our sample of 50 universities is located on the right hand side of the distribution of technology transfer activities. In particular, our sample is significantly likely to create more USOs ($p<.05$), generate more equity investment in USOs ($p<.01$), have a greater total research income ($p<.01$), have a greater experience of involvement in technology transfer activities ($p<.01$), be more likely to have a medical school ($p<.01$) and science park ($p<.01$). This emphasis in our sample of respondents is not surprising since those universities that are actively involved in spinning-out companies will be more likely to fully complete the questionnaire.

< Insert Table 2 here >

Definition and Measurement of Variables

In this section we detail the variables we employed in our analysis. Detailed definitions of all the dependent and independent variables employed in the analysis are presented in Table 1.

< Insert Table 1 here >

Dependent Variables

The dependent variables we employ are the number of USOs created in 2002 (USOs) and the number of equity investments in existing USOs in 2002 (EIUSOs). EIUSOs is a count of the number of equity investments. These two variables were employed in order to differentiate between potential differences in universities creating USOs and the creation of USOs that have been validated in terms of being able to attract external equity investment.

Independent Variables

The independent variables we employ cover both resource inputs of the universities into the commercialization process and the capabilities of the universities. All of the data collected for the independent variables was collected for the financial year 2001 and the data relating to outputs (i.e. the creation of USOs and equity investments in USOs) was 2002. This lagged approach enables us to overcome problems associated with endogeneity.

The measure of a university's investment in research was measured in terms of its total research income (TRESI). This data is collected in the UK by HEBI. We employed a natural log transformation of this variable in our analysis due to the high level of variance between the research incomes of universities.

The measure of a university's expenditure on the protection of its intellectual property was measured in terms of spending on external legal fees, patent costs and specialist IP consultancy advice (IPEXP). Again, we employed a natural log transformation of this variable in our analysis due to the high level of variance between the expenditures of universities.

The measure of a university's input of people into the technology transfer process was measured in terms of the number of full time equivalents (FTEs) the university had working on technology transfer activities (TTSTAFF).

The measure of a university's experience of technology transfer (EXPER) was measured in terms of the number of years the university had been involved in the activity. We defined involvement as the first year in which the university had first dedicated at least 0.5 FTEs toward technology transfer activities.

In the absence of existing scales relating to the business development capabilities, incentives and rewards and access to external funding in the university commercialization context, we conducted detailed case study interviews to identify the appropriate dimensions to include in the questionnaire. We conducted interviews with TTOs and academic entrepreneurs in seven universities selected on the basis that they are among the top ten research elite universities in the UK. The universities were pursuing active but different programs of university technology transfer and were at different points in transforming their policies, routines and incentive mechanisms towards enabling its intellectual property to be commercialised more readily through new USO ventures and licensing. The interviews revealed a number of key capabilities that universities require in order to effectively spin-out companies. These capabilities we term: Business Development, Incentives and Rewards and Access to Equity finance

The Business Development Capability construct (BDCAP) relates to the extent to which the University has clear processes for spinning out companies. We measured this construct by asking respondents to rate the extent to which the following elements either promote or impede the spinning-out companies in their university. The four elements were: the marketing, technical, negotiating skills of the university staff involved in commercialisation; the availability of a clear process for conducting IPR due diligence; the availability of a clear process for spinning out companies; and the availability of university staff to manage the commercialisation process. With reference to these statements, a summated average scale was calculated (Cronbach's Alpha = 0.86).

Incentives and Rewards capability construct (INCENT) relates to the ability of the university to have the capability of implementing the necessary incentives and rewards to facilitate the process of spinning-out companies. We measured this construct by asking the respondents to rate the availability of incentives

and rewards for university staff to spend time on spin-outs; the availability of incentives and rewards to attract commercial management to spin-outs; the availability of incentives and rewards for academics to commercialise research. Respondents rated each item in terms of the extent to which the factor had either impeded or promoted the spinning-out of companies; the likert scale ranged from 1 = strongly impeded … 3 = no effect … 5 = strongly promoted the spinning-out of companies. With reference to these statements, a summated average scale was calculated (Cronbach's Alpha = 0.72).

The Access to External Funding capability construct (EXTFIN) examines the extent to which universities are able to attract finance for their USOs from external equity providers. We measured this construct be asking respondents to rate the extent to which their ability to attract funding from a range of different providers either promoted or hindered the process of spinning-out companies. The three providers we focused on were: the ability to obtain finance from venture capital firms; the ability to obtain finance from business angels; and the ability to obtain finance from industrial partners. With reference to these statements, a summated average scale was calculated (Cronbach's Alpha = 0.77).

Finally, we employed three control variables – whether or not the university has a medical school (MEDSCH), whether or not the university had a science park (SCIPRK) and the R&D intensity of the region (R&D). These variables were employed to control for the high resource requirements of a medical school, which have proved to be a significant drain on a universities ability to transfer technology via licensing when research expenditure is controlled for (see: Seigel et al 2002). A Science Park may be viewed as a technology catalyst that may facilitate the creation of USOs, however, work from the UK has found the impact of science parks to be negligible (see: Westhead, Seigel and Wright, 2003). Finally, we follow (Siegel et al, 2002) and employ an environmental control, that of R&D intensity among local firms

Data and empirical results

Descriptive statistics relating to the selected dependent, independent and control variables are reported in Tables 3 and 4. The descriptive statistics show that our sample of 50 universities generated a mean of 1.9 USOs and 2.92 USOs with equity investments. From Table 4 it can be seen that there is a substantial dispersion between the different universities in terms of the number of USOs and EIUSOs they can generate. The distribution of activity indicates that 40% and 38% of the 50 universities generated no USOs or equity investments in USOs, respectively, in the financial year 2002. The truncated nature of these distributions of activity meant that we could not simply use an OLS approach and so we had to use negative binomial and or poisson regression techniques.

< Insert Table 3 & 4 here >

A preliminary stage of our analysis was to examine the relationship between a university's licensing and spin-out activities. We investigated this relationship to see if USOs are a substitute or a complement to licensing activity. In order to examine the nature of the relationship we ran pairwise correlations for our sample of 50 full respondents, the results of which are presented in Table 5. The results present evidence that there is a correlation between licensing in terms of the number of licenses, options and agreements (LOAs) (r = .61), LOAs £50k-£249k (r = .56) and license income (r = .50) and USOs. These results were mirrored with the correlations between EIUSOs the same measures of licensing activities, but were weaker. The evidence suggests that the large licensing deals (LOAs £250k +) are less correlated with USOs and EIUSOs. These results indicate that there is relatively high degree of correlation between licensing and USO activity suggesting that we may be able to infer that the two outputs are not clear substitutes for one another. The weaker correlations for licensing income may well reflect the long time periods between issuing a license and generating license income. Also, there are very few large licenses in the UK sector that generate over £250k + (see: Wright et al, 2002).

< Insert Table 5 here >

The correlation matrix of all the variables in the analysis is presented in Table 6. As expected, the variables relating to the creation of USO companies, whether or not external equity backed, were positively correlated – significant at the 5% level and better- to all the hypothesized variables.

Unsurprisingly some multi-collinearity was found to be present in the data, especially in relation to the relationships between TRESINC and IPEXP (r = .54), TRESINC and TTSTAFF (r = .46), and TTSTAFF and EXPER (r = 67), TRESINC and EXPER (r = .55), EXPER and IPEXP (r = .45), BDCAP and IPEXP (r = .43) and BDCAP and EXPER (r = .43). In order to investigate the extent to which this was a problem an OLS analysis was performed in order compute variance inflation factor (VIF) scores. The VIFs computed for all the variables were found not to exceed 2.5, which is well within the acceptable guideline of 10 (see Hair et al, 1998), therefore, multicollinearity was eliminated as a potential problem.

< Insert Table 6 here >

The distribution of the dependent variables (or rather their error terms) meant that we could not simply use an OLS technique. The hypotheses were tested using poisson and negative binomial regression techniques. Furthermore, we computed all our results with robust coefficients. The poisson distribution is appropriate in analyzing count data, such as the number of USOs created, where the dependent variable is discrete and involves non-negative integers relating to the number of events occurring in a given interval (Hausman et al., 1984). The basic poisson model is restricted by the imposition of an equal conditional mean and variance. A problem arises where there is over-dispersion in the data, that is where the variance of the dependent variable exceeds the mean. If over-dispersion is present, the covariance matrix will be biased downwards, producing spuriously small standard errors of the estimates and inflated t-statistics. This problem may be addressed by adopting a negative binomial model that allows for over-dispersion (Cameron and Trivedi, 1986). In the analysis below we test for over-dispersion and select the poisson or negative binomial approach as appropriate. Our analysis first examined the issue of the generation of USOs. In total we tested four different models. Model 1 included a basic measure of resources inputs with our controls: USOs = f{TRESINC, IPEXP, TTSTAFF, MEDSHC, SCIPRK, R&D}. Model 2 was similar to model 1 but included an experience term: USOs = f{TRESINC, IPEXP, TTSTAFF, EXPER, MEDSHC, SCIPRK, R&D}. Model 3 included the capability measures but excluded the experience term: USOs = f{TRESINC, IPEXP, TTSTAFF, BDCAP, INCENT, EXTFIN, MEDSHC, SCIPRK, R&D}. Finally, model 4 was out full model that included all of our variables: USOs = f{TRESINC, IPEXP, TTSTAFF, EXPER, BDCAP, INCENT, EXTFIN, MEDSHC, SCIPRK, R&D}. As the error term was not found to be over-dispersed we employed a poisson regression. The results of this analysis are presented in Table 7.

< Insert Table 7 here >

The results indicate that the resource inputs for universities' involvement in USO creation are significantly related to USO creation. In particular, Model 1 finds TRESINC ($p<.05$), IPEXP (($p<.05$) and TTSTAFF ($p<.10$), with a Psuedo R Square of .28. In model 2 TTSTAFF becomes insignificant when we include the EXPER variable. In model 3 we find that TRESINC ($p<.10$) and IPEXP ($p<.10$) are reduced in significance, however, BDCAP ($p<.05$) becomes significant, with a Psuedo R Square of .33. Finally, the full model (model 4) is similar to model 3, however, the effect of the BDCAP variable is reduced when the experience term (EXPER) is included. These results provide evidence that although resource inputs into the process of spinning-out companies from universities may be important it is also important to have the necessary business development capabilities. The results provide support for H1a, H2a and H3a, that resource inputs are important in terms of generating USO activity. Also, the results support H5a that a university's business development capabilities are important for a strategy of spinning-out companies. These results also highlight the fact that when the experience and skills of the TT staff is controlled for the importance of basic resource inputs is reduced.

The second stage of our analysis examined the external equity investments in USOs (EIUSOs). We ran four different regression models which mirrored our approach for the USOs. Model 5 included a basic measure of resources inputs with our controls: USOs = f{TRESINC, IPEXP, TTSTAFF, MEDSHC, SCIPRK, R&D}. Model 6 included an experience term: USOs = f{TRESINC, IPEXP, TTSTAFF, EXPER, MEDSHC, SCIPRK, R&D}. Model 7 included the capability measures but excluded the experience term (EXPER): USOs = f{TRESINC, IPEXP, TTSTAFF, BDCAP, INCENT, EXTFIN, MEDSHC, SCIPRK, R&D}. Model 8 included all of our variables: USOs = f{TRESINC, IPEXP, TTSTAFF, EXPER, BDCAP, INCENT, EXTFIN, MEDSHC, SCIPRK, R&D}. As the error term was

over-dispersed, we employed a negative binomial approach for models 5 through 8. The results of this analysis are presented in Table 8.

< Insert Table 8 here >

The results indicate that the resource inputs have different impacts on equity investments in USOs (EIUSOs) than in terms of creating USOs. The role of IPEXP is very important ($p<.01$) in model 5 and remains significant at the 5% level model 6 through 8. This pattern, however, is not reflected in the results for TRESINC and TTSTAFF. TRESINC is insignificant for all models and TTSTAFF is only significant for mode 5 ($p<.10$). As with models 3 and 4 business development capabilities were found to be important in EIUSOs (model 7 $p<.05$; model 8 $p<.05$), however, our experience term (EXPER) was also found to be significant for model 8 ($p<.10$). Our full model here has a Psuedo R Square of 0.16. These results, as with the above, indicate the importance not only of inputs for spinning-out companies but the importance of the skills of the university. The results provide evidence to support H2b, that spending on external IP protection is an important input into the process., however, the other resource inputs are not significant when we include experience and capabilities in our model. Furthermore, our results support H4a and H5a, that the experience of the TT office and business development capabilities have a significant impact on the ability of a university to generate USOs that attract external equity finance. No evidence, however, was found to suggest that INCENT and EXTFIN had a significant impact on USOs or EIUSOs.

The difference between the EIUSOs and the USOs relates to the expenditure on protecting IP (IPEXP) being the only significant input. Furthermore, the importance of experience is only found with respect to EIUSOs and not with USOs. This may reflect the need for a reputation in a market, which can only be achieved through experience.

Conclusions and implications

This study draws on novel data from a sample of universities that account for the vast majority of university commercialization activity in the UK to distinguish between the factors influencing the creation of USOs as such and those influencing the creation of USOs that are more likely to generate wealth, as indicated by those ventures that are able to attract external equity financing. In contrast to earlier studies, we provide new evidence on the determinants of both the number of USOs created as well as the number of external equity-backed USOs. We argue while it is relatively straightforward to create a new legal entity, it is considerably more difficult to create one that generates wealth. A central issue, therefore, which has been neglected in previous studies, is to analyze the importance of both university resources and capabilities in the spin-out process.

We find that the following resource inputs are important drivers of universities' creation of USOs. In particular, total research income and expenditure on IP protection were found to be consistently significant in the creation if USOs. The number of staff in the TTO was found to be significant in the partial models excluding experience and/or capabilities but was found to be insignificant when these variables were included. This is consistent with DiGregorio and Shane (2003) who found only intermittent support for the number of TTO staff as a control variable. The findings relating to experience and capabilities indicate that only the university's business development capabilities were an important determinant of USO activity. These results highlight the importance of both resource inputs and skills in the creation of USOs.

The only important resources in the process of creating USOs that attract external equity finance was spending on IP protection. This resource input was consistently significant across all models. This may well highlight the importance of IP for any external equity provider and therefore signals the need to make sure IP is clean, well-defined and protected before trying to raise external equity finance. In terms of the experience and capabilities of the university we find that the experience of the TTO and the business development capabilities are significant. Therefore, experience appears to be more important in creating USOs that attract external equity finance than merely for USOs as such. Also, the results relating to business development capabilities indicate that the level of significance is greater for the external

equity investments in USOs than the creation of USOs. These findings provide an important additional novel insight by identifying that it is not so much the number of TTO staff that is important but their expertise. These findings may suggest that universities need to think of the experience and skills of their staff if they are to create USOs that attract external equity finance.

The business development capability was found to be consistently significant across the different models. The components of this variable suggest that the creation of capabilities related to clear processes for conducing IPR due diligence and the creation of spin-out companies, and the availability of adequately trained staff are important determinants of a university's success in creating USOs and externally equity backed USOs. However, neither of the other qualitative measures, the availability of incentives and rewards, and external relational capabilities relating to obtaining finance were significant in any of the models. The absence of a significant relationship between access to venture capital, business angel and corporate finance is consistent with US evidence that the extent of local venture capital activity does not affect the extent of spin-out activity (DiGregorio and Shane, 2003).

These results provide interesting insights into the operation of university TTO activities and have important implications for practitioners. Although resource inputs are important, especially expenditure on IP protection, their significance is reduced when we examine the impact of experience and capabilities as well as resource inputs. In particular, they highlight the importance of the experience and skills of the university's TTO staff if they are to create USOs and USOs that attract external equity investment. This raises implications for how UK universities should attract, train and retain TT officers. In the UK the public sector, monopsony for TT officer labour means that the wages paid to TT officers will be lower than those compared to the private sector. Any differentials in wages will place universities at a disadvantage as any skilled TT officer with skills of business venturing may well be attracted to the private sector

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Tables, charts and graphs

Table 1: Variable Descriptions

VARIABLE	DEFINITION
USOs	New USOs formed 2002
EIUSOs	Equity investments in all USO companies during 2002
TRESINC	Natural log of total research expenditure 2001
IPEXP	Natural log of expenditure of external IP advice 2001
TTSTAFF	Full time employees employed in USO activities 2001
EXPER	Number of years involved in TT activities
I&R	Incentives and Rewards 2001
BDCAP	Business Development Capabilities 2001
EXTFIN	External Relational Capabilities 2001
MEDSCH	University has a medical school (1=yes, 0=no)
SCIPRK	University has a science park (1=yes, 0=no)
RD	R&D intensity of businesses in local region 2001

Table 2: Sample Representativeness

		N	Mean	S.D.	Chi Sq
USOs [1]	respondent	50	1.90	2.25	8.09**
	non respondent	60	1.03	1.64	
EIUSOs [1]	respondent	50	2.92	3.79	12.67***
	non respondent	58	1.14	2.39	
TRESINC [1]	respondent	50	27.69m	31.21m	25.43***
	non respondent	60	11.17m	26.35m	
EXPER [1]	respondent	50	8.44	6.80	17.12***
	non respondent	53	5.89	5.89	
MEDSCH	respondent	50	.40	.49	8.73**
	non respondent	60	.17	.38	
SCIPRK	respondent	50	.38	.49	7.57**
	non respondent	60	.17	.38	

[1] Chi-Squared with ties

Significance: * p<.1; ** P<.05; *** P<.01

Table 3: Descriptive Statistics

Variable	Mean	S.D.	Minimum	Maximum
USOs	1.90	2.25	0	10
EIUSOs	2.92	3.79	0	16
TRESINC	27.69m	31.21m	.62m	146.43m
IPEXP	116820	208691	0	983896
TTSTAFF	5.51	6.56	0	35
EXPER	8.44	6.80	1	31
BDCAP	3.15	.90	1.25	5
INCENT	3.08	.82	1.33	5
EXTFIN	3.06	.71	1.33	4.33
MEDSCH	.4	.49	0	1
SCIPARK	.38	.49	0	1
R&D	.19	.15	.05	.54

Table 4: USOs and EIUSOs per University 2002

USOs	USOs Number (%)	EISUOs Number (%)
0	20 (40)	19 (38)
1	7 (14)	8 (16)
2	7 (14)	4 (8)
3	5 (10)	4 (8)
4	5 (10)	2 (4)
5	1 (2)	3 (6)
6	4 (8)	1 (2)
7	-	-
8	-	2 (4)
9	-	4 (8)
10	1 (2)	1 (2)
11	-	1 (2)
16	-	1 (2)
Total	50	50

Table 5: USOs and Licensing

		Mean	S.D.	1	2	3	4	5	6
1	USOs	1.90	2.25	1.00					
2	EIUSOs	2.92	3.79	.79	1.00				
3	No of LOAs	8.36	9.61	.61	0.56	1.00			
4	No of LOAs £50k– 249k	1.06	2.18	.56	.41	.46	1.00		
5	No of LOAs £250k +	.18	.48	.29	.24	.17	.50	1.00	
6	License income (£000)	317	557	.50	.38	.51	.69	.74	1.00

Table 6: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12
1	USOs	1.00											
2	EIUSOs	.79	1.00										
3	TRESINC	.56	.52	1.00									
4	IPEXP	.54	.55	.54	1.00								
5	TTSTAFF	.52	.51	.46	.32	1.00							
6	EXPER	.54	.62	.55	.45	.67	1.00						
7	BDCAP	.60	.59	.33	.43	.37	.43	1.00					
8	INCENT	.35	.40	.20	.18	.26	.18	.49	1.00				
9	EXTFIN	.31	.33	.14	.06	.31	.26	.30	.26	1.00			
10	MEDSCH	.35	.40	.58	.51	.44	.49	.49	.24	.18	1.00		
11	SCIPARK	.42	.26	.37	.32	.20	.22	.29	.19	.03	.12	1.00	
12	R&D	-.06	.01	.02	-.03	-.08	-.16	-.13	.08	.07	-.08	-.05	1.00

Table 7: USOs Formed FY 2002: Poisson Regression Models

	Model 1	Model 2	Model 3	Model 4
TRESINC	.392** (.171)	.373** (.175)	.291* (.149)	.264* (.150)
IPEXP	.236** (.102)	.217** (.103)	.157* (.089)	.149* (.087)
TTSTAFF	.027* (.016)	.019 (.017)	.019 (.017)	.013 (.019)
EXPER		.014 (.021)		.013 (.017)
BDCAP			.410** (.206)	.398* (.208)
INCENT			.080 (.213)	.105 (.219)
EXTFIN			.092 (.168)	.074 (.163)
MEDSCH	-.391 (.416)	-.364 (.416)	-.402 (.332)	-.372 (.345)
SCIPARK	.321 (.313)	.342 (.314)	.219 (.283)	.241 (.290)
R&D	-.619 (.534)	-.592 (.550)	-.776 (.789)	-.761 (.771)
Constant	-6.000*** (1.691)	-5.700*** (1.762)	-5.903*** (1.691)	-5.652*** (1.681)
N	50	50	50	50
Wald	62.55***	61.52***	117.42 ***	123.55***
Pseudo R2	0.2808	0.2837	0.3314	0.3334

Significance: * p<.1; ** P<.05; *** P<.01

Table 8: USOs with Equity Investments FY 2002: Negative Binomial Regression Models

	Model 5	Model 6	Model 7	Model 8
TRESINC	.279 (.183)	.159 (.199)	.214 (.149)	.119 (.158)
IPEXP	.401*** (.152)	.382*** (.145)	.279** (.141)	.250** (.122)
TTSTAFF	.052* (.031)	.024 (.032)	.039 (.030)	.013 (.031)
EXPER		.053 (.037)		.046* (.027)
BDCAP			.611** (.244)	.578** (.245)
INCENT			.166 (.271)	.238 (.281)
EXTFIN			-.034 (.212)	-.112 (.186)
MEDSCH	-.264 (.462)	-.223 (.474)	-.349 (.382)	-.284 (.406)
SCIPRK	-.113 (.360)	.030 (.378)	-.282 (.300)	-.184 (.313)
R&D	-1.068 (1.073)	-.775 (1.014)	-1.074 (1.107)	-.800 (1.057)
Constant	-6.235*** (1.970)	-5.326*** (2.062)	-6.586*** (2.067)	-5.622*** (1.992)
/lnalpha	-.2010244 (.3768318)	-.2869396 (.3759504)	-.786282 (.5644038)	-.9495782 (.6769351)
Alpha	.8178924 (.3082079)	.7505571 (.2821722)	.4555353 (.2571059)	.3869042 (.261909)
N	50	50	50	50
Wald	42.77***	37.47***	63.58***	74.14***
Pseudo R2	0.1015	0.1135	0.1504	0.1637

Significance: * p<.1; ** P<.05; *** P<.01

How do Early Stage High Technology Investors select their Investments?

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Abstract

This study examines the investment selection behaviour of 68 European early stage venture capital funds specialized in high technology. In particular, we examine whether or not early stage high tech VCs exhibit heterogeneity in their selection behaviour, and if so, what drives this behaviour. To examine these issues we employ a conjoint analysis methodology, which requires venture capitalists make investment decisions in 27 well selected business proposals. Our results indicate that VCs exhibit substantial heterogeneity in investment selection behaviour, however, employing a cluster analysis three clear types of investors emerge: those who focus on technology, those who focus on finance and those who focus on people. We then examine differences between the three groups in terms of the sectoral focus, the sources of the funds and the background/ education of the investment manager. The results indicate that technology investors make most use of public money and invest in biotech. These investment managers sometimes have an academic background. Finance investors make the least use of public capital, invest in ICT and their investment managers are the least experienced. People investors are most often found in the other sectors and the investment managers combine experience within other VC funds and have a business education.

The results indicate that public money in the VC industry is used for investing in business proposals with strong technologies. In this way, public money aims at stimulation of technological renewal and thus economic growth, and helps to overcome the market failure that is existing for early stage high tech funding at an early stage.

Introduction

Getting an insight in to how venture capitalist funds make investment decisions has been a major topic of research during the past two decades. Previous research has identified a number of important criterions on which venture capital firms base their decision to invest. A first group of scholars found that the "human capital" of entrepreneurial teams was a very important decision factor. This human capital includes among others a) the ability of management, whether it is management skill, quality of management, characteristics of the management team or the management track record (Shepherd and Zacharakis, 1999); b) the management skills of the entrepreneur (Tyebjee & Bruno, 1984; MacMillan et al. 1985; 1987); c) the heterogeneity of the entrepreneurial team (Keeley and Roure, 1989). A second series of researchers have identified the market environment in which the venture starts up as one of the major decision factors. This environment includes the characteristics of the market/industry (Hisrich and Jankowitz 1990), environmental threats to the business (Tyebjee and Bruno 1984, Meyer et al, 1993), the level of competition (Hutt and Thomas 1985, Kahn 1987, Muzyka et al, 1996) and the degree of product differentiation (Tyebjee and Bruno 1984, Hutt and Thomas 1985, Kahn 1987, Hisrich and Jankowitz 1990). Other factors which are found to be important criteria used by venture capitalists to evaluate venture proposals are the financial criteria and exit opportunities (Macmillan et al., 1987) and the product/service characteristics (Macmillan et al., 1987; Muzyka, 1987).

Virtually all of the above mentioned studies have been undertaken with US based venture capitalists. Further on, Muzyka et al (1996) emphasize that the aforementioned studies were exploratory in terms of data collection technique and assume a single hierarchy of decision criteria. Along the lines of this criticism, Muzyka et al (1996) explored the trade offs in decision criteria among the European Venture Capitalists. They found three groups of VCs in Europe: those primarily concerned with investing nationally, those who focus solely upon the deal, and mainstream investors who consistently and instinctively rank management team criteria at the top of their list. The Muzyka et al. (1996) study was a first attempt to synthesize and hierarchically classify to selection criteria found by the first wave of VC studies. However the results remained meagre, having one cluster with only four VCs and a very large one where – consistent with the previous studies – the "human factor" is the utmost important one.

Since the Muzyka study in the mid-nineties, the venture capital industry in Europe has grown significantly. In parallel, VC scholars have emphasized that the VC industry is fragmented into different segments. Many studies find that early stage VCs differ from late stage VCs (Elango, 1995; Sapienza et al 1994).

However, research on selection behaviour of VCs so far has only focused on the venture capital industry as a whole. Several researchers have however indicated that high tech investing is different (Lockett et all, 2002; Murray and Lott 1996; Baum and Silverman 2003) and that some investors have a bias against investing in high tech. In this research, we are focusing on those venture capitalists for whom investing in high tech is core business. As economic growth is determined by, amongst others, technological renewal, it is important to study this group of high tech VCs from a policy perspective. High tech investors play a key role in funding high tech companies that can accomplish this technological renewal, and thus create economic growth.

This study builds upon the previous work of Muzyka, departing from the same hypothesis that not all venture capitalists use the same hierarchy of decision criteria. Consistent with Muzyka (1996), we test this hypothesis by investigating the trade offs made by venture capitalists in Europe at the moment they make a decision to further investigate an initial business plan or not. Taking into account the market fragmentation which is suggested by other scholars, we focus on a population of early stage high tech venture capital funds in Europe. This provides some degree of homogeneity in terms of the forms of the firms. Next to this, the methodology includes face-to-face interviews, having venture capitalists evaluate business proposals and comment on their decisions, thus capturing both quantitative and qualitative data.

The paper unfolds along the following lines. We start with the theoretical background and formulate a hypothesis framework. Second, we discuss the methodology used. In a third part of the paper, we analyse the cluster results. Then, we link the cluster results with the characteristics of the funds. The paper ends with a discussion of the conclusions and recommendations.

Main arguments

Theoretical background: 'The heterogeneity of VC investment selection behaviour'

As described in the introduction, many studies have already looked at the selection criteria of venture capitalists. The early studies in the eighties and mid-nineties indicated that for the average venture capitalist the "human factor" is the most important criterion. This human factor can be found in the entrepreneurial experience, the management skills and the business experience, which are allocated to the founding team (Hall and Hofer, 1993 for a review of these early studies). Sandberg et al. (1988) suggest a contingent relationship among the criteria used by VCs. In line with most studies at that time, they argue that deals are selected based upon the human resource criteria in combination with the characteristics of the industry, the proposed strategy or business model and the structure of the deal.

Although these early studies revealed interesting and useful insights, they were criticized for using simple methodologies in assessing the evaluation criteria. In short, the most often used method was a post hoc methodology which consisted effectively of asking why investment managers had invested in certain business proposals. This method, however, is problematic as it might generate biased results because people are poor at introspection (Shepherd and Zacharakis, 1998), are often motivated to bias results in a post hoc rationalisation (March and Feldman, 1981), and have limited capacity to recall what has happened (Fischhoff, 1982). As a reaction on these post hoc methods, researchers started to experiment with real time methods such as verbal protocol analysis. Hall and Hofer (1993) presented four venture capitalists six protocols for assessment. They found that VCs screen and assess business proposals very rapidly which makes it unlikely that they can persistently evaluate their decisions post hoc. They found that the key criteria used by the VCs have to do with the financial and economic conditions of the business plan such as long term growth and profitability. Surprisingly they found a lack of importance placed on the entrepreneur or his team. So far, they are the only study which has found financial criteria to be of utmost importance.

Riquelme and Rickards (1992) question the subjectivity of the analysis and interpretation involved in verbal protocol techniques without being supplemented with other techniques such as computer algorithms. They suggest that verbal protocol analysis is more an art than a science. Instead, they suggest using conjoint analysis as a technique for the analysis of VCs' decision making. Conjoint analysis is not new, it is a general term referring to a technique that requires respondents to make a series of judgements,

based on profiles, from which their 'captured' decision processes can be decomposed into its underlying structure. A profile is simply a combination of all the attributes where each attribute is described by one of its levels. It has been used in other fields of research, especially in marketing, where it has a strong tradition.

Muzyka et al (1996) followed Riquelme and Rickards' pioneering work to use conjoint analysis in assessing the decision criteria used by VCs. In a more sophisticated analysis, he analyses the key criteria used by European VCs in evaluation potential investments characterized by 53 profiles (each profile required the respondent to make a trade-off between a pair of independent criteria). To determine which attributes were to be included in the conjoint analysis, he carried out open-ended interviews with VCs. The venture capitalists made 53 pair wise trade-offs with multiple levels. They found that among the first seven, five management team criteria were ranked and product-market criteria appeared to be moderately important; fund and deal criteria were at the bottom of the rankings. Over 75% of the venture capitalists in their study had this kind of profile.

Zacharakis and Meyer further refined this use of conjoint analysis and let venture capitalists invest in 50 ventures in an experimental setting. They found that team factors were much less high in the hierarchy and a significant group of VCs ranked market and competition variables as being the most important.

Next to the methodological drawbacks of most previous studies, it is surprising how they all focus on the venture capital industry as a whole, while previous research shows that this venture capital industry is not homogeneous in its investment focus. Lockett et al (2002) found that, in comparison to the Murray and Lott study (1995) a bias remained against VC firms' involvement in the earliest stages of the technology investment cycle. Therefore, we have reasons to believe that the high tech VC industry is a distinct market in itself and that firms may behave differently from their non-tech counterparts. That is why this research only focuses on those venture capitalists investing in early stage high tech proposals.

To summarize, the aforementioned studies seem to suggest that there might be three groups of venture capitalists. One group, which is called by Muzyka et al. (1996), the mainstream venture capitalist, emphasizes most the human resource criteria, followed by product market and venture capital specific criteria such as exit possibilities. A second group of venture capital funds distinguished by researchers using real life protocols are investors which place most importance on the financial aspects of the business plan such as growth, time to break-even and profitability. Finally, a new stream of research using conjoint analysis seems to recognize a group which is much more concerned about the product market characteristics of the business plan than of the management and entrepreneurial team criteria. This leads us to the following proposition:

Proposition 1: Early stage high tech investors will exhibit heterogeneity in terms of their focus of investment selection behaviour.

What drives differences in investment selection behaviour?

Detecting changes among investment criteria is only a first step in our understanding of the venture capital rationale. A subsequent question which arises is why venture capitalists differ in their selection criteria. A number of explanations have been suggested in the literature. For instance, Elango et al. (1995) showed that there are significant differences in investment criteria between venture capitalists focusing on early stage and late stage deals. Late stage investors seem to emphasize much more the market acceptance than the early stage investors. Mayer and Schoors (2002) confirmed these differences when they compared sources of funds and investment activities of venture capital funds in Germany, Israel, Japan and the UK. The country differences they found were related to the sources of VC funds that differed significantly across countries.

There is also some emerging evidence that venture capitalists, which invest in high tech use different criteria than the non tech VCs (Lockett et all, 2002). However, these studies suggest that there is a very strong correlation between investing in early stage business proposals and high tech ones.

Mayer and Schoors (2002) find that venture capitalists invest in different types of business proposals according to their own sources of funds. For instance, bank and pension fund backed VC firms are inclined towards late stage investments in low tech domestic sectors whereas government backed VC funds invest in early stage domestic high tech sectors. Although this study does not specifically look at the investment criteria used, it indicates that the institutional structure has an important effect on the decisions which are made by the investment manager. In other words, it suggests that the investment criteria are indeed different.

It seems indeed reasonable investment managers investing funds from public initiatives have other than financial objectives , and may be focusing more on the capacity of technological breakthrough and renewal of a project, as this may influence economic growth. Bank and pension fund backed VC firms may be biased in their investment behaviour by guidelines set out by their investors, and may be influenced by the financial culture of these investors.
This leads us to the following proposition:

Proposition 2: The source of funds of European high tech early stage venture capitalists will have a significant effect on the selection criteria used by these VCs

Shepherd et al (2002) suggest that also the investment manager's experience plays an important role. They were the first to link selection behaviour to investment manager's experience. They examined whether more experience at the venture capital task resulted in better decisions. The results show that experience is beneficial to VC decision-making, but only up to a point (14 years of experience). In their model, age, stage of investment and technology were each individually added as a control variable and the results did not significantly change and none of these control variables were significant.

Also in our sample of early stage high tech investors it seems plausible that the emphasis investment managers put on certain criteria may evolve. An investment manager, who has experienced the difficulties the replacement of the portfolio company's CEO brings, may stress human factors when selecting new projects. Or this experienced investment manager may stress protect ability of the product that the portfolio company commercialises, as he learnt that this protection gives the possibility to reform the management team or change the company's strategy, without loosing value to competitors. It may even be that the most experienced investment managers attach little importance to financial forecasts in the business plan, as they often prove to be unreliable, and far away from reality. This leads us to the following proposition:

Proposition 3:The background and experience of the investment manager will have a significant effect on the selection criteria

Baum and Silverman (2003) indicate that there are three broad types of signals that may affect VCs' assessments of start-ups: alliance capital, intellectual capital and human capital. Interestingly, their research only focuses on VCs investing in biotech companies. According to them, a start-up's alliances provide signals for both access to valuable resources and knowledge critical to early performance. Next to this, by signalling innovative capabilities, patents and patents pending (intellectual capital) helps start-ups possessing them to acquire additional resources, increasing the likelihood that they will obtain VC financing. Finally, they indicate that the identity and background of top management are widely regarded as important signals of a start-up's future potential, increasing its chances of obtaining VC financing. They found that start-ups with more downstream and horizontal alliances obtained significantly more VC financing than start-ups with fewer alliances. Start-ups with more patents granted or patent applications also obtained significantly more VC financing. Finally, start-ups with larger top management teams, presidents that take on a broader role and presidents who currently act as president of other biotechnology start-ups obtained significantly more VC financing.

It looks reasonable that VCs investing in biotechnology projects will stress the protect ability of the technology, while this is much less the case in ICT, where software is hard to protect. Having a team with strong commercial skills and a good network may matter more in ICT businesses where knowledge is hard to protect and time to market is crucial. Next to this, it would not be surprising that biotech investors prefer non-platform technologies over platform technologies. A lot of investments in companies using a

platform technology in biotech turned out into service companies, and generated poor returns for investors in the past. Biotech investors may thus be less inclined to investing in platform technologies. Next to this, biotech companies looking for finance in an early stage hardly ever have a product that is already accepted by the market. We may then assume that market acceptance will be a little important criterion for biotech investors.

Proposition 4: the sector in which the business proposal is situated will have a significant effect on the importance of selection criteria

Methodology

As outlined above, most of the studies into VCs' decision making have relied on post-hoc methods of data collection. These methods include the use of questionnaires, surveys and interviews to collect data on the VCs' decision policy. Sandberg et al (1988), Hall and Hofer (1993) and Zacharakis and Meyer (1995) attempt to overcome these problems by using verbal protocols. These verbal protocols have the advantage of being real time experiments where VCs 'think aloud' while a business plan is being screened. The problem with these real time studies is that it is difficult to analyse the data in a consistent way and sophisticated computer algorithms are needed to detect patterns. In this study, we build upon the positive aspects of both the post hoc and the real time studies. Post hoc studies have the advantage of measuring complex issues in an easy to analyse way. Real time studies have the advantage of observing the decisions at the moment they are made.

Instead, we presented the venture capitalists with a number of fictive business cases that differ on attributes.

These attributes were selected in two steps. First of all, we made an overview of criteria that had been used in previous research. Apart from this, we had 2 VCs, 1 business angel investing in early stage high tech and 3 VC experts draw a list of criteria that were important to them. This was necessary given the fact that no research had been conducted with high tech investors exclusively and in order to impede that selection criteria important to those VCs were excluded. We got back to them after making the comparison between literature and their own lists, and ended up with a set of attributes that they accepted as being the criteria they judged on when screening a business plan in reality, and still remained concise enough in order to have VCs make judgements based on abstract information.

We ended up with four main categories of selection criteria: team, market, product and finance. In total, twelve different attributes were included: team, entrepreneur, contact with the entrepreneur, uniqueness of the product, protection of the product, market acceptance, platform technology, location, size and growth of the targeted market, time to break-even and return on investment.

An example of the business plan presented is shown in figure 2. In line with the conjoint analysis philosophy and consistent with Muzyka et al. (1996), potential events were matched to the different attributes (see table 1). Thirty levels or events were conceptually developed based upon the twelve attributes. For instance, team complementarity and experience are two important characteristics of the attribute "team". A business start-up team can then be complementary, but have no experience or be not complementary and have experience, or have none of both. This means that four different combinations are possible for the attribute "team". For other attributes such as uniqueness, only two levels are allowed: either it is unique or not.

-- Insert table 1 about here --

The possible events associated with the twelve attributes summarized in table one can then be combined into 'business proposals' (or profiles). Theoretically any combination of 12 (number of attributes) out of 30 potential events is possible. This would result in more than 1000 theoretically feasible business proposals or profiles. The total number of profiles resulting from all possible combinations of the levels would become too great for respondents to score in a meaningful way. Therefore, a fractional factorial design using Addelman's basic plans (Addelman, 1962) for designing an orthogonal main effects plan

was chosen. This resulted in 27 business proposals that were presented to the respondents (investment managers). These 27 proposals were printed on 'cards' used during the interviews (see figure 2 for example of such a business proposal). Investment managers were asked to judge the proposals on a five-point Likert scale (1= bad investment opportunity, I would certainly not invest; 5= major investment opportunity, large chance of investing). From these scores, conjoint analysis derived utility scores for each attribute. Utility scores are measures of how important each characteristic is to the respondent's overall preference of a product. Based on these utility scores importance scores were computed by taking the utility range for the particular factor and dividing it by the sum of all utility ranges.

-- Insert figure 2 about here --

The sample

A stratified sample of 68 VC firms was drawn from different regions across Europe, which were selected as being those with the highest R&D intensity and venture capital presence. Since we only considered early stage high tech, we needed to get an international dataset because the number of VCs of any one country, outside of the US, would have been too small. The seven regions were: Cambridge/London region (UK), Ile de France (France), Flanders (Belgium), North Holland (the Netherlands), Bavaria (Germany), Stockholm region (Sweden), Helsinki region (Finland). In each region, we wanted to have a representation of small and large funds with various degrees of public funding. Because a random sampling based upon the most widespread available sample frame, i.e. the EVCA-filings, would result in a sample biased towards the larger private venture capital firms, we created our own sample frame, collating the directory information from EVCA with those of the various regional venture capital associations and information obtained through contacts we had with academics that cover the topic in each of the seven regions selected. This resulted in a population of 220 funds. We only included funds that are early stage and high tech investors. The sample frame was stratified in different groups or subpopulations according to the scale of the funds (small funds versus mega funds) and their institutional investors (captives, private funds, public funds, private/public partnerships). Figure 1 shows also the representativity of these funds in comparison with the total number of funds in high tech and early stage and their capital managed per region, selected in our database.

-- Insert table 2 about here --

-- Insert figure 1 about here --

Data collection

The interview consisted of two parts and took on average 1,5 hours. Data were collected during the period January 2003-November 2003. First, we collected information about the resource-based characteristics of the venture capital firm, and the investment manger interviewed. Information that we obtained before the interview, such as website information was verified and completed during the interview. This includes information on fund size, origin of the funds, number of years since establishment, number of investments made in early stage high tech, sectors of investment etc. Information on the investment manager included information on education, experience (as entrepreneur, in business, as investment manager) and his/her sector focus. Second, we studied how these investment managers select projects using the 27 business proposals as an interview guideline. Before having the respondents score the proposals, we showed a fictive business card (see figure 2), so that they would understand the criteria combined in the cards, and went in the meanwhile through the definitions used (see table 3). This allowed us to make sure that each respondent had the same understanding of a criterion. The investment managers judged the business proposals on a 1-5 scale. They were asked to motivate their scores. This allowed us not only to get an insight into the selection process and the importance of certain criteria, but also to get an insight into the reasoning process of the respondent. In this way, we could both collect quantitative and qualitative data on the selection process, in contrast to previous research using conjoint analysis. Quantitative analysis permitted to shed light on the importance of selection criteria and the respective importance scores, where as qualitative data permitted to interpret the results obtained from the analysis.

-- Insert table 3 about here --

Results

From the scores investment managers gave to the 27 business proposals, conjoint analysis derived utility scores for each attribute. Utility scores are measures of how important each characteristic is to the respondent's overall preference of a product. Based on these utility scores importance scores were computed by taking the utility range for the particular factor and dividing it by the sum of all utility ranges. Using the importance scores, relative rakings of the investment decision criteria per respondent could be made. The model proved the internal validity of the data (high Pearson's R and Kendall's tau statistics).

Figure 3 provides an insight into the ranking given by early stage high tech investors to selection criteria. Descriptives for the importance scores of each criterion are given in table 4.

-- Insert figure 3 here --
-- Insert table 4 about here --

Potential return on investment, and people characteristics, such as the ability of the entrepreneur and the characteristics of his team seem to be on top of the list of important selection criteria. Size and geography of the market (global or regional) and whether or not a technology is a platform technology have little impact on the VC's decision.

But do this group of early stage high tech investors form a homogeneous group of investors, or do differences exist among them?

Analysis of proposition 1: Early stage high tech investors will exhibit heterogeneity in terms of their focus of investment selection behaviour.

Proposition 1 stipulates that different groups of investors will differ in the way they rank their selection criteria in order of importance. To explore this proposition, we used a cluster analysis. Cluster analysis encompasses a number of different classification algorithms, which can be classified into two broad families: hierarchical and non-hierarchical clustering. Ketchen & Shook (1996) suggest using both procedures as complements to each other: first a hierarchical procedure can be used as an exploratory methodology to determine the desired number of clusters and as input to the non-hierarchical step. We follow this two-step approach. To perform the hierarchical cluster analysis, we follow Ward's procedure with squared Euclidean distance as linkage measures (Hambrick, 1983). We used the output of the conjoint analysis presented in figure, being the importance scores derived from the interviewee's responses. Importance scores link to the following criteria: characteristics of the team, characteristics of the lead entrepreneur, contact with the lead entrepreneur, market size, market growth, geography of the market, platform technology, protect ability of the product, uniqueness of the product, market acceptance, time to break-even and return on investment. Following the criteria of Hair et al. (1992), we find a three clusters-solution as the most appropriate for our data. Figure 4 shows the tree diagram for the cluster analysis. Subsequently, we performed a k-means clustering with three clusters as the predefined number of clusters and the same variables as inputs.

-- Insert figure 4 about here --

For ease of interpretation, each cluster was given a name, indicating the selection behaviour of its members. The F-statistic of the variance analysis and the descriptive statistics for each cluster are given in Table 5. We found that 6 decision criteria were significantly different at the 0.05 level for the three groups. First, the importance given to the human resource variables as a reason to invest was significantly different between the clusters (complementarity of the venture team, competence of the lead entrepreneur and contact with the VC). Second, the market location (local versus global) was significantly different. Third, the importance given to the protect ability of the technology characterized certain investors. Finally, the financial part of the deal such as ROI was significantly different. The specific cluster characteristics are discussed below.

-- Insert table 5 --

CLUSTER 1 (20 VCs) we term the cluster of the financial investors. This group of investors emphasizes the potential return set out in the business plan. As shown in table 2, the ROI criterion receives an importance score of 25 out of 100. Business plans that do not show sufficient potential return are not selected. Next to this financial criterion, these investors also find the team complementarity and the market forecast important. These investors mainly invest in complementary teams with strong leaders that are focussing on fast growing markets. If we add the importance scores attached to the entrepreneurial team, competence of the lead entrepreneur, market growth and potential return on investment, we get an importance score of 55 out of hundred. This means that these investors base their investment decision on a very rational logic which is based on a limited set of quasi objective factors such as ROI, growth and team completeness. In line with this, it is the group that attaches the least importance to the contact with the entrepreneur. It looks as if these investors want to have complementary teams with good leadership potential, but do not bother much about getting along with the entrepreneur. It looks as if they feel confident that a well established team will generate the financial return they are aiming for, without too much interference or coaching from them.

CLUSTER 2 (22 VCs) we term the cluster of the technology investors. These investors make a much more balanced analysis of a business proposal than the previous group. This means that they take into account much more criteria than the other VCs. Many criteria receive an equal weight in the final decision and only the degree to which the technology can be protected and the contact the investment manager has with the entrepreneur receive an importance score of more than 10 out of 100. This group of investors also emphasizes the "uniqueness" of the product. Next to these factors, also potential market growth, return on investment and uniqueness of the product matter. Protection ability and contact with the entrepreneur are factors on which they differ from other investors; they attach much more importance to these criteria than the other groups of VCs.

CLUSTER 3 (26 VCs) we term the cluster of the people investors. Most important factors in the selection process are human factors, such as leadership capacities of the entrepreneur and the quality (complementarity and experience) of his team. Financial criteria come in at a second place. Closely connected to these human factors, is the contact with the entrepreneur, however, it is less important than for the technology investors.. This cluster also attaches the least importance to the ability to protect the technology. The selection behaviour that this group demonstrates comes close to the findings of studies based on post-hoc data collection methods which found that the quality of the entrepreneur is the most important selection criterion (Wells, 1974; Poindexter 1976; Tyebjee and Bruno 1984 ; MacMillan et al 1985, 1987). It can be assumed that this group is a group of VCs that have a long tradition and only recently turned to investing in high tech. Therefore, they are still focusing on the same criteria that were found by researchers studying selection behaviour of the overall VC industry, given their long tradition.

-- Insert table 6 about here --

We can thus conclude that hypothesis one is supported. We find a considerable degree of heterogeneity in the way in which early stage high tech VCs select their investments. In particular, we find a group of investors, which emphasize the human resource or team characteristics; a group which puts most emphasis on the financial data (in line with real time studies); and a group which stresses the technology characteristics such as patent ability of the technology and the degree to which the technology can be protected. Furthermore not only do we identify key differences between the focus of different VC firms in terms of their selection behaviour we also identify differences between how balanced the firms selection criteria are. Financial and people investors tend to make their investments very focused on few criteria, where as the decision made by technology investors tends to be very balanced, taking into account several criteria, and making a balanced evaluation of the business proposal as a whole.

Analysis of proposition 2, 3 and 4

To test propositions 2, 3 and 4, we have contructed a multinomial logistic model. In the multinomial logit model, we estimate a set of coefficients $b^{(1)}, b^{(2)}, b^{(3)}$ corresponding to each outcome category.

Outcome category 1 is the cluster of "financial investors". Outcome category 2, the cluster of "technology investors" and outcome 3 the cluster of people investors.

$$P(y=1)=\frac{e^{Xb^{(1)}}}{e^{Xb(1)}+e^{Xb^{(2)}}+e^{Xb(3)}}$$

$$P(y=2)=\frac{e^{Xb^{(2)}}}{e^{Xb(1)}+e^{Xb^{(2)}}+e^{Xb(3)}}$$

$$P(y=3)=\frac{e^{Xb^{(3)}}}{e^{Xb(1)}+e^{Xb^{(2)}}+e^{Xb(3)}}$$

The model, however, is unidentified in the sense that there is more than one solution to $b^{(1)}, b^{(2)}$ and $b^{(3)}$ that leads to the same probabilities for y=1, y=2 and y=3. To identify the model, one of $b^{(1)}, b^{(2)}$ or $b^{(3)}$ is arbitrarily set to 0- it does not matter which. That is, if we arbitrarily set $b^{(1)}$=0, the remaining coefficients $b^{(2)}$ and $b^{(3)}$ would measure the change relative to the y=1 group. If we instead set $b^{(2)}$=0, the remaining coefficients $b^{(1)}$ and $b^{(3)}$ would measure the change relative to the y=2 group. The coefficients would differ because they have different interpretations, but the predicted probabilities for y = 1, 2 and 3 would still be the same. The results that are reported in table 8 (see further) have as a default the cluster of "people investors" as a control group. In addition, we tested a model which had cluster 2, the "technology investors" as a base group. Doing so, this allows us to interpret eventual differences between cluster 1, "the financial investors" and cluster 2, "the people investors".

Proposition 2: The source of funds of European high tech early stage venture capitalists will have a significant effect on the selection criteria used by these VCs

As aforementioned, previous studies haver argued that the institutional origin of the venture capital fund might have an impact on the kind of deals that the fund attracted. This argument was the basis for proposition two, in which we position that the source of funds of the high tech, early stage venture European capitalists will have a significant effect on the selection criteria used by these VCs. For instance, publicly funded VCs may not only focus on realising a considerable return, but may also take into account other factors such as employment and technological renewal. Bank funded VCs may be inclined to following rules of thumb existing at the bank level, and may put much more weight on financial forecasts, given the financial culture at the bank.

To test this proposition, we analysed whether the three different types differed significantly from each other in terms of institutional origin. Institutional origin was operationalized in the following ways. First, we made a distinction between funds that are part of a larger management holding and those that are not. A fund is considered to be part of a holding if it is part of a group of funds such as follow-up funds or funds with different investment focuses. Second, we made a distinction between captives or not. Captives are funds that are a 100% private equity subsidiary of a bank or financial institute. Finally, we analysed the degree of public capital in the fund structure.

-- Insert table 7 about here --

The results of the univariate analysis are included in table 7. Since the number of captives (n=5) is too small, we decided to omit this variable in the multivariate model, which is included in table 8.

-- Insert table 8 about here --

After controlling for age and size (operationalized by the capital managed), we do not find a significant difference with respect to holding structure although the funds that belong to a holding tend to be less prevalent among the technology investors. The latter group are more independent funds created by

successful entrepreneurs, who looked for additional institutional investors to complement their own money. Second, we examined the difference in the degree of public money, which these funds have access to. Table 8 shows that among the technology investors, the availability of public money is significantly larger than among the people investors. However, the percentage of public money used by the financial investors is not significantly larger than that used by the people investors. This suggests that it are especially the technology investors which make significantly more use of public money[39]. The venture capitalists that belong to these investors have over 30% of their money from public funds such as national government initiatives or the European Investment Fund. Financial investors however make the least use of these public sources. Only 8% of their fund structure is on average of public origin. This could signify that public money is being used to help overcome problems of market failure for high tech. Lockett et al (2002) conclude in their 1999 survey of UK VCs that a bias against VC firms' involvement in the earliest (seed and start-up) stage of the technology investment cycle remains. By investing in these early stage technology funds, governments want to stimulate technological renewal, and thus stimulate economic growth. We can thus conclude that proposition 2 receives mixed support. The source of funds of the technology investors is different from that of the financial and people investors. The percentage of public capital is significantly different, however we do not receive sufficient support to conclude that the holding structure is also different.

Proposition 3:The background and experience of the investment manager will have a significant effect on the selection criteria

Proposition 3 stipulates that the background and experience of the investment manager will significantly affect the way in which the selection is performed. To operationalize this hypothesis, we looked at three different kinds of experience or background. First, we made a distinction between those investment managers with a business degree (MBA) and those without. Second, we measured whether they had experience in previous jobs and if so, what kind of job they had done. If they worked in a bank or accountancy firm, we classified this as having financial experience. If they had worked at university after graduating, we labelled this academic experience. If they had worked as a consultant, this was coded as consulting experience. If they had been entrepreneurs themselves, we coded this as having entrepreneurial experience. Finally, if they had some overall experience in a company, we labelled this business experience.

Few investment managers have entrepreneurial experience. This is surprising since the funds in our sample specifically focus on early stage investments. Neither did we encounter a lot of investment managers with prior experience in other VC funds. Only one out of five of the investment managers had prior experience. This indicates that the emergence of early stage high tech venture capitalists is a pretty new phenomenon.

Most of the investment managers have an MBA. However, the MBA variable is not significantly different between the categories of investors. In terms of experience, we find that bank and other fund experience is significantly higher among the people investors than among the technology investors, while academic experience is much less. However, financial and people investors do not significantly differ on these categories, nor do financial and technology investors[40]. This means that investment managers which have worked in previous funds or in a banking environment tend to find the people characteristics most important. The financial investors lie somewhere in between, while the technology investors excessively recruit academics. This is in line with the expectations since this category of venture capitalists tends to be specialized in pre-seed investments and are often linked to universities and/or public research labs. It seems then logic that the prevalence of academics among these investors is highest.

We conclude that also proposition 3 receives mixed support. People investors seem to be the most experienced investment managers, but this is only significant in comparison to the technology investors,

[39] This is confirmed by the additional analyses using technology investors as a base group. The two other clusters have signicantly less public money in their capital.

[40] Additional analyses with group 3, the technology investors as a base group for comparison do not show any differences between the financial investors and the technology investors.

which inversely tend to recruit particularly less experienced managers. Among them, academic experience is rated the highest.

Proposition 4: the sector in which the business proposal is situated will have a significant effect on the importance of selection criteria

In proposition 4, we argue that the sectoral focus of the fund will play a role. To operationalise this sectoral focus, we use the sectoral distinctions which are most often made by the VCs themselves. We make a difference between biotech, ICT, industrial automation and other.

More than half of the funds invest in biotech, which is not surprising since they are high tech venture capital funds and biotechnology is considered to be a large and attractive high tech domain. Again, the differences between technology investors and people investors are the largest and the only significant ones. The percentage of technology investors investing in biotech is significantly higher than within the group of people investors. The financial investors are somewhat in the middle. People investors invest significantly more in industrial automation than their colleagues in the two other categories do. Each category of investors seems to invest in ICT.

Conclusion and recommendations

In this paper, we analysed how high tech early stage venture capitalists in Europe select deals to invest in. To do so, we use a novel methodology which combines the advantages of the post hoc studies and the real time studies. The post hoc studies have the advantage that they generate well codified results that are easy to analyse, the real time studies offer insights in decision criteria, which might be more implicitly taken into account than explicitly remembered. The post hoc studies usually conclude that team variables are the most important ones, while real time studies indicate that other variables such as financial and product market expectations might be much more important than initially thought.

Whereas most real time and post hoc studies make only a listing of the criteria, which are found to be important, studies based upon conjoint analysis techniques go one step further and propose a hierarchy of decision criteria used. In line with these studies, we also propose a hierarchy of decision criteria in this paper. Further, we limited the analysis to early stage, high tech venture capitalists in Europe. There are several reasons for this: first, the venture capital industry in Europe has boomed since the mid-nineties and several specialized early stage venture capitalists have been created. Second, most studies find a difference in selection criteria between early and later stage venture capitalists. Our focus of interest is specifically on early stage deals and the differences among these investors. Finally, investment in high tech companies has emerged as a specific business in itself, attracting a number of investment managers and newly created funds which would else not have been in the venture capital industry.

Using a cluster analysis, we find that the 68 funds are equally spread over three clusters, which we labelled the “financial investors”, the “people investors” and the “technology investors”. The people investors correspond most to the investors found in the post hoc studies. They overemphasize the team and leadership criteria of the founders. However, we also find the financial variables to play an important role. Market size and growth are much less important. People investors tend to have the most experienced and educated investment managers. It might well be that they are the longest in industry and therefore it is not surprising that they correspond most to the profile found in the older studies; A second group, which can be clearly distinguished are the financial investors. 25% of their investment decision is based upon expectations about ROI. These investors usually take minority positions in deals and are managed by the least experienced investment managers. It seems as if they compensate lack of experience with technical knowledge about financial engineering. Also for them the market prospect is quite unimportant. Finally, we detected the category of technology investors. For this category, the extent to which the technology can be protected and the contact they have with the prime founder of the start-up are key. However, they also look at other variables such as ROI, market prospects and founder characteristics. After all, they make the most balanced due diligence.

In comparison to the previous studies, we find that the product market characteristics are overall considered to be relatively unimportant. This might be explained by the fact that we look here specifically at early stage venture capitalists. Start-ups usually have a less clear idea about the downstream market and make more assumptions about this market in their business plan. This might explain why the venture capitalists investing in these business plans pay less attention to the proposed market expectations. We also find that there is a category investors, which is quite different from the ones found in previous studies: the technology investors. They might be unique for early stage high tech venture capitalists.

We further developed hypotheses in the paper about how to explain the differences in selection behaviour. Previous studies indicated that institutional background, the sector in which the venture capital fund is active and the background of the investment manager plays a role. Indeed, we find differences that can be related to these three groups of variables. First, we find that the extent to which these funds use public capital is different. Especially technology investors make use of different public forms of support. We can thus conclude that the availability of public capital on the venture capital scene has attracted some funds with a deviant way of looking at investment opportunities. We also find clear sectoral differences. Technology investors have more frequently a focus on biotechnology than people investors. People investors focus on industrial automation. Finally, we looked at the background and education of the investment managers interviewed. People investors tend to be the most experienced and have obtained the highest degree. Technology investors often have an academic background. Overall, technology investors tend to be different from people investors while financial investors fall somewhat in between.

If we look at the analysis from a policy point of view, we find the most public money in the funds of the technology investors. Given that these investors focus the most on the technological strength of a business plan, it looks as if this money is used for technological renewal and for stimulation of economic growth. This public money is managed by investment managers that have a profile that is not very usual in the VC industry. Quite a lot of these investment managers have academic experience, working as research assistant or Ph. D. student in a technological domain before coming to the VC industry. Very little of them have prior experience as manager of other funds, and are thus new in business. They are more than other funds involved in biotech investing, and less in ICT investing. As these investors are active in a very early stage more frequent than the other groups (often provide seed financing), it is acceptable that they are helping to overcome the market failure high tech entrepreneurs are confronted with.

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Tables, charts and graphs

Table 1: Trade-off table

Characteristics of…	Attribute	Levels (potential events)
A) Team	1) Team	1) Non complementary and no business experience 2) Complementary and business experience 3) Non complementary and business experience 4) Complementary and no business experience
B) Entrepreneur lead entrepreneur	2) Entrepreneur	5) Leader: yes 6)Leader: no 7) perseverance: yes 8) perseverance: no
	3) Contact with the entrepreneur	9) contact with VC: good 10) contact with VC:bad
C) Proposed product or service	4) Uniqueness	11) Product is unique: 12) Product is not unique
	5) Market acceptance	13)product is accepted by the market 14) product is not accepted by the market
D) Technology	6) Protection	15) Protection is possible
	7) Platform technology	16) Protection is not possible 17)It is a platform technology 18) it is no platform technology
E) Targeted market	8) Location	19)the market is regional
	9)-Size	20) the market is global
	10)Growth	21)it is a niche market 22) it is a mainstream market 23) the market is seemingly high growth 24) the market is low growth
F) Financial forecast	11)Time to break-even	25) expected time to breakeven is Less than 1,5 years, 26) expected time to breakeven is more than 3 years 27)expected time to breakeven is between 1,5 and 3 years
	12) Return	28) expected return is Less than 30%, 29) expected return is more than 50% 30) expected return is between 30 and 50%

Table 2: Distribution of interviews by region

Region	Country	Number of interviews carried out
Ile-de-France	France	10
Helsinki region	Finland	7
Stockholm region	Sweden	11
Flanders	Belgium	8
Bavaria (Münich region)	Germany	10
South-East England	UK	11
North-Holland	The Netherlands	11
		68

Figure 1: Sample of European early stage high tech investors

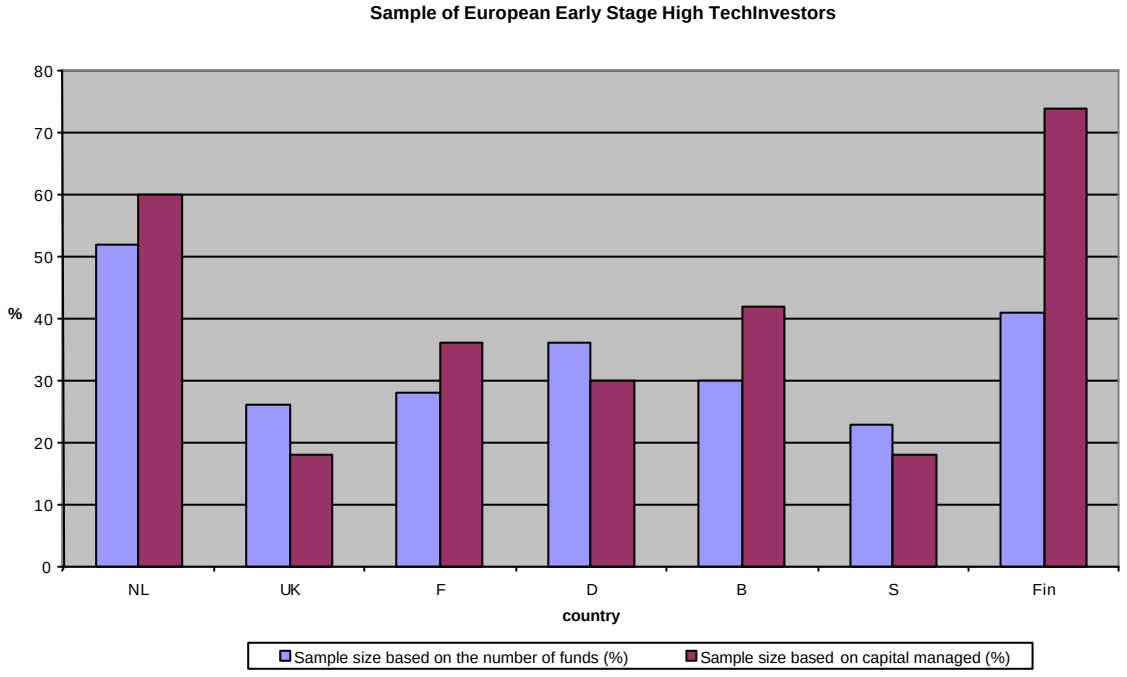


Figure 2 : Example business proposal scored by investment manager

Table 3: definitions given to selection criteria

Selection criterium	*Definition*
Complementary team	Both technical and commercial competencies are in the team
Business experience	At least one of the entrepreneurs has commercial experience in the sector
Entrepreneur is leader	Entrepreneur can motivate people, can be in charge
Entrepreneur is perseverant	Entrepreneur goes on, even if things get tougher
Good contact with the entrepreneur	You get along, you are on the same wavelength with respect to his business ideas
Regional market	Submarket of the world market (for instance: Europe)
Niche market	Small, specialised market with small number of players
Mainstream market	Large market with a lot of players
Unique product	The customer has the perception that there are no alternatives for the product
Protected product	Protection by patent or trade secrets
Market acceptance	First sales have been realised by the company or its competitor
Platform technology	Broad technology with lots of different applications
Break-even	Point at which cash is in balance (cash-out equals cash-in)
Return	Yearly return on investment

Figure 3: Importance of selection criteria to early stage high tech investors

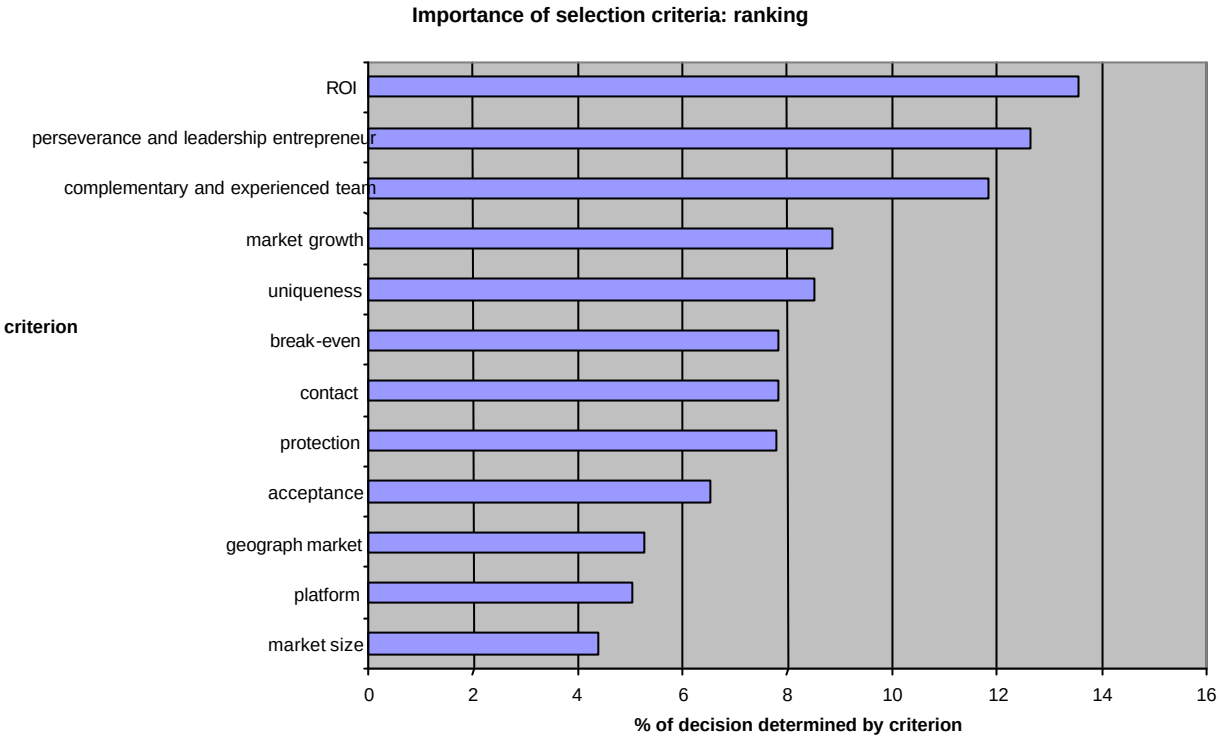


Table 4: Descriptive statistics on conjoint analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Importance team	68	,97	29,14	11,8534	6,19212
Importance leader	68	1,85	33,33	12,6353	7,92478
Importance contact	68	,00	46,19	7,8056	7,85183
Importance market size	68	,00	20,43	4,3863	3,34188
Importance market growth	68	,00	26,25	8,8418	5,56971
Importance geograph market	68	,00	17,24	5,2678	3,88205
Importance platform	68	,00	14,49	5,0318	3,81331
Importance protection	68	,00	30,14	7,7643	6,45765
Importance uniqueness	68	,00	17,59	8,5259	4,29999
Importance acceptance	68	,00	25,81	6,5222	5,43668
Importance break-even	68	,00	19,93	7,8182	3,68857
Importance ROI	68	,00	44,71	13,5475	8,70958
Valid N (listwise)	68				

Table 5: Selection profile (means and standard deviations): results from cluster analysis

Selection criterion	Financial Investors	Technology Investors	People Investors	F (p)
Venture Team	11.91	8.42	14.71	7.309***
	(5.22)	(3.74)	(7.17)	(0.0014)
Competence Lead entrepreneur	8.69	7.77	19.78	34.284****
	(5.91)	(3.32)	(6.79)	(<0.001)
Contact with the VC	4.37	11.70	7.16	5.315***
	(3.60)	(10.90)	(5.69)	(0.0073)
Market Size	4.04	5.13	4.02	0.81
	(2.48)	(4.40)	(2.88)	(0.4490)
Market Growth	10.02	9.54	7.34	1.592
	(6.49)	(5.92)	(4.21)	(0.2113)
Market Location	4.01	7.68	4.19	7.532***
	(3.16)	(4.31)	(3.10)	(0.0011)
Platform Technology	4.94	6.12	4.18	1.573
	(4.14)	(3.65)	(3.59)	(0.2152)
Protection Ability	6.12	12.45	5.06	11.457****
	(4.79)	(8.04)	(3.31)	(<0.001)
Uniqueness	7.80	9.29	8.44	0.6280
	(3.92)	(4.23)	(4.68)	(0.5369)
Market Acceptance	5.85	5.74	7.69	0.986
	(6.29)	(3.46)	(6.06)	(0.3785)
Time to Break-even	7.99	6.82	8.53	1.3193
	(3.65)	(2.55)	(4.41)	(0.2744)
Return on Investment	24.25	9.33	8.88	57.608****
	(6.82)	(4.60)	(4.49)	(<0.001)
Cluster Size	20	22	26	

Levels of significance: *=.10; **=.05; ***=.01; ***=.001

Table 6: conjoint analysis results by investor type

	People investors	*Technology investors*	*Financial investors*
Venture Team	14,71	7,77	11,91
Competence Lead entrepreneur	19,78*	8,42	8,69
Contact with the VC	7,16	11,70	4,37
Market Size	4,02	5,13	4,04
Market Growth	7,34	9,54	10,02
Market Location	4,19	7,68	4,00
Platform Technology	4,18	6,12	4,94
Protection Ability	5,06	12,45	6,12
Uniqueness	8,44	9,29	7,80
Market Acceptance	7,70	5,74	5,85
Time to Break-even	8,53	6,82	7,99
Return on Investment	8,88	9,33	24,25

*Percentage of the investment decision which can be attributed to this criterion.
The criteria which make up for 50% of the decision are displayed in red!

Table 7: Univariate Statistics

	Financial Investors	Technology Investors	People Investors	Overall
Origin of Funds				
Holding	45%	27.3%	46%	39.7%
Captive	15%	0%	4.2%	5.9%
% public capital**	8.07%	32%	21.6%	20.82%
Sectoral				
Biotech*	45%	77%	50%	57.4%
ICT**	95%	68%	92.3%	85.3%
Industrial Automation**	10%	27.3%	50%	30.9%
Other	15%	36.4%	29.4%	29.4%
Investment Manager				
Business Education*	55%	57%	83%	66.15%
Academic Experience*	5%	22.7%	5.2%	10.6%
Banking Experience**	25%	13.4%	46%	28.78%
Entrepreneurial Experience	15%	13.64%	16.67%	15.15%
Prior Experience as manager of other funds	20%	9.5%	33.3%	21%

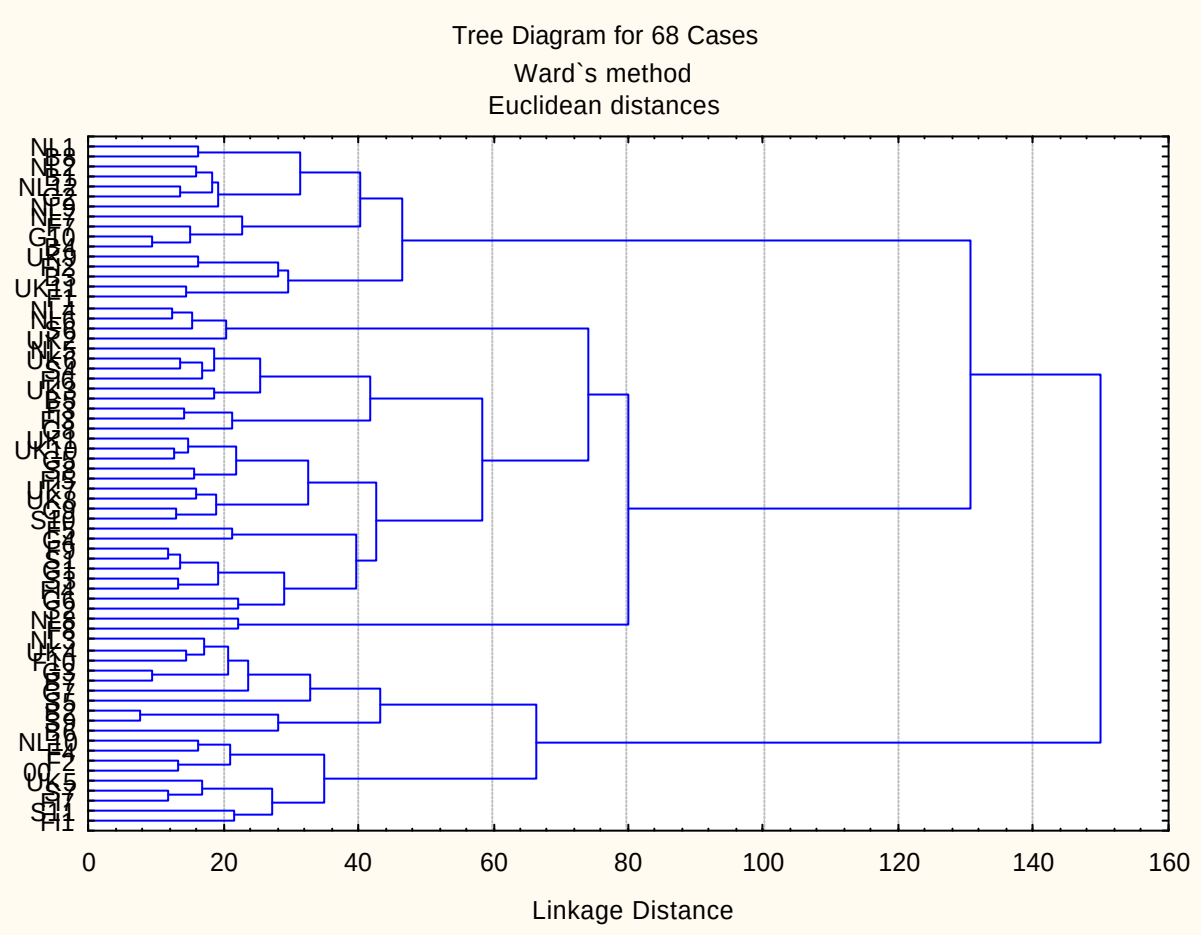
Levels of significance: *=.10; **=.05; ***=.01; ****=.001

Table 8: Multinomial regression analysis

	Base model I	*Base model II*	*Base model III*	*Base model IV*	*Full model*
Comparison between financial and people investors (=comparison group)					
Constant term	-0.581	-0.511	-0.305	-1.60	-0.432
Origin of funds					
Holding		0.274			-0.435
Percentage public money		-0.177			-0.009
Experience of VC					
Business administration			0.006		-0.168
Academic experience			1.959		3.205
Banking experience			-0.880		-1.007
Entrepreneurial experience			0.293		0.787
Other fund experience			-0.601		-1.200
Sector					
Biotech				0.810	0.833
ICT				1.055	1.225
Industrial automation				-2.741***	-3.161****
Control variables					
Fund size	-0.000	-0.001	0.000	-0.001	-0.001
Fund age	0.050	0.069	0.066	0.054	0.070
Comparison between technology and people investors (=comparison group)					
Constant term	-0.390	-0.210	0.602	0.045	0.229
Origin of funds					
Holding		-0.745			-1.660
Percentage public money		0.006			0.027*
Experience of VC					
Business administration			-0.247		-0.393
Academic experience			4.412***		5.512**
Banking experience			-1.809**		-2.401**
Entrepreneurial experience			0.476		1.019
Other fund experience			-2.739**		-3.782**
Sector					
Biotech				1.471*	2.409*
ICT				-0.951	0.572
Industrial automation				-1.539*	-3.294**
Control variables					
Fund size	-0.002	0.000		-0.000	-0.001
Fund age	0.038	0.022		0.045	-0.051
Adjusted R^2	*0.0135*	*0.062*	*0.1881*	*0.154*	*0.3644*

Levels of significance: *=.10; **=.05; ***=.01; ****=.001

Figure 4: Cluster analysis – graphical presentation



Private Equity Investments and Disclosure Policy

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Abstract

We investigate whether a firm's disclosure policy is affected by the changing corporate setting and intensified corporate governance associated with private equity (PE) investments. For a unique sample of unquoted PE backed firms we observe a significant switch to increased financial disclosure in the pre-investment year, consistent with the hypothesis that entrepreneurs attempt to reduce information asymmetries inherent to the PE application by increasing their disclosure levels. Further, we document that the governance and professionalization impact of PE investors affects their portfolio firms' financial disclosure positively. Finally, differentiating on investor type (government versus non-government related) reveals no overall effect on disclosure, both in the pre- as in the post-investment years. Results are robust to various sensitivity checks.

Introduction

Since decades, corporate decisions to disclose information to outsiders have been of interest for both analytical and empirical accounting researchers. This issue is of major importance as economic theory suggests that a firm's disclosure policy is negatively related to its cost of capital since disclosure reduces information asymmetries. Analytical studies have modeled the discretionary disclosure of information in various settings resulting in full disclosure (Grosman 1981, Milgrom 1981) and partial disclosure equilibria (Bhattacharya and Ritter (1983), Verecchia (1983), Diamond and Verecchia (1991), Gigler (1994)). Empirical work on corporate disclosure is rooted in the 1960s and typically examines the effect of increased levels of disclosure on a firm's ability to reduce agency costs. However, results of these studies are mixed. Other studies focus explicitly on the interaction between a firm's corporate governance structure and its disclosure policy. Again, results are mixed: authors find both positive and negative relations between the intensity of a firm's corporate governance structure and its disclosure policy.

The current study is situated in the latter stream of research, in that we study the impact of changes in ownership structure and corporate governance on a firm's disclosure policy. More specifically, we examine disclosure policies of a large hand-collected sample of Belgian unlisted firms receiving private equity (PE) financing from professional equity investment companies, both in the period before and after the PE investment.[41] The motivation for using this dataset stems from the unique Belgian institutional and legal framework which requires all national companies (both listed and unlisted) to file yearly financial statements to the National Bank of Belgium. This offers a richness of financial statement information and provides the opportunity to study the effect of a change in ownership and governance structure resulting from the PE investment on a firm's disclosure policy, even when firms are not subject to stock exchange reporting requirements. Further, this dataset is unique in that it contains (changes in) firm-specific disclosure observations around a clearly identified PE financing event and thus allows to study corporate disclosure policies as a response to information-asymmetries and agency problems inherent to the PE offering. As such, this research takes into account that disclosure decisions are non-random events and responds to the worry of researchers that disclosure is often treated independently from a firm's changing environment or economics (Healy and Palepu (2001)).

A study like this is interesting for several reasons. Studies on unlisted firms is appealing in its own right, due to the predominance of private companies in the economy and the fact that only marginal attention has been paid to these kind of firms in empirical studies.[42] Moreover, the PE setting is particularly

[41] We use the term private equity (PE) rather than venture capital throughout this study, based on the characteristics of our sample. According to the European Venture Capital and Private Equity 'venture capital' is defined as a "*subset of private equity and refers to equity investments made for the launch, early development, or expansion of a business*." Private equity is broader in meaning and is also used to define *"external equity capital that is raised to strengthen a company's balance sheet, to make acquisitions or to finance a management buy-out or buy-in"* (EVCA Glossary). Since a considerable number of our observations (cfr. infra) refer to later stage deals and hence do not satisfy the exact definition of venture capital, we use private equity to label all our equity financed deals.

[42] Recent studies acknowledge this shortage of attention and explicitly study earnings characteristics of unlisted firms in a regulatory setting where financial reporting requirements of unlisted firms are similar to those of listed firms (e.g. Ball and Shivakumar (2004), Hand (2005)). The importance and contribution to the economy of unlisted firms is high. In Europe, unlisted firms constitute over 99% of all private non- agricultural entities and hence are a non-negligible part of the economy. Figures for

interesting since it is characterized by various information asymmetries and agency problems which inherently affect the business process and organization. Therefore, the use of financial statement information is important in a PE context, even for unlisted firms (Hand (2005)). We acknowledge the importance of financial statement information and study the relation between the (nearby) governance of a PE investor and a firm's disclosure policy. Hereby, the current study not only complements accounting research on determinants of disclosure but also entrepreneurial finance research which often treats the corporate reporting environment as exogenous.

We argue that a firm discloses more information to the outside world when raising PE finance and derive this argument from basic economic theory. The information asymmetry problem that typically arises between a better-informed entrepreneur and outside PE investors gives rise to the lemons problem, which causes good and bad projects to be valued at an average level (Akerlof (1970)). In an attempt to resolve this problem, the best entrepreneurs signal their superior quality and increased disclosure might be a valuable instrument to do so. Various studies have shown that financial figures are key determinants in screening and selecting portfolio companies, especially in Continental Europe (MacMillan, Zemann and Subbanarasimha (1987); Fried and Hisrich (1994); Wright and Robbie (1998); Manigart et al. (2000)). Moreover, survey evidence shows that more than 70% of professional investors labels accounting disclosure as the most important item which impacts their investment decision (McKinsey (2002)). Consequently, we argue that high quality entrepreneurs showcase their financial reporting openness and professionalism to outsiders by increasing their disclosure levels. We therefore expect and also find evidence of increased disclosure of financial information in the year before firms get PE.

Second, we argue that portfolio firms' disclosure policies are affected by PE investors' governance. This argument originates from the well-illustrated phenomenon that PE investors are close monitors of their portfolio firms (Gompers (1995), Sapienza, Manigart and Vermeir (1996), Kaplan and Strömberg (2002)). These monitoring efforts are particularly driven by the agency problem, as described in Jensen and Meckling (1976), where the interests of principals (here: PE investors) and agents (here: entrepreneurs-managers) are not perfectly aligned. As a response to the agency problems, PE investors are intensively involved in their portfolio firms' day-to-day activities and contract a substantial number of controls like cash flow and control rights contingent upon observed performance measures (Gompers (1995), Robbie and Wright (1998), Gompers and Lerner (2001), Kaplan and Strömberg (2002)). This strong PE investor involvement results in a substantial change in governance and positively affects the professionalism the firm is operating with. We argue and show that this intensified governance and professionalization is noticeable in the way financial reporting is conducted and, as such, is manifested in a higher disclosure of financial information to outsiders.

To document these propositions empirically, we study disclosure policies of a large sample of unlisted Belgian PE backed firms from (at most) 3 years before until (at most) 5 years after they received PE for the first time in their history, and compare these with a matched sample of independent firms that never received PE. Since the firms under analysis are unlisted and press releases or extended annual reports are rare for these kind of firms, we gauge a firm's disclosure behavior by looking at its willingness to report complete (i.e. more detailed) financial statements when abbreviated (i.e. shorter in length, providing less detail) statements are sufficient to comply with legal requirements. Complete financial statements require more intensive preparation and financial expertise and contain more competitive information. Hence, complete financial statement disclosers incur substantially higher proprietary costs than firms which only report abbreviated financial statements. In the pre-PE financing period one would only expect firms to switch to a complete financial statement reporting if the increase in proprietary costs resulting from the increased disclosure is offset by the decrease in information asymmetry. After the PE investment it is likely that the financial expertise, the intensified monitoring and professionalism of the PE investor will be dominant, leading to expectations of a higher disclosure policy when professional PE investors become involved.

Through panel data analyses, we find that PE portfolio firms partly resolve the information asymmetry gap by disclosing significantly more financial statement information than they are legally obliged to,

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Belgium are similar to European averages in that about 99% of all Belgian firms are unlisted and they contribute to the large majority of total GDP.

especially in the pre-PE financing year. These differences remain significant when we control for firm-specific characteristics and potential endogeneity problems. From the PE investment year onwards, PE backed firms are even more likely to disclose complete financial statements compared to both the matched sample and the pre-investment firm-years. This finding suggests a clear governance and professionalization impact of PE investors on their portfolio firms' disclosure behavior. Further, we condition for differences in investor type by splitting our sample in government PE backed and non-government PE backed firms. We expect that the lower monitoring and governance impact which is often associated with government-related PE investors will yield lower disclosure levels for their portfolio firms. Results, however, do not support this view although government PE backed firms switch earlier to a high disclosure strategy. This suggests that the well-documented difference in governance and professionalization between government and non-government PE investors has no sizeable effects on the way financial disclosure of their portfolio firms is enforced.

The current study has several contributions. First, this study distinguishes itself from the traditional disclosure literature which studies governance structures in relation to a firm's disclosure behavior. Prior studies typically associate proxies for a firm's governance structure with aggregate measures of disclosure tendencies (Raffournier (1995), Ho and Wong (2001), Eng and Mak (2003)). However, these studies face the problem of being short of good proxies for a firm's governance structure which often results into mixed results. The firms analyzed in the current study are unique in that they contain an indisputable change in governance system resulting from the PE involvement. This provides an exclusive setting to study the impact of intensified scrutiny and governance pressure on a firm's disclosure behavior. Second, prior studies typically investigate disclosure tendencies of publicly listed companies, primarily driven by data unavailability of unlisted firms. However, recent evidence shows that financial statement information matters for unlisted firms, especially in a PE context, and that this issue is surprisingly neglected in the literature (Hand (2005)). The current study acknowledges this shortcoming and enhances the understanding of the use of disclosure for unlisted firms in response to increased scrutiny and governance by PE investors. Third, most studies analyze disclosure behavior cross-sectionally and typically neglect intertemporal dependencies. However, disclosure decisions are non-random events and cannot be treated independently from a firm's changing environment or economics (Healy and Palepu (2001)). The current study overcomes this disregard and exploits the characteristics of a longitudinal dataset to analyze the disclosure evolution in a panel data context.

The paper proceeds as follows. Section 2 reviews the corporate disclosure literature. In section 3, we build hypotheses by combining the PE framework and the disclosure setting. In section 4, we describe the research setting, explore the characteristics of the Belgian PE industry and illustrate the sample properties. In section 5, detailed statistics are provided and section 6 reports the results of our multivariate analyses. Finally, section 7 concludes and discusses the results.

Literature Review

Literature on disclosure, both analytical and empirical, is extensive and typically focuses on the interplay between information asymmetries and disclosure policy. Information asymmetries create costs by introducing adverse selection in transactions between economic agents (Akerlof (1970)). It is commonly accepted that a firm can reduce the level of information asymmetries by committing itself to disclose more information to the outside world. Analytical studies on disclosure policy have been pioneered by Grosman (1981) and Milgrom (1981). These studies find that economic agents are better off by adopting a full disclosure policy since incomplete disclosure results in buyers' suspicion and, as a consequence, high price discounts. Verecchia (1983) shows why real-life disclosure is often non-complete by introducing proprietary costs, i.e. costs associated with increased levels of disclosure originating from the preparation and presentation efforts and the higher exposure to competitors. Hence, economic agents are typically not willing to disclose all information they hold since this generates proprietary costs. While outsiders do not know to what extent the withheld information represents good or bad news, the value of the firm typically is lowered to a threshold level whereby a manager is motivated to withhold a specified amount of information.

A stream of empirical research focuses on the determinants of a firm's voluntary disclosure decision and the associated economic benefits of increased disclosure. These economic benefits are often valorized by studying the relation between a firm's cost of capital and its disclosure policy. To test this relation, researchers focus on various proxies for a firm's cost of equity capital like bid-ask spreads (Healy, Hutton and Palepu (1999), Leuz and Verecchia (2000)), stock liquidity (Botosan and Frost (1998), Leuz and Verecchia (2000)), share price variability (Leuz and Verecchia (2000)) and accounting-based valuations (Botosan (1997)). Botosan (1997) finds evidence that greater disclosure is associated with a lower cost of equity capital, but only for firms with low analyst following. Botosan and Frost (1998) find a positive association between stock liquidity and the timeliness of disclosure. Leuz and Verecchia (2000) show that German firms switching from German GAAP to IAS or US GAAP experience lower bid-ask spreads and higher trading volume but record no improvements with respect to share price variability. Sengupta (1998) analyzes a firm's cost of debt capital in relation to disclosure and finds that firms with timely and clear disclosures are rewarded with a lower cost of borrowing.

Related studies use the context of equity offerings to investigate the interaction between a firm's disclosure policy and its associated cost of capital. Schrand and Verecchia (2002) study disclosure policies around Initial Public Offerings (IPOs) and find that greater disclosure frequency in the pre-IPO period is associated with lower underpricing. Marquardt and Wiedman (1998) find that prior to a Seasoned Equity Offering (SEO), firms often increase their disclosure level substantially to reduce information asymmetries inherent to the equity offering. Lang and Lundholm (2000) document that a consistently high disclosure strategy leads to a reduction of the information asymmetry inherent in the offering, whereas increased disclosure often is a result of an attempt to "hype the stock".

Other studies focus more explicitly on the governance-related determinants of a firm's disclosure behavior and analyze this behavior in an agency context where principals and agents have different objectives (Jensen and Meckling (1976)). Managerial ownership is seen as an indication of the alignment of interests between principals and agents resulting in studies investigating the relation between a firm's disclosure policy, its ownership structure and the corporate governance system in-place. Ruland, Tung and George (1990) find that ownership structure, measured as the percentage of voting stock owned by officers and directors, is by far the most important variable in explaining a firm's disclosure of earnings forecasts. Forker (1992) reports a positive association between the tightness of a firm's corporate governance system and share option disclosures. Ho and Wong (2001) study Hong Kong listed firms and document that the existence of an audit committee is positively related to the extent of disclosure while the percentage of family members on the board has a negative impact on disclosure. Eng and Mak (2003) study firms listed on the Singapore Stock Exchange and find a positive association between government ownership and voluntary disclosure, while both the number of outside directors and managerial ownership influence disclosure behavior negatively. However, Raffournier (1995) does not find a specific relation between the disclosure policy of Swiss firms and their ownership structure.

To our knowledge, no prior studies have explicitly considered the PE investment process and the associated disclosure policy of their portfolio companies. Gompers (1995), Lerner (1995) and Kaplan and Strömberg (2002) have studied the monitoring function of PE investors more in general. Others, like Hellmann and Puri (2002) focus on the supportive role of PE and find that PE is related to a number of professionalization measures like human resource policies, the adoption of stock option plans and hiring a marketing vice president. Mitchell, Reid and Terry (1995) show that PE investors have a substantial post-investment demand for accounting information and that accounting profit targets are often used as safeguards in bonding arrangements. None of the aforementioned studies, however, measures to what extent the PE investment process impacts the portfolio firms financial reporting practice. We argue that applying for and receiving PE affects a firm's business environment and study how the disclosure issue is related to this.

Hypotheses Development

PE is a financing alternative for entrepreneurial firms when traditional financing mechanisms like bank loans and other credits are difficult or even impossible to obtain. As such, PE has developed as an important intermediary in financial markets and is especially appropriate for the financing of firms where

large information asymmetries and agency problems are present (Admati and Pfleiderer (1994), Gompers and Lerner (2001)). In this section, we argue how both aforementioned issues are thought to impact the corporate disclosure behavior of portfolio firms in the years around the PE financing.

Disclosure and Pre-Financing Information Asymmetries

Anecdotal evidence and academic studies show that PE investors screen potential entrepreneurial companies extensively before deciding to invest in the company. Selection only takes place when a firm successfully passes an initial screening round and a more thorough due diligence process (Robbie and Wright (1998)). Although there are substantial differences across firm types, industry and geographic location there is anecdotal evidence that out of 100 proposals that are submitted to a PE investor per year, on average only ten pass the initial screening round and from these ten, only one or two actually receive PE financing (Berlin (1998)).

Since information asymmetries and adverse selection problems clearly determine the probability of receiving PE financing, good entrepreneurs have an incentive to signal their high quality to outside PE investors. One option for entrepreneurs to signal their dedication is retaining a substantial equity stake in the venture firm (e.g. Leland and Pyle (1977)). This behavior mitigates the agency conflict by aligning the interests of entrepreneurs and outside investors. Other important criteria on which PE investors ground their investment decisions are viability and novelty of the project, financial profitability, skills and dedication of the entrepreneurial team and possibility for high returns at the exit time (Hall and Hofer (1993) Fried and Hisrich (1994), Robbie and Wright (1998)). It is of paramount importance that entrepreneurs who want to attract PE score sufficiently high on most of these criteria to signal their high quality to potential investors.

Evidence further shows that accounting information is a crucial issue which is required by PE investors before deciding to invest (Manigart et al. (2000), Kaplan and Strömberg (2004)). In general, professional investors rate accounting disclosure as the most important element which impacts their financing decision (McKinsey (2002)). Given that the use of accounting information and its disclosure extent is highly important in screening and selecting investment opportunities, we expect entrepreneurs to give more attention to it when applying for PE. Entrepreneurs can reduce information asymmetries inherent to the PE offering by disclosing more information than legally required to outside stakeholders. From an investor's point of view, a high disclosure strategy is likely to be evaluated positively since this behavior not only indicates a high professionalism with respect to the in-house financial reporting process but also a readiness to disclose information after the PE investment has taken place. We therefore postulate that high quality firms switch to a higher disclosure level prior the PE investment in an attempt to reduce information asymmetries and to signal their superior quality.

In the line of this reasoning, we postulate that a high disclosure strategy will initially facilitate the PE financing search through a reduction of the information asymmetry present in the first steps of the quest for PE. Entrepreneurial research generally agrees that PE investors have access to internal documents which generally contain substantially more information than the published annual report (e.g. Fried and Hisrich (1994), Robbie and Wright (1998)). At first sight, this would mean that increased disclosure would not have additional value to PE investors, since they have in-depth information which goes beyond the disclosure of financial information. However, we argue that entrepreneurial firms catch the attention of PE investors, amongst others, by increased disclosure levels. At the time entrepreneurs start their search for financing, PE investors do not yet posses the detailed information they typically ask for in the due diligence process. Hence, a high disclosure strategy is a valuable tool to reduce initial information asymmetries in the search for PE.

Disclosure and Post-Financing Monitoring

Whereas the pre-investment period is typically dominated by information asymmetries and adverse selection problems, the mutual relationship which arises between the entrepreneur and its PE investor after the PE investment is subject to potential agency conflicts and moral hazard problems. There is substantial evidence that PE investors address agency conflicts by extensive monitoring ex post, which typically intensifies the portfolio companies' corporate governance system in-place (e.g. Gompers (1995),

Lerner (1995), Robbie and Wright (1998), Gompers and Lerner (2001), Kaplan and Strömberg (2002)). Hellmann and Puri (2002) go beyond this monitoring role of PE and find that PE investors play a supportive role in building the entrepreneurial firm.

We argue that the intensified monitoring and professionalization originating from the PE investor will affect the disclosure policy of portfolio firms. Since PE investors play a role that goes beyond that of traditional financial intermediaries, it is likely that they guide and professionalize the financial reporting process. Since PE investors typically monitor their portfolio companies closely, they may contract deals with their portfolio firms stipulating that the financial reporting should comply with some minimum reporting criteria, like e.g. have a substantial amount of public disclosure. Further, portfolio companies also benefit from the financial expertise and in-house knowledge of the professional PE investor enabling them to report complete financial statements with a minimum of effort. Thus, professionalization is another factor which is expected to drive disclosure positively. Both arguments suggest that PE backed firms are likely to disclose more information than would be the case without PE involvement. As such, we postulate that from the PE investment onwards, PE investors' involvement evokes a higher disclosure policy.

Taking the aforementioned elements into account, we incline towards the argument that PE governance and portfolio firm's disclosure are complements rather than substitutes. Consistent with the complementary argument of intensified corporate governance, we associate a greater extent of disclosure with additional PE monitoring since the adoption of more governance mechanisms strengthens the internal controls in order to minimize opportunistic behavior and information asymmetries (Leftwich, Watts and Zimmerman (1981)). Alternatively, PE monitoring could also be a substitute for voluntary disclosure since higher monitoring influence could reduce the need for other governance mechanisms, such as higher disclosure levels. PE investors, however, are concerned about their perceived quality in the PE industry (Gompers and Lerner (2001)). Provided that PE quality is generally reflected by the quality of their portfolio companies, it is likely that PE investors use their monitoring power to implement a high disclosure policy in their portfolio companies.

Disclosure and Investor Type

Different types of PE investors often generate different types of deals, particularly because both the professionalism of the screening and monitoring activities are determined by investor type (e.g. Lerner (1999), Leleux and Surlemont (2003)). Since a firm's disclosure behavior is likely to be associated with the extent and intensity of its screening and monitoring efforts, one can question whether the disclosure policy of PE portfolio companies is affected by its investor type. Especially, we are interested in disclosure policies of firms backed by government-related PE investors versus non-government-related PE investors.

Managers of government-related PE investment companies are often labeled as civil servants and as such may not have the experience nor the motivation to select or support entrepreneurial companies (Manigart, Baeyens and Van Hyfte (2002), Leleux and Surlemont (2003)). Government-related PE investors' investment decisions are often driven more by a societal goal instead of a profit maximization standpoint (Lerner, 1999). Moreover, government-related PE investors have less pressure to earn a return on their investment, as they do not have to raise new funds from the market and may have other goals than value maximization for their shareholders (Gompers and Lerner (2001)). Further, the absence of performance-related incentive schemes in government-related PE investors create less incentives to monitor portfolio companies tightly compared to the profit-oriented incentive packages which are more commonly used in non-government PE investment firms (Leleux and Surlemont (2003)).

Provided that government-related PE investors use less stringent screening devices before the PE investment, are weaker monitors ex post and have less professional in-house skills to support their portfolio companies, we expect lower disclosure in government-PE backed firms compared to non-government PE backed firms and this both in the pre- and post-investment stage. Prior to the PE investment, firms which focus on attracting government PE and are aware of the lower professionalism and other goals of these government PE firms have less incentives to disclose additional information on

top of the regulatory minima.[43] From an investor perspective, firms with low disclosure levels may reflect a lower professionalism and/or a lower willingness to share information to outside PE investors making it more difficult for them to raise capital from more stringent and selective non-government PE instances. In the post-investment period, we expect the weaker monitoring activities in-place to result in a lower disclosure policy for government-PE backed firms compared to their non-government PE backed counterparts. [44]

Research Setting and Sample Properties

To test the hypotheses, we use a unique hand-collected database containing financial statement information of Belgian companies that received PE financing between 1985 and 1999. This dataset has two major advantages which make it particularly attractive to study the disclosure issue.

First, all Belgian companies (both listed and non-listed) are obliged to deposit their financial statement annually at the National Bank of Belgium in accordance with Belgian Legislation. Hence, this dataset offers the opportunity to study the evolution in the disclosure behavior of unlisted firms which experience a clearly identifiable change in ownership and governance structure resulting from the PE investment. Such a dataset is typically not available in a classical research context like the US where detailed financial statement information of unlisted firms is not retrievable. Therefore, this dataset offers an excellent opportunity to study disclosure behavior of unlisted firms as a response to (*i*) increased scrutiny by outside PE investors before the investment date and (*ii*) a changing corporate governance and increased professionalization ex post. Although unlisted firms, on average, experience a lower demand for high quality financial accounting compared to listed firms and are less subject to public scrutiny, their disclosure decision may nevertheless be affected by the decision to raise PE financing and the change in governance and professionalization ex post.

Second, the Belgian PE industry differs substantially from that in the US and the UK and even other Continental European countries since approximately half of all PE investments come from government-related PE firms (EVCA, various yearbooks). Hence, our specific dataset on Belgian PE deals may provide useful insights in whether differences in PE investor types and characteristics (i.e. government versus non-government related) affect the disclosure policy of their portfolio firms.

The Belgian PE Industry

Before the 1980s, Europe and the US were two different continents with respect to PE financing patterns. The absence of a supportive entrepreneurial spirit across Europe combined with poor exit alternatives offered by the stock market resulted in a substantial underdevelopment of the European PE industry compared to the US. The Belgian situation was comparable to the one in Europe, where PE only gained importance after the 1980s. Evidence of this juvenile character of the Belgian PE industry is clearly illustrated when comparing the importance of the industry with respect to the size of the economy. During our observation period 1985-1999, average Belgian PE investments totaled 0.06% of GDP. US figures are substantially higher, reaching values of 3 to 4 times that size during the same period (Manigart, Baeyens and Van Hyfte (2002)). Consistent with worldwide tendencies, the Belgian PE industry grew sharply, especially during the late 1990's bubble years to a maximum of 0.22% of GDP in 2000. Over the last two years, again following worldwide tendencies, total PE investments nearly halved to 0.12% of GDP in 2002 (EVCA, various yearbooks).

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[43] This argumentation, however, implicitly assumes that entrepreneurs focus on one PE investment party at a time instead of 'go shopping' with several investment parties. Anecdotal evidence, however, shows that this is not always the case. Nevertheless, it still is relevant to study potential differences in disclosure behavior prior to the PE investment, dependent upon the specific investor's type that eventually takes up the investment.

[44] Our postulated relation is opposite to the one developed in Eng and Mak (2003), where the authors suggest and find a positive relation between government intervention and disclosure policy. The main reason why we expect this inverse relation is that we study unlisted firms with a rather small investor base, even after PE participation. Eng and Mak (2003) focus on a substantially different setting and study the disclosure behavior of listed firms leading to these different propositions.

During the observation period, the vast majority (58%) of Belgian PE funds was invested in the expansion stage. Seed and start-up investments, replacement capital and buy-outs accounted for respectively 26%, 9% and 7%. The most popular investment sector was high-tech related (47%), according to EVCA definitions, *"communications, computer and other electronics related, biotech and medical or health related"*. Industrial-related and consumer-related sectors accounted for respectively 17% and 10% of all investments during that period.

With respect to investor type, the Belgian PE industry is further characterized by a large number of small independent PE investors and a few large PE investment houses (EVCA, various years). It is noteworthy that more than half of all PE investments made during our observation period come from government-related PE investors. Both the Flemish GIMV (*Gewestelijke InvesteringsMaatschappij voor Vlaanderen*) and the Walloon SRIW (*Société Régionale d'Investissement de Wallonie*) account for a substantial part of these government-related PE investments. Independent and captive investors both account for a mere 25% of total investments.

Reporting Requirements of Belgian Firms

Belgian companies are obliged to file their financial statement annually in compliance with Belgian Legislation. In accordance with the Royal Decree of October 8, 1976, small and medium-sized firms are allowed to report an abbreviated (i.e. less detailed) financial statement whereas large firms are obliged to report a complete (i.e. more detailed) financial statement. One of the main advantages of reporting an abbreviated format is its confined preparation time and the fact that it allows firms to protect potentially sensitive information from public scrutiny. Firms can only opt for the abbreviated format if they do not exceed two or more of the following criteria: (*i*) annual turnover < 6,250,000 euro, (*ii*) total assets < 3,125,000 euro and (*iii*) average number of full time employees < 50. If a firm employs more than 100 full time employees on an annual basis it is automatically classified as a large firm, irrespective of its sales or total assets level.[45] However, small or medium-sized firms are free to supply more information than legally required by reporting a complete, i.e. more detailed, financial statement on a voluntary basis.

Complete financial statements differ from abbreviated statements in that they provide more detailed information on a number of financial statement items. With respect to the balance sheet, abbreviated formats provide less detail with respect to financial fixed assets, inventory and contracts in progress, investments and long term debt. The income statement also differs substantially since far less detail is provided on operating costs and expenses; these are summarized together with sales in a gross margin. Further, providing details on sales, purchases of raw materials, services and other goods is optional. Finally, accompanying notes to the financial statement are also restricted to a minimum for abbreviated formats.

Disclosure Proxy

The proxy used in the current study to measure a firm's disclosure policy is a self-constructed measure related to the disclosure of financial statement items. Firms which comply with the minimum requirements to file an abbreviated financial statement but which nevertheless decide to disclose a complete financial statement optionally are labeled as high-disclosure firms. The motivation for using this disclosure proxy is that we analyze disclosure behavior of non-US based and unlisted firms. This restricts

[45] This law is in accordance with the 4th European Directive which defines a Small and Medium-sized Enterprise as a firm that does not exceed two or more of the following criteria: 250 employees, EUR 20 million sales and EUR 10 million total assets. Each European member State is allowed to adopt lower thresholds into their national legislation. Hence, Belgium applies more stringent rules to classify a firm as a large versus small entity. Belgian law also states that if firms belong to a group, the minimum criteria are calculated on a consolidated basis (KB October 8, 1976, art. 12, §2). Portfolio companies of PE investment firms, however, are an important exception to this rule since their business areas are too divergent and therefore do not have to be consolidated. Consequently, portfolio companies of PE backed firms still have the possibility to report an abbreviated financial statement if their individual financial statement figures do not exceed the regulatory minima. Note that the aforementioned criteria and amounts are the current minima and evolved over our observation period. Up to 1991, e.g., annual turnover had to be lower than 145 million Belgian Francs (BEF) and total assets should not exceed 70 million BEF. Between 1991 and 1995, the maximum level for annual turnover was 170 million BEF and for total assets 85 million BEF. From 1996 on, turnover and total assets minima were respectively 200 million BEF and 100 million BEF. Also note that BEF is the former currency of Belgium (before January 1, 2002), with conversion rate: 1 Euro = 40.3399 BEF.

us from making use of standard disclosure measures like AIMR metrics or management forecasts. The metric used in this study is primarily related to the disclosure of financial statement information since alternative measures for disclosures like analyst meetings, conference calls and other professional venues are not applicable for this sample of unlisted firms. Although financial disclosure captures only one aspect of a firm's total disclosure behavior, we are convinced that this disclosure metric is relevant for our research context. Financial statements are one of the most important means by which unlisted firms communicate their business to the outside stakeholders. Moreover, studying financial accounting disclosure is particularly interesting since evidence shows that accounting disclosure is by far the most important issue for professional investors to ground their investment decision. Finally, other metrics for firm disclosure as well as management forecasts and AIMR disclosure scores have also been criticized in that they are evenly unable to capture a firm's total willingness to disclose and are often biased (e.g. Healy and Palepu, 2001).

Since abbreviated financial statements contain far less detail than complete financial statements, external parties are better informed about the firm's underlying business activities and the competitive situation of complete financial statement disclosers. As a result, SME firms that are legally allowed to issue an abbreviated financial statement but which, nevertheless, decide to issue a complete financial statement opt to provide a substantial amount of extra information to outside stakeholders. In the vein of Verecchia's (1983) arguments, we state that firms which report complete financial statements optionally, burden themselves with a substantial proprietary cost since they not only face higher preparation and presentation costs but also because they provide a substantially higher amount of firm details to outsiders which might harm their competitive position. Therefore, SME firms are thought to disclose complete financial statements based on the trade-off between the increase in proprietary costs and the intrinsic benefits inherent to this improved disclosure. Given that firms which are seeking for outside PE financing are typically cash constrained, we expect a higher willingness to disclose additional financial statement information, even if this disclosure is harmful for their competitive position.[46]

A concern, often overlooked in disclosure studies, is whether the disclosure act is a commitment to a higher disclosure policy rather than an *ad hoc* decision to disclose, which might be reversed if a firm feels the need to do so (Diamond and Verecchia (1991), Leuz and Verecchia (2000)). A commitment to a higher disclosure level yields higher economic benefits than a conditional disclosure decision since a consistently high disclosure policy has more information content. A firm's decision to disclose a complete financial statement generates switches in a firm's accounting system but could be reversed at a later time. However, we are convinced that by adopting a more complex and elaborated financial reporting strategy, firms build substantial financial expertise and know-how which is not likely to be reversed. Consequently, we expect and also find that this switch to a higher disclosure strategy causes a change in the firm's financial reporting attitude and professionalism and is a valuable proxy for a firm's disclosure commitment. [47]

Data and Descriptives

The Sample

All analyses are run on a hand-collected database with financial and non-financial data of Belgian PE backed companies that received PE financing for the first time in their history over the period 1985 to 1999. Deals were identified by consulting PE investment reports and press releases, while financial

[46] To some extent, our study empirically tests an extension of the feedback effect equilibrium model, developed by Bhattacharya and Ritter (1983). These authors develop a model in which asymmetrically informed agents are motivated to communicate their private information to a subset of uninformed agents, but can only do this through channels which convey directly useful information to competitors. Their model is drawn in a setting where firms have high RandD spending and need to raise financing but can only do this by reducing their informational advantage, i.e. by disclosing technological information publicly. In our setting, sample firms also have to decide on the amount of disclosed information which can be useful for competitors (e.g. sales levels, cost structures, etc.). However, the disclosure we measure is entirely financial and does not convey information on any technological advantage.

[47] From those firms that switch to a higher disclosure strategy, about 95% stick to this complete financial statement reporting strategy in later years. This finding confirms our argument that a switch to a complete financial reporting is not likely to be reversed in a later stage and is a suitable proxy for a firm's disclosure commitment.

statements of the sample firms were retrieved from the financial statement information database of the National Bank of Belgium and 'Belfirst'®, a Bureau Van Dijk database. Next to the financial statements, we identified the PE investor identity and the exact date of the initial PE investment. To be included in this sample, portfolio companies have to be independent firms of which the financial statements are recorded on a regular basis in the database of the National Bank of Belgium. Further, financial and holding companies are excluded because of their highly specific nature and their industry-specific reporting requirements. This selection procedure results in a sample of 556 PE backed firms, representing nearly 40% of all PE investments in Belgium over the observed period.

To provide a basis for comparison, we selected a comparable sample of companies that did not receive PE, a method consistent with related studies in the field. Following Megginson and Weiss (1991), Jain and Kini (1995) and Lerner (1999), each PE backed company is matched as closely as possible with a non-PE backed independent firm on three criteria in the pre-investment year: (*i*) activity – measured by a two digit sector code –, (*ii*) size – proxied by total assets – and (*iii*) age.[48] For firms which received PE funding in the start-up year, the matching year was set equal to the first year in which the financial statement data become available, typically being the investment year.

We focus on a sample firms' disclosure policies in the years around the PE financing event. These are the years of interest to study the effect of signaling, increased monitoring and changing professionalization on the portfolio firm's disclosure policy. We therefore focus our analyses on a time window of 3 years before until 5 years after the PE financing year. Since not all firms have information available from (*t*-3), e.g. because they were not operational at that time, and not all firms report information until (*t*+5) since firms can go bankrupt or merge with another firm, the sample is an unbalanced panel with maximally 9 years of consecutive data for each firm.

To test our hypotheses, we concentrate on those firm-years in which firms comply with the requirements to report an abbreviated financial statement but are nevertheless free to provide a complete financial statement optionally. If a company discloses a complete financial statement although legally an abbreviated format is sufficient, it is labeled as a high disclosure firm since this firm is willing to carry the costs stemming from the increased disclosure in exchange for the alleged economic benefits. Hence, we leave out all firm-years from the initial dataset for which companies exceed the minimum requirements and consequently are legally obliged to report a complete financial statement, since these are not the focus of our research. This results in a substantial reduction in the number of observations in the analysis. E.g. in the year of PE financing, we find that approximately 33% of the initially identified PE firms exceed the legal requirements to report an abbreviated financial statement. Panel A of Table 1 shows a breakdown for the PE financing year on the number of available firm-observations in our PE backed and matched sample. Panel B additionally provides descriptive statistics on sample and matched firms' in the PE financing year.

< Insert Table 1 about here >

Table 1 shows a breakdown of the available firm-observations both for the PE backed and non-PE backed matched sample. We summarize the results of our search in the PE financing year in Panel A. From the initially detected PE backed and matched sample, we have financial statement information of 876 firms (438 PE backed and 438 non-PE backed matched firms). Missing variables with respect to one or more of the reported minimum criteria limits us to 745 firms for which we can calculate whether a firm is allowed to report an abbreviated financial statement or whether firms are legally obliged to report a complete financial statement. Of these 745 firms, 336 are PE backed and 409 are non-PE backed. For 302 firms (146 PE backed and 156 non-PE backed), firm characteristics exceed two or more of the minimum requirements in the year of interest. Hence, these firms are obliged to report a complete financial statement, which makes that only 443 firms (190 PE backed and 253 non-PE backed) are, according to the law, allowed to report an abbreviated format. We focus our analyses on these firm observations since

[48] One can be doubtful that these matching criteria are sufficient to find a proper match for each PE backed firms and that they might be insufficient to make sure that a PE firm and its matched equivalent are indeed proper matches. One potential problem that might arise from this incomplete matching is that our multivariate panel regression results are impacted by a self-selection problem, as mentioned in Heckman (1979). In response to this problem, we run two-stage equation models to capture these treatment effects (Greene, 1997) of which the results are reported in the sensitivity analyses.

these are the firms that have the option to freely commit to a higher disclosure policy. We have calculated and computed the number of available observations in each firm-year in an identical way, leading to a variable number of observations across all years, in each sample.

Panel B shows that in the year of PE-financing, sample and control firms are on average 9.60 years old, whereas the median age is 6.00 years. Mean (median) total assets are 1,557,752 (1,014,479) EUR. Top three sectors are (1) computer related services (22.3%), (2) wholesale distribution (19.4%) and (3) building services (7.7%). Testing the differences in means (medians) between both the PE backed and the non-PE backed sample shows that in the year of PE financing, both sets are similar with respect to age and sector distribution but that PE backed firms are on average larger than non-PE backed firms.[49] Moreover, we find that the mean leverage is 67.6% and does not differ significantly between PE backed and matched firms. By contrast, PE backed firms are less profitable and have more fixed assets at their disposal than non-PE backed matched firms, and this both in a significant way.

Variable Selection

In what follows, we describe the variables used in the analyses and the way they are defined and collated. We identify variables that are related to the PE investment and its associated change in corporate governance next to additional firm-specific determinants of corporate disclosures which are often identified in the extant literature. The variable of interest, HIGHDISC, is a binary variable taking a value of 1 when a firm discloses a complete financial statement although legally an abbreviated format is sufficient. PE is a binary variable taking the value of one if a firm receives PE and is activated both in the pre- and post-investment years. PE_{post} is an interaction variable which is equal to one for PE backed firms, but only from the moment the firm receives PE financing and is zero otherwise. This variable measures the additional impact of PE investor's monitoring pressure on the firm's compliance to disclose complete financial statements. PE_{year-3} and PE_{year-2} are interaction variables used in the multivariate analyses. These variables are activated for PE backed firms three and two years prior to PE financing, respectively. Combinations of the interaction variables PE, PE_{year-3}, PE_{year-2} and PE_{post} allows to disentangle the differences in firms' willingness to disclose, both in the pre- and post-investment years, dependent on the incidence of being PE backed. GOVERNMENT is a dummy variable that is activated when a PE portfolio firm is backed by a government-related instance. We multiply this variable with PE and PE_{post} to measure differences in firms' disclosure policy – again both in the pre- and post PE financing period – depending on PE investor type (i.e. government versus non-government related PE investors). All the aforementioned variables allow us to untie the impact of (*i*) the entrepreneurial attempts to catch potential PE investors' attention by means of increased public disclosure in the pre-financing period and *(ii)* the monitoring and professionalization effect PE investors have on their portfolio firms' disclosure policy once these have invested.

We further incorporate firm-specific variables, previously identified as determinants of corporate disclosure behavior. LNAGE is the natural logarithm of a firm's age and is expected to be negatively related to a firm's decision to disclose (Raffournier (1995), Ho and Wong (2001)) since information asymmetries are typically higher in younger firms and might call for a higher disclosure extent. LEVERAGE is defined as (Total Liabilities/Total Assets) and quantifies a firm's solvency situation: a high leverage corresponds to having larger volumes of outstanding liabilities. High leverage levels are expected to substitute the need for additional disclosure since leverage helps controlling the free cash flow problem and the agency costs of debt are typically controlled through restrictive debt covenants rather than increased disclosure of information in annual reports (Jensen (1986)). FIXASSETS measures the proportion of a firm's fixed assets to total assets. Consistent with previous studies (Leftwich, Watts and Zimmerman (1981), Ho and Wong (2001)), we expect FIXASSETS to be negatively related to the voluntary disclosure proxy. A higher proportion of fixed assets is associated with less information asymmetry and consequently with a lower risk profile. XORDINC is a dummy variable taking the value of 1 when a firm's extraordinary income is higher than 25% of its current income level. Firms with a high

[49] Although the initial matching criteria worked well to identify a sample of non-PE backed firms that is comparable to the PE backed sample with respect to age, sector classification and size, the additional conditioning on complete financial statements and the fact that some firms have missing information with respect to the variables of interest causes these differences with respect to the average size in the samples of interest.

extraordinary component in reported income are associated with more uncertainty calling for a positive association between XORDINC and HIGHDISC. Moreover, extraordinary items often impact the balance sheet and as such might also require a more detailed balance sheet (Chen, DeFond and Park (2002)).[50] Finally, LOSS is a dummy variable taking the value of 1 when a firm reports a loss. Loss-making firms are potentially more risky than profitable firms and are as such potentially more compelled to disclose complete financial statements above the regulatory minima. Table 2 summarizes the definition and measurement of all variables used in the analyses and their expected relation with our disclosure variable.[51]

< Insert Table 2 about here >

Analyses

Univariate Results

Table 3 shows a breakdown of the total number of firm observations available in each year around the PE financing event as well as the absolute and relative number of high disclosure firm-year observations. The proportional evolution of high disclosure firms within the PE backed sample and the matched sample is further illustrated in Figure 1.

< Insert Table 3 and Figure 1 about here >

The number of available firm-year observations varies between a minimum of 128 (115) and a maximum of 285 (234) in the non-PE backed sample (PE backed sample). The total number of observations increases over time and reaches a maximum two years after the PE financing in both subsamples. This is due to the average age of the analyzed firms: a breakdown of the sample firms' age shows that about one third of the firms are younger than 2 years at the time of PE financing leading to an underrepresentation of firm-years in the pre-PE financing years compared to post-years.

In the non-PE backed sample, the average number of high disclosers remains constant over the observation period, exactly as we expected. On average, 14.9% of all non-PE backed firms disclose more information than legally required. By contrast the mean proportion of high disclosure firms in the PE backed sample is 27.6% and is significantly higher ($c^2=5.99$) than the percentage within the non-PE backed sample. For the PE sample firms, the average percentage of high disclosers in the period before the PE financing date differs significantly ($c^2=4.41$) from the percentage in the post-financing period: 17.3% versus 31.3%.

The proportional differences per year across both samples show interesting patterns. Whereas the percentage of high disclosures for PE backed firms rises from 15.7% in (t-3) over 23.7% in the year of PE financing to a maximum of 36.6% in year (t+5), the proportion in the non-PE sample remains fairly stable around its mean level (14.9%). Univariate test statistics show that the average proportion of high disclosers is significantly higher for the PE backed subsample than for the matched sample one year before the PE financing (at the 90% confidence level) and intensifies further from the PE financing year onwards. These univariate results indicate that (i) PE backed firms switch to a higher disclosure level in the pre-PE financing year and (ii) PE investors' involvement further impacts the disclosure policy of their portfolio companies positively. Conditioning the sample for government versus non-government PE

[50] In unreported analyses, we also created dummies which were respectively activated when a firm's extraordinary income is higher than 10% and 50% of current profit levels. All results remain stable with respect to these refinements.

[51] Often, disclosure studies also control for a firm's size and proxy this variable by (the natural logarithm of) a firm's market value or by (the natural logarithm of) total assets. However, we do not possess data on the individual firms' market value since we study data of unlisted firms. Moreover, controlling for size by looking at the firm's total assets is inappropriate in this setting given that total assets is one of the three identifiable elements which determine whether or not a firm is obliged to report a complete financial statement (see Section about the disclosure proxy (3.2)). As a consequence, we opt not to incorporate a size variable in our analyses.

backed portfolio firms shows no significant differences, suggesting no systematic impact of investor type on PE investors' disclosure policy at this level.[52]

However, these findings have to be interpreted with the necessary caution because they do not control for differences in firm characteristics. Table 4 shows descriptive statistics for the variables of interest in our total sample. Panel A reports cross-tables and c^2-statistics for high and low disclosure firms differentiating on (*i*) being PE backed, (*ii*) reporting a substantial extraordinary income (above 25% of current profit) and (*iii*) reporting a loss. In contrast to our expectations, high disclosure firms are proportionally underrepresented in the sample with high levels of extraordinary income. Differentiating for firms reporting losses versus profits does not yield significantly different patterns between the high and low disclosure subsample.

Panel B provides descriptive statistics on the continuous variables of interest and *t*-test and Mann-Whitney test statistics indicating the difference in means (medians) between high disclosure versus low disclosure firms. Results show that younger firms tend to disclose more, a finding in line with the postulation that younger firms are more risky and as such are more inclined to reduce information asymmetry problems by increased disclosure. Further, high disclosure firms have a significantly lower leverage compared to low disclosure firms, a finding consistent with the Jensen-type (1986) argument. We do not find significant differences in fixed assets between high and low disclosure firms.

Finally, Panel C of Table 3 presents Pearson and Spearman correlations between the variable of interest (HIGHDISC) and the continuous explanatory variables. All relations between HIGHDISC and the other variables are in line with the above results. Further, correlations between the independent variables are often significant but fairly small and suggest no collinearity problems in the multivariate analyses.

< Iinsert Table 4 about here >

Disclosure Model and Multivariate Results

In this section, we apply pooled panel logit regressions to examine the dynamic relationship between a firm's disclosure policy, the change in corporate governance and professionalism driven by PE investors' presence, together with other firm-specific characteristics. To digress briefly on this methodology, panel data techniques combine cross-sectional and time-series characteristics in an optimal model and control for individual heterogeneity across firms, collinearity among the variables and firms dynamics over time (Baltagi (2001)). Further, panel data analyses allow to capture firms' economics of adjustment to a specific state – here: disclosure policy – and suffer less from biases resulting from aggregation (Greene (1997), Baltagi (2001)). Given the binary structure of our dependent variable, a panel logit is the most appropriate method of analysis.

We model a firm's decisions to disclose as a function of receiving PE, both in the pre- and post-financing years, together with other cross-sectional determinants identified in the extant disclosure literature and also described above. Our initial panel logit model has the following form:

$$HIGHDISC_{it} = a + b_{1it}.PE + b_{2it}.PE_{post} + g'_{it}.CONTROL\ VARIABLES + U_{it} \quad (1$$

We model to what extent a firm's decision to disclose complete financial statements is related to receiving PE financing and condition our analyses for pre-financing years (b_1) and post-financing years ($b_1 + b_2$). Further, we incorporate control variables which we described above (Table 2). Results of this panel logit are reported in the first column of Table 5.

< Insert Table 5 about here >

[52] With respect to commitment to a higher disclosure policy, we already mentioned that of those firms that switch to a higher disclosure strategy in the pre-financing years, most firms stick to this high disclosure level. From the 43 firms that were identified reporting a complete financial statement from the pre-financing years onwards, only 3 reverse this high disclosure strategy in a later stage. This provides evidence that the analyzed disclosure strategy is to be interpreted as a persistent commitment to higher disclosure, and hence is expected to lead to higher economic benefits than an occasional switch.

Results show clear evidence in line with the findings of the bivariate analyses. In the pre-financing years, PE backed firms have a significantly higher probability of being a high disclosure firm (b_1 = 1.24). This probability increases strongly from the PE financing year onwards as b_2 = 2.28, leading to a compound coefficient in the post-PE financing years compared to non-PE backed firm-years of 3.52. These coefficients indicate that, prior to the PE financing, PE backed firms have about 21% higher likelihood of being a high disclosure firm compared to non-PE backed matches, and an additional 67% increase in probability once the PE financing has taken place. [53] Further, we find that both younger firms and low-leverage firms have a higher probability of being in the high disclosure sample. Both findings are in line with our expectations and the bivariate results. None of the other control variables are significant.

Since we are particularly interested in the difference in disclosure policy between PE backed and non-PE backed firms very close to the PE-financing date, we additionally incorporate two year dummies (PE_{year-3} and PE_{year-2}) in our model. Including these dummies allows to distinguish differences in disclosure behavior between PE backed and non-PE backed firms one year before the PE financing compared to earlier pre-financing years and compared to post-financing years. Model (2) shows this relation:

$$HIGHDISC_{it} = a + b_{1it}.PE + b_{2it}.PE_{year-3} + b_{3it}.PE_{year-2} + b_{4it}.PE_{post} + g'_{it}.CONTROL\ VARIABLES + \quad (2$$

The results of the second column of Table 4 show the significantly higher tendency to report complete financial statements one year prior to the PE financing (b_1 = 1.92). We find no relation between a firm's disclosure policy and being three or two years before its PE financing date: as well ($b_1 + b_2$) and ($b_1 + b_3$) are insignificantly different from zero. Further, the additional disclosure effect for PE backed firms in the post-financing years remains high and significant (b_4 = 1.60). With respect to the control variables, all coefficients and significance levels are similar to those of the first model.

Results of both models provide clear evidence in line with our expectations. PE backed firms switch to a higher disclosure policy in the pre-financing year and we interpret this behavior as an attempt to reduce information asymmetries inherent to this PE application. Moreover, we find multivariate evidence that the likelihood to provide complete financial statements is even higher from the moment PE investors have invested in the portfolio firm. This finding is a clear indication that the intensified corporate governance and increased professionalization resulting from the PE investors' presence has a complementary effect on the supply of the accounting disclosure of their portfolio firms.

In a third model, we sort out differences in disclosure policy by conditioning the data on investor type (government versus non-government PE backed) after controlling for intrinsic company characteristics. To retrieve potential differences between firms backed by different investor types, we extend model (1) by adding two dummy variables. Both interaction variables control for government relations. The first dummy is activated when a firm is backed by a government-related PE provider, both in the pre- and post-financing period (= Government_PE). The second dummy is activated from the moment a firm receives government-related PE onwards (= $Government\_PE_{post}$), and is zero otherwise. Incorporating these additional dummies allows to disentangle the incremental effects of investor types (government versus non-government related) on their portfolio firm's disclosure policy, conditioning for different subperiods. Again, we incorporate the same control variables as above:

$$HIGHDISC_{it} = a + b_{1it}.PE + b_{2it}.PE_{post} + b_{3it}.Government\_PE + b_{4it}.Government\_PE_{post} + g'_{it}.CONTROL\ VARIABLES + U_{it} \quad (3$$

[53] This increase in probability is calculated as follows: the initial proportion between high disclosure firms (= firms that report a complete financial statement) and firms that follow the legal requirements (= report an abbreviated format) is (720/3,494) = 0.206. The logit coefficient on PE (β_1) = 1.244 and corresponds to an odds ratio of $e^{1.244}$ = 3.469. Multiplying the initial proportion 0.206 with this calculated odds ratio conducts a new odds of 0.715. Since the odds is the probability divided by the non-probability, we obtain the following equation: x/(1-x) = 0.715 or x = 0.417. This means that for each PE backed observation the probability of being in the high disclosure sample = 41.7%. This corresponds to an increase of (41.7% – 20.6%) = 21.1%. For the coefficient on PE_{post}, one can perform an identical calculation to estimate the increase in probability.

Column 3 of Table 5 shows a significantly positive effect on disclosure in the pre-PE financing period within the government PE backed firms (b_3 = 2.75) which is not present in the non-government PE backed sample. Although this shows that government PE backed firms disclose more in the pre-financing years compared to non-government PE backed firms, the difference in disclosure post PE financing date between both samples is not significantly different from zero. The combined effect of (b_3 + b_4) shows that, after the PE financing date, the total difference in disclosure extent between government and non-government PE backed firms is not significantly different from zero. This suggests that investor type has no overall impact on their portfolio companies' disclosure policy ex post. Hence, these multivariate findings do not corroborate our postulation that a PE portfolio firm's disclosure policy is related to the characteristics of the investor type. By contrast, it suggests that entrepreneurs trace different PE investor parties and do not adjust their disclosure policy in function of the investor type. As such, we find that for this sample of unlisted PE backed firms, the well-documented difference in governance and professionalization between PE investors has no sizeable effects on the way financial statement disclosure of their portfolio companies is enforced.

Sensitivity Analyses

In subsequent sensitivity analyses, we additionally control for elements which could – at least partially – drive our results. Since both the number of observations and some characteristics of PE backed and control firms differ after selection of firm-years where firms are free to report an abbreviated financial statement could make us concerned about the comparability of these samples. We therefore dealt with this matching issue in more detail and identified a perfect match sample where firm-year observations were only included in the analysis if each firm has a matched observation available for the same firm-year of the control sample. This more stringent matching method has the advantage that there is a matched equivalent available for each PE backed firm in the control sample and gives more confidence about the comparability of the observations across both samples over different firm-years. The analyses were rerun for this perfect matched sample and all patterns and results remain qualitatively equal. [54]

Additionally, we controlled for the inevitable endogeneity problem that is encountered when comparing PE backed firms with a set of matched firms. Although PE backed firms and their counterparts are matched as closely as possible in the pre-financing year (or the financing year if the company receives PE in the start up year), PE backed firms could still differ substantially from the matched firms due to intrinsic characteristics that are not controlled for in the analysis which might drive our findings. This endogeneity problem is often encountered in disclosure studies and is typically addressed by running two-stage equation models which take into account this kind of self-selection. We run two yearly logits for both the pre-financing and the financing year in which we specify the disclosure policy as a function of being PE backed and the same firm-specific characteristics used in the pooled panel logits. Focusing on these two years is important because these are the years where matching took place, which make them prone to potential uncontrolled selection bias.

In a next step, we estimate two-stage Heckman corrected logit models for these firm-years and compare the regression coefficients. In the two-stage logits, we first model the decision to attract PE as a function of a company's (asset and gross margin) growth, investment intensity, profitability and the total amount of free cash available. All the aforementioned variables could differ potentially between the both samples and as such might disturb the findings when we do not control for them. In a second step, these intrinsic differences between PE backed and non-PE backed firms are integrated in our initial estimation model to capture the effect of being PE backed. Results are discussed in more detail in Appendix 1 and show that controlling for the aforementioned firm characteristics which are not captured by the matching criteria, does not yield different results than for the uncontrolled yearly logits. These findings comfort us that our results are not substantially biased by the endogeneity present in our sample.

[54] However, since the observations are matched in the (pre-)financing year, obtaining a perfectly matched observation per year is not necessarily our main concern. Differences in growth patterns and financial reporting policy are specific elements which make this dataset particularly attractive to analyze. Eliminating those firm-year observations for which no perfect match is available, inevitably also eliminates a substantial amount of useful information on sample and control firm characteristics and yields a substantially lower number of observations to be used in the analyses. For these reasons, we choose to report the results of the unconditioned samples in our main analyses.

Conclusion and Discussion

Analytical disclosure studies present several arguments why a firm's disclosure policy and its corporate governance system in-place are thought to be related. Empirical studies, however, often show mixed results most likely since both corporate governance and disclosure are measured by noisy proxies. The current study tries to overcome these shortcomings by studying corporate disclosure policies in a specific setting, namely around the private equity (PE) financing event. Studying a firm's disclosure policy in relation to PE financing has the advantage that we do not have to rely on noisy proxies for changes in corporate governance structure since the analyzed firms experience an indisputable and perfectly identifiable change in their corporate environment. As such, this study not only complements accounting research by analyzing determinants of a firm's disclosure policy in relation with a changing corporate governance system in-place but also entrepreneurial finance research since this often treats the corporate reporting environment as exogenous.

More specifically, this study analyzes the disclosure policy of companies financed by PE investors, both before and after the PE investment, and compares it with the disclosure policy of matched non-PE backed firms. The disclosure policy is defined as the choice whether or not to disclose complete financial statements (which contain more details on sales levels and costs structures, amongst others) rather than abbreviated financial statements when possible. Reporting complete financial statements burdens a company with substantial proprietary costs inherent to the increased disclosure, making this a suitable proxy to measure unlisted firms' disclosure behavior. Analyses are run on a unique hand-collected sample of Belgian unlisted, PE backed firms in the years around the PE financing event. The specific legal environment and PE industry characteristics in Belgium make it particularly suitable to conduct this study. All Belgian firms, both listed and unlisted, have to report financial statements. This creates a possibility to study the impact of changes in ownership structure, corporate governance and professionalization patterns resulting from the PE investment on a firm's disclosure policy even when this firm is not listed on a stock exchange. Moreover, since about half of all PE investments come from public PE investment funds, these data shed more light on the impact of investor type on disclosure policies of portfolio firms. Studying the disclosure behavior longitudinally overcomes the often ignored feature that disclosure depends on a firm's changing environment or economics.

We find clear evidence that firms switch to a higher disclosure policy one year before they receive PE. This increase in disclosure is interpreted as an entrepreneurial attempt to reduce the information asymmetries inherent to the PE application. The commitment to this high disclosure is further intensified from the PE investment date onwards, suggesting a governance and professionalization impact of PE investors on their portfolio firm's financial reporting behavior. Conditioning the sample on differences in investor type shows that, after the PE financing date, portfolio firms' disclosure behavior does not differ systematically between government PE backed and non-government PE backed firms. However, government PE backed firms do show an earlier switch to a higher disclosure level. This finding might be attributed to a longer search-for-equity period for these firms. Firms that receive government-related PE financing could initially have tried to attract non-government PE investors hereby providing more financial disclosure, but in the end failed to do so. In a later stage, these firms might have to resort to lower quality PE investors, typically being the government-related instances. However, the rather low number of observations prior to the PE finance for the non-government backed firms makes it hard to provide sound proof for this argument and needs to be corroborated by further research. Our results are robust for a number of additional sensitivity checks, including the endogeneity problem present in our sample. In general, the evidence is consistent with the conjecture that there exists a clear link between a firm's disclosure behavior and its changing corporate environment caused by the PE investment.

Our findings might, nevertheless, be subject to some caveats. We do not have specific information on the (stipulations in) contracts between the firms and their PE investors nor with other external parties like banks and creditors. As such, existing (debt) contracts could contain explicit stipulations about financial reporting policies, making the analyzed disclosure behavior less discretionary than a priori assumed. By dissecting these contracts, one could discern more precisely to what extent the increased disclosure is a consequence of the increased monitoring or rather a pure professionalization outcome. Additionally, the

dataset contains only firms that applied for and actually received PE financing. As such, potential control sample firms could be PE applicants that were unable to attract it. We do not see this as a big issue since it could only underestimate our results making the current relations even stronger than they are now. We encourage other researchers to examine other institutional settings and to relate the disclosure behavior to contractual stipulations. This could shed more light on the interrelationship between PE monitoring and professionalization impulses on a portfolio firm's disclosure policy.

These results have important implications for several economic parties. Entrepreneurs can learn from this that financial disclosure is an important issue in PE screening and governance. Increased governance resulting from PE investor involvement and synergies coming from PE in-house skills make portfolio firms more likely to commit to a high disclosure strategy. Further, these results are also important for other stakeholders of PE backed companies like banks, competitors, employees or suppliers that actively make use of PE firm financial statements. PE investors affect the professionalization of their portfolio firms' financial reporting in that they contribute to a higher disclosure, making financial statements substantially more informative for external stakeholders.

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Appendices

APPENDIX 1
Year-Logits and Two-Stage Treatment Logits in Pre-Financing and Financing Year

Dependent = Disclosure (1, 0)	Year$_{-1}$				Year$_0$			
	Test Logit		Treatment Logit		Test Logit		Treatment Logit	
Variable	*Coeff*	*z*	*Coeff*	*z*	*Coeff*	*z*	*Coeff*	*z*
PE	0.574	2.00†	–	–	0.684	2.59†	–	–
LNAGE	0.040	0.20	0.058	0.57	–0.195	–1.18	0.213	1.53
FIXASSETS	–0.501	–0.90	–0.287	–0.86	0.545	1.14	0.668	1.46
LEVERAGE	–0.994	–1.81*	–1.019	–1.85*	–1.025	–2.09†	–0.659	–1.87*
XORDINC	–0.114	–0.28	–0.126	–0.68	–0.691	–1.40	–0.824	–1.20
LOSS	0.149	0.49	0.002	0.02	–0.079	–0.29	0.028	0.13
Constant	–1.194	–1.73*	–0.907	–2.49†	–1.131	–2.05†	–0.765	–1.09
r (Test, Treatment)			–0.909					–0.06
			–0.909					
Wald test of *r* =0			2.47					0.04
			2.47					
No. of observations			360			442		416
376								
			Selection Logit				Selection Logit	
Dependent = PE (1,0)			(Year–*1*)				(Year*0*)	
			Year-1	Year–*1*				
			Coeff	*z*			*Coeff*	*z*
? (Total Assets) Growth			–0.000	–0.01			0.458	3.70‡
Investments/TA			0.005	0.01			0.907	1.78†
? (Gross Margin)			–0.033	–1.45			0.030	2.84‡
Accumulated Profit/TA			–1.863	–3.26‡			–2.384	–2.38†
Cash Reserves/TA			–1.954	–2.08†			–1.794	–2.47†
Constant			0.103	1.14			–0.265	–2.68‡

This table presents the results of two yearly cross-sectional logits, one in the pre-financing year (t–*1*) and one in the year of PE financing (t*0*). The dependent variable is a dummy variable taking the value of one if a firm discloses a complete financial statement and zero otherwise. These yearly cross-sectional logit regressions show the relations between the decision to disclose complete financial statements and the propensity of being PE backed together with firm-specific variables in both matching years. Although PE backed firms and their counterparts are matched as closely as possible by size, age and sector industry in the pre-financing year (or the financing year if the company receives PE in the start up year), PE backed firms could still differ substantially from the matched firms due to intrinsic characteristics that are not controlled for in the uni- and multivariate analyses and might drive our findings.

We address this potential endogeneity problem by additionally running two-equation models which take into account this kind of self-selection. If the correlation between the error terms of the uncorrected logit (Test Logit) and the two-stage logit (Treatment Logit) is low, we can be confident that our uncorrected model is not harmed by potential endogeneity present in the sample. In this two-step Treatment Logit, we first model the PE application as a function of a firm's (*i*) ? (Total Assets): (year-on-year asset growth,

relative to last year's assets), (*ii*) Investments intensity (investment in tangible and intangible assets as a percentage of total assets), ? (Gross margin) (= year-on-year change in gross margin, being a proxy for sales levels, as a fraction of last year's gross margin figure), Accumulated profits (profits accumulated into retained earnings, expressed as a fraction of last year's assets) and the extent of Cash reserves (year-end cash situation as a percentage of last year's total assets). These specific variables are used in our selection model, since anecdotal and empirical evidence shows that these variables well capture uncontrolled differences in PE backed and non-PE backed firms. Robbie and Wright (1998) and Gompers and Lerner (2001), amongst others, report that PE backed firms typically have a higher growth pattern and investment (needs), are less profitable and are most often cash constrained.

In a second step, these intrinsic differences between PE backed and non-PE backed firms are integrated in our initial estimation model to capture the effect of being PE backed. Wald χ^2 statistics indicate that both in the pre-financing year and the financing year itself the error terms between the uncorrected (Test) Logit and the Treatment Logit, controlling for endogeneity, are unrelated. This evidence suggests that although self-selection is present in our sample, it is not driving our results substantially. The coefficients of most control variables, however, are rather insignificant. We are not concerned about this finding since we loose a substantial amount of information by running these logits on a yearly basis instead of using the entire panel. The main reason for running these logits is to control for self-selection bias. Note that the number of observations in the Treatment Logits are lower than in the Test Logits due to missing data with respect to the additional variables needed to calculate the Selection Logits. Note that * = significant at the 10% confidence level, † = significant at the 5% confidence level, ‡ = significant at the 1% confidence level.

Tables, charts and graphs

TABLE 1 - Breakdown of Available Observations (Panel A) and Descriptives of Variables of Interest in the PE Financing Year (Panel B)

Panel A [(a)]

		All	PE backed	Non-PE backed
Number of firm-observations for which financial statement data are available		876	438	438
–	Firm-observations with missing information on one or more of the criteria	(131)	(102)	(29)
=		745	336	409
–	Firm-observations which exceed regulatory minima	(302)	(146)	(156)
=	Firm-observations of interest	443	190	253

Panel B [(b)]

		Mean	*Median*	*Minimum*	*Maximum*	*Stdev.*	*N*
Age							
	All	9.59	6.00	0.00	91.00	10.9	443
	PE	9.90	6.00	0.00	71.00	10.8	190
	Non-PE	9.36	5.00	0.00	91.00	11.0	253
Total Assets							
	All	1,557,752	1,014,479‡	24,021	23,472,443	2,107,599	443
	PE	1,884,893	1,346,062	26,549	18,089,262	2,054,792	190
	Non-PE	1,312,073	797,201	24,021	23,472,443	2,117,349	253
Fixed Assets (%)							
	All	37.20†	34.04‡	0.00	98.83	27.01	443
	PE	40.23	39.79	0.00	97.46	25.52	190
	Non-PE	34.97	27.23	0.00	98.83	28.01	253
Leverage (%)							
	All	67.64	71.70	0.51	263.42	28.01	443
	PE	68.95	71.83	0.51	263.42	27.98	190
	Non-PE	66.48	71.53	1.32	201.13	28.00	253
Return on Assets (%)							
	All	–0.82‡	0.74‡	–174.95	109.82	17.43	443
	PE	–4.28	0.19	–174.95	109.82	22.33	190
	Non-PE	1.78	1.52	–63.28	54.21	11.87	253

Top 3 Sectors	(1)	Computer Services:	22.3 %
	(2)	Wholesale Distribution:	19.4 %
	(3)	Building Services:	7.7 %

[(a)] Panel A of Table 1 gives a breakdown of the number of available firm-observations both for the PE backed and non-PE backed matched sample in the PE financing year.

[(b)] Panel B provides descriptive statistics on some characteristics of our PE backed and matched sample firms, as well as differences in means (medians) between both samples. Age is the number of years since the firm has been set up. Total assets is the absolute amount of total assets outstanding at the fiscal year-end, expressed in Euro

(EUR). Fixed Assets is the relative proportion of fixed assets to total assets. Leverage is the proportion of a firm's Total Liabilities to Total Assets. Return on Assets refers to the profitability of the sample firms and equals a firm's fiscal earnings divided by total assets. Top 3 sectors refer to the 2-digit activity codes that are represented most in our sample. Asterisks mean that the means (medians) of the two groups are significantly different using a two-tailed t-test (Mann-Whitney U test), *: $p < 0.10$, †: $p < 0.05$, ‡: $p < 0.01$.

TABLE 2 - Definition, measurement and expected sign of variables of interest [(a)]

Variable	**Definition**	**Measurement**	*Expected Sign*
HIGHDISC	Voluntary Disclosure Dummy	Binary variable, taking the value of 1 when a firm reports a complete financial statement although legally an abbreviated format is sufficient	/
PE	Private Equity Dummy	Dummy variable, taking the value of 1 when a firm is PE backed; this dummy is activated both in the pre- and post-investment years	+
PE_{post}	PE * Post-investment dummy	Dummy variable, taking the value of 1 from the moment a firm is PE backed, 0 otherwise	+
PE_{year-3}	PE * Year–*3*	Dummy variable, activated three years before the PE financing date	–
PE_{year-2}	PE * Year–*2*	Dummy variable, activated two years before the PE financing date	–
GOVERNMENT	Government dummy	Interaction variable; captures the effect of investor type on a firm's disclosure policy. 1 = Government Backed, 0 = Non-Government Backed	–
LNAGE	Age variable	Natural logarithm of the number of years since foundation	–
LEVERAGE	Leverage	(Total Liabilities/Total Assets): controls for a firm's debt obligation	–
FIXASSETS	Fixed Assets in Place	Firms' fixed assets as a proportion of total assets	–
XORDINC	Extra-ordinary items dummy	Dummy variable taking the value of 1 when extra-ordinary income exceeds 25% of current profit	+
LOSS	Loss Dummy	Binary variable taking the value of 1 when a firm reports a loss before taxes, zero otherwise	+

[(a)] This table gives an overview of all variables of interest analyzed in the univariate and multivariate analyses. The dependent variable HIGHDISC is analyzed as a function of pre- and post-PE financing variables to capture the willingness of firms that apply for and receive PE financing to disclose a complete financial statement, both in the pre- and post-PE financing years. Additionally, GOVERNMENT is a dummy variable which is activated if the PE investor is a government-related firm. LNAGE is the natural logarithm of a firm's age and controls for uncertainty and information-asymmetry problems. LEVERAGE measures the amount of a firm's Total Liabilities to Total Assets. FIXASSETS is the proportion of Fixed Assets to Total Assets and is expected to be negatively related to a firm's disclosure behavior. Further, XORDINC (a dummy variable activated when a firm reports an extraordinary income above 25% of its current profit) and LOSS (a dummy variable activated when a firm reports a loss) are two additional controls for the inherent risks of a firm.

TABLE 3 - Evolution of High Disclosure Firms Per Subsample:
([1] Non-PE Backed versus PE Backed and [2] Government versus Non-Government PE Backed) [(a)]

	Non-PE backed			*PE backed*			*Government PE backed*			c^2	c^2
Year	*N* all	*N* Highdisc	*%* Highdisc	*N* all	*N* Highdisc	*%* Highdisc	*N* all	*N* Highdisc	*%* Highdisc	*PE versus nonPE*	*GovPE versus Non-GovPE*
–3	128	20	*15.6%*	115	18	*15.7%*	78	14	*17.9%*	*0.00*	*0.72*
–2	146	20	*13.7%*	143	24	*16.8%*	94	19	*20.2%*	*0.39*	*1.69*
–1	202	27	*13.4%*	174	35	*20.1%*	122	23	*18.9%*	*2.21**	*0.26*
0	253	33	*13.0%*	190	45	*23.4%*	134	28	*20.9%*	*5.87*‡	*0.48*
1	281	42	*14.9%*	218	66	*30.3%*	154	44	*28.6%*	*10.83*‡	*0.38*
2	285	42	*14.7%*	234	76	*32.5%*	173	56	*32.4%*	*14.37*‡	*0.00*
3	258	43	*16.7%*	212	70	*33.0%*	158	51	*32.3%*	*10.35*‡	*0.07*
4	206	33	*16.0%*	161	54	*33.5%*	116	41	*35.3%*	*9.34*‡	*0.31*
5	16	27	*16.3%*	123	45	*36.6%*	87	34	*39.1%*	*9.07*‡	*0.38*
Sum	1,924	287		1,570	433		1,116	310			
Mean (t–3; t+5)	214	32	14.9%	174	48	27.6%	124	34	27.8%		
Mean (t–3; t–1)	159	22	14.1%	144	26	17.8%	98	19	19.0%		
Mean (t0; t+5)	241	37	15.2%	190	59	31.3%	137	42	30.9%		

(a) Table 3 reports descriptive evolutions (total number as well as relative percentage) of the total number of firm-year observations for respectively the non-PE backed, PE backed subsample and the government-PE backed subsample. In order to test our hypotheses we focus on those firm-years in which firms comply with the regulatory minima to report an abbreviated financial statement. This additional condition yields an unequal number of firm-year observations across both samples. The focus of our analyses is, however, on those firms that meet the minimum requirements and hence have the choice to report a standard (abbreviated) format or a more detailed (complete) financial statement. Imposing this condition on our data leads to an unequal number of firm-year observations in both samples across years since a specific firm might fulfill the requirements to report an abbreviated format in one year although its matched firm does not (or: no longer) meet these minimum requirements. Further, unequal number of observations in the PE backed and non-PE backed sample are also a result of missing data on one or more elements of the financial statement items to calculate the compliance with the minimum criteria. A breakdown of a perfect match sample (i.e. sample for which a firm-year observation in one subsample was only incorporated in the analysis if its matching firm-year observation was also available – *available on request*) shows a similar pattern. We expect a high and surging number of PE backed firms compared to a rather stable number of non-PE backed firms that report complete financial statements around the PE financing event, since no specific event is taking place for the latter firms. Comparing non-government PE backed firms with government PE backed firms, indicates differences within the PE backed sample, dependent on investor type. For each (sub)sample, the number of firms that report complete financial statements (i.e. commit to a higher level of disclosure than legally required) is shown as a fraction of the total number of available observations. χ^2 test-statistics show differences in high disclosure patterns between (1) the PE backed and non-PE backed subsample and (2) within the PE backed sample, dependent on investor type (i.e. Government PE backed versus Non-Government-PE backed). N_{all} = Total number of observations and $N_{Highdisc}$ = number of high disclosure firms. Note that: * = significant at the 10% confidence level, † = significant at the 5% confidence level, ‡ = significant at the 1% confidence level.

TABLE 4 - Descriptive Statistics for Regression Variables Including Differences in Means and Medians for High Disclosure Firms and Low Disclosure Firms [(a)]

Panel A: Dummy variables

Variable	Sample	$N_{HIGHDISC}$	$N_{LOWDISC}$
PE	1	433[‡] (*27.58%*)	1,137 (*72.42%*)
	0	287 (*14.92%*)	1,637 (*85.08%*)
XORD	1	78[‡] (*15.18%*)	436 (*84.82%*)
INC	0	642 (21.54%)	2,338 (*78.46%*)
LOSS	1	266 (*21.61%*)	965 (*78.39%*)
	0	454 (*20.06%*)	1,809 (*79.94%*)

Panel B: Continuous Variables

Variable	Sample	N	Mean	Median	Minimum	Maximum	Stddev	Skewness
LNAGE	HIGHDISC	720	1.875[†]	1.792[†]	0.000	4.317	0.916	0.202
	LOWDISC	2774	1.939	1.946	0.000	4.554	0.863	0.092
LEVERAGE	HIGHDISC	720	0.579[‡]	0.610[‡]	0.005	2.634	0.337	0.517
	LOWDISC	2774	0.689	0.725	0.003	2.425	0.281	0.419
FIX	HIGHDISC	720	0.392	0.330	0.000	0.990	0.319	0.412
ASSETS	LOWDISC	2774	0.369	0.325	0.000	0.991	0.267	0.589

TABLE 4 – Continued

Panel C: Correlations

Variable	HIGHDISC	LNAGE	LEVERAGE	FIXEDASSETS
HIGHDISC	1.000	–0.029	–0.149	0.033
	–	(*0.077*)	(*<0.001*)	(*0.048*)
LNAGE	–0.033	1.000	–0.108	–0.018
	(*0.052*)	–	(<0.001)	(0.286)
LEVERAGE	–0.149	–0.110	1.000	–0.120
	(*<0.001*)	(*0.077*)	–	(<0.001)
FIXASSETS	0.002	–0.002	–0.091	1.000
	(*0.906*)	(*0.919*)	(*<0.001*)	–

[(a)] Panel A reports univariate proportionate differences in disclosure tendency (χ^2 test results) in relation to (*1*) receiving PE financing (PE), (*2*) reporting extraordinary income above 25% of current income (XORDINC) and (*3*) reporting a loss before taxes (LOSS). Panel B provides descriptive statistics for the continuous dependent variables for both the subsample of high disclosure firms (HIGHDISC) and low disclosure firms (LOWDISC). Two-tailed *t*-test statistics (Mann Whitney U test statistics) have been run to control for differences in means (medians) for both subsamples (HIGHDISC – i.e. firms that report a complete financial statement although legally an abbreviated format is sufficient – versus LOWDISC – i.e. firms that follow minima legal requirements and hence report an abbreviated financial statement). In Panel C, we provide Pearson (above the diagonal line) and Spearman (under the diagonal line) correlations for the variable of interest, HIGHDISC, and the continuous variables used in our multivariate analyses. Note that * indicates significance at the 10% confidence level, † = at the 5% confidence level, ‡ = at the 1% confidence level.

TABLE 5

Panel Logit Regressions (Random Effects Model) [a]

Model (1): $HIGHDISC_{it} = a_{it} + b_{1it}.PE + b_{2it}.PE_{post} + g'_{it}.CONTROLS + U_{it}$

Model (2): $HIGHDISC_{it} = a_{it} + b_{1it}.PE + b_{2it}.PE_{year-3} + b_{3it}.PE_{year-2} + b_{4it}.PE_{post} + g'_{it}.CONTROLS + U_{it}$

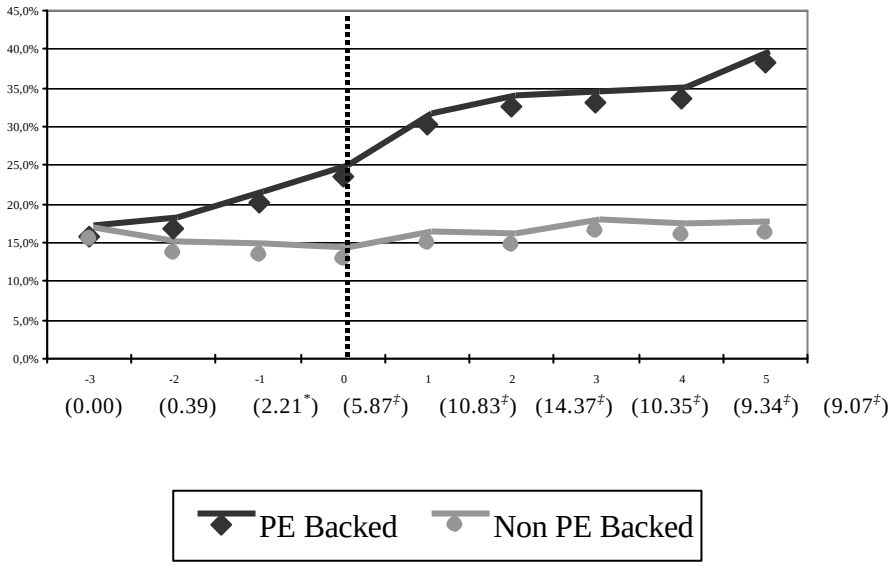
Model (3): $HIGHDISC_{it} = a + b_{1it}.PE + b_{2it}.PE_{post} + b_{3it.}Government*PE + b_{4it}.Government*PE_{post} + g'_{it}.CONTROLS + U_{it}$

Variable	Model (1)	Model (2)	Model (3)
PE	1.244†	1.916‡	–1.165•
	(2.62)	(3.91)	(–1.91)
PE_{year-3}	/	–1.533†	/
		(–2.04)	
PE_{year-2}	/	–1.348•	/
		(–1.94)	
PE_{post}	2.280‡	1.603‡	4.432‡
	(6.32)	(3.91)	(6.69)
GOVERNMENT*PE	/	/	2.752‡
			(3.70)
GOVERNMENT*PE_{post}	/	/	–2.360‡
			(–3.12)
LNAGE	–0.420†	–0.427†	–0.346†
	(–2.27)	(–2.45)	(–2.00)
FIXASSETS	0.414	0.372	0.354
	(0.95)	(0.85)	(0.78)
LEVERAGE	–1.337‡	–1.355‡	–1.602‡
	(–3.68)	(–3.75)	(–4.18)
XORDINC	–0.227	–0.204	–0.156
	(–0.74)	(–0.67)	(–0.51)
LOSS	0.158	0.184	0.237
	(0.72)	(0.83)	(1.07)
Constant	–4.300‡	–4.309‡	–4.339‡
	(–8.52)	(–8.72)	(–8.90)

N° of firms	*716*	*716*	*716*
N° of obs.	*3,494*	*3,494*	*3,494*
Wald Chi²	199.45	198.31	189.78
LR test	1,517.37	1,522.77	1,523.04

This panel logit uses a random effects estimation method for three alternative model specifications. Panel logits techniques combine cross-sectional and time-series characteristics in one optimal model and meanwhile control for individual heterogeneity across firms, collinearity among the variables and firms dynamics over time. For more information on panel logit analyses, we refer to Greene (1997) and Baltagi (2001). We model the disclosure decision of sample and control firms as a function of variables related to receiving PE both in the pre- and post-investment years (Model 1 and 2) and additionally check for differences between investor types (Model 3). For a rigorous description of all variables of interest and control variables, we refer to Table 2. Note that * indicates significance at the 10% confidence level, † = at the 5% confidence level, ‡ = at the 1% confidence level.

FIGURE 1 - Evolution of High Disclosure Firms Per Subsample (PE Backed versus Non-PE Backed) [(a)]



[(a)] This figure shows the yearly evolution in the percentage of PE backed versus non-PE backed firms that report a complete financial statement, although legally an abbreviated format is sufficient. Figure 1 shows a visibly higher percentage from *t*–1 for PE backed companies (black line) compared to non-PE backed companies (gray line). This disproportion intensifies strongly after the PE investment year. χ^2 coefficients (reported between brackets below the relative firm-years) indicate statistical differences between the number of PE backed firms and non-PE backed firms that report complete financial statements for each firm-year. Note that * indicates significance at the 10% confidence level, † = at the 5% confidence level, ‡ = at the 1% confidence level.

[55] National GAAP generally allow managers to report accounting earnings in an accrual accounting based system. This accounting system is more flexible than the traditional cash accounting reporting and allows managers to shift revenues and expenses into the period they are actually incurred. Hence, accrual accounting systems have the advantage of better matching revenues and expenses, hereby allowing entrepreneurs to generate more value relevant accounting figures than cash accounting would do (Ball & Brown, 1968; Dechow, 1994).

[56] Non-government related PE investors are (1) firms investing funds from third parties and (2) captive funds, i.e. funds in which the main shareholder of the management company contributes most of the capital from its own internal sources and reinvests realized capital gains into the fund. Government-related PE firms invest government funds either directly or indirectly in portfolio companies (EVCA Glossary).

[57] In constructing empirical histograms, researchers face the problem of choosing an optimal bin width that balances (*i*) the need for a precise density estimate and (*ii*) the need for a fine resolution. Scott (1992) recommends a bin width that is positively related to the variability in the data and negatively to the number of observations. High variation in the data calls for wider bins and the number of observations determines the size of bin widths adversely. To calculate the optimal bin width, we use a measure similar to the one used in Degeorge et al. (1999) and Plummer & Mest (2001). Bin width = $2.IQR.n^{-1/3}$, with *IQR* = interquartile range, a measure for variability in the data and *n* = total number of observations.

[58] The standardized difference is based the following formula (Burgstahler & Dichev, 1997): $s^2 = N.p_i.(1 - p_i) + ¼.N.(p_{i-1} + p_{i+1}).(1 - p_{i-1} - p_{i+1})$, where N = number of observations, p_i = the probability that an observation falls in interval i, p_{i-1} = the probability that an observation falls in interval *(i-1)* and p_{i+1} = the probability that an observation falls in interval *(i+1)*.

[59] For the sake of brevity we do not report earnings distributions post PE investment date. Specifically since these distributions do not show significant discrepancies between both samples.

[60] McNichols (2001) reports that up to 1999, over 45% of all earnings management studies published in leading accounting journals were developed by using a variant of the accruals model.

[61] This estimation is a variant on the normally used model which uses sales growth as an explanatory factor instead of growth in net added value. The reason for this change is that Belgian SMEs are allowed to report abbreviated financial statements when they comply with the following requirements. A company should (*1*) employ less than 100 employees on average per year registered or (*2*) not meet two or more of the following criteria: (*i*) annual turnover > 6,250,000 euro, (*ii*) balance sheet total > 3,125,000 euro and (*iii*) average number of employees > 50. One major difference between abbreviated and complete financial statements is that sales levels only have to be disclosed in complete financial statements. In abbreviated formats, only a net added value is reported. This value equals (Operating Income [*financial statement item 70/74*] – Raw Materials and Consumables *[item 60*] – Services and Other Goods [*item 61*]). Given that over 60% of our sample firms report an abbreviated statement, we use net added value figures to avoid ample missing data in our estimations.

[62] Unreported coefficients of the standard OLS regression show that both the coefficient and the significance of the PE variable is lower in all observation years, suggesting that selection bias is driving the uncorrected results and underestimates the impact of receiving PE.

[63] However, since we do not have data on the exact pricing of the deals we cannot examine this relationship further. Hence, it remains an open question whether and if so, to what extent, PE investors are fooled by this accruals management or take it into account in the valuation of the firm.

[64] Although we are limited to analyzing earnings figures in the post-financing period, we are still able to include sufficient observations in our research since earnings levels are available for all sample companies. Hence, unlike the accruals estimation in the previous section, we are not limited to study only those companies which report added value.

[65] We additionally winsorized the top 2 and 2.5% and our results of the transitory earnings models (cfr. infra) remained stable.

Dynamic University Spin-Out Companies: Entrepreneurial Ventures or Technological Lifestyle Businesses?

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Abstract

Increasingly, universities are being seen as important engines of technological development and growth which can act as catalysts for the enhancement of employment opportunities and the development of high technology and knowledge-based sectors. One means by which it is believed that university-based knowledge can be utilized is through the establishment of university spin-out companies, especially as universities increasingly seek to contribute to their region's economic development. This is because spin-outs tend to locate near their parent organization and thus, their economic benefits in terms of job creation and taxable wealth tend to accrue locally. In this paper we review the research literature on university spin-outs as a technology transfer mechanism and assess the post-start-up development of spin-outs from a regional research university in the UK. Based on the initial analysis of the survey data we conclude that many university spin-outs are more like technology lifestyle ventures than entrepreneurial businesses, and are limited in growth potential by the aspirations of the founders, the composition of the initial management teams and the resource endowments of the ventures. Accordingly, these ventures will make only a minimal contribution to the development of the regional economies in which they are located.

Introduction

"[there are] growing doubts surrounding university spin-outs, the 1,000 or so new businesses set up to commercialise university research. … the government has been using taxpayers' cash to stimulate the spin-outs that it uses as proof it is succeeding in making boffins more commercially-minded. But … there were no figures … to prove that costs – including public investment – were less that the sales of products, intellectual property or spin-out equity. The businesses could as easily have been destroying value as creating it" (Guthrie 2004:13)

"About 90 per cent of spin-outs are wishful thinking. What [the government] never publishes are statistics on survival rates" (Bhattacharyya 2004, quoted in Guthrie 2004)

"[there is a] need for better measurement of the returns produced by university spin-outs. Without this, it is impossible to see whether they are creating value – leaving the debate on whether spin-outs beat collaboration or licencing to fall back on the voodoo of anecdotal evidence" (Guthrie 2004)

A central theme in economic, industrial and technology policy discussions within the UK in recent years has been the link between wealth creation and competitiveness in a knowledge-driven global economy and the exploitation of scientific and technological developments in scientific laboratories and universities (DTI, 2002; Lambert, 2003; HM Treasury, 2004). Indeed, governments at national and international level increasingly consider the higher education sector as having a significant role to play in regional economic development. Not only, as Klofsten and Jones-Evans (2000: 299-300) observe, are universities "important engines of technological development and growth" but they can potentially act as "catalysts for the enhancement of employment opportunities [either directly or indirectly] for local industry" most particularly in the high technology and knowledge-based sectors.

One means by which it is believed that university-based knowledge can be utilized is through the establishment of university spin-out companies, especially as universities increasingly seek to contribute to their region's economic development (Mian, 1997). This is because spin-outs tend to locate near their parent organization and thus, their economic benefits in terms of job creation and taxable wealth tend to accrue locally. This is in contrast to technology transfer from a university to a large cooperation where benefits are more likely to be transferred out of the immediate region (Steffensen et al, 2000; Downes and Eadie, 1998). As well as being viewed, by some commentators, as an efficient means by which to transfer technology from universities to industry the creation and growth of spin-out companies can not only provide employment for a university's graduates but in some cases can also contribute to university revenue (Birley, 2002; Steffensen et al, 2000; Doutriaux, 1987). This is particularly the case in the UK where increasingly within the HEI (Higher Education Institute) sector, which has faced a reduction in central government support, there has been a shift in the UK from a grant to an exchange economy in higher education (Etzkowitz et al, 2000). Attention has thus been focused on commercialisation

activities, including the development of spin-out companies, as a means of generating alternative sources of income (Jones-Evans et al, 1998).

Realising the potential of a university's intellectual assets, therefore, has been driven largely by immediate financial pressures and the need to generate income in the short-term, and so attention had tended to focus on activities such as contract research and licensing and not on spinning-out companies (Downes and Eadie, 1998). This is because employing the spin-out route as the prime means of generating income tends to be seen as requiring more effort over a longer term and for more uncertain returns. For this reason the argument for the wholesale adoption of this strategy by HEIs does not appear to be very compelling, as some recent commentators (see quotations above) make clear (Guthrie 2004). Indeed, as Hague and Oakley (2000) have observed generating an income stream for the university from this activity is not always of prime consideration for university management. For instance, Hague and Oakley (2000: 14) discovered during their survey of a sample of 18 UK universities that "the raising of revenue was not and could not be the sole, or even the most important, reason for the activity". Instead reasons advanced to explain involvement in spin-out company formation, and also licensing technology, included, retaining close links with business, an opportunity to 'market test' ideas when appropriate and access to the best and most current equipment. In addition, for the more research-intensive universities in the UK engaging in this activity is viewed as a means of attracting and retaining the best staff as well as supporting the university's core research mission (Hague and Oakley, 2000).

As a result of these diverse factors for engaging in spin-out activity, some commentators have differentiated between different types of spin-out firms. While some, like Nicolaou and Birley (2003), have produced a typology based on the role and extent of involvement in the venture by the academic entrepreneur, others like Webster and Rappert (1997) have differentiated firms into four distinct types based on their relationship with the university. First, the 'independent' firm describes a venture that has broken away from the university and where contact is relatively modest in comparison with links to other firms. Second, the 'hybrid' firm has stronger links with the university and is likely to be located within the parent institution and is dependent on it for a degree of administrative and financial support. Third, the aim of the 'shell' firm, which can be located within the university's holding company, is to 'pull' research income into a university department. Fourth, the role of the 'virtual' firm is to bring together research staff from a number of academic sites in the UK with the aim of developing new embryonic product ideas for third parties who will take them onto market (Rappert and Webster, 1998; Rappert et al, 1999). The value of such a typology is that it demonstrates that spin-out firms have distinct linkages with the university as well as varying capacities for growth – for instance independent and hybrid firms are more likely to grow than either shell or virtual firms.

The risks and problems inherent in establishing spin-out companies should not be under-estimated and they represent only one route in commercialising a university's intellectual property. In appropriate circumstance such ventures can make a significant contribution to economic prosperity – for instance, in the last 6 years, Imperial College, London has been involved in spinning-out 53 companies, one of which, Turbo Genset, was recently valued at £740 million (Tomes, 2003). The key challenge, however, is to ensure that where it is considered that spinning-out a company is the most viable option to adopt that it is structured and managed so that its potential is fully realised. Many factors influence the extent to which a spin-out company on the one hand survives in the first instance, and on the other whether it grows into a venture which can make a significant economic contribution. While there is a substantive literature on which types of firms or individuals succeed in spin-out company formation (see for example, Shane and Stuart, 2002; Levin and Stephan, 1991; Roberts, 1991), Hughes (2003) believes that it would be of value to consider which features lead to success in spin-out company generation, especially as the indicators of success in this area are not well defined. Further he warns that it is important to recognise that the number of spin-outs alone is an insufficient indicator of success because this neglects consideration of their initial scale as well as their potential to subsequently grow and survive. Given that not all spin-outs do not seem to grow to any substantial size it is vital to understand those factors likely to hinder spin-out growth and those which can contribute to their success.

The research reported in this paper represents the first formal attempt to understand the processes governing the origins, establishment and growth of university spin-out ventures. Specifically, we explore the growth dynamics of university spin-out companies using data gathered from in-depth semi-structured

interviews with the founders and/or CEOs of a population of spin-out companies in one university within the UK. The paper is structured as follows. Firstly, we consider the recent trends in spin-out activity within the UK. Secondly, we review the debate on the specific difficulties and challenges associated with spin-out company formation. Thirdly, we summarise the case study methodology adopted in this paper and profile the research site. Fourthly, based on an analysis of the data gathered we explore the extent to which 'technology lifestyle' businesses exist within the spin-out population of this particular university and identify the key dimensions on which high-growth entrepreneurial and low-growth entrepreneurial technology lifestyle business differ. Finally, we identify the implications of this phenomenon of technology lifestyle businesses for universities, technology entrepreneurs and policy makers with an interest in regional and national economic development.

Recent trends in spin-out company formation in the UK

In a recent survey on commercialisation activity in UK universities (Wright et al, 2003) it was observed that university technology transfer was an activity at which the UK is very good. Indeed per unit of funding UK universities are completing more technology license agreements than their US counterparts as well as spinning out nearly twice as many new companies (Hockaday et al, 2003). Despite this activity there has been an overall decrease in spin-out company formation, possibly as a result of difficult market conditions for technology-based companies and redressing the balance between spinning-out companies and licensing technology to existing companies as an optimum route to commercialisation. These findings are consistent with those of the most recent higher education-business interaction survey (HEFCE, 2003) that reported that spin-out company formation had slowed between 2000-01 and 2001-02, although the three year survival rate has remained stable, with a 30 percent increase in the number of firms surviving more than three years.

However, spin-out numbers are not a useful indicator of the impact of third stream activity. One reason for this might be while some university spin-outs have been successful the net return to universities from the majority are comparatively insignificant. Indeed, it is difficult to ascertain how successful spin-out companies are as hard data on how research translates into commercial success is not available in the UK (Tomes, 2003). To overcome this issue Hague and Oakley (2000) recommended that in the UK as well as generating information on the raw numbers of new ventures created that factors such as longevity, scale and equity value of each venture as well as the relationship between spin-offs, start-ups and licensing income was determined.

While the recent introduction of university commercialization surveys has gone some way to addressing this problem Wright et al (2003) nevertheless note that due to insufficient data it is still not possible to make international comparisons with respect to spin-out company success and advise strong caution against drawing county-by-country comparisons based on absolute numbers. Instead they suggest that it might be more meaningful to draw comparisons about the quality of spin-outs. One mechanism by which this might be achieved is by examining the number of new ventures that are created using external equity finance as well as the amount of external equity that a new spin-out company might receive. While Wright et al (2003) have used the successful raising of external equity by a firm as an indicator other variables are also appropriate guides to the success (and by implication the quality) of a firm. For instance, sales, turnover and increased employment opportunities can also be used as suitable indicators (Davidsson and Wiklund, 2000). Indeed if these factors are taken into consideration then the picture with respect to spin-out company development in the UK can be considered in a comparatively positive light for as the HEFCE (2003) survey makes clear total turnover and staffing of all active companies have continued to rise, suggesting that company growth is occurring. This may be a reflection of a change in emphasis from increasing the number of new companies to a focus on enhancing their viability. Nevertheless, the UK figures still suggest that the majority of spin-outs remain small, with those surviving for more than three years still averaging only around 10-15 employees.

Spin-out company formation: challenges and difficulties

Establishing a new venture is a challenging process and its success or otherwise is dependent on a number of factors. Indeed, newly established and small businesses form a very volatile group with a high rate of exits and entries, although in recent years estimates of failure rates for new ventures have improved with 91.4% of UK VAT-registered businesses in 2000 trading for a year, compared to 85.5% in 1993, while the percentage of UK businesses surviving 3 years or more increased from 60% to 64% (DTI, 2003).

In addition to the significant barriers which any new venture potentially has to overcome spin-out companies encounter additional entrepreneurial challenges beyond those faced by new high-tech ventures in general. Perhaps one of the most crucial factors in the process is the fact that many spin-out companies are formed, not by classic entrepreneurs, but by an entrepreneurial academic. Meyer (2003) differentiates the entrepreneurial academic from the academic entrepreneur by suggesting that the former may not necessarily be growth-oriented or aware of their businesses innovation and development needs. Furthermore, as the academic might still be working within the university growth of the spin-out company might not be his/her first priority. Indeed, they may not have either a unique idea nor a high need for achievement in this area but may instead be pursuing more independence or looking for ways in which to overcome dissatisfaction with their current role (Roberts, 1991). Further, university spin-outs generally tend to be founded primarily on the basis of some technological advance rather than on the presumption of some sort of competitive advantage based on marketing, sales or distribution (Pérez Pérez and Martínez Sánchez, 2002). Indeed the founders of such ventures tend to have limited business experience (Franklin et al 2001; Radosevich, 1995). Vohora et al (2004) specifically identify two fundamental difficulties; firstly, the specific challenges and obstacles encountered in the evolution of an initial idea in a non-commercial environment to becoming established as a competitive rent-generating firm, and secondly the conflicting objectives of key stakeholders which may adversely impact upon a new venture's ability to move from one phase to another.

Methodological approach

In this research a case study methodology was adopted. Case studies, which represent one of a range of qualitative approaches to research (Easterby-Smith et al, 2002), attempt to increase understanding of local perceptions and "explicate the ways in which people in particular settings come to understand, account for, take action, and otherwise manage their day-to-day situations" (Miles and Huberman, 1994:7). Specifically, "case study research consists of a detailed investigation … of phenomena, within their context. The phenomenon is not isolated from its context … but is of interest precisely because the aim is to understand how behaviour and/or processes are influenced by, and influence context" (Hartley 2004:323, see also Rousseau and Fried 2001).

Consequently such an approach provides researchers with a greater opportunity for obtaining as holistic perspective of a specific research project as possible (Valedin, 1974; Hughes, 1990; Weber, 1949). This view is consistent with that advocated by Huse and Landström (1997) who, the context of a discussion of the benefits of qualitative research to entrepreneurship, have argued that this approach is used to generate concepts and models that lead to a deeper understanding of problems. This perspective also resonates with that held by Mike Scott who, as Gartner and Birley (2002: 387) have observed in a special issue of Journal of Business Venturing dedicated to his memory, "believed passionately in the importance of using both qualitative methods and longitudinal studies to explore the complexities of the entrepreneurial process". In particular, a qualitative study "that systematically compares similarities and differences in patterns of interactions, the resulting meanings of the key variables, and their influences on various organizational outcomes" (Bartunek and Seo, 2002: 240) can stimulate the development of a new understanding of the variety of manifestations of the university spin-out process.

The case study reported in this paper represents part of an on-going research project which focuses on the spin-out company activity of one of the longest established technology transfer organisations in the UK, Queen's University, Belfast (herafter known as Queen's) (Leitch and Harrison, 2004). Queen's is a 150 year old, red brick, research-based university in Northern Ireland. The research focuses on the

development and growth of approximately 50 per cent of the spin-out companies established with the support of the university's technology transfer company, QUBIS Ltd. In-depth, semi-structured interviews were conducted with the Chief Executive of the commercial holding company of Queen's as well as with the founders and/or CEOs of the university's spin-out companies. These interviews lasted on average two and half hours and were conducted over an eight month period from September 2003 to April 2004. Following a resource-based perspective the interviews focused on identifying the importance of a number of key resources on the development of these ventures. Specifically information was gathered on company demographics (formation date, employment and sales history, technology and market orientation), the founding process (the research and technology foundation, the relationship with the university, the career path of the founding team) and the business development process (formation and development of the management team, recruitment of key personnel, product development and diversification, development of market and customers, access to finance, social capital networks).

Results

The spin-outs included in the sample are highly diverse (Table 1): they cover a range of sectors (5 each in software and biotech/medical, with others in electronics, manufacturing and environmental consultancy), and have been established for varying periods of time – 8 are recent foundations (2000 or later), while three were established in the late 1980s. This pattern reflects the recent rise in the level of spin-out company formation in the UK. Given the age profile, it is not surprising that the majority of these spin-outs are small in employment terms: only four companies employ more than 40 in 2004. However, the relationship between company formation date and size is not absolute: software company K has grown rapidly, despite its recent formation (reflecting the fact that this is a second order spin-out of an existing spin-out rather than an organically growing new venture – Leitch and Harrison 2004), and company J has remained small, reflecting in part its continuing emphasis on local and national consultancy basis. What these figures do suggest is that there is, first, little evidence to suggest that university spin-out companies (even the relatively successful ones) will provide a substantive contribution to economic well-being, and second, that where benefits are being realised, even on a small scale, these are achieved only over the long term.

With one exception (company B) these spin-outs are based on the exploitation of very small portfolios of protectable intellectual property (in terms of patents and other forms of IP protection), and in the exceptional case this large IP portfolio is not yet associated with above-average venture performance. In the software sector, particularly with a services rather than products orientation which is characteristic of these companies (Harrison, Mason and Girling 2004), the absence of formal IP protection is understandable, but it is less evident why this relatively low reliance on strong IP portfolios should be characteristic of the other companies in the sample, and it calls into question the extent to which these companies, for the most part, compete on the basis of specific complementary intellectual assets (Teece 1986, 2002). This suggests that more detailed examination of the asset specificity of university spin-outs should pay more attention to generic issues of intellectual assets and their exploitation than to formal IP and its protection per se (Gregson and Harrison 2004, Harrison and Sullivan 2000, Sullivan and Sullivan 2000).

With the exception of company K, those spin-outs that have grown since start-up have done so by developing a strong market presence in markets outside the UK, and company K, as a recent second-order spin-out based on the development of a new software product, is aggressively targeting the non-UK market.

In terms of the perception of University support for spin-out companies, it is clear that there has been considerable variation, depending on the precise area of potential support required by the spin-out venture (Table 2). For most companies, the University-provided services which are most highly regarded (rated as 'important' or 'very important') are in the areas of general encouragement to exploit technology, in clarifying the legal IP position (not a surprise, given the university's own interests in this matter), providing IP protection through support for patent filing activities, providing pre-company formation business advice, and in their general support. Much less valued was the University support for identifying the market opportunity for the technology, technology development, explanation of alternative

exploitation options and career options for academic entrepreneurs. What clearly comes across, therefore, is a University role characterised by general exhortation and specific IP-related advice, which is less extensively backed up by detailed advice and services in the strategic and operational development of the technology into a commercial venture: this confirms suggestions elsewhere (see Harrison 2004) that there is an on-going gap in the provision of support in the commercialisation process between proof of (and protection of) concept and commercial venture development which is not currently covered by the university technology transfer office. Unless there are other actors in the network providing this support and advice (and in peripheral regional economies where university technology transfer offices play an economic development role rather than or as well as a technology transfer role, this may be problematic – Leitch and Harrison 2004) there are resulting constraints on the development of these ventures.

Most respondents identified benefits from being associated with the university/technology transfer office. For many, these benefits were in the form of the advice and support offered through the start-up process, described by company C as 'looking after the company's interests while a VC may not'. Others pointed to the provision of business services (eg office support), and networking and communication opportunities which made a contribution to the development of the business through identification of partners, staff and market opportunities. For a small number of respondents there was also a benefit in terms of credibility and reputation: the association with the University to some extent overcame or helped to overcome the liabilities of newness which constrain new ventures.

On the other hand, there are also disadvantages of being associated with the university, identified by almost half of the respondents. For some, these were represented in the tensions between spin-out company development and other aspects of the academic role (teaching, departmental administration and research) and in inter-departmental tensions within the institution. For others, the association was deemed responsible for problems in resource acquisition strategies, in terms of attracting outside investors and the investment capital required (company C; M) and good business-experienced recruits (company B). What is not clear from these few cases where resource constraints have been identified is the extent to which they will influence negatively the development of the company. Company B has grown to above average spin-out size over 14 years, and the other two companies are still very new: the problems in accessing external equity, and the potentially negative signals that association with the university sends out, are, however, consistent with the wider UK issue that spin-outs have problems in accessing external equity (Lambert 2003).

Conclusions and implications

This initial analysis of the nature of the spin-out company development process has suggested that there are considerable differences among spin-outs in terms of their development. For the most part, spin-outs from UK universities appear to start and remain small, even where they are serving international rather than local and national markets. Even where they do grow, over a period of a decade or more, they still remain relatively small in employment terms. This raises a number of issues. From a public policy perspective, this suggests that spin-out companies are at best only going to make a minor contribution to economic development: they do not, on present evidence, represent a platform for sustained economic transformation. From the university sector point of view, spin-outs are not likely to be a major source of income, as compared to licensing or other technology transfer activities. From a research point of view, this initial evidence suggests that the identification of the determinants of the overall performance of university spin-outs over the long run, and of variations in that performance, is an important area for further more detailed research. In so doing, and in the light of the evidence on the services provided by the university to spin-outs, that research could usefully focus on the resource acquisition strategies of spin-out companies: access to adequate resources in terms of finance, skilled personnel, advice and business development support and entrepreneurial capital are crucial to venture development.

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Table 1 – Characteristics of case study spin-out companies

COMPANY	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Year of Formation	1996	1990	2002	1989	1993	2002	2002	2002	1986	1987	2001	2003	2001	1999	
Employees in 2004	10	45	1.5	111	5	4	7	15	170	11	75	4	0	5	1
Sector	Software	Electronics	Manuf	Electronics	Biotech	Medical	Software	Biotech	Software	Environ-mental	Software	High-tech textiles	Biotech	Software	Medical
Initial patents filed		14	1		1	1	N/a	1	N/a	N/a	N/a	Not yet	4	N/a	N/a
Current patents held		30		4		1	N/a	3	N/a	N/a	N/a			N/a	N/a
Initial licences		100s													
Current licences															
Other IP protection					trademark						trademark				
Initial market/ customer		Broad base	Global	University research labs	Global	Hospital	Higher education	Academic labs	Med/lge orgs	Government agencies	Large computer cos	Europe haulage sector	Effluent/ waste treatment	Higher education	Medical education
Current primary customer		Broad base	Research institute	Labs and OEMs	Labs and research institutes		Higher education	SMEs biotech	Med/lge orgs	Environ & Health sectors	Large computer cos	Europe haulage sector		Higher education	Medical manuf.
Projected size		$2bn	£60k	US$60m	N/avail		Quite large	Over £1m	Limitless	N/avail	Limitless	£200m		Quite large	Large
Number of customers	Not trading	150	3	N/avail	Many	Not yet trading	9	Over 60	>100	350	>100	Not yet trading	Little trading activity	5	
Market share		1% of US market		US$3m sales	Full		1%	Full?	Unknown	18-20%	<1%			1%	
% market in UK		10%		<10%	8%		90%	Little	Unknown	100%	99%			50%	40%
% market ex-UK		90%		>90%	92%		10%	most	Unknown	0%	1% but target to iincrease			50%	60%

Table 2 – University support for spin-out companies

	Role Not Played	Very Unimp 1	2	3	4	Very Imp 5
Identified 'market opportunity' for technology	7	5	0	0	1	2
Assisted in technology development	6	3	2	2	0	2
Explained exploitation options (licensing, spin-out)	6	2	0	0	3	4
Laid out career options (i.e. academic vs. entrepreneur)	6	2	2	2	3	0
Provided pre-company-formation business advice	2	1	1	1	4	6
Provided IP protection (filing activities for IPR)	4	1	0	0	4	6
Clarified legal position of IP (who owns what)	4	1	1	0	2	7
Encouraged/supported founder to exploit technology	2	1	1	0	1	10
Provided strategy for spinning out company	3	1	0	5	1	5
Promoted spin-out to external commercial agents	2	2	2	1	5	3
Overall support by university in company formation	1	2	0	1	5	6