UNIVERSITEIT GENT

FACULTEIT ECONOMIE
EN BEDRIJFSKUNDE

HOVENIERSBERG 24
B-9000 GENT
Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER

How do Early Stage High Technology Investors Select Their Investments?

Bart Clarysse [1]

Mirjam Knockaert [2]

Andy Lockett [3]

March 2005

2005/297

[1] *Ghent University and Vlerick Leuven Gent Management School, Reep 1, 9000 Gent, Belgium (+32 9 210 98 21; bart.clarysse@ugent.be)*
[2] *Ghent University and Vlerick Leuven Gent Management School, Reep 1, 9000 Gent, Belgium (mirjam.knockaert@vlerick.be)*
[3] *Nottingham University Business School, Jubilee Campus, Wollaton Road, Nottingham, NG8 1BB, United Kingdom (andy.lockett@nottingham.ac.uk)*

The authors greatly acknowledge professor Sophie Manigart, Ghent University, for comments on an earlier version of this paper. This paper also benefited from comments at the Babson Entrepreneurship research conference 2004, the Gate2Growth Specialized workshop on Venture Capital (Barcelona, 2004) and the research seminars within the Operations and Technology Management Centre at Vlerick Leuven Gent Management School.

Abstract
This study examines the selection behaviour of 68 European early stage high tech VCs. In particular, we examine whether or not these VCs exhibit heterogeneity in their selection behaviour. To examine these issues we employ a conjoint analysis methodology. Our results indicate that VCs exhibit substantial heterogeneity in investment selection behaviour. Employing a cluster analysis three types of investors emerge: those who focus on technology, those who focus on finance and those who focus on people. We then examine the drivers of these differences, being the sectoral focus, the sources of funds and the human capital of the investment manager.

HOW DO EARLY STAGE HIGH TECHNOLOGY INVESTORS SELECT THEIR INVESTMENTS?

EXECUTIVE SUMMARY

Quite a lot of researchers have studied selection criteria used by venture capitalists when assessing a business proposal. Most of these studies were undertaken with US venture capitalists and used post hoc methodology or verbal protocol analysis. In this research, we build upon the positive aspects of these methodologies, but use a conjoint analysis instead, allowing us to both capture the hierarchy of selection criteria used by VCs and the reasoning of the investment manager during the selection process.

We focus on a specific subset of the European venture capital industry, namely those VCs investing in early stage high tech projects. Next to studying selection behaviour of these VCs, we look at what drives this selection behaviour. We specifically look at whether the sources of funds, the human capital of the investment manager and the sector in which the business proposal is situated are determinants of VCs' selection behaviour.

Our results indicate that VCs exhibit substantial heterogeneity in investment selection behaviour. 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 their sectoral focus, the sources of the funds and the human capital 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 of this study have important implications for practitioners. Our results show that the background and experience of investment managers can influence the individual's selection behaviour. VCs may build their investment teams with a human capital consideration in mind. Next to this, it is interesting to VCs to know which VCs

have similar selection patterns and thus to know which VCs they will be competing with on specific deals, or could be potential syndication partners.

Similarly, high tech entrepreneurs can benefit from a better knowledge of selection behaviour. What makes this research particularly interesting to them is that it focuses on a subset of the European VC industry and focuses on those investors they will call upon when looking for finance for their early stage high tech projects. In addition, entrepreneurs can benefit from a better knowledge of what drives selection behaviour, and thus approach those investors that are more likely to invest in their investment proposal. It is particularly interesting to the entrepreneur to see that selection behaviour differs between funds and that not all venture capitalists are putting the same criteria on top of their list. Next to this, it is interesting to the entrepreneur to understand how fund characteristics, the background of the investment manager that is in front of him/her, and the sector the investment proposal is in, will determine the VC's selection behaviour.

Finally, knowledge on differences in selection behaviour is interesting to fund investors, and more specifically to investors of public money. The results indicate that public money is used for investing in business proposals with a strong technological basis. This may be viewed as an attempt to overcome problems associated with perceived market failures, that exist for early stage high tech funding.

INTRODUCTION

The issues as to how venture capitalists select which proposals to invest in has been a major topic of research over the past two decades. Previous research has identified a number of important criteria on which venture capital firms base their decision to invest. First, the "human capital" of entrepreneurial teams was found to be an important decision factor. Human capital includes: (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)); and (c) the heterogeneity of the entrepreneurial team (Keeley and Roure (1989)). A second stream of research 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 have been found to be important criteria used by venture capitalists to evaluate venture proposals are: 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. Furthermore, Muzyka et al (1996) emphasize that these studies were exploratory in terms of their data collection techniques and assume a single hierarchy of decision criteria. To overcome these limitations Muzyka et al (1996) explored trade offs in decision criteria among 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 as their primary criteria. 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. The results, however, were rather 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. A number of studies have found that early stage VCs differ from late stage VCs (e.g. Elango (1995); Sapienza et al (1994)); and that high tech and non-high tech VCs differ (Lockett, Murray and Wright (2002); Murray and Lott (1996); Baum and Silverman (2003)). Therefore, the fact that, to date research on investment selection behaviour of VCs has only focused on the venture capital industry as a whole may be problematic. In this paper we start from the premise that high tech investing is different from non-high tech investing (Lockett et all (2002), and focus only on those venture capitalists for whom investing in high tech is core business. 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 departs from the idea that not all venture capitalists use the same hierarchy of decision criteria for selecting investment proposals. In particular, we address two main research questions:

RQ1: Do early stage high tech venture capitalists differ in their investment selection behaviour?

RQ2: What drives the differences in behaviour across early stage high tech venture capitalists?

Consistent with Muzyka et al (1996), we test this idea by investigating the trade offs made by early stage high tech venture capitalists, across Europe, at the moment they take the decision as to whether or not to further investigate an initial proposal. By focusing only on the population of early stage high tech venture capital firms in Europe we are able to generate a degree of homogeneity in terms of the VC firms we investigate.

The paper is structured as follows. First, we outline the theoretical background and develop hypotheses. Second, we outline the method used, focusing on the use of conjoint analysis. Third, we present a cluster analysis of the venture capital firms according to their investment selection behaviour and then link the cluster results with the characteristics of the funds. Finally, we draw conclusions from our results.

THEORETICAL BACKGROUND

The heterogeneity of VC investment behaviour

As outlined above, many studies have examined the selection criteria of venture capitalists. The early studies in the 1980s to mid 1990s found 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 (see: 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. As 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 common approach 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 can potentially 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. For example, 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. Also, key criteria used by the VCs are related to 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/her team. To date, this is the only study which has found financial criteria to be of utmost importance.

In a further development, the subjectivity of analysis and interpretation involved in verbal protocol techniques, without being supplemented with other techniques such as computer algorithms, has been questioned by Riquelme and Rickards (1992). They argue that verbal protocol analysis is more an art than a science; suggesting instead the use of 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.

Muzyka et al (1996), followed Riquelme and Rickards' (1992) pioneering work, to use conjoint analysis in assessing the decision criteria used by VCs. In a more sophisticated analysis, they analysed the key criteria used by European VCs in evaluating

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, open-ended interviews with VCs were carried out. 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 percent of the venture capitalists in their study conformed to this profile. Zacharakis and Meyer (2000) refined this use of conjoint analysis to let venture capitalists invest in 50 ventures in an experimental setting. They found that team factors were much less high in the hierarchy of importance, and a significant group of VCs ranked market and competition variables as being the most important.

To summarize, the above studies have identified three groups of venture capitalists. One group, which is called by Muzyka et al. (1996), the *mainstream* venture capitalist, focuses on human resources, followed by product market and financial criteria such as exit possibilities. A second group, identified 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.

As outlined above, previous research has shown that the venture capital industry is not homogeneous in its investment focus. Lockett et al (2002) found that, as with the Murray and Lott study (1995), a bias remained against VC firms' involvement in the earliest stages of the technology investment cycle. We have reason, therefore, 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. It is for this reason that our research only focuses on those venture capitalists investing in early stage high tech proposals. Our point of departure is that early stage high tech investors will exhibit heterogeneity in terms of their investment selection behaviour. In the next section we examine what may drive these differences in behaviour.

What drives differences in investment selection behaviour?

The investment decision of the investment manager with respect to a specific project may be a determinant of 1) the investment strategy of the VC and 2) the result of a screening of the potential deal. This research focuses on the screening of the potential deal, but does take into account that the overall investment strategy of the fund may impact the individual's appraisal of a potential project.

An important influence on VC investment selection behaviour may be the source of funds the VC has to invest. The source of funds may affect investment strategy of the fund, which may in turn affect the investment decision on specific deals. Hellman (2002) develops a theory on strategic investment, indicating that private equity arms of banks seek complementarities between their venture capital and lending activities. Therefore, it seems natural that they will base their investment decision on other criteria than non-strategic investors. The same goes for public funds. Investment managers investing funds from public initiatives may have other objectives rather than purely financial ones (Manigart et al, 2002). For instance, they may be focusing more on the capacity of technological breakthrough and renewal of a project, as this may influence economic growth.

Mayer et al (2005) 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.

This leads us to the following proposition:

P1: 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

A second factor that may be important in terms of accounting for differences in the investment selection behaviour of VC firms is the human capital of its investment managers, and more specifically their experience (Shepherd et al (2002)). Shepherd et al (2002) examined whether more specific experience in the venture capital industry 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 change according to their experience. An investment manager, who has experienced the difficulties associated with the replacement of the portfolio company's CEO, may be more likely to stress human factors when selecting new projects. Or this experienced investment manager may stress the ability to protect the product that the portfolio company commercialises, as he/she learnt that this protection gives the possibility to reform the management team or change the company's strategy, without losing 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:

P2: The background and experience of the investment manager will have a significant effect on the selection criteria

A third factor may be the business sector of the investment proposal. Many scholars study high tech start-ups in particular environments such as biotechnology (Stuart et al (1999), Baum and Silverman (2003)), computers (Eisenhardt and Tabrizi (1995)) and software and dot-coms (Amit and Zott (2001)). The underlying rationale for studying companies in a specific environment is that the technological regime influences to a large extent the business model a start-up can follow. Therefore, some researchers study VCs investing in specific technologies only (e.g. Baum and Silverman (2003) focus on biotech

investing). Baum and Silverman (2003) indicate that there are three broad types of signals that may affect VCs' assessments of start-ups in biotech: alliance capital, intellectual capital and human capital. So, even though early stage high tech investors may be a quite homogeneous subset of the VC industry, we still believe differences may occur with respect to the sectors of investment. VCs investing in biotechnology projects may stress the protectability 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, biotech companies looking for early stage finance hardly ever have a product that is already accepted by the market. We may then assume that market acceptance will be of little importance to biotech investors. This discussion leads to the following proposition.

P3: the sector in which the business proposal is situated will have a significant effect on the importance of selection criteria

METHOD

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. Verbal protocol analysis has 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, we

constructed a synthesis of the criteria that had been used in previous research. In addition, we drew on the insights of two VCs, one business angel investing in early stage high tech and three VC experts in order to draw a list of criteria that were important to them. We deemed this a necessary process given that no research had been conducted with high tech investors exclusively. Finally we synthesised the two lists into a set of criteria that we then pre-tested with the experts, which they accepted as being the criteria they judged on when screening a business plan in reality. From this process 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.

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 developed conceptually 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 1 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 1 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 score for the particular factor and dividing it by the sum of all utility scores.

-- Insert figure 1 about here --

The sample

A stratified sample of 68 VC firms was drawn from different regions across Europe. We selected the regions 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). The number of respondents in each region is presented in table 2. In each region, we wanted to have a representation of small and large funds with various degrees of public funding. 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. Therefore, 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 investing early stage and high tech. 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) in order to avoid sample selection bias. Figure 2 shows also the representativeness 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 2 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 an entrepreneur, in business, as an investment manager) and his/her sectoral focus. Second, we studied how these investment managers select projects using the 27 business proposals. Before the respondents scored the proposals, we showed them a fictive business card (see figure 1), in order that they would understand the criteria we combined in the cards, and outlined 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. In addition, all respondents were asked to provide a justification for the 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 behind the respondents' decision process. 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 allowed us to examine the relative importance of the different selection criteria, and the qualitative data permitted us to interpret the results obtained from the analysis.

-- Insert table 3 about here --

RESULTS

The heterogeneity of early stage high tech VC investment selection behaviour

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 score for the particular factor and dividing it by the sum of all utility scores. Using the importance scores, relative rankings 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. The results show that the potential return on investment, and people characteristics, such as the ability of the entrepreneur and the characteristics of his/her team were the most important selection criteria overall. Size and geographical breadth of the market (global or regional) and whether or not a technology is a platform technology have little impact on the VC's decision.

-- Insert figure 3 here --
-- Insert table 4 about here --

In order to examine the extent to which this group of early stage high tech investors exhibits heterogeneity in terms of their investment selection processes we employed 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 3, 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. Subsequently, we performed a k-means clustering with three clusters as the predefined number of clusters and the same variables as inputs.

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 about here--

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 5, the ROI criterion receives an importance score of 24 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)).

-- Insert table 6 about here --

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.

What drives differences in VC investment selection behaviour?

To test propositions 1, 2 and 3 we constructed a multinomial logistic model. In the multinomial logit model, we estimate a set of coefficients $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ 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".

$$P(y=1)=\frac{e^{X\beta^{(1)}}}{e^{X\beta(1)}+e^{X\beta^{(2)}}+e^{X\beta(3)}}$$

$$P(y=2)=\frac{e^{X\beta^{(2)}}}{e^{X\beta(1)}+e^{X\beta^{(2)}}+e^{X\beta(3)}}$$

$$P(y=3)=\frac{e^{X\beta^{(3)}}}{e^{X\beta(1)}+e^{X\beta^{(2)}}+e^{X\beta(3)}}$$

The model, however, is unidentified in the sense that there is more than one solution to $\beta^{(1)}$, $\beta^{(2)}$ and $\beta^{(3)}$ that leads to the same probabilities for y=1, y=2 and y=3. To identify the model, one of $\beta^{(1)}$, $\beta^{(2)}$ or $\beta^{(3)}$ is arbitrarily set to 0- it does not matter which. That is, if we arbitrarily set $\beta^{(1)}$=0, the remaining coefficients $\beta^{(2)}$ and $\beta^{(3)}$ would measure the change relative to the y=1 group. If we instead set $\beta^{(2)}$=0, the remaining coefficients $\beta^{(1)}$ and $\beta^{(3)}$ 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".

As aforementioned, previous studies have argued that the institutional origin of the venture capital fund might have an impact on the kind of deals that the fund selects. This argument was the basis for proposition 1, 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 realizing 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.

Proposition 1 stipulates that institutional origin affects VC investment selection behaviour. 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, or if it is set up as a subsidiary (for instance from a bank). 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. Public capital can be provided by European (f.i. EIF), national or regional authorities.

---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, presented 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. 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.[4] 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 (Table 7). Only 8% of their fund structure is on average of public origin. We can thus conclude that P1 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.

[4] 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.

Proposition 2 stipulates that the background and experience of the investment manager will significantly affect the way in which the selection is performed. To operationalize this we examined 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 European 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. Financial and people investors, however, do not significantly differ on these categories, nor do financial and technology investors.[5] 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.

[5] 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.

We conclude that P2 receives mixed support. People investors seem to be the most experienced investment managers, but this is only significant in comparison to the technology investors, which inversely tend to recruit particularly less experienced managers. Among them, academic experience is rated the highest.

Proposition 3 stipulates that the sectoral focus of the fund will play a role. To operationalize 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.

We conclude that P3 receives support, but only for biotech and industrial automation, and not for ICT investing.

CONCLUSION AND IMPLICATIONS

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 emphasize the team and leadership potential of the founders. However, we also find the financial variables to play an important role for them. 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. The market prospect is also for them quite unimportant. The funds in these group are managed by the least experienced investment managers. 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 of 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.

From a public policy perspective, we find most public money invested 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 targeted to technological renewal and stimulation of economic growth. This public money is managed by investment managers that have a profile that is not common 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.

This study has important implications for practitioners. As our results show that the background and experience of investment managers can influence the individual's selection behaviour, VCs may build their investment teams with a human capital consideration in mind. Also high tech entrepreneurs can benefit from a better knowledge of selection behaviour by VCs. It is particularly interesting to them to know how selection behaviour is driven by the source of funds, the investment manager that is in front of him/her, and the sector the investment proposal is in. This knowledge may enable him to approach the appropriate investor for his proposal and may increase his/her chances of finding finance. For instance, an entrepreneur with a proposal that builds upon a strong proprietary technology but that lacks an experienced team may have more chances of finding finance with a public fund than with a private one.

This study points to several interesting questions for future research. First, it would be interesting to interview more than one investment manager per fund in order to determine whether the results on fund characteristics and human capital variables still hold at fund level. Second, it would be interesting to extend this research to other regions, such as the US, and to investigate differences that exist between regions. Compared to the US, innovative small and medium companies find it more difficult to get started and grow. The dominant view is that this is due to the nature of capital markets and the problems of raising finance for small risky businesses (Martin et al, 2002). Extending the current research to US VCs may indicate whether US VCs differ with respect to selection behaviour from European VCs, and whether this may explain differences that seem to exist between the US and Europe in nurturing early stage high tech ventures.

References

Amit, R. and Zott, C. 2001. Value creation in e-business. *Strategic Management Journal* 22: 493-520.

Baum, J.A.C. and Silverman, B.S. 2003. Picking winners or building them? Alliance, intellectual and human capital as selection criteria in venture financing and performance of biotechnology start-ups. *Journal of Business Venturing*, xx: xxx – xxx, Article in Press.

Eisenhardt, K. and Trabrizi, B.N. 1995. Accelerating adaptive processes: product innovation in the global computer industry. *Administrative Science Quarterly* 40: 84-110.

Elango, B., Fried, V.H., Hisrich, R.D., Poloncjek, A. 1995. How Venture Capital Firms Differ. *Journal of Business Venturing* 10: 157-179.

Fischhoff, B. 1982. For those condemned to study the past: heuristics and biases. In. Hindsight, *Judgement under uncertainty: heuristics and biases*. Cambridge University Press.

Hall, J. & Hofer, C.W. 1993. Venture Capitalists' Decision Criteria in New Venture Evaluation. *Journal of Business Venturing* 8: 25-42.

Hellman, T. 2002. A theory of strategic venture investing. *Journal of Financial Economics*. 64: 285-314.

Hisrich, R.D. and Jankowitz, A.D. 1990. Intuition in venture capital decisions: an exploratory study using a new technique. *Journal of Business Venturing*. 5: 49-62.

Hutt, R.W. and Thomas, B. 1985. Venture capital in Arizona. *Frontiers of Entrepreneurship Research*. 155-169.

Kahn, A.M. 1987. Assessing venture capital investments with noncompensatory behavioural decision models. *Journal of Business Venturing*. 2: 193-205.

Keeley, R.H. and Roure, J.B. 1989. Determinants of new venture success before 1982 and after a preliminary look at two eras. *Frontiers of Entrepreneurship Research*. 274-287.

Lockett A., Murray, G. and Wright, M. 2002. Do UK venture capitalists still have a bias against investment in new technology firms. *Research Policy.* 31: 1009-1030.

MacMillan, I.C., Siegel, R. and Subbanarashima, P.N. 1985. Criteria used by venture capitalists to evaluate new venture proposals. *Journal of Business Venturing*. 1: 119-128.

MacMillan, I.C., Zemann, L. and Subbanarashima, P.N. 1987. Criteria distinguishing successful from unsuccessful ventures in the venture screening process', *Journal of Business Venturing*. 2: 123-137.

Manigart S., Baeyens K., Van Hyfte W. 2002. The survival of venture capital backed companies. *Venture Capital*. 4(2): 103-124.

March, J.G. and Feldman, M.S. 1981. Information in organisations as signal and symbol. *Administrative Science Quarterly*. 26: 171-186.

Martin R., Sunley P., Turner D. (2002). Taking risks in regions: the geographic anatomy of Europe's emerging venture capital market. *Journal of Economic Geography*. 2; p. 121-150.

Mayer, C., Schoors, K. and Yafeh, Y. 2005. Sources of funds and investment activities of venture capital funds: evidence from Germany, Israel, Japan and the UK. *Journal of Corporate Finance*. Forthcoming 2005.

Meyer, G.D., Zacharakis, A.L. and De Castro, J. 1993. A post-mortem of new venture failure: an attribution theory perspective. *Frontiers of Entrepreneurship Research*. 256-269.

Murray, G., Lott, J. 1995. Have UK venture capitalists a bias against investment in new technology-based firms? *Research Policy*. 24: 283-300.

Muzyka, D., Birley, S. and Leleux, B. 1996. Trade-offs in the investment decisions of European Venture Capitalists, *Journal of Business Venturing*, 11: 273-287.

Riquelme, H. and Rickards, T. 1992. Hybrid conjoint analysis: an estimation probe in new venture decisions. *Journal of Business Venturing*. 7: 505-518.

Sapienza, H.J., Amason, A.C. and Manigart, S. 1994. The level and nature of venture capitalist involvement in their portfolio companies: a study of three European countries. *Managerial Finance*. 20(1): 3-17.

Sandberg, W.R., Schweiger, D.M. and Hofer, C.W. 1988. Use of verbal protocols in determining venture capitalists' decision process. *Entrepreneurship Theory and Practice*. 13: 182-196.

Shepherd, D.A. and Zacharakis, A. 1999. Conjoint analysis: a new methodological approach for researching the decision policies of venture capitalists, *Venture Capital*, 1 (3): 197 – 217.

Shepherd, D. A. and Zacharakis, A. 2002. Venture capitalists' expertise: a call for research into decision aids and cognitive feedback. *Journal of Business Venturing*. 26(3): 81-91.

Shepherd, D. A., Zacharakis, A. & Robert, A. J. 2003. VCs' Decision Processes: Evidence suggesting more experience may not always be better. *Journal of Business Venturing*. 18: 381-401.

Stuart, T.E., Hoang, H. and Hybels, R.C. 1999. Interorganizational Endorsements and the performance of entrepreneurial ventures. *Administrative Science Quarterly*. 44: 315-349.

Tyebjee, T.T. and Bruno, A.V. 1984. A model of VC investment activity. *Management Science*. 30: 1051-1066.

Zacharakis, A.L. and Meyer, G.D. 1995. The venture capitalist decision: understanding process versus outcome. *Frontiers of Entrepreneurship Research*, 465-478.

Zacharakis, A. and Meyer, G.D. 1998. A lack of insight: do Venture Capitalists really understand their own decision process? *Journal of Business Venturing*. 13: 57-76.

Zacharakis, A. and Meyer, G.D. 2000. The potential of actuarial decision models: can they improve the venture capital investment decision? *Journal of Business Venturing*. 15: p. 323-334.

Table 1: Trade-off table conjoint analysis

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	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 16) protection is not possible
	7) Platform technology	17) it is a platform technology 18) it is no platform technology
E) Targeted market	8) Location	19) the market is regional 20) the market is global
	9) Size	21) it is a niche market 22) it is a mainstream market
	10) Growth	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%

Figure 1 : Example business proposal scored by investment manager

You will be presented a project with following features

- The team is NOT COMPLEMENTARY and has NO BUSINESS EXPERIENCE
- The entrepreneur is a LEADER with PERSEVERANCE, with whom you have a GOOD contact
- The company will play on a WORLDWIDE NICHE market with HIGH growth potential
- The product is UNIQUE and can be PROTECTED, and is ALREADY ACCEPTED by the market
- We can speak of a PLATFORM technology
- We expect break -even AFTER MORE THAN 3 YEARS and a return which is LOWER THAN 30%

Your scores for this project as an investment opportunity?

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 2: Sample of European early stage high tech investors

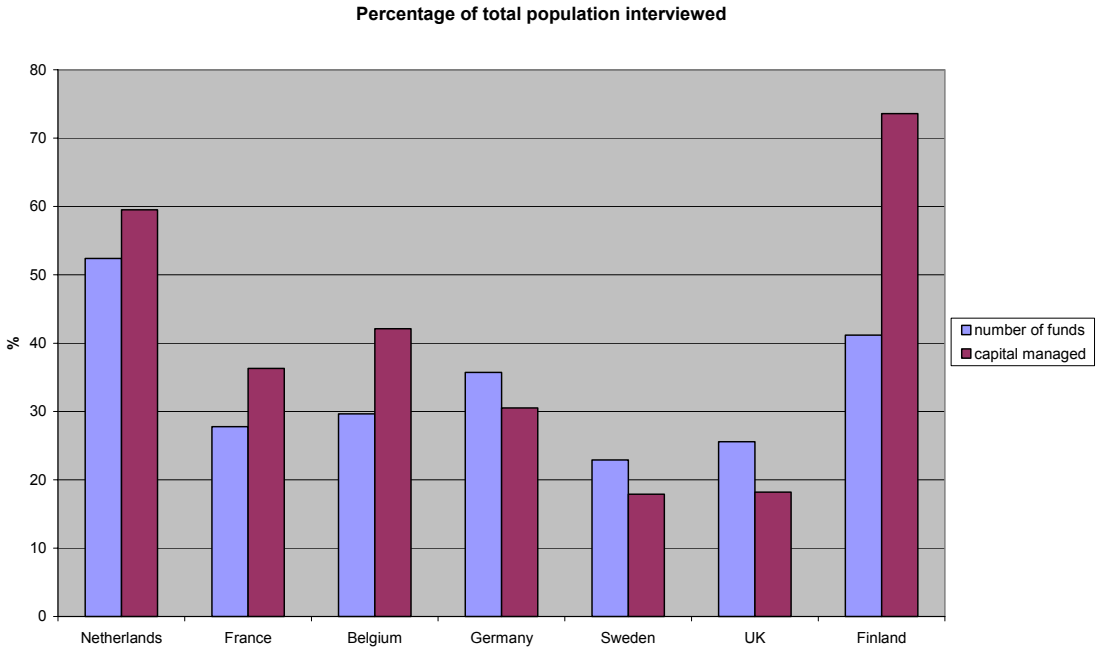

Table 3: Definitions given to selection criteria

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

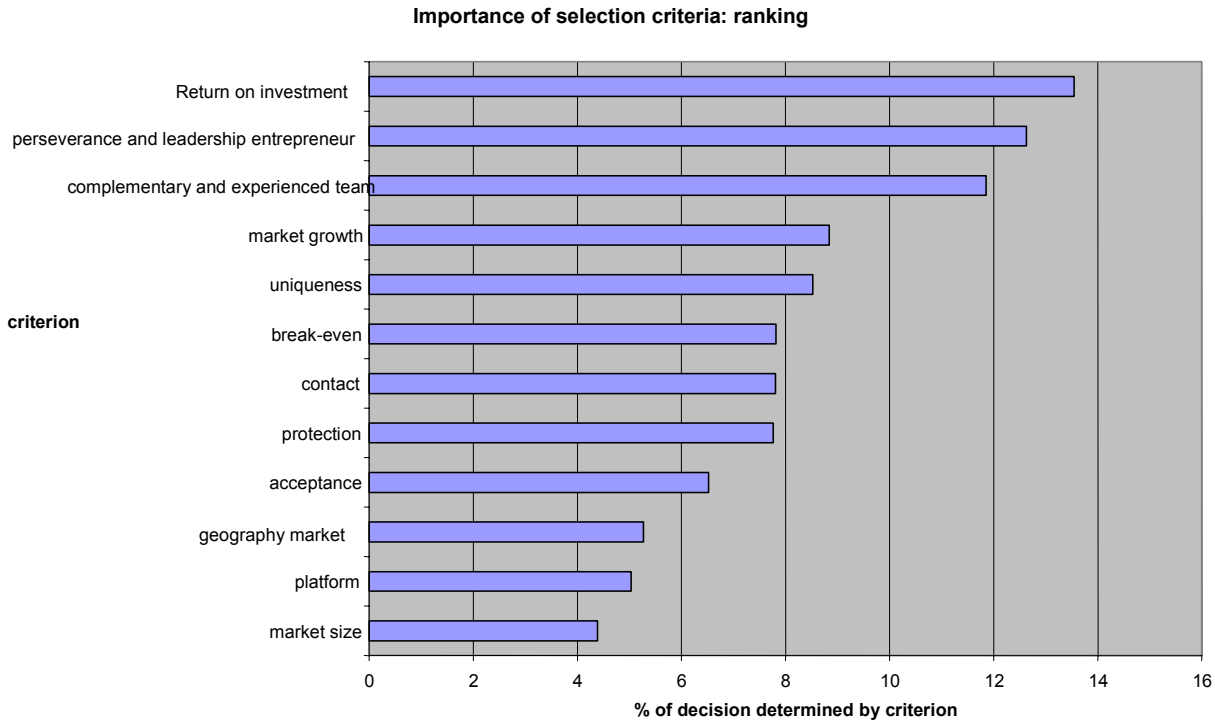

Table 4: Descriptive statistics of importance scores - results of conjoint analysis

	Minimum	Maximum	Mean	Std. Deviation
Importance team	.97	29.14	11.85	6.19
Importance leader	1.85	33.33	12.64	7.92
Importance contact	.00	46.19	7.81	7.85
Importance market size	.00	20.43	4.39	3.34
Importance market growth	.00	26.25	8.84	5.57
Importance geograph market	.00	17.24	5.27	3.88
Importance platform	.00	14.49	5.03	3.81
Importance protection	.00	30.14	7.76	6.45
Importance uniqueness	.00	17.59	8.53	4.30
Importance acceptance	.00	25.81	6.52	5.44
Importance break-even	.00	19.93	7.82	3.69
Importance ROI	.00	44.71	13.55	8.71

Table 5: Selection profile (means and standard deviations): results from cluster analysis[6]

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

[6] The table reports means and standard deviations of importance scores for each selection criterion. Importance scores can range between 0 and 100, with 0 being no importance attached to the criterion and 100 meaning that only that specific criterion is important. Importance scores for all selection criteria for one respondent add up to 100

Table 6: Conjoint analysis results by investor type[7]

	Financial investors	Technology investors	People investors
Venture Team	**11.91**	7.77	**14.71**
Competence Lead entrepreneur	8.69	8.42	**19.78**
Contact with the VC	4.37	**11.70**	7.16
Market Size	4.04	5.13	4.02
Market Growth	**10.02**	**9.54**	7.34
Market Location	4.00	7.68	4.19
Platform Technology	4.94	6.12	4.18
Protection Ability	6.12	**12.45**	5.06
Uniqueness	7.80	**9.29**	8.44
Market Acceptance	5.85	5.74	7.70
Time to Break-even	7.99	6.82	**8.53**
Return on Investment	**24.25**	**9.33**	**8.88**

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 bold

[7] The table reports means and standard deviations of importance scores for each selection criterion. Importance scores can range between 0 and 100, with 0 being no importance attached to the criterion and 100 meaning that only that specific criterion is important. Importance scores for all selection criteria for one respondent add up to 100

Table 7: Univariate Statistics

	Financial Investors	Technology Investors	People Investors	Overall
Origin of Funds				
Holding	45%	27%	46%	40%
Captive	15%	0%	4%	6%
% public capital**	8%	32%	22%	21%
Sectoral				
Biotech*	45%	77%	50%	57%
ICT**	95%	68%	92%	85%
Industrial Automation**	10%	27%	50%	31%
Other	15%	36%	29%	29%
Investment Manager				
Business Education*	55%	57%	83%	66%
Academic Experience*	5%	23%	5%	11%
Banking Experience**	25%	13%	46%	29%
Entrepreneurial Experience	15%	14%	17%	15%
Prior Experience as manager of other funds	20%	10%	33%	21%

Chi-Square Test. 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	-1.600	-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

UNIVERSITEIT GENT

FACULTEIT ECONOMIE EN BEDRIJFSKUNDE
HOVENIERSBERG 24
9000 GENT

Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

04/219 **G. POELS, A. MAES, F. GAILLY, R. PAEMELEIRE**, The Pragmatic Quality of Resources-Events-Agents Diagrams: an Experimental Evaluation, January 2004, 23 p.

04/220 **J. CHRISTIAENS,** Gemeentelijke financiering van het deeltijds kunstonderwijs in Vlaanderen, Februari 2004, 27 p.

04/221 **C.BEUSELINCK, M. DELOOF, S. MANIGART**, Venture Capital, Private Equity and Earnings Quality, February 2004, 42 p.

04/222 **D. DE CLERCQ, H.J. SAPIENZA**, When do venture capital firms learn from their portfolio companies?, February 2004, 26 p.

04/223 **B. LARIVIERE, D. VAN DEN POEL**, Investigating the role of product features in preventing customer churn, by using survival analysis and choice modeling: The case of financial services, February 2004, 24p. (published in *Expert Systems with Applications,* 2004)

04/224 **D. VANTOMME, M. GEUENS, J. DE HOUWER, P. DE PELSMACKER**, Implicit Attitudes Toward Green Consumer Behavior, February 2004, 33 p.

04/225 **R. I. LUTTENS, D. VAN DE GAER**, Lorenz dominance and non-welfaristic redistribution, February 2004, 23 p.

04/226 **S. MANIGART, A. LOCKETT, M. MEULEMAN et al.**, Why Do Venture Capital Companies Syndicate?, February 2004, 33 p.

04/227 **A. DE VOS, D. BUYENS**, Information seeking about the psychological contract: The impact on newcomers' evaluations of their employment relationship, February 2004, 28 p.

04/228 **B. CLARYSSE, M. WRIGHT, A. LOCKETT, E. VAN DE VELDE, A. VOHORA**, Spinning Out New Ventures: A Typology Of Incubation Strategies From European Research Institutions, February 2004, 54 p.

04/229 **S. DE MAN, D. VANDAELE, P. GEMMEL**, The waiting experience and consumer perception of service quality in outpatient clinics, February 2004, 32 p.

04/230 **N. GOBBIN, G. RAYP,** Inequality and Growth: Does Time Change Anything?, February 2004, 32 p.

04/231 **G. PEERSMAN, L. POZZI,** Determinants of consumption smoothing, February 2004, 24 p.

04/232 **G. VERSTRAETEN, D. VAN DEN POEL,** The Impact of Sample Bias on Consumer Credit Scoring Performance and Profitability, March 2004, 24 p. (forthcoming in *Journal of the Operational Research Society*, 2004).

04/233 **S. ABRAHAO, G. POELS, O. PASTOR,** Functional Size Measurement Method for Object-Oriented Conceptual Schemas: Design and Evaluation Issues, March 2004, 43 p.

04/234 **S. ABRAHAO, G. POELS, O. PASTOR,** Comparative Evaluation of Functional Size Measurement Methods: An Experimental Analysis, March 2004, 45 p.

04/235 **G. PEERSMAN,** What caused the early millennium slowdown? Evidence based on vector autoregressions, March 2004, 46 p. (forthcoming in *Journal of Applied Econometrics*, 2005)

04/236 **M. NEYT, J. ALBRECHT, Ph. BLONDEEL, C. MORRISON,** Comparing the Cost of Delayed and Immediate Autologous Breast Reconstruction in Belgium, March 2004, 18 p. (forthcoming in *British Journal of Plastic Surgery,* 2005)

04/237 **D. DEBELS, B. DE REYCK, R. LEUS, M. VANHOUCKE,** A Hybrid Scatter Search / Electromagnetism Meta-Heuristic for Project Scheduling, March 2004, 22 p. (forthcoming in *European Journal of Operational Research*, 2005).

04/238 **A. HEIRMAN, B. CLARYSSE,** Do Intangible Assets and Pre-founding R&D Efforts Matter for Innovation Speed in Start-Ups?, March 2004, 36 p.

UNIVERSITEIT GENT

FACULTEIT ECONOMIE EN BEDRIJFSKUNDE
HOVENIERSBERG 24
9000 GENT

Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

04/239 **H. OOGHE, V. COLLEWAERT,** Het financieel profiel van Waalse groeiondernemingen op basis van de positioneringsroos, April 2004, 15 p.

04/240 **E. OOGHE, E. SCHOKKAERT, D. VAN DE GAER,** Equality of opportunity versus equality of opportunity sets, April 2004, 22 p. (forthcoming in *Social Choice and Welfare*, 2005).

04/241 **N. MORAY, B. CLARYSSE,** Institutional Change and the Resource Flows going to Spin off Projects: The case of IMEC, April 2004, 38 p. (forthcoming in *Research Policy*, 2005).

04/242 **T. VERBEKE, M. DE CLERCQ,** The Environmental Kuznets Curve: some really disturbing Monte Carlo evidence, April 2004, 40 p.

04/243 **B. MERLEVEDE, K. SCHOORS,** Gradualism versus Big Bang: Evidence from Transition Countries, April 2004, 6 p.

04/244 **T. MARCHANT,** Rationing : dynamic considerations, equivalent sacrifice and links between the two approaches, May 2004, 19 p.

04/245 **N. A. DENTCHEV,** To What Extent Is Business And Society Literature Idealistic?, May 2004, 30 p.

04/246 **V. DE SCHAMPHELAERE, A. DE VOS, D. BUYENS,** The Role of Career-Self-Management in Determining Employees' Perceptions and Evaluations of their Psychological Contract and their Esteemed Value of Career Activities Offered by the Organization, May 2004, 24 p.

04/247 **T. VAN GESTEL, B. BAESENS, J.A.K. SUYKENS, D. VAN DEN POEL, et al.,** Bayesian Kernel-Based Classification for Financial Distress Detection, May 2004, 34 p. (forthcoming in *European Journal of Operational Research*, 2004)

04/248 **S. BALCAEN, H. OOGHE,** 35 years of studies on business failure: an overview of the classical statistical methodologies and their related problems, June 2004, 56 p.

04/249 **S. BALCAEN, H. OOGHE,** Alternative methodologies in studies on business failure: do they produce better results than the classical statistical methods?, June 2004, 33 p.

04/250 **J. ALBRECHT, T. VERBEKE, M. DE CLERCQ,** Informational efficiency of the US SO_2 permit market, July 2004, 25 p.

04/251 **D. DEBELS, M. VANHOUCKE,** An Electromagnetism Meta-Heuristic for the Resource-Constrained Project Scheduling Problem, July 2004, 20 p.

04/252 **N. GOBBIN, G. RAYP**, Income inequality data in growth empirics : from cross-sections to time series, July 2004, 31p.

04/253 **A. HEENE, N.A. DENTCHEV,** A strategic perspective on stakeholder management, July 2004, 25 p.

04/254 **G. POELS, A. MAES, F. GAILLY, R. PAEMELEIRE,** User comprehension of accounting information structures: An empirical test of the REA model, July 2004, 31 p.

04/255 **M. NEYT, J. ALBRECHT,** The Long-Term Evolution of Quality of Life for Breast Cancer Treated Patients, August 2004, 31 p.

04/256 **J. CHRISTIAENS, V. VAN PETEGHEM,** Governmental accounting reform: Evolution of the implementation in Flemish municipalities, August 2004, 34 p.

04/257 **G. POELS, A. MAES, F. GAILLY, R. PAEMELEIRE,** Construction and Pre-Test of a Semantic Expressiveness Measure for Conceptual Models, August 2004, 23 p.

04/258 **N. GOBBIN, G. RAYP, D. VAN DE GAER,** Inequality and Growth: From Micro Theory to Macro Empirics, September 2004, 26 p.

UNIVERSITEIT GENT

FACULTEIT ECONOMIE EN BEDRIJFSKUNDE
HOVENIERSBERG 24
9000 GENT

Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

04/259 **D. VANDAELE, P. GEMMEL,** Development of a measurement scale for business-to-business service quality: assessment in the facility services sector, September 2004, 30 p.

04/260 **F. HEYLEN, L. POZZI, J. VANDEWEGE,** Inflation crises, human capital formation and growth, September 2004, 23 p.

04/261 **F. DE GRAEVE, O. DE JONGHE, R. VANDER VENNET,** Competition, transmission and bank pricing policies: Evidence from Belgian loan and deposit markets, September 2004, 59 p.

04/262 **B. VINDEVOGEL, D. VAN DEN POEL, G. WETS,** Why promotion strategies based on market basket analysis do not work, October 2004, 19 p. (forthcoming in *Expert Systems with Applications*, 2005)

04/263 **G. EVERAERT, L. POZZI,** Bootstrap based bias correction for homogeneous dynamic panels, October 2004, 35 p.

04/264 **R. VANDER VENNET, O. DE JONGHE, L. BAELE,** Bank risks and the business cycle, October 2004, 29 p.

04/265 **M. VANHOUCKE,** Work continuity constraints in project scheduling, October 2004, 26 p.

04/266 **N. VAN DE SIJPE, G. RAYP,** Measuring and Explaining Government Inefficiency in Developing Countries, October 2004, 33 p.

04/267 **I. VERMEIR, P. VAN KENHOVE,** The Influence of the Need for Closure and Perceived Time Pressure on Search Effort for Price and Promotional Information in a Grocery Shopping Context, October 2004, 36 p. (published in *Psychology & Marketing,* 2005).

04/268 **I. VERMEIR, W. VERBEKE**, Sustainable food consumption: Exploring the consumer attitude – behaviour gap, October 2004, 24 p.

04/269 **I. VERMEIR, M. GEUENS**, Need for Closure and Leisure of Youngsters, October 2004, 17 p.

04/270 **I. VERMEIR, M. GEUENS**, Need for Closure, Gender and Social Self-Esteem of youngsters, October 2004, 16 p.

04/271 **M. VANHOUCKE, K. VAN OSSELAER**, Work Continuity in a Real-life Schedule: The Westerschelde Tunnel, October 2004, 12 p.

04/272 **M. VANHOUCKE, J. COELHO, L. V. TAVARES, D. DEBELS**, On the morphological structure of a network, October 2004, 30 p.

04/273 **G. SARENS, I. DE BEELDE**, Contemporary internal auditing practices: (new) roles and influencing variables. Evidence from extended case studies, October 2004, 33 p.

04/274 **G. MALENGIER, L. POZZI**, Examining Ricardian Equivalence by estimating and bootstrapping a nonlinear dynamic panel model, November 2004, 30 p.

04/275 **T. DHONT, F. HEYLEN**, Fiscal policy, employment and growth: Why is continental Europe lagging behind?, November 2004, 24 p.

04/276 **B. VINDEVOGEL, D. VAN DEN POEL, G. WETS**, Dynamic cross-sales effects of price promotions: Empirical generalizations, November 2004, 21 p.

04/277 **J. CHRISTIAENS, P. WINDELS, S. VANSLEMBROUCK,** Accounting and Management Reform in Local Authorities: A Tool for Evaluating Empirically the Outcomes, November 2004, 22 p.

04/278 **H.J. SAPIENZA, D. DE CLERCQ, W.R. SANDBERG**, Antecedents of international and domestic learning effort, November 2004, 39 p.

04/279 **D. DE CLERCQ, D.P. DIMO**, Explaining venture capital firms' syndication behavior: A longitudinal study, November 2004, 24 p.

UNIVERSITEIT GENT

FACULTEIT ECONOMIE EN BEDRIJFSKUNDE
HOVENIERSBERG 24
9000 GENT

Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER SERIES

04/280 **T. FASEUR, M. GEUENS**, Different Positive Feelings Leading to Different Ad Evaluations: The Case of Cosiness, Excitement and Romance, November 2004, 17 p.

04/281 **B. BAESENS, T. VAN GESTEL, M. STEPANOVA, D. VAN DEN POEL**, Neural Network Survival Analysis for Personal Loan Data, November 2004, 23 p. (Forthcoming in *Journal of the Operational Research Society*)

04/282 **B. LARIVIÈRE, D. VAN DEN POEL**, Predicting Customer Retention and Profitability by Using Random Forests and Regression Forests Techniques, December 2004, 30 p. (Forthcoming in *Expert Systems with Applications*, 2005).

05/283 **R. I. LUTTENS, E. OOGHE,** Is it fair to "make work pay"?, January 2005, 28 p.

05/284 **N. A. DENTCHEV,** Integrating Corporate Social Responsibility In Business Models, January 2005, 29 p.

05/285 **K. FARRANT, G. PEERSMAN**, Is the exchange rate a shock absorber or a source of shocks? New empirical evidence, January 2005, 26 p. (forthcoming *Journal of Money Credit and Banking*, 2005)

05/286 **G. PEERSMAN**, The relative importance of symmetric and asymmetric shocks and the determination of the exchange rate, January 2005, 24 p.

05/287 **C. BEUSELINCK, M. DELOOF, S. MANIGART**, Private Equity Investments and Disclosure Policy, January 2005, 44 p.

05/288 **G. PEERSMAN, R. STRAUB**, Technology Shocks and Robust Sign Restrictions in a Euro Area SVAR, January 2005, 29 p.

05/289 **H.T.J. SMIT, W.A. VAN DEN BERG, W. DE MAESENEIRE**, Acquisitions as a real options bidding game, January 2005, 52 p.

05/290 **H.T.J. SMIT, W. DE MAESENEIRE**, The role of investor capabilities in public-to-private transactions, January 2005, 41 p.

05/291 **A. VEREECKE, S. MUYLLE**, Performance Improvement Through Supply Chain Collaboration: Conventional Wisdom Versus Empirical Findings, February 2005, 33 p.

05/292 **A. PRINZIE, D. VAN DEN POEL**, Incorporating sequential information into traditional classification models by using an element/position- sensitive SAM, February 2005, 32 p. (Forthcoming in *Decision Support Systems*).

05/293 **D. DEBELS, M. VANHOUCKE**, A Decomposition-Based Heuristic For The Resource-Constrained Project Scheduling Problem, February 2005, 25 p.

05/294 **D. DEBELS, M. VANHOUCKE**, A Bi-Population Based Genetic Algorithm for the Resource-Constrained Project Scheduling Problem, February 2005, 10 p.

05/295 **W. VANDEKERCKHOVE, N.A. DENTCHEV** Network perspective on stakeholder management: Facilitating entrepreneurs in the discovery of opportunities, February 2005, 31 p.

05/296 **N. MORAY, B. CLARYSSE,** Institutional Origin and Resource Endowments to Science-Based Entrepreneurial Firms: A European Exploration, February 2005, 39 p.