Determinants of required return in venture capital investments: A five country study*

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Abstract

Using two complementary theoretical perspectives, we develop hypotheses regarding the determinants of the return required by venture capitalists and test them on a sample of over 200 venture capital companies (VCCs) located in five countries. Consistent with resource based theory, we find that early stage specialists require a significantly higher return than other VCCs when investing in later stage ventures. Consistent with financial theory, we find that acquisition /buyout specialists require a significantly lower return than other VCCs when investing in expansion companies. Furthermore, in comparison to specialists, highly stage-diversified VCCs require a significantly higher return for early stage investments. Independent VCCs require a higher rate of return than captive or public VCCs. In general, higher required returns are associated with VCCs providing more intensity of involvement, having shorter expected holding period of the investment, and being located in the US or UK (in comparison to those in France, Belgium, and the Netherlands).

Key-words

Required Return, Venture Capital, Investments

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INTRODUCTION

Conventional financial theory asserts that in perfect financial markets the return required for a project by a rational investor is influenced by two factors: the risk of the investment project and the return on riskless investment alternatives (Brealey and Myers, 1996). By holding a diversified portfolio of investments, however, investors are able to diversify their risk positions and thus reduce total portfolio risk. Such a theory implies that investors do not require a higher return for an investment project with a higher idiosyncratic risk which can be eliminated by investing in several non-related projects.

The market for venture capital (VC) investments, however, is far from perfect (Wright and Robbie, 1998). First, not all investors have the same information at the same point in time (Admati and Pfleiderer, 1994). VC investments are mostly private, unquoted companies, with little pressure to divulge information, no financial analysts monitoring them and potential investors knowing considerably less about them than about publicly quoted companies. On the other hand, VC managers are more actively involved in the company than passive investors on the stock market (Elango et al., 1995; Sapienza et al., 1996). Once the investment is made, monitoring and value adding is likely to lead to a more thorough understanding of the business than outside analysts would normally acquire.

Second, VC investments are highly illiquid as they cannot be sold easily at any point in time (Sahlman, 1990). Potential buyers have to be sought and some value for the business has to be agreed upon. This makes trading in private stocks a costly and time-consuming process. Further, VC investments are typically long term investments: for early stage projects it takes approximately five years before investments are mature enough to be sold and often several investment rounds are required before harvesting is possible (Sahlman, 1990).

Third, it is more difficult to fully diversify a portfolio of unquoted investments than one of quoted investments. High information and transaction costs will only be economical when the potential gains from the investment are substantial, resulting in a need for relatively large investments. The amounts invested in a VC project are often a significant part of the total amount of funds at the disposal of the VCC, thus restraining its ability to diversify (Robinson, 1987).

Finally, VC investments are more risky than investments in quoted companies (Schilit, 1993), due to the high business risk faced by this type of companies. In sum, informational difficulties, illiquidity, large investment sizes, and high business risk in VC settings mean that a higher overall return will be required a priori by VCCs than by investors on the stock market. The existence of huge market imperfections implies that idiosyncratic investment risk and other investment characteristics may be as important as market risk in determining required return(Rea,1989).

In this paper, we examine the determinants of the return required by VCCs. We focus on the return for different investment stages, as it is well documented that the stage of development of a company is an important risk dimension. Moreover, VC managers use 'investment stage' as a natural categorization of investments.. Using a risk dimension that is intuitively meaningful to managers increases the validity of the results (McNamara and Bromiley, 1999). Further, we examine return determinants in five different VC markets: the US, the UK, the Netherlands, Belgium and France. This international setting allows us to examine the breadth of applicability of results and to examine differences between countries, an issue of increasing importance for international entrepreneurship research (McDougall and Oviatt, 1997).

This study contributes to our understanding of the critical relation between expected risk and return, an issue central to the strategic management of entrepreneurial efforts (McNamara and Bromiley, 1999). Investors in funds need to be well informed on the a priori required return of VCCs, given their risk profile, in order to be able to optimally allocate the funds of their portfolio. They can benefit from an awareness of the heterogeneity of the VC community across different countries. Entrepreneurs need to be aware of the factors influencing the decisions of VCCs, so that they can anticipate their needs and be better prepared for the investment negotiations. It may also be of interest both to different types of VCCs as well as to policy makers to consider whether non-financial outcomes of VC investing substantively affect the required return sought by independent versus non-independent VCCs; if these are different it may suggest that the performance of captive and publicly supported VCCs ought to be assessed on some measures in addition to financial returns. In short, this study advances knowledge of this highly imperfect market by focusing more thoroughly on the determinants of required returns than has been previously attempted.

The structure of the paper is as follows: in the next section we discuss the theoretical determinants of the required return and develop hypotheses, some of which propose alternative ways of viewing the meaning and sources of higher and lower return or hurdle rates. Then we describe the research method and report the results. Finally, we restate the major conclusions and discuss the implications for entrepreneurs and for further research.

DETERMINANTS OF THE REQUIRED RETURN

The Impact of Specialization on Required Return

Conventional finance theory posits that a positive relationship exists between the risk of an investment and the return required by the investor (Brealey and Myers, 1996). Thanks to diversification, the overall risk of a diversified VC portfolio will not be as high as the average of its individual investments (Manigart et al., 1994). The return required for a less diversified portfolio of investments should thus be higher than for a well-diversified portfolio (Norton and Tenenbaum, 1993), everything else equal. The more the VC portfolio is focused or specialized in a specific investment stage, the more the outcomes of the investments will be correlated with each other. Therefore, the resulting risk should mean that a VCC specialized in a specific investment stage will require a higher return than a non-specialized VCC.

In a perfect market, the only important risk dimension is the degree to which an investment or portfolio of investments varies with fluctuations in "the market" or in the economy at large. Specific business risk factors, such as technological or market development or the development stage of the company, are unimportant because they can be diversified away. Some VCCs, however, concentrate their investments in specific stages of the development of companies, for example in early stage investments or in management buy-outs (Robinson, 1987). Manigart et al. (1994) have shown that specialized VCCs in Europe have a higher systematic risk than generalist VCCs. Conventional finance theory suggests, for example, early stage VCCs will require a higher return for an investment in an early stage venture, as this investment increases the specialization for these VCCs. On the other hand, when investing in an early stage company, a non-early stage VCC increases its portfolio diversification and thus lowers its overall risk. In short, a financial theory perspective suggests that investing in a company that matches the existing profile will increase unsystematic risk whereas

investing in a non-matching company should decrease this risk. Hence, the following hypothesis is suggested:

H1A Specialized VCCs will require a higher return than non-specialized VCCs for investments in their area of specialization.

Resource-based theories come to the opposite prediction, however. The resource-based view characterizes the firm as a collection of tangible and intangible resources. Competitive advantage for the firm is seen to derive from the accumulation of hard to imitate internal resources (Barney, 1991). With respect to VCCs, specializing in a specific investment stage allows VC managers to gain a better understanding of the specifics for that particular investment stage. This deeper knowledge allows them to make better investment decisions than VC managers not specialized in that investment stage and to select the appropriate companies to invest in. Their superior understanding will allow them both to assess inherent risks and to monitor the investee company more effectively thus lowering business risk. Both effects lead to the assertion that, a priori, specialized VCCs will require a lower return for an investment in their area of specialization, everything else equal. Hence, the following hypothesis is suggested:

H1B Specialized VCCs will require a lower return than non-specialized VCCs for investments in their area of specialization.

Impact of Monitoring and Value-Adding on Required Return

In a highly imperfect VC market, agency risks and business risks are likely to become important (Sapienza and Gupta, 1994). Agency risk refers to the risk that the ability of the entrepreneur is lower than expected or that the entrepreneur may take actions in his/her personal interest, but which destroy value for the VCC (Admati and Pfleiderer, 1994; Amit et al., 1990 ; Sapienza and Gupta, 1994VCCs may reduce agency risk by closely monitoring the investee companies after the investment is made. Thanks to this monitoring, entrepreneurs are less able to get away with opportunistic actions that destroy company value. While Gorman and Sahlman (1989) and Sapienza (1992) both found monitoring to be heaviest in early stage ventures, MacMillan et al. (1989) and Elango et al. (1995) found no relationship between stage and involvement. Thus, there appears mixed evidence as regards to whether stage affects the level and type of involvement. In any case, one purpose of monitoring would appear to be to lower agency or business risks or both. Therefore, according to finance theory, the presence of mechanisms to monitor should lower the perceived variability of

future performance and lower the required return. Hence, this line of argument leads to the following hypothesis:

H2A More monitoring and assistance leads to a lower required return.

Venture involvement is costly to VCCs, because it is time intensive. Therefore, VC managers will invest their time only to the extent that they expect that the venture will be worth more with a hands-on approach than with a hands-off approach (MacMillan et al., 1989). Recent theorists (see Wright and Robbie, 1998; Manigart and Sapienza, 1999 for extensive reviews) have questioned whether the role of a VC manager is better characterized as that of value protector (i.e., one who seeks to minimize venture downside risk) or value enhancer (i.e., one who seeks to maximize venture upside potential). The latter characterization is consistent with resource-based theory which suggests that sustaining competitive advantage requires that a firm create unique skills that create rent-producing value (Barney, 1991). Thus, VCCs are compensated for their value-adding monitoring and assistance by requiring higher returns from ventures in their portfolios in which they are highly active. This logic leads to the following hypothesis:

H2B More monitoring and assistance leads to a higher required return.

It is worth noting that both of the above hypotheses posit benefits to involvement. The contrast is in presumptions about the meaning and effects of VC managers' efforts. Finance theory tends to assume that investors cannot directly affect the capacity for returns from investment. Monitoring lowers variability due to agency risks, allowing investors to accept a slightly lower hurdle rate. From this perspective, the return to investors for involvement is a lower level of risk at a given level of return. The value-adding proposition, more consistent with resource-based theory, presumes an effectual role for VC managers. For these, the return to investors for involvement is a higher level of return at a given level of risk. It is quite possible that some VC managers take the former approach and emphasize monitoring in their involvement, that some take the latter approach and emphasize value creation, and that some may attempt both. These differences may explain inconsistencies in past results regarding involvement preferences .

Impact of Type of VCC on Required Return

VCCs may pursue other than purely financial goals, depending on the goals and preferences of their

backers. Although Salman (1990) notes that the most common structure of VCCs in the US is the limited partnership, not all VCCs are constituted in this way, especially in Europe. Public sector VCCs, for example, may emphasize employment creation in a certain area or environmental-friendly investments, rather than purely financial concerns (Lovejoy, 1988; DTI, 1999). For bank affiliates, VC investment activity can be seen as an extension of the services provided to a potentially profitable market segment and as a mechanism for binding clients into the financial investor (Bruno, 1986). Captive VCCs, as a strategic arm of an industrial company, may exist primarily as a means to get a window on technology, to obtain technology licenses or product marketing rights, or to secure international business opportunities (Siegel et al., 1988; Manigart and Struyf, 1997).

Independent VCCs, however, invest money from investors whose major objective can be assumed to be return on investment(Robbie,Wright and Chiplin, 1997). Rationalization by institutional investors of the number of VCCs in which they invest and increasing transparency of the returns being eamed by VCCs (see Wright, Robbie and Albrighton, 1998 for a review) mean that independent VCCs need to demonstrate above average returns if they are to raise subsequent rounds of funds, which may in turn mean that funds' providers discourage diversification. Gatekeepers acting on behalf of funds providers have also increased the pressure on independent VCCs to increase returns. In contrast, captive VCCs may have 'unlimited' access to finance (Woolfman, 1993) and, as mentioned earlier, may have a greater tolerance for lower returns providing that other goals are being met (Robbie, Wright and Chiplin, 1997). Hence, the following hypothesis is suggested:

H3 Independent VCCs require a higher overall return than captive or public sector VCCs.

Impact of Investment Time Horizon on Required Return

The reinvestment problem is a further problem that does not exist in perfect financial markets but is encountered by VCCs. The reinvestment problem arises because, after the sale of a stake in an investment, venture capitalists are unable to reinvest the proceeds immediately in profitable business opportunities, whereas perfect market investors can buy and sell on the spot. The shorter the expected investment horizon of VC investments, the higher the risk of being left with idle cash for some period. Moreover, closed-end funds often have to return exited funds to the original investor; the consequence of this is that VCCs cannot reinvest

the cash to enhance returns. Therefore, VC managers will require a higher return, if their expected holding period is shorter (Stevenson, Muzyka and Timmons, 1987). However, investment stage may be important, hence it is necessary to take investment stage preference into account.

H4: The overall required return is negatively related to the expected investment horizon.

Other Factors Potentially Affecting Required Return

Other factors beyond those suggested by finance and resource-based theories are likely to influence VCCs' required return rates. Apart from the above dimensions, risk and return perceptions and preferences are also likely to be influenced by "constant" factors (Sitkin and Pablo, 1992), such as the individual characteristics of the managers (Laughun, Payne and Crum, 1980), organizational culture (Morgan, 1986), national culture (Hofstede, 1984) and institutional environment (Tyebjee and Vickery, 1988). In this study, we are unable to take individual managerial characteristics into account, but this may not pose a serious limitation in that rate of return and valuation issues are typically determined by the VCC rather than individual investment managers (Wright and Robbie, 1996).

We do control for national context, as the study is undertaken in five countries. Differences in the institutional, legal and cultural environment and in dominant corporate governance systems (Hofstede, 1984) may significantly influence the conduct of business. Previous studies have highlighted the heterogeneity of such venture capital markets across differing countries (Wright, et al., 1992; Manigart, 1994; Sapienza, et al., 1996). In the light of such general evidence, differences may also be expected in the approaches to the valuation of VC projects. Ooghe, et al. (1991) and Murray (1995) argue that market development across different countries is likely to be associated with differences in competition, rates of return, investment stage preferences, and the variety of types of funds' providers.

In each country, VC will have its own unique characteristics. Given that capital markets are more mature and dominant in Anglo-American countries, it may be expected that therein the valuation process is both more developed and more likely to rely on standard corporate finance theory developed in an advanced capital market context (Manigart et al., 1997). In countries where holding and networking structures predominate, such as France, Belgium and the Netherlands (Moerland, 1995), long term relationships are impor-

tant, and frequent, detailed valuation of companies may be less important. Executives in VCCs in different countries may also have very different skills. Furthermore, the primacy of economic return to investors versus regional development, job creation, and the like may vary by country.

Organizational culture of the VCC may also influence required returns in ways not directly suggested by our theoretical framework. As objective proxies for culture, we used size of the VCC (the number of offices), its number of hierarchical layers (Lerner, 1994), and its age. March and Shapira (1987) found that the risk-taking behavior of companies does change over time, and particularly that there is a tendency to underestimate risk as a result of favorable experiences. Thus, the age and size of the VCC may be an important determinant for the overall required return.

Finally, the percentage of small size investments and of early stage investments may reflect variations in perceived risk and may therefore be important for required return.

RESEARCH METHOD AND SAMPLE DESCRIPTION

A questionnaire was designed and pre-tested with UK venture capitalists, advisors and academics (Wright and Robbie, 1996). The questionnaires were translated into French and Dutch, in order to be used in France, Belgium and the Netherlands. They were sent to the full members of the British Venture Capital Association in early 1994 and to the full members of the 'Association Française des Investisseurs en Capital Risque,' the Belgian Venturing Association, the 'Nederlandse Vereniging voor Participatiemaatschapppijen' and to the French, Dutch and Belgian members of the European Venture Capital Association in late 1995 - early 1996 and to 299 US venture capitalists in late 1997. In the US, we randomly sampled 299 VCCs from all those listed in Pratt's Guide to Venture Capital Sources (1997), without regard to regional, industry, or stage preferences. We excluded firms listed as investment bankers among those originally chosen, because they did not fit the classifications in Europe and are not representative of the major types in the US (less than 2%).

In all countries, follow-up reminders were sent after two to three months. An organization-wide response was sought: the cover letter asked senior investment managers to report institutions' perceptions rather than individual approaches. An early pilot study showed that the issues examined here were generally driven

by organization-wide policies. Table 1 shows that the response rate was: 66 completed and usable replies out of 114 questionnaires sent in the UK (58% response rate); 73 of 299 in the US (24% response rate); 32 of 133 in France (24% response rate); 24 of 58 in the Netherlands (41% response rate) and 14 of 28 in Belgium (50% response rate). The VCCs in our sample represent 81% of all new VC investments in the UK, 25% in France, 58% in the Netherlands and 86% in Belgium;[1] thus, the sample includes a high percentage of investors in the European countries. An examination of public data in the US and Europe revealed that respondents were not different from non-respondents in terms of type of VCCs, age of VCC, or any available size measures. Therefore, in addition to the good response rates, these results suggest that our results are likely representative of the countries studied, a point discussed at greater length below.

Insert Table 1 about here

Table 1 gives an overview of sample characteristics. In order to test for representativeness of the sample for the entire VC population in the four European countries, sample characteristics are compared to data from the European Venture Capital Association (EVCA) (see Table 1). Our continental European sample consists of a relatively larger number of independent VCCs compared to the VC industry in the respective countries. The stage distribution of the investments in the sample under study is, moreover, more heavily weighted towards acquisition/buy-out investments, compared to population statistics. The fact that the VCCs in our sample report less early stage investments than found in the EVCA statistics can be explained by the fact that EVCA statistics report the stage distribution of new investments in 1995 only, whereas our sample reports the stage distribution of the current investment portfolio. This sample might thus include investments VCCs entered at the early stage of development, but which have matured and are now reported as an expansion/development investment. For the US sample, tests were carried out for differences between respondents and non-respondents on the basis of capital under management, number of general partners, age of firm, and industry and stage preferences. No significant differences were identified.

[1] The total number of investments our study encompasses are related to the total number of investments in the differing countries as reported in the EVCA Yearbook (1997).

Insert Table 2 about here

Table 2 provides the means, standard deviations, and correlations of the variables used in this study. VCCs were asked to specify their required rates of return for each investment stage. The required return for specific investment stages is reported in 7 categories: less than 20%, from 21% to 25%, from 26% to 30%, from 31% to 35%, from 36% to 45%, from 46% to 55%, and more than 55%. Due to the sensitive nature of the data, we did not ask for a specific number. Moreover, our pre-tests indicated that they did not have a fixed required return in mind, but would rather say "around 30%," for example.

On average, VCCs require a return between 36% and 45% for early stage investments and between 26% and 30% for expansion investments, acquisitions, buy-outs and other later stage categories. Stage specific required rates of return reported are comparable to those in Elango et al. (1995) who found a 42% hurdle rate for early stage investments and 33 % for later stage investments. The return required for early stage investments is significantly higher than the return required for late stage investments in our data, while Elango et al. (1995) found partial support for this statement.

We focused on portfolio diversification along the stage of investment dimension[2] (Norton and Tenenbaum, 1993). Respondents were asked what percentage of their portfolio was invested in early stage ventures, in expansion stage ventures, in MBOs/MBIs or other later stage ventures. When 50% or more is invested in a particular investment stage, the VCC is classified as a specialist of that particular stage. If it does not invest more than 50% in either of the categories, it is classified as a non-specialist. In our sample, 46 VCCs are early stage specialists, 41 are expansion stage specialists, 85 are acquisition/MBO/MBI specialists, while 21 have no particular specialization. We thus measure actual investment behavior (a limitation of the 1992 Gupta and Sapienza study which examined only preferences), which is very close to investment preference in this sample, evidenced by the high correlation between the two variables. Further, we computed a Hirschman index (Hirschman, 1964) as a measure of diversification over investment stages; it may vary between 0 for an undiversified company and 0.67 (n=3) for a company with 33.34% of its activities in each of

[2] We have no data on sectorial investment patterns.

the three investment stages. The mean value in our sample is 0.33.

As proxies for the monitoring intensity of the VCCs, we calculate the number of lead investments as a percentage of total investments (Elango, et al. 1995) and the average number of investments per investment manager. Although Elango et al. did not find a significant correlation between this percentage and involvement, a close inspection of their results shows that when VC managers are in the lead role they put significantly more time in than if they are not in the lead position. We find that almost two thirds of the investments are undertaken as lead investor. On average, each investment manager is involved with 5.6 investments, a figure in line with Gorman and Sahlman (1989), who also found that senior VC managers tended to be more highly involved with a smaller number of portfolio companies than junior staff.

In order to measure the expected investment time horizon, we asked the respondents to indicate how long they expected their average investment in a specific investment stage to remain in their portfolio. Consistent with Robinson (1987), early stage ventures are estimated to take on average 6.16 year to mature, expansion stage ventures 5.10 year and acquisitions or MBO/MBIs 4.74 year.

To control for constant factors likely to affect risk preferences and perceptions at the individual VCC level, we use a variety of measures: the natural log of the age of the VCC (11.06 years on average), the natural log of the number of offices (1.56 offices on average), the natural log of the number of hierarchical layers (1.90 hierarchical layers on average), and a dummy for VCC type (0= captive/public, 1= independent). We also use dummy variables to account for country level constant factors (the base case in this study is the US; Belgium and the Netherlands are taken together, as they show similar investment behavior).

Table 2 shows that the Pearson correlation between independent variables is quite low; most correlations, except for the country dummies, are below 40%. The data are analysed using chi-square analyses and limited dependent variables (LDV) techniques (in the statistical package LIMDEP)[3]. We use the latter instead of OLS regressions because the dependent variable (required return) is reported in 7 discrete return intervals. The LDV technique allows for the dependent variable to be an interval variable and takes the different band-

[3] T-tests for independent samples and Manova analyses are also carried out, but not reported here. They yield results consistent with the other tests.

widths of the intervals into account. The output of LDV are maximum likelihood estimates of parameter coefficients. As a check, we performed the same analyses using OLS and obtained highly similar results.

RESULTS

Impact of Specialization on Required Return. We examined the first set of competing hypotheses (whether investing outside of an area of concentration is associated with lower or higher required return) in two ways. First, we examined the relative level of required return expected by specializers inside and outside their specialities. For this, Table 3 reports the results of chi-squared tests between independent samples. Second, we examined the level of required return by stage as a function of level of stage diversification as well as the other key predictors in this study (type of VCC, involvement intensity, and investment horizon). Table 4 reports the LDV maximum likelihood estimations for required return for early stage investments, for expansion/development stage investments and for management buy-out/acquisition investments.

Insert Table 3 about here

Table 3 shows that stage specialists do not require a significantly different return for investments in their area of specialization than do VCCs not specialized in that particular investment stage. The results show, on the other hand, that early stage specialists require a significantly *higher* return than other VCCs when investing in expansion companies, consistent with resource-based theory.[4] Acquisition/buyout specialists, on the other hand, require a marginally significant *lower* return when investing in expansion companies, consistent with the financial view. This provides mixed results with regard to H1, with neither theory appearing to have received a greater portion of support.

Insert Table 4 about here

Table 4 reports the results of the multivariate analyses and reveals additional information regarding H1. Here, H1 is tested with a continuous 'stage diversification' variable, which may be thought of as

[4] Another explanation for this finding might be that early stage specialists may be doing expansion deals which are on the borderline between early stage and expansion stage. However, given our data, we are unable to test this explanation.

the inverse of specialization. It is shown that highly diversified companies require a significantly higher return for early stage investments (see Column 1) and marginally higher ones for acquisitions or MBO/MBIs (Column 3), while the degree of diversification does not influence required return for expansion stage investments. On balance, therefore, the resource-based explanation (H1B) appears to receive greater support than that offered by finance theory (H1A).

Impact of Monitoring and Assistance on Required Return. Two opposing hypotheses were proposed with respect to the impact of involvement on the required return; a risk reduction (H2A) and a value-adding argument (H2B). We used two proxies for greater intensity of involvement: percentage of investments as lead investors and (the inverse of) the number of investments per VC manager. Table 2 shows that the percentage of lead investments is not correlated with the required return, but the number of investments per venture capital manager is significantly negatively correlated with the required return for expansion investments and for acquisitions/MBO/MBIs. The latter relationship is also confirmed in the multivariate analysis in Table 4, in that the fewer the number of investments per VC manager, the greater is the required return for early stage, for expansion stage, and for acquisition/buyout. Thus, H2B receives strong support. VCC value-added intensity appears associated with a greater required return rate.

The risk reduction hypothesis (H2A) also receives some support. Table 4 shows that there is a significantly negative coefficient for the percentage of lead investments in the early stage model. Taking the lead in the most risky type of investments, namely early stage investments, perhaps reduces the perceived risk and thus the required return. The lead position does not appear to affect required returns in later stage ventures.[5]

Impact of Type of VCC on Required Return. It was expected that independent VCCs would require a higher return than captive or public sector VCCs. Table 3, panel A shows that the mean return required by independent VCCs is significantly higher for every investment stage[6] than that required by

[5] The fact that the number of lead investments has less predictive power may be due to the fact that VCCs may overstate their lead positions. The reliability of this measure may therefore not be as strong as that of number of investments per investment manager to measure monitoring intensity.

[6] Except the chi-square test for IRR early stage.

captive or public VCCs.[7] Multivariate analyses in Table 4 support this finding. The coefficient of the "independent VCC" dummy is positive in all three models and significant for early stage and expansion stage investments. Independent VCCs require a higher return than captive or public VCCs, supporting Hypothesis 3.

Impact of Time Horizon on Required Return. A longer time horizon was expected to lead to a lower required return (H4). The investment horizon is significantly negatively correlated with required return in each specific investment stage (Table 2). The coefficient of this variable is negative in all multivariate models (Table 4); it is marginally significant for early stage and expansion stage investments. Hypothesis 4 thus receives weak support.

Impact of Control Variables. The coefficients of the control variables in the multivariate models (Table 4) show that: 1) compared to their American colleagues, Belgian and Dutch VCCs require a significantly lower after-tax return for all investment stages, and French and British VCCs require a significantly lower return for expansion investments (these findings are confirmed in Table 3, panel B); 2) a higher percentage of small investments leads to a significantly lower required return for all investment stages, and 3) a greater percentage of investment in early stage ventures is associated with higher required returns for early stage investments. The other control variables do not significantly influence the required rates of return.

DISCUSSION

Our key goal in this paper was to shed light on the risk-reward trade-off in the venture capital industry, a highly imperfect capital market. We found, first, that stage diversification is not generally viewed by VC investors as a risk-reduction strategy; however, specialization is associated with lower required returns for early stage ventures. Second, we found being more often in the lead investor role is associated with lower required returns for early stage investments and fewer investments per VCC manager associated with higher required returns. We also found, as predicted, that required returns for independent VCCs are significantly

[7] This finding might be influenced by differences in size of deals in different type of VCCs. However, there is no significant difference in the size of deals of public or private funds (chi-squared test). This is confirmed by the fact that the correlation between the percentage of small size investments and type of VCC is only 0.19 (not significant).

higher than for captive and publicly-supported firms for early stage and expansion stage investments. Finally, we obtained weak support for the prediction that shorter anticipated time horizons are associated with higher required returns. Other interesting relationships were revealed in our data: specifically, required returns vary systematically by stage, average size of investment, and by country.

Our competing hypotheses regarding the association of stage diversification and required returns are based on finance and resource-based theories. As revealed in Table 4 greater stage diversification is generally related to higher required returns, contrary to the finance theory view that diversification would be useful in spreading risk. As suggested by a resource-based view, specialization thus appears more effective in controlling risks. The findings might have been stronger if industry specialization was considered. Unfortunately, we do not have this information.

We expected these relationships between specialization and expected return to be particularly evident for early stage specialists given the higher risks of such a portfolio. Yet, the detailed analysis shown in Panel A of Table 3 does not reveal a consistent effect. Puzzled by these results, we conducted follow-on analyses to more fully understand the responses. First, whereas our data are complete on most measures, we found that firms specializing in early stage ventures often failed to report required returns for very late stages, and those specializing in the latest stage often did not report for early stages. Specifically, an analysis of the 'missing data' is interesting. It shows that 45% of the early stage VCCs do not report a required return for acquisitions/buyouts, and 52% of the acquisition/buyout VCCs do not report a required return for early stage companies. Missing data may therefore contribute to our lack of observed statistical relationships. More important is the possible meaning of this lack of response. We speculate that when a VCC has insufficient knowledge about a particular investment stage, it perceives risk as too high and prefers not to invest, rather than to require an extremely high return. If this is correct, then the specialization hypothesis receives greater support. Consistent with the conclusions reached by Gupta and Sapienza (1992), what this suggests is that VC firms hold preferences consistent with a belief that they can control risks better where they have developed specialized knowledge. A remaining future research challenge is to test whether specialization reduces realized and not just perceived risk, and whether this holds for industry specialization as well.

Finally, the investment behavior of the investors in VCCs may be important in this discussion.[8] Investors, especially limited partners in VC funds, may diversify by investing in VCCs, specialized in different investment stages. In this way, diversification may be a concern for the investors, but not for the VCCs. However, it does not necessarily follow that VCCs should be less concerned about stage diversification. Some are, because they have asymmetric information problems or because they may have skills in certain sectors that can be applied across different stages to spread risk. Further research on goals and requirements of investors is needed. Results regarding involvement intensity provide evidence of both risk protecting mechanisms suggested in finance theory and capability building as suggested in the resource-based view. Taking the role of lead investor allows a VCC greater access to information and greater control over agency and business risks (Sahlman, 1990), especially in early stage ventures (Barney et al., 1989). Our results show that any risk-reducing effects of being the lead investor are significantly associated with lower required returns only in early stage investments. At the same time, our results indicate that fewer investments per VCC manager is associated with higher required returns for early stage and for acquisition/MBO/MBI investments. If this greater intensity were primarily a means of monitoring and reducing risks, then VCCs could accept lower returns on the reduced risks. Instead, the pattern is more consistent with VCCs' demanding a premium for providing greater intensity of assistance. This interpretation is consistent with Rosenstein et al.'s (1993) assertion that an 'elite' set of VCCs add more value than the average firm. Overall, our results suggest that value protection and value adding are not necessarily mutually exclusive: evidence of both exists simultaneously in early stage ventures. Second, as with the results for Hypothesis 1, our results imply that learning and the accumulation of venture-specific capabilities are important for VCCs.

Our findings regarding required returns for independent versus captive and publicly-supported VCCs are consistent with the view that the latter pursue significant goals in addition to achieving financial return. In the UK, local government controlled Enterprise Boards (Lovejoy, 1988) provide long term finance to medium-sized manufacturing companies where they are not available from private sector sources (e.g. in turnaround cases) while Regional Venture Capital Funds (DTI, 1999) being introduced to fund smaller early

[8] We thank the reviewer for pointing this out.

stage, high technology businesses across all regions with the provision of guarantees and requirements for a minimum proportion of funds to be invested in start-up investments.

The implication for entrepreneurs, is that requirements on return are likely to be less severe, but also that they will be expected to produce other outcomes of value to their backers. For corporate backers, such outcomes might include innovation, knowledge transfer, and the like; for public-sponsored backers, they might include job creation, urban renewal, and the like. Both policy makers and researchers, then, should keep in mind these multiple goals in evaluating the output of VCCs. Policy makers should not evaluate VCCs they sponsor solely on their achieved rates of return, and researchers should perhaps seek broader measures of the impact of venture capital-backed activity and should distinguish VCC type in assessments.

Our finding that VCCs require greater returns for shorter time horizons calls for some qualification. First, it should be remembered that VCCs require highest returns for early stage ventures, ventures in whom their capital will be tied up for the longest period. Second, it should be kept in mind that, ceteris paribus, a venture held one year should return a greater *rate* of return than one held three years, not a greater absolute return. Among the other correlates of required returns among our control variables, several were significant and merit comment. First, we observe that the earlier the venture stage, the higher the required return; this replicates the finding of Elango et al. (1995) and is perhaps unsurprising given the higher risk of such ventures. What is very interesting is that the greater the percentage of small sized investments held by a VCC, the lower its required return in all three investment stages. One possible explanation is that such VCCs use the number of investments as a hedge against performance variance, preferring to invest the same amount of money in more ventures; it should be remembered that this significant relationship holds controlling for the number of investments per VCC manager as well as our other proxies for size such as number of offices and hierarchical layers. An alternative explanation is one of reverse causality: perhaps VCCs that have not built a superior reputation are relegated to smaller deals and are forced to accept less favorable returns.

This paper is one of the first to compare differences in required returns between countries and these differences also deserve comment. In general, we find that required returns are greatest in the US and lowest in Belgium and the Netherlands across all stages of investing. France and the UK also have lower required

returns for the expansion stages. Does this imply that competition is higher or that VCCs are better able to control risks in continental European countries? A strict adherence to the standard finance theory assumptions regarding the limited ability of investors to directly influence venture outcomes might lead to such an interpretation. However, as pointed out elsewhere, resource-based views regarding the ability of VCCs to create a knowledge advantage that is translatable into strategic advantage and higher margins is a plausible alternative. Thus, one interpretation is that where greater knowledge and venture-assisting competencies are brought to bear, higher returns can be commanded. From the perspective of individual entrepreneurial firms, these possibilities hold significant implications.

Implications for Entrepreneurs, Policy Makers and VCCs

Previous studies have focused on comparisons between VCCs that emphasize different stages in their investment policies. However, we find that entrepreneurs running a project at a particular investment stage may face different return requirements from different VCCs. Given the danger that being turned down by one investor may harm chances with the next one (Bygrave and Timmons, 1992), entrepreneurs may benefit from knowing investors' expectations and requirementsas they approach investors; however, adjustments to their own venture situation is not always feasible.

If an entrepreneurial team is confident that it needs no advice or other type of hands-on assistance from a VCC, it may wish to seek the profile of a VCC likely to seek the lowest required returns, i.e. captive or public VCCs. In addition to the stage characteristics of the VCC portfolio, entrepreneurs might also realize a price benefit from seeking VCCs whose portfolios are comprised primarily of smaller investments. Finally, Belgian and Dutch VCCs are cheaper than their American, French or British colleagues, and recent trends indicate a greater willingness on the part of VCCs to invest across borders (Baker and Smith, 1998).

Finding the 'cheapest' financing source may be critical for some firms. The pattern of our results, however, suggests that VCCs expect to be compensated not just for taking greater risks but also for having greater expertise and exerting additional effort. This interpretation is consistent with past evidence indicating that VCCs put more time into early stage ventures (Sapienza and Timmons, 1989) and with evidence that VCCs specializing in early stage ventures also specialize by industry (Gupta and Sapienza, 1992). Thus, indi-

rect evidence suggests that VCCs attempt to bring value-adding knowledge to bear on their investments rather than to diversify away the risks. The lower required return rate of VCCs in Belgium and the Netherlands may also reflect a relatively lower level of effort or involvement than their counterparts in the US and the UK, consistent with the findings of Sapienza et al. (1996). These are also considerations that entrepreneurs should keep in mind. Our data do not allow us to examine whether the more expensive capital characteristic of some countries and some VCCs' greater involvement intensity is worth the price. One of many challenges for future research will be to investigate what may determine the most effective and efficient matches between investors and entrepreneurs.

Limitations of This Study and Implications for Further Research

Although this study is one of the most extensive to date on the topic of the determinants of VCCs' required rates of return, several limitations must be kept in mind in interpreting the results. First, our cross sectional design allow us only to infer rather than to test causal relationships. Second, although we attempted to address this issue in the design of the research, an inherent limitation of multi-country studies is that variations in language and culture are likely to impede the extent to which any research instrument will be interpreted and answered in the same manner across settings. Third, we are unable to test the exact meaning of higher or lower required returns. Most critically, it is difficult to know with certainty whether higher requirements relate specifically to greater anticipated risk or greater anticipated VCC effort or both. In short, we believe that future research should try to take additional steps to identify the specific processes, behaviors, and goals of VCC activity to help unravel this meaning. The results of the study and the limitations of our approach suggest several additional areas for further research. A fundamental question, from a theoretical and a practitioner point of view, is whether VC investment strategy matters. Finance theory suggests that in a perfect market picking the right investments up-front and diversifying the portfolio to the desired level of risk is the only strategy that investors should worry about. However, the venture capital market is not a perfect market (Wright and Robbie, 1998). More research must be done to reveal the relative value of diversification versus specialization. Moreover, given the greater importance of monitoring in the venture capital market, there is a need to examine the link between the nature of monitoring (Cable and Shane, 1997) and the re-

quired rate of return.

In conclusion, this study has provided evidence on the determinants of the rate of return required by VCCs, an area of venture capital research that has hitherto received little attention from researchers. Among the most noteworthy findings are the discrepancies across countries and VCC type for the level of required returns. The latter of these is, we think, especially important for it suggests that some VCCs seek to contribute a good deal more than financial returns to investors and partially explains why policy makers may support even "poorly performing" VCCs. On balance, the evidence tends to be more consistent with value adding rather than value protecting roles for VCCs. The evidence also suggested tha t risk reduction and value adding are not necessarily mutually exclusive activities. We look forward to additional research that can penetrate more fully the issues that this work has partially uncovered.

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TABLE 1: Characteristics of the sample

	US	UK	France	The Netherlands	Belgium
Number of responses	73	66	32	24	14
Response rate	24%	58%	24%	41%	50%
Total # of new investments as % of industry total*	N.A.	81%	25%	58%	86%
Investor type					
Independent VCCs	60 (82%)	33 (50 %)	13 (40 %)	15 (62%)	6 (43 %)
% of investments by independent VCCs (EVCA data)	N.A.	57 %	33 %	46%	8%
Stage distribution of investments					
Early	46%	17%	12%	21%	18%
according to EVCA data		6%	14%	28%	32%
Expansion/development	31%	30%	32%	26%	43%
according to EVCA data		44%	50%	50%	50%
Acquisition/buyout/others	23%	53%	56%	53%	39%
according to EVCA data		50%	36%	22%	18%

*: Compared to data from the EVCA statistics (EVCA Yearbook, 1997)

TABLE 2: Descriptive statistics and correlations

	Mean	St.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Independent variables																	
1 Stage diversification	0.33	0.21	1.00														
2 Independent VCC[2]	0.63	0.48	.07	1.00													
3 % lead investments	64.4%	28.1%	-.02	.16	1.00												
4 # investments/VCM [1]	6.55	5.56	.38*	-.08	-.30*	1.00											
Expected investment time horizon for…																	
5 early stage investments [1]	6.16	2.24	-.12	.18	-.02	.06	1.00										
6 expansion investments[1]	5.10	2.12	-.04	-.14	.13	.08	.32	1.00									
7 acquisitions/buyouts[1]	4.74	2.02	-.02	-.10	.36*	.12	.32*	.78*	1.00								
Control Variables																	
8 Age [1]	11.06	7.96	.04	-.06	-.12	.47 *	.06	.05	-.01	1.00							
9 # offices [1]	1.56	1.43	.00	-.04	.05	-.16	.03	-.14	-.07	.04	1.00						
10 # hierarchical layers [1]	1.90	0.84	.06	-.13	-.13	.10	.06	.14	.21*	.12	-.13	1.00					
11 % small size investm.	50.9%	40.0%	0.21*	.19	.11	.19	.19	-.06	.01	.02	-.15	-.04	1.00				
12 % early stage investm.	22.7%	30.2%	-.06	.26*	-.01	-.04	-.07	-.44*	-.27*	.02	.11	-.04	.37*	1.00			
13 UK[2]	0.38	0.49	.09	-.08	.00	.12	.17	.03	-.06	.13	.16	.12	.18	-.20*	1.00		
14 France[2]	0.13	0.34	-.12	-.16	-.08	-.08	-.25*	.12	.07	-.08	-.10	.23*	-.35*	-.15	-.31*	1.00	
15 Belgium, Netherlands[2]	0.14	0.35	.08	-.08	.07	.20*	.13	.50*	.43*	.07	-.06	.12	-.05	-.03	-.32*	-.16	1.00
Dependent Variables																	
IRR early stage[3]	5.30	1.86	.13*	.18	-.15	-.19	-.35*	-.51*	-.51*	-.12	.12	-.25*	-.22	.11	.09	.05	-.43*
IRR expansion[3]	3.48	1.55	-.08	.35*	-.07	-.31*	-.00	-.46*	-.40*	-.13	.15	-.38*	-.10	.32*	-.12	-.24*	-.38*
IRR acquisition/buyout[3]	3.31	1.23	.03	.16	.03	-.33*	-.14	-.49*	-.56*	-.19	.18	-.16	-.16	-.05	.18	-.05	-.44*

[1]: the natural log of the variable is used in the correlations.
[2]: dummy variable
[3:] The required return is reported in 7 categories: less than 20% (category 1), from 21% to 25% (cat. 2), from 26% to 30% (cat. 3), from 31% to 35% (cat. 4), from 36% to 45% (cat. 5), from 46% to 55% (cat. 6) and more than 55% (cat. 7).
*: correlates significant at the 5% level (2-tailed)

TABLE 3: Test results with sample split

Panel A: Split according to investment stage strategy of VCC

	Early stage specialist			Expansion stage specialist			Acquisition/buyout specialist		
	No	Yes		No	Yes		No	Yes	
	mean	mean	p (chi^2)	mean	mean	p (chi^2)	mean	mean	p (chi^2)
IRR Early Stage[1]	5.244	5.284	0.766	5.321	5.086	0.560	5.253	5.268	0.543
IRR Expansion[1]	3.318	3.851	0.024	3.482	3.361	0.496	3.669	3.172	0.114
IRR Acquisition-buyout[1]	3.412	2.853	0.362	3.292	3.370	0.193	3.212	3.400	0.133
N	141	46		146	41		102	85	

[1]: The required return is reported in 7 categories: less than 20% (1), from 21% to 25% (2), from 26% to 30% (3), from 31% to 35% (4), from 36% to 45% (5), from 46% to 55% (6) and more than 55% (7).

Panel B: Split according to ownership status and location of VCC

	Captive/Public	Independent		US & UK	Continental Europe	
	mean	mean	p (chi^2)	Mean	mean	p (chi^2)
IRR Early Stage[1]	4.892	5.505	0.282	5.648	4.455	0.000
IRR Expansion[1]	2.856	3.856	0.005	3.935	2.463	0.000
IRR Acquisition/buyout[1]	2.957	3.404	0.044	3.683	2.388	0.000
N	82	127		139	73	

[1]: The required return is reported in 7 categories: less than 20% (1), from 21% to 25% (2), from 26% to 30% (3), from 31% to 35% (4), from 36% to 45% (5), from 46% to 55% (6) and more than 55% (7).

TABLE 4: Results of the LDV regressions

coefficient (p-value; 2-sided)	Column 1 IRR Early stage	Column 2 IRR Expansion	Column 3 IRR Acquisition / buyout
Constant	76.26	50.13	37.32
	(0.000)	(0.000)	(0.000)
1)*Diversification variables* (H1)			
stage diversification	19.76	-1.67	5.80
	(0.032)	(0.690)	(0.109)
2) *Monitoring variables* (H2)			
% lead investments	-15.40	-4.32	-2.32
	(0.009)	(0.128)	(0.424)
ln(# investments per VCM)	-4.74	-2.30	-1.95
	(0.054)	(0.045)	(0.074)
3) *Affiliation* (H3)			
independent VCC	6.54	3.86	1.46
	(0.083)	(0.013)	(0.246)
4) *Investment horizon* (H4)			
ln(investment horizon)	-7.55	-5.00	-0.91
	(0.170)	(0.104)	(0.724)
5) *Control variables*			
ln(age)	-2.00	0.20	-0.87
	(0.464)	(0.852)	(0.552)
ln(# offices)	-0.01	0.92	1.08
	(0.997)	(0.554)	(0.529)
ln(# hierarchical layers)	-6.26	-2.13	0.42
	(0.188)	(0.277)	(0.865)
% small size investments	-13.09	-5.49	-3.82
	(0.018)	(0.012)	(0.053)
% early stage investments	12.54	2.98	-1.80
	(0.051)	(0.389)	(0.567)
UK	7.09	-4.75	0.24
	(0.136)	(0.019)	(0.886)
France	2.80	-10.40	-3.59
	(0.730)	(0.020)	(0.131)
Belgium, the Netherlands	-11.17	-9.57	-8.49
	(0.075)	(0.001)	(0.001)
N	94	112	101
Adjusted R^2	0.262	0.426	0.187
F-value	3.540	7.339	2.774
Log-likelihood	-140.119	-162.314	-140.615

Note: The figures between brackets are 2-sided p-levels of significance of the coefficients

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