

Risk Management in Venture Capital Investor-Investee Relations

by

Gavin C Reid, Nicholas G Terry and Julia A Smith[†]

Abstract

This paper provides an empirical analysis of risk handling arrangements adopted in the relationship between the venture capital investor and his investee. The theoretical framework adopted is principal-agent analysis, which views the investee as a risk averse agent entering into a risk sharing contract with the investor, a risk neutral (fully diversified) principal. The sample analysed is made up of twenty venture capital investors in the UK over the period 1992-93, and (where available) their corresponding investee(s). These investors accounted for about three quarters of venture capital activity in the UK over this period. The paper reports on evidence gathered by semi-structured interviews with investors and investees, on expected returns, portfolio balance, screening and risk sharing.

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Key words: venture capital, risk management, information asymmetry,
investor-investee relations

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1. Introduction

This paper provides an empirical analysis of risk-management arrangements adopted in the relationship between the venture capital investor and his investee. The underlying theoretical framework, which is explained briefly before the empirical part of the paper, is that of principal-agent analysis. Our use of this framework views the investee as a risk averse, but relatively well informed, agent who is entering into a risk sharing contract with a risk neutral, but relatively poorly informed, principal, the venture capital investor. The asymmetry of information between investor and investee, and their different attitudes to risk, provide the basis for mutually beneficial contracting.

Contemporary empirical evidence on venture capital contracting is analysed from this perspective. This makes reference to a sample of twenty venture capital investors in the UK over the period 1992-93 and, where available, their corresponding investee(s). Semi-structured questionnaires were used in face to face interviews to gather primary source data on the risk management methods adopted by investors and investees. These data were both quantitative and qualitative and were gathered under the headings of *expected returns*, *portfolio balance*, *screening* and *risk sharing*. The overall analysis of investor-investee risk management in this paper is pursued under these headings. It is preceded by a summary of the theoretical background and a brief account of the data and how they were gathered.

2. Theoretical Background

The venture capitalist is a type of financial intermediary [*cf.* Chan (1983)]. Typically, he is handling funds for an upstream client who lacks the skills to be involved in high

risk/high return investment opportunities. Without financial intermediaries investees would flood the market with projects of dubious value, hoping to exploit the ultimate investors' ignorance. This would cause the market for venture capital to fail, denying backing to potentially good projects as investors who have had unhappy involvements with bad projects withdraw from this funding arena. Venture capitalists act as relatively well-informed financial intermediaries who can limit this problem of adverse selection in the market for funds by their skills in handling high risk investments.¹ In acting for upstream clients, they benefit the ultimate investor and the investee alike in keeping active the market for outside equity. In turn, they benefit from the existence of this market by pursuing their trade in a profit maximising fashion.

Although this paper is essentially empirical, our view is that sound applied work should always have a theoretical underpinning. To this end, the general framework we have adopted is that of principal-agent analysis. Previous work [*cf.* Sahlman (1990)] using this framework has focused on the relationship between the upstream client and the venture capitalist. However, in our approach, the *venture capitalist* is thought of as the *principal*, providing a large injection of equity finance for specific investments by the *owner-manager* or *entrepreneur*, to be thought of as the *agent*. In general principal-agent settings [*cf.* Sappington (1991)] the agent is tempted to shirk on effort and to avoid risk once a contract has been agreed with the principal. That is the principal is confronted with the problem of moral hazard. Therefore, the principal seeks to write a contract that will elicit an optimal level of effort and risk sharing. In the specific context of venture capital investor-investee relations, principal-agent analysis typically assumes a risk neutral principal (investor) and an effort and risk averse agent (investee) [*cf.* Chan, Siegel and Thakor (1990)]. If there were no agency problems, the principal (investor) would absorb all the risk and the agent would receive a fixed payment [*cf.* Lambert (1986)]. In fact, in the venture capital world such arrangements are very uncommon, and our data also indicate that they are disliked.² Thus theory suggests agency problems will arise, and practice confirms

their presence. Given that agency problems arise, the issue of how they are resolved, particularly as regards the handling of risk, is subtle. Theoretical work like that of Lambert (1986) suggests that if high risk is encouraging owner-managers to underinvest in the more profitable projects which the investor actually prefers, then improved communications will increase the willingness of the owner-manager to choose the risky projects.

The work that we are reporting on provides a particularly detailed picture of this communication process between investor and investee, and its influence on risk management. As well as providing a coherent framework for examining this process, our work also provides case study 'tests' of the principal-agent approach, in the sense of confirming the relevance of categories used (for example, the form which communication takes, like the provision of management accounts) and the predicted relation between them (for example, the 'trading' of risk and information in the pursuit of contract optimality).

3. Empirical background

Over the period June 1992 to September 1993 we were active in interviewing pairs of investors and investees in the UK venture capital industry. Our sampling frame was provided by the alphabetic listing of venture capital funds in the *Venture Capital Report (4th edn)*. Respondents to our initial postal enquiry constituted the sample of investors, and in each meeting with an investor a request was made to make contact with the investee under discussion. This was generally granted. The data on which we report are made up of twenty investors and sixteen investees. Six investors were unwilling or unable (for example, start-up fund *I*) to provide access to investees, and two investors were willing to provide access to two investees. The latter offers were particularly warmly accepted, as multiple agents add another dimension to the study.

According to data provided by the British Venture Capital Association (BVCA) the total value of venture capital investments undertaken at the time of our field work was about £1,400 million. Our sample of investors included the two largest players in the

UK venture market, and the twenty investors in all accounted for about three quarters of investment activity within this market during the period 1992-93. The average value of investments made in the sample was £0.98 million.

In Mitchell, Reid and Terry (1995) a careful comparison is drawn between our sample of investors and the population of UK investors as specified in the *Venture Capital Report (5th edn)*, the latter being the body of data relevant to our period of field work. They indicate a close correspondence between sample and population characteristics. The main difference between the two is that the average size (for example, by employment, total funds invested) is greater for the sample than for the population, this being explicable by the presence of the two largest UK venture capital investors in the sample. Table 1 provides a summary comparison of some key attributes of investors in the sample and in the population. The typical deal size is similar between sample and population, as are other deal characteristics like maxima and minima for size of equity stakes, number of investment involvements, and average period to exit. These data, allied to the fact that the sample is a high proportion of the population (53%=20/38) lead us to believe that conclusions based on the sample have general validity for the population of investors.

[Table 1 near here]

Investees were obviously far more diverse than investors, and contacts were provided to us on the basis that they were representative of the typical investment involvement. Data are complete for investees on the qualitative dimension, but somewhat less complete, as compared to investors, on the quantitative dimension. In the nature of things, as no full records of all investees exist, it is not possible to provide comparisons between the sample of investees and the population of investees. However, this is of little importance to our study, where the focus of interest is on the relationship of the investor to the investee. Key characteristics of investees are given in Table 2. This information has been obtained from summary data sheets completed

[Table 2 near here]

by investees, in addition to their participating in semi-structured interviews. The data are revealing, and display a number of important features of investee firms. First, they

Characteristics	Average Values	
	Sample	Population
Average Value of Investments (£m)	0.98 (1.12)	0.78 (0.65)
Minimum Equity Stake (%)	6.1 (8.2)	6.3 (6.7)
Maximum Equity Stake (%)	57.6 (19.6)	56.7 (18.7)
Number of Involvements with Investee Per Annum	15.4 (20.8)	10.2 (10.4)
Timescale for Investment (years)	5.0 (1.2)	7.9 (2.3)
Number of Full-Time Venture Capital Executives	7.0 (6.2)	6.5 (4.3)

*Notes: (a) Values given are arithmetic means; standard deviations are in brackets
 (b) Sample has 20 investors; population has 38 investors*

Comparison of Sample and Population Characteristics of UK Venture Capital Investors 1992-93

Table 1

Characteristics	Average Values
Age of Investee Firm (years)	16.6 (20.4)
Number of Employees (full-time)	166.9 (253.7)
Annual Sales (£000s)	12,446.9 (22,279.9)
Net Profit After Tax (£000s)	788.4 (1,368.4)
Proportion of Share Capital Held (%)	38.9 (30.1)
Current Rate of Return (%)	32.7 (39.0)
Forecast Rate of Return at Exit (%)	43.0 (21.6)

Notes: (a) Average values are the arithmetic mean; standard deviations are in brackets

(b) Sample has typically fifteen investees, but incomplete returns on some characteristics are common.

**Characteristics of Typical Investees of
Venture Capital Investors**

Table 2

are not young. None was less than three years old, and the average age was nearly 17 years. Second, whilst technically 'small' (that is, less than 200 employees on average), they are by no means micro-firms. These are firms of substantial scale, and they may even have ambitions for main market listing.³ Third, investees are willing to contemplate a considerable dilution of ownership in order to permit the injection of large amounts of outside equity into the firm. The average proportion of share capital owned by the investee is 39%. The range is from close to zero to 78%, and the median is exactly 50%. Fourth, both the current and expected rates of return⁴ (IRRs) are high, having average values of 33% and 43% respectively.

Overall, what the data of Table 2 suggest is that investors are averse to the high risk exposure of seed corn and start-up financing: indeed are averse to what some might regard as the classical form of business venturing. They limit adverse selection by backing mature small firms. However, even though the main investment involvement is with development capital⁵, investors seek from investees, and get, a relatively high rate of return. Thus in relation to the complete spectrum of all investment opportunities, venture capital investment remains firmly in the high risk/high return category.

The instruments used for gathering data on investors and investees were questionnaires used for conducting semi-structured interviews. Distinct questionnaire designs were used for each case, with the investor questionnaire schedule being more qualitative than the investee schedule. In addition, investors and investees were asked to complete basic data sheets which required them to supply information of the sort displayed in Tables 1 and 2. The full questionnaire designs are too complex and extensive to be reported upon here, and extend well beyond the scope of the subject matter of this paper.⁶ Therefore, so far as the scope of this paper is concerned, Table 3 indicates how the investors were questioned under four main headings. Whilst we

[Table 3 near here]

have for accuracy reported them here, for the sake of convenience elsewhere, we have abbreviated these four main headings to simply: expected returns, portfolio balance,

I Chance outcomes and sure prospects

- Role of chance
- Use of actuarial values
- Certainty equivalents

II Offsetting good outcomes against bad

- Actions that affect chance
- Irreducibility of chance
- Portfolio balance
- Investee numbers and diversification

III Effects of new investees on risk management

- Methods of screening investees
- Portfolio balance consequences (for example, risk/return; by sectoral and regional composition)

IV Sharing risk with the investee

- Investee motivation for risk sharing
(consequences for portfolio balance; implications of differing degrees of risk aversion)
- Investor willingness to accept risk and consequences for investee effort

Summary of Interview Agenda for Investor

Table 3

screening and risk sharing. The investee aspects of risk management and their relation to those of the investor were explored under a similar set of categories, but in a more structured way, using dummy and categorical variables to support the qualitative evidence supplied.⁷ In the discussion of results that follows, these four headings, expected returns, portfolio balance, screening and risk sharing are used to examine risk management among and between investors and investees.

4. Expected returns

Whilst outcomes are typically thought by investors to involve some measure of chance, its exact extent is not always easy to quantify and may only be expressed in qualitative terms. When exact quantification is used, this is typically associated with broader professional judgement. When confronted with a £10m project with only a 1/10 chance of success, most said they would not get involved. Their comments were often forthright: "Not interested" (*A*); "Not worth anything" (*D*); "Not worth its mathematical expectation" (*I*); "We wouldn't touch this type of investment" (*R*). For 78% of investors who responded (14/18), the chance element was very important in reaching an evaluation of the project [*cf.* Column 3 of Table 4]. For 75% (12/16) of

[Table 4 near here]

the responding investors, the chance of failure was so high that the project was evaluated as worthless [*cf.* Column 4 of Table 4]. Only 12.5% (2/16) placed the value of the project at its actuarial value of £1m, and just two investors again (12.5%=2/16) put it at half its actuarial value. Given the choice between £1.2m for certain and a lottery giving £1m with odds 9/10 or £3m with odds 1/10, 59% (10/17) of investors expressed a preference for the risky alternative and 35% (6/17) a preference for the sure thing. Just one investor (6%=1/17) was indifferent between the investments. In

this situation where downside risk is attenuated (investors couldn't get less than £1m) and upside risk is attractive (investors have a reasonable chance, 1/10, of getting £3m) the actuarial value seems a much more reasonable reference point than in the previous example with extreme downside risk (i.e. 9/10 chance of getting nothing).

INVESTOR	Not at all	Moderately	Very	£0	£½m	£1m
A			✓		✓	
B	✓					
C			✓	✓		
D			✓	✓		
E			✓	✓		
F			✓	✓		
G			✓	✓		
H			✓	✓		
I			✓		✓	
J			✓	✓		
K			✓	✓		
L	✓					✓
M			✓	✓		
N	✓			✓		
O	✓					
P						
Q			✓	✓		
R				✓		
S			✓			✓
T			✓	✓		

- Notes: (a) Table relates to questions on a drilling project which can yield £10m, with probability $1/10$, or zero, with probability $9/10$.
 (b) Columns 1 to 3 relate to relevance of the riskiness of the project to its perceived worth to the investor.
 (c) Columns 4 to 6 represent the approximate value of the project before the results come in.
 (d) Further columns (up to £12m by increments of £1m) could be nominated, but were not.

Risk Relevance and Value of Risky Project

Table 4

Investees were fairly unanimous (88%=14/16) in regarding their involvement with the investor as having an element of luck or chance in it. Whilst comments like "luck plays a large part", "it's luck in some ways", "there's always an element of luck", "you take a gamble" feature strongly with investees, these are usually modified by statements like "I certainly don't rely on luck" and "it's [*viz.* the gamble] limited by your own knowledge". This is rather in contrast to investors who emphasise right from the start that luck is not a blind force, that uncertainty can in some measure be controlled (by risk categories, structuring, risk/reward profile, sensitivity analysis *etc.*). With the investor there is a lesser sense of risk being irremediable; whilst with the investee there is a sense that there may be no remedy for risk - it is just there.

When investees were asked the same question as was addressed to investors about choosing between £1.2m for sure and a lottery with £1m mostly (9/10) and £3m occasionally (1/10), a somewhat higher proportion went for the sure thing (44%=7/16, compared to 40%) and a somewhat lower proportion (56%=9/16, compared to 53%) went for the risky alternative. 75% (=12/16) of investees thought that the profitability of a new project was partly a matter of chance, and 75% (=9/12) attached a risk discount to profit for that reason. When confronted with a potential sale of £1m which only had a 50/50 chance of coming off, most investees (59%=10/17) evaluated the worth of the order as zero, but a surprisingly high proportion (35%=6/17) evaluated the worth at its actuarial value of £1/2m. This compared with just 14% of investors nominating the actuarial value. However, in the latter case, the probability of no net reward was much higher (at 9/10). It is also possible that in the latter case the risk situation might have been viewed as a 'one off', whereas in the former (investee) case the connotation is of a repeated risk.

The overall picture that emerges is of investors who are more experienced at risk management than investees; more inclined to want to 'handle' or 'manage' risk; and less inclined to view risk - especially downside risk - as something that must be borne or suffered.

5. Portfolio balance

In approaching the risk management behaviour of the investor, our second interest was in the way in which good outcomes were offset against bad. This was addressed in three ways. First, the investor was asked, for a set of investee involvements, about the extent to which uncertain good and bad outcomes could be balanced by directly influencing the chances of success or failure. Further, the extent to which this process had limits, and thus chance was irreducible, was probed. Second, the actual methods used to bring about an offsetting of good outcomes against bad were investigated, probing especially on devices like the avoidance of single sector or single technology involvements in a given fund. Third, the least number of investees the investor would contemplate in a fund, regarded as a portfolio, was investigated, with particular emphasis on the supposed effect that investee numbers had on risk management.

In approaching investees, our initial interest was in the investee's perceived risk class. Their perceived risk classes were as follows: high 33% (=5/15); medium 13% (=2/15); an low 53% (=8/15). A surprisingly high proportion report a self-appraised low risk category, suggesting investors face a problem of adverse selection. Investees were then asked whether they could undertake actions to limit or modify their exposure to risk, and if so, what they were. Of the twenty investors asked, nineteen answered the question which enquired whether they used methods to offset bad against good outcomes. Of these, the majority (68%=13/19) said they did use such methods. Of the investors who replied, most (71%=10/14) said they avoided single sector involvements and most (71%=10/14) said they would also avoid single technology involvements. Some who would avoid single technology involvement might not avoid single sector involvement. The converse was also true, but

uncommon (one example only). In the latter case, the investor (*H*) said that whilst he was willing to have one cider company in his portfolio, he was not willing to confine his portfolio to alcoholic beverages.

As well as single technology avoidance *per se*, there was also a tendency to high technology avoidance. This was not just a matter of perceived higher risk, but also because "we don't have the expertise to handle them" (*A*), "technology gets obsolete" (*C*), "[experience of] bad outcomes" (*R*). In such cases fear of adverse selection led to this decision rule. Stage of investment was also important for portfolio balance, with a tendency to avoid early stage and start-up investments. In these cases, avoidance of risk, rather than of adverse selection, was the rationale. In this context the computer software industry (*E*), gambling and property development (*Q*) and building (*T*) were regarded as too risky.

Many investors explicitly used the language of portfolio balance in explaining how a fund would be composed. Thus *B* said "Yes, [we] spread the portfolio risk"; *D* said "[we] try to balance out areas, see how it goes before taking another one in that area"; *G* said "sectoral balance is something we do take into account"; *H* said "you wouldn't want the portfolio balanced very heavily to companies which had one chance of success"; *I* said "we try not to get overweight on any one sector"; *K* said "[we] have one or two very high risk investments out of 15 to 20 in any one portfolio"; and *T* said "we stratify by area of activity".

To the extent that the canons of portfolio balance are defied, the existence or acquisition of especially detailed information is usually the reason. In the spirit of Mark Twain's famous statement "put all your eggs in one basket - and watch that basket", investor *L* said "I stay pretty close in touch with the investees and talk to some almost daily on the phone. I wouldn't avoid single sector or single technology involvements". In a similar vein, investor *F* said "because of where we come from, we tend to invest in things that are manufacturing related". Investor *N*, who did not claim to balance his portfolio by sector or technology, said "we check that they [the

investee] have the experience they say - due diligence is important. We check they do stay where they say [they will] and have the experience they claim".

Considered overall, no investors literally used a portfolio balance model (e.g. a Markowitz quadratic programming model). Many, indeed most, did think in portfolio balance terms, but at differing levels of formality. In doing so, this perspective was often modified by a variety of considerations, of which the depth and scope of information on investees were the most important. Thus investor *E* said he did "no arithmetical or statistical analysis. We use our own feelings and judgement"; *I* said "we're not very scientific on this" and *J* said portfolio balance is used "but only in a limited way", it being modified "by judgement of the management involved".

Regarding portfolio size, the average size was 28 investees. The modal size-class was 10 to 15 and the size range was from one (*P* said "one is OK") to 200 (*O* said he "may be over-diversified").⁸ Putting aside the house style reflected in *P*'s response ("each [investee] is treated on its own merits") the very small fund of *A* (5 only) made sense in the context of his use of "relatively safe assured tenancy based property investments under B.E.S. [Business Expansion Scheme]". A widely used rule of portfolio composition was to hold no more than 10% of the portfolio in any one company. A related, but not identical, rule that was commonly used was to have no less than ten investees in a portfolio. A distinction must sometimes be made between a fund and a portfolio. In the early stages of creating a new fund, the number of investees included in it may be small. At this stage such a fund is not truly a portfolio. Sometimes such new funds are created by re-packing a few younger investees from a more mature fund into a new fund, and adding to these further new investees by appeal to portfolio balance principles, combined with broader judgements, as outlined above.

In describing how investee numbers were determined, many investors provided further insight into issues of portfolio balance. Three gave quite detailed accounts of risk management of a portfolio. (i) Investor *C* explained that the absolute size of the fund made a difference to risk management. In the case of *C*, as with most investors

in the sample, the number of venture capital executives was quite limited. One of his funds had a value of £70m. This was best portrayed as 35x£2m investment involvements rather than 140x£0.5m investment involvements. For *C*, the main criteria for portfolio construction were: likelihood of success; prospective return; and portfolio balance. (ii) In the case of investor *F*, a model was built of a desired portfolio, which originally had fifty investees in it. Several funds of different maturities were run simultaneously, and a house rule was that no more than 20% of any one fund should be invested in a single firm. The aim was to spread the cash in each fund over different sectors, and then to further partition this cash amongst different companies, so as to "put a limit on the ultimate risk we take with any one company". (iii) Investor *N* typically had 10 to 20 investees in a portfolio. He paid attention to size distribution within the portfolio and saw a place for balancing large against small investee involvements. One investment was too low, and twenty (worth say £0.25m each on average) was probably just too many. Monitoring was known to be costly ("problems take a lot of time"), so *N* favoured getting into a syndicate agreement with lead investors who would do the controlling. He saw there being a trade off between larger numbers for superior risk management and smaller numbers for tighter monitoring and control. This was a common finding.

Overall, size of portfolio was dictated both by considerations of risk management and by limits to the span of control of venture capital executives. Very often investors contemplated investee numbers in a portfolio which looked well below what is required for fully diversifying risk. Investor *T* made a comment which encapsulates most experience: "We prefer smaller numbers closely monitored to a large portfolio where risk is more diversified". Although this need not imply that monitoring is proactive, it is at least widespread.

6. Screening

Our third area of interest focuses on the use of risk-return analysis, and more generally on ways of evaluating the chances of new investees doing well, rather than badly, in

relation to the returns they promise. This was addressed in two ways. First, investors were asked about the screening methods which they used to decide which propositions to evaluate, and subsequently the type of investment selection procedures they employed. Second, the way in which investees may attempt to modify risk were explored, as well as ways in which risk exposure is communicated to investors.

The use of risk-return analysis for investment was accepted if not universal practice amongst investors.⁹ Some undertook this informally. For example, Investor L said "I don't write down the probabilities. I do it intuitively". Others are more formal, and in some cases highly sophisticated. For example, Investor J said "we want to know the whole range of rates of return across the probabilities from 0% to 100% - i.e. a complete probability distribution of IRRs". Pushing the formality of this analysis further, the concept of risk-return analysis is recognised by venture capitalists when they are engaged in investment selection. As two investors (*D* and *H*) stated "The greater the risk, the greater the return required"; and "The higher the projected return, the higher the chance of them doing badly". However, within the context of venture capital investment, the progression between levels of risk and the compensatory levels of return required is probably not proportional, but rather increasing. This is evidenced by the generally accepted minimum target rates of return being typically set at no less than 25%, and up to 40% to accept any risk at all. This means that the risk-return locus starts at a base level of 25% or more, rises rapidly and quickly reaches a level of risk for which the required upside gain to accept it is probably without limit. The dominant view among venture capital investors is that without the prospect of significant upside gains in all situations of non-trivial risk the deal is not worth doing. This is exemplified by the statement of investor *G* that "[we] will only make the investment if we feel a very high level of confidence that the plan will succeed". It is this expectation on the part of investors that is one of the most likely explanations of why business plans, submitted by potential investee firms, contain an over-estimate of what can be achieved. As investee *N* put it, "We were bullish as we were desperate to do this [*viz.* the deal]".

Given these investor expectations, how do they evaluate the chances of new investees doing well rather than badly in relation to the returns promised? The business plan is the platform from which information is taken to begin the process of investment selection. The evaluation by the venture capital investor starts from the proposition that the information provided in the plan is optimistic, especially within the time-scale and for the type of exit route preferred by the investor. A typical view would be, for example, that of investor *N*: "We look at the realism of the assumptions underlying the [business] plan. We test projections heavily, analyse markets and check that costs are reasonable for sales levels". This is not surprising given that the business plan is likely to have been prepared by an accountant who would intend it to be seen by a range of potential financial backers. Of these, bankers, for example, may well be more ready to accept optimistic predictions about cash flow generation, profitability and growth because they often protect themselves against unfulfilled promises with devices such as covenants to the lending agreement (*cf.* the subscription agreement or investment memorandum used in venture capital investment transactions). Covenants could include the requirements that regular interest cover calculations be prepared for the bank during the life of the loan (to protect against interest default risk); and that security taken against assets can be exercised if the bank felt that the loan was under threat (from principal default risk). Conversely, the venture capital investor, in the absence of an active secondary market into which the investment could be traded, sees the deal as more than just getting the money back plus some fixed interest margin. Venture capitalists can be seen, therefore, as that class of investors which takes on high risk investment propositions, in the expectation of high returns. Despite the commitment to this type of financial intermediation, the venture capital investor must still take a realistic view of what the investee firm might achieve. This does not mean, however, that 'unexciting' returns (in other words, those close to, or just below the target), or returns available to other classes of investor, will be acceptable. Investors are aware of the need to be protected

from the behaviour of investees who, as in the case of (*Q*), would argue that, "I don't think we would communicate a downside [risk] unless specifically asked".

This introduces the notion of trust between the investor and investee. Two investors (*Q* and *R*) expressed this in the following terms: "We are more interested in how we think they will perform, rather than what they say. We do require plans, but also assess the people involved"; and "If you have confidence in the people then you tend to accept their projections". This approach is recognised by some investees who say they "talk openly about the whole business" (for example, investee *P*).

However, the general premise remains that investors look at propositions with some degree of suspicion, especially with regard to the promised performance. This led us to a consideration of particular approaches to screening. The expected 25%-40% range of rates of return mentioned already represents a type of filtering device. In setting such 'hurdle' IRRs many conventional lending propositions will be excluded, as will equity-based transactions that can be done reasonably easily and in a straightforward manner by traditional corporate finance departments of banks. This can mean that many propositions sent to venture capitalists will have been turned down by more traditional forms of financial intermediation. As one investor (*T*) explained, either "they come to us because they need the money and the bank has refused", or they are "the 'cherries' - those who have ... [an already] successful business ... [which they] wish to grow, ... [but who need to] obtain additional funding to expand". In these cases, the expansion plans may have been considered by the banks to be too risky.

To this extent the venture capital investor is confirmed as offering a specialist type of financial intermediation. Indeed his skills and expertise can be seen to be directed towards refining this role as witnessed by the following comment by investor *J*: "An experienced venture capitalist can only hit [*viz.* choose successful ventures] slightly more than the inexperienced. I am good at managing the downside risk". In other words, what distinguishes a venture capital investor from other forms of financial intermediation is not the ability to spot 'winners'; this ability, it seems, is accepted as

reasonably equally distributed across different types of finance houses. Rather, it is the ability of the venture capital investor to turn an under-performing investment into another 'winner' (at least within the context of the funding structure employed and the methods of realisation available). One investee (*F*) summarised the reason for this approach as, "When things get tough, it concentrates his [the investor's] mind".

Overall, in order for venture capital investors to consider an investment proposition it must initially appear to be capable of satisfying a minimum rate of return; about 25% appears to be the industry norm, though higher rates are frequently mooted. Our investors received, on average, 550 proposals a year of which 35% passed this threshold test. A more detailed evaluation follows of those propositions that pass the first 'test', and this concentrates upon the 'realism' of the projections contained within the business plan submitted by the hopeful investee. These projections are subject to extensive scrutiny by both venture capital house representatives and other 'independent' specialists invited by the potential investor. For our sample of investors, of the 550 proposals received on average per year, just 15, only 3%, led to investment involvement. There appears to be a generally accepted view that the promises and the paths to deliver them, described by investees in their plans, will be over-optimistic, which results in a recalibration of both the likely returns and the risks present. There is also a recognition that once involved in the investment the venture capital house has a stake in making the transaction work, according to the revised and agreed plan. This can take the form of providing managerial and technical assistance, or making clear that additional finance can be made available, or both.

7. Risk sharing

In this the final substantive section we highlight several aspects of the investor-investee relationship as it centres upon the issue of sharing risk. First, the possible motivation of investees in seeking risk sharing positions with this type of investor is considered. Second, the willingness of the investor to bear the larger part of the risk is explored, extending to full risk acceptance, with the investee being given a fixed,

rather than an uncertain, payoff at exit. Third, the investor's use of risk management to elicit investee effort is considered. And fourth, the investee's own perception of the consequences of reduced risk exposure on effort are explored, including the attractiveness of a fixed, rather than an uncertain payoff.

Although investee firms recognise the optimistic nature of the business plans submitted to potential financial backers, about 56% (9/16) of investees persisted with the view that venture capitalists over-estimate the risk inherent in the particular business. As one investee (*D*) put it, "They have to overestimate, to safeguard themselves". Moreover, investees recognise that this tendency exists both because investors "require a high return on their funds" (investee *F*) and "are much more worried about ... their ignorance" (investee *H*). This supposed 'ignorance' could arise from deliberate attempts by the investee to disguise or hide risk, or simply from investors bringing a limited body of technical knowledge to investment appraisal. In the words of investee *R*, "It depends on the background of the person within the venture capital company". Whatever the reason, investors try to reduce ignorance. Thus investor *K* stated, "We do an appraisal - it's the key to our investment - a fundamental part of the job".

Given this difficulty of fully resolving information asymmetries, and the use of risk assessment in the face of a less than full understanding and incomplete revelation of both the nature and type of the risks, it is perhaps surprising that deals are concluded at all. That they are in practice concluded indicates that investors are willing to bear risk, even if their knowledge of it may be incomplete, and they may feel its extent has been understated. Further, there is a motivation for investees to seek a risk sharing position, knowing that once the deal is concluded they are going to rely on investors not only for finance but also to 'trouble shoot' company problems. For the majority of investee firms (9/16 = 56%), the fact that the venture capital investor would be sharing in some of the business risk with them was considered important. As investee *K* clearly stated, "It was vital [for the deal to be done]"; and investee *G* admitted that a realisation that the investor was taking "all the risks on financing" was also an

important aspect of the deal. For the investors, the relationship was viewed rather differently. While investor *M* made it clear that, "If they don't share risk, we don't do the deal", many others saw it as varying according to the type of transaction under consideration, be it management buyout, expansion, reconstruction or whatever. In addition, investors perceived a resistance on the part of the investee firms to share ownership. As investor *G* quipped, "His desire is to fulfil his dreams with our money". One way in which such dreams can be fulfilled is by retaining a significant part of the equity in the business. Therefore, the investee is motivated to raise the maximum amount of capital by giving away the minimum amount of equity. This could be achieved through getting the venture capital investor to accept a greater amount of the risk than they think they are accepting for any given amount of funding supplied. Although this presents the unlikely picture of the investor being a victim of adverse selection, the reason why he may accept such a position at the outset is because of what investor *O* calls, "commonality of interest with management". That is, if things go wrong, as a result possibly of the overly optimistic picture presented by the investee, then the venture capitalist becomes the most likely rescuer and will extract a bigger ownership stake.

An alternative way of arriving at a subscription contract would be to offer the investee firm a fixed sum in return for the venture capitalist's involvement, rather than receiving a proportion of the value of the firm at exit. Of the 16 investees questioned, 38% (=6/16) said 'yes' to this idea. Whilst the fixed sum needed to be sufficiently attractive, its main advantage was complete risk elimination; that is, "knowing exactly what you are working for" as investee *D* put it. Compare this with the view of investee firm *M*, which typified that of those *not* attracted to this idea, who said it would be "a disenchantment for me... - they [the investor] need me committed to the end result [the exit value]". As far as the investors are concerned, the idea of a fixed payoff to the investee firm appealed to 15% (=3/20), whilst the rest said 'no' with varying degrees of distaste. According to investor *E*, "We wouldn't even contemplate a fixed sum"; whilst investor *T* explained, "No - it is perceived as a criterion or

requirement to have a focused and motivated management". Thus the majority view was that offering fixed payoffs had the potential for disturbing the incentive mechanism used to avoid or mitigate the effects of moral hazard. Interestingly, the three investors who responded positively to the suggestion of fixed payoffs did so in terms of a percentage of equity (for example, a payoff of 25% of equity, to be agreed at the time of signing the subscription agreement). The *value* of this stake, however, is not fixed at the time of the financing deal. In this way the prospect of a share in the exit value provides investees with an incentive for effort throughout the contract.

The incentive issue was pursued further by investigating the extent to which the investee firms felt that having a venture capital investor bear some of the business risk resulted in them relaxing more in running the business. Only 15% (=3/16) felt able to say 'yes' to this suggestion. The strongest views were held by those investees who rejected this notion. For example, investee *K* reported, "It is not a very relaxed life". Moreover, 77% (=10/13) of those who said that they had not relaxed since becoming involved with a venture capitalist thought they now worked harder or much harder than before the financing deal. As investee *D* stated, it "keeps you on your toes because of a second party [the venture capital investor] to answer to". In addition, as investee *N* put it, "Because we have part of the cake [we have an incentive to see the cake grow]".

The investors had more diverse reactions to the suggestion that their involvement could lead to less effort on the part of the owner-managers. A significant proportion of investors (47% = 9/19) felt that there were positive incentive and effective control benefits to be gained from ensuring that owner-managers retained a sizeable stake (up to 75% was quoted) in the business, and that their ability to cash-in this stake was inextricably bound-up with the overall success of the business and the exit plans of the venture capital investor. As investors *E* and *R* expressed it, "We tend to find that effort increases because there is a new shareholder to whom they are responsible"; and, "To ensure management effort we like them to have a big equity stake". Nonetheless, there existed a significant (20% = 4/19) group of investors who were

uncomfortable with this idea of using an exit-based financial bribe to avoid a reduction in management effort. This view can be best summarised using the words of investors *L* and *S* who said, "I think mostly they're not influenced by financial considerations"; and "We weed out early on in our assessment of management [which would include those thought likely to reduce post-investment effort]". That leaves a third group of investors who considered that the resulting impact of their involvement on management effort could go in either direction. According to investor *Q*, "Sometimes personality is such that their motivation won't change - some people are there to win. In some it has an effect ... [what is important here] is to build a relationship in advance of any funding being given".

At least in the minds of owner-managers, their involvements with venture capitalists had as much to do with gaining access to funds as to sharing risk. However, the reason for other, more traditional, backers having refused to become involved needs to be considered before taking this view at face value. It is likely that the cause of refusal by a bank, for example, to fund entirely a particular deal will be linked to risk. Therefore, perhaps without full awareness, investees seeking a partner prepared to fully or partially fund their firms, are in effect looking for a partner in risk. In such circumstances owner-managers and investors may hold differing views on the nature and impact of risk. Managers live with business risk as part of being a manager, whilst investors see risk as something that can be moulded in some way or at least clearly reflected in anticipated rates of return.

8. Conclusion

This paper has examined a sample of paired investor-investee relationships in the UK venture capital industry, with a view to analysing how risk is managed, within a principal-agent framework. This involved analysing risk management under four headings: *expected returns*, *portfolio analysis*, *screening* and *risk sharing*. The following conclusions emerge under each of these headings.

Expected returns

- (a) Both investors and investees perceive themselves to be exposed to significant levels of risk.
- (b) Investees are inclined to consider their risk exposure to be irreducible; investors are more inclined to feel risk can be managed.
- (c) Investees take it for granted that risky situations involve an upside and a downside; investors are more inclined to seek means of enhancing the upside (e.g. by incentives) and attenuating the downside (e.g. by screening).

Portfolio balance

- (d) Investors seek to construct a balanced portfolio, offsetting good outcomes against bad, by avoiding single sector and single technology investment involvements.
- (e) The average portfolio size (28) falls short of that suggested by diversification considerations because of organisational features e.g. the span of control of venture capital executives, and their conscious management of risk.

Screening

- (f) Risk/return analysis is widely used by investors. Risk and return rise together.
- (g) Progression between perceived risk classes of investors is not proportioned. It may be subject to jumps (e.g. 20% target IRR for a *range* of low risks; 30% target IRR for the next range, of medium risks *etc*).
- (h) At high levels of risk, many projects are unfundable, even to venture capitalists, as required IRRs are perceived as unbounded.
- (i) Investors assume investees will overstate returns and understate risks. They attempt to limit adverse selection by rigorous screening (only 30% of proposals being reviewed) and careful due diligence, leading to just 3% of proposals being backed.
- (j) Investees know investors screen with a fine filter and set high hurdle IRRs, and respond by over-optimism in formulating their business plan. This partly sustains investors' expectations of adverse selection.

Risk sharing

- (k) Investees over-estimate potential rewards to investors, and investors over-estimate risks of investees.
- (l) Investors seek risk-sharing benefits from their relationships with investors.
- (m) Both investors and investees dislike fixed pay-off arrangements for investees, feeling they disturb incentives on both sides.
- (n) Investees are sufficiently exposed to risk post-contract to sustain effort.

The general picture that emerges is of skilled risk-handling by investors to limit adverse selection pre-contract, and to attenuate moral hazard post-contract. The former is achieved by using a fine filter on proposals, high hurdle rates of return, and by being strongly resistant to permitting downside risk exposure. The latter is achieved by tight monitoring and an unwillingness to bear all risk. Investee behaviour is governed in fair measure by investor procedures. The tendency of investees to over-state returns and to under-state risk is partly driven by a desire to conclude a deal that relieves their finance capital scarcity, but also to share the risk, especially the downside, with a specialist like the investor.

Footnotes

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- ¹ Current work by the likes of Admati and Pfleiderer (1994) appropriately views the skills of venture capitalists as being the resolution of information asymmetries.
- ² When investees were asked whether or not they would like a fixed sum on exit from the deal, of the sixteen who replied, 63% (10/16) said 'No'. Comments which were added to this included: "We prefer to achieve the realisation of the true value of the shares"; and "We would want the same potential for gain as the [venture capital] institutions". This matter is discussed further in Section 7.
- ³ The investor data indicate that market listing/flotation is the preferred exit route in about 20% of cases.
- ⁴ Annualised internal rates of return (%), typically as computed on a Lotus 123 spreadsheet.
- ⁵ In the sample of investors, the modal investment (45%) was in development capital. The other main investment forms were buyout (40%), start-up (11%) and other (4%).
- ⁶ Considerable detail is provided in Mitchell, Reid and Terry (1992).
- ⁷ In addition, wherever possible, we collected accounting data, brochures, financial PR *etc* to the extent that the respondent was willing.
- ⁸ This is slightly less than the figure of 30 investments which recent work by Statman (1990) suggests is required for a fully diversified portfolio. However, some of the earlier finance literature gives figures as low as fifteen investments for full diversification. The modal figure suggests many investors operate with portfolios this size or even lower.

- ⁹ Only investor *S* said categorically "no, we don't do this". Methods used ranged from "It's the key to our investment" (*K*) to "There is no statistical analysis, it's just a hunch" (*J*).

References

- Admati, Anat R and Paul Pfleiderer, 1994, 'Robust financial contracting and the role of venture capitalists', *Journal of Finance* **49(2)**, 371-402.
- BVCA, 1994 and 1995, *Directory*, London: Jeffrey Pellin.
- Chan, Yuk-Shee, 1983, 'On the positive role of financial intermediation in allocation of venture capital in a market with imperfect competition', *The Journal of Finance* **XXXVIII (5)**, 1543-1568.
- Chan, Yuk-Shee, Daniel Siegel and Anjan V Thankor, 1990, 'Learning, corporate control and performance requirements in venture capital contracts', *International Economic Review* **31**, 365-381.
- Lambert, Richard A, 1986, 'Executive effort and selection of risky projects', *Rand Journal of Economics* **17(1)**, 77-88.
- Mitchell, Falconer, Gavin C Reid and Nicholas G Terry, 1995, 'Post investment demand for accounting information by venture capitalists', forthcoming in *Accounting and Business Research* **Summer**.
- Mitchell, Falconer, Gavin C Reid and Nicholas G Terry, 1992, 'Some agency aspects of venture capital investment behaviour', University of Edinburgh: Centre for Financial Markets Research Discussion Paper.
- Sahlman, William A, 1990, 'The structure and governance of venture-capital organizations', *Journal of Financial Economics* **27**, 473-521.
- Sappington, David E M, 1991, 'Incentives in principal-agent relationships', *Journal of Economic Perspectives* **5**, 45-66.
- Statman, L, 1990, 'How many stocks make a diversified portfolio?' in D H Miller and S C Myers (eds), 1991, *Frontiers of Finance: the Battermarch Fellowships Papers*, Oxford: Basil Blackwell, 468-485.