

Firm Size Effects on Venture Capital Syndication: The Role of Resources and Transaction Costs

Hans Bruining, Ernst Verwaal, Andy Lockett,
Mike Wright and Sophie Manigart

ERIM REPORT SERIES <i>RESEARCH IN MANAGEMENT</i>	
ERIM Report Series reference number	ERS-2005-077-STR
Publication	November 2005
Number of pages	30
Persistent paper URL	
Email address corresponding author	jbruining@rsm.nl ; everwaal@rsm.nl
Address	Erasmus Research Institute of Management (ERIM) RSM Erasmus University / Erasmus School of Economics Erasmus Universiteit Rotterdam P.O.Box 1738 3000 DR Rotterdam, The Netherlands Phone: + 31 10 408 1182 Fax: + 31 10 408 9640 Email: info@erim.eur.nl Internet: www.erim.eur.nl

Bibliographic data and classifications of all the ERIM reports are also available on the ERIM website:
www.erim.eur.nl

ERASMUS RESEARCH INSTITUTE OF MANAGEMENT

REPORT SERIES *RESEARCH IN MANAGEMENT*

ABSTRACT AND KEYWORDS	
Abstract	The present paper examines firm size effects on the decision of venture capital firms to participate in a venture capital investment syndication network. The authors submit that firm size effects in venture capital syndication are dependent on resource acquisition motives and transaction cost considerations. Analysis of 317 venture capital firms in 6 European countries reveals a curve linear relationship between firm size and venture capital syndication participation. We also find positive and negative moderating effects of firm size. The implication of our findings is that there are both advantages and disadvantages in syndicated investment for the smaller and larger venture capitalist.
Free Keywords	Venture Capital, Firm Size, Syndication Networks, Resource-Based View, Transaction Cost Theory
Availability	The ERIM Report Series is distributed through the following platforms: Academic Repository at Erasmus University (DEAR), DEAR ERIM Series Portal Social Science Research Network (SSRN), SSRN ERIM Series Webpage Research Papers in Economics (REPEC), REPEC ERIM Series Webpage
Classifications	The electronic versions of the papers in the ERIM report Series contain bibliographic metadata by the following classification systems: Library of Congress Classification, (LCC) LCC Webpage Journal of Economic Literature, (JEL), JEL Webpage ACM Computing Classification System CCS Webpage Inspec Classification scheme (ICS), ICS Webpage

**FIRM SIZE EFFECTS ON VENTURE CAPITAL SYNDICATION: THE ROLE
OF RESOURCES AND TRANSACTION COSTS**

Hans Bruining and Ernst Verwaal¹

RSM Erasmus University, The Netherlands

Andy Lockett and Mike Wright

Nottingham University Business School, United Kingdom

Sophie Manigart

Ghent University, Belgium

¹ Hans Bruining and Ernst Verwaal are with the Department of Strategic Management and Business Environment of the RSM Erasmus University. Corresponding author: Hans Bruining, RSM Erasmus University, T7-47, Burg. Oudlaan 50, NL-3062 PA Rotterdam, The Netherlands. Tel.: +31-10-408 1795, fax: +31-10-408 9013; E-mail addresses: jbruining@rsm.nl and everwaal@rsm.nl

**FIRM SIZE EFFECTS ON VENTURE CAPITAL SYNDICATION: THE ROLE
OF RESOURCES AND TRANSACTION COSTS**

Abstract

The present paper examines firm size effects on the decision of venture capital firms to participate in a venture capital investment syndication network. The authors submit that firm size effects in venture capital syndication are dependent on resource acquisition motives and transaction cost considerations. Analysis of 317 venture capital firms in 6 European countries reveals a curve linear relationship between firm size and venture capital syndication participation. We also find positive and negative moderating effects of firm size. The implication of our findings is that there are both advantages and disadvantages in syndicated investment for the smaller and larger venture capitalist.

Keywords: venture capital, firm size, syndication networks, resource-based view, transaction cost theory

JEL classification: G2, G3, D8

1. Executive summary

Syndication involves two or more venture capital firms taking an equity stake in an investment, either in the same round or, at different points in time. The extant literature emphasizes venture capital syndication as a means to gain access to resources from syndicate members. Such resources may allow venture capital firms to reduce the volatility of their returns, improve their management capabilities or gain access to deal flow generated by the syndicate. However, venture capital firms may be less motivated to syndicate transactions if they believe that sole investing by themselves generates superior returns as compared to participation in a syndicated investment. Management of syndicated investments may be less flexible and takes more time than non-syndicated investments, as well as introducing greater chances of conflicts. This paper investigates the impact of venture capital firm size on its decision to participate in a syndicate. Grounded in resource based and transaction cost economics theory, it examines how VC firm size is related to resource acquisition and transaction costs and thus influences the decision to participate in the syndicate.

We conjecture five main explanations why venture capital firm size is related to syndication participation. Firstly, we expect that larger venture capital firms are better able to diversify their investments, have more management expertise available and more access to deal flow due to their central network positions. Thus, larger venture capital firms have more of these resources available and therefore have a lower need to syndicate their investments. Secondly, transaction costs of the syndicate governance are likely to increase complexity with the number of partners in the syndicate. Smaller venture capital firms have smaller amounts available for investment and a smaller portfolio scale and scope. Ex post transaction costs may rise substantially with a more

diverse and larger number of syndicate members involved. Thirdly, smaller venture capital firms are more likely to change their investment focus in the syndicate if their relatively smaller funds are fully invested which may increase the costs of renegotiating in terms of complexity and timeliness. Fourthly, small firms have a narrower range of transactions, related to a smaller volume of sales, which reduces the risk for the perpetrator of opportunism. Finally, smaller venture capitalists go bankrupt more easily, thereby increasing the risk of discontinuity towards the syndicate partners.

The data were gathered using a mail survey in 6 European countries, ranging from Northern Europe (United Kingdom, Sweden) to central countries as France, Germany, the Netherlands and Belgium. Our sample thus includes countries in different parts of Europe, where the venture capital industry is since long established and industry practices have matured.

Our findings indicate that the decision to participate in syndication networks increases as the venture capital firm size increases. However, this relationship is non-linear. Beyond the number of approximately 8 to 9 investment executives per VC firm the syndication participation decreases. Our results show that small firms have a transaction costs disadvantage in syndication participation and are less likely to participate in syndication networks even though they would like to do that. However, in early stage deals smaller venture capitalists can use their relative advantage in flexibility and niche-filling capacity in early stage investment. This result supports the proposition of resource-based and transaction cost theory that smaller and larger firms have different strategic positions in resources and transaction costs. In syndication networks venture capital firms may combine these relative strengths. For example,

smaller venture capital firms may deliver promising seeds and start-ups where larger venture capital firms subsequently invest large sums of money into.

2. Introduction

Syndication involves two or more venture capital firms taking an equity stake in an investment, either in the same round or, at different points in time (Brander et al. 2002). The extant literature emphasizes venture capital syndication as a means to gain access to resources from syndicate members. Such resources may allow venture capital firms to reduce the volatility of their returns, improve their management capabilities or gain access to deal flow generated by the syndicate (e.g. Bygrave 1987; Manigart et al. 2002). However, venture capital firms may be less motivated to syndicate transactions if they believe that sole investing by themselves generates superior returns as compared to participation in a syndicated investment (CMBOR, 2002). Management of syndicated investments may be less flexible and takes more time than non-syndicated investments, and may bring about greater chances of conflicts (Wright and Lockett, 2003).

In organizational studies firm size is considered one of the most influential variables (Chen and Hambrick, 1995). Large size has been seen as giving a firm such advantages as economies of scale, experience, brand name recognition, and market power (Hambrick et al. 1982). Conversely, smallness has been credited with increasing flexibility in production, in price, in enhancing speed and risk-seeking behavior (Chen and Hambrick 1995). Hofer (1975) identified size as a critical variable moderating the relationship between strategy and performance. Other studies (Smith, Guthrie and Chen, 1989) supported this idea empirically. Size is also proposed as an explanation of the level of transaction costs (Nooteboom, 1993; Verwaal and Donkers 2002). A smaller

portfolio scale and scope reduces risk for the perpetrator of opportunism (Nooteboom 1993, p. 291) and increases the number of partners in the syndicate, which makes renegotiating more difficult and time-consuming (Wright and Lockett, 2003). In this paper we explore firm size related advantages and disadvantages in transaction costs that may explain different levels of syndication participation.

In order to explain venture capital firm size effects in syndication participation we use two theoretical perspectives: the resource-based view and transaction cost economics. These theoretical approaches are considered complementary by their main contributors (e.g. Penrose, 1996; Williamson, 1999). Penrose defines the distinguishing nature of the firm in line with Coase (1937) as an ‘administrative hierarchy’ and ‘court of last resort’ (Penrose, 1959, p. 16) and considered resource value and transaction cost issues not as mutually exclusive. Her view is shared by Williamson (1999, p. 1098) who states that the transaction costs and the resource-based view ‘deal with partly overlapping phenomena, often in complementary ways’. Moreover, a growing body of literature suggests that transaction costs not only complements the resource-based view but also influences resource value creation. (Mahoney, 2001; Jacobides and Winter, 2005; Foss and Foss, 2005).

The aim of the present paper is to advance the theoretical perspective on venture capital syndication by demonstrating that there are important firm size effects which depend on both resource acquisition motives and transaction costs considerations. First, we conceive the syndicate as a governance form that allows venture capital firms to gain access to resources and we argue that larger firms have more resources available and thus have a lower need to syndicate their investment from a resource-based perspective. Then, we present a transaction costs framework of participation in

syndicated investments and we explore the consequences of firm size effects on syndicated venture capital investment. We submit that there are both positive and negative effects of size in transaction costs of a venture capital syndication network. Subsequently, we describe the data and present the empirical results. Finally, we conclude with a discussion of the results, the limitations of this study, and provide directions for future research.

3. Firm size and resource acquisition motives for venture capital syndication participation

This section reviews the resource motives to participate in venture capital syndication and their relationship with firm size. Based on the literature three types of resources may be distinguished: financial diversification, access to management expertise and exchange of deal flow.

Financial diversification. The financial diversification motive stems from financial theory (Cumming, 2002; Zacharakis 2002). Syndication facilitates diversification of the venture capital firm's investment portfolio into industries that can compensate a drop in one market with a rise in another, because the investments in different industries differ in the way they are influenced by macro-economic factors (Zacharakis 2002). Lockett and Wright (2001) showed that the dominant motive for venture capital firms in the UK to syndicate their deals is spreading financial risk through risk sharing. De Clerq and Dimov (2004) found support for a financial risk sharing rationale for syndication among 200 US-based venture capital firms over a 12-year period. From the perspective of financial diversification, larger venture capital

firms have fewer incentives to participate in syndication networks (Manigart et al., 2002) since they can more easily diversify within their own portfolio.

Access to management expertise. The management expertise of a venture capital firm is likely to be constrained by the scope of its activities. The need to gain access to specific management expertise through syndication may particularly be important if venture capital firms try to access to a geographical region, industry or investment stage outside their normal range of investment activities. Syndication networks may provide access to the superior expertise of other venture capital firms, thereby improving the quality of selection and the management and monitoring of investments (Sapienza et al., 1996; Wright & Lockett, 2002). Several studies support this access to management expertise argument (Sorenson and Stuart, 2002). Larger venture capital firms have a broader scope of activities and therefore are less likely to need expertise outside their knowledge and capabilities base and therefore have a smaller incentive to syndicate their investments (Barnet and Amburgey, 1990).

Access to deal flow. Venture capital firms are not likely to identify interesting opportunities outside their natural investment area (Sorenson & Stuart, 2002). Syndication allows venture capital firms to do so by using interfirm networks across geographic and industry boundaries (Manigart et al., 1994; Sorensen & Stuart, 2002) and venture capital firms that are part of syndication networks may increase the likelihood of being invited into future deals. From a deal flow perspective, larger venture capital firms are more likely to hold central network positions and therefore have more access to deal flow (Seppä and Jääskeläinen, 2002) and thus lesser need for syndication.

In sum, from a financial diversification, management expertise as well as an access to deal flow perspective, we may expect that larger venture capital firms are better able to diversify their investments, have more management expertise available and more access to deal flow due to their central network positions. Larger venture capital firms have more of these resources available and therefore have a lower need to syndicate their investments. In the following section we explore the role of transaction costs in the relationship between venture capital firm size and syndication network participation.

4. Firm size and transaction costs of venture capital syndication participation

According to transaction cost economics, the fundamental problem of organizations is how to cope efficiently with an unpredictable environment and governance structures are predominantly instruments of adaptation to uncertainty (Williamson, 1999). Uncertainty results primarily from strategic behavior (opportunism) and non-strategic behavior (bounded rationality) of transaction partners. Firms will prefer those governance forms that by approximation show the highest level of comparative adaptive efficiency to unexpected future contingencies.

Venture capital syndication as governance structure is particularly likely to differ in its adaptive capability compared to sole investing. Unanticipated events may need to be discussed and renegotiated by the syndicate partners and therefore response may be less swift (Wright and Lockett, 2003, p. 2083). Furthermore, the bargaining process following unexpected contingencies in syndicated investments may also lead to conflicts of interest resulting from either ex post opportunism or bounded rationality of the syndicate partners. Hence, the response by venture capital firms that sole investing

is more flexible and generates superior returns as compared to a participation in a syndicated investment (CMBOR, 2002) can very well be explained by the transaction costs of syndication governance. The transaction costs of the syndicate governance form are likely to increase if the complexity and thereby the relational risks of the governance structure increases.

Why would firm size change the complexity and relational risks of the syndicate? Let us consider for example the case of the smaller venture capital firm. Firstly, transaction costs of the syndicate governance are likely to increase complexity with the number of partners in the syndicate (Wright and Locket, 2003). Smaller venture capital firms have smaller amounts available for investment and a smaller portfolio scale and scope. Ex post transaction costs may rise substantially with a more diverse and larger number of syndicate members involved. Secondly, smaller venture capital firms are more likely to change their investment focus in the syndicate if their relatively smaller funds are fully invested which may increase the costs of renegotiating in terms of complexity and timeliness (Wright and Locket, 2003). Thirdly, small firms have a narrower range of transactions, related to a smaller volume of sales, which reduces the risk for the perpetrator of opportunism (Nooteboom 1993). Finally, smaller venture capitalists go bankrupt more easily, thereby increasing the risk of discontinuity towards the syndicate partners (Nooteboom 1993). Thus, the transaction costs of small venture capital firms are likely to be higher compared to large venture capital firms as they increase the complexity and relational risks of the governance structure.

In sum, we argue that smaller venture capital firms face higher transaction costs of syndicated investment and therefore are less likely to syndicate, however, from a resource-based view, larger firms have lower incentives to syndicate their investments.

After some point the relative magnitude of the venture capital firm size effect of transaction costs on the decision to syndicate will be smaller than the impact of the venture capital firm size effect of resource motivations. Therefore, based on the combined transaction costs and resource-based analysis, we propose a curve linear relationship (inverse U-shaped curve) between venture capital firm size and syndication network participation.

H1: venture capital firm size is first positively related and then negatively related to participation in syndication networks (inverse U-shaped relationship).

Thus, larger venture capital firms have less to gain from syndication; however, they also create lower transaction costs in a syndication network. A syndicate that consists of a few large venture capital firms will be more manageable and adaptive to changing conditions than a syndicate including a large number of smaller venture capital firms. Although the potential for value creation by resources may be increased, firms may not be able to fully realize the benefits of the resource attributes provided by the syndication network. Put differently, the capability to create value from the resources provided by the syndicate might be constrained by the transaction costs of the syndication network (Foss and Foss, 2005). Therefore, we expect that given their resource motivations, larger firms are more likely to actually participate in syndication networks than smaller venture capital firms. As a consequence, we expect that the impact of syndication motives on syndication participation will increase as firm size increases. Hence we formulate that:

H2a: There will be a stronger impact of financial risk diversification motives on syndication network participation when venture capital firm size is large.

H2b: There will be a stronger impact of resource-based motives on syndication network participation when venture capital firm size is large.

H2c: There will be a stronger impact of deal flow motives on syndication network participation when venture capital firm size is large.

Previous studies suggest that venture capital firms investing in early stage investments emphasize uniqueness and growth potential of products rather than demonstrated market acceptance as in later stage investments (Elango et al., 1995). High levels of asset-specific investments are particularly associated with early stage investments (seed and start-ups) where technology, management and markets are generally new. The early stage investors, compared to later stage investors, are specialized in the sector and invest more intuitively on the basis of incomplete information. This contrasts with later stage investments that focus more on historical information on profitability, cash flow forecasts and the use of complex debt arrangements. The level of uncertainty is likely to be higher in early stage deals, which underlines the necessity to develop capabilities to handle unexpected specific requirement. Smaller venture capital firms are seen as being quicker and more nimble due to their structural simplicity (Chen and Hambrick, 1995). Small firms, can coordinate their smaller number of employees by direct supervision in stead of formalized co-ordination of the specialized work processes (Mintzberg, 1979), which facilitates their advantage of speed and flexibility in organizational processes. Therefore, small venture capitalists may be more efficient in responding to unanticipated specific requirements in early stage investment and therefore have

relatively lower transaction costs (Nooteboom, 2002). Large venture capital firms may even use smaller venture capital firms as pipelines to deliver those promising seeds and start-ups to invest in (see Hibbard, 2004). Thus:

H3: There will be a stronger impact of early stage investment on syndication participation when venture capital firm size is small.

In the next sections we present our data and empirically test our theoretical framework.

5. Method

The data were gathered using a pre-tested mail survey. The questionnaire was developed with the assistance of venture capital firm managers, advisors and academics (see Locket and Wright, 2001). We administered the questionnaire in 6 European countries, ranging from Northern Europe (United Kingdom, Sweden) to central countries as France, Germany, the Netherlands and Belgium. Our sample thus includes countries in different parts of Europe, where the venture capital industry is since long established and industry practices have matured.

The questionnaires were translated into French and Dutch in order to be used in France and Belgium. The questionnaire was administered by post to the head offices of all 106 venture capital firms in the United Kingdom, identified using the British Venture Capital Association handbook and CMBOR (Centre for Management Buy-out Research) records. In Belgium data was collected by sending a questionnaire to 79 venture capital firms, identified using an own constructed database and the membership list of the Belgian Venturing Association and the European Venture Capital

Association. In France, data was collected by sending out 120 questionnaires to the full members of the 'Association Française des Investisseurs en Capital Risque'. In Sweden three different sources were used to select 169 venture capital firms: the membership list of the Swedish Venture Capital Association, the membership list of the Swedish National Board of Technical and Industrial Development and an own constructed database. In Germany and the Netherlands the untranslated questionnaire was sent to the 191 members of the EVCA and 50 members of the Dutch Venture Capitalist Association. In all countries, a follow-up was done either by sending reminders or by calling the venture capital firms after 1 – 2 months.

The total sample consists of 317 usable responses (44% response rate) from 6 European countries (63 United Kingdom, 66 Sweden, 49 France, 68 Germany, 29 The Netherlands and 42 Belgium). These countries are considered matured in the venture capital firm industry (Manigart et al, 2002). As response rates and participation in syndication networks might be related, non-response bias of the sample was tested using the test of Armstrong and Overton (1977), and no significant deviation was found. In addition, the representativeness of the sample was tested for each country separately using firm specific characteristics (minimum investment preference, maximum investment preference and the number of staff members) available from the national and European venture capital directories. In Belgium, France, Germany and the Netherlands, no significant differences were found between respondent and non-respondents. In Sweden and the United Kingdom, the respondents' maximum investment preference is significantly (5% confidence level) larger than that of non-respondents. This indicates that the sample is generally representative for the venture capital firm industry in the six countries of the study.

To examine the empirical relationship between venture capital firm size and syndication participation intensity, we measure syndication participation in five categories of proportions of investment syndicated. At a 5-point categorical scale we measure whether 0-20%, 21-40%, 41-60%, 61-80 or 81-100% of the deals are syndicated of their total deals.

Various measures can be used to express firm size, such as the number of executives, the number of venture capital firm investments syndicated or the size of investments. We have chosen the number of venture capital firm executives as our size measure. The size of the labor force is one of the more common methods of measuring organizational size (e.g. Tosi and Patt 1967; Blau and Falbe, 1976). Alternative measures of firm size such as for example sales volume are highly correlated with number of employees (Smith, Guthrie and Chen, 1989). More importantly, the number of employees is closely linked to the theoretical basis of the firm size argument: economies of specialization and speed and flexibility in organizational processes. Venture capital firm size in terms of the number of *specialized* venture capital employees captures both the economies of specialization and the complexity of coordination of the venture capital firm. Therefore, for this study the number of venture capital firm executives is the most appropriate measure of firm size.

A description of the variables is presented in Table I and an overview of the bivariate correlations is presented in Table II. The scale items relating to syndication motivation were first factor analyzed, using principle component procedures and varimax rotation. By means of an exploratory factor analysis, we analyzed the different dimensions of the scales to assess their unidimensionality and factor structure. Items that did not satisfy the following criteria were deleted: (1) items should have

communality higher than 0.3; (2) dominant loadings should be greater than 0.5; (3) cross-loadings should be lower than 0.3; and (4) the scree plot criterion should be satisfied (Briggs and Cheek, 1986; DeVellis, 1991). This resulted in a pool of 11 questions, which are listed in Table I. Next, the reliabilities of the dimensions of each scale were assessed by means of the Cronbach alpha coefficient. The alphas are 0.81 (Management expertise), 0.72 (Financial diversification) and 0.83 (Access deal flow). Furthermore, all items have correlations of 0.70 or more with their respective constructs, which suggests a satisfactory item reliability (Hulland, 1999).

***** Place Table I about here *****

We used confirmatory factor analysis with EQS version 6.1 and maximum likelihood estimation to validate the scales resulting from the exploratory factor analysis. A satisfactory fit was achieved ($\chi^2 = 112$, $df = 41$, $p < .01$), root-mean-square estimated residual [RMSEA] = 0.06, Bentler-Bonnett Normed fit index [NFI] = 0.92). The ratio of chi-square to degrees of freedom is 2.73; a value of less than 3.0 for the ratio indicates a good fit (Carmines and McIver, 1981). A NFI value above 0.9 is considered an indication of good fit, and the RMSEA of 0.06 indicates good model fit because it does not exceed the critical value of 0.08 (Bentler and Bonet, 1981). Thus, the measurement model is acceptable, given these supportive indices.

Discriminant validity of the scales was further verified by comparing the shared variance between any two constructs and the variance extracted from each of the constructs. In all cases, the shared variance between two constructs was less than the variance extracted from each of the constructs, supporting the validity of the measurement model (Fornell and Larcker, 1981), and none of the confidence intervals

of the correlation coefficients between any two constructs contained 1.0 (Anderson and Gerbing, 1988).

Control variables for country differences and the source of funds are included.

6. Results

Given the nature of the dependent variable, we use an ordinal regression model. The bivariate correlations of the variables under study are presented in Table II. The correlations between venture capital firm size and the other variables suggest that venture capital firm size is larger in the UK and venture capital firm size is smaller in the market of early stage investment and managed funds. In addition, in line with the theory (Manigart et al, 2002) the financial diversification motive is more important for smaller firms.

***** Place Table II about here *****

The results of the ordinal regression are presented in Table III. In line with the findings of previous studies (Lockett and Wright, 2001; Manigart et al., 2002), we find a positive coefficient ($p < .05$) between the financial risk diversification motive to syndicate and participation in syndication networks. We find a smaller coefficient for access to resources ($p < .10$) and the results in Table II indicate that deal flow motives have no significant role in the decision to syndicate venture capital investments. This evidence supports the finding of Lockett and Wright (2001) and de Clerq and Dimov (2004) that the spreading of financial risk is the dominant motive effect to syndicate venture capital firm investment. The effect of deal flow remains insignificant in alternative models

where the non-linear effect of venture capital firm size and moderating effects are included in the model (see Model II en III in Table II).

***** Place Table III about here *****

Model I in Table III shows that the effect of venture capital firm size is small and insignificant. This would indicate that venture capital firm size is not important or alternatively suggests misspecification of the functional form. In Model II, we include the quadratic term of venture capital firm size to allow the estimation of a nonlinear model of the effect of venture capital firm size. The results of model II in Table III show that venture capital firm size is positively related to participation in syndication networks and highly significant ($p < .01$). A highly significant ($p < .01$) and negative quadratic venture capital firm size term demonstrates that the effect of venture capital firm size decreases as venture capital firm size increases. Both the significance of this quadratic term and the improved fit of the model imply that the relationship is curve linear (inverse U-shaped) as suggested by hypothesis 1. Figure 1 plots the relationship between venture capital firm size and syndication network participation. The plot shows that up to about a venture capital firm size of 9 investment executives the relationship is positive (75% of the 317 observations) and that for venture capital firms with more than 8 executives the relationship is negative. Thus, for a large majority of venture capital firms in Europe minimizing transaction costs dominate the relationship between venture capital firm size and syndication participation. For venture capital firms larger than 9 investment executives (25%) the resource motivations dominate the venture capital firm size effects in syndication network participation.

***** Place Figure I about here *****

Hypotheses 2a, 2b and 2c are concerned with the moderating effect of venture capital firm size on motives to participate in syndication networks. The estimation results of Model III, IV and V in Table III show that the moderating effect of venture capital firm size on access to resources and financial risk diversification motives is significant ($p < .05$), supporting hypotheses 2a and 2b. Hence, when venture capital firm size is large there will be a stronger impact of financial risk diversification motives and of access to resources motives on syndication participation. Hypothesis 2c states that the deal flow motive is moderated by venture capital firm size, which is not supported by the evidence. However, as reported above the main effect of deal flow is also not significant, indicating that deal flow is not an important motive in the decision to participate in syndicate networks for both smaller and larger venture capital firms.

Models VI and VII from Table III show that stage of investment is highly significant and positively associated with a venture capital firm's syndication participation ($p < .01$). This result indicates that the necessity of the venture capital firm to syndicate early stage investments is very powerful. Looking at the negative interaction effect of venture capital firm size and stage on the venture capital firm's syndication participation, the results from model VI and VII in Table III also support hypothesis 3 that early stage investment is more positively related to venture capital firm syndication participation when venture capital firm size is small.

In model 7 from Table III we estimate all hypothesized effects simultaneously and the results support the findings from the individual estimates (Table III model 2-6). This implies that the results in this study are robust, even if all effects are taken simultaneously into account.

Finally, in relation to the control variables, the country characteristic variables show that only the United Kingdom and France significantly deviate from the European average, where France is positively and the United Kingdom is negatively related to participation in syndication networks.

7. Discussion and conclusion

The results of this paper contribute a number of key findings to the study of venture capital firm syndication. First the results show that small and large venture capital firms differ significantly in their participation in syndication networks and that venture capital firm size moderates the resource motive-syndication participation relation. We also demonstrated that small venture capital firms have a transaction costs advantage in early stage deals, and that they can use their relative advantage in flexibility and niche-filling capacity in early stage investment, while larger venture capital firms can use their advantage of scale in later stage investment. This result supports the proposition of transaction cost theory (e.g. Nooteboom, 1993; Verwaal and Donkers, 2002) that small and large firms face different levels of transaction costs. More generally, our evidence leads us to conclude that venture capital firm size influences the strategy of syndication, which in turn influences how its resources interact with the transaction and how the venture capital firm chooses to govern it.

A number of areas for further research are suggested by our results. For example, researchers should take into account the role of transactions costs more explicitly by measuring the relative cost advantage of the syndicates and the link with the capabilities of the venture capital firm's management. It would be interesting to examine the driving factors behind the transaction costs of the syndication network and

when and how they exceed the transaction costs of sole investing. As indicated in our study, increase in transaction cost by long lead times for coordinated action in the syndicate (Wright and Lockett, 2003) may offer an explanation why venture capital firms prefer the option of sole investing.

In our research the composition of the syndication networks are unknown as well as the change in it. There is a need to look at the dynamics of the composition of syndication networks over time in terms of venture capital firm size, governance and control, skills/experience, investment stage and cross border types. Longitudinal research could shed more light on how syndicates with different compositions share resources and risks and how successful they are.

Our study supports the work of Lerner (1994) that venture capital firms prefer syndicating with larger and established colleagues, however, in contrast to Lerner we find that this behavior may not be sensible for early stage deals. Further research could reveal other factors that influence the level of transaction costs. Early stage expertise, mostly found in smaller venture capital firms, can become critical for larger syndicate partners to control transaction costs by providing timely support in product innovation and new business formation. Especially in cases where investees face rapidly changing technology and knowledge environments with short product life cycles that make rapid dissemination of information necessary. Large venture capital firms that do not possess the kind of specific social and technical assets to handle these kinds of uncertainties in a flexible way with their portfolio companies would welcome those who can. In the United States, for example traditional LBO associations have been joining forces with venture capital firms for this reason. Overall, this type of research could yield insight into the effectiveness of the venture capital firm governance and control under different

economic situations and in general into the contribution of the venture capital industry for the economy.

Like all research, this study has several limitations. First, our study includes venture capital markets with different levels of development. Other follow-up multinational studies may focus on institutional differences between the countries as size of funds of the venture capital firm or on specific elements, such as the valuation approaches of venture capital firms in the syndication process. Also, our dependent variable is measured on a five point scale while a continuous measurement may yield more precise estimates. The results may also be time frame specific and influenced by the “tech bubble” for the West European countries in 2001 and 2002.

In conclusion, our study contributes to the literature of transaction cost and venture capital finance by providing a novel approach to examining transaction cost factors linked to venture capital firm size that affect syndication among venture capitalists. Overall, we found that transaction cost arguments explain the extent to which small and large venture capital firms engage in syndication. We hope that our study leads to a deeper investigation of the process through which the venture capital industry may enhance successful governance.

REFERENCES

- Anderson JC, Gerbing D.W. 1988. Structural equation modelling in practice: a review and recommended two step approach. *Psychological Bulletin* 103: 411–423.
- Armstrong JS, Overton T. 1977. Estimating non-response bias in mail surveys. *Journal of Marketing Research* 14: 396–402.

- Arthurs, J.D., Busenitz, L.W., Hoskisson, R.E., and Johnson, R.A. 2003. Venture capitalists and information asymmetries in the pricing of IPO securities. Working Paper Venture capital Division: Academy of Management Conference, Seattle.
- Blau, P.M., and Falbe, C.M. 1976. Technology and organization in manufacturing. *Administrative Science Quarterly* 21:20-40.
- Brander, J. A., Amit, R., and Antweiler, W. 2002. Venture Capital Syndication: Improved Venture Selection versus the Value-Added Hypothesis. *Journal of Economics and Management Strategy* 11 (3): 423-452.
- Briggs SR, Cheek JM. 1988. On the nature of self-monitoring: problems with assessment, problems with validity. *Journal of Personality and Social Psychology* 54: 663–678.
- Bruining, J., and Wright, M. 2002. Entrepreneurial Orientation in Management Buy-Outs and the Contribution of Venture Capital. *Venture Capital: An International Journal of Entrepreneurial Finance* 4: 147-168.
- Bygrave, W. D. 1987. Syndicated Investments by Venture Capital Firms: A Networking Perspective. *Journal of Business Venturing* 2: 139–154.
- Carmines EG, McIver, J. 1981. Analysing models with unobserved variables: analysis of covariance structures. In *Social Measurement: Current Issues*, Bohrnstedt GW, Borgatta EF (eds). Sage: Beverly Hills, CA; 65–115.
- Chen, M.J., and Hambrick, D.C. 1995. Speed, stealth and selective attack: how small firms differ from large firms in competitive behaviour. *Academy of Management Journal*, 38 (2): 453-482.
- CMBOR 2002. *Venture Capital in Europe*, Centre for Management Buy-out Research, University of Nottingham, Nottingham.
- Cumming, D. J., 2002. *The Determinants of Venture Capital Portfolio Size: Empirical Evidence*. Working Paper University of Alberta School of Business.

- De Clerq, D and Dimov, D. 2004. Explaining venture capital firms' syndication behaviour: a longitudinal study. *Venture capital: An International Journal of Entrepreneurial Finance* 6(4) 243-256.
- DeVellis R. 1991. *Scale Development*. Sage Publications: Newbury Park, NJ.
- Elango, B. Fried, V.H., Hisrich, R.D., and Polonchek, A. 1995. How venture capital firms differ? *Journal of Business Venturing* 10, 157-179.
- Foss K, Foss NJ. 2005. Resources and transaction costs: How property rights economics furthers the resource-based view. *Strategic Management Journal* 26: 541-553.
- Fornell C, Larcker D.F. 1981. Evaluating structural equation models with observable variables and measurement error. *Journal of Marketing Research* 18: 39-50.
- Hambrick, D.C., MacMillan, J.C. and Day, D.L. 1982. Strategic attributes and performance in the BCG matrix- APIMS-based analysis of industrial product businesses. *Academy of Management Journal* 25:510-531.
- Hibbard, J. 2004. Fresh Seed in the Valley: After a long drought, small venture capital firm firms are popping up to fund start-ups. *Business Week* July 19.
- Hofer C.W. 1975. Toward a contingency theory of business strategy. *Academy of Management Journal* 18: 784-810.
- Hulland J. 1999. Use of partial least squares in strategic management research: a review of four recent studies. *Strategic Management Journal* 20: 195-204.
- Jacobides MG, Winter SG. 2005. The co-evolution of capabilities and transaction costs: Explaining the institutional structure of production. *Strategic Management Journal* 26: 395-413.
- Lerner J., 1994. The Syndication of Venture Capital Investments. *Financial Management* 23: 16-27.

- Lockett, A., and Wright, M. 2001. The Syndication of Venture Capital Investments. *OMEGA: The International Journal of Management Science* 29: 375-390.
- Mahoney J. 2001. A resource-based theory of sustainable rents. *Journal of Management* 6: 651-660.
- Manigart, S., Lockett, A., Wright, M., Meuleman, M., Landström, H., Bruining, J., Desbrieres, P., and Hommel, U. 2002. Why Do Venture Capital Companies Syndicate? working Paper, Babson Kaufmann Conference, Boulder.
- Manigart, S., P. Joos, and De Vos, D. 1994. The Performance of Publicly Traded European Venture Capital Companies. *The Journal of Small Business Finance* 3(2): 111-125.
- Marsden, P.V. 1982. Brokerage Behavior in restricted Exchange Networks, in Marsden, P.V. and Lin, N. Editors, *Social Structure and network Analysis*: 201-218. Beverly Hills, C.A. Sage.
- Mintzberg, H. 1979. *The Structuring of Organizations*. Prentice Hall: Engelwood Cliffs: NY.
- Nootenboom, B. 1993. Firm Size Effects on Transaction Costs. *Small Business Economics* 5:283-295.
- Penrose ET. 1959. *The Theory of the Growth of the Firm*. Wiley: New York.
- Piskorski, M.J., and Anand, B. 2002. Money can't buy me love? Relational and non-relational resources in the formation of venture capitalist syndicates, Working Paper, Graduate School of Business, Stanford University, Stanford, CA.
- Sapienza, H., Manigart, S., and Vermeir, W. 1996. Venture Capitalist Governance and Value-Added in Four Countries. *Journal of Business Venturing* 11: 439-470.
- Seppä, T. and Jääskeläinen, M. 2002. How the Rich Become Richer in Venture Capital: Firm Performance and Positions in Syndication Networks. Working Paper Babson Kaufmann Entrepreneurship Conference Boulder: 494-505.
- Simon, H.A. 1972. "Theories of bounded rationality" In C.B. Mcguire and R. Radner, eds, *Decision and Organization*. New York: American Elsevier, pp. 161-176.

- Smith, A., 1776. *The Wealth of Nations*, Modern Library, New York, 1937, p.700.
- Smith, K.G., Guthrie, J.P., and Chen, M.-J. 1989. Strategy, size and performance. *Organization Studies* 10:63-81.
- Sorenson, O., and Stuart, T.E. 2001. Syndication Networks and the Spatial Distribution of Venture Capital Investments. *American Journal of Sociology* 106: 1546-1588.
- Tosi, H., and Patt, H. 1967. Administrative ratios and organizational size., *Academy of Management Journal* 10: 161-168.
- Verwaal, E., and Donkers, B. 2002. Firm Size and Export Intensity: Solving an Empirical Puzzle. *Journal of International Business Studies*, 33 (3): 603-613.
- Williamson, O.E. 1983. Credible Commitments: Using Hostages to Support Exchange. *American Economic Review*, 519-40.
- Williamson, O.E. 1996. Economic Organisation: The Case for Candor. *Academy of Management Review*, 21 (1):48-57
- Williamson OE. 1999. Strategy research: governance and competence perspectives. *Strategic Management Journal* **20**: 1087–1108.
- Wright, M., and Lockett, A. 2003. The Structure and Management of Alliances: Syndication in the Venture Capital Industry. *Journal of Management Studies* 40: 2073-2102.
- Zacharakis, A., 2002. Business Risk, Investment Risk, and Syndication of Venture Capital Deals. Working Paper Academy of Management Meeting, Denver.

FIGURE I

The relationship between venture capital firm size and syndication network participation

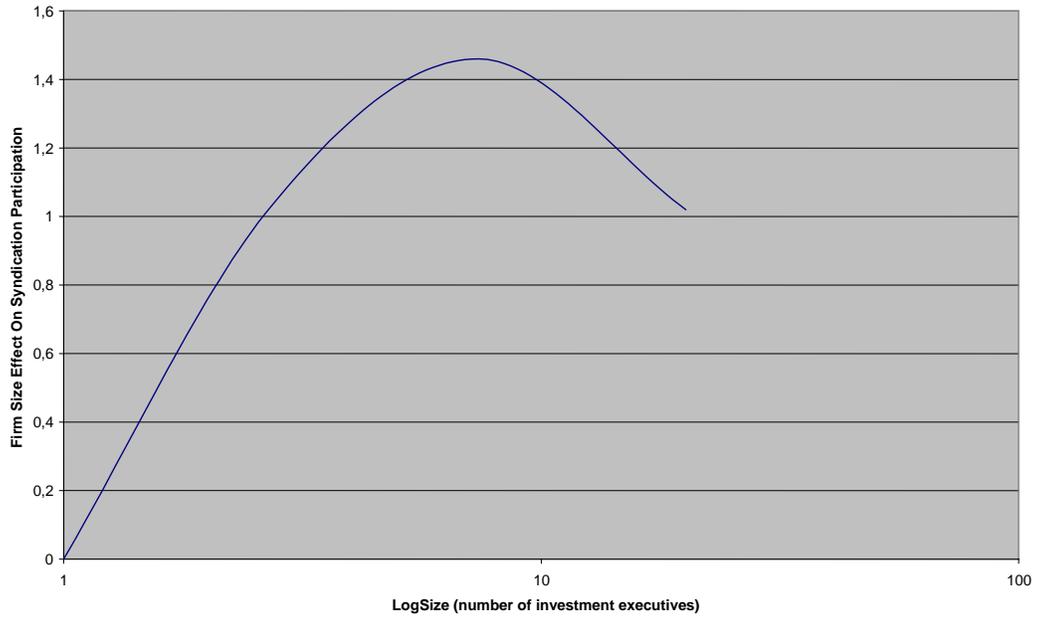


TABLE I

Description of the variables

Name	Median	Mean	S.E.	Description
LogSize	1.61	1.64	.95	The log of the number of venture capital firm executives
Management expertise ($\alpha = 0.81$)	2.40	2.57	1.13	Composite measure with the following items <ul style="list-style-type: none"> - The deal is outside the industries in which you usually invest - The deal is located outside the geographical region(s) in which you usually invest - Difficulty in bringing in industry experts from outside - The deal is outside the investment stage(s) in which you usually invest - The need to access specific skills in order to manage the investment
Financial diversification ($\alpha = 0.72$)	4.00	3.79	.89	Composite measure with the following items <ul style="list-style-type: none"> - The large size of the deal in proportion to the size of funds available - The requirement of additional rounds of financing - The large size of the deal in proportion to the firm's average deal size - The large size of the deal in proportion to the largest deal previously undertaken
Access to deal flow ($\alpha = 0.83$)	3.00	2.73	1.12	Composite measure with the following items <ul style="list-style-type: none"> - The possibility of the future reciprocation of deals - The reciprocation of past deal flow
Stage	1.00	.60	.49	Dummy variable where early stage investment is 1 and later stage investment is 0
Sweden	0.00	.16	.36	Dummy variable where Sweden is 1 and else is 0
Belgium	0.00	.12	.33	Dummy variable where Belgium is 1 and else is 0
France	0.00	.19	.39	Dummy variable where France is 1 and else is 0
Netherlands	0.00	.12	.32	Dummy variable where The Netherlands is 1 and else is 0
UK	0.00	.25	.44	Dummy variable where the United Kingdom is 1 and else is 0
Own sources	0.00	.46	.50	Dummy variable where own sources is 1 and else is 0
Managed funds	0.00	.37	.48	Dummy variable where managed sources is 1 and else is 0

Table II

Pearson Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sweden (1)	1											
Belgium (2)	-,16	1										
UK (3)	-,25	-,22	1									
France (4)	-,20	-,18	-,28	1								
Netherlands (5)	-,16	-,13	-,21	-,17	1							
Managed funds(6)	,21	-,06	-,16	-,04	-,06	1						
Own funds (7)	-,13	-,05	,18	,05	-,01	-,70	1					
Resources (8)	,05	,21	-,12	-,06	-,04	,13	-,09	1				
Diversification (9)	,05	,04	-,00	,04	-,02	,03	,03	,08	1			
Deal flow (10)	-,09	-,01	,01	,10	-,06	-,07	,05	,19	,15	1		
Stage (11)	,21	,09	-,19	-,06	-,11	,07	-,04	,10	,03	-,07	1	
Size (12)	-,18	-,13	,17	-,07	,03	-,23	,10	-,06	-,21	,10	-,19	1

Bold = $p < .05$

TABLE III

Estimation Results Syndication Network Participation

Explanatory variables	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII
(Cut-off parameter 1)	1.42**	2.43***	2.51***	2.23***	2.50***	2.62***	2.49***
(Cut-off parameter 2)	2.55***	3.59***	3.68***	3.40***	3.66***	3.80***	3.70***
(Cut-off parameter 3)	3.45***	4.53***	4.62***	4.35***	4.59***	4.74***	4.65***
(Cut-off parameter 4)	4.61***	5.72***	5.82***	5.55***	5.79***	5.94***	5.85***
Sweden	.08	.11	.12	.04	.11	.06	.17
Belgium	.56	.67	.69	.62	.70	.70	.69
United Kingdom	-1.04***	-.96***	-.96***	-1.04***	-.97***	-1.05***	-1.10***
France	.62	.72*	.71*	.61*	.73*	.72*	.63*
The Netherlands	.13	.39	.35	.41	.38	.30	.29
Managed funds	.61*	.77**	.81**	.91**	.82**	.75**	.92**
Own funds	.51*	.46	.47*	.55*	.49*	.43	.52*
Resources	.13*	.14*	.12*	.14*	.15*	.13*	.12*
Diversification	.28**	.28**	.28**	.27**	.27**	.29**	.28**
Deal flow	.12	.07	.08	.06	.07	.08	.08
Stage	.71***	.82***	.81***	.80***	.81***	1.23***	1.13***
LogSize	.11	1.39***	1.53***	1.21***	1.46***	1.35***	1.31***
LogSize2		-.32***	-.35***	-.26**	-.33***	-.25**	-.24**
LogSize*Resources			.22**				.19**
LogSize*Diversificatio				.40**			.35**
LogSize*Dealflow					.14		.05
LogSize*Stage						-.05**	-.04*
	Pseudo	Pseudo	Pseudo	Pseudo	Pseudo	Pseudo	Pseudo
Model summary	R-square	R-Square	R-Square	R-Square	R-Square	R-Square	R-Square
	.190	.230	.240	.243	.233	.242	.273
* = P<.10							
** = P<.05							
*** = P<.01							
		$\Delta\chi^2=$	$\Delta\chi^2=$	$\Delta\chi^2=$	$\Delta\chi^2=$	$\Delta\chi^2=$	$\Delta\chi^2=$
		11.6	3.2	4.1	1.1	3.6	10.1

Publications in the Report Series Research* in Management

ERIM Research Program: "Strategy and Entrepreneurship"

2005

Reciprocity of Knowledge Flows in Internal Network Forms of Organizing

Raymond van Wijk, Frans A.J. van den Bosch, Henk W. Volberda and Sander M. Heinhuis

ERS-2005-024-STR

<http://hdl.handle.net/1765/6552>

Managing Potential and Realized Absorptive Capacity: How do Organizational Antecedents matter?

Justin J.P. Jansen, Frans A.J. van den Bosch, Henk W. Volberda

ERS-2005-025-STR

<http://hdl.handle.net/1765/6550>

*How Knowledge Accumulation Changed the Competitive Advantage of Strategy Consulting Firms**

Frans A.J. van den Bosch, Marc G. Baaij and Henk W. Volberda

ERS-2005-026-STR

<http://hdl.handle.net/1765/6553>

Successful management buyouts: Are they really more entrepreneurial?

Hans Bruining and Ernst Verwaal

ERS-2005-076-STR

Firm Size Effects on Venture Capital Syndication: The Role of Resources and Transaction Costs

Hans Bruining, Ernst Verwaal, Andy Lockett, Mike Wright and Sophie Manigart

ERS-2005-077-STR

* A complete overview of the ERIM Report Series Research in Management:

<https://ep.eur.nl/handle/1765/1>

ERIM Research Programs:

LIS Business Processes, Logistics and Information Systems

ORG Organizing for Performance

MKT Marketing

F&A Finance and Accounting

STR Strategy and Entrepreneurship