

While getting the industry-leading corporations on board was critical for Red Hat, the contribution of the other types of equity investors was also important. For Intel, being involved in the emergence of Linux as a challenger to, or at least a credible substitute for, Windows had the desired outcome of a decreasing dependence on Microsoft. Being tied exclusively to the development of Windows in the PC market, the progress of which was dictated by Microsoft, had reduced the speed with which the world's largest microprocessor company had been able to develop its own chip technology. Similarly, for leading computer manufacturers, the emergence of Linux reduced the adverse effects stemming from the virtual monopoly of Microsoft in PC operating systems.

The case of Red Hat was also win-win deal between independent and corporate venture capitalists. While the corporations were essential in conferring the credibility of the market place, the independent venture capitalist investors had a superior understanding of the means by which young and rapidly growing technology ventures can best be advised and supported up to and through a successful IPO. The different sets of investors were complementary. The timing of their introduction reflected the different development stages and needs of Red Hat.

As evidence of its own belief in the strategic importance and benefits of CVC for both investors and investees, Red Hat announced on May 9, 2000 the formation of Red Hat Ventures, a new CVC division of Red Hat devoted to supporting Open Source and Internet infrastructure startups through a combination of direct venture funding and strategic business relationships with Red Hat. According to their press release, Red Hat Ventures' objective is to leverage Red Hat's leadership in the Open Source and Linux markets to accelerate the breadth of tools, services, and technologies available to customers; and deliver on the promise of making Linux and other Open Source technologies the platform of choice for deploying and extending Internet infrastructure.

Commenting on the first investments of Red Hat ventures, Matthew Szulik, President and CEO of Red Hat said: "It was important to us that Red Hat Ventures be much more than a source of financing for these companies. As the leading provider of Linux-based Internet infrastructure solutions, we see huge opportunities in creating true partnerships with these companies: we accelerate their ability to reach the global Linux market and they enhance our ability to offer the broadest range of Internet solutions to enterprise customers."

"Red Hat Ventures is a natural extension of the overall Red Hat business plan," said Harold Covert, Chief Financial Officer. "For our customers, Red Hat Ventures scales our ability to bring together the elements of the full Open Source ecosystem for Internet infrastructure. For Red Hat, these investments will enhance revenue streams, expand our customer base, and increase the variety of products and services offered through redhat.com." (Red Hat press release on May 9, 2000).

Table A1 Summary of the investments in Red Hat, Inc.

Description of the Investment Round	Comments
A round	
Date: August, 1997	
Investment: \$2 million	
Investors: Frank Batten Jr.	
Rationale: Getting the business started	
Description: Seed money	
B round	
Date: 28.09.1998	Robert Young (1999:41): "The significance of closing this round with Intel and Netscape was <i>that it made Linux-based operating systems safe for the major application vendors</i> , including Oracle, Corel, and Computer Associates. They would now be willing to sell their applications to their customers running on Red Hat Linux."
Investment: \$8 million	
Investors: Intel, Netscape, Benchmark Capital, Greylock Management	
Rationale: Gaining credibility and connections	
Description: Independent VCs would bring in experience and contacts, Benchmark Capital based in Silicon Valley and Greylock Management on the East coast. Corporations would bring in technical credibility.	Wall Street Journal (29.09.1998, cited in the book), announcement of the investment by Intel, Netscape, Benchmark Capital, and Greylock Management: "a potentially significant endorsement for an upstart challenger to Microsoft Corp's dominance in operating system software."
C round	
Date: 30.03.1999	Robert Young (1999:157) "As it turned out, our business model benefited most from the March investment round, and got us in good shape for an IPO at a later date. We worked closely with Intel, Compaq, Dell, IBM, Novell, Oracle, and SAP to determine exactly what it was that they, and their customers were looking for."
Investment: \$7 million	
Investors: IBM, Compaq, Dell, Oracle, SAP, and Novell	
Rationale: Building the business system	
Description: Red Hat built a list of the most critical industry players to create a close connection with. Intel and Netscape were already in. IBM, Compaq, Dell, Oracle, SAP, and Novell were invited. Invitation of multiple corporations and threats of leaving one out helped in managing difficult demands of individual corporations.	Robert Young (1999:44) "If the only way to be considered a reliable supplier of server operating system was to be a billion-dollar company, we would always do the next best thing: partner with the industry's leading suppliers that might benefit from having alternative operating system suppliers". Robert Young (1999:158) " <i>The endorsements from Dell, Compaq, and IBM cemented the perception that Red Hat Linux was a technology on which reliable, multibillion-dollar companies were going to build products.</i> "
IPO	
Date: 11.08.1999	
Offer size: \$84 million	
Market capitalization at IPO: \$815.8 million	
First day price development: +271%	

Sources: Quotes from Robert Young, the founder, former CEO and President, and currently the Chairman of Red Hat, are taken from a book written by him: *Under the radar: how Red Hat changed the software business--and took Microsoft by surprise*. Other sources include a case on Red Hat (MacCormack A & Herrman K. 1999. *Red Hat and the Linux Revolution*. Case Study, Harvard Business School) and the prospectus and press releases of Red Hat.

APPENDIX 1 HOW RED HAT USED CORPORATE VENTURE CAPITAL INVESTMENTS FROM MULTIPLE INDUSTRY-LEADING CORPORATIONS TO BUILD CREDIBILITY FOR ITS BUSINESS MODEL

Red Hat, the leading supplier of the Linux operating systems, made a highly successful initial public offering in August 1999. Linux, which was initially developed by Linus Torvalds, represents the most seriously alternative and threat to Microsoft Windows' position as the dominant computer operating system. The success of Red Hat has been largely explained by its revolutionary use of 'open source' software development in its business model. Open source development means that the source code of the software is freely available and anyone can suggest, and put forward for consideration by their peers, improvements in the code. In the case of Linux, the open source 'community' i.e. a world-wide body of freelance programmers, enthusiasts and professional who distrust the near monopoly position of Microsoft in the PC market, maintains the level of innovation and, in consequence, the technical lead of Linux.

Red Hat enjoys a central position in this community as a major value-added seller of the Linux operating system. It supports the development community financially and directly benefits from their inputs into Linux. The basic business model of Red Hat is to sell Linux-based 'shrink-wrapped' software packages with a promise of professional level support for customers. What makes this model different from the typical software business model is that the source code for the software is freely available on the Internet at no charge. Red Hat does not have any copyright. Thus, the key foundation of the Red Hat business model is that its professional services makes the Linux operating system safe, accountable and easy to use for corporate clients. This is achieved by ensuring that comprehensive support, comparable to that available for Windows systems, is provided for the buyers of its Red Hat software products.

In order to become established as a provider of advanced software products to corporate clients, Red Hat had to signal to its customers that its credibility and reputation were established and recognized by its industry peers. Through the strategic use of corporate venture capital finance, Red Hat has purposely attracted several industry-leading corporations as investors. By Red Hat's public association with, among others, Intel, IBM, Dell and Netscape – in addition to some of the most well known independent venture capital firms in the US – it has increased both the credibility of the Linux operating system and itself as the foremost provider of the software. The strategy by which Red Hat has used corporate venture capital to support its business model is illustrated in Table A1.

Table 5 Impact of corporate venture capital on IPO valuation

Variables	Logarithm of market capitalization at the close of the IPO		
	Predicted sign	Model 1 (Base model)	Model 2 (H1 & H2)
Single Global Fortune 500 Infocom corporation as investor dummy	+		.204 + (.147)
Multiple Global Fortune 500 Infocom corporations as investors dummy	+		.525 ** (.209)
<i>Control variables</i>			
Sales for the last 12 months before the IPO (millions, logarithm)	+	.158 *** (.033)	.163 *** (.033)
Age of the company at IPO (logarithm)	+/-	-.631 *** (.087)	-.613 *** (.087)
Company operates in a communications sector	+/-	.286 * (.128)	.274 * (.127)
Company operates in a computer hardware sector	+/-	-.299 (.329)	-.303 (.326)
Company operates in a computer software sector	+/-	-.201 (.124)	-.241 + (.124)
Company operates in a semiconductors sector	+/-	-.175 (.235)	-.175 (.232)
Nasdaq index at IPO	+	.001 *** (.000)	.001 *** (.000)
Percentage of shares offered of the total outstanding shares after IPO	-	-.026 *** (.003)	-.025 *** (.003)
Number of venture capitalists as owners before IPO	+	.050 *** (.012)	.041 *** (.013)
<i>Independent Variables</i>			
Constant		19.598 *** (.313)	19.519 *** (.311)
Adjusted R^2		.434	.444
F -statistic		26.278 ***	22.565 ***
p -value		0.000	0.000
Number of observations		325	325

*** significant at the 0.001 level, ** significant at the 0.01 level, * significant at the 0.05 level, + significant at the 0.1 level. (1-tail when direction is predicted, 2-tail otherwise). Unstandardized beta coefficients reported. Standard errors in parentheses.

Table 4 Correlation matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Logarithm of market capitalization at the close of the IPO	-												
2 Sales for the last 12 months before the IPO (millions)	-.01	-											
3 Age of the company at IPO (logarithm)	-.29 **	.35 **	-										
4 Company operates in a communications sector	.17 **	.19 **	.06	-									
5 Company operates in a computer hardware sector	-.11 *	.03	.08	-.08	-								
6 Company operates in a computer software sector	-.22 **	.12 *	.24 **	-.29 **	-.08	-							
7 Company operates in a Internet specific sector	.11 *	-.35 **	-.36 **	-.49 **	-.14 **	-.54 **	-						
8 Company operates in a semiconductors sector	-.08	.20 **	.18 **	-.12 *	-.03	-.13 **	-.22 **	-					
9 Nasdaq index at IPO	.22 **	-.27 **	.00	.02	-.04	-.08	.09 *	-.07	-				
10 Percentage of shares offered of the total outstanding shares after IPO	-.46 **	-.12 *	.03	-.07	.04	.03	.01	.02	.10 *	-			
11 Number of venture capitalists as owners before IPO	.26 **	-.34 **	-.09 *	.04	-.05	-.07	.10 *	-.12 *	.20 **	.02	-		
12 Single Global Fortune 500 Infocom corporation as investor dummy	.10 *	-.04	-.02	-.06	.01	.06	.02	-.05	.01	-.05	.25 **	-	
13 Multiple Global Fortune 500 Infocom corporations as investors dummy	.18 **	-.13 *	-.09 *	.04	-.04	.05	-.04	-.06	.00	-.11 *	.17 **	-.09 *	-

** significant at the 0.01 level, * significant at the 0.05 level (2-tail). Nonparametric Pearson correlations.

Table 3 Comparative statistics by different corporate venture capital backing categories

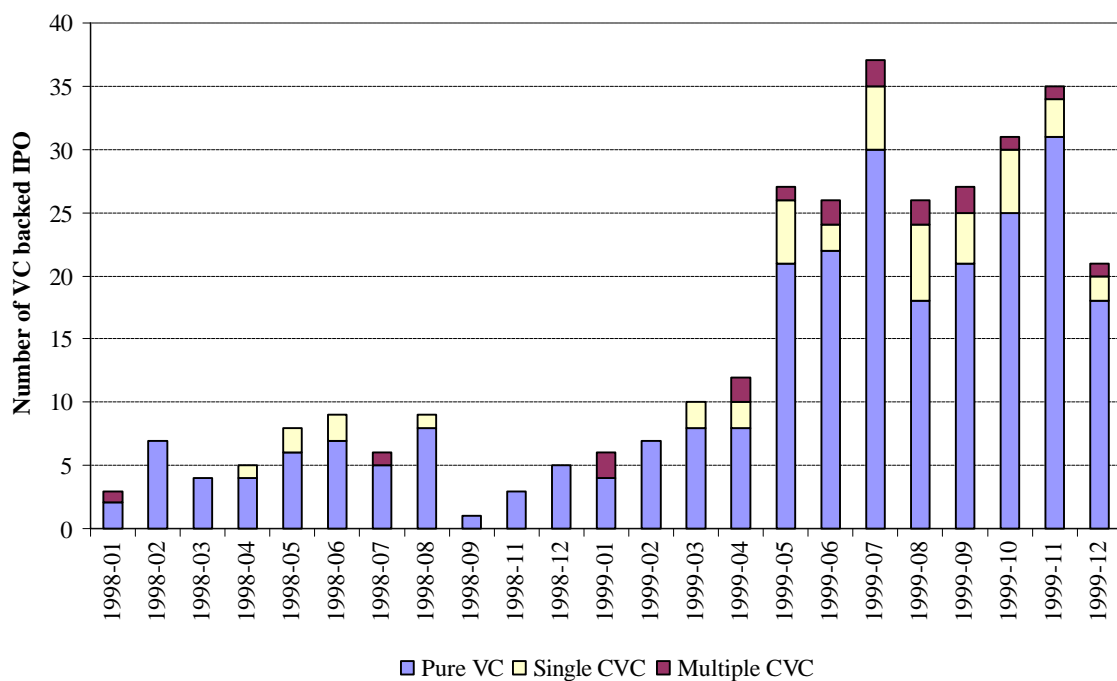
	Medians		
	Pure VC	Single CVC	Multiple CVC
Sales, last 12 months before IPO, millions	\$11.6	\$10.2	\$5.2
EBIT, last 12 months before IPO, millions	\$-6.1	\$-11.0	\$-12.2
Net income last, 12 months before IPO, millions	\$-7.0	\$-12.2	\$-13.7
Total assets, millions	\$84.0	\$85.0	\$106.2
Years from the founding to IPO	4.5	4.2	3.5
Share of offering of the total outstanding shares	26.0%	22.3%	17.9%
Change in the management ownership	51.0%	48.6%	44.0%
Retained management ownership	-19.2%	-16.7%	-15.4%
Number of venture capital investors	5.0	8.0	9.0
Offer price	\$14.0	\$14.5	\$16.5
Proceeds from the IPO, millions	\$60.0	\$60.0	\$82.5
Market capitalization at the close of the IPO, millions	\$467.7	\$598.2	\$1,047.6

Medians are reported separately for each group divided based on the number of Global Fortune 500 Infocom investors.

Table 1 Sample description

Sample companies	Matching companies	Non matching companies
Initial public offerings in 1.1.1998-31.12.1999	966	
Venture capital backed	405	561
Information technology	325	80
Global Fortune 500 Infocom backed	60	265
Multiple Global Fortune 500 Infocom backed	18	42

Source: Venture Economics, 2000 and New Issues database of Thomson Financial Securities Data, 2000

**Figure 3 Sample Companies by Number of Investors and IPO Month****Table 2 Sample Companies by Industry**

	Number of Global Fortune 500 InfoCom investors			All	Percentage of Total
	Pure VC	Single CVC	Multiple CVC		
Communications	57	6	5	68	20.9 %
Computer Hardware	6	1		7	2.2 %
Computer Software and Services	61	13	6	80	24.6 %
Internet Specific	126	21	7	154	47.4 %
Semiconductors/Other Elect.	15	1		16	4.9 %
Total	265	42	18	325	100.0 %

Sample companies are cross-tabulated based on the industry classification of Venture Economics database and number of Global Fortune 500 InfoCom investors.

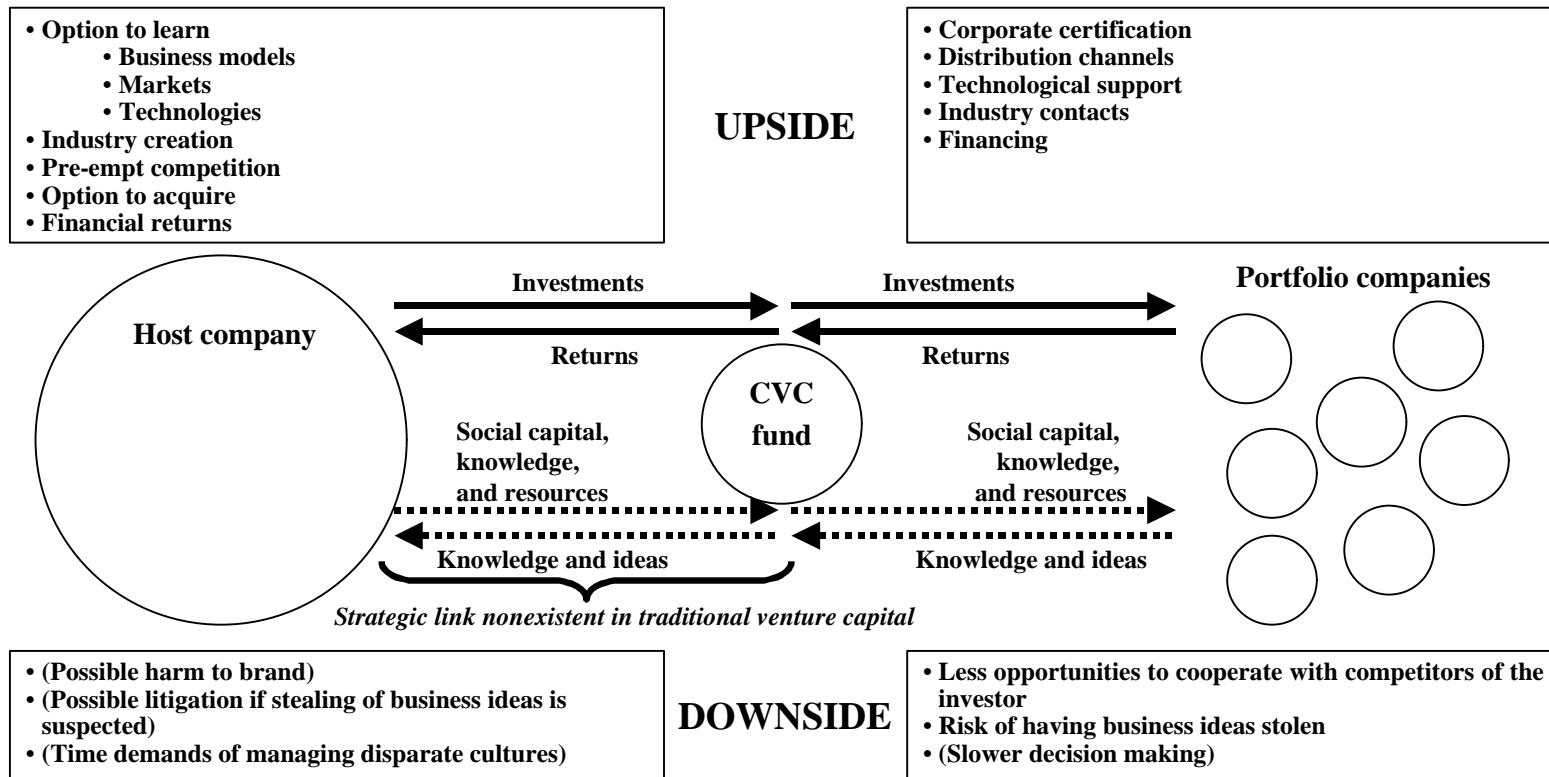


Figure 2 Model of value added and possible problems in corporate venture capital

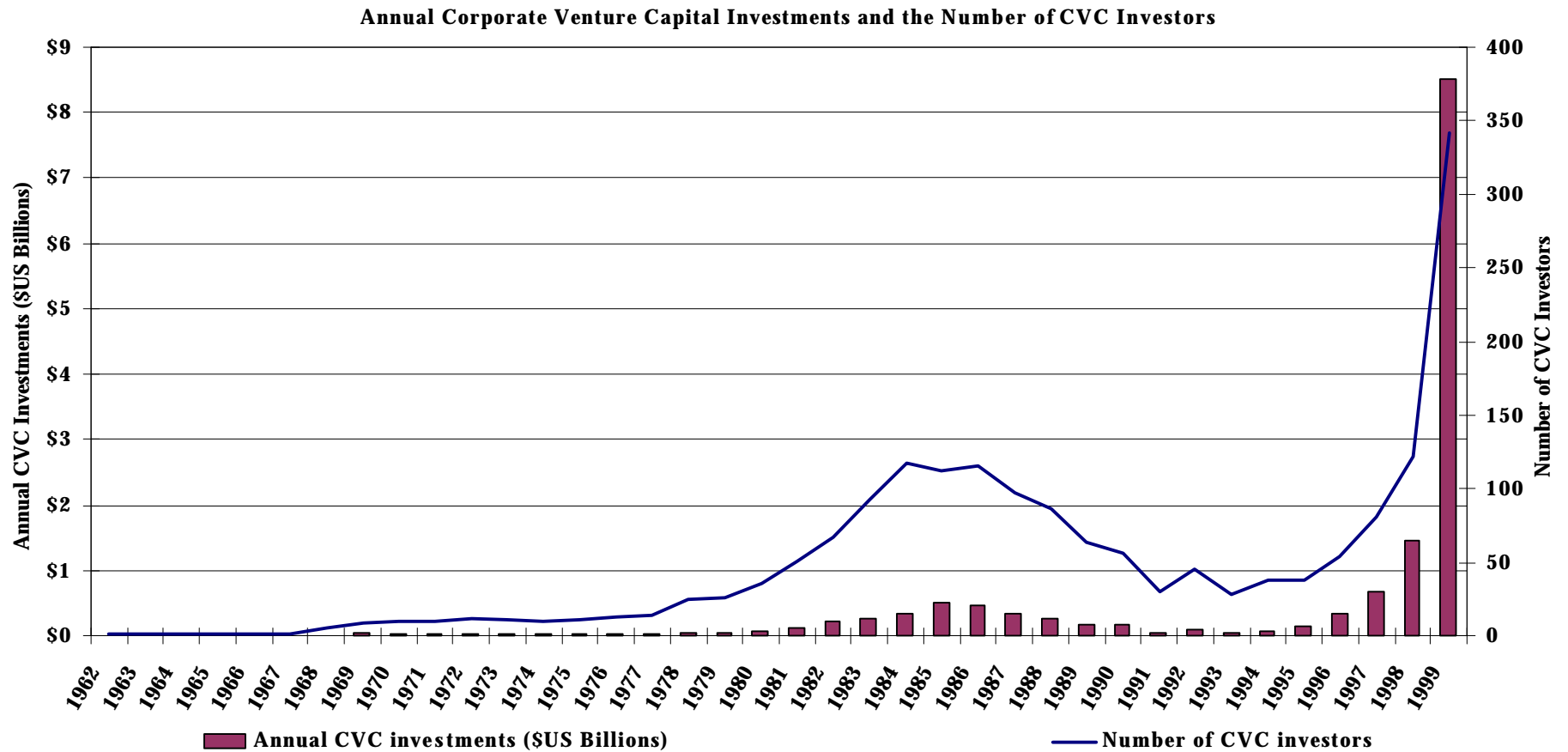


Figure 1 Development of Annual Venture Capital Investments by Subsidiaries and Affiliates of Industrial Corporations and Corporate Partnerships in 1960-1999 (Venture Economics, January 2000)

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IPO. It cannot be assumed that IPOs are the sole or always the most desirable exit channel for attractive investments. Finally, our analysis has been restricted to InfoCom sectors which have recorded high rates of share price growth in the recent past. The generalizations of our findings would benefit from a wider spectrum of sectors and technologies also being similarly appraised. Life science and biotechnology ventures could be one important area for further research activity.

Our study also has several implications for future research. We indicate that the association of new ventures with industry leading corporations via the agency of corporate venture capitalists may lead to higher IPO valuations. We have also established the existence of a hierarchy or pecking order of performance with multiple CVC/VC investors being at the apex. However, the exact reasons why this advantageous ranking should occur are not fully resolved by our paper although a number of hopefully fruitful lines of analysis are suggested. Closer investigation of the exact nature of the value-added processes provided by both corporate and traditional venture capitalists is needed in order to understand better the multi-faceted relationships between investors and investees. This present study uses data sets of IPO performance figures. It may well add greater depth to our findings if we could also seek testable explanations for our results from the various players within the industry (i.e. the investee firms, venture capitalists and CVC personnel). The results of our quantitative analyses need to be viewed against practitioners' more qualitative and pragmatic understandings as to the role and importance of the various components of the value-added, relational process including network formation, certification, and the benefits of sharing knowledge and other complementary resources.

presence of CVCs also has additional, significant deal generation and information sharing benefits (Bygrave 1987 & 1988). Thus, this study suggests a win-win strategy is possible. The investing corporates and the portfolio company each gain strategic and financial benefits from their association within the wider network. The participating venture capital companies also benefit from the involvement of additional venture capital firms and the CVC(s). The finding that the collective participation of several industry-leading corporations in a financing leads to superior results further suggests that co-investments by alliance partners might be an efficient way to shape industry development by supporting the growth of high potential companies. The powerful advantages of co-operative and synergistic action between different investor types in order to rapidly establish an innovative firm and/or a new technological advance could be used as a vehicle for corporations seeking to influence the evolution of a technology. Such a strategic and pre-emptive role for CVC within the innovative process has not previously been noted in the literature.

Implications for Independent Venture Capitalists

For independent venture capitalists, our study concludes that corporate investors are attractive syndication partners. In identifying, selecting, financing and subsequently supporting start-ups and young firms until a successful market realization, no one type of equity provider has a monopoly on the diverse skill sets needed. Each party benefits from the involvement of the others. The existence of a pecking order of structures impacting on the investee firms' performance supports this assertion. Our findings suggest that corporate venture capitalists as network partners can bring a range of benefits including incremental certification and complementary value-added. The potential agency problem of conflicting interests in corporate venture capital investments may be attenuated by introducing more than one industry-leading corporation into the syndicate. Contrary to the belief of some venture capitalists, this study indicates that companies which also have corporate venture capitalists as investors are actually more successful in making initial public offerings when measured in the time from founding to IPO, market capitalization at IPO or price-to-sales multiple at IPO. However, the venture capital firms may have to be mindful that CVC finance is a highly substitutable product for their own financial and related services. There is a possible danger that venture capital firms could get crowded out of attractive deals by their erstwhile corporate partners unless their unique firm resources are emphasized. However, CVCs appear to have less interest and experience in a direct involvement in the governance of their portfolio firms than other types of investor. There may be an important and complementary 'hands on' role for traditional equity providers as the managers of the syndicate/investee relationship.

Limitations of the Present Study and Implications for Further Research

As already noted, our data sets contain a survivor bias as they detail some of the most successful investments in a CVC portfolio. Typically, a trade sale is the more common mode of exit from private equity portfolios with only a small minority going to an IPO. This may also be the case for CVC investors. Further, for portfolio company purchasers with highly related resources to the target investee firm, the existence of synergies post acquisition may be such as to increase the purchase price above that available from an

successful) cohort of portfolio companies. It may be that the greater number of investors does not add to the firm's success in any material way. Rather, the existence of several corporate investors signals to the market the existing attraction of the investment opportunity. Multiple groupings of CVC firms, possibly given their superior sources of information and time to undertake evaluations, don't add value but merely recognize it in others. They are just better at picking attractive firms. There may also be some economies of scale and scope in investee selection with multiple investors sharing knowledge in order to avoid adverse selection problems and thus enabling them to choose only the highest quality potential firms.

An additional but not necessarily conflicting explanation of our results is that the CVCs are not passive agents selecting attractive firms. Their very involvement alters the market's perception of the value of the firms in which they have invested. (A number of Fortune 500 CVCs in discussions with the authors strongly argued the reality of this effect.) There is some evidence of a certification or signaling effect that works in the favor of the attractive firm and its investors. In short, a potentially successful firm may signal the likelihood of its own success thereby attracting more and better investors and increasing the chances of its success. This latter, 'self fulfilling prophesy' explanation reverses the direction of causation of the agency argument. In this latter argument, the corporate investors do not actually make a tangible operational contribution to the subsequent success of the chosen firm. None the less, both arguments and their causalities could exist in tandem.

What is less in contention is that multiple and heterogeneous partners with a diversity of complementary and related assets, working in a reciprocal network in order to exploit multi-firm resources do contribute to the IPO performance of investee companies located within such structures. In short, from the viewpoint of the economics interests of the investee firm, a multiplicity and diversity of investors is desirable.

Implications for Industry-Leading Corporations

For industry-leading corporations, the present study suggests that syndication and co-operative strategies in CVC can lead to superior results. In order to maximize relational benefits, the CVC should ensure a multiplicity of investors, including other CVCs and traditional venture capital firms, which are prepared to share unique and complementary resources including both tangible and intangible assets. CVCs are likely to be the main contributors of intellectual assets and operating experience. However, traditional venture capital firms can bring to the network/syndicate greater experience and competencies in, for example, deal structuring, contract negotiation and other monitoring and governance issues. It is perhaps the venture capitalist's clarity and singularity of purpose - i.e. the maximizing of capital gain within a given time frame - that provides most value in a syndication of parties with invariably multiple and mixed interests.

As a form of diversification, syndication also has risk reduction advantages for the cooperating investors as the finite economic consequences of an adverse outcome, i.e. firm or investment failure, are shared among a greater number of principals. However, the syndicate also shares a greater array of assessment skills and adverse selection should be a manageable problem. In the context of venture capital investment, the

latter companies were, in turn, found have a superior performance to companies solely financed by a traditional, independent venture capitalists. There appears to be a 'pecking order' in IPO performance with those companies with multiple CVCs at the pinnacle.

We find the difference between single and multiple GF500ICT backed ventures worthy of further analysis. We assume that the greater certification provided by multiple GF500ICT investors, regarding both the value of the novel technology and the credibility of the investee firm developing the technology, might be an important explanation of the observed performance differences. Certification is in part a function of consensus. Generally, the larger the number of CVCs supporting a young, innovative firm, the better the firm's subsequent valuation. The same logic also applies for the number of traditional venture capital firms associated with an investment. The effect of multiple VC firms is shown to have a highly significant influence ($p < 0.001$) on the valuation at the IPO. These findings have important implications for new technology-based firms, corporate venture capitalists, and independent venture capital firms alike.

Our findings also add further empirical validity to the relational view perspective of the resource-based view of the firm (Dyer & Singh 1998, Yli-Renko *et al.* 2000). In detailing the nature of these investment activities, we have *de facto* been describing the workings of specialist investment networks. Through the sharing of complementary resources, from such intangible assets as industry experience to the concrete assets of warehousing in the distribution channels, the CVC can add multiple sources of value to its investments' operational activities. Similarly, the traditional venture capital partners contribute specific and not easily imitated skills including their experience of the monitoring and governance of start-ups and young firms. Thus, the growth of a young company is no longer bound by its limited internal resources. Its participation in the investment syndicate ensures its access to a wide array of multi-firm resources stemming from the relationship.

Implications for New, Technology-Based Firms

From the pragmatic perspective of the new technology-based firms, the study suggests that CVCs are attractive investment partners. This derives more from their strategic assets than the finance they provide. Importantly, CVCs are attractive as a complement to, not a substitute for, the skills of the traditional venture capital investors. However, the finding that multiple corporate investors are associated with more successful portfolio companies is open to several interpretations. It is possible that multiple investors resolve or ameliorate the negative (and value destroying) effects of agency problems that can occur between a single investor/firm dyad. Multiple investors are obliged to act within a wider consensus that meets the minimum acceptable interests of all the inter-related parties including the investee firm. It is unlikely that the exercise of undue influence or control by a single CVC investor on behalf of its own private interests would be tolerated by its syndicate partners. All CVCs (and venture capital firms) have to be mindful of ensuring their continued access to the network and to the future deal flow of their investor partners.

However, the superior results for investee firms with multiple investors may just be a consequence of the fact that such firms represent a more attractive (i.e. potentially

EMPIRICAL RESULTS

Table 4 presents the correlation matrix and descriptive statistics of the dependent, independent, and control variables used in testing the impact of CVC on the IPO valuation. As hypothesized, the existence of single and multiple GF500ICTs is positively correlated with the market capitalization. All the control variables are also correlated with price-to-sales multiple in the direction hypothesized except for age, which is negatively correlated with the market capitalization. This finding is consistent with the literature as age is known to be negatively correlated with the growth of small firms (Evans 1987). It is future growth which the market is measuring and bullish technology markets tend to prefer youth to age. The correlations between the independent variables are relatively low reducing possible problems with multicollinearity in the regressions.

<Insert Table 4 about here>

Table 5 reports the results of the OLS regressions explaining the impact of CVC investors on IPO valuation. The model 1 presents the base model with only control variables included. As expected, sales was found to be significantly positively related with the market capitalization. In the regression, age at IPO was found to be negatively related to the market value. Of the four dummy variables describing the industry subsectors, communications companies had a higher market capitalization compared to Internet specific companies. On the other hand, computer software companies had lower market capitalizations than Internet companies. For computer hardware and semiconductor companies there were no statistically significant differences compared to Internet specific companies. Supporting our expectations regarding the impact of market conditions, Nasdaq index was positively related to the market capitalization and highly significant. Also according to our expectations on the influence of demand-supply balance at the IPO, the percentage of shares offered of the total outstanding shares after the IPO was highly negatively related to the market capitalization. Finally, again as expected, the number of venture capitalists at the IPO was highly positively related to the market capitalization at the close of the first trading day after the IPO.

In model 2, the independent variables describing the number of Global Fortune 500 investors are introduced. Supporting hypothesis 1, the existence of Global Fortune 500 investors is positively related with the market capitalization. Supporting hypothesis 2, the existence of multiple Global Fortune 500 investors results in higher increase in the valuation than a single Global Fortune 500.

<Insert Table 5 about here>

DISCUSSION AND CONCLUSIONS

The key result of this research is that it demonstrates that there are statistically robust differences in the IPO performance and valuation of venture capital-backed companies with and without a Global Fortune 500 InfoCom corporation as an additional investor. Investee companies with multiple corporate investors were found to have superior performances when compared to companies with a single corporate investor. These

bullish market conditions by including the Nasdaq share index at the time of the IPO date in the regressions.

Proportion of outstanding shares offered at IPO. Second, we control the influence of the demand-supply balance at the time of the IPOs. If only a small proportion of the available shares is floated at the IPO, aggregate demand might easily exceed the supply thereby leading to increasing prices. Controlling for the percentage of shares offered at the IPO (expressed as a percentage of the total post-IPO shares) addresses the demand-supply issue.

Number of venture capital investors. Third, we try to isolate the certification benefits provided by corporate venture capitalists by controlling for the certification influence of independent venture capitalists. As argued by Barry *et al.* (1990) the presence of multiple venture capitalists indicates that the issuer has persuaded a larger number of sophisticated investors that the firm has favorable prospects, and is willing to open itself up for scrutiny and guidance. Furthermore, the lead venture capitalist has increased incentives to monitor carefully because it has increased the risk to its reputation by soliciting the participation of other venture capitalists. According to Barry *et al.* higher number of venture capitalists should be associated with more intense monitoring, less uncertainty, and therefore better appreciation by the market. We control for this possible effect by including in the regression the number of venture capital investors at IPO as registered in the Venture Economics database records.

Reliability and Validity

The data in the research were primarily obtained from the Venture Economics database, from the New Issues database of Thomson Financial Securities Data, from the CRSP database, and from individual IPO prospectuses. All these data sources have been used in various academic studies published in the highest ranked journals.

However, there are two clear limitations in our data set. First, the data set covers only two years of IPOs in 1998-1999. The reason for selecting a relatively short time period is because of the very recent nature of the CVC phenomenon. While a small number of new CVC activities were started before 1998, the last two years totally dominate aggregate CVC and related IPO activity for more than a decade (see Figure 1). To extend backwards the time period of the research would have been to add substantially to the workload for very little additional information. The other limitation in the data set is the possible survivor bias caused by the fact that the sample consists exclusively of IPOs, which is a highly favorable outcome for a VC or CVC investment. Therefore, by definition, unsuccessful CVC and VC investments are not analyzed in this paper. This is acceptable given that this study is focused on the role of CVCs in creating public companies. An IPO is also the most public and transparent indication of the success of a CVC investment activity. Fortuitously, it is also the exit choice on which most data are available. Finally, in the statistical analyses, we tested for multicollinearity between each of the independent variables in both sets of regressions. Multicollinearity did not present a problem in any of the regressions when accepting tolerances above 0.10 and VIF-values below 10.

In the regressions, we transform the market value using the natural logarithm in order to achieve a normal distribution. After transformation, the market value seems relatively well normally distributed. Using logarithmic transformation also reduces the problem caused by heteroscedasticity in the regressions.

Independent Variables

Existence of GF500ICT investors. We try to explain the impact of corporate venture capital investments on the IPO valuation. The existence of one or multiple CVCs is measured using two dummy variables. The first dummy variable indicates whether or not the venture is backed by a single GF500ICT company. The second dummy variable indicates the existence of multiple GF500ICT investors. The use of these two binary, dummy variables allows the effect of each of the three categories of investor to be modeled and appraised.

Control Variables

We test several control variables to ensure that the impacts we hypothesize are caused by corporate venture capital investments and not by other exogenous factors.

Revenues. In order to control the differences in the firm size, we measure the revenues for the fiscal year before the IPO. The revenues were transformed using the logarithmic transformation. Revenues are hypothesized to be positively related to the market value of the ventures.

Age. In order to control the influence of age, we added the time from the date of founding to the date of IPO in the regressions.

Industry subsector. In order to control for potential differences between companies operating in different industries, we control the impact of the five industry subsectors in the study by including four dummy variables. The subsectors in the study are

- Communications
- Computer Hardware
- Computer Software and Services
- Internet Specific
- Semiconductors/Other Elect.

The 154 Internet specific companies represent the majority of the sample of 325 companies and is used in the regressions as the 'base case'. Therefore, a dummy variable is assigned for each of the four other categories. The dummy variable is assigned '1' if the company belongs to the category and '0' otherwise.

Nasdaq index. First, we control for the impact of stock market movements. During the two year period, 1998-1999, Nasdaq grew rapidly as a result of exceptionally bullish technology markets. The frequency of IPOs also increased towards the end of this period (see Figure 3). In the valuation regressions, we control for the impact of the

develop faster and are more highly valued than their counterparts. When compared to InfoCom enterprises supported exclusively by traditional venture capital firms, those ventures financed by one or more GF500ICT investors had:

- lower sales revenues in the 12 months before the IPO
- greater losses in the 12 months before the IPO
- larger total assets
- floated at a younger age
- more venture capital firms as investors
- smaller IPOs in relation to the total outstanding shares
- lower reductions, i.e. dilution, in management's' ownership post IPO
- a lower retained ownership by management post IPO
- a higher offer price
- higher proceeds from the IPO
- a higher market capitalization at the IPO

<Insert Table 3 about here>

Variables

Dependent Variables

Market Value. As the dependent variable measuring the IPO valuation, we measure the market value of the shares outstanding at the close of the offer. As contrast to Stuart et al (1999), we use the market value at the close of the offer instead of the market value calculated based on the offer price. Using the market value at the close of the IPO is more consistent with earlier IPO studies assuming that the true value is the one determined by the public market in the first close of the offer and the offer price is often purposefully underpriced to attract market interest.

The market value at the close of the IPO is calculated by multiplying the closing price of the first trading day and the number of shares outstanding after the IPO. We took the share price information from CRSP which seemed most reliable when comparing to other sources. In cases where the values of CRSP and TFSD databases were different, we sought confirmative information from IPO.com and other sources. We found that both the New Issues data base of Thomson Financial Securities Data and the CRSP data base contained erroneous entries for the number of shares outstanding after the IPO. Therefore, we collected manually prospectuses for the sample companies. We found prospectuses at www.sec.gov for 317 companies of 325 companies in the sample. For the eight missing companies, the correct number of outstanding shares was determined by combining several sources of information. The share price for the first trading day was obtained primarily from the CRSP data. However, to ensure accuracy we compared the CRSP data with TFSD data and other sources in order to check for the existence of possible errors. CRSP data appeared accurate for the share prices. Having completed this somewhat laborious procedure, we are confident of the accuracy of our dependent variable.

CVC activities recorded by Venture Economics. There is an incessant, strategic imperative for continued innovation in these dynamic, highly competitive, knowledge-based industries. Given these importunate demands on industry incumbents, it may be surmised that InfoCom firms are likely to be heavily engaged in CVC type activities for the multiple reasons of innovation, IPR acquisition, competitive intelligence and the encouragement of a highly flexible and adaptive corporate culture.

Sample

The research sample consists of 325 venture capital-backed, information and communications technology companies that undertook an initial public offering (IPO) on NASDAQ between January 1998 – December 1999. The data was collected from the Venture Economics database. This commercial database contains information of over 118,000 private equity transactions from 1970 to the present time (Venture Economics 1999). Venture Economics' data have been used in several academic studies on venture capital (e.g. Bygrave 1989 & 1990, Gompers 1995). The information on IPOs was obtained from the New Issues database of Thomson Financial Securities Data. Merging the two databases yielded 405 venture capital financed companies of which 325 were information technology companies according to the Venture Economics classification. Of the 325 companies identified, 60 (18%) had also received finance from a Global Fortune 500 Infocom Corporation. Eighteen of these identified companies, i.e. approximately 1 in 20, had received finance from two or more corporate investors.

<Insert Table 1 about here>

Figure 3 reports the distribution of sample companies according to the month of IPO divided in three classes based on the number of corporate venture capital investors. No pattern is evident other than the fact that CVC in all its forms is a minority activity and that total CVC activity has fluctuated significantly over the two-year period. Table 2 presents the sample companies categorized by their industries as defined in Venture Economics' database. A little over one third of all CVC activities are related to Internet activities. The growing importance of this single category corroborates the intelligence and adaptation logic for CVCs given the potentially hugely disruptive effect of e-commerce on the core businesses of the parent corporations (Anderson & Tushman 1990) This CVC pattern closely reflects the trends in the traditional US venture capital industry. In 1999, \$31.8 billion was invested by venture capital firms in internet related companies. This figure, which was four times larger than the 1998 value, represented 66% of the total investments by US venture capitalists that year (National Venture Capital Association 2000).

<Insert Figure 3 about here>

<Insert Table 2 about here>

Table 3 compares the median values of the dependent, independent, and control variables between the three groups categorized by the existence of, and number, of CVC investors. Looking at the medians of the variables of these groups lends support to the general hypothesis that ventures additionally financed by GF500ICT corporations

Lower incidence of CVC/investee agency conflict. One of the objectives commonly imposed on CVCs by their corporate parents is to find suitable, future acquisition candidates (Siegel *et al.* 1988, Winters 1988, Sykes 1992, McNally 1997). Sykes noted that his CVC respondents made the observation that the owner-managers of entrepreneurial, portfolio companies were frequently antagonistic to the corporate investor using CVC investment activities as a means of ‘buying an option’ for future acquisition. Better and more experienced entrepreneurs have a clear view as to the potential value of their companies. They are also well aware that the assumption of a controlling interest by one corporate investor may well pre-empt the opportunity for an attractive IPO because the enterprise may subsequently be perceived by the market as *de facto* owned by its major investor. This will likely diminish the interest of other corporations that occupy a similar or related technology or market space in acquiring the firm. In most cases, experienced and well-informed entrepreneurs will not want to lose the option of taking their venture public at some future point (Sykes 1990). Even if the entrepreneur has purposely targeted a known trade buyer, the ability of the firm to elect to go to an IPO sets a constraint on the acquirer pricing too aggressively. Alternative exit options significantly increasing the vendor’s negotiating power in an efficient market. The existence of two or more corporate investors attenuates this agency problem by reducing the perceived dominance of a single CVC over the future wealth creating capability of the young investee firm. The behavior of any single investor has to be sanctioned by all other parties to the investment. Egregiously selfish actions in a relatively small and highly networked CVC/VC community are likely to be widely communicated. They risk the CVC subsequently being excluded from any future reciprocal deal flow. Aggressive private actions, which could create excessive agency costs, are likely to have to be moderated in the light of collectively imposed and accepted, investor responsibilities (Olson 1968).

METHODS

Empirical Setting

The empirical setting for this study is centered on ‘new technology-based firms’ (Arthur D Little 1977) and Fortune 500 corporations operating in our broadly defined Information and Communications (InfoCom) industries. In this paper, we include the companies from the following categories of the Global Fortune 500 list for Year 1999 in our sample of GF500ICT corporations:

- Computer Services and Software
- Computers, Office Equipment
- Electronics, Electrical Equipment
- Entertainment
- Publishing, Printing
- Telecommunications

InfoCom industries are a particularly attractive medium for a study of CVC because of their very high predisposition to engage in venturing activities over recent years. In our list of 66 corporations in selected industries in the Global Fortune 1999 list, 54 had

valuations than similar firms co-financed by only a single, industry-leading corporate investor.

We believe there are at least three reasons why multiple GF500ICT backed ventures would receive higher valuations than single GF500ICT backed ventures: (1) incremental certification; (2) enhanced opportunity to establish a new dominant design; and (3) lower incidence of CVC/investee agency conflict. These arguments are discussed below in more detail.

Incremental certification. We assume that certification by prominent partners is an incremental and cumulative function. This assumption is confirmed by Stuart *et al.* (1999). Thus, having two prominent partners is better than having only one. It is likely that the incremental beneficial effects will describe a curvi-linear function. Marginal benefits are likely to diminish rapidly after, say, the third GF500ICT corporate partner has joined. (However, the limited number and range of multiple CVCs in the sample did not allow us to test this relation empirically.)

Enhanced opportunity to create a new dominant design. In InfoCom industries, value is not only dependent of the technical superiority of a product or solution. Critically, the resultant value of a new innovative product or process depends on its rapid and wide scale adoption as the industry standard or dominant design. Analogous to Metcalfe's Law of network effects, the more universal the adoption of a new innovation, the greater its value to each of its users. Technology has long been known as a major influence on industry structure (Klein 1977). The advent of a dominant design is likely to reduce the number of players in a particular product/technology space. As Suárez and Utterback (1995) show, new entrants that enter the industry *after* the development of a dominant design are less likely to survive than firms that co-existed before the advent of the new design. Most new innovations will not become the dominant design but merely one of a number of alternative and subordinate solutions. The establishment of many industry-wide solutions has been as a result of a negotiated alliance between leading, and competing, corporations. Contemporary examples of this kind of alliances in wireless telecommunications include GSM, WAP, and Bluetooth. Over time, similar processes have determined, for example, the design of steam engines, bicycles, Portland cement plants, industrial glass production and the near universal adoption of the QUERTY keyboard in Western economies (David 1985, Basalla 1988, Anderson and & Tushman 1990). Critically, the advent of a dominant design also significantly reduces the uncertainty consequent on multiple technology choices for the purchasers or users of the technology and thereby increases their utility. The co-operative commitment of several CVCs to one portfolio company, and thus to a single technology solution, aligns closely the interests of the investors to that of the portfolio company and its technology. The more industry leading companies that are committed to a common solution, the less likely the provision of serious support for alternative and competing technological offerings. To deviate from the new technology orthodoxy is to risk failure as non-standard competencies become irrelevant. Such concerted actions by powerful corporates, via their CVCs, or through direct investment, materially improves the competitive environment for the new and innovating investee firm developing the standard. In an efficient market, this advantage will be directly reflected in its market valuation.

corporation's overall interests - may therefore result in a greater ability to realize portfolio complementarities and synergies than is normally available to a traditional venture capital firm. For example, corporations could link new ventures to relevant but not publicly available technology expertise in the corporate and assist with building alliances around innovative ideas in order to support rapid and pre-emptive establishment of new dominant designs (See McGrath *et al.* 1992 for earlier literature on influencing the emergence of new dominant designs).

Better investment selection. We assume that corporations might have certain advantage over independent venture capitalists in the execution of both market and technology-related due diligence as suggested by Gompers and Lerner (1998). Traditional venture capitalists are hugely constrained in the number of new investments they can properly investigate given their scarce personnel resources. Gifford (1997) has shown that it is more rational for contemporary venture capitalists to optimize the value of their scarce time across the totality of funds under their management rather than to optimize specific venture funds or limited partners' investments. This issue of excessive time demands on venture capitalists investing in young firms has also been raised by *The Economist* (2000). Having access to marketing and technology experts from the corporate parent's operating divisions or R&D laboratories removes a major time or knowledge constraint facing traditional venture capitalists. This greater time for reflection and analysis available to the CVC could lead to better investment decisions. This might be, for example, by the early recognition of novel but as yet immature ideas. It might also be by an enhanced ability of the CVC to screen out potential 'lemons' (unsuccessful investment) early in the investment approval process by greater and more informed due diligence (Tyebjee & Bruno 1984, McMillan *et al.* 1985).

As Schumpeter (1961) has described, over time existing technologies and operating practices are replaced by newer and more efficient technologies. This occurs by processes that are often highly disruptive if not fatal to incumbent firms. Across the spectrum of technologies, at any one time there are likely to be 'dominant designs' either emerging; remaining as yet established and uncontested; or being challenged by new designs (Anderson & Tushman 1990, Suárez & Utterback 1995). The ability to be able to recognize discontinuities and to react quickly at times of transition between dominant technologies can confer enormous, future economic advantage. Leading corporations may well have a better view of, and influence on, the processes by which a new dominant design emerges within their core markets and technologies. However, this greater foresight of established players is a highly contentious assertion. As Christensen and Rosenbloom (1995) show, existing market leaders may well be aware of contending dominant technologies early in their development cycle but may not be able to exploit this knowledge effectively or quickly to their own direct corporate benefit.

Differences between Single CVC and Multiple CVC Backed Companies

We hypothesize that ventures with multiple GF500ICT investors receive higher IPO valuations when compared to ventures having only a single GF500ICT investor.

Hypothesis 2: New, technology-based firms receiving venture capital and co-financed by multiple corporate venture capital organizations receive higher IPO

their direct advantage the fact that an industry-leading corporation has chosen specifically to invest in them. That such a relationship has been offered by a corporation, through the agency of its CVC organization, is indicative of the investee firm's potential. This potential is a consequence of the young firm's technology/intellectual property rights rather than its production, sales, or marketing capabilities - each of which the corporate is likely to already command internally. The commercial advantages of this exploitation of the more powerful partner's status and social capital has been shown in several studies (Walker *et al.* 1997, Zaheer *et al.* 1998, Stuart *et al.* 1999).

Complementary value-added. Building on the existing research literature on CVC, our understanding of the value-added provided by traditional venture capitalists (Sapienza 1992), and the 'relational view' extension of the resource-based theory of the firm (Dyer & Singh 1998), we assume that industry-leading corporations are able to provide their portfolio companies with several kinds of complementary value-adding resources. Globally leading corporations normally have well developed and superior distribution channels. Preferential access to such channels is an asset of great value to a young, resource constrained, small technology based company. As already noted, the securing of appropriate channel access is particularly important at the early stages of a young firm's internationalization (Burgel *et al.* 2000). Obtaining a presence in key overseas markets can be prohibitively expensive for a small, under-capitalized firm especially if there is a high level of client adaptation and support servicing required in the initial sales process. Thus, the association with a larger firm, and preferential access to its established infrastructure and operating systems (e.g. sales support and distribution logistics), pushes the new incumbent rapidly along the experience curve while protecting it at least temporarily from the full forces of market competition.

It is also reasonable to assume that globally successful InfoCom companies have superior technical expertise related to the specialist technical area of the young firm if not to the specific technology application. Large InfoCom companies often create a very detailed, strategic 'road maps' as to how they see individual technologies and their market potential developing over time. This intelligence can be of major value to the young firm starting or expanding its sales activities. Thus, access to complementary, technological information from the corporation may generate major savings in cost and time. It may also represent a material reduction in both market and technology uncertainties given the superior intelligence resources of the corporate.

Finally, given the strategic logic of the CVC to invest in related and contiguous technologies, it is likely that the portfolio of investee firms financed by the CVC, each and collectively, represents a deep resource of complementary technologies, processes, and market experiences. This 'keiretsu' type network model presents advantages to both portfolio companies and to the CVC investor(s) alike. The cultivation of portfolio firm synergies and linkages has not usually been a pattern traditionally followed by professional venture capital firms. Indeed, the primary operational logic of venture capital firms may be to seek diversification benefits through investment in unrelated enterprises in order to manage diversifiable or unsystematic risk (Norton & Tenenbaum 1993). The ability of CVCs to accommodate a relatively greater level of unsystematic risk - given the strategic interests and greater industry knowledge of the parent and the relative small economic size of the CVC activity within the sum of the parent

corporate. The failure of new product ideas is part of the pell-mell of commercial life and carries no exceptional stigma. Further, regardless of legal liability, the reality of commercial life is that few Davids attempt to sue corporate Goliaths – and even fewer succeed. What is likely to be of far more material importance is the potentially disruptive and time consuming effects on the corporate parent of managing a heterogeneous association of small and large organizations with disparate histories, cultures, objectives and behavior (Lorange *et al.* 1992). These opportunities and threats are graphically summarized in Figure 2.

<Insert Figure 2 about here>

IMPACT OF CORPORATE VENTURE CAPITAL ON IPO VALUATION

CVC provides an important means by which a young firm is able to access and share proprietary corporate resources of high strategic and operational value (for example, extensive R&D activity or market research knowledge) in addition to gaining core financing. Through an inter-organizational relationship with CVC investors, the growth of a young company is no longer bound by its limited internal resources (Eisenhardt & Schoonhoven 1996, Dyer & Singh 1998, Yli-Renko *et al.* 2000). In knowledge-based industries, characterized by high levels of uncertainty, intense competition and steep technology trajectories, such preferential access for small firms is likely to have a significant influence on the probability of economic success of the new enterprise (Stuart *et al.* 1999). The larger and more eminent the corporate partner, the greater the value of the shared resources to the recipient small firms (Stuart 2000). We would therefore expect to see that corporate venture capital backed companies receive higher IPO valuations compared to the valuations of those ventures financed exclusively by independent venture capitalists.

Hypothesis 1: New technology based firms co-financed by corporate venture capital organizations of industry-leading corporations receive higher IPO valuations than comparable firms financed exclusively by independent venture capital firms

There are three reasons why we assume corporate venture capital backed companies could receive higher valuations from informed market makers at the IPO stage: (1) complementary certification; (2) complementary value-added through synergistic benefits; and (3) advantageous selection, i.e. the better investment selection abilities of CVCs in identifying high potential young firms in related industries. These rationales are discussed below in more detail.

Complementary certification. We assume that corporate venture capital investors can, and do, provide their portfolio companies with increased certification (Stuart *et al.* 1999). The benefit to the smaller companies is directly related to their public association with corporate investors enjoying international reputations. Whereas most new enterprises and traditional venture capital firms are familiar to only a very limited number of people, the majority of the portfolio companies' prospective customers and suppliers are likely to recognize and accept the high credibility and status of Global Fortune 500 companies. The founder management of a new enterprise can leverage to

forms of value-added. In a survey by McNally (1997), enhanced credibility in the market place was the most frequently mentioned major advantage of CVC over other forms of equity financing noted by investee firms. However, other more operational benefits from their relationships included: help with short-term problems, access to technical expertise, opportunities to establish further business relationships, and access to corporate management expertise. The successful CVC/investee relationship may include resource transfers across a wide spectrum of strategic and tactical demands.

But entrepreneurs can also envisage several threats in accepting CVC finance. There is a 'pecking order' of preference in accepting external finance, and most small firms strongly resist diluting their equity ownership (Myers *et al.* 1984). Too close an association with one industry-leading corporation could prejudice the independence of the young enterprise and thereby limit other valuable, co-operation possibilities. This potentially value-compromising effect when a CVC is involved as a co-investor or syndicate partner is frequently cited by traditional venture capital firms. Too close an association or inter-dependency is deemed a particular concern if it adversely affects the exit opportunities or value of the investee firm. Similarly, entrepreneurs worry about the threat of corporate investors covertly appropriating the firm's intellectual capital, a concern endemic to all alliance-type relationships involving the sharing of key competencies or intellectual property rights. However, it is made more fraught when one partner is many times larger and better financed than the other. Relative scale does not change the nature of the relationship but rather exacerbates its potential effects.

As noted, from the corporate investor's interests, there are several potential advantages in providing CVC. In addition to the opportunity for generating attractive financial returns, corporate venturing may provide the investors with several new strategic insights. Indeed, the 'project hurdle rate' defining *ex ante* an acceptable level of investment returns may primarily be used as a conditional means of identifying the best prospect companies rather than as the central economic rationale (Hurry *et al.* 1992). Through CVCs' close association with new technology based firms both as corporate investors and part owners, they can gain low risk 'options to learn' about emerging business models in dynamic and novel markets and/or technologies. Thus, involvement in CVC, as a 'commercial intelligence' mechanism, can be the catalyst for the corporation's investment in new and strategically important industries. Such early-stage investments in young companies can also be used to help pre-empt the actions of competitors by seeking first mover advantage in speculative but promising technologies. Similarly, some corporations also view CVC investments as an efficient way to search for and select future acquisition targets (Siegel *et al.* 1988, Winters 1988, Sykes 1992, McNally 1997). Large technology-based corporations often use acquisitions as a mechanism to acquire new, or to enhance existing, competencies (Trautwein 1989, Laamanen 1997)

Given the disparities of economic size, the potential disadvantages of CVC to the large investor firm are, *ceteris paribus*, smaller than their possible negative effects on a young, portfolio company. Extensive leverage of a commonly owned brand and the subsequent failure of a portfolio company could conceivably damage the reputation of the corporate investor. In addition, corporate investors could technically be sued if they were proven to have misused proprietary information owned exclusively by their portfolio companies. However, these threats are in practice of minor importance to the

funding, it raises a number of important strategic and operational questions for both investors and investee firms.

THEORETICAL BACKGROUND

There are two major differences between CVCs and independent venture capital firms. One difference is structural and the other resource related. They each influence the nature of the inter-organizational relationships between and within the CVC/Investee/VC 'triad', and thus have important performance implications. Firstly, the limited partner and the managing partners of the CVC are both from and part of the same corporate parent. This unity does not remove entirely agency costs but does allow a very considerable focus of interest in common objectives particularly when the CVC personnel are career managers from the parent company. The second key difference from traditional venture capital firms resides in the ability of the CVC to provide direct operational assistance/support and high levels of industry-specific knowledge to the investee firm from its own specialist resources. The benefits that each party share from the complementarity of their unique and firm-specific resource endowments links this research to a growing interest in the 'relational view' literature (Dyer & Singh 1998). The dynamic association between the three heterogeneous parties to the investment can be usefully seen as an inter-firm network. This network facilitates the co-operative sharing of both tangible and tacit resources reduces firm constraints and increases the utility of each member of the network.

The fact that the sole investor in the CVC fund is an industrial corporation may influence value-added opportunities and/or create possible conflicts particularly for the portfolio companies. It is not suggested in the relational view that agency costs and other inter-firm conflicts are removed or do not occur. On the credit side, corporate partners can provide technological support and managerial expertise, as well as providing credibility and access to key distribution channels/markets. For example, many high-tech start-ups are increasingly either 'born global' (i.e. selling to several countries as soon as they have a developed product) or internationalize at a very early age (Oviatt & MacDougall 1994, Burgel & Murray 1999). High knowledge intensity and rapid entry into foreign markets have each been shown to be associated with faster international growth (Autio *et al.* 2000). In addition to also confirming the growth benefits of internationalization to new high-tech small firms, Burgel *et al.* (2000) have also shown that the limited market credibility of young high tech firms can materially impede their ability to internationalize rapidly. Established firms are very wary of introducing the offerings and services of unknown young firms into their core technologies, products or processes. These authors term this sales constraint on young firms 'the liability of alienness'. Logistics providers similarly see the distribution of the products of new technology based firms as being frequently economically unattractive given that such commitments often require a high investment in product knowledge for a very uncertain incremental revenue stream. Therefore, it can be hypothesized that global industry-leading companies can materially assist in the rapid internationalization of new technology-based firms by providing them with greater credibility. In effect, the young firm's public association with highly established and respected larger companies is seen to reflect directly and positively on the reputation of the young firm, i.e. a 'halo effect'. In addition to increased credibility, CVCs may often provide several other

considerable, future economic expectations on the company coming to the market. An IPO is thus only a viable, longer-term strategy for finance raising for the potentially most attractive companies. The very bullish stock market in technology stocks, particularly in the US since the second half of 1990s, has re-affirmed the relative attractiveness of IPOs. Gompers & Lerner (1998) found that 39.3% of portfolio companies sharing a 'strategic fit' (a term comparable to Rumelt's 1974 concept of 'relatedness') with their CVC investor achieved an IPO. The corresponding figures were 35.1% for portfolio companies not sharing a strategic fit with their CVCs and only 30.1% for portfolio companies financed only by independent venture capitalists. In addition, the 'pre-money valuation' was found to be significantly higher for companies with CVC backing when compared to independent venture capital financed firms.

It appears from these findings that the discriminating variable is not the finance *per se* but rather the specific industry experience and commercial acumen of the investors. This lends credence to Warne's (1988) definition of venture finance as "capital and consulting". The importance of the source of finance is supported by Stuart *et al.* in 1999. Focusing on the biotechnology industry, they examined the impact of endorsement by different types of alliance partners on the time from firm foundation to the IPO, and on the market valuation of the firm at the IPO. They found that the greater technological prominence of equity investors both reduced the time to an IPO and increased the market capitalization at IPO. They also found that the higher the uncertainty experienced by the investee firm, the more important was the prominence of the alliance partners.

These contemporary findings confirm the results of earlier studies, which have examined the IPO performance of firms both with and without venture capital. For example, Barry *et al.* (1990) examined an exhaustive set of initial public offerings by venture-capital-backed companies between 1978 and 1987. Their findings indicated that venture capital-backed companies were associated with less under-pricing at the time of the IPO. Similar results were found by Megginson & Weiss (1991) and Lerner (1994b). Their explanation for these results was that not only were venture capitalists better at selecting high potential firms but, critically, the higher quality of the investee monitoring demanded by venture capitalists as a pre-condition for allocating finance was recognized and rewarded by capital markets (Barry *et al.* 1990).

In contrast, there remains a dearth of studies which have made comparisons between the IPO performance of portfolio companies financed by independent venture capitalists alone and those financed additionally by CVCs. Given the importance currently being accorded by governments across the developed world to promoting venture capital activity as a means of upgrading the existing innovative infrastructure of an economy (see, for example, Bank of England 1996, OECD 1996, European Commission 1995 & 1998, DTI 1998, Williams 1998, Murray & Marriott 1998, US Senate 1999), the absence of rigorous analyses of alternative modes to traditional venture capital activity is a potentially serious omission. This present study focuses on the impact of CVC involvement on the valuation of portfolio companies at the time of the IPO. It is difficult to determine how much performance variations are the result of different investment preferences or the actual value-added contributions of different types of investors. However, if performance is found to be contingent on different forms of

resource-based theory of the firm by demonstrating that critical resources can be obtained from and through a network. Therefore, combining and delivering complementary resources to the investee firm in a CVC/VC/portfolio company network can provide superior results when measured by the valuation at IPO.

The paper is structured as follows: Section 2 reviews the literature on CVC; Section 3 presents theoretical background; Section 4 discusses the hypotheses; Section 5 describes the sample including the selection and operationalization of the variables; and Section 6 describes the empirical results of the study. Finally, section 7 discusses the conclusions of the research and the possible interpretations of the findings including their theoretical and practical implications. Appendix I provides a short case history and illustrates how corporate venture capital investments from multiple industry-leading corporations worked as a critical success factor for Red Hat, the leading provider of Linux-based operating systems.

EARLIER RESEARCH ON CORPORATE VENTURE CAPITAL

The ambitious concept of CVC with its dynamic relationships between entities of differing size, age, culture, objectives and product/market focus remains highly problematic for corporate managers versed in the traditional, hierarchical construct of command and control. CVC has formalized and added greater focus to the more generic activity of corporate venturing. CVC emulates directly the established deal flow and selection techniques/practices of the traditional, independent venture capital firms in order to embark on a planned rather than speculative program of acquisitions and spin-offs. CVC is a specific mode of operating in order to undertake corporate venturing investment activities. Possibly reflecting the historic dearth of successful CVC programs, only a relatively few academic researchers have focused on this specialist activity. The majority of earlier empirical studies of CVC have either been relatively descriptive surveys, explorations of perceived success factors or, more frequently, case studies on the genesis and development of a particular CVC entity (Rind 1981, Hardyman *et al.* 1983, Siegel *et al.* 1988, Winters 1988, Sykes 1990, Sykes 1992, Block & MacMillan 1993, Hunt & Lerner 1995, McNally 1997). Much of this existing research took place in the 1980's and early 1990's with the few exceptions including Block & MacMillan (1993), Hunt & Lerner 1995, McNally (1997), and Gompers & Lerner (1998). More comprehensive, empirical studies have been particularly absent and Gompers and Lerner's 1998 study remains a notable exception. It is therefore not surprising that no earlier studies have focused on CVC in InfoCom industries. However, given the hugely disruptive intervention of the Internet and e-commerce, InfoCom industries have now moved to the hub of the New Economy. Given the immense rewards to winning companies, inter-firm rivalry is intense and innovation has assumed a critical competitive importance. InfoCom has rapidly grown to become one of the most active domains of CVC.

In an extensive study of 32,000 venture capital financings, Gompers and Lerner demonstrated that CVCs can perform at least as well as traditional venture capital firms when measured by the probability of their portfolio companies making an IPO. An IPO is generally viewed as the most financially rewarding exit channel by early-stage venture capital investors (Bygrave & Timmons 1992). However, a flotation imposes

strategic interests, unlike the traditional, independent venture capital fund, it will not normally invest unless the new enterprise generates additional corporate-related externalities in addition to its economic attractiveness. None the less, CVCs are keen to participate in the exceptionally attractive, recent financial returns of the venture capital industry. For example, 3 year IRR net returns to the limited partners (institutional investors) in US early-stage funds to 1998 averaged 37.7% (Venture Economics 1999). At the same time, corporations are also interested in the means by which portfolio firms can act as agents or catalysts for the introduction of innovative technologies, products, and processes into the established, more mature technologies, products, and markets of the corporate investor.

From the singular perspective of the resource-constrained entrepreneur seeking both external finance and access to the commercial experience and extensive networks of the professional investor, corporate venture capital can appear extremely attractive. This relationship with a CVC offers the young firm the promise of superior access to major markets, advanced technological competencies, network opportunities, and the social capital and reputational effects stemming from a public association with one or more industry-leading corporations. However, these putative benefits are not without their potential costs. Small companies may also, and at the same time, feel nervous that they risk losing their fragile independence and operational autonomy by becoming too closely involved with very large and highly acquisitive corporations.

Given the recent popularity of CVC as a vehicle for strategic intelligence, the dearth of quantitative studies determining the success or failure of various corporate venturing alternatives (as measured by their economic impact on either portfolio or parent companies) is of particular concern. Significantly, much of the work that is available has been undertaken before the recent very large increases in CVC activity (Rind 1981, Hardyman *et al.* 1983, Siegel *et al.* 1988, Winters 1988, Sykes 1990, Sykes 1992). It also pre-dates the wide-scale advent of the Internet and e-commerce.

The purpose of this paper is to explore the impact of CVC interventions on the valuation of investee firms in the InfoCom industries that have had an initial public offering (IPO). Only by such a liquidity event can an objective value be placed on the actions of the investors. The paper seeks to address shortcomings in the extant research literature by analyzing the impact of CVC on the performance of new, technology-based companies. The research employs a large sample of quantitative data from InfoCom companies that have made an IPO in 1998-1999. By this period, the wide scale advent of alternative, Internet-based business models had already had a marked effect on the level of CVC activity. The issue of syndication between CVCs and its possible impact on certification or signaling effects; dominant design issues in technologically volatile markets; and agency costs are also considered.

The paper seeks to make three empirical contributions. 1) First, it illustrates that corporate venture capital can be an attractive source of external financing for new, technology-based companies because of the existence of related strategic benefits. 2) Secondly, it also demonstrates that cooperative strategies with multiple CVCs endorsing a new, technology-based company provide superior results compared to companies financed exclusively by independent VCs or co-financed by a single CVC. 3) Finally, the paper supports the 'relational view' perspective (Dyer & Singh 1998) of the

INTRODUCTION

“Alliances with well known partners may fortify producers’ reputations , in addition to providing access to resources ...”

Stuart, TE, Strat. Mgmt. J., 2000

“The endorsements from Dell, Compaq, and IBM cemented the perception that Red Hat Linux was a technology on which reliable, multibillion-dollar companies were going to build products.”

Robert Young (Founder, President & CEO of Red Hat, Inc.)

The venture capital activities of large, technology-based corporations have increased rapidly during the last few years. Direct venture capital investments made by the subsidiaries and affiliates of industrial corporations have more than doubled during each of the last six consecutive years with annualized growth rates of 130% in 1993-1999 and 489% in 1998-1999 (derived from Venture Economics data, January 2000). A significant number of major information and communications technology corporations (InfoComs) established new corporate venture capital (CVC) funds in 1999.

<Insert Figure 1 about here>

When we refer to the term corporate venture capital, we mean that activity by which an established corporation sets up a new wholly-owned entity with the specific objective of investing corporately owned finance and other resources in a number of high potential young enterprises. The CVC activity acts in the same fashion as an independent venture capital firm and seeks to maximize the capital gain on its investments. The CVC may either invest in new enterprises coming from within or outside the parent company. Investments may be made by the CVC alone or in ‘syndicates’ with other CVCs and/or venture capital firms (Lerner 1994a).

The reasons for this renewed interest in CVC are both economic and strategic. However, the ability to augment the core competencies of the corporation in existing and new markets appears to be the dominant logic (Hamel 1999). The CVC activity acts as an advanced intelligence and information system for the parent organization giving them an early indication of major changes in their competitive environment via their association with new companies in emerging technologies and markets. Corporates also see their association with, and fostering of, highly entrepreneurial and innovative young businesses as having an important rejuvenating effect on the parent company. Hamel describes this process of encouraging a renewed climate of ideas generation and new enterprise formation within the parent organization as “bringing Silicon Valley inside”.

However, corporations typically face a trade-off between strategic and financial objectives when formulating their CVC strategies. Because the CVC has additional

ABSTRACT

Using a sample of 325 venture capital backed, information technology IPOs in 1998-99, we find that enterprises co-financed by multiple Global Fortune 500 InfoCom corporations (GF500ICTs) receive higher valuations than comparable firms supported by venture capitalists alone. Similarly, this former group outperforms firms co-financed by a single GF500ICT corporate. We explain the superior performance of GF500ICT co-financed ventures by complementary certification and value-added as well as better investment selection. The superior performance of enterprises with multiple GF500ICT investors is posited as the result of incremental certification, validation of emerging dominant designs, and reduced incidence of agency problems because of the countervailing effects of several corporate investors. Our findings support resource-based/organizational-capability theories by demonstrating the positive influence of technology based corporations on VC backed enterprises in non-established technologies.

Key words: corporate venture capital, corporate venturing, venture capital, initial public offering, syndication, information and communications technologies

Running headline: Corporate venture capital and the creation of US public companies

**CORPORATE VENTURE CAPITAL AND THE CREATION OF US PUBLIC
COMPANIES: THE IMPACT OF SOURCES OF VENTURE CAPITAL ON THE
PERFORMANCE OF PORTFOLIO COMPANIES**

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